AMENDMENT 1

DEPARTMENT OF DEFENSE
SMALL BUSINESS INNOVATION RESEARCH (SBIR) PROGRAM
SBIR 24.3 Program Broad Agency Announcement (BAA)

AMENDMENT 1: The purpose of Amendment 1 is to extend the deadline for receipt of proposals to October 23, 2024 at 12:00 p.m. ET.

August 21, 2024: DoD BAA issued for pre-release
September 18, 2024: DoD begins accepting proposals
October 23, 2024: Deadline for receipt of proposals no later than **12:00 p.m. ET**

Participating DoD Components:

- Department of Navy (Navy)
- Department of Air Force (Air Force)
- Chemical and Biological Defense (CBD)
- Defense Health Agency (DHA)
- Defense Threat Reduction Agency (DTRA)
- Missile Defense Agency (MDA)

IMPORTANT

This BAA incorporates MANDATORY foreign disclosure requirements and other important programmatic changes as required by the SBIR and STTR Extension Act of 2022 (Pub. L. 117-183). These updates can be found in sections 2.2, 2.5, 3.0, 4.2.e., 4.3, 6.0, 8.2, and 5.3.h. Each proposing small business concern is required to complete the Disclosures of Foreign Affiliations or Relationships to Foreign Countries webform under Volume 7 of the proposal submission. Small business concerns are highly encouraged to review the full BAA to remain apprised of any additional recent programmatic changes.

This BAA also incorporates FAR 52.204-29 and FAR 52.204-30, Federal Acquisition Supply Chain Security Act (FASCSA) Orders. Small business concerns are highly encouraged to review the full text of these clauses and required representations found in section 8.2 of this BAA.

Deadline for Receipt: Complete proposals must be certified and submitted in the Defense SBIR/STTR Innovation Portal (DSIP) no later than **12:00 PM** ET on **October 23, 2024.** Proposals submitted after 12:00 p.m. ET will not be evaluated. The final proposal submission includes successful completion of all firm level forms, all required volumes, and electronic corporate official certification. Please plan to submit proposals as early as possible to avoid unexpected delays due to high volume of traffic during the final hours before the BAA close. DoD is not responsible for missed proposal submission due to system latency.

Classified proposals will not be accepted under the DoD SBIR Program.

This BAA and DSIP are designed to reduce the time and cost required to prepare a formal proposal. DSIP is the official portal for DoD SBIR/STTR proposal submission. Proposers are required to submit proposals via DSIP; proposals submitted by any other means will be disregarded. Proposers submitting through this site for the first time will be asked to register. Proposing small business concerns are required to register for a Login.gov account and link it to their DSIP account. See section 4.16 for more information regarding registration.

SBIR/STTR Updates and Notices: To be notified of SBIR/STTR opportunities and to receive email updates on the DoD SBIR and STTR Programs, you are invited to subscribe to our Listserv by visiting https://www.dodsbirsttr.mil/submissions/login and clicking "DSIP Listserv" located under Quick Links.

Questions: Please refer to the DSIP Customer Support Document for general information regarding the DoD SBIR/STTR process in DSIP. For additional assistance with the DSIP application, please visit the Learning & Support section of the DSIP at https://www.dodsbirsttr.mil/submissions/learning-support/. Email DSIP Support at DoDSBIRSupport@reisystems.com only for further assistance with issues pertaining directly to the DSIP application. Questions submitted to DSIP Support will be addressed in the order received during normal operating hours (Monday through Friday, 9:00 a.m. to 5:00 p.m. ET). **See section 4.15 for further information on where to direct questions regarding instructions and topics in this BAA**.

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1.0 INTRODUCTION

The Small Business Administration (SBA), through its SBIR/STTR Policy Directive, purposely departs from normal Government solicitation formats and requirements, thus authorizing agencies to simplify the SBIR/STTR award process and minimize the regulatory burden on small business. Consistent with the SBA SBIR/STTR Policy Directive, the Department of Defense (DoD) is soliciting proposals as a Broad Agency Announcement (BAA). The DoD SBIR/STTR Programs follow the policies and practices of the most current SBA SBIR/STTR Policy Directive. The guidelines presented in this BAA incorporate and make use of the flexibility of the SBA SBIR/STTR Policy Directive to encourage proposals based on scientific and technical approaches most likely to yield results important to the DoD and the private sector. The SBIR/STTR Policy Directive is available HERE.

Navy, Air Force, CBD, DHA, DTRA, and MDA, hereafter referred to as DoD Components, invite proposing small business concerns to submit proposals under this BAA for the Small Business Innovation Research (SBIR) Program. Proposing Small Business Concerns with the capability to conduct research and development (R&D) in any of the defense-related topic areas described in this BAA and to commercialize the results of that R&D are encouraged to participate.

This BAA is for Phase I proposals only unless a topic is accepting Direct to Phase II proposals. A separate BAA will not be issued requesting Phase II proposals, and unsolicited proposals will not be accepted. All proposing small business concerns that receive a Phase I award originating from this BAA will be eligible to participate in Phase II competitions and potential Phase III awards. DoD Components will notify Phase I awardees of the Phase II proposal submission requirements. Submission of Phase II proposals will be in accordance with instructions provided by individual Components. The details on the due date, content, and submission requirements of the Phase II proposal will be provided by the awarding DoD Component either in the Phase I award or by subsequent notification. If a proposing small business concern submits their Phase II proposal prior to the dates provided by the individual Components, it may be rejected without evaluation.

DoD is not obligated to make any awards under Phase I, Phase II, or Phase III, and all awards are subject to a risk-based due diligence security review and the availability of funds. DoD is not responsible for any monies expended by the proposing small business concern before the issuance of any award. Proposals must conform to the terms of this announcement.

2.0 PROGRAM DESCRIPTION

2.1 Objectives

The objectives of the DoD SBIR Program include stimulating technological innovation, strengthening the role of small business in meeting DoD research and development needs, fostering and encouraging participation by minority and disadvantaged persons in technological innovation, and increasing the commercial application of DoD-supported research or research and development results.

2.2 Due Diligence Program to Assess Security Risks

The SBIR and STTR Extension Act of 2022 (Pub. L. 117-183) requires the DoD, in coordination with the SBA, to establish and implement a due diligence program to assess security risks presented by small business concerns seeking a Federally funded award. The full text of the SBIR and STTR Extension Act of 2022 is available at https://www.congress.gov/117/plaws/publ183/PLAW-117publ183.pdf.

The DoD SBIR/STTR Programs follow the policies and practices of the SBA SBIR/STTR Policy

Directive. The Policy Directive was revised effective May 3, 2023, to incorporate requirements of the SBIR and STTR Extension Act of 2022. This revision is incorporated into this BAA, including the utilization of the Appendix III, Disclosure Questions as Volume 7 (Disclosures of Foreign Affiliations or Relationships to Foreign Countries) of the proposal submission.

In accordance with Section 4 of the SBIR and STTR Extension Act of 2022, the DoD will review all proposals submitted in response to this BAA to assess security risks presented by small business concerns seeking a Federally funded award. The Department will use information provided by the small business concern in response to the Disclosures of Foreign Affiliations or Relationships to Foreign Countries (Volume 7 of the proposal submission) and the proposal to conduct a risk-based due diligence review on the following: cybersecurity practices; patent analysis; employee analysis and foreign ownership including the financial ties and obligations (which shall include surety, equity, and debt obligations) of the small business concern; and employees of the small business concern to a foreign country, foreign person, or foreign entity. The Department will also assess proposals utilizing open-source analysis and analytical tools, for the nondisclosures of the information set forth in 15 U.S.C. 638(g)(13).

DoD has partnered with Project Spectrum to provide an online course on Understanding Foreign Ownership, Control, or Influence (FOCI). This course defines FOCI, explains what it means to be under FOCI, and details FOCI's effect on a company seeking initial or continued eligibility for access to a federally funded award. Small business concerns can register and access this course by following the instructions below:

1. Go to projectspectrum.io
2. Click “Profile/Dashboard” in the top right and then click “Sign Up” from the dropdown menu.
3. Follow the instructions to sign up for an account. Descriptions of the account types are provided below each option.
4. Verify your email by entering the code sent to the email address you provided when signing up.
5. Log in to Project Spectrum by clicking “Profile/Dashboard > Login” in the top right.
6. Hover over “Courses” in the Navigation Bar, and then select “FOCI” from the dropdown listing.
7. Copy the provided password.
8. Click on the “Understanding Foreign Ownership, Control, or Influence (FOCI)” course, which will open a new browser tab.
9. From the new tab, log in to Encite.io using your email address and the copied password.
10. Enroll in the course and click “Enter” to begin.

For assistance with registration or access to the Project Spectrum website, please contact support@projectspectrum.io.

2.3 OUSD(R&E) Critical Technology Areas

Although each DoD Component develops SBIR and STTR topics that are mission-oriented to their programs, topics generally align with the OUSD(R&E) Critical Technology Areas. While many technologies may cross between these categories, these areas represent the broad and different approaches required to advance technologies crucial to the Department. By focusing efforts and investments into these critical technology areas, the Department will accelerate transitioning key capabilities to the Military Services and Combatant Commands.

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OUSD(R&E) Critical Technology Areas:

- FutureG
- Trusted AI and Autonomy
- Biotechnology
- Advanced Computing and Software
- Integrated Sensing and Cyber
- Directed Energy (DE)
- Hypersonics
- Microelectronics
- Integrated Network Systems-of-Systems
- Quantum Science
- Space Technology
- Renewable Energy Generation and Storage
- Advanced Materials
- Human-Machine Interfaces

Below are additional technology areas supporting DoD Component-specific mission-critical areas:

- Advanced Infrastructure & Advanced Manufacturing
- Combat Casualty Care
- Emerging Threat Reduction
- Military Infectious Diseases
- Military Operational Medicine
- Mission Readiness & Disaster Preparedness
- Nuclear
- Sustainment & Logistics

Full descriptions of the above technology areas can be reviewed here: https://media.defense.gov/2023/Mar/21/2003183351/-1/-1/1/OUSDRE_SBIR_STTR_CRITICAL_TECH_AREAS.PDF.

2.4 Three Phase Program

The SBIR Program is a three-phase program. Phase I is to determine, to the extent possible, the scientific, technical, and commercial merit and feasibility of ideas submitted under the SBIR Program. Phase I awards are made in accordance with current SBA Policy Directive guidelines. The period of performance is generally between six to twelve months with twelve months being the maximum period allowable. Proposals should concentrate on research or research and development 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 DoD support in Phase II. Proposing small business concerns are encouraged to consider whether the research or research and development being proposed to DoD Components also has private sector potential, either for the proposed application or as a base for other applications.

Phase II awards will be made to proposing small business concerns based on results of their Phase I effort and/or the scientific merit, technical merit, and commercialization potential of the Phase II proposal. Phase II awards are made in accordance with the current SBA Policy Directive guidelines. The period of performance is generally 24 months. Phase II is the principal research or research and development effort and is expected to produce a well-defined deliverable prototype. A Phase II contractor may receive up to one additional, sequential Phase II award for continued work on the project.

Under Phase III, the small business concern is required to obtain funding from either the private sector, a non-SBIR Government source, or both, to develop the prototype into a viable product or non-R&D service for sale in military or private sector markets. 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.

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2.5 Program on Innovation Open Topics

Section 7 of the SBIR and STTR Extension Act of 2022 requires the DoD to establish innovation open topic activities in order to—

(A) increase the transition of commercial technology to the DoD;
(B) expand the small business nontraditional industrial base;
(C) increase commercialization derived from investments of the Department of Defense; and
(D) expand the ability for qualifying small business concerns to propose technology solutions to meet DoD needs.

Unlike conventional topics, which specify the desired technical objective and output, open topics can use generalized mission requirements or specific technology areas to adapt commercial products or solutions to close capability gaps, improve performance, or provide technological advancements in existing capabilities.

A small business concern may only submit one (1) proposal to each open topic. If more than one proposal from a small business concern is received for a single open topic, only the most recent proposal to be certified and submitted prior to the submission deadline will receive an evaluation. All prior proposals submitted by the small business concern for the same open topic will be marked as nonresponsive and will not receive an evaluation.

Open topics released under this BAA will be clearly identified as such in the title and objective of the topic. Proposal preparation instructions for open topics may vary significantly across DoD Components. Proposing small business concerns are advised to carefully read and follow all instructions from the DoD Component for the open topic of interest. Unless specifically noted in the Component instructions, all requirements outlined in this BAA remain in effect for open topics.

3.0 DEFINITIONS

The following definitions from the SBA SBIR/STTR Policy Directive, the Federal Acquisition Regulation (FAR) and other cited regulations apply for the purposes of this BAA:

Commercialization

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

Cooperative Research and Development

Research and development conducted jointly by a small business concern and a research institution. For purposes of the STTR Program, 40% of the work is performed by the small business concern, and not less than 30% of the work is performed by the single research institution. For purposes of the SBIR Program, this refers to work conducted by a research institution as a subcontractor to the small business concern. At least two-thirds of the research and/or analytical work in Phase I must be conducted by the proposing small business concern.

Covered Individual

An individual who contributes in a substantive, meaningful way to the scientific development or

execution of a research and development (R&D) project proposed to be carried out with a Federally funded award from DoD. DoD has further designated covered individuals as including all proposed key personnel.

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 the objective are the same or closely related to another proposal or award, regardless of the funding source.

Export Control

The International Traffic in Arms Regulations (ITAR), 22 CFR Parts 120 through 130, and the Export Administration Regulations (EAR), 15 CFR Parts 730 through 799, will apply to all projects with military or dual-use applications that develop beyond fundamental research, which is basic and applied research ordinarily published and shared broadly within the scientific community. More information is available at https://www.pmddtc.state.gov/ddtc_public.

NOTE: Export control compliance statements found in the individual Component-specific proposal instructions are not meant to be all inclusive. They do not remove any liability from the submitter to comply with applicable ITAR or EAR export control restrictions or from informing the Government of any potential export restriction as fundamental research and development efforts proceed.

Federal Laboratory

As defined in 15 U.S.C. §3703, means any laboratory, any federally funded research and development center (FFRDC), or any center established under 15 U.S.C. §§ 3705 & 3707 that is owned, leased, or otherwise used by a Federal agency and funded by the Federal Government, whether operated by the Government or by a contractor.

Federally Funded Award

A Phase I, Phase II (including Direct to Phase II, sequential Phase II/subsequent Phase II and cross-agency Phase II), or Phase III SBIR or STTR award made using a funding agreement.

Foreign Affiliation

As defined in 15 U.S.C. § 638(e)(16), foreign affiliation means a funded or unfunded academic, professional, or institutional appointment or position with a foreign government or government-owned entity, whether full-time, part-time, or voluntary (including adjunct, visiting, or honorary). This includes appointments or positions deemed adjunct, visiting, or honorary with research institutions located in a foreign country of concern.

Foreign Country of Concern

As defined in 15 U.S.C. § 638(e)(17), foreign country of concern means the People's Republic of China, the Democratic People's Republic of Korea, the Russian Federation, the Islamic Republic of Iran, or any

other country determined to be a country of concern by the Secretary of State.

Foreign Entity

Foreign entity means any branch, partnership, group or sub-group, association, estate, trust, corporation or division of a corporation, non-profit, academic institution, research center, or organization established, directed, or controlled by foreign owners, foreign investors, foreign management, or a foreign government.

Foreign Government

Foreign government means any government or governmental body, organization, or instrumentality, including government owned-corporations, other than the United States Government or United States state, territorial, tribal, or jurisdictional governments or governmental bodies. The term includes, but is not limited to, non-United States national and subnational governments, including their respective departments, agencies, and instrumentalities.

Foreign Nationals

Foreign Nationals (also known as Foreign Persons) as defined by 22 CFR 120.16 means any natural person who is not a lawful permanent resident as defined by 8 U.S.C. § 1101(a)(20) or who is not a protected individual as defined by 8 U.S.C. § 1324b(a)(3). It also means any foreign corporation, business association, partnership, trust, society or any other entity or group that is not incorporated or organized to do business in the United States, as well as international organizations, foreign governments and any agency or subdivision of foreign governments (e.g., diplomatic missions).

“Lawfully admitted for permanent residence” means 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, such status not having changed.

"Protected individual’’ means an individual who (A) is a citizen or national of the United States, or (B) is an alien who is lawfully admitted for permanent residence, is granted the status of an alien lawfully admitted for temporary residence under 8 U.S.C. § 1160(a) or 8 U.S.C. § 1255a(a)(1), is admitted as a refugee under 8 U.S.C. § 1157, or is granted asylum under Section 8 U.S.C. § 1158; but does not include (i) an alien who fails to apply for naturalization within six months of the date the alien first becomes eligible (by virtue of period of lawful permanent residence) to apply for naturalization or, if later, within six months after November 6, 1986, and (ii) an alien who has applied on a timely basis, but has not been naturalized as a citizen within 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.

Fraud, Waste and Abuse

a. **Fraud** includes any false representation 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.
b. **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.

c. **Abuse** includes any intentional or improper use of Government resources, such as misuse of rank, position, or authority or resources.
d. The SBIR Program training related to Fraud, Waste and Abuse is available at: https://www.sbir.gov/tutorials/fraud-waste-abuse/tutorial-1. See Section 4.17 for reporting Fraud, Waste and Abuse.

Funding Agreement

Any contract, grant, or cooperative agreement entered 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. Only contracts and other transaction authority (OTA) agreements will be used by DoD Components for all SBIR awards.

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

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

Certified HUBZone Small Business Concern

An SBC that has been certified by SBA under the Historically Underutilized Business Zones (HUBZone) Program (13 C.F.R. § 126) as a HUBZone firm listed in the Dynamic Small Business Search (DSBS).

Malign Foreign Talent Recruitment Program

As defined in 42 U.S.C § 19237, the term "malign foreign talent recruitment program" means-

(A) any program, position, or activity that includes compensation in the form of cash, in-kind compensation, including research funding, promised future compensation, complimentary foreign travel, things of non de minimis value, honorific titles, career advancement opportunities, or other types of remuneration or consideration directly provided by a foreign country at any level (national, provincial, or local) or their designee, or an entity based in, funded by, or affiliated with a foreign country, whether or not directly sponsored by the foreign country, to the targeted individual, whether directly or indirectly stated in the arrangement, contract, or other documentation at issue, in exchange for the individual-

(i) engaging in the unauthorized transfer of intellectual property, materials, data products, or other nonpublic information owned by a United States entity or developed with a Federal research and development award to the government of a foreign country or an entity based in, funded by, or affiliated with a foreign country regardless of whether that government or entity provided support for the development of the intellectual property, materials, or data products;

(ii) being required to recruit trainees or researchers to enroll in such program, position, or activity;

(iii) establishing a laboratory or company, accepting a faculty position, or undertaking any other employment or appointment in a foreign country or with an entity based in, funded by, or affiliated with a foreign country if such activities are in violation of the standard terms and conditions of a Federal research and development award;

(iv) being unable to terminate the foreign talent recruitment program contract or agreement except in extraordinary circumstances;

(v) through funding or effort related to the foreign talent recruitment program, being limited in the capacity to carry out a research and development award or required to engage in

work that would result in substantial overlap or duplication with a Federal research and development award;

(vi) being required to apply for and successfully receive funding from the sponsoring foreign government's funding agencies with the sponsoring foreign organization as the recipient;

(vii) being required to omit acknowledgment of the recipient institution with which the individual is affiliated, or the Federal research agency sponsoring the research and development award, contrary to the institutional policies or standard terms and conditions of the Federal research and development award;

(viii) being required to not disclose to the Federal research agency or employing institution the participation of such individual in such program, position, or activity; or

(ix) having a conflict of interest or conflict of commitment contrary to the standard terms and conditions of the Federal research and development award; and

(B) a program that is sponsored by-

(i) a foreign country of concern or an entity based in a foreign country of concern, whether or not directly sponsored by the foreign country of concern;

(ii) an academic institution on the list developed under section 1286(c)(8) of the John S. McCain National Defense Authorization Act for Fiscal Year 2019 (10 U.S.C. 2358 note; 1 Public Law 115–232) ; or

(iii) a foreign talent recruitment program on the list developed under section 1286(c)(9) of the John S. McCain National Defense Authorization Act for Fiscal Year 2019 (10 U.S.C. 2358 note; 1 Public Law 115–232).

Performance Benchmark Requirements

Companies with multiple SBIR/STTR awards must meet minimum performance requirements to be eligible to apply for a new Phase I or Direct-to-Phase II award. The purpose of these requirements is to ensure that Phase I applicants that have won multiple prior SBIR/STTR awards are making progress towards commercializing the work done under those awards. The Phase I to Phase II Transition Rate addresses the extent to which an awardee progresses a project from Phase I to Phase II. The Commercialization Benchmark addresses the extent to which an awardee has moved past Phase II work towards commercialization.

The SBIR and STTR Extension Act of 2022 (Pub. L. 117-183) amended the application of these benchmarks for more experienced firms. Detailed information on benchmark calculations and increased performance standards for more experienced firms can be found at https://www.sbir.gov/performance-benchmarks.

Personal Conflict of Interest

A situation in which an individual has a financial interest, personal activity, or relationship that could impair the employee's ability to act impartially and in the best interest of the Government when performing under the contract. (A de minimis interest that would not "impair the employee's ability to act impartially and in the best interest of the Government" is not covered under this definition.)

Among the sources of personal conflicts of interest are-
(i) Financial interests of the covered employee, of close family members, or of other members of the covered employee's household;
(ii) Other employment or financial relationships (including seeking or negotiating for prospective employment or business); and

(iii) Gifts, including travel.

Financial interests referred to in paragraph (1) of this definition may arise from-
(i) Compensation, including wages, salaries, commissions, professional fees, or fees for business referrals;
(ii) Consulting relationships (including commercial and professional consulting and service arrangements, scientific and technical advisory board memberships, or serving as an expert witness in litigation);
(iii) Services provided in exchange for honorariums or travel expense reimbursements;
(iv) Research funding or other forms of research support;
(v) Investment in the form of stock or bond ownership or partnership interest (excluding diversified mutual fund investments);
(vi) Real estate investments;
(vii) Patents, copyrights, and other intellectual property interests; or
(viii) Business ownership and investment interests.

Principal Investigator

The principal investigator/project manager is the one individual designated by the applicant to provide the scientific and technical direction to a project supported by the funding agreement.

For both Phase I and Phase II, the primary employment of the principal investigator must be with the proposing small business concern at the time of award and during the conduct of the proposed project. Primary employment means that more than one-half of the principal investigator's time is spent in the employ of the small business. This precludes full-time employment with another organization. Occasionally, deviations from this requirement may occur, and must be approved in writing by the contracting officer after consultation with the agency SBIR/STTR Program Manager/Coordinator. Further, a proposing small business concern or research institution may replace the principal investigator on an SBIR/STTR Phase I or Phase II award, subject to approval in writing by the contracting officer.

Proprietary Information

Proprietary information is any information that a small business concern considers to be non-public information that is owned by the small business concern and is marked accordingly.

Research Institution

Any organization located in the United States that is:

a. A university.
b. A nonprofit institution as defined in Section 4(5) of the Stevenson-Wydler Technology Innovation Act of 1980.
c. A contractor-operated federally funded research and development center, as identified by the National Science Foundation in accordance with the government-wide Federal Acquisition Regulation issued in accordance with Section 35(c)(1) of the Office of Federal Procurement Policy Act. A list of eligible FFRDCs is available at: https://www.nsf.gov/statistics/ffrdclist/.

Research or Research and Development

Any activity that is:

a. A systematic, intensive study directed toward greater knowledge or understanding of the subject studied.

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

All activities involving animal subjects shall be conducted in accordance with DoDI 3216.01 "Use of Animals in DoD Programs," 9 C.F.R. parts 1-4 "Animal Welfare Regulations," National Academy of Sciences Publication "Guide for the Care & Use of Laboratory Animals," as amended, and the Department of Agriculture rules implementing the Animal Welfare Act (7 U.S.C. §§ 2131-2159), as well as other applicable federal and state law and regulation and DoD instructions.

"Animal use" protocols apply to all activities that meet any of the following criteria:
a. Any research, development, test, evaluation or training, (including experimentation) involving an animal or animals.
b. An animal is defined as any living or dead, vertebrate organism (non-human) that is being used or is intended for use in research, development, test, evaluation or training.
c. A vertebrate is a member of the subphylum Vertebrata (within the phylum Chordata), including birds and cold-blooded animals.

See DoDI 3216.01 for definitions of these terms and more information about the applicability of DoDI 3216.01 to work involving animals.

Research Involving Human Subjects

All research involving human subjects shall be conducted in accordance with 32 C.F.R. § 219 "The Common Rule," 10 U.S.C. § 980 "Limitation on Use of Humans as Experimental Subjects," and DoDI 3216.02 "Protection of Human Subjects and Adherence to Ethical Standards in DoD-Supported Research," as well as other applicable federal and state law and regulations, and DoD component guidance. Proposing small business concerns must be cognizant of and abide by the additional restrictions and limitations imposed on the DoD regarding research involving human subjects, specifically as they regard vulnerable populations (DoDI 3216.02), recruitment of military research subjects (DoDI 3216.02), and informed consent and surrogate consent (10 U.S.C. § 980) and chemical and biological agent research (DoDI 3216.02). Food and Drug Administration regulation and policies may also apply.

"Human use" protocols apply to all research that meets any of the following criteria:
a. Any research involving an intervention or an interaction with a living person that would not be occurring or would be occurring in some other fashion but for this research.
b. Any research involving identifiable private information. This may include data/information/specimens collected originally from living individuals (broadcast video, web-use logs, tissue, blood, medical or personnel records, health data repositories, etc.) in which the identity of the subject is known, or the identity may be readily ascertained by the investigator or associated with the data/information/specimens.

See DoDI 3216.02 for definitions of these terms and more information about the applicability of DoDI 3216.02 to research involving human subjects.

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Research Involving Recombinant DNA Molecules

Any recipient performing research involving recombinant DNA molecules and/or organisms and viruses containing recombinant DNA molecules shall comply with the National Institutes of Health Guidelines for Research Involving Recombinant DNA Molecules, dated January 2011, as amended. The guidelines can be found at: https://osp.od.nih.gov/wp-content/uploads/2016/05/NIH_Guidelines.pdf. Recombinant DNA is defined as (i) molecules that are constructed outside living cells by joining natural or synthetic DNA segments to DNA molecules that can replicate in living cells or (ii) molecules that result from the replication of those described in (i) above.

Service-Disabled Veteran-Owned Small Business (SDVOSB)

A small business concern owned and controlled by a Service-Disabled Veteran or Service-Disabled Veterans, as defined in Small Business Act 15 USC § 632(q)(2) and SBA's implementing SDVOSB regulations (13 CFR 125).

Small Business Concern (SBC)

A concern that meets the requirements set forth in 13 C.F.R. § 121.702 (available here).

An SBC must satisfy the following conditions on the date of award:

a. Is organized for profit, with a place of business located in the United States, which operates primarily within the United States or which makes a significant contribution to the United States economy through payment of taxes or use of American products, materials or labor;
b. Is in the legal form of an individual proprietorship, partnership, limited liability company, corporation, joint venture, association, trust or cooperative, except that if the concern is a joint venture, each entity to the venture must meet the requirements set forth in paragraph (c) below;
c. Is more than 50% directly owned and controlled by one or more individuals (who are citizens or permanent resident aliens of the United States), other small business concerns (each of which is more than 50% directly owned and controlled by individuals who are citizens or permanent resident aliens of the United States), or any combination of these; and
d. Has, including its affiliates, not more than 500 employees. (For explanation of affiliate, see www.sba.gov/size.)

Subcontract

A subcontract is any agreement, other than one involving an employer-employee relationship, entered into by an awardee of a funding agreement calling for supplies or services for the performance of the original funding agreement. This includes consultants.

Subcontractor

Subcontractor means any supplier, distributor, vendor, firm, academic institution, research center, or other person or entity that furnishes supplies or services pursuant to a subcontract, at any tier.

United States

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

Women-Owned Small Business Concern

An SBC that is at least 51% owned by one or more women, or in the case of any publicly owned business, at least 51% of the stock is owned by women, and women control the management and daily business operations.

4.0 PROPOSAL FUNDAMENTALS

4.1 Introduction

The proposal must provide sufficient information to demonstrate to the evaluator(s) that the proposed work represents an innovative approach to the investigation of an important scientific or engineering problem and is worthy of support under the stated criteria. The proposed research or research and development must be responsive to the chosen topic, although it need not use the exact approach specified in the topic. Anyone contemplating a proposal for work on any specific topic should determine:

a. The technical approach has a reasonable chance of meeting the topic objective,
b. This approach is innovative, not routine, with potential for commercialization and
c. The proposing small business concern has the capability to implement the technical approach, i.e., has or can obtain people and equipment suitable to the task.

Please note, **this BAA is for Phase I proposals only** unless the Component is participating in the **Direct to Phase II Program**.

a. Direct to Phase II

15 U.S.C. §638 (cc), as amended by NDAA FY2012, Sec. 5106, and further amended by NDAA FY2019,Sec. 854, PILOT TO ALLOW PHASE FLEXIBILITY, allows DoD to make a SBIR Phase II award to a small business concern with respect to a project, without regard to whether the small business concern was provided an award under Phase I of the SBIR program with respect to such project. DoD does not guarantee Direct to Phase II opportunities will be offered in future BAAs.

Each eligible topic requires proposing small business concerns provide documentation to demonstrate feasibility described in the Phase I section of the topic has been met. **Feasibility documentation cannot be based upon or logically extend from any prior or ongoing federally funded SBIR or STTR work.** Work submitted within the feasibility documentation must have been substantially performed by the proposing small business concern and/or the principal investigator. If technology in the feasibility documentation is subject to Intellectual Property (IP), the proposing small business concern must either own the IP or must have obtained license rights to such technology prior to proposal submission, to enable it and its subcontractors to legally carry out the proposed work.

If the proposing small business concern fails to demonstrate technical merit and feasibility equivalent to the Phase I level as described in the associated topic, the related Phase II proposal will not be accepted or evaluated, in accordance with the Component-specific Direct to Phase II instructions.

Please refer to the Component-specific Direct to Phase II instructions for full details regarding Component Direct to Phase II processes and proposal preparation requirements.

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4.2 Proposing Small Business Concern Eligibility and Performance Requirements

a. Each proposing small business concern must qualify as a small business concern as defined by 13 C.F.R §§ 701-705 at time of award and certify to this in the Cover Sheet section of the proposal. The eligibility requirements for the SBIR/STTR programs are unique and do not correspond to those of other small business programs (see Section 3 of this BAA). Proposing small business concern must meet eligibility requirements for Small Business Ownership and Control (see 13 CFR § 121.702).

b. A minimum of two-thirds of the research and/or analytical work in Phase I must be conducted by the proposing small business concern. For Phase II, a minimum of one-half (50%) of the research and/or analytical work must be performed by the proposing small business concern. The percentage of work is measured by both direct and indirect costs. Occasionally, deviations from these SBIR requirements may occur, and must be approved in writing by the Funding Agreement officer after consultation with the agency SBIR/STTR program manager/coordinator. For more information on the percentage of work calculation during proposal submission, refer to section 5.3.

c. For both Phase I and II, the primary employment of the principal investigator must be with the proposing small business concern at the time of the award and during the conduct of the proposed effort. Primary employment means that more than one-half of the principal investigator's time is spent with the small business. Primary employment with a small business concern precludes full-time employment at another organization.

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

e. **Benchmarks**. Proposing small business concern with prior SBIR/STTR awards must meet two performance benchmark requirements as determined by the SBA on June 1 each year.
   (1) Phase I to Phase II Transition Rate: For all proposing small business concerns with greater than 20 Phase I awards over the past five fiscal years excluding the most recent year, the ratio of Phase II awards to Phase I awards must be at least 0.25.
   (2) Commercialization Benchmark: For all proposing small business concerns with greater than 15 Phase II awards over the last 10 fiscal years excluding the last two years, the proposing small business concern must have received, to date, an average of at least $100,000 of sales and/or investments per Phase II award received or have received a number of patents resulting from the SBIR work equal to or greater than 15% of the number of Phase II awards received during the period.

The SBIR and STTR Extension Act of 2022 (Pub. L. 117-183) amended the application of these benchmarks for more experienced firms. Detailed information on benchmark calculations, increased performance standards for more experienced firms and consequence of failure to meet benchmarks can be found at https://www.sbir.gov/performance-benchmarks.

As defined by the SBIR/STTR Policy Directive, Department of the Army, Department of the Navy, and Department of the Air Force each constitute its own Federal agency, and the remaining DoD Components fall under the executive agency of the Department of Defense. Companies that fail to meet either of the benchmarks under the Increased Performance Standards for more Experienced Firms may not receive more than an overall total of 80 awards from DoD, as detailed in the breakdown below:

Army – 20 total Phase I and Direct to Phase II awards
Navy – 20 total Phase I and Direct to Phase II awards
Air Force – 20 total Phase I and Direct to Phase II awards
All other DoD Components - 20 Phase I and Direct to Phase II awards, combined

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4.3 Disclosures Regarding Ties to People's Republic of China and Other Foreign Countries

Each proposing small business concern is required to complete the Disclosures of Foreign Affiliations or Relationships to Foreign Countries webform under Volume 7 of the proposal submission.

The disclosure requires the following information:

(A) the identity of all owners and covered individuals of the small business concern who are a party to any foreign talent recruitment program of any foreign country of concern, including the People's Republic of China;
(B) the existence of any joint venture or subsidiary of the small business concern that is based in, funded by, or has a foreign affiliation with any foreign country of concern, including the People's Republic of China;
(C) any current or pending contractual or financial obligation or other agreement specific to a business arrangement, or joint venture-like arrangement with an enterprise owned by a foreign state or any foreign entity;
(D) whether the small business concern is wholly owned in the People's Republic of China or another foreign country of concern;
(E) the percentage, if any, of venture capital or institutional investment by an entity that has a general partner or individual holding a leadership role in such entity who has a foreign affiliation with any foreign country of concern, including the People's Republic of China;
(F) any technology licensing or intellectual property sales to a foreign country of concern, including the People's Republic of China, during the five-year period preceding submission of the proposal; and
(G) any foreign entity, offshore entity, or entity outside the United States related to the small business concern.

After reviewing the above listed disclosures of the proposing small business concern, and if determined appropriate by the DoD, the Department may ask the small business concern may to provide true copies of any contractual or financial obligation or other agreement specific to a business arrangement or joint-venture like arrangement with an enterprise owned by a foreign state or any foreign entity in effect during the five-year period preceding submission of the proposal with respect to which the small business concern made the disclosures.

4.4 Joint Ventures

Joint ventures and limited partnerships are permitted, provided that the entity created qualifies as a small business in accordance with the Small Business Act, 13 U.S.C. § 121.701. Proposing small business concern must disclose joint ventures with existing (or planned) relationships/partnerships with any foreign entity or any foreign government-controlled companies.

A small business joint venture entity must submit, with its proposal, the representation required in paragraph (c) of FAR solicitation provision 52.212-3, Offeror Representations and Certifications-Commercial Products and Commercial Services, and paragraph (c) of FAR solicitation provision 52.219-1, Small Business Program Representations, in accordance with 52.204-8(d) and 52.212-3(b) for the following categories:

(A) Small business;
(B) Service-disabled veteran-owned small business;
(C) Women-owned small business (WOSB) under the WOSB Program;
(D) Economically disadvantaged women-owned small business under the WOSB Program; or
(E) Historically underutilized business zone small business.

These representations can be found as Attachment 2 to this BAA and must be uploaded to Volume 5, Supporting Documents of the proposal submission in DSIP, if applicable.

4.5 Export-Controlled Topic Requirements

For proposals submitted under export-controlled topics, either International Traffic in Arms or Export Administration Regulations (ITAR/EAR), a copy of the certified DD Form 2345, Militarily Critical Technical Data Agreement, or evidence of application submission must be included. The form, instructions, and FAQs may be found at the United States/Canada Joint Certification Program website, https://www.dla.mil/Logistics-Operations/Services/JCP/DD23%2045Instructions/.

DD Form 2345 approval will be required if a proposal submitted in response to a topic marked as ITAR/EAR is selected for award.

4.6 Majority Ownership in Part by Multiple Venture Capital, Hedge Fund, and Private Equity Firms

Unless otherwise noted in the participating Component instructions, proposing small business concerns owned in majority part by multiple venture capital operating companies (VCOCs), hedge funds, or private equity funds are ineligible to submit applications or receive awards for opportunities in this BAA. Component instructions will specify if participation by a small business majority owned in part by VCOCs, hedge funds, or private equity funds is allowable for a specific topic in the BAA. If a Component authorizes such participation, any proposing small business concern that is owned, in whole in or in part, by any VCOC, hedge fund, and/or private equity fund must identify each foreign national, foreign entity, or foreign government holding or controlling greater than a 5% equity stake in the proposing small business concern, whether such equity stake is directly or indirectly held. The proposing small business concern must also identify any and all of its ultimate parent owner(s) and any other entities and/or individuals owning more than a 5% equity stake in its chain of ownership.

4.7 Conflicts of Interest

Contract awards to proposing small business concern 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.

4.8 Organizational Conflicts of Interest (OCI)

FAR 9.5 Requirements

In accordance with FAR 9.5, proposing small business concerns are required to identify and disclose all facts relevant to potential OCIs involving the proposing small business concern's organization and any proposed team member (sub-awardee, consultant). Under this Section, the proposing small business concern is responsible for providing this disclosure with each proposal submitted to the BAA. The disclosure must include the proposing small business concern's, and as applicable, proposed team member's OCI mitigation plan. The OCI mitigation plan must include a description of the actions the proposing small business concern has taken, or intends to take, to prevent the existence of conflicting roles that might bias the proposing small business concern's judgment and to prevent the proposing small business concern from having unfair competitive advantage. The OCI mitigation plan will specifically discuss the disclosed OCI in the context of each of the OCI limitations outlined in FAR 9.505-1 through FAR 9.505-4.

Agency Supplemental OCI Policy
In addition, DoD Components may have a supplemental OCI policy prohibiting contractors/performers from concurrently providing Scientific Engineering Technical Assistance (SETA), Advisory and Assistance Services (A&AS) or similar support services and being a technical performer. As part of the FAR 9.5 disclosure requirement above, a proposing small business concern must affirm whether the proposing small business concern or any proposed team member (sub-awardee, consultant) is providing SETA, A&AS, or similar support to any DoD Component office(s) under: (a) a current award or sub-award; or (b) a past award or sub-award that ended within one calendar year prior to the proposal's submission date.
If SETA, A&AS, or similar support is being or was provided to any DoD Component office(s), the proposal must include:

- The name of the DoD Component office receiving the support;
- The prime contract number;
- Identification of proposed team member (sub-awardee, consultant) providing the support; and
- An OCI mitigation plan in accordance with FAR 9.5.

Government Procedures
In accordance with FAR 9.503, 9.504 and 9.506, the Government will evaluate OCI mitigation plans to avoid, neutralize or mitigate potential OCI issues before award and to determine whether it is in the Government's interest to grant a waiver. The Government will only evaluate OCI mitigation plans for proposals determined selectable under the BAA evaluation criteria and funding availability.

The Government may require proposing small business concerns to provide additional information to assist the Government in evaluating the proposing small business concern's OCI mitigation plan.

If the Government determines a proposer failed to fully disclose an OCI; or failed to provide the affirmation of Government support as described above; or failed to reasonably provide additional information requested by the Government to assist in evaluating the proposer's OCI mitigation plan, the Government may reject the proposal and withdraw it from consideration for award.

4.9 Classified Proposals

Classified proposals will not be accepted under the DoD SBIR Program. If topics will require classified work during Phase II, the proposing small business concern must have a facility clearance to perform the Phase II work. For more information on facility and personnel clearance procedures and requirements, please visit the Defense Counterintelligence and Security Agency (DCSA) website at: https://www.dcsa.mil/mc/ctp/fc/.

4.10 Research Involving Human Subjects

All research involving human subjects, to include use of human biological specimens and human data, shall comply with the applicable federal and state laws and agency policy/guidelines for human subject protection (see Section 3).

Institutions to be awarded funding for research involving human subjects must provide documentation of a current Federal Assurance of Compliance with Federal regulations for human subject protection, for example a Department of Health and Human Services, Office for Human Research Protections Federal-wide Assurance (http://www.hhs.gov/ohrp). Additional Federal Assurance documentation may also be

requested by the awarding DoD Component. All institutions engaged in human subject research, to include subcontractors, must also have a valid Assurance. In addition, personnel involved in human subjects research must provide documentation of completing appropriate training for the protection of human subjects. Institutions proposing to conduct human subject research that meets one of the exemption criteria in 32 CFR 219.101 are not required to have a Federal Assurance of Compliance. Proposing small business concerns should clearly segregate research activities involving human subjects from other research and development activities in their proposal.

If selected, institutions must also provide documentation of Institutional Review Board (IRB) approval or a determination from an appropriate official in the institution that the work meets one of the exemption criteria with 32 CFR 219. As part of the IRB review process, evidence of appropriate training for all investigators should accompany the protocol. The protocol, separate from the proposal, must include a detailed description of the research plan, study population, risks and benefits of study participation, recruitment and consent process, data collection and data analysis.

The amount of time required for the IRB to review and approve the protocol will vary depending on such things as the IRB's procedures, the complexity of the research, the level of risk to study participants and the responsiveness of the Investigator. The average IRB approval process can last between one and three months. Once the IRB has approved the research, the awarding DoD Component will review the protocol and the IRB's determination to ensure that the research will be conducted in compliance with DoD and DoD Component policies. The DoD review process can last between three to six months. Ample time should be allotted to complete both the IRB and DoD approval processes prior to recruiting subjects. **No funding can be used towards human subject research until ALL approvals are granted. Submitters proposing research involving human and/or animal use are encouraged to separate these tasks in the technical proposal and cost proposal to avoid potential delay of contract award.**

4.11 Research Involving Animal Subjects

All research, development, testing, experimentation, education or training involving the use of animals shall comply with the applicable federal and agency rules on animal acquisition, transport, care, handling, and use (see Section 3).

For submissions containing animal use, proposals should briefly describe plans for their Institutional Animal Care and Use Committee (IACUC) review and approval.

All Recipients must receive their IACUC's approval as well as secondary or headquarters-level approval by a DoD veterinarian who is trained or experienced in laboratory animal medicine and science. **No animal research may be conducted using DoD funding until all the appropriate DoD office(s) grant approval. Submitters proposing research involving human and/or animal use are encouraged to separate these tasks in the technical proposal and cost proposal to avoid potential delay of contract award.**

4.12 Research Involving Recombinant DNA Molecules

All research involving recombinant DNA molecules shall comply with the applicable federal and state law, regulation and any additional agency guidance. Research shall be approved by an Institutional Biosafety Committee.

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4.13 Debriefing/Technical Evaluation Narrative

After final award decisions have been announced, the technical evaluations of the submitter's proposal may be provided to the submitter. Please refer to the Component-specific instructions of your topics of interest for Component debriefing processes.

4.14 Pre-Award and Post Award BAA Protests

Interested parties have the right to protest in accordance with the procedures in FAR Subpart 33.1.

Protests exclusively related to the terms of this BAA must be served to:
osd.ncr.ousd-r-e.mbx.SBIR-STTR-Protest@mail.mil

For the purposes of a protest related to a particular topic selection, non-selection or award decision, protests should be served to the point-of-contact (POC) listed in the instructions of the DoD Component that authored the topic.

For protests filed with the Government Accountability Office (GAO), a copy of the protest shall be submitted to the email address listed above (pre-award ONLY) or DoD Component POC (selection/award decision ONLY) within one day of filing with the GAO. Protests of small business status of a selected proposing small business concern may also be made to the SBA.

Size protests regarding the small business status of a selected proposing small business concern may be made to the SBA in accordance with the procedures in FAR § 19.302.

4.15 Award Information

All proposals will be evaluated and judged on a competitive basis in terms of technical capability and technical value. Proposals will be initially screened to determine responsiveness to the topic objective. Proposals passing this initial screening will be technically evaluated by engineers, scientists or subject matter experts to determine the most promising technical and scientific approaches. As a common statement of work does not exist, each proposal will be assessed on the merit of the approach in achieving the technical objectives established in the topic. DoD is under no obligation to fund any proposal or any specific number of proposals in each topic. It also may elect to fund several or none of the proposed approaches to the same topic.

a. **Number of Awards**. The number of awards will be consistent with the Component's RDT&E budget. No contracts will be awarded until evaluation of all qualified proposals for a specific topic is completed.

b. **Type of Funding Agreement**. Each proposal selected for negotiation and possible award will be funded under negotiated contracts or purchase orders and will include a reasonable fee or profit consistent with normal profit margins provided to profit-making proposing small business concerns for R/R&D work. Firm-Fixed-Price, Firm- Fixed-Price Level of Effort, Labor Hour, Time & Material, or Cost-Plus-Fixed-Fee type contracts can be negotiated and are at the discretion of the Component Contracting Officer.

c. **Dollar Value**. Contract value varies among the DoD Components; it is important for proposing small business concerns to review Component-specific instructions regarding award size.

d. **Timing**. Proposing small business concerns will be notified of selection or non-selection status for an award by the DoD Component that originated the topic no later than 90 days of the closing date for this BAA. Please refer to the Component-specific instructions for details.

The SBA SBIR/STTR Policy Directive, Section 7(c)(1)(ii), states agencies should issue the award no more than 180 days after the closing date of the BAA.

4.16 Questions about this BAA and BAA Topics

a. **General SBIR Questions/Information**.

(1) **DSIP Support**:
Email DSIP Support at DoDSBIRSupport@reisystems.com only for assistance with using the DSIP application. Questions regarding DSIP can be emailed to DSIP Support and will be addressed in the order received, during normal operating hours (Monday through Friday, 9:00 a.m. to 5:00 p.m. ET). Please include information on your small business concern, a proposal number (if applicable), and screenshots of any pertinent errors or issues encountered.

DSIP Support cannot provide updates to proposal status after submission, such as proposal selection/non-selection status or contract award status. Contact the DoD Component that originated the topic in accordance with the Component-specific instructions given at the beginning of that Component's topics.

(2) **Websites**:
DSIP (https://www.dodsbirsttr.mil/submissions/login) provides the following resources:

- SBIR and STTR Program Opportunities
- Topics Search Engine
- Topic Q&A
- All Electronic Proposal Submission for Phase I and Phase II Proposals. Proposing small business concerns submitting through this site for the first time will be asked to register on https://www.dodsbirsttr.mil/submissions.

DoD SBIR/STTR website (https://www.defensesbirsttr.mil/) provides the following resources:

- Customer Support Information
- SBIR and STTR Program Information

(3) **SBIR/STTR Updates and Notices**:
To be notified of SBIR/STTR opportunities and to receive email updates on the DoD SBIR and STTR Programs, subscribe to the Listserv by selecting "DSIP Listserv" under Quick Links on the DSIP login page.

b. **General Questions about a DoD Component.** Questions pertaining to a particular DoD Component or the Component-specific BAA instructions should be submitted in accordance with the instructions given at the beginning of that Component's topics.

c. **Direct Contact with Topic Authors**. From **August 21 – September 18, 2024,** this BAA is issued for pre-release with the names of the topic authors and their phone numbers and email addresses. During the pre-release period, proposing small business concerns have an opportunity to contact topic authors

by telephone or email to ask technical questions about specific BAA topics. Questions should be limited to specific information related to improving the understanding of a particular topic's requirements. Proposing small business concerns may not ask for advice or guidance on solution approach and you may not submit additional material to the topic author. If information provided during an exchange with the topic author is deemed necessary for proposal preparation, that information will be made available to all parties through Topic Q&A. After this period questions must be asked through Topic Q&A as described below.

d. **Topic Q&A.** Once DoD begins accepting proposals on **September 18, 2024,** no further direct contact between proposing small business concerns and topic authors is allowed unless the Topic Author is responding to a question submitted during the pre-release period. Proposing small business concerns may submit written questions through Topic Q&A at https://www.dodsbirsttr.mil/submissions/login. In Topic Q&A, all questions and answers are posted electronically for general viewing. Identifying information for the questioner and respondent is not posted.

Questions submitted through the Topic Q&A are limited to technical information related to improving the understanding of a topic's requirements. Any other questions, such as those asking for advice or guidance on solution approach, or administrative questions, such as SBIR or STTR program eligibility, technical proposal/cost proposal structure and page count, budget and duration limitations, or proposal due date WILL NOT receive a response. Refer to the Component-specific instructions given at the beginning of that Component's topics for help with an administrative question.

Proposing small business concerns may use the Topic Search feature on DSIP to locate a topic of interest. Then, using the form at the bottom of the topic description, enter and submit the question. Answers are generally posted within seven (7) business days of question submission (answers will also be e-mailed directly to the inquirer).

The Topic Q&A for this BAA opens on **August 21, 2024**, and closes to new questions on **October 2, 2024**, **at 12:00 PM ET**. Once the BAA closes to proposal submission, no communication of any kind with the topic author or through Topic Q&A regarding your submitted proposal is allowed.

Proposing small business concerns are advised to monitor Topic Q&A during the BAA period for questions and answers. Proposing small business concerns should also frequently monitor DSIP for updates and amendments to the topics.

4.17 Registrations and Certifications

Individuals from proposing small business concerns must be registered in the DSIP to prepare and submit proposals. **The DSIP application is only accessible from within the United States, which is defined as the fifty states, the territories and possessions of the Federal Government, the Commonwealth of Puerto Rico, the Republic of the Marshall Islands, the Federated States of Micronesia, the Republic of Palau, and the District of Columbia.** All users are required to have an individual user account to access DSIP. As DSIP user accounts are authenticated by Login.gov, all users, who do not already have a Login.gov account, will be required to create one. If you already have a Login.gov account, you can link your existing Login.gov account with your DSIP account. Job Aids and Help Videos to walk you through the process are in the Learning & Support section of DSIP, can be accessed here: https://www.dodsbirsttr.mil/submissions/learning-support/training-materials.

Be advised the sharing of accounts and passwords is a violation of the Terms of Use for Login.gov and DoD policy.

Please note the email address you use for Login.gov should match the email address associated with your existing DSIP account. If you do not recall the email address associated with your DSIP account, or if you already have an existing Login.gov account using a different email address, you will need your Firm's UEI or DUNS number and your Firm PIN to link your Login.gov account with your DSIP account. If the email address associated with your existing DSIP account has been used for multiple DSIP accounts within your Firm, you will also need your Firm's UEI or DUNS number and your Firm PIN in order to link your Login.gov account with your DSIP account. The Firm PIN can be obtained from your Firm Admin. You can view the Firm Admin's contact information by entering your Firm's UEI or DUNS number when prompted. If you are the Firm Admin, please ensure that you contact all DSIP users in your Firm and provide them with the Firm PIN.

Users should complete their account registrations as soon as possible to avoid any delays in proposal submissions.

The System for Award Management (SAM) allows proposing small business concerns interested in conducting business with the Federal Government to provide basic information on business structure and capabilities as well as financial and payment information. Proposing small business concerns must be registered in SAM. To register, visit www.sam.gov. A proposing small business concern that is already registered in SAM should login to SAM and ensure its registration is active and its representations and certifications are up to date to avoid delay in award.

The Federal Government will use the Unique Entity ID (SAM) to identify organizations doing business with the Government. The DUNS number will no longer be a valid identifier. If the proposing small business concern has an entity registration in SAM.gov (even if the registration has expired), a UEI (SAM) has already been assigned. This can be found by signing into SAM.gov and selecting the Entity Management widget in the Workspace or by signing in and searching entity information. **For proposing small business concerns with established Defense SBIR/STTR Innovation Portal (DSIP) accounts, update the small business concern profile with the UEI (SAM) as soon as possible.**

For new proposing small business concern registrations, follow instructions during SAM registration on how to obtain a Commercial and Government Entry (CAGE) code and be assigned the UEI (SAM). Once a CAGE code and UEI (SAM) are obtained, update the proposing small business concern's profile on the DSIP at https://www.dodsbirsttr.mil/submissions/.

In addition to the standard federal and DoD procurement certifications, the SBA SBIR Policy Directive requires the collection of certain information from proposing small business concerns at time of award and during the award life cycle. Each proposing small business concern must provide this additional information at the time of the Phase I and Phase II award, prior to final payment on the Phase I award, prior to receiving 50% of the total award amount for a Phase II award, and prior to final payment on the Phase II award.

4.18 Promotional Materials

Promotional and non-project related discussion is discouraged, and additional information provided via Universal Resource Locator (URL) links or on computer disks, CDs, DVDs, video tapes or any other medium will not be accepted or considered in the proposal evaluation.

4.19 Prior, Current, or Pending Support of Similar Proposals or Awards

IMPORTANT -- While it is permissible, with proposal notification, to submit identical proposals or proposals containing a significant amount of essentially equivalent work (see Section 3) for consideration

under numerous federal program BAAs or solicitations, it is unlawful to enter negotiation for contracts requiring essentially equivalent effort. If there is any question concerning prior, current, or pending support of similar proposals or awards, it must be disclosed to the soliciting agency or agencies as early as possible. See Section 5.3.c(11).

4.20 Fraud and Fraud Reporting

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

The DoD, Office of Inspector General Hotline ("Defense Hotline") is an important avenue for reporting fraud, waste, abuse, and mismanagement within the DoD. The Office of Inspector General operates this hotline to receive and investigate complaints or information from contractor employees, DoD civilians, military service members and public citizens. Individuals who wish to report fraud, waste or abuse may contact the Defense Hotline at (800) 424-9098 between 8:00 a.m. and 5:00 p.m. Eastern Time or visit https://www.dodig.mil/Components/Administrative-Investigations/DoD-Hotline/Hotline-Complaint/ to submit a complaint. Mailed correspondence should be addressed to the Defense Hotline, The Pentagon, Washington, DC 20301-1900, or email addressed to hotline@dodig.mil.

4.21 State and Other Assistance Available

Many states have established programs to provide services to those proposing 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;
- Assistance in obtaining Phase III funding.

Contact your State SBIR/STTR Support office at https://www.sbir.gov/state_services?state=105813# for further information. Small business concerns may seek general administrative guidance from small and disadvantaged business utilization specialists located in various Defense Contract Management activities throughout the continental United States.

4.22 Discretionary Technical and Business Assistance (TABA)

DoD has not mandated the use of TABA pending further SBA guidance and establishment of a limit on the amount of technical and business assistance services that may be received or purchased by a small business concern that has received multiple Phase II SBIR or STTR awards for a fiscal year. The proposing small business concerns should carefully review individual component instructions to determine if TABA is being offered and follow specific proposal requirements for requesting TABA funding.

5.0 PHASE I PROPOSAL

5.1 Introduction

This BAA and DSIP sites are designed to reduce the time and cost required to prepare a formal proposal. DSIP is the official portal for DoD SBIR/STTR proposal submission. Proposing small business concerns are required to submit proposals via DSIP; proposals submitted by any other means will be disregarded. Proposing small business concerns submitting through this site for the first time will be asked to register.

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It is recommended proposing small business concerns register as soon as possible upon identification of a proposal opportunity to avoid delays in the proposal submission process.

This information in this section is applicable to Phase I proposals only. If the Component is participating in the **Direct to Phase II Program**, refer to the Component-specific Direct to Phase II instructions for more information on proposal preparation.

Guidance on allowable proposal content may vary by Component. A completed proposal submission in DSIP does NOT indicate that each proposal volume has been completed in accordance with the Component-specific instructions. Accordingly, it is the proposing small business concern's responsibility to consult the Component-specific instructions for detailed guidance, including required proposal documentation and structure, cost and duration limitations, budget structure, TABA allowance and proposal page limits.

DSIP provides a structure for providing the following proposal volumes:

Volume 1: Proposal Cover Sheet
Volume 2: Technical Volume
Volume 3: Cost Volume
Volume 4: Company Commercialization Report
Volume 5: Supporting Documents

a. Contractor Certification Regarding Provision of Prohibition on Contracting for Certain Telecommunications and Video Surveillance Services or Equipment (Attachment 1) MANDATORY
b. Verification of Eligibility of Small Business Joint Ventures (Attachment 2), if applicable
c. Other supporting documentation (Refer to Component-specific instructions for additional Volume 5 requirements)
A completed proposal submission in DSIP does NOT indicate the mandatory supporting documents have been uploaded. It is the responsibility of the proposing small business concern to ensure the mandatory documents listed above have been uploaded and included with the proposal submission.

Volume 6: Fraud, Waste and Abuse Training
Volume 7: Disclosures of Foreign Affiliations or Relationships to Foreign Countries

All proposing small business concerns **must** complete the following:

- Volume 4: Company Commercialization Report (upload of CCR from SBIR.gov to DSIP is required for proposing small business concerns with prior Federal SBIR or STTR awards)
- Volume 5(a): Contractor Certification Regarding Provision of Prohibition on Contracting for Certain Telecommunications and Video Surveillance Services or Equipment (Attachment 1)
- Volume 6: Fraud, Waste and Abuse training
- Volume 7: Disclosures of Foreign Affiliations or Relationships to Foreign Countries

DO NOT lock, password protect, or encrypt any files uploaded to DSIP.

Refer to Section 5.3 below for full details on these proposal requirements.

A Phase I Proposal Template is available to provide helpful guidelines for completing each section of your Phase I technical proposal. This can be found at https://www.dodsbirsttr.mil/submissions/learning-support/firm-templates.

Detailed guidance on registering in DSIP and using DSIP to submit a proposal can be found at https://www.dodsbirsttr.mil/submissions/learning-support/training-materials. If the proposal status is "In Progress" or "Ready to Certify" it will NOT be considered submitted, even if all volumes are added prior to the BAA close date. The proposing small business concern may modify all proposal volumes prior to the BAA close date.

Although signatures are not required on the electronic forms at the time of submission the proposal must be certified electronically by the corporate official for it to be considered submitted. If the proposal is selected for negotiation and possible award, the DoD Component program will contact the proposing small business concern for signatures prior to award.

5.2 Marking Proprietary Proposal Information

Proposing small business concerns that include data in their proposals they do not want disclosed to the public for any purpose, or used by the Government except for evaluation purposes, shall:

(1) Mark the first page of each Volume of the proposal submission with the following legend:

> "This proposal includes data that shall not be disclosed outside the Government and shall not be duplicated, used, or disclosed-in whole or in part-for any purpose other than to evaluate this proposal. If, however, a contract is awarded to this proposing small business concern as a result of-or in connection with-the submission of this data, the Government shall have the right to duplicate, use, or disclose the data to the extent provided in the resulting contract. This restriction does not limit the Government's right to use information contained in this data if it is obtained from another source without restriction. The data subject to this restriction are contained in pages [insert numbers or other identification of sheets]"; and

(2) Mark each sheet of data it wishes to restrict with the following legend:

> "Use or disclosure of data contained on this page is subject to the restriction on the first page of this volume."

The DoD assumes no liability for disclosure or use of unmarked data and may use or disclose such data for any purpose.

Restrictive notices notwithstanding, proposals and final reports submitted through DSIP may be handled, for administrative purposes only, by support contractors. All support contractors are bound by appropriate non-disclosure agreements.

5.3 Phase I Proposal Instructions

a. **Proposal Cover Sheet (Volume 1)**

On DSIP at https://www.dodsbirsttr.mil/submissions/, prepare the Proposal Cover Sheet.

The Cover Sheet must include a brief technical abstract that describes the proposed R&D project and a discussion of anticipated benefits and potential commercial applications. Each section should be no more than 200 words. **Do not include proprietary or classified information in the Proposal Cover Sheet**. If your proposal is selected for negotiation and possible award, the technical abstract and discussion of anticipated benefits may be publicly

released on the Internet. You may modify the cover sheet as often as necessary until the BAA closes.

The amounts listed in the Percentage of Work (POW) certification question on the Proposal Cover Sheet are derived from information entered by the proposing small business concern in the Cost Volume (Volume 3). Details on the calculation can be viewed in DSIP during proposal submission.

If the POW calculations fall below eligibility requirements, a letter of explanation or approval by the Funding Agreement officer must be uploaded to the certification question to complete the submission. Some DoD Components will not accept any deviations from the POW minimum requirements. Please refer to the Component instructions regarding acceptance of deviations to the POW requirements.

b. **Format of Technical Volume (Volume 2)**

(1) **Type of file**: The Technical Volume must be a single Portable Document Format (PDF) file, including graphics. Perform a virus check before uploading the Technical Volume file. If a virus is detected, it may cause rejection of the proposal. **Do not lock or encrypt the uploaded file. Do not include or embed active graphics such as videos, moving pictures, or other similar media in the document.**

(2) **Length**: It is the proposing small business concern's responsibility to verify that the Technical Volume does not exceed the page limit after upload to DSIP. Please refer to Component-specific instructions for how a technical volume is handled if the stated page count is exceeded. Some Components will reject the entire technical proposal if the proposal exceeds the stated page count.

(3) **Layout:** Number all pages of your proposal consecutively. Those who wish to respond must submit a direct, concise, and informative research or research and development proposal (no type smaller than 10-point on standard 8-1/2" x 11" paper with one-inch margins). The header on each page of the Technical Volume should contain your proposing small business concern name, topic number, and proposal number assigned by DSIP when the proposal is created. The header may be included in the one-inch margin.

c. **Content of the Technical Volume (Volume 2)**

The Technical Volume should cover the following items in the order given below:

(1) **Identification and Significance of the Problem or Opportunity.** Define the specific technical problem or opportunity addressed and its importance.

(2) **Phase I Technical Objectives.** Enumerate the specific objectives of the Phase I work, including the questions the research and development effort will try to answer to determine the feasibility of the proposed approach.

(3) **Phase I Statement of Work (including Subcontractors' Efforts)**

a. Provide an explicit, detailed description of the Phase I approach. If a Phase I option is required or allowed by the Component, describe appropriate research activities which would commence at the end of Phase I base period should the Component elect to exercise the option. The Statement of Work should indicate what tasks are planned, how 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 attempt to determine the technical feasibility of the proposed concept. The methods planned to achieve each objective or task should be discussed explicitly and in detail. This section should be a substantial portion of the Technical Volume section.

b. This BAA may contain topics that have been identified by the Program Manager as research or activities involving Human/Animal Subjects and/or Recombinant DNA. If Phase I performance includes performance of these kinds of research or activities, please identify the applicable protocols and how those protocols will be followed during Phase I. Please note that funds cannot be released or used on any portion of the project involving human/animal subjects or recombinant DNA research or activities until all the proper approvals have been obtained (see Sections 4.9 - 4.11). **Small Business Concerns proposing research involving human and/or animal use are encouraged to separate these tasks in the technical proposal and cost proposal to avoid potential delay of contract award.**

(4) **Related Work.** Describe significant activities directly related to the proposed effort, including any conducted by the principal investigator, the proposing small business concern, consultants, or others. Describe how these activities interface with the proposed project and discuss any planned coordination with outside sources. The technical volume must persuade reviewers of the proposing small business concern's awareness of the state-of-the-art in the specific topic. Describe previous work not directly related to the proposed effort but similar. Provide the following:

a. Short description,
b. Client for which work was performed (including individual to be contacted and phone number), and
c. Date of completion.

(5) **Relationship with Future Research or Research and Development**

a. State the anticipated results of the proposed approach if the project is successful.
b. Discuss the significance of the Phase I effort in providing a foundation for Phase II research or research and development effort.
c. Identify the applicable clearances, certifications and approvals required to conduct Phase II testing and outline the plan for ensuring timely completion of said authorizations in support of Phase II research or research and development effort.

(6) **Commercialization Strategy.** Describe in approximately one page your proposing small business concern's strategy for commercializing this technology in DoD, other Federal Agencies, and/or private sector markets. Provide specific information on the market need the technology will address and the size of the market. Also include a schedule showing the quantitative commercialization results from this SBIR project your proposing small business concern expects to achieve.

(7) **Key Personnel.** Identify key personnel who will be involved in the Phase I effort including information on directly related education and experience. A concise technical resume of the principal investigator, including a list of relevant publications (if any), must be included (Please do not include Privacy Act Information). All resumes will count toward the page limitations for Volume 2.

(8) **Foreign Citizens.** Identify any foreign citizens or individuals holding dual citizenship expected to be involved on this project as a direct employee, subcontractor, or consultant. For these individuals, please specify their country of origin, the type of visa or work permit

under which they are performing and an explanation of their anticipated level of involvement on this project. The proposal may be deemed nonresponsive if the requested information is not provided. The proposing small business concerns should report all individuals expected to be involved on this project considered a foreign national as defined in Section 3 of the BAA. You may be asked to provide additional information during negotiations to verify the foreign citizen's eligibility to participate on a SBIR contract. Supplemental information provided in response to this paragraph will be protected in accordance with the Privacy Act (5 U.S.C. 552a), if applicable, and the Freedom of Information Act (5 U.S.C. 552(b)(6)).

(9) **Facilities/Equipment.** Describe available instrumentation and physical facilities necessary to carry out the Phase I effort. Justify equipment purchases in this section and include detailed pricing information in the Cost Volume. State whether the facilities where the proposed work will be performed meet environmental laws and regulations of federal, state (name), and local Governments for, but not limited to, the following groupings: airborne emissions, waterborne effluents, external radiation levels, outdoor noise, solid and bulk waste disposal practices, and handling and storage of toxic and hazardous materials.

(10) **Subcontractors/Consultants.** Involvement of a university or other subcontractors or consultants in the project may be appropriate. If such involvement is intended, it should be identified and described to the same level of detail as the prime contractor costs. A minimum of two- thirds of the research and/or analytical work in Phase I, as measured by direct and indirect costs, must be conducted by the proposing small business concern, unless otherwise approved in writing by the Contracting Officer. SBIR efforts may include subcontracts with Federal Laboratories and Federally Funded Research and Development Centers (FFRDCs). A waiver is no longer required for the use of federal laboratories and FFRDCs; however, proposing small business concerns must certify their use of such facilities on the Cover Sheet of the proposal.

(11) **Prior, Current, or Pending Support of Similar Proposals or Awards.** If a proposal submitted in response to this BAA is substantially the same as another proposal that was funded, is now being funded, or is pending with another Federal Agency, or another or the same DoD Component, you must reveal this on the Proposal Cover Sheet and provide the following information:

a. Name and address of the Federal Agency(s) or DoD Component to which a proposal was submitted, will be submitted, or from which an award is expected or has been received.
b. Date of proposal submission or date of award.
c. Title of proposal.
d. Name and title of principal investigator for each proposal submitted or award received.
e. Title, number, and date of BAA(s) or 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 does not apply, state in the proposal "No prior, current, or pending support for proposed work."

d. **Content of the Cost Volume (Volume 3)**

Complete the Cost Volume by using the on-line cost volume form on DSIP. Some items in the cost breakdown may not apply to the proposed project. There is no need to provide information on each individual item. What matters is that enough information be provided to allow us to understand how you plan to use the requested funds if a contract is awarded.

(1) List all key personnel by name as well as by number of hours dedicated to the project as direct labor.
(2) While special tooling and test equipment and material cost may be included under Phases I, the inclusion of equipment and material will be carefully reviewed relative to need and appropriateness for the work proposed. The purchase of special tooling and test equipment must, in the opinion of the Component Contracting Officer, be advantageous to the Government and should be related directly to the specific topic. These may include such items as innovative instrumentation or automatic test equipment. Title to property furnished by the Government or acquired with Government funds will be vested with the DoD Component, unless it is determined that transfer of title to the contractor would be more cost effective than recovery of the equipment by the DoD Component.

(3) Cost for travel funds must be justified and related to the needs of the project.
(4) Cost sharing is permitted for proposals under this BAA; cost sharing is not required, nor will it be an evaluation factor in the consideration of a Phase I proposal.
(5) A Phase I Option (if applicable) should be fully costed separately from the Phase I (base) approach.
(6) All subcontractor costs and consultant costs, such as labor, travel, equipment, materials, must be detailed at the same level as prime contractor costs. Provide detailed substantiation of subcontractor costs in your cost proposal. Volume 5, Supporting Documents, may be used if additional space is needed.

When a proposal is selected for negotiation and possible award, you must be prepared to submit further documentation to the Component Contracting Officer to substantiate costs (e.g., an explanation of cost estimates for equipment, materials, and consultants or subcontractors). For more information about cost proposals and accounting standards, see https://www.dcaa.mil/Guidance/Audit-Process-Overview/.

e. **Company Commercialization Report (Volume 4)**

The Company Commercialization Report (CCR) allows companies to report funding outcomes resulting from prior SBIR and STTR awards. SBIR and STTR awardees are required by SBA to update and maintain their organization's CCR on SBIR.gov. Commercialization information is required upon completion of the last deliverable under the funding agreement. Thereafter, SBIR and STTR awardees are requested to voluntarily update the information in the database annually for a minimum period of 5 years.

The proposing small business concern has prior DoD and/or non-DoD Phase I and/or Phase II SBIR/STTR awards, regardless of whether the project has any commercialization to date, a PDF of the CCR must be downloaded from SBIR.gov and uploaded to the Firm Forms section of DSIP by the Firm Admin. Firm Forms are completed by the DSIP Firm Admin and are applied across all proposals the proposing small business concern submits. The DSIP CCR requirement is fulfilled by completing the following:

1. Log into the firm account at https://www.sbir.gov/.

2. Navigate to My Dashboard > My Documents to view or print the information currently contained in the Company Registry Commercialization Report.
3. Create or update the commercialization record, from the company dashboard, by scrolling to the "My Commercialization" section, and clicking the create/update Commercialization tab under "Current Report Version". Please refer to the "Instructions" and "Guide" documents contained in this section of the Dashboard for more detail on completing and updating the CCR. **Ensure the report is certified and submitted.**
4. Click the "Company Commercialization Report" PDF under the My Documents section of the dashboard to download a PDF of the CCR.
5. Upload the PDF of the CCR (downloaded from SBIR.gov in previous step) to the Company Commercialization Report in the Firm Forms section of DSIP. This upload action must be completed by the Firm Admin.

This version of the CCR, uploaded to DSIP from SBIR.gov, is inserted into all proposal submissions as Volume 4.
During proposal submission, the proposing small business concern will be prompted with the question: "Do you have a new or revised Company Commercialization Report to upload?". There are three possible courses of action:

a. If the proposing small business concern has prior DoD and/or non-DoD Phase I and/or Phase II SBIR/STTR awards and **DOES have a new or revised CCR from SBIR.gov to upload to DSIP**, select YES.
   - If the user is the Firm Admin, they can upload the PDF of the CCR from SBIR.gov directly on this page. It will also be updated in the Firm Forms and be associated with all new or in-progress proposals submitted by the proposing small business concern. If the user is not the Firm Admin, they will receive a message that they do not have access and must contact the Firm Admin to complete this action.
   - **WARNING:** Uploading a new CCR under the Firm Forms section of DSIP or clicking "Save" or "Submit" in Volume 4 of one proposal submission is considered a change for ALL proposals under any open BAAs or CSOs. If a proposing small business concern has previously certified and submitted any Phase I or Direct to Phase II proposals under ***any*** BAA or CSO ***that is still open***, those proposals will be automatically reopened. Proposing small business concerns will have to recertify and resubmit such proposals. If a proposing small business concern does not recertify or resubmit such proposals, they will not be considered fully submitted and will not be evaluated.

b. If the proposing small business concern has prior DoD and/or non-DoD Phase I and/or Phase II SBIR/STTR awards, and **DOES NOT have a new or revised CCR from SBIR.gov to upload to DSIP**, select NO.
   - If a prior CCR was uploaded to the Firm Forms, the proposing small business concern will see a file dialog box at the bottom of the page and can view the previously uploaded CCR. This read-only access allows the proposing small business concern to confirm that the CCR has been uploaded by the Firm Admin.
   - If no file dialog box is present at the bottom of the page that is an indication that **there is no previously uploaded CCR in the DSIP Firm Forms**. To fulfill the DSIP CCR requirement the Firm Admin must follow steps 1-5 listed above to download a PDF of the CCR from SBIR.gov and upload it to the DSIP Firm Forms to be included with all proposal submissions.

c. If the proposing small business concern has **NO** prior DoD and/or non-DoD Phase I and/or Phase II SBIR/STTR awards, the upload of the CCR from SBIR.gov is not required and small business concern will select NO. The CCR section of the proposal will be marked complete.

While all proposing small business concerns with prior DoD and/or non-DoD Phase I and/or Phase II SBIR/STTR awards must report funding outcomes resulting from these awards through the CCR from SBIR.gov and upload a copy of this report to their Firm Forms in DSIP, **please refer to the Component-specific instructions for details on how this information will be considered during proposal evaluations.**

f. **Supporting Documents (Volume 5)**

Volume 5 is provided for proposing small business concerns to submit additional documentation to support the Coversheet (Volume 1), Technical Volume (Volume 2), and the Cost Volume (Volume 3).

All proposing small business concerns are REQUIRED to submit the following document to Volume 5: Contractor Certification Regarding Provision of Prohibition on Contracting for Certain Telecommunications and Video Surveillance Services or Equipment (Attachment 1)

The following documents may be included in Volume 5 if applicable to the proposal. Refer to Component-specific instructions for additional Volume 5 requirements.

1. Letters of Support
2. Additional Cost Information
3. Funding Agreement Certification
4. Technical Data Rights (Assertions)
5. Lifecycle Certification
6. Allocation of Rights
7. Verification of Eligibility of Small Business Joint Ventures (Attachment 2)
8. DD Form 2345, if applicable (see section 4.5)
9. Other

g. **Contractor Certification Regarding Provision of Prohibition on Contracting for Certain Telecommunications and Video Surveillance Services or Equipment**

The DoD must comply with Section 889(a)(1)(B) of the National Defense Authorization Act (NDAA) for Fiscal Year 2019 and is working to reduce or eliminate contracts with entities that use any equipment, system, or service that uses covered telecommunications equipment or services (as defined in BAA Attachment 1) as a substantial or essential component of any system, or as critical technology as part of any system.

All proposals must include certifications in Defense Federal Acquisition Regulation Supplement (DFARS) provisions 252.204-7016, 252.204-7017, and clause 252.204-7018, executed by the proposing small business concern's authorized proposing small business concern representative. The DFARS provisions and clause may be found in BAA Attachment 1. **These certifications must be signed by the authorized proposing small business concern representative and uploaded as a separate PDF file in the supporting documents sections of Volume 5 for all proposal submissions.**

The effort to complete the required certification clauses includes the proposing small business concern and any contractors that may be proposed as a part of the submission including research partners and suppliers. The proposing small business concerns are strongly encouraged to review the requirements of these certifications early in the proposal development process. Failure to submit or complete the required certifications as a part of the proposal submission process may be cause for rejection of the proposal submission without evaluation.

h. **Fraud, Waste and Abuse Training (Volume 6)**

The Fraud, Waste and Abuse (FWA) training is **required** for Phase I and Direct to Phase II proposals. FWA training provides information on what represents FWA in the SBIR/STTR program, the most common mistakes that lead to FWA, as well as the penalties and ways to prevent FWA in your small business concern. This training material can be found in the Volume 6 section of the proposal submission module in DSIP and must be thoroughly reviewed once per year. Plan and leave ample time to complete this training based on the proposal submission deadline. FWA training must be completed by one DSIP firm user with read/write access (Proposal Owner, Corporate Official or Firm Admin) on behalf of the proposing small business concern.

i. **Disclosures of Foreign Affiliations or Relationships to Foreign Countries (Volume 7)**

In accordance with Section 4 of the SBIR and STTR Extension Act of 2022 and the SBA SBIR/STTR Policy Directive, the DoD will review all proposals submitted in response to this BAA to assess security risks presented by small business concerns seeking a Federally funded award. Small business concerns must complete the Disclosures of Foreign Affiliations or Relationships to Foreign Countries webform in Volume 7 of the DSIP proposal submission (NOTE: PDF uploads will no longer be accepted). Full proposal submissions cannot be certified and submitted by the Corporate Official until Volume 7 is fully completed and the webform is submitted.

Please be aware that the Disclosures of Foreign Affiliations or Relationships to Foreign Countries WILL NOT be accepted as a Supporting Document in Volume 5 of the DSIP proposal submission. Do not upload any previous versions of this form to Volume 5.

For additional details, please refer to Section 2.2 and 4.3. The Disclosure Questions are included below:

1. Is any owner or covered individual of the applicant or awardee party to any malign foreign talent recruitment program? If yes, disclose the first and last name of each owner or covered individual, identify their role (i.e., owner or covered individual), and the malign foreign talent recruitment program.
2. Is there a parent company, joint venture, or subsidiary, of the applicant or awardee that is based in or receives funding from, any foreign country of concern? If yes, disclose the name, full address, applicant or awardee relationships (i.e., parent company, joint venture, or subsidiary) of each entity based in, or funded by, any foreign country of concern.
3. Does the applicant or awardee have any current or pending contractual or financial obligation or other agreement specific to a business arrangement, or joint venture-like arrangement with an enterprise owned by a foreign state or any foreign entity? If yes, disclose the name of each enterprise or foreign entity, type of obligation, agreement, or

arrangement (*i.e.,* contractual, financial, or other), description of obligation, agreement, or arrangement, and the foreign state(s) and/or the country of the foreign entity (or entities).

4. Is the applicant or awardee wholly owned in a foreign country? If yes, disclose the foreign country.
5. Does the applicant or awardee have any venture capital or institutional investment? If yes, proceed to question 5a. If no, proceed to question 6.

   5a. Does the investing entity have a general partner or any other individual holding a leadership role who has a foreign affiliation with any foreign country of concern? If yes or unable to determine, disclose the venture capital or institutional investing entity's name, the percentage of ownership obtained by the investing entity, and the type of investment (i.e., equity, debt, or combination of equity and debt).
6. During the previous 5-year period, did the applicant or awardee have any technology licensing or intellectual property sales or transfers, to a foreign country of concern? If yes, disclose the name, address, and country, of the institution or entity that licensed, purchased, or received the technology or intellectual property.
7. Is there any foreign business entity, offshore entity, or entity outside the United States related to the applicant or awardee? If yes, disclose the entity name, relationship type (i.e., foreign business entity, offshore entity, entity outside the United States), description of the relationship to the applicant or awardee, and entity address and country.
8. Does the applicant or awardee have an owner, officer, or covered individual that has a foreign affiliation with a research institution located in a foreign country of concern? If yes, disclose the first and last name of each owner, officer, or covered individual that has a foreign affiliation with a foreign country of concern, identify their role (i.e., owner, officer, or covered individual), and the name of the foreign research institution and the foreign country of concern where it is located.

6.0 PHASE I EVALUATION CRITERIA

Proposals will be evaluated based on the criteria outlined below, unless otherwise specified in the Component-specific instructions. Selections will be based on a determination of the overall technical value of each proposal and an evaluation of the cost volume, with the appropriate method of analysis given the contract type to be awarded, for selection of the proposal(s) most advantageous to the Government, considering the following factors which are listed in descending order of importance:

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

Cost or budget data submitted with the proposals will be considered during evaluation.

Technical reviewers will base their conclusions only on information contained in the proposal. It cannot be assumed reviewers are acquainted with the proposing small business concern or key individuals or any

referenced experiments. Relevant supporting data such as journal articles, literature, including Government publications, etc., should be included based on requirements provided in Component-specific instructions.

Denial of Awards

The DoD will not make an award under the SBIR program if it determines that—

(A) the small business concern submitting the proposal –

(i) has an owner or covered individual that is party to a malign foreign talent recruitment program;

(ii) has a business entity, parent company, or subsidiary located in the People's Republic of China or another foreign country of concern; or

(iii) has an owner or covered individual that has a foreign affiliation with a foreign entity located in the People's Republic of China or another foreign country of concern; and

(B) the relationships and commitments described in clauses (i) through (iii) of subparagraph (A)—

(i) interfere with the capacity for activities supported by the DoD to be carried out;

(ii) create duplication with activities supported by the DoD;

(iii) present concerns about conflicts of interest;

(iv) were not appropriately disclosed to the DoD;

(v) violate Federal law or terms and conditions of contracts or other agreements awarded by the DoD; or

(vi) pose a risk to national security.

7.0 PHASE II PROPOSAL INFORMATION

7.1 Introduction

Unless the Component is participating in Direct to Phase II, Phase II proposals may only be submitted by Phase I awardees. Submission of Phase II proposals are not permitted at this time, and if submitted, will be rejected without evaluation. Phase II proposal preparation and submission instructions will be provided by the DoD Components to Phase I awardees.

7.2 Proposal Provisions

IMPORTANT -- While it is permissible, with proposal notification, to submit identical proposals or proposals containing a significant amount of essentially equivalent work for consideration under numerous federal program BAAs and solicitations, it is unlawful to enter negotiation for contracts or grants requiring essentially equivalent effort. If there is any question concerning this, it must be disclosed to the soliciting agency or agencies as early as possible. If a proposal submitted for a Phase II effort is substantially the same as another proposal that was funded, is now being funded, or is pending with another Federal Agency, or another or the same DoD Component, you must reveal this on the Cover Sheet and provide the information required in Section 5.4.c(11).

Due to specific limitations on the amount of funding and number of awards that may be awarded to a particular proposing small business concern per topic using SBIR/STTR program funds, Head of Agency Determinations are now required before a different agency may make an award using another agency's topic. This limitation does not apply to Phase III funding. Please contact your original sponsoring agency before submitting a Phase II proposal to an agency other than the one who sponsored the original topic.

Section 4(b)(1)(i) of the SBIR/STTR Policy Directive provides that, at the agency's discretion, projects awarded a Phase I under a solicitation for SBIR may transition in Phase II to STTR and vice versa. A

proposing small business concern wishing to transfer from one program to another must contact their designated technical monitor to discuss the reasons for the request and the agency's ability to support the request. The transition may be proposed prior to award or during the performance of the Phase II effort. Agency disapproval of a request to change programs shall not be grounds for granting relief from any contractual performance requirement. All approved transitions between programs must be noted in the Phase II award or award modification signed by the contracting officer that indicates the removal or addition of the research institution and the revised percentage of work requirements.

7.3 Commercialization Strategy

At a minimum, your commercialization strategy must address the following five questions:

(1) What is the first product that this technology will go into?
(2) Who will be the customers, and what is the estimated market size?
(3) How much money will be needed to bring the technology to market, and how will that money be raised?
(4) Does the proposing small business concern contain marketing expertise and, if not, how will that expertise be brought into the small business concern?
(5) Who are the proposing small business concern's competitors, and what is the price and/or quality advantage over those competitors?

The commercialization strategy must also include a schedule showing the anticipated quantitative commercialization results from the Phase II project at one year after the start of Phase II, at the completion of Phase II, and after the completion of Phase II (i.e., amount of additional investment, sales revenue, etc.). After Phase II award, the proposing small business concern is required to report actual sales and investment data in its SBA Company Commercialization Report via "My Dashboard" on SBIR.gov at least annually. For information on formatting, page count and other details, please refer to the Component-specific instructions.

7.4 Phase II Evaluation Criteria

Phase II proposals will be evaluated based on the criteria outlined above in section 6.0, unless otherwise specified in the Component-specific instructions.

7.5 Phase II Award Information

DoD Components will notify Phase I awardees of the Phase II proposal submission requirements. Submission of Phase II proposals will be in accordance with instructions provided by individual Components. The details on the due date, content, and submission requirements of the Phase II proposal will be provided by the awarding DoD Component either in the Phase I award or by subsequent notification.

7.6 Adequate Accounting System

To reduce risk to the small business and avoid potential contracting delays, companies interested in pursuing Phase II SBIR contracts and other contracts of similar size with the DoD, have an adequate accounting system per General Accepted Accounting Principles (GAAP), Generally Accepted Government Auditing Standards (GAGAS), Federal Acquisition Regulation (FAR) and Cost Accounting Standards (CAS) in place. The accounting system will be audited by the Defense Contract Audit Agency (DCAA). DCAA's requirements and standards are available on their Website at https://www.dcaa.mil/Guidance/Audit-Process-Overview/ and https://www.dcaa.mil/Checklists-Tools/Pre-award-Accounting-System-Adequacy-Checklist/.

AMENDMENT 1

7.7 Phase II Enhancement Policy

To further encourage the transition of SBIR research into DoD acquisition programs as well as the private sector, certain DoD Components have developed their own Phase II Enhancement policy. Under this policy, the Component will provide a Phase II awardee with additional Phase II SBIR funding if the proposing small business concern can match the additional SBIR funds with non-SBIR funds from DoD acquisition programs or the private sector.

See component instructions for more details on Phase II Enhancement opportunities.

7.8 Commercialization Readiness Program (CRP)

The SBIR/STTR Reauthorization Act of 2011 established the Commercialization Pilot Program (CPP) as a long-term program titled the Commercialization Readiness Program (CRP).

Each Military Department (Army, Navy, and Air Force) has established a Commercialization Readiness Program. Please check the Component instructions for further information.

The DoD SBIR/STTR Program has established the OSD Transitions SBIR Technology (OTST) Pilot Program. The OTST pilot program is an interim technology maturity phase (Phase II), inserted into the SBIR development.

For more information contact osd.ncr.ousd-r-e.mbx.sbir-sttr-tech-transition@mail.mil.

8.0 CONTRACTUAL REQUIREMENTS

8.1 Additional Contract Requirements

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

Examples of general provisions:

a. **Standards of Work**. Work performed under the contract must conform to high professional standards.
b. **Inspection**. Work performed under the contract is subject to Government inspection and evaluation at all reasonable times.
c. **Examination of Records**. The Comptroller General (or a fully authorized representative) shall have the right to examine any directly pertinent records of the contractor involving transactions related to this contract.
d. **Default**. The Government may terminate the contract if the contractor fails to perform the work contracted.
e. **Termination for Convenience**. The contract may be terminated at any time by the Government if it deems termination to be in its best interest, in which case the contractor will be compensated for work performed and for reasonable termination costs.
f. **Disputes**. Any dispute concerning the contract which cannot be resolved by agreement shall be decided by the contracting officer with right of appeal.

g. **Contract Work Hours**. The contractor may not require an employee to work more than eight hours a day or forty hours a week unless the employee is compensated accordingly (receives overtime pay).
h. **Equal Opportunity**. The contractor 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 contractor will not discriminate against any employee or applicant for employment because he or she is a disabled veteran.
j. **Affirmative Action for Handicapped**. The contractor 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 member of or delegate to Congress shall benefit from the contract.
l. **Covenant Against Contingent Fees**. No person or agency has been employed to solicit or secure the contract upon an understanding for compensation except bona fide employees or commercial agencies maintained by the contractor for the purpose of securing business.
m. **Gratuities**. The contract may be terminated by the Government if any gratuities have been offered to any representative of the Government to secure the contract.
n. **Patent Infringement**. The contractor shall report each notice or claim of patent infringement based on the performance of the contract.
o. **Military Security Requirements**. The contractor shall safeguard any classified information associated with the contracted work in accordance with applicable regulations.
p. **American Made Equipment and Products**. When purchasing equipment or a product under the SBIR funding agreement, purchase only American-made items whenever possible.

Applicable Federal Acquisition Regulation (FAR) and/or Defense Federal Acquisition Regulation Supplement (DFARS) Clauses:

q. **Unique Identification (UID)**. If your proposal identifies hardware that will be delivered to the government, be aware of the possible requirement for unique item identification in accordance with DFARS 252.211-7003.
r. **Disclosure of Information.** In accordance with FAR 252.204-7000, Government review and approval will be required prior to any dissemination or publication, regardless of medium (e.g., film, tape, document), pertaining to any part of this contract or any program related to this contract except within and between the Contractor and any subcontractors, of unclassified and non-fundamental information developed under this contract or contained in the reports to be furnished pursuant to this contract.
s. **Animal Welfare**. Contracts involving research, development, test, evaluation, or training on vertebrate animals will incorporate DFARS clause 252.235-7002.
t. **Protection of Human Subjects**. Effective 29 July 2009, contracts that include or may include research involving human subjects in accordance with 32 CFR Part 219, DoD Directive 3216.02 and 10 U.S.C. 980, including research that meets exemption criteria under 32 CFR 219.101(b), will incorporate DFARS clause 252.235-7004.
u. **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 22.2803.
v. **ITAR**. In accordance with DFARS 225.7901-4, Export Control Contract Clauses, the clause found at DFARS 252.225-7048, Export-Controlled Items (June 2013), must be included in all BAAs/solicitations and contracts. All awards resulting from this BAA will include DFARS 252.225-7048. Full text of the clause may be found at https://www.govinfo.gov/content/pkg/CFR-2013-title48-vol3/pdf/CFR-2013-title48-vol3-sec252-225-7048.pdf.

w. **Cybersecurity**. Any small business concern receiving an SBIR/STTR award is required to provide adequate cybersecurity on all covered contractor information systems. Specific security requirements and cyber incident reporting requirements are listed in DFARS 252.204.7012. To learn about cybersecurity resources for your SBIR/STTR contract visit the Blue Cyber webpage: https://www.safcn.af.mil/CISO/Small-Business-Cybersecurity-Information/.

x. **Safeguarding Covered Defense Information Controls.** As prescribed in DFARS 252.204-7008, for covered contractor information systems that are not part of an information technology service or system operated on behalf of the Government, the SBC represents that it will implement the security requirements specified by National Institute of Standards and Technology (NIST) Special Publication (SP) 800-171, "Protecting Controlled Unclassified Information in Nonfederal Information Systems and Organizations."

y. **Limitations on the Use or Disclosure of Third- Party Contractor Reported Cyber Incident Information.** As required in DFARS 252.204-7009, the Contractor must agree that certain conditions apply to any information it receives or creates in the performance of a resulting contract that is information obtained from a third-party's reporting of a cyber incident pursuant to DFARS clause 252.204-7012, Safeguarding Covered Defense Information and Cyber Incident Reporting (or derived from such information obtained under that clause).

z. **Notice of NIST SP 800-171 DoD Assessment Requirements.** As prescribed by DFARS 252.204-7019, in order to be considered for award, the SBC is required to implement NIST SP 800-171. The SBC shall have a current assessment (see 252.204-7020) for each covered contractor information system that is relevant to the offer, contract, task order, or delivery order. The Basic, Medium, and High NIST SP 800-171 DoD Assessments are described in the NIST SP 800-171 DoD Assessment Methodology located at https://www.acq.osd.mil/dpap/pdi/cyber/strategically_assessing_contractor_implementation_of_NIST_SP_800-171.html. In accordance with DFARS 252.204-7020, the SBC shall provide access to its facilities, systems, and personnel necessary for the Government to conduct a Medium or High NIST SP 800-171 DoD Assessment, as described in NIST SP 800-171 DoD Assessment Methodology, linked above. Notification of specific requirements for NIST SP 800-171 DoD assessments and assessment level will be provided as part of the component instructions, topic, or award.

aa. **Contractor Certification Regarding Provision of Prohibition on Contracting for Certain Telecommunications and Video Surveillance Services or Equipment.** In accordance with DFARS Subpart 204.21, DFARS provisions 252.204-7016, 252.204-7017, and clause 252.204-7018 are incorporated into this solicitation. This subpart implements section 1656 of the National Defense Authorization Act for Fiscal Year 2018 (Pub. L. 115-91) and section 889(a)(1)(A) of the National Defense Authorization Act for Fiscal Year 2019 (Pub. L. 115-232). Full text of the provisions and clause and required offeror representations can be found in Attachment 1 of this BAA.

8.2 Federal Acquisition Supply Chain Security Act (FASCSA) Orders

FAR 52.204-29 Federal Acquisition Supply Chain Security Act Orders—Representation and Disclosures and FAR 52.204-30 Federal Acquisition Supply Chain Security Act Orders—Prohibition are included in this solicitation. In accordance with FAR 52.204-29 and FAR 52.204-30, proposers must review FASCSA orders at https://sam.gov/content/supplychainorders for covered articles, or any products or services produced or provided by a source, that are prohibited by an applicable FASCSA order.

During contract performance, the Contractor shall review SAM.gov at least once every three months, or as advised by the Contracting Officer, to check for covered articles or for products or services produced by a source subject as part of any new FASCSA order(s) that could impact their supply chain, and report to the Contracting Officer if any covered article or product or service produced or provided by a source

was provided to the Government or used during contract performance.

By submission of a proposal in response to this BAA, the proposing small business concern represents that it has conducted a reasonable inquiry, and that the small business concern does not propose to provide or use in response to this BAA any covered article, or any products or services produced or provided by a source, if the covered article or the source is prohibited by an applicable FASCSA order in effect on the date the BAA was issued.

FULL TEXT:

FAR 52.204-29 Federal Acquisition Supply Chain Security Act Orders—Representation and Disclosures (Dec 2023)

(a) *Definitions.* As used in this provision, *Covered article, FASCSA order, Intelligence community, National security system, Reasonable inquiry, Sensitive compartmented information, Sensitive compartmented information system,* and *Source* have the meaning provided in the clause 52.204-30, Federal Acquisition Supply Chain Security Act Orders—Prohibition.

(b) *Prohibition.* Contractors are prohibited from providing or using as part of the performance of the contract any covered article, or any products or services produced or provided by a source, if the prohibition is set out in an applicable Federal Acquisition Supply Chain Security Act (FASCSA) order, as described in paragraph (b)(1) of FAR 52.204-30, Federal Acquisition Supply Chain Security Act Orders—Prohibition.

(c) *Procedures*.

(1) The Offeror shall search for the phrase "FASCSA order" in the System for Award Management (SAM)(*https://www.sam.gov)* for any covered article, or any products or services produced or provided by a source, if there is an applicable FASCSA order described in paragraph (b)(1) of FAR 52.204-30, Federal Acquisition Supply Chain Security Act Orders—Prohibition.

(2) The Offeror shall review the solicitation for any FASCSA orders that are not in SAM, but are effective and do apply to the solicitation and resultant contract (see FAR 4.2303(c)(2)).

(3) FASCSA orders issued after the date of solicitation do not apply unless added by an amendment to the solicitation.

(d) *Representation.* By submission of this offer, the offeror represents that it has conducted a reasonable inquiry, and that the offeror does not propose to provide or use in response to this solicitation any covered article, or any products or services produced or provided by a source, if the covered article or the source is prohibited by an applicable FASCSA order in effect on the date the solicitation was issued, except as waived by the solicitation, or as disclosed in paragraph (e).

(e) *Disclosures.* The purpose for this disclosure is so the Government may decide whether to issue a waiver. For any covered article, or any products or services produced or provided by a source, if the covered article or the source is subject to an applicable FASCSA order, and the Offeror is unable to represent compliance, then the Offeror shall provide the following information as part of the offer:

(1) Name of the product or service provided to the Government;

(2) Name of the covered article or source subject to a FASCSA order;

(3) If applicable, name of the vendor, including the Commercial and Government Entity code and unique entity identifier (if known), that supplied the covered article or the product or service to the Offeror;

(4) Brand;

(5) Model number (original equipment manufacturer number, manufacturer part number, or wholesaler number);

(6) Item description;

(7) Reason why the applicable covered article or the product or service is being provided or used;

(f) *Executive agency review of disclosures.* The contracting officer will review disclosures provided in paragraph (e) to determine if any waiver may be sought. A contracting officer may choose not to pursue a waiver for covered articles or sources otherwise subject to a FASCSA order and may instead make an award to an offeror that does not require a waiver

(End of clause)

FAR 52.204-30 Federal Acquisition Supply Chain Security Act Orders—Prohibition

(a) Definitions. As used in this clause— https://www.acquisition.gov/far/52.204-30.

(b) *Prohibition.*

(1) Unless an applicable waiver has been issued by the issuing official, Contractors shall not provide or use as part of the performance of the contract any covered article, or any products or services produced or provided by a source, if the covered article or the source is prohibited by an applicable FASCSA orders as follows:

(i) For solicitations and contracts awarded by a Department of Defense contracting office, DoD FASCSA orders apply.

(ii) For all other solicitations and contracts DHS FASCSA orders apply.

(2) The Contractor shall search for the phrase "FASCSA order" in the System for Award Management (SAM) at *https://www.sam.gov* to locate applicable FASCSA orders identified in paragraph (b)(1).

(3) The Government may identify in the solicitation additional FASCSA orders that are not in SAM, which are effective and apply to the solicitation and resultant contract.

(4) A FASCSA order issued after the date of solicitation applies to this contract only if added by an amendment to the solicitation or modification to the contract (see FAR 4.2304(c)). However, see paragraph (c) of this clause.

(5)

(i) If the contractor wishes to ask for a waiver of the requirements of a new FASCSA order being applied through modification, then the Contractor shall disclose the following:

(A) Name of the product or service provided to the Government;

(B) Name of the covered article or source subject to a FASCSA order;

(C) If applicable, name of the vendor, including the Commercial and Government Entity code and unique entity identifier (if known), that supplied or supplies the covered article or the product or service to the Offeror;

(D) Brand;

(E) Model number (original equipment manufacturer number, manufacturer part number, or wholesaler number);

(F) Item description;

(G) Reason why the applicable covered article or the product or service is being provided or used;

(ii) *Executive agency review of disclosures.* The contracting officer will review disclosures provided in paragraph (b)(5)(i) to determine if any waiver is warranted. A contracting officer may choose not to pursue a waiver for covered articles or sources otherwise covered by a FASCSA order and to instead pursue other appropriate action.

(c) *Notice and reporting requirement.*

(1) During contract performance, the Contractor shall review *SAM.gov* at least once every three months, or as advised by the Contracting Officer, to check for covered articles subject to FASCSA order(s), or for products or services produced by a source subject to FASCSA order(s) not currently identified under paragraph (b) of this clause.

(2) If the Contractor identifies a new FASCSA order(s) that could impact their supply chain, then the Contractor shall conduct a reasonable inquiry to identify whether a covered article or product or service produced or provided by a source subject to the FASCSA order(s) was provided to the Government or used during contract performance.

(3)

(i) The Contractor shall submit a report to the contracting office as identified in paragraph (c)(3)(ii) of this clause, if the Contractor identifies, including through any notification by a subcontractor at any tier, that a covered article or product or service produced or provided by a source was provided to the Government or used during contract performance and is subject to a FASCSA order(s) identified in paragraph (b) of this clause, or a new FASCSA order identified in paragraph (c)(2) of this clause. For indefinite delivery contracts, the Contractor shall report to both the contracting office for the indefinite delivery contract and the contracting office for any affected order.

(ii) If a report is required to be submitted to a contracting office under (c)(3)(i) of this clause, the Contractor shall submit the report as follows:

(A) If a Department of Defense contracting office, the Contractor shall report to the website at *https://dibnet.dod.mil*.

(B) For all other contracting offices, the Contractor shall report to the Contracting Officer.

(4) The Contractor shall report the following information for each covered article or each product or service produced or provided by a source, where the covered article or source is subject to a FASCSA order, pursuant to paragraph (c)(3)(i) of this clause:

(i) Within 3 business days from the date of such identification or notification:

(A) Contract number;

(B) Order number(s), if applicable;

(C) Name of the product or service provided to the Government or used during performance of the contract;

(D) Name of the covered article or source subject to a FASCSA order;

(E) If applicable, name of the vendor, including the Commercial and Government Entity code and unique entity identifier (if known), that supplied the covered article or the product or service to the Contractor;

(F) Brand;

(G) Model number (original equipment manufacturer number, manufacturer part number, or wholesaler number);

(H) Item description; and

(I) Any readily available information about mitigation actions undertaken or recommended.

(ii) Within 10 business days of submitting the information in paragraph (c)(4)(i) of this clause:

(A) Any further available information about mitigation actions undertaken or recommended.

(B) In addition, the Contractor shall describe the efforts it undertook to prevent submission or use of the covered article or the product or service produced or provided by a source subject to an applicable FASCSA order, and any additional efforts that will be incorporated to prevent future submission or use of the covered article or the product or service produced or provided by a source that is subject to an applicable FASCSA order.

(d) *Removal*. For Federal Supply Schedules, Governmentwide acquisition contracts, multi-agency contracts or any other procurement instrument intended for use by multiple agencies, upon notification from the Contracting Officer, during the performance of the contract, the Contractor shall promptly make any necessary changes or modifications to remove any product or service produced or provided by a source that is subject to an applicable FASCSA order.

(e) *Subcontracts*.

(1) The Contractor shall insert the substance of this clause, including this paragraph (e) and excluding paragraph (c)(1) of this clause, in all subcontracts and other contractual instruments, including subcontracts for the acquisition of commercial products and commercial services.

(2) The Government may identify in the solicitation additional FASCSA orders that are not in SAM, which are effective and apply to the contract and any subcontracts and other contractual instruments under the contract. The Contractor or higher-tier subcontractor shall notify their subcontractors, and suppliers under other contractual instruments, that the FASCSA orders in the solicitation that are not in SAM apply to the contract and all subcontracts.

(End of clause)

8.3 Agency Recovery Authority and Ongoing Reporting

In accordance with Section 5 of the SBIR and STTR Extension Act of 2022, the DoD will –

1) require a small business concern receiving an award under its SBIR program to repay all amounts received from the Federal agency under the award if—
   (A) the small business concern makes a material misstatement that the Federal agency determines poses a risk to national security; or
   (B) there is a change in ownership, change to entity structure, or other substantial change in circumstances of the small business concern that the Federal agency determines poses a risk to national security; and
2) require a small business concern receiving an award under its SBIR program to regularly report to the Federal agency and the Administration throughout the duration of the award on—
   (A) any change to a disclosure required under subparagraphs (A) through (G) of section 4.3 above;
   (B) any material misstatement made under section 8.2 paragraph (A) above; and
   (C) any change described in section 8.2 paragraph (B) above.

8.4 Basic Safeguarding of Covered Contractor Information Systems

FAR 52.204-21, Basic Safeguarding of Covered Contractor Information Systems, is incorporated into this solicitation. In accordance with FAR 52.204-21, the contractor shall apply basic safeguarding requirements and procedures when the contractor or a subcontractor at any tier may have Federal contract information residing in or transiting through its information system.

8.5 Prohibition on Contracting with Persons that have Business Operations with the Maduro Regime

DFARS 252.225-7055, Representation Regarding Business Operations with the Maduro Regime, is incorporated into this solicitation. In accordance with section 890 of the National Defense Authorization Act for Fiscal Year 2020 (Pub. L. 116-92), DoD is prohibited from entering into a contract for the procurement of products or services with any person that has business operations with an authority of the government of Venezuela that is not recognized as the legitimate government of Venezuela by the United States Government, unless the person has a valid license to operate in Venezuela issued by the Office of Foreign Assets Control of the Department of the Treasury.

8.6 Copyrights

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

8.7 Patents

Small business concerns normally may retain the principal worldwide patent rights to any invention developed with Government support. The Government receives a royalty-free license for its use, reserves the right to require the patent holder to license others in certain limited circumstances, and requires that anyone exclusively licensed to sell the invention in the United States must normally manufacture it domestically. 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 period of five years to allow the awardee to pursue a patent. See also Section 8.7, Invention Reporting.

8.8 Invention Reporting

SBIR awardees must report inventions to the Component within two months of the inventor's report to the awardee. The reporting of inventions may be accomplished by submitting paper documentation, including fax, or through the Edison Invention Reporting System at www.iedison.gov for those agencies participating in iEdison.

8.9 Technical Data Rights

Rights in technical data, including software, developed under the terms of any contract resulting from proposals submitted in response to this BAA 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 twenty years after completion of the project under which the data were generated. This data should be marked with the restrictive legend specified in DFARS 252.227-7018 Class Deviation 2020-O0007. Upon expiration of the twenty-year restrictive license, the Government has Government Purpose 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 contractors except: (1) For evaluation purposes; (2) As expressly permitted by the contractor; or (3) A use, release, or disclosure that is necessary for emergency repair or overhaul of items operated by the Government. See DFARS clause 252.227-7018 Class Deviation 2020-O0007 "Rights in Noncommercial Technical Data and Computer Software – Small Business Innovation Research (SBIR) Program."

If a proposing small business concern plans to submit assertions in accordance with DFARS 252.227-7017 Class Deviation 2020-O0007, those assertions must be identified and assertion of use, release, or disclosure restriction MUST be included with your proposal submission, at the end of the technical volume. The contract cannot be awarded until assertions have been approved.

8.10 Final Technical Reports - Phase I through Phase III

a. **Content**: A final report is required for each project phase. The reports must contain in detail the project objectives, work performed, results obtained, and estimates of technical feasibility. A completed SF 298, "Report Documentation Page," will be used as the first page of the report. Submission resources are available at https://discover.dtic.mil/submit-documents/. In addition, monthly status and progress reports may be required by the DoD Component.

b. **SF 298 Form "Report Documentation Page" Preparation**:

(1) If desirable, language used by the proposing small business concern in its Phase II proposal to report Phase I progress may also be used in the final report.

(2) For each unclassified report, the proposing small business concern submitting the report should fill in Block 12 (Distribution/Availability Statement) of the SF 298, "Report Documentation Page," with the following statement: "Distribution authorized to U.S. Government only; Proprietary Information, (Date of Determination). Other requests for this document shall be referred to the Component SBIR Program Office."

Note: Data developed under a SBIR contract is subject to SBIR Data Rights which allow for protection under DFARS 252.227-7018 Class Deviation 2020-O0007 (see Section 8.5, Technical Data Rights). The sponsoring DoD activity, after reviewing the proposing small business concern's entry in Block 12, has final responsibility for assigning a distribution statement.

For additional information on distribution statements see the following Defense Technical Information Center (DTIC) Web site: https://discover.dtic.mil/wp-content/uploads/2018/09/distribution_statements_and_reasonsSept2018.pdf

(3) Block 14 (Abstract) of the SF 298, "Report Documentation Page" must include as the first sentence, "Report developed under SBIR contract for topic [insert BAA topic number. [Follow with the topic title, if possible.]" The abstract must identify the purpose of the work and briefly describe the work conducted, the findings or results and the potential applications of the effort. **Since the abstract will be published by the DoD, it must not contain any proprietary or classified data and type "UU" in Block 17.**

(4) Block 15 (Subject Terms) of the SF 298 must include the term "SBIR Report".

c. **Submission**: In accordance with DoD Directive 3200.12 and DFARS clause 252.235-7011, a copy of the final report shall be submitted (electronically or on disc) to:

Defense Technical Information Center
ATTN: DTIC-OA (SBIR)
8725 John J Kingman Road, Suite 0944
Ft. Belvoir, VA 22060-6218

Delivery will normally be within 30 days after completion of the Phase I technical effort.

Other requirements regarding submission of reports and/or other deliverables will be defined in the Contract Data Requirements List (CDRL) of each contract. Special instructions for the submission of CLASSIFIED reports will be defined in the delivery schedule of the contract.

DO NOT E-MAIL Classified or controlled unclassified reports, or reports containing SBIR Data Rights protected under DFARS 252.227-7018 Class Deviation 2020-O0007.

AMENDMENT 1

ATTACHMENT 1

Department of Defense (DoD)
Small Business Innovation Research (SBIR) Program
Small Business Technology Transfer (STTR) Program

Contractor Certification Regarding Provision of Prohibition on Contracting for Certain Telecommunications and Video Surveillance Services or Equipment
(DFARS SUBPART 204.21)

Contractor's Name	
Small Business Concern Name	
Office Tel #	
Mobile #	
Email	

Name of person authorized to sign: _____

Signature of person authorized: _____

Date: _____

The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

DFARS PROVISIONS INCORPORATED IN FULL TEXT:

252.204-7016 Covered Defense Telecommunications Equipment or Services—Representation

COVERED DEFENSE TELECOMMUNICATIONS EQUIPMENT OR SERVICES—REPRESENTATION (DEC 2019)

(a) *Definitions*. As used in this provision, "covered defense telecommunications equipment or services" has the meaning provided in the clause 252.204-7018 , Prohibition on the Acquisition of Covered Defense Telecommunications Equipment or Services.

(b) *Procedures*. The Offeror shall review the list of excluded parties in the System for Award Management (SAM) (https://www.sam.gov/) for entities excluded from receiving federal awards for "covered defense telecommunications equipment or services".

(c) *Representation*. The Offeror represents that it ☐ does, ☐ does not provide covered defense telecommunications equipment or services as a part of its offered products or services to the Government in the performance of any contract, subcontract, or other contractual instrument.

252.204-7017 Prohibition on the Acquisition of Covered Defense Telecommunications Equipment or Services—Representation

PROHIBITION ON THE ACQUISITION OF COVERED DEFENSE TELECOMMUNICATIONS EQUIPMENT OR SERVICES—REPRESENTATION (MAY 2021)

*The Offeror is not required to complete the representation in this provision if the Offeror has represented in the provision at 252.204-7016 , Covered Defense Telecommunications Equipment or Services—Representation, that it "**does not** provide covered defense telecommunications equipment or services as a part of its offered products or services to the Government in the performance of any contract, subcontract, or other contractual instrument."*

(a) *Definitions*. "Covered defense telecommunications equipment or services," "covered mission," "critical technology," and "substantial or essential component," as used in this provision, have the meanings given in the 252.204-7018 clause, Prohibition on the Acquisition of Covered Defense Telecommunications Equipment or Services, of this solicitation.

(b) *Prohibition*. Section 1656 of the National Defense Authorization Act for Fiscal Year 2018 (Pub. L. 115-91) prohibits agencies from procuring or obtaining, or extending or renewing a contract to procure or obtain, any equipment, system, or service to carry out covered missions that uses covered defense telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system.

(c) *Procedures*. The Offeror shall review the list of excluded parties in the System for Award Management (SAM) at https://www.sam.gov for entities that are excluded when providing any equipment, system, or service to carry out covered missions that uses covered defense telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system, unless a waiver is granted.

Representation. If in its annual representations and certifications in SAM the Offeror has represented in paragraph (c) of the provision at 252.204-7016 , Covered Defense Telecommunications Equipment or Services—Representation, that it "does" provide covered defense telecommunications equipment or services as a part of its offered products or services to the Government in the performance of any contract, subcontract, or other contractual instrument, then the Offeror shall complete the following additional representation:

AMENDMENT 1

The Offeror represents that it ☐will ☐will not provide covered defense telecommunications equipment or services as a part of its offered products or services to DoD in the performance of any award resulting from this solicitation.

(e) *Disclosures*. If the Offeror has represented in paragraph (d) of this provision that it "will provide covered defense telecommunications equipment or services," the Offeror shall provide the following information as part of the offer:

(1) A description of all covered defense telecommunications equipment and services offered (include brand or manufacturer; product, such as model number, original equipment manufacturer (OEM) number, manufacturer part number, or wholesaler number; and item description, as applicable).

(2) An explanation of the proposed use of covered defense telecommunications equipment and services and any factors relevant to determining if such use would be permissible under the prohibition referenced in paragraph (b) of this provision.

(3) For services, the entity providing the covered defense telecommunications services (include entity name, unique entity identifier, and Commercial and Government Entity (CAGE) code, if known).

(4) For equipment, the entity that produced or provided the covered defense telecommunications equipment (include entity name, unique entity identifier, CAGE code, and whether the entity was the OEM or a distributor, if known).

(End of provision)

252.204-7018 Prohibition on the Acquisition of Covered Defense Telecommunications Equipment or Services

PROHIBITION ON THE ACQUISITION OF COVERED DEFENSE TELECOMMUNICATIONS EQUIPMENT OR SERVICES (JAN 2021)

Definitions. As used in this clause—

"Covered defense telecommunications equipment or services" means—

(1) Telecommunications equipment produced by Huawei Technologies Company or ZTE Corporation, or any subsidiary or affiliate of such entities;

(2) Telecommunications services provided by such entities or using such equipment; or

(3) Telecommunications equipment or services produced or provided by an entity that the Secretary of Defense reasonably believes to be an entity owned or controlled by, or otherwise connected to, the government of a covered foreign country.

"Covered foreign country" means—

(1) The People's Republic of China; or

(2) The Russian Federation.

"Covered missions" means—

(1) The nuclear deterrence mission of DoD, including with respect to nuclear command, control, and communications, integrated tactical warning and attack assessment, and continuity of Government; or

(2) The homeland defense mission of DoD, including with respect to ballistic missile defense.

"Critical technology" means—

(1) Defense articles or defense services included on the United States Munitions List set forth in the International Traffic in Arms Regulations under subchapter M of chapter I of title 22, Code of Federal Regulations;

(2) Items included on the Commerce Control List set forth in Supplement No. 1 to part 774 of the Export Administration Regulations under subchapter C of chapter VII of title 15, Code of Federal Regulations, and controlled—

(i) Pursuant to multilateral regimes, including for reasons relating to national security, chemical and biological weapons proliferation, nuclear nonproliferation, or missile technology; or

(ii) For reasons relating to regional stability or surreptitious listening;

(3) Specially designed and prepared nuclear equipment, parts and components, materials, software, and technology covered by part 810 of title 10, Code of Federal Regulations (relating to assistance to foreign atomic energy activities);

(4) Nuclear facilities, equipment, and material covered by part 110 of title 10, Code of Federal Regulations (relating to export and import of nuclear equipment and material);

(5) Select agents and toxins covered by part 331 of title 7, Code of Federal Regulations, part 121 of title 9 of such Code, or part 73 of title 42 of such Code; or

(6) Emerging and foundational technologies controlled pursuant to section 1758 of the Export Control Reform Act of 2018 (50 U.S.C. 4817).

"Substantial or essential component" means any component necessary for the proper function or performance of a piece of equipment, system, or service.

(b) *Prohibition*. In accordance with section 1656 of the National Defense Authorization Act for Fiscal Year 2018 (Pub. L. 115-91), the contractor shall not provide to the Government any equipment, system, or service to carry out covered missions that uses covered defense telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system, unless the covered defense telecommunication equipment or services are covered by a waiver described in Defense Federal Acquisition Regulation Supplement 204.2104 .

(c) *Procedures*. The Contractor shall review the list of excluded parties in the System for Award Management (SAM) at https://www.sam.gov for entities that are excluded when providing any equipment, system, or service, to carry out covered missions, that uses covered defense telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system, unless a waiver is granted.

(d) *Reporting*.

(1) In the event the Contractor identifies covered defense telecommunications equipment or services used as a substantial or essential component of any system, or as critical technology as part of any system, during contract performance, the Contractor shall report at https://dibnet.dod.mil the information in paragraph (d)(2) of this clause.

(2) The Contractor shall report the following information pursuant to paragraph (d)(1) of this clause:

(i) Within 3 business days from the date of such identification or notification: the contract number; the order number(s), if applicable; supplier name; brand; model number (original equipment manufacturer number, manufacturer part number, or wholesaler number); item description; and any readily available information about mitigation actions undertaken or recommended.

(ii) Within 30 business days of submitting the information in paragraph (d)(2)(i) of this clause: any further available information about mitigation actions undertaken or recommended. In addition, the Contractor shall describe the efforts it undertook to prevent use or submission of a covered defense telecommunications equipment or services, and any additional efforts that will be incorporated to prevent future use or submission of covered telecommunications equipment or services.

(e) *Subcontracts*. The Contractor shall insert the substance of this clause, including this paragraph (e), in all subcontracts and other contractual instruments, including subcontracts for the acquisition of commercial items.

(End of clause)

AMENDMENT 1

ATTACHMENT 2

Department of Defense (DoD)
Small Business Innovation Research (SBIR) Program
Small Business Technology Transfer (STTR) Program

Verification of Eligibility of Small Business Joint Ventures

A small business joint venture offeror must submit, with its offer, the representation required in paragraph (c) of FAR solicitation provision 52.212-3, Offeror Representations and Certifications-Commercial Products and Commercial Services, and paragraph (c) of FAR solicitation provision 52.219-1, Small Business Program Representations, in accordance with 52.204-8(d) and 52.212-3(b) for the following categories:

(A) Small business;
(B) Service-disabled veteran-owned small business;
(C) Women-owned small business (WOSB) under the WOSB Program;
(D) Economically disadvantaged women-owned small business under the WOSB Program; or
(E) Historically underutilized business zone small business

Contractor's Name	
Small Business Concern Name	
Office Tel #	
Mobile #	
Email	

Name of person authorized to sign: _____

Signature of person authorized: _____

Date: _____

FAR Provision Incorporated in Full Text:

52.219-1 Small Business Program Representations (Oct 2022)

(a) *Definitions*. As used in this provision-

Economically disadvantaged women-owned small business (EDWOSB) concern means a small business concern that is at least 51 percent directly and unconditionally owned by, and the management

and daily business operations of which are controlled by, one or more women who are citizens of the United States and who are economically disadvantaged in accordance with 13 CFR part 127, and the concern is certified by SBA or an approved third-party certifier in accordance with 13 CFR 127.300. It automatically qualifies as a women-owned small business concern eligible under the WOSB Program.

Service-disabled veteran-owned small business concern-

(1) Means a small business concern-

(i) Not less than 51 percent of which is owned by one or more service-disabled veterans or, in the case of any publicly owned business, not less than 51 percent of the stock of which is owned by one or more service-disabled veterans; and

(ii) The management and daily business operations of which are controlled by one or more service-disabled veterans or, in the case of a service-disabled veteran with permanent and severe disability, the spouse or permanent caregiver of such veteran.

(2) "Service-disabled veteran" means a veteran, as defined in 38 U.S.C.101(2), with a disability that is service-connected, as defined in 38 U.S.C.101(16).

Small business concern—

(1) Means a concern, including its affiliates, that is independently owned and operated, not dominant in its field of operation, and qualified as a small business under the criteria in 13 CFR part 121 and the size standard in paragraph (b) of this provision.

(2) *Affiliates*, as used in this definition, means business concerns, one of whom directly or indirectly controls or has the power to control the others, or a third party or parties control or have the power to control the others. In determining whether affiliation exists, consideration is given to all appropriate factors including common ownership, common management, and contractual relationships. SBA determines affiliation based on the factors set forth at 13 CFR 121.103.

Small disadvantaged business concern, consistent with 13 CFR 124.1002, means a small business concern under the size standard applicable to the acquisition, that-

(1) Is at least 51 percent unconditionally and directly owned (as defined at 13 CFR 124.105) by-

(i) One or more socially disadvantaged (as defined at 13 CFR 124.103) and economically disadvantaged (as defined at 13 CFR 124.104) individuals who are citizens of the United States, and

(ii) Each individual claiming economic disadvantage has a net worth not exceeding $750,000 after taking into account the applicable exclusions set forth at 13 CFR 124.104(c)(2); and

(2) The management and daily business operations of which are controlled (as defined at 13 CFR 124.106) by individuals who meet the criteria in paragraphs (1)(i) and (ii) of this definition.

Veteran-owned small business concern means a small business concern-

AMENDMENT 1

(1) Not less than 51 percent of which is owned by one or more veterans (as defined at 38 U.S.C.101(2)) or, in the case of any publicly owned business, not less than 51 percent of the stock of which is owned by one or more veterans; and

(2) The management and daily business operations of which are controlled by one or more veterans.

Women-owned small business concern means a small business concern-

(1) That is at least 51 percent owned by one or more women; or, in the case of any publicly owned business, at least 51 percent of the stock of which is owned by one or more women; and

(2) Whose management and daily business operations are controlled by one or more women.

Women-owned small business (WOSB) concern eligible under the WOSB Program (in accordance with 13 CFR part 127) means a small business concern that is at least 51 percent directly and unconditionally owned by, and the management and daily business operations of which are controlled by, one or more women who are citizens of the United States, and the concern is certified by SBA or an approved third-party certifier in accordance with 13 CFR 127.300.

(b) (1) The North American Industry Classification System (NAICS) code for this acquisition is _____ *[insert NAICS code]*.

(2) The small business size standard is _____ *[insert size standard]*.

(3) The small business size standard for a concern that submits an offer, other than on a construction or service acquisition, but proposes to furnish an end item that it did not itself manufacture, process, or produce (*i.e.*, nonmanufacturer), is 500 employees if the acquisition—

(i) Is set aside for small business and has a value above the simplified acquisition threshold;

(ii) Uses the HUBZone price evaluation preference regardless of dollar value, unless the offeror waives the price evaluation preference; or

(iii) Is an 8(a), HUBZone, service-disabled veteran-owned, economically disadvantaged women-owned, or women-owned small business set-aside or sole-source award regardless of dollar value.

(c) *Representations.*

(1) The offeror represents as part of its offer that—

(i) it ☐is, ☐ is not a small business concern; or

(ii) It ☐is, ☐is not a small business joint venture that complies with the requirements of 13 CFR 121.103(h) and 13 CFR 125.8(a) and (b). [*The offeror shall enter the name and unique entity identifier of each party to the joint venture:* __.]

AMENDMENT 1

(2) [*Complete only if the offeror represented itself as a small business concern in paragraph (c)(1) of this provision.*] The offeror represents that it ☐is, ☐ is not, a small disadvantaged business concern as defined in 13 CFR 124.1002.

(3) [*Complete only if the offeror represented itself as a small business concern in paragraph (c)(1) of this provision.]* The offeror represents as part of its offer that it ☐ is, ☐ is not a women-owned small business concern.

(4) *Women-owned small business (WOSB) joint venture eligible under the WOSB Program.* The offeror represents as part of its offer that it ☐ is, ☐ is not a joint venture that complies with the requirements of 13 CFR 127.506(a) through (c). [*The offeror shall enter the name and unique entity identifier of each party to the joint venture: __.*]

(5) *Economically disadvantaged women-owned small business (EDWOSB) joint venture.* The offeror represents as part of its offer that it ☐ is, ☐ is not a joint venture that complies with the requirements of 13 CFR 127.506(a) through (c). [*The offeror shall enter the name and unique entity identifier of each party to the joint venture: __.*]

(6) [*Complete only if the offeror represented itself as a small business concern in paragraph (c)(1) of this provision.*] The offeror represents as part of its offer that it ☐ is, ☐ is not a veteran-owned small business concern.

(7) [*Complete only if the offeror represented itself as a veteran-owned small business concern in paragraph (c)(6) of this provision.*] The offeror represents as part of its offer that

(i) It ☐ is, ☐ is not a service-disabled veteran-owned small business concern; or

(ii) It ☐ is, ☐ is not a service-disabled veteran-owned joint venture that complies with the requirements of 13 CFR 125.18(b)(1) and (2). [*The offeror shall enter the name and unique entity identifier of each party to the joint venture: __.*] Each service-disabled veteran-owned small business concern participating in the joint venture shall provide representation of its service-disabled veteran-owned small business concern status.

(8) [*Complete only if the offeror represented itself as a small business concern in paragraph (c)(1) of this provision.*] The offeror represents, as part of its offer, that-

(i) It ☐ is, ☐ is not a HUBZone small business concern listed, on the date of this representation, as having been certified by SBA as a HUBZone small business concern in the Dynamic Small Business Search and SAM, and will attempt to maintain an employment rate of HUBZone residents of 35 percent of its employees during performance of a HUBZone contract (see 13 CFR 126.200(e)(1)); and

(ii) It ☐ is, ☐□ is not a HUBZone joint venture that complies with the requirements of 13 CFR 126.616(a) through (c). [*The offeror shall enter the name and unique entity identifier of each party to the joint venture: __.*] Each HUBZone small business concern participating in the HUBZone joint venture shall provide representation of its HUBZone status.

AMENDMENT 1

(d) *Notice.* Under 15 U.S.C.645(d), any person who misrepresents a firm's status as a business concern that is small, HUBZone small, small disadvantaged, service-disabled veteran-owned small, economically disadvantaged women-owned small, or women-owned small eligible under the WOSB Program in order to obtain a contract to be awarded under the preference programs established pursuant to section 8, 9, 15, 31, and 36 of the Small Business Act or any other provision of Federal law that specifically references section 8(d) for a definition of program eligibility, shall-

(1) Be punished by imposition of fine, imprisonment, or both;

(2) Be subject to administrative remedies, including suspension and debarment; and

(3) Be ineligible for participation in programs conducted under the authority of the Act.

(End of provision)

Version 2

DEPARTMENT OF THE NAVY (DoN)
24.3 Small Business Innovation Research (SBIR)
Proposal Submission Instructions

IMPORTANT

- **The following instructions apply to topics:**
  - **N243-105 through N243-106**

- Submitting small business concerns are encouraged to thoroughly review the DoD Program BAA and register for the DSIP Listserv to remain apprised of important programmatic changes.
  - The DoD Program BAA is located at: https://www.dodsbirsttr.mil/submissions/login. Select the tab for the appropriate BAA cycle.
  - Review the Attachments of the DoD Program BAA and ensure the correct version of the following MANDATORY item is uploaded to the Supporting Documents, Volume 5:
    - Contractor Certification Regarding Provision of Prohibition on Contracting for Certain Telecommunications and Video Surveillance Services or Equipment (Attachment 1)
  - Register for the DSIP Listserv at: https://www.dodsbirsttr.mil/submissions/login.

- The information provided in the DoN Proposal Submission Instructions document takes precedence over the DoD Instructions posted for this Broad Agency Announcement (BAA).

- **DoN Phase I Technical Volume (Volume 2) page limit is not to exceed 10 pages.**

- Proposing small business concerns that are more than 50% owned by multiple venture capital operating companies (VCOC), hedge funds (HF), private equity firms (PEF) or any combination of these are eligible to submit proposals in response to DoN topics advertised in this BAA. Information on Majority Ownership in Part and certification requirements at time of submission for these proposing small business concerns are detailed in the section titled ADDITIONAL SUBMISSION CONSIDERATIONS.

- Phase I Technical Volume (Volume 2) and Supporting Documents (Volume 5) templates, specific to DoN topics, are available at https://www.navysbir.com/links_forms.htm.

- The DoN provides notice that Basic Ordering Agreements (BOAs) may be used for Phase I awards, and BOAs or Other Transaction Agreements (OTAs) may be used for Phase II awards.

- This BAA is issued under regulations set forth in Federal Acquisition Regulation (FAR) 35.016 and awards will be made under "other competitive procedures". The policies and procedures of FAR Subpart 15.3 shall not apply to this BAA, except as specifically referenced in it. All procedures are at the sole discretion of the Government as set forth in this BAA. Submission of a proposal in response to this BAA constitutes the express acknowledgement to that effect by the proposing small business concern.

INTRODUCTION

The DoN SBIR/STTR Programs are mission-oriented programs that integrate the needs and requirements of the DoN's Fleet through research and development (R&D) topics that have dual-use potential, but primarily address the needs of the DoN. More information on the programs can be found on the DoN SBIR/STTR website at www.navysbir.com. Additional information on DoN's mission can be found on the DoN website at www.navy.mil.

The Acting Director of the DoN SBIR/STTR Programs is Mr. Brian Shipley. For questions regarding this BAA, use the information in Table 1 to determine who to contact for what types of questions.

TABLE 1: POINTS OF CONTACT FOR QUESTIONS REGARDING THIS BAA

Type of Question	When	Contact Information
Program and administrative	Always	Navy SBIR/STTR Program Management Office usn.pentagon.cnr-arlington-va.mbx.navy-sbir-sttr@us.navy.mil or appropriate Program Manager listed in Table 2 (below)
Topic-specific technical questions	BAA Pre-release	Technical Point of Contact (TPOC) listed in each topic. Refer to the Proposal Fundamentals section of the DoD SBIR/STTR Program BAA for details.
	BAA Open	DoD SBIR/STTR Topic Q&A platform (https://www.dodsbirsttr.mil/submissions) Refer to the Proposal Fundamentals section of the DoD SBIR/STTR Program BAA for details.
Electronic submission to the DoD SBIR/STTR Innovation Portal (DSIP)	Always	DSIP Support via email at dodsbirsupport@reisystems.com
Navy-specific BAA instructions and forms	Always	DoN SBIR/STTR Program Management Office usn.pentagon.cnr-arlington-va.mbx.navy-sbir-sttr@us.navy.mil

TABLE 2: DoN SYSTEMS COMMANDS (SYSCOM) SBIR PROGRAM MANAGERS

Topic Numbers	Point of Contact	SYSCOM	Email
N243-105	Mr. Timothy Petro and Ms. Gladis Aispuro	Naval Facilities Engineering Center (NAVFAC)	timothy.j.petro4.civ@us.navy.mil and gladis.g.aispuro.civ@us.navy.mil
N243-106	Mr. Shadi Azoum	Naval Information Warfare Systems Command (NAVWAR)	info@navwarsbir.com

PHASE I SUBMISSION INSTRUCTIONS

The following section details requirements for submitting a compliant Phase I proposal to the DoD SBIR/STTR Programs.

(NOTE: Proposing small business concerns are advised that support contract personnel will be used to carry out administrative functions and may have access to proposals, contract award documents, contract deliverables, and reports. All support contract personnel are bound by appropriate non-disclosure agreements.)

DoD SBIR/STTR Innovation Portal (DSIP). Proposing small business concerns are required to submit proposals via the DoD SBIR/STTR Innovation Portal (DSIP); follow proposal submission instructions in the DoD SBIR/STTR Program BAA on the DSIP at https://www.dodsbirsttr.mil/submissions. Proposals submitted by any other means will be disregarded. Proposing small business concerns submitting through DSIP for the first time will be asked to register. It is recommended that small business concerns register as soon as possible upon identification of a proposal opportunity to avoid delays in the proposal submission process. Proposals that are not successfully certified electronically in DSIP by the Corporate Official prior to BAA Close will NOT be considered submitted and will not be evaluated by DoN. Proposals that are encrypted, password protected, or otherwise locked in any portion of the submission will be REJECTED unless specifically directed within the text of the topic to which you are submitting. Please refer to the DoD SBIR/STTR Program BAA for further information.

Proposal Volumes. The following seven volumes are required.

- **Proposal Cover Sheet (Volume 1).** As specified in DoD SBIR/STTR Program BAA.

- **Technical Proposal (Volume 2)**
  - Technical Proposal (Volume 2) must meet the following requirements or the proposal will be REJECTED:
    - Not to exceed ten (10) pages, regardless of page content
    - Single column format, single-spaced typed lines
    - Standard 8 ½" x 11" paper
    - Page margins one inch on all sides. A header and footer may be included in the one-inch margin.
    - No font size smaller than 10-point
    - Include, within the ten-page limit of Volume 2, an Option that furthers the effort in preparation for Phase II and will bridge the funding gap between the end of Phase I and the start of Phase II. Tasks for both the Phase I Base and the Phase I Option must be clearly identified. Phase I Options are exercised upon selection for Phase II.
    - Work proposed for the Phase I Base must be exactly six (6) months.
    - Work proposed for the Phase I Option must be exactly six (6) months.

  - Additional information:
    - A Phase I proposal template specific to DoN to meet Phase I requirements is available at https://navysbir.com/links_forms.htm
    - A font size smaller than 10-point is allowable for headers, footers, imbedded tables, figures, images, or graphics that include text. However, proposing small business concerns are cautioned that if the text is too small to be legible it will not be evaluated.

- **Cost Volume (Volume 3).**
  - Cost Volume (Volume 3) must meet the following requirements or the proposal will be REJECTED:
    - The Phase I Base amount must not exceed $140,000.
    - Phase I Option amount must not exceed $100,000.

- Costs for the Base and Option must be separated and clearly identified on the Proposal Cover Sheet (Volume 1) and in Volume 3.
- For Phase I, a minimum of two-thirds of the work is performed by the proposing small business concern. The two-thirds percentage of work requirement must be met in the Base costs as well as in the Option costs. DoN will not accept deviations from the minimum percentage of work requirements for Phase I. The percentage of work is measured by both direct and indirect costs. To calculate the minimum percentage of work for the proposing small business concern the sum of all direct and indirect costs attributable to the proposing small business concern represent the numerator and the total cost of the proposal (i.e., Total Cost before Profit Rate is applied) is the denominator. The subcontractor percentage is calculated by taking the sum of all costs attributable to the subcontractor (Total Subcontractor Costs (TSC)) as the numerator and the total cost of the proposal (i.e., Total Cost before Profit Rate is applied) as the denominator.
  - Proposing Small Business Concern Costs (included in numerator for calculation of the small business concern):
    - Total Direct Labor (TDL)
    - Total Direct Material Costs (TDM)
    - Total Direct Supplies Costs (TDS)
    - Total Direct Equipment Costs (TDE)
    - Total Direct Travel Costs (TDT)
    - Total Other Direct Costs (TODC)
    - General & Administrative Cost (G&A)

    NOTE: G&A, if proposed, will only be attributed to the proposing small business concern.
  - Subcontractor Costs (numerator for subcontractor calculation):
    - Total Subcontractor Costs (TSC)
  - Total Cost (i.e., Total Cost before Profit Rate is applied, denominator for either calculation)
- **Cost Sharing: Cost sharing is not accepted on DoN Phase I proposals. If a value above or below $0.00 is entered in the Cost Sharing field the proposal will be deemed non-compliant and will be REJECTED by DoN.**

- Additional information:
  - Provide sufficient detail for subcontractor, material, and travel costs. Subcontractor costs must be detailed to the same level as the prime contractor. Material costs must include a listing of items and cost per item. Travel costs must include the purpose of the trip, number of trips, location, length of trip, and number of personnel.
  - Inclusion of cost estimates for travel to the sponsoring SYSCOM's facility for one day of meetings is recommended for all proposals.
  - The "Additional Cost Information" of Supporting Documents (Volume 5) may be used to provide supporting cost details for Volume 3. When a proposal is selected for award, be prepared to submit further documentation to the SYSCOM Contracting Officer to substantiate costs (e.g., an explanation of cost estimates for equipment, materials, and consultants or subcontractors).

- **Company Commercialization Report (Volume 4)**. DoD collects and uses Volume 4 and DSIP requires Volume 4 for proposal submission. Please refer to the Phase I Proposal section of the DoD SBIR/STTR Program BAA for details to ensure compliance with DSIP Volume 4 requirements.

- **Supporting Documents (Volume 5).** Volume 5 is for the submission of administrative material that DoN may or will require to process a proposal, if selected, for contract award.

  All proposing small business concerns must review and submit the following items, as applicable:
  - **Telecommunications Equipment Certification.** Required for all proposing small business concerns. The DoD must comply with Section 889(a)(1)(B) of the FY2019 National Defense Authorization Act (NDAA) and is working to reduce or eliminate contracts, or extending or renewing a contract with an entity that uses any equipment, system, or service that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system. As such, all proposing small business concerns must include as a part of their submission a written certification in response to the clauses (DFAR clauses 252.204-7016, 252.204-7018, and subpart 204.21). The written certification can be found in Attachment 1 of the DoD SBIR/STTR Program BAA. This certification must be signed by the authorized company representative and is to be uploaded as a separate PDF file in Volume 5. Failure to submit the required certification as a part of the proposal submission process will be cause for rejection of the proposal submission without evaluation. Please refer to the instructions provided in the Phase I Proposal section of the DoD SBIR/STTR Program BAA.
  - **Majority Ownership in Part.** Proposing small business concerns which are more than 50% owned by multiple venture capital operating companies (VCOC), hedge funds (HF), private equity firms (PEF), or any combination of these as set forth in 13 C.F.R. § 121.702, are eligible to submit proposals in response to DoN topics advertised within this BAA. Complete certification as detailed under ADDITIONAL SUBMISSION CONSIDERATIONS.

  - Additional information:
    - Proposing small business concerns may include the following administrative materials in Supporting Documents (Volume 5); a template is available at https://navysbir.com/links_forms.htm to provide guidance on optional material the proposing small business concern may want to include in Volume 5:
      - Additional Cost Information to support the Cost Volume (Volume 3)
      - SBIR/STTR Funding Agreement Certification
      - Data Rights Assertion
      - Allocation of Rights between Prime and Subcontractor
      - Disclosure of Information (DFARS 252.204-7000)
      - Prior, Current, or Pending Support of Similar Proposals or Awards
      - Foreign Citizens
    - Details of Request for Discretionary Technical and Business Assistance (TABA), if proposed, is to be included under the Additional Cost Information section if using the DoN Supporting Documents template.
    - Do not include documents or information to substantiate the Technical Volume (Volume 2) in Volume 5 (e.g., resumes, test data, technical reports, or publications). Such documents or information will not be considered.
    - A font size smaller than 10-point is allowable for documents in Volume 5; however, proposing small business concerns are cautioned that the text may be unreadable.

- **Fraud, Waste and Abuse Training Certification (Volume 6)**. DoD requires Volume 6 for submission. Please refer to the Phase I Proposal section of the DoD SBIR/STTR Program BAA for details.

- **Disclosures of Foreign Affiliations or Relationships to Foreign Countries (Volume 7)**. In accordance with Section 4 of the SBIR and STTR Extension Act of 2022 and the SBA SBIR/STTR Policy Directive, the DoD will review all proposals submitted in response to this BAA to assess security risks presented by small business concerns seeking a Federally funded award. Small business concerns must complete the Disclosures of Foreign Affiliations or Relationships to Foreign Countries webform in Volume 7 of the DSIP proposal submission. Please refer to the Phase I Proposal section of the DoD SBIR/STTR Program BAA for details.

PHASE I EVALUATION AND SELECTION

The following section details how the DoN SBIR/STTR Programs will evaluate Phase I proposals.

Proposals meeting DSIP submission requirements will be forwarded to the DoN SBIR/STTR Programs. Prior to evaluation, all proposals will undergo a compliance review to verify compliance with DoD and DoN SBIR/STTR proposal eligibility requirements. Proposals not meeting submission requirements will be REJECTED and not evaluated.

- **Proposal Cover Sheet (Volume 1).** The Proposal Cover Sheet (Volume 1) will undergo a compliance review to verify the proposing small business concern has met eligibility requirements and followed the instructions for the Proposal Cover Sheet as specified in the DoD SBIR/STTR Program BAA.

- **Technical Volume (Volume 2).** The DoN will evaluate and select Phase I proposals using the evaluation criteria specified in the Phase I Proposal Evaluation Criteria section of the DoD SBIR/STTR Program BAA, with technical merit being most important, followed by qualifications of key personnel and commercialization potential of equal importance. The information considered for this decision will come from Volume 2. This is not a FAR Part 15 evaluation and proposals will not be compared to one another. Cost is not an evaluation criterion and will not be considered during the evaluation process; the DoN will only do a compliance review of Volume 3. Due to limited funding, the DoN reserves the right to limit the number of awards under any topic.

  The Technical Volume (Volume 2) will undergo a compliance review (prior to evaluation) to verify the proposing small business concern has met the following requirements or the proposal will be REJECTED:
  - Not to exceed ten (10) pages, regardless of page content
  - Single column format, single-spaced typed lines
  - Standard 8 ½" x 11" paper
  - Page margins one inch on all sides. A header and footer may be included in the one-inch margin.
  - No font size smaller than 10-point, except as permitted in the instructions above.
  - Include, within the 10-page limit of Volume 2, an Option that furthers the effort in preparation for Phase II and will bridge the funding gap between the end of Phase I and the start of Phase II. Tasks for both the Phase I Base and the Phase I Option must be clearly identified.
  - Work proposed for the Phase I Base must be exactly six (6) months.

  - Work proposed for the Phase I Option must be exactly six (6) months.

- **Cost Volume (Volume 3).** The Cost Volume (Volume 3) will not be considered in the selection process and will only undergo a compliance review to verify the proposing small business concern has met the following requirements or the proposal will be REJECTED:
  - Must not exceed values for the Base ($140,000) and Option ($100,000).
  - Must meet minimum percentage of work; a minimum of two-thirds of the work is performed by the proposing small business concern. The two-thirds percentage of work requirement must be met in the Base costs as well as in the Option costs. DoN will not accept deviations from the minimum percentage of work requirements for Phase I.
  - **Cost Sharing: Cost sharing is not accepted on DoN Phase I proposals. If a value above or below $0.00 is entered in the Cost Sharing field the proposal will be deemed non-compliant and will be REJECTED by DoN.**

- **Company Commercialization Report (CCR) (Volume 4).** The CCR (Volume 4) will not be evaluated by the Navy nor will it be considered in the Navy's award decision. However, all proposing small business concerns must refer to the DoD SBIR/STTR Program BAA to ensure compliance with DSIP Volume 4 requirements.

- **Supporting Documents (Volume 5).** Supporting Documents (Volume 5) will not be considered in the selection process and will only undergo a compliance review to ensure the proposing small business concern has included items in accordance with the PHASE I SUBMISSION INSTRUCTIONS section above.

- **Fraud, Waste, and Abuse Training Certificate (Volume 6).** Not evaluated.

- **Disclosures of Foreign Affiliations or Relationships to Foreign Countries (Volume 7)**. Disclosures of Foreign Affiliations or Relationships to Foreign Countries (Volume 7) will be assessed as part of the Due Diligence Program to Assess Security Risks. Refer to the DoD SBIR/STTR Program BAA to ensure compliance with Volume 7 requirements.

ADDITIONAL SUBMISSION CONSIDERATIONS

This section details additional items for proposing small business concerns to consider during proposal preparation and submission process.

Due Diligence Program to Assess Security Risks. The SBIR and STTR Extension Act of 2022 (Pub. L. 117-183) requires the Department of Defense, in coordination with the Small Business Administration, to establish and implement a due diligence program to assess security risks presented by small business concerns seeking a Federally-funded award. Please review the Program Description section of the DoD SBIR/STTR Program BAA for details on how DoD will assess security risks presented by small business concerns. The Due Diligence Program to Assess Security Risks will be implemented for all Phases.

Discretionary Technical and Business Assistance (TABA). The SBIR and STTR Policy Directive section 9(b) allows the DoN to provide TABA (formerly referred to as DTA) to its awardees. The purpose of TABA is to assist awardees in making better technical decisions on SBIR/STTR projects; solving technical problems that arise during SBIR/STTR projects; minimizing technical risks associated with SBIR/STTR projects; and commercializing the SBIR/STTR product or process, including intellectual property protections. Proposing small business concerns may request, in their Phase I Cost Volume

(Volume 3) and Phase II Cost Volume, to contract these services themselves through one or more TABA providers in an amount not to exceed the values specified below. The Phase I TABA amount is up to $6,500 and is in addition to the award amount. The Phase II TABA amount is up to $25,000 per award. The TABA amount, of up to $25,000, is to be included as part of the award amount and is limited by the established award values for Phase II by the SYSCOM (i.e. within the $2,000,000 or lower limit specified by the SYSCOM). As with Phase I, the amount proposed for TABA cannot include any profit/fee by the proposing small business concern and must be inclusive of all applicable indirect costs. TABA cannot be used in the calculation of general and administrative expenses (G&A) for the SBIR proposing small business concern. A Phase II project may receive up to an additional $25,000 for TABA as part of one additional (sequential) Phase II award under the project for a total TABA award of up to $50,000 per project. A small business concern receiving TABA will be required to submit a report detailing the results and benefits of the service received. This TABA report will be due at the time of submission of the final report.

Request for TABA funding will be reviewed by the DoN SBIR/STTR Program Office.

If the TABA request does not include the following items the TABA request will be denied.

- TABA provider(s) (firm name)
- TABA provider(s) point of contact, email address, and phone number
- An explanation of why the TABA provider(s) is uniquely qualified to provide the service
- Tasks the TABA provider(s) will perform (to include the purpose and objective of the assistance)
- Total TABA provider(s) cost, number of hours, and labor rates (average/blended rate is acceptable)

TABA must NOT:

- Be subject to any indirect costs, profit, or fee by the SBIR proposing small business concern
- Propose a TABA provider that is the SBIR proposing small business concern
- Propose a TABA provider that is an affiliate of the SBIR proposing small business concern
- Propose a TABA provider that is an investor of the SBIR proposing small business concern
- Propose a TABA provider that is a subcontractor or consultant of the requesting small business concern otherwise required as part of the paid portion of the research effort (e.g., research partner, consultant, tester, or administrative service provider)

TABA requests must be included in the proposal as follows:

- Phase I:
    - Online DoD Cost Volume (Volume 3) – the value of the TABA request.
    - Supporting Documents (Volume 5) – a detailed request for TABA (as specified above) specifically identified as “TABA” in the section titled Additional Cost Information when using the DoN Supporting Documents template.
- Phase II:
    - DoN Phase II Cost Volume (provided by the DoN SYSCOM) - the value of the TABA request.
    - Supporting Documents (Volume 5) – a detailed request for TABA (as specified above) specifically identified as “TABA” in the section titled Additional Cost Information when using the DoN Supporting Documents template.

Proposed values for TABA must NOT exceed:

- Phase I: A total of $6,500
- Phase II: A total of $25,000 per award, not to exceed $50,000 per Phase II project

If a proposing small business concern requests and is awarded TABA in a Phase II contract, the proposing small business concern will be eliminated from participating in the DoN SBIR/STTR Transition Program (STP), the DoN Forum for SBIR/STTR Transition (FST), and any other Phase II assistance the DoN provides directly to awardees.

All Phase II awardees not receiving funds for TABA in their awards must participate in the virtual Navy STP Kickoff during the first or second year of the Phase II contract. While there are no travel costs associated with this virtual event, Phase II awardees should budget time of up to a full day to participate. STP information can be obtained at: https://navystp.com. Phase II awardees will be contacted separately regarding this program.

Disclosure of Information (DFARS 252.204-7000). In order to eliminate the requirements for prior approval of public disclosure of information (in accordance with DFARS 252.204-7000) under this award, the proposing small business concern shall identify and describe all fundamental research to be performed under its proposal, including subcontracted work, with sufficient specificity to demonstrate that the work qualifies as fundamental research. Fundamental research means basic and applied research in science and engineering, the results of which ordinarily are published and shared broadly within the scientific community, as distinguished from proprietary research and from industrial development, design, production, and product utilization, the results of which ordinarily are restricted for proprietary or national security reasons (defined by National Security Decision Directive 189). A small business concern whose proposed work will include fundamental research and requests to eliminate the requirement for prior approval of public disclosure of information must complete the DoN Fundamental Research Disclosure and upload as a separate PDF file to the Supporting Documents (Volume 5) in DSIP as part of their proposal submission. The DoN Fundamental Research Disclosure is available on https://navysbir.com/links_forms.htm and includes instructions on how to complete and upload the completed Disclosure. Simply identifying fundamental research in the Disclosure does **NOT** constitute acceptance of the exclusion. All exclusions will be reviewed and, if approved by the government Contracting Officer, noted in the contract.

Majority Ownership in Part. Proposing small business concerns that are more than 50% owned by multiple venture capital operating companies (VCOC), hedge funds (HF), private equity firms (PEF), or any combination of these as set forth in 13 C.F.R. § 121.702, **are eligible** to submit proposals in response to DoN topics advertised within this BAA.

For proposing small business concerns that are a member of this ownership class the following must be satisfied for proposals to be accepted and evaluated:

a. Prior to submitting a proposal, small business concerns must register with the SBA Company Registry Database.
b. The proposing small business concern within its submission must submit the Majority-Owned VCOC, HF, and PEF Certification. A copy of the SBIR VC Certification can be found on https://navysbir.com/links_forms.htm. Include the SBIR VC Certification in the Supporting Documents (Volume 5).
c. Should a proposing small business concern become a member of this ownership class after submitting its proposal and prior to any receipt of a funding agreement, the proposing small business concern must immediately notify the Contracting Officer, register in the appropriate SBA database, and submit the required certification which can be found on https://navysbir.com/links_forms.htm.

System for Award Management (SAM). It is strongly encouraged that proposing small business concerns register in SAM, https://sam.gov, by the Close date of this BAA, or verify their registrations are still active and will not expire within 60 days of BAA Close. Additionally, proposing small business

concerns should confirm that they are registered to receive contracts (not just grants) and the address in SAM matches the address on the proposal. A small business concern selected for an award MUST have an active SAM registration at the time of award or they will be considered ineligible.

Notice of NIST SP 800-171 Assessment Database Requirement. The purpose of the National Institute of Standards and Technology (NIST) Special Publication (SP) 800-171 is to protect Controlled Unclassified Information (CUI) in Nonfederal Systems and Organizations. As prescribed by DFARS 252.204-7019, in order to be considered for award, a small business concern is required to implement NIST SP 800-171 and shall have a current assessment uploaded to the Supplier Performance Risk System (SPRS) which provides storage and retrieval capabilities for this assessment. The platform Procurement Integrated Enterprise Environment (PIEE) will be used for secure login and verification to access SPRS. For brief instructions on NIST SP 800-171 assessment, SPRS, and PIEE please visit https://www.sprs.csd.disa.mil/nistsp.htm. For in-depth tutorials on these items please visit https://www.sprs.csd.disa.mil/webtrain.htm.

Human Subjects, Animal Testing, and Recombinant DNA. Due to the short timeframe associated with Phase I of the SBIR/STTR process, the DoN does **not** recommend the submission of Phase I proposals that require the use of Human Subjects, Animal Testing, or Recombinant DNA. For example, the ability to obtain Institutional Review Board (IRB) approval for proposals that involve human subjects can take 6-12 months, and that lengthy process can be at odds with the Phase I goal for time-to-award. Before the DoN makes any award that involves an IRB or similar approval requirement, the proposing small business concern must demonstrate compliance with relevant regulatory approval requirements that pertain to proposals involving human, animal, or recombinant DNA protocols. It will not impact the DoN's evaluation, but requiring IRB approval may delay the start time of the Phase I award and if approvals are not obtained within two months of notification of selection, the decision to award may be terminated. If the use of human, animal, and recombinant DNA is included under a Phase I or Phase II proposal, please carefully review the requirements at: https://www.nre.navy.mil/work-with-us/how-to-apply/compliance-and-protections/research-protections. This webpage provides guidance and lists approvals that may be required before contract/work can begin.

Government Furnished Equipment (GFE). Due to the typical lengthy time for approval to obtain GFE, it is recommended that GFE is not proposed as part of the Phase I proposal. If GFE is proposed, and it is determined during the proposal evaluation process to be unavailable, proposed GFE may be considered a weakness in the technical merit of the proposal.

International Traffic in Arms Regulation (ITAR). For topics indicating ITAR restrictions or the potential for classified work, limitations are generally placed on disclosure of information involving topics of a classified nature or those involving export control restrictions, which may curtail or preclude the involvement of universities and certain non-profit institutions beyond the basic research level. Small businesses must structure their proposals to clearly identify the work that will be performed that is of a basic research nature and how it can be segregated from work that falls under the classification and export control restrictions. As a result, information must also be provided on how efforts can be performed in later phases if the university/research institution is the source of critical knowledge, effort, or infrastructure (facilities and equipment).

SELECTION, AWARD, AND POST-AWARD INFORMATION

Notifications. Email notifications for proposal receipt (approximately one week after the Phase I BAA Close) and selection are sent based on the information received on the proposal Cover Sheet (Volume 1). Consequently, the e-mail address on the proposal Cover Sheet must be correct.

Debriefs. Requests for a debrief must be made within 15 calendar days of select/non-select notification via email as specified in the select/non-select notification. Please note debriefs are typically provided in writing via email to the Corporate Official identified in the proposal of the proposing small business concern within 60 days of receipt of the request. Requests for oral debriefs may not be accommodated. If contact information for the Corporate Official has changed since proposal submission, a notice of the change on company letterhead signed by the Corporate Official must accompany the debrief request.

Protests. Interested parties have the right to protest in accordance with the procedures in FAR Subpart 33.1.

Pre-award agency protests related to the terms of the BAA must be served to: osd.ncr.ousd-r-e.mbx.SBIR-STTR-Protest@mail.mil. A copy of a pre-award Government Accountability Office (GAO) protest must also be filed with the aforementioned email address within one day of filing with the GAO.

Protests related to a selection or award decision should be filed with the appropriate Contracting Officer for an Agency Level Protest or with the GAO. Contracting Officer contact information for specific DoN Topics may be obtained from the DoN SYSCOM Program Managers listed in Table 2 above. For protests filed with the GAO, a copy of the protest must be submitted to the appropriate DoN SYSCOM Program Manager and the appropriate Contracting Officer within one day of filing with the GAO.

Awards. Due to limited funding, the DoN reserves the right to limit the number of awards under any topic. Any notification received from the DoN that indicates the proposal has been selected does not ultimately guarantee an award will be made. This notification indicates that the proposal has been selected in accordance with the evaluation criteria and has been sent to the Contracting Officer to conduct compliance review of Volume 3 to confirm eligibility of the proposing small business concern, and to take other relevant steps necessary prior to making an award.

Contract Types. The DoN typically awards a Firm Fixed Price (FFP) contract or a small purchase agreement for Phase I. In addition to the negotiated contract award types listed in the section of the DoD SBIR/STTR Program BAA titled Proposal Fundamentals, for Phase II awards the DoN may (under appropriate circumstances) propose the use of an Other Transaction Agreement (OTA) as specified in 10 U.S.C. 4021/10 U.S.C. 4022 and related implementing policies and regulations. The DoN may choose to use a Basic Ordering Agreement (BOA) for Phase I and Phase II awards.

Funding Limitations. In accordance with the SBIR and STTR Policy Directive section 4(b)(5), there is a limit of one sequential Phase II award per small business concern per topic. The maximum Phase I proposal/award amount including all options is $240,000. The Phase I Base amount must not exceed $140,000 and the Phase I Option amount must not exceed $100,000. The maximum Phase II proposal/award amount including all options (including TABA) is $2,000,000 (unless non-SBIR/STTR funding is being added). Individual SYSCOMs may award amounts, including Base and all Options, of less than $2,000,000 based on available funding. The structure of the Phase II proposal/award, including maximum amounts as well as breakdown between Base and Option amounts will be provided to all Phase I awardees either in their Phase I award or a minimum of 30 days prior to the due date for submission of their Initial Phase II proposal.

Contract Deliverables. Contract deliverables for Phase I are typically a kick-off brief, progress reports, and a final report. Required contract deliverables (as stated in the contract) must be uploaded to https://www.navysbirprogram.com/navydeliverables/.

Payments. The DoN makes three payments from the start of the Phase I Base period, and from the start of the Phase I Option period, if exercised. Payment amounts represent a set percentage of the Base or Option value as follows:

Days From Start of Base Award or Option	Payment Amount
15 Days	50% of Total Base or Option
90 Days	35% of Total Base or Option
180 Days	15% of Total Base or Option

Transfer Between SBIR and STTR Programs. Section 4(b)(1)(i) of the SBIR and STTR Policy Directive provides that, at the agency's discretion, projects awarded a Phase I under a BAA for SBIR may transition in Phase II to STTR and vice versa.

PHASE II GUIDELINES

Evaluation and Selection. All Phase I awardees may submit an **Initial** Phase II proposal for evaluation and selection. The evaluation criteria for Phase II is the same as Phase I (as stated in this BAA). The Phase I Final Report and Initial Phase II Proposal will be used to evaluate the small business concern's potential to progress to a workable prototype in Phase II and transition the technology to Phase III. Details on the due date, content, and submission requirements of the Initial Phase II Proposal will be provided by the awarding SYSCOM either in the Phase I contract or by subsequent notification.

Awards. The DoN typically awards a Cost Plus Fixed Fee contract for Phase II; but, may consider other types of agreement vehicles. Phase II awards can be structured in a way that allows for increased funding levels based on the project's transition potential. To accelerate the transition of SBIR/STTR-funded technologies to Phase III, especially those that lead to Programs of Record and fielded systems, the Commercialization Readiness Program was authorized and created as part of section 5122 of the National Defense Authorization Act of Fiscal Year 2012. The statute set-aside is 1% of the available SBIR/STTR funding to be used for administrative support to accelerate transition of SBIR/STTR-developed technologies and provide non-financial resources for the small business concerns (e.g., the Navy STP).

PHASE III GUIDELINES

A Phase III SBIR/STTR award is any work that derives from, extends, or completes effort(s) performed under prior SBIR/STTR funding agreements, but is funded by sources other than the SBIR/STTR programs. This covers any contract, grant, or agreement issued as a follow-on Phase III award or any contract, grant, or agreement award issued as a result of a competitive process where the awardee was an SBIR/STTR firm that developed the technology as a result of a Phase I or Phase II award. The DoN will give Phase III status to any award that falls within the above-mentioned description. Consequently, DoN will assign SBIR/STTR Data Rights to any noncommercial technical data and noncommercial computer software delivered in Phase III that were developed under SBIR/STTR Phase I/II effort(s). Government prime contractors and their subcontractors must follow the same guidelines as above and ensure that companies operating on behalf of the DoN protect the rights of the SBIR/STTR firm.

Version 2

Navy SBIR 24.3 Phase I
Topic Index

N243-105 TITLE: Compatibility of Tier 4 Diesel Engines with JP-8

OUSD (R&E) CRITICAL TECHNOLOGY AREA(S): Sustainment

OBJECTIVE: Develop a solution or set of solutions that will enable the use of JP-8 in current Tier 4 diesel engines without adverse effects. The solution should apply as broadly as possible to multiple systems and engine types.

DESCRIPTION: Navy expeditionary forces require equipment compatible with JP-8 to meet DoD level guidance prescribing JP-8 as the single fuel for expeditionary operations. JP-8 is an aviation fuel with up to 3000 ppm of sulfur. Current Tier 4 diesel engines are unable to meet the JP-8 compatibility requirement due to these engines requiring the use of ultra low sulfur diesel (ULSD) with a 15 ppm limit on sulfur. The use of ULSD is needed both to meet Tier 4 emissions requirements, but also to prevent degradation or damage to the engine and the emission components. Emissions components in Tier 4 engines such as catalysts and particulate filters are sulfur sensitive, they clog or are destroyed if JP-8 or high sulfur diesel fuels are used.

Navy expeditionary forces currently satisfy this JP-8 requirement via the use of Tier 3 or lower or "export" market engines. These engines are becoming increasingly obsolete and progressively more difficult to procure and sustain. Increased procurement costs result from the need to source and integrate these engines into commercial items that are designed to be EPA compliant with Tier 4 engines for the U.S. market.

Performance Requirements: The solution or solution set will need to allow for the fielding of commercial items using standard Tier 4 engines. The solution will need to allow for operation with both ULSD fuel supplies while in CONUS and JP-8 fuel supplies during expeditionary operations. The solution will need to result in no net increase in lifecycle cost and not negatively impact the performance of the engine beyond what is expected when using JP-8 in Tier 3 or lower engines. This includes power output, fuel efficiency, and ability to run throughout the range of worldwide environmental conditions. Lifecycle cost calculations will assume quantities of 100 for a single unique end item. The solution should apply as broadly as possible to multiple system and engine types (including different makes and models, both on and off-highway engines) and sizes of diesel engines ranging from small 10hp pony motors through large commercial truck engines. Demonstrate the solution via instrumented testing.

Current equipment operates under an EPA exemption for national security. Any solution is permitted to result in exhaust emissions that no longer meet Tier 4 requirements. Exhaust emissions should meet or exceed the requirements of the equivalent Tier 3 engine.

PHASE I: Define, design, and establish the feasibility of a concept that will result in the ability to procure equipment with current Tier 4 engines and operate this equipment during expeditionary operations with JP-8 fuel supplies. Produce a prototype engineering design with major components identified as either existing commercial items or those requiring no further development under Phase II. Ensure that any development components should be of sufficient maturity such that a full-scale prototype can be developed and demonstrated under Phase II.

Identify and calculate expected procurement and sustainment costs for the concept. Identify any potential limitations or impacts to the system resulting from the concept, which could include any limitations on application (e.g., horsepower limitation) or increases in weight, among other possible characteristics.

Provide a Phase II plan.

PHASE II: Produce and demonstrate a prototype of the concept developed under Phase I. Include a minimum of 50 hours (threshold), preferably 100 hours or greater (objective), of run time using JP-8 or the CONUS equivalent F-24 as the supplied fuel. Demonstrate the prototype on an engine that is, of a minimum, in the 19-56 kW category (Threshold) to the 56-130 kW (or higher) category with a diesel exhaust fluid (DEF) system (Objective). Perform any small-scale demonstrations or testing of developmental components, as needed, to increase the maturity of the technology in support of a physical prototype of the Phase I concept.

Perform any instrumented tests needed to validate the performance requirements of the prototype (e.g., dynamometer, instrumentation of the engine, or exhaust analysis).

PHASE III DUAL USE APPLICATIONS: The end goal of Phase II is expected to be a design that, with further engineering development and testing to refine the design and develop manufacturing, would result in an end item the government can procure or component(s) and/or modifications that vendors of end items can incorporate into their systems that are procured by the expeditionary Navy. Phase III would concentrate on that additional engineering and commercialization effort required to prepare the solution(s) for a successful transition.

The final solution(s) would be applied across the full spectrum of future equipment within the expeditionary Navy, such as civil engineering support equipment, construction equipment, and tactical and light ground vehicles. The solution would also be made available and socialized with the joint services, including the Army, Air Force, and Marine Corps.

Any solutions developed under this SBIR topic which have potential commercial applications will be communicated to potential commercialization partners, such as engine manufacturers. These include any sulfur reduction filters or sulfur tolerate emissions components which could be applied to improve emissions in diesel engines in markets with high sulfur diesel.

REFERENCES:

1. “40 CFR Part 1039, PART 1039—CONTROL OF EMISSIONS FROM NEW AND IN-USE NONROAD COMPRESSION-IGNITION ENGINES.” https://www.ecfr.gov/current/title-40/part-1039
2. “40 CFR 1068.225, § 1068.225 Exempting engines/equipment for national security.” https://www.ecfr.gov/current/title-40/section-1068.225
3. Rohrbach, Ron et al. “Desulfurization Fuel Filter.” Honeywell, 24 August 2006, pp.1-22. https://www.energy.gov/eere/vehicles/articles/desulfurization-fuel-filter
4. Tran, D.T.; Palomino, J.M. and Oliver, S.R.J. “Desulfurization of JP-8 jet fuel: challenges and adsorptive materials.” RSC Advances, 8(13), February 2018, pp. 7301-7314. doi: 10.1039/c7ra12784g. PMID: 35540312; PMCID: PMC9078402.

KEYWORDS: JP-8; diesel; engine; Expeditionary; Tier 4; sulfur

N243-106 TITLE: Drone RF Optimized Nodal Element (DRONE) Antenna System

OUSD (R&E) CRITICAL TECHNOLOGY AREA(S): Integrated Network Systems-of-Systems;Microelectronics;Advanced Materials

OBJECTIVE: Develop a tunable Drone RF Optimized Nodal Element (DRONE) Antenna System using tethered drones.

DESCRIPTION: The Navy is heavily reliant on communications to function in all operating environments. Thus, there is a need for solutions that contribute to the redundancy and/or resiliency of communications capabilities. The process to install new antenna systems aboard Navy platforms is both time consuming and costly. The transition targets are Naval systems within the High Frequency (HF) to Very High Frequency (VHF) bands, to include Digital Modular Radio (DMR). DMR is a software defined radio capable of four channels that can simultaneously support both voice and data networks and various waveforms.

The tunable antenna system using tethered drones must enable the following (at a minimum):

- Cover the military HF to the VHF bands (Threshold: 3 MHz - 88 MHz; Objective: 2 MHz - 300 MHz)
- Handle high-power levels
  - HF: 40 dBW (Threshold), 50 dBW (Objective)
  - VHF: 30 dBW (Threshold), 40 dBW (Objective)
- Match the desired frequency through means such as tether length, matched filters, current probes, switched current clamps, etc. (Threshold: 1/4 wave; Objective: 1/2 wave)
- Provide beam forming/nulling capabilities with an array of elements (Objective)
- Reduce the Radar Cross Section (RCS) of the drones by means such as radar absorptive materials, active signals interactions, etc. (Objective)

This SBIR topic focuses on addressing these challenges with the DRONE Antenna System, a novel antenna system utilizing tethered drones. This solution shall operate from the military HF band to the VHF band. To cover this frequency range, the tethered antenna shall adjust to /4 (Objective: /2) of the desired center frequency/antenna element. The drones shall employ precision flight patterns/maneuvers to address the arc of the tether to avoid polarization issues, as well as allow for the safety of flight away from the naval platform. Additionally, the DRONE Antenna System shall be easily and quickly deployable and be scalable to form an array of drones.

Work produced in Phase II may become classified. Note: The prospective contractor(s) must be U.S. owned and operated with no foreign influence as defined by 32 U.S.C. § 2004.20 et seq., National Industrial Security Program Executive Agent and Operating Manual, unless acceptable mitigating procedures can and have been implemented and approved by the Defense Counterintelligence and Security Agency (DCSA) formerly Defense Security Service (DSS). The selected contractor must be able to acquire and maintain a secret level facility and Personnel Security Clearances. This will allow contractor personnel to perform on advanced phases of this project as set forth by DCSA and NAVWAR in order to gain access to classified information pertaining to the national defense of the United States and its allies; this will be an inherent requirement. The selected company will be required to safeguard classified material during the advanced phases of this contract IAW the National Industrial Security Program Operating Manual (NISPOM), which can be found at Title 32, Part 2004.20 of the Code of Federal Regulations.

PHASE I: Conduct a study to determine the technical feasibility of the DRONE Antenna System, that covers the operational HF and VHF frequencies. Describe the technical solution based on the investigation and technical trade-offs.

For the identified solution, develop the SBIR Phase II Project Plan to include a detailed schedule (in Gantt format), spend plan, performance objectives, and transition plan for the target Program of Record (PoR).

PHASE II: Develop the prototype DRONE Antenna System. Demonstrate and validate its performance in a laboratory environment.

Develop a set of performance specifications for the DRONE Antenna System. Conduct the Systems Engineering Technical Review (SETR) Process (i.e., System Requirements Review (SRR), Preliminary Design Review (PDR), and Critical Design Review (CDR)).

Engage and collaborate with the Program Office and Naval Information Warfare Center (NIWC) Pacific engineers. Establish a working relationship with PMW/A 170 and NIWC Pacific engineers to perform integration studies to include the identification of any necessary engineering changes to the target PoR system(s).

Develop a SBIR Phase III Project Plan to include a detailed schedule (in Gantt format) and spend plan, performance requirements, and revised transition plan for the target PoR system(s). Develop the life-cycle support strategies and concepts for the system.

It is probable that the work under this effort will be classified under Phase II (see Description section for details).

PHASE III DUAL USE APPLICATIONS: Refine and fully develop the Phase II prototype to produce a Production Representative Article (PRA) of the DRONE Antenna System. Perform Formal Qualification Tests (FQT) (e.g., field testing, operational assessments) of the PRA solution with the target PoR system(s). Provide life-cycle support strategies and concepts for the DRONE Antenna System by developing a Life-Cycle Sustainment Plan (LCSP). Additionally, investigate the dual use of the developed technologies for commercial applications. Commercial applications include rapid deployment of mobile networks for disaster relief, business continuity backup communications systems, and temporary augmentation of Major Network Operators (e.g., AT&T) to support events in remote locations that lacks infrastructure.

REFERENCES:

1. Law, Preston E. Jr. “Shipboard Antennas, Second Edition.” Artech House, Boston | London, August 1, 1986, ISBN-13: 978-0890062111 or ISBN-10: 0890062110. https://us.artechhouse.com/Shipboard-Antennas-Second-Edition-P248.aspx
2. Defense Advancement Staff. “Tethered Drone System Released for Military Communications Relay.” Defense Advancement, March 14, 2023. https://www.defenseadvancement.com/news/tethered-drone-system-released-for-military-communications-relay/ 3. National Industrial Security Program Executive Agent and Operating Manual (NISP), 32 U.S.C. § 2004.20 et seq. (1993). https://www.ecfr.gov/current/title-32/subtitle-B/chapter-XX/part-2004.

KEYWORDS: Antenna; Battle Force Tactical Network; BFTN; Digital Modular Radio; DMR; High Frequency; HF; Very High Frequency; VHF; Tactical Communications Modernization; TACCOM; TACCOMS

Version 2

DEPARTMENT OF THE AIR FORCE
24.3 SMALL BUSINESS INNOVATION RESEARCH (SBIR) PHASE I
PROPOSAL SUBMISSION INSTRUCTIONS

The Air Force intends these Phase I proposal submission instructions to clarify the Department of Defense (DoD) Broad Agency Announcement (BAA) as it applies to the topics solicited herein. **Offerors must ensure proposals meet all requirements of the SBIR 24.3 BAA posted on the Defense SBIR/STTR Innovation Portal (DSIP) at the proposal submission deadline date/time.**

Applicants are encouraged to thoroughly review the DoD Program BAA and register for the DSIP Listserv to remain apprised of important programmatic and contractual changes.

- Full component-specific instructions and topic descriptions are available on DSIP at https://www.dodsbirsttr.mil/submissions/solicitation-documents/active-solicitations. Be sure to select the tab for the appropriate BAA cycle.

Please ensure all e-mail addresses listed in the proposal are current and accurate. The DAF is not responsible for ensuring notifications are received by firms changing mailing address/e-mail address/company points of contact after proposal submission without proper notification to the DAF. **If changes occur to the company mail or email addresses or points of contact after proposal submission, the information must be provided to the AF SBIR/STTR One Help Desk.** The message shall include the subject line, "24.3 Address Change".

Points of Contact:

General information related to the AF SBIR/STTR program and proposal preparation instructions, contact the AF SBIR/STTR One Help Desk at usaf.team@afsbirsttr.us. All applicants have ample opportunity to request clarifying information. **The DAF encourages applicants to request clarifying information as early as possible, as delays in such requests constrain the DAF's ability to provide satisfactory resolution to applicant concerns.**

- Questions regarding the DSIP electronic submission system, contact the DoD SBIR/STTR Help Desk at dodsbirsupport@reisystems.com.
- For technical questions about the topics during the pre-announcement and open period, please reference the DoD SBIR 24.3 BAA.
- Air Force SBIR/STTR Contracting Officer (CO):
  - Mr. Daniel J. Brewer, Daniel.Brewer.13@us.af.mil

General information related to the AF Small Business Program can be found at the AF Small Business website, http://www.airforcesmallbiz.af.mil/. The site contains information related to contracting opportunities within the AF, as well as business information and upcoming outreach events. Other informative sites include those for the Small Business Administration (SBA), www.sba.gov, and the Procurement Technical Assistance Centers (PTACs), http://www.aptacus.us.org. These centers provide Government contracting assistance and guidance to small businesses, generally at no cost.

PHASE I PROPOSAL SUBMISSION

The DoD SBIR 24.3 Broad Agency Announcement, https://www.dodsbirsttr.mil/submissions/login, includes all program requirements. Phase I efforts should address the feasibility of a solution to the selected topic's requirements.

PHASE I PROPOSAL FORMAT

Complete proposals must include all of the following:

Volume 1: DoD Proposal Cover Sheet
Note: If selected for funding, the proposal's technical abstract and discussion of anticipated benefits will be publicly released. Therefore, do not include proprietary information in this section.
Volume 2: Technical Volume
Volume 3: Cost Volume
Volume 4: Company Commercialization Report
Volume 5: Supporting Documents
Volume 6: Fraud, Waste, and Abuse Training
Volume 7: Disclosures of Foreign Affiliations or Relationships to Foreign Countries

DoD PROPOSAL COVER SHEET (VOLUME 1)

Complete the proposal Cover Sheet in accordance with the instructions provided via DSIP. The technical abstract should include a brief description of the program objective(s), a description of the effort, anticipated benefits and commercial applications of the proposed research, and a list of keywords/terms. The technical abstract of each successful proposal will be submitted to the Office of the Secretary of Defense (OSD) for publication and, therefore, must not contain proprietary or classified information.

TECHNICAL VOLUME (VOLUME 2):

The Technical Volume should include all graphics and attachments but should not include the Cover Sheet, which is completed separately as Volume 1. The Phase I technical volume (uploaded in Volume 2) shall contain the required elements found below. Ensure that all graphics are distinguishable in black and white.

The Phase I Technical Volume page/slide limits identified for the topics do not include the Cover Sheet, Cost Volume, Cost Volume Itemized Listing (a-h). The Technical Volume must be no smaller than 10-point on standard 8-1/2" x 11" paper with one-inch margins. Only the Technical Volume and any enclosures or attachments count toward the page limit. In the interest of equity, pages/slides in excess of the stated limits will not be reviewed. The documents required for upload into Volume 5, "Other", do not count toward the specified limits.

All topics in these Phase I instructions have a Volume 2 page limit of 20 pages, not inclusive of other items discussed above. All topics listed in these Phase I instructions have a duration limit of six (6) months. Any proposals that exceed this duration will be disqualified. All topics listed have a maximum value of $180,000.00. Proposals that exceed this value will be disqualified.

These instructions supplement the 24.3 SBIR BAA. In addition to the requirements found in the 24.3 SBIR BAA, applicants are required to provide the following information in Volume 2:

Key Personnel: Identify in the Technical Volume all key personnel who will be involved in this project; include information on directly related education, experience, and citizenship.

- A technical resume of the principal investigator, including a list of publications, if any, must be included. Only one principal investigator/project manager can be designated to a proposal at any given time.
- Concise technical resumes for subcontractors and consultants, if any, are also useful.
- Identify all U.S. permanent residents to be involved in the project as direct employees, subcontractors, or consultants.
- Identify all non-U.S. citizens expected to be involved in the project as direct employees, subcontractors, or consultants. For all non-U.S. citizens, in addition to technical resumes, please provide countries of origin, the type of visa or work permit under which they are performing and an explanation of their anticipated level of involvement on this project, as appropriate. Additional

information may be requested during negotiations in order to verify the foreign citizen's eligibility to participate on a contract issued as a result of this announcement. **Note:** Do not upload information such as Permanent Resident Cards (Green Cards), birth certificates, Social Security Numbers, or other PII to the DSIP system.

Phase I Statement of Work Outline

NOTE: The DAF uses the work plan outline as the initial draft of the Phase I Statement of Work (SOW). Therefore, **do not include proprietary information in the work plan outline**. To do so will necessitate a request for revision, if selected, and may delay award.

Include a work plan outline in the following format:
Scope: List the effort's major requirements and specifications.
Task Outline: Provide a brief outline of the work to be accomplished during the Phase I effort.
Milestone Schedule
Deliverables
Progress reports
Final report with SF 298

COST VOLUME (VOLUME 3)

All topics listed in these Phase I instructions have a maximum value of $180,000.00. Proposals that exceed this amount will be disqualified.

Cost information should be provided by completing the Cost Volume in DSIP and including the Cost Volume Itemized Listing specified below. The Cost Volume detail must be adequate to enable Air Force personnel to determine the purpose, necessity and reasonability of each cost element. Provide sufficient information (a.-g. below) regarding funds use. The DSIP Cost Volume and Itemized Cost Volume Information will not count against the specified page limit. The itemized listing also may be submitted in Volume 5 under the "Other" dropdown option.

a. **Direct Cost Materials**: Justify costs for materials, parts, and supplies with an itemized list containing types, quantities, prices and where appropriate, purpose. Material costs may include the costs of such items as raw materials, parts, subassemblies, components, and manufacturing supplies.

b. **Other Direct Costs**: This category includes, but is not limited to, specialized services such as machining, milling, special testing or analysis, and costs incurred in temporarily using specialized equipment. Proposals including leased hardware must include an adequate lease v. purchase justification.

c. **Direct Labor**: Identify key personnel by name, if possible, or by labor category, if not. Direct labor hours, labor overhead and/or fringe benefits, and actual hourly rates for each individual are also necessary for the CO to determine whether these hours, fringe rates, and hourly rates are fair and reasonable.

d. **Travel**: Travel costs must relate to project needs. Break out travel costs by trip, number of travelers, airfare, per diem, lodging, etc. The number of trips required, as well as the destination and purpose of each, should be reflected. Recommend budgeting at least one trip to the Air Force location managing the contract.

e. **Subcontracts**: Involvement of university or other consultants in the project's planning and/or research stages may be appropriate. If so, describe in detail and include information in the Cost Volume. The proposed total of consultant fees, facility lease/usage fees, and other subcontract or purchase agreements may not exceed **one-third of the total contract price** or cost (do not include profit in the calculation), unless otherwise approved in writing by the CO. The SBIR funded work percentage calculation considers

both direct and indirect costs after removal of the SBC's proposed profit. Support subcontract costs with copies of executed agreements. The documents must adequately describe the work to be performed. At a minimum, include a Statement of Work (SOW) with a corresponding detailed Cost Volume for each planned subcontract.

f. **Special Tooling, Special Test Equipment, and Material**: The inclusion of equipment and materials will be carefully reviewed relative to need and appropriateness to the work proposed. Special tooling and special test equipment purchases must, in the CO's opinion, be advantageous to the Government and relate directly to the effort. These toolings or equipment should not be of a type that an offeror would otherwise possess in the normal course of business. These may include items such as innovative instrumentation and/or automatic test equipment.

g. **Consultants**: Provide a separate agreement letter for each consultant. The letter should briefly state what service or assistance will be provided, the number of hours required, and the hourly rate.

NOTE: If no exceptions are taken to an offeror's proposal, the Government may award a contract without negotiations. Therefore, the offeror's initial proposal should contain the offeror's best terms from a cost or price and technical standpoint. If there are questions regarding the award document, contact the Phase I CO identified on the cover page. The Government reserves the right to reopen negotiations later if the CO determines doing so to be necessary.

COMPANY COMMERCIALIZATION REPORT (VOLUME 4)

Completion of the CCR as Volume 4 of the proposal submission in DSIP is required. Please refer to the DoD SBIR 24.3 BAA for full details on this requirement. Information contained in the CCR will not be considered by the Air Force during proposal evaluations.

SUPPORTING DOCUMENTS VOLUME (VOLUME 5)

The following documents may be required if applicable to your proposal:

1. DD Form 2345: For proposals submitted under export-controlled topics, either International Traffic in Arms or Export Administration Regulations (ITAR/EAR), a copy of the certified DD Form 2345, Militarily Critical Technical Data Agreement, or evidence of application submission must be included. The form, instructions, and FAQs may be found at the United States/Canada Joint Certification Program website, http://www.dla.mil/HQ/InformationOperations/Offers/Products/LogisticsApplications/JCP/DD2345Ins tructions.aspx. DD Form 2345 approval will be required if proposal if selected for award.
    a. Topics AF242-0010, AF242-0011 **ONLY**: the certified and completed DD Form 2345, Military Critical Technical Data Agreement, must be included with the initial proposal submission. Proposals that do not include this document will be disqualified..

2. Verification of Eligibility of Small Business Joint Ventures (Attachment 3 to the DOD SBIR 24.3 BAA)
3. Technical Data Rights Assertions (if asserting data rights restrictions)

FRAUD, WASTE, AND ABUSE TRAINING (VOLUME 6)

Note that the FWA Training must be completed prior to proposal submission. When training is complete and certified, DSIP will indicate completion of the Volume 6 requirement. The proposal cannot be submitted until the training is complete.

DISCLOSURES OF FOREIGN AFFILIATIONS OR RELATIONSHIPS TO FOREIGN

COUNTRIES (VOLUME 7)
Small business concerns must complete the Disclosures of Foreign Affiliations or Relationships to Foreign Countries webform in Volume 7 of the DSIP proposal submission. Please be aware that the Disclosures of Foreign Affiliations or Relationships to Foreign Countries WILL NOT be accepted as a PDF Supporting Document in Volume 5 of the DSIP proposal submission. Do not upload any previous versions of this form to Volume 5. For additional details, please refer to the DoD SBIR Program BAA.

DISCRETIONARY TECHNICAL AND BUSINESS ASSISTANCE (TABA)
The Air Force does not participate in the Discretionary Technical and Business Assistance (TABA) Program. Proposals submitted in response to DAF topics shall not include TABA.

AIR FORCE PROPOSAL EVALUATIONS
Proposals will be evaluated for overall merit in accordance with the criteria discussed in the 24.3 BAA. DAF is seeking varying technical/scientific approaches and/or varying and new technologies that would be responsive to the problem statement(s) and area(s) of interest in the topic. Multiple procurements are planned and anticipated to be awarded as a result of the topic, each proposal is considered a separate procurement and will be evaluated on its own merit, and that the Government may award all, some, or none of the proposals. Any per-award or per-topic funding caps are budgetary estimates only, and more or less funding may become available. Funding decisions are made with complete disregard to the other awards under the same topic.

In accordance with 15 USC 638(vv) (Section 4 of the SBIR and STTR Extension Act of 2022), and the Deputy Secretary of Defense Memorandum; Subject: Defense Small Business Innovation Research and Small Business Technology Transfer Due Diligence Program dated May 13, 2024, the DAF will review all proposals submitted in response to this BAA to assess security risks presented by small business concerns seeking a Federally funded award. The DAF will use information provided by the small business concern in response to the Disclosure of Foreign Affiliations or Relationships to Foreign Countries and the proposal to conduct a risk-based due diligence review on the cybersecurity practices, patent analysis, employee analysis, and foreign ownership of a small business concern, including the small business concern and employees of the small business concern to a foreign country, foreign person, foreign affiliation, or foreign entity. The DAF will also assess proposals utilizing open-source analysis and analytical tools, for the nondisclosures of the information set forth in 15 U.S.C. 638(g)(13). If DAF assesses that a small business concern has security risk(s), DAF will review the proposal, the evaluation, and the security risks and may decide not to select the proposal for award based upon a totality of the review.

MAJORITY OWNERSHIP IN PART BY MULTIPLE VENTURE CAPITAL, HEDGE FUND, AND PRIVATE EQUITY FIRMS
Small business concerns that are owned in majority part by multiple venture capital operating companies (VCOCs), hedge funds, or private equity funds are not eligible to submit applications or receive awards for DAF Topics.

PERFORMANCE OF WORK REQUIREMENTS AND LOCATION OF WORK
For Phase I, a minimum of two-thirds of the research or analytical effort must be performed by the Awardee. The DAF measures percentage of work by both direct and indirect costs, not including profit. Occasionally, the DAF will consider deviations from this performance of work requirement. **Requests for Performance of Work deviations must be made twice: prior to submission during the topic open period and as part of the initial proposal submission.** For requests prior to the initial proposal submission, the DAF will consider the request and approve or disapprove requesting applicants to proceed with DSIP submission. Upon proposal receipt, the DAF will again consider such requests for approval for the resultant award.

All R/R&D work must be performed in the United States. Based on a rare and unique circumstance, the DAF may approve a particular portion of the R/R&D work to be performed or obtained in a country outside of the United States. The awarding Funding Agreement officer must approve each specific condition in writing. Applicants seeking this approval must make such a request with their initial proposal submission. The DAF will not consider these requests prior to proposal submission.

DAF USE OF SUPPORT CONTRACTORS

Restrictive notices notwithstanding, proposals may be handled for administrative purposes only, by support contractors. These support contractors may include, but are not limited to TEC Solutions, Inc., APEX, Oasis Systems, Riverside Research, Peerless Technologies, HPC-COM, Mile Two, Montech, Wright Brothers Institute, and MacB (an Alion Company). In addition, only Government employees and technical personnel from Federally Funded Research and Development Centers (FFRDCs) MITRE and Aerospace Corporations working under contract to provide technical support to AF Life Cycle Management Center and Space and Missiles Centers may evaluate proposals. All support contractors are bound by appropriate non-disclosure agreements. Contact the AF SBIR/STTR CO Daniel J. Brewer (Daniel.Brewer.13@us.af.mil) with concerns regarding the use of support contractors.

PROPOSAL STATUS AND FEEDBACK

The Principal Investigator (PI) and Corporate Official (CO) indicated on the Proposal Cover Sheet will be notified by e-mail regarding proposal selection or non-selection. Small Businesses will receive a notification for each proposal submitted. Please read each notification carefully and note the Proposal Number and Topic Number referenced.

Automated feedback will be provided for Phase I proposals designated Not Selected. Additional feedback may be provided at the sole discretion of the DAF.

IMPORTANT: Proposals submitted to the DAF are received and evaluated by different organizations, handled by topic. Each organization operates within its own schedule for proposal evaluation and selection. Updates and notification timeframes will vary. If contacted regarding a proposal submission, it is not necessary to request information regarding additional submissions. Separate notifications are provided for each proposal.

The Air Force anticipates that all proposals will be evaluated and selections finalized within approximately 90 calendar days of solicitation close. Refrain from contacting the BAA CO for proposal status before that time.

Refer to the DoD SBIR Program BAA for procedures to protest the Announcement.
As further prescribed in FAR 33.106(b), FAR 52.233-3, Protests after Award should be submitted to: Air Force SBIR/STTR Contracting Officer Daniel J. Brewer, Daniel.Brewer.13@us.af.mil.

AIR FORCE SUBMISSION OF FINAL REPORTS

All Final Reports will be submitted to the awarding DAF organization in accordance with Contract instructions. Companies will not submit Final Reports directly to the Defense Technical Information Center (DTIC).

PHASE II PROPOSAL SUBMISSIONS

DAF organizations may request Phase II proposals while Phase I technical performance is ongoing or at any time after the conclusion of the period of performance. This decision will be based on the awardee's technical progress, as determined by an DAF Technical Point of Contact review using the Phase II review criteria outlined above.

Phase II is the demonstration of the technology found feasible in Phase I. Only Phase I awardees are eligible to submit a Phase II proposal. All Phase I awardees will be sent a notification with the Phase II proposal submittal date and detailed Phase II proposal preparation instructions. If the physical or email addresses or firm points of contact have changed since submission of the Phase I proposal, correct information shall be sent to the DAF SBIR/STTR One Help Desk. Phase II dollar values, performance periods, and proposal content will be specified in the Phase II request for proposal.

NOTE: The DAF primarily makes SBIR Phase I and II awards as Firm-Fixed-Price contracts. However, awardees are strongly urged to work toward a Defense Contract Audit Agency (DCAA)-approved accounting system. If the company intends to continue work with the DoD, an approved accounting system will allow for competition in a broader array of acquisition opportunities, including award of Cost-Reimbursement types of contracts. Please address questions to the Phase II CO, if selected for award.

All proposals must be submitted electronically via DSIP by the date indicated in the Phase II proposal instructions. Note: Only ONE Phase II proposal may be submitted for each Phase I award.

Version 2

Air Force SBIR 24.3 Phase I Topic Index

Version 2

SF243-0001 TITLE: Event Based Data Fusion for Temporal Super Resolution in Image Based Tracking

OUSD (R&E) CRITICAL TECHNOLOGY AREA(S): Space Technology

The technology within this topic is restricted under the International Traffic in Arms Regulation (ITAR), 22 CFR Parts 120-130, which controls the export and import of defense-related material and services, including export of sensitive technical data, or the Export Administration Regulation (EAR), 15 CFR Parts 730-774, which controls dual use items. Offerors must disclose any proposed use of foreign nationals (FNs), their country(ies) of origin, the type of visa or work permit possessed, and the statement of work (SOW) tasks intended for accomplishment by the FN(s) in accordance with the Announcement. Offerors are advised foreign nationals proposed to perform on this topic may be restricted due to the technical data under US Export Control Laws.

OBJECTIVE: The objective of this SBIR is to build and demonstrate data fusion algorithms which enable joint tracking between traditional imaging sensors and neuromorphic sensors. The resulting research should deliver data fusion algorithms that enable and inform search and track concept of operations while improving track fidelity in the temporal domain using the neuromorphic data and improving target discrimination using traditional imagers.

DESCRIPTION: Neuromorphic or event-based sensors (EBS) offer an alternative sensing paradigm in which pixels operate asynchronously and only report scene dynamics in the form of (x,y,t,p) messages where x and y are pixel indices, t is a timestamp in microsecond precision and p is a polarity bit to indicate increasing or decreasing changes [1]. The result is a sensor with high temporal resolution in combination with significantly reduced power consumption and overall data reduction as compared to traditional high speed video. The ability to measure fleeting temporal dynamics at reduced power and computational cost has prompted a number of studies in leveraging this sensing technology for applications such as moving target engagement. This then requires methods by which neuromorphic sensing data streams can be integrated with and leveraged alongside traditional sensing modalities. This topic seeks solutions to demonstrate the data fusion of neuromorphic and framing data such that tracking information from framing imagers can be temporally upsampled through the use of event based data streams. Ultimately this should be implemented and deployed in a processing architecture which is well suited for onboard processing hardware which are naturally constrained by size weight and power. Although fused tracking data should be the end product the delivered software product, solutions should also include concept of operations considerations that enable geo-registration, clutter suppression, sensor tip & cue and track handoff. Finally the study should include trade space analysis to inform the ideal measurement cadence between the sensors and the ideal homography required to move between these modalities.

PHASE I: Phase I research should consist of development and demonstration of candidate tracking algorithms which can independently be applied to frame based imaging data and event based sensing data respectively. Awardee(s) should also identify a viable route by which data fusion will occur in the phase II research. Proposed candidate algorithms should be computationally lightweight, have a viable path towards the intended data fusion pipeline and execution within onboard processing hardware.

PHASE II: Phase II will take candidate algorithms identified in phase I and prove out the data fusion using real sensor data representative of overhead sensing concept of operations. This should involve working with co-sighted sensors in which the framing sensor field of view is much larger than the event based sensor field of view. Success of this data fusion will be measured by the ability to provide a continuous high fidelity track by temporally upsampling using the event based sensor data. Algorithms should also demonstrate the capability for improved target discrimination using intensity data from the

framing imager. Finally, the processing pipeline used to detect, track and fuse will be integrated and run as a laboratory prototype which is identified as well suited for onboard processing. Performers will report tracking performance using annotated data to determine probability of detect and false alarm, sensitivity limits of the final prototype, temporal performance/real time capability and power requirements. Prototypes should utilize surrogate data to demonstrate real time tracking, data fusion and track products. Laboratory prototypes and associated software products will be delivered to the government technical point of contact and validated for potential field deployment using real time scene simulation and test sensors.

PHASE III DUAL USE APPLICATIONS: Phase III will optimize and repackage the laboratory prototype for integration into an overhead field demonstration. The field demonstration will include ground truth targets and emulate a tasking, collection, processing, exploitation, and dissemination pipeline to assess the accuracy, latency and value add for warfighter application. This will validate the ability of the solution to be deployed and transitioned to a space platform.

REFERENCES:

1. G. Gallego et al., "Event-Based Vision: A Survey," in IEEE Transactions on Pattern Analysis and Machine Intelligence, vol. 44, no. 1, pp. 154-180, 1 Jan. 2022, doi: 10.1109/TPAMI.2020.3008413.;
2. Gehrig, D., Rebecq, H., Gallego, G., Scaramuzza, D. (2018). Asynchronous, Photometric Feature Tracking Using Events and Frames. In: Ferrari, V., Hebert, M., Sminchisescu, C., Weiss, Y. (eds) Computer Vision – ECCV 2018. ECCV 2018. Lecture Notes in Computer Science(), vol 11216. Springer, Cham. https://doi.org/10.1007/978-3-030-01258-8_46.;
3. Stepan Tulyakov, Alfredo Bochicchio, Daniel Gehrig, Stamatios Georgoulis, Yuanyou Li, Davide Scaramuzza. (2022) Time Lens++: Event-based Frame Interpolation with Parametric Non-linear Flow and Multi-scale Fusion. https://doi.org/10.48550/arXiv.2203.17191.;
4. T. Stoffregen, G. Gallego, T. Drummond, L. Kleeman and D. Scaramuzza, "Event-Based Motion Segmentation by Motion Compensation," 2019 IEEE/CVF International Conference on Computer Vision (ICCV), Seoul, Korea (South), 2019, pp. 7243-7252, doi: 10.1109/ICCV.2019.00734.;

KEYWORDS: Neuromorphic; Even-Based Sensing; Computer Vision; Computation Imaging; Asynchronous Sensor; Real Time Processing; Remote Sensing; Tracking; On-Board Processing; Data Fusion; Algorithm Development

Version 2

SF243-0002 TITLE: Spectral-Binning Focal Plane Array for Infrared Spectroscopy

OUSD (R&E) CRITICAL TECHNOLOGY AREA(S): Microelectronics; Quantum Science

The technology within this topic is restricted under the International Traffic in Arms Regulation (ITAR), 22 CFR Parts 120-130, which controls the export and import of defense-related material and services, including export of sensitive technical data, or the Export Administration Regulation (EAR), 15 CFR Parts 730-774, which controls dual use items. Offerors must disclose any proposed use of foreign nationals (FNs), their country(ies) of origin, the type of visa or work permit possessed, and the statement of work (SOW) tasks intended for accomplishment by the FN(s) in accordance with the Announcement. Offerors are advised foreign nationals proposed to perform on this topic may be restricted due to the technical data under US Export Control Laws.

OBJECTIVE: Development of a sensitive infrared focal plane array (FPA) that intrinsically resolves spectra over the spectral range 1.5 to 12 μm to be used in place of conventional high-speed spectrometers for measuring the spectral characteristics of targets and target simulators. The FPA must provide varying spectral response across one axis, with the other axis used for summation of radiation signal output for each spectral response bin.

DESCRIPTION: The space simulation chambers of the Space Systems Test Facility (SSTF) at Arnold Air Force Base facilitate the testing of high-performance interceptors and surveillance sensors in a low background radiation (20 K) environment, as well as making spectral signature measurements of aerospace structures. These facilities offer support for developmental and operational Test and Evaluation (T&E) of aerospace systems. To provide the needed spectral measurement capability, a cryo-vacuum-compatible compact spectrometer is needed to augment the spectral sensing capability of AEDC's space simulation chambers, as well as provide technology advancement for similar venues throughout DoD. Such a spectral measurement system must operate in a low temperature, high vacuum environment and provide spectral data for point measurements of a targets using a collimating optical system. The spectral system should range from 1.5 to 14 μm with a spectral resolution of 0.1 (threshold) or 0.05 μm (objective), capable of 10 spectra per second (threshold) or 100 per second (objective) and an average quantum efficiency of 0.5. The goal is an FPA (or suite of FPAs) that inherently spectrally resolves the incident light so that, for example, a vertical row of pixels is sensitive only to a narrow spectral band of light would be summed to measure the signal within that narrow spectral band. Each subsequent vertical row increments spectrally so that across orthogonal axis of the FPA the full spectral range can be measured. The goal is to avoid conventional spectral dispersing elements or narrow band filters over the detection elements, or mechanical positioners that are problematic in terms of speed or reliability. The objective of this topic is to develop this FPA to accomplish spectral binning without a conventional dispersive element through the use of nanolithographic design and manufacturing techniques. However, other innovative concepts will be considered. This has the potential to be a technology development that could be extended to the area of hyperspectral scene projectors. Proposals include detailed risk mitigation strategies by addressing potential challenges in developing and integrating the advanced FPA technology. Also, methodologies should be defined for testing and validation at critical junctures to ensure a clear and robust path to successful implementation.

PHASE I: Demonstrate a proof-of-concept spectral FPA that has a format of 128 x 128 pixels and provides 0.1 μm resolution across the LWIR spectral range. Implement, expound upon and refine, as necessary, the proposed risk mitigation strategies mentioned in the Topic Description. Provide a plan for Phase II testing and validation of the prototype FPA technology in the AEDC Space Systems Test Facility laboratory early enough to allow refinements to ensure a clear and robust path to successful implementation.

PHASE II: Develop, demonstrate and deliver a prototype infrared spectral FPA that has a format of 256 x 256 pixels and provides 0.05 µm resolution across its spectral range (1.5 to 14 µm). The product could be a suite of FPAs that can cover the desired spectral range. Implement the proposed testing and validation of the prototype at AEDC to allow modifications as necessary for successful implementation to the Space Systems Facility prior to the end of the Phase II effort.

PHASE III DUAL USE APPLICATIONS: Phase III efforts would be directed towards larger FPA formats with higher resolution spectral performance. Instrumentation incorporating this type of technology would be useful in many DoD venues involved in calibration, characterization, and mission performance testing of imaging sensor systems.

REFERENCES:

1. Nicholson, R.A., Mead, K.D., and Lowry, H.S., "Radiometric Calibration and Mission Simulation Testing of Sensor Systems in the AEDC 7V and 10V Chambers," SPIE Proceedings, Vol. 6208-46 (2006).;
2. McGovern, W.R., et.al., "Metal-mesh optical filter technology for mid-IR, far-IR, and submillimeter," SPIE Proc. Vol. 8385, 838506 (2012).;
3. Le Perchec, J., et.al., "High rejection bandpass optical filters based on sub-wavelength metal patch arrays," Optics Express, Vol. 19, No. 17, 15 Aug 2011.;
4. Fan, K, and Padilla, W.J., "Dynamic electromagnetic metamaterials," Materials Today, Vol. 18, No. 1, Jan/Feb 2015, Dynamic electromagnetic metamaterials - ScienceDirect.;
5. Jiang, S., Li, J., Lai, J., Yi, F., "Metamaterial microbolometers for multi-spectral infrared polarization imaging," Opt Express, 2022 Mar 14, 30(6):9065-9087.doi: 10.1364/OD.45298, Metamaterial microbolometers for multi-spectral infrared polarization imaging - PubMed (nih.gov).;

KEYWORDS: cryo-vacuum; infrared spectral calibration; infrared detectors; focal plane arrays; infrared spectrometers, imaging sensors; imaging sensor testing; space simulation

Version 2

SF243-0003 TITLE: Reentry Events and Impact Location Prediction

OUSD (R&E) CRITICAL TECHNOLOGY AREA(S): Emerging Threat Reduction

The technology within this topic is restricted under the International Traffic in Arms Regulation (ITAR), 22 CFR Parts 120-130, which controls the export and import of defense-related material and services, including export of sensitive technical data, or the Export Administration Regulation (EAR), 15 CFR Parts 730-774, which controls dual use items. Offerors must disclose any proposed use of foreign nationals (FNs), their country(ies) of origin, the type of visa or work permit possessed, and the statement of work (SOW) tasks intended for accomplishment by the FN(s) in accordance with the Announcement. Offerors are advised foreign nationals proposed to perform on this topic may be restricted due to the technical data under US Export Control Laws.

OBJECTIVE: Delivery of software capability that automatically detects reentry events and predicts the impact location and time.

DESCRIPTION: Reentry events present a specific challenge and inherent risk to space operations. A reentry refers to the return of a spacecraft into Earth's atmosphere. There are a wide range of reasons as to why a reentry may be occurring but regardless of the motivation, detecting, tracking, and predicting impact is critical to the Space Domain Awareness (SDA) community. Space Systems Command (SSC) Space Domain Awareness (SDA) Tap Lab is seeking solutions to provide a software capability that can automatically detect reentry events and predict the impact time and location.

The software product must be able to be integrated into existing toolchains that are used by USSF operators and the SDA Tap Lab. As this capability is only one specific functionality to be used in conjunction with other tools to provide a wholistic understanding of space domain awareness and space operations, it is pivotal that the solution be able to seamless integrate with existing systems through API call. The solution must also meet all development and operational requirements for system integration and use on classified systems.

PHASE I: The Phase I will focus on conducting a feasibility study to demonstrate the technical and scientific merit of developing a software capability for detecting reentry events and predicting impact locations and times. This feasibility study would involve demonstrating a framework design as a proof of concept to show that such a capability is achievable. The proposed solution should be able to accurately detect reentry events and provide predictions regarding the impact area. Additionally, the feasibility study should include a plan for integrating the software capability into existing toolchains used by USSF operators and the SDA Tap Lab. This integration plan should outline how the solution will seamlessly integrate with existing systems through API calls and meet all development and operational requirements for use on classified systems. Overall, the Phase I topic description would lay the groundwork for further development and refinement of the software capability in subsequent phases.

PHASE II: Phase II will entail developing and refining the concept established in Phase I with a specific focus on enhancing evaluation metrics such as accuracy, precision, F1 score, and overall model performance. This phase will involve iterative improvements to the software capability based on insights gained from Phase I, aiming to enhance the accuracy and reliability of reentry event detection and prediction.

Furthermore, Phase II will expand the scope of input data to encompass a wider breadth of reentry events, thereby enhancing the robustness and effectiveness of the software capability. This expanded dataset will enable the model to capture a more comprehensive range of reentry scenarios, improving its predictive capabilities and overall performance.

Additionally, Phase II will involve rigorous testing and validation of the enhanced software capability to ensure its effectiveness across various operational scenarios. This testing will involve simulated and real-world data to validate the accuracy and reliability of the reentry event detection and prediction algorithms.

PHASE III DUAL USE APPLICATIONS: Phase III will involve scaling the finalized model developed in Phase II to encompass the analysis of all launch events, not just reentry events, thereby broadening its scope and utility. This expanded capability will enable the software to detect and predict the impact locations and times of various launch events, including rocket launches and other space activities.

Furthermore, Phase III will focus on expanding the notification functionality of the software to provide timely alerts and notifications regarding all significant launch events. This enhanced notification system will ensure that relevant stakeholders receive actionable information in real-time or near-real-time, enabling them to respond effectively to emerging space events.

Moreover, Phase III will explore the dual-use potential of the software solution, identifying opportunities for its application beyond military and national security contexts. This may include adaptation for commercial space operators, international partners, and other stakeholders interested in enhancing their space situational awareness and operational readiness.

REFERENCES:

1. C. Bhattacharyya & S. Bhattacharyya, "Detecting Re-entry of a Moving Object in an Irregular Space", IEEE, January 2009.;

KEYWORDS: Reentry event; impact prediction; space domain awareness; SDA

Version 2

SF243-0004 TITLE: Responsible Space Behavior Event Classification

OUSD (R&E) CRITICAL TECHNOLOGY AREA(S): Emerging Threat Reduction

The technology within this topic is restricted under the International Traffic in Arms Regulation (ITAR), 22 CFR Parts 120-130, which controls the export and import of defense-related material and services, including export of sensitive technical data, or the Export Administration Regulation (EAR), 15 CFR Parts 730-774, which controls dual use items. Offerors must disclose any proposed use of foreign nationals (FNs), their country(ies) of origin, the type of visa or work permit possessed, and the statement of work (SOW) tasks intended for accomplishment by the FN(s) in accordance with the Announcement. Offerors are advised foreign nationals proposed to perform on this topic may be restricted due to the technical data under US Export Control Laws.

OBJECTIVE: Delivery of software capability that automatically detects and evaluates on orbit or space related activity. Evaluation should classify the specific activity as hostile, irresponsible, or other

DESCRIPTION: In July 2021, Secretary of Defense Lloyd Austin published a memo outlining five tenants of responsible space behavior.

- Operate in, from, and through space with due regard to others and in a professional manner;
- Limit the generation of long-lived debris;
- Avoid the creation of harmful interference;
- Maintain safe separation and safe trajectory;
- Communicate and make notifications to enhance the safety and stability of the domain.

As space continues to become more congested and commoditized there is a growing need to identify and understand irresponsible space behaviors. Understanding what those activities look like and identifying patterns such as type of irresponsible activity, associated elevation in threat level to other space objects, responsible party, and other key pieces of information will provide the space community with a deeper understanding and awareness. Additionally, this level of understanding can be leveraged to better understand and establish a prescribed list of space activity norms and standards.

Space Systems Command (SSC) Space Domain Awareness (SDA) Tap Lab is seeking solutions to provide a software capability that can automatically detect and classify on-orbit activities as hostile or irresponsible. Anticipated data sources are orbital data (elsets, state vector, observations, or other), pattern of life assessments and behavior patterns, and other open-source datasets.

The software product must be able to be integrated into existing toolchains that are used by USSF operators and the SDA Tap Lab. As this capability is only one specific functionality to be used in conjunction with other tools to provide a wholistic understanding of space domain awareness and space operations, it is pivotal that the solution be able to seamless integrate with existing systems through API call. The solution must also meet all development and operational requirements for system integration and use on classified systems.

PHASE I: The Phase I will involve conducting a feasibility study and developing a proof of concept for a software capability that can automatically detect and classify on-orbit activities as irresponsible, adversarial, or other. The proposed solution should demonstrate the ability to accurately classify and analyze on-orbit activities based on predefined criteria, such as patterns of behavior and associated threat levels. The feasibility study should assess the scientific and technical merit of the proposed approach, including the feasibility of integrating various data sources such as orbital data, pattern of life assessments, and other open-source datasets. Additionally, the Phase I effort should include a clear plan

for how the proposed solution will be integrated into existing toolchains used by USSF operators and the SDA Tap Lab, as well as how it will meet development and operational requirements for use on classified systems. Funding for Phase I may be sought through government programs such as the Small Business Innovation Research (SBIR) program or other Department of Defense (DoD) initiatives focused on space domain awareness and threat detection.

PHASE II: Phase II involves building upon the concept developed in Phase I to enhance its capabilities and performance. This includes refining the software capability to improve evaluation metrics such as accuracy, precision, F1 score, and other relevant performance indicators. Additionally, Phase II should focus on expanding the breadth of input data used for detecting and classifying on-orbit activities. This broader dataset will enable a more comprehensive assessment of various types of space-related events, thereby enhancing the overall scope and effectiveness of the software solution. The Phase II effort should involve rigorous testing and validation to ensure that the refined concept meets the operational requirements of the Space Systems Command (SSC) Space Domain Awareness (SDA) Tap Lab and USSF operators.

PHASE III DUAL USE APPLICATIONS: Phase III dual use involves scaling up the finalized model developed in Phase II to encompass the analysis of all launch events and expanding its notification functionality. This means extending the software capability to detect, classify, and analyze a wider range of space-related activities, including not only on-orbit events but also all launch events. Furthermore, the notification functionality should be enhanced to provide timely alerts to relevant stakeholders, including USSF operators and other government agencies, about detected launch events and on-orbit activities. In addition to its military application, this expanded capability could have dual-use potential for commercial space operators and international partners interested in enhancing their own space domain awareness and situational awareness capabilities. For example, commercial satellite operators could benefit from early detection and notification of launch events to protect their assets and ensure uninterrupted operations. International partners may also find value in leveraging the software capability to enhance their own space surveillance and tracking capabilities, contributing to global space domain awareness efforts.

To facilitate the transition of this technology, partnerships with industry stakeholders, international collaborators, and government agencies involved in space surveillance and tracking should be pursued. Funding strategies may involve continued government support through programs such as SBIR or other research and development initiatives focused on space domain awareness and space situational awareness. Integration plans should prioritize interoperability with existing systems and toolchains used by USSF operators and other relevant entities, ensuring seamless integration into operational environments. Additionally, engagement with the ATLAS Dynamic Event Processing Space Threat Need program of record should be considered to align with broader Department of Defense priorities and initiatives in space domain awareness.

REFERENCES:

1. S. Flanagan et al., "A Framework of Deterrence in Space Operations", Rand Corporation, 2023.;

KEYWORDS: Responsible space; classification; space domain awareness; SDA; on orbit activity

Version 4

DEPARTMENT OF AIR FORCE (DAF)
24.3 SMALL BUSINESS INNOVATION RESEARCH (SBIR) DIRECT-TO-PHASE-II (D2P2)
PROPOSAL SUBMISSION INSTRUCTIONS

The DAF intends these proposal submission instructions to clarify the Department of Defense (DoD) Broad Agency Announcement (BAA) as it applies to the topics solicited herein. **Firms must ensure proposals meet all requirements of the 24.3 SBIR BAA posted on the DoD SBIR/STTR Innovation Portal (DSIP) at the proposal submission deadline date/time.**

Applicants are encouraged to thoroughly review the DoD Program BAA and register for the DSIP Listserv to remain apprised of important programmatic and contractual changes.

- The DoD Program BAA is located at: https://www.defensesbirsttr.mil/SBIR-STTR/Opportunities/#announcements. Be sure to select the tab for the appropriate BAA cycle.
- Register for the DSIP Listserv at: https://www.dodsbirsttr.mil/submissions/login.

Please ensure all e-mail addresses listed in the proposal are current and accurate. The DAF is not responsible for ensuring notifications are received by firms changing mailing address/e-mail address/company points of contact after proposal submission without proper notification to the DAF. **If changes occur to the company mail or email addresses or points of contact after proposal submission, the information must be provided to the AF SBIR/STTR One Help Desk.** The message shall include the subject line, "24.3 Address Change".

Points of Contact:

- For general information related to the AF SBIR/STTR program and **proposal preparation instructions**, contact the AF SBIR/STTR One Help Desk at usaf.team@afsbirsttr.us. All applicants have ample opportunity to request clarifying information. **The DAF encourages applicants to request clarifying information as early as possible, as delays in such requests constrain the DAF's ability to provide satisfactory resolution to applicant concerns.**
- For questions regarding the **DSIP electronic submission system**, contact the DoD SBIR/STTR Help Desk at dodsbirsupport@reisystems.com.
- **For technical questions about the topics** during the pre-announcement and open period, please reference the DoD 24.3 SBIR BAA.
- Air Force SBIR/STTR Contracting Officer (CO):
  Mr. Daniel J. Brewer, Daniel.Brewer.13@us.af.mil

General information related to the AF Small Business Program can be found at the AF Small Business website, http://www.airforcesmallbiz.af.mil/. The site contains information related to contracting opportunities within the AF, as well as business information and upcoming outreach events. Other informative sites include those for the Small Business Administration (SBA), www.sba.gov, and the Procurement Technical Assistance Centers (PTACs), http://www.aptacus.us.org. These centers provide Government contracting assistance and guidance to small businesses, generally at no cost.

DIRECT TO PHASE II

15 U.S.C. §638 (cc), as amended by the SBIR AND STTR EXTENSION ACT OF 2022, allows DoD to make a SBIR Phase II award to a small business concern with respect to a project, without regard to whether the small business concern was provided an award under Phase I of an SBIR program with respect to such project. DAF is conducting a "Direct to Phase II" implementation of this authority for these 24.3 SBIR topics and does not guarantee D2P2 opportunities will be offered in future solicitations. Each eligible topic requires documentation to determine whether the feasibility requirement described in the Phase I section of the topic has been met.

DIRECT TO PHASE II PROPOSAL SUBMISSION

The DoD SBIR 24.3 Broad Agency Announcement, https://www.dodsbirsttr.mil/submissions/login, includes all program requirements. Phase I efforts should address the feasibility of a solution to the selected topic's requirements.

The complete proposal must be submitted electronically through DSIP. Ensure the complete technical volume and additional cost volume information is included in this sole submission. The preferred submission format is Portable Document Format (.pdf). Graphics must be distinguishable in black and white. **VIRUS-CHECK ALL SUBMISSIONS.**

The System for Award Management (SAM) allows proposing small business concerns interested in conducting business with the Federal Government to provide basic information on business structure and capabilities as well as financial and payment information. Proposing small business concerns must be registered in SAM. To register, visit www.sam.gov. A proposing small business concern that is already registered in SAM should login to SAM and ensure its registration is active and its representations and certifications are up-to-date to avoid delay in award.

On April 4, 2022, the DUNS Number was replaced by the Unique Entity ID (SAM). The Federal Government will use the UEI (SAM) to identify organizations doing business with the Government. The DUNS number will no longer be a valid identifier. If the proposing small business concerns has an entity registration in SAM.gov (even if the registration has expired), a UEI (SAM) has already been assigned. This can be found by signing into SAM.gov and selecting the Entity Management widget in the Workspace or by signing in and searching entity information. For proposing small business concerns with established Defense SBIR/STTR Innovation Portal (DSIP) accounts, update the Small Business Concern profile with the UEI (SAM) as soon as possible.

For new proposing small business concern registrations, follow instructions during SAM registration on how to obtain a Commercial and Government Entry (CAGE) code and be assigned the UEI (SAM). Once a CAGE code and UEI (SAM) are obtained, update the Small business concern's profile on the DSIP at https://www.dodsbirsttr.mil/submissions/.

INTRODUCTION: D2P2 proposals must follow the steps outlined below:

1. Applicants must create a Cover Sheet in DSIP; follow the Cover Sheet instructions provided in the DoD SBIR 24.3 BAA.Applicants must provide documentation satisfying the Phase I feasibility requirement* to be included in the Phase II proposal. Applicants must demonstrate completion of research and development through means other than the SBIR/STTR Programs to establish the feasibility of the proposed Phase II effort based on the criteria outlined in the topic description.
2. Applicants must submit D2P2 proposals using the instructions below.

*NOTE: DAF will not consider the applicant's D2P2 proposal if the applicant fails to demonstrate technical merit and feasibility have been established. It will also not be considered if it fails to demonstrate the feasibility effort was substantially performed by the applicant and/or the principal investigator (PI). Refer to the topics' Phase I descriptions for minimum requirements needed to demonstrate feasibility. Feasibility documentation cannot be based upon or logically extend from any prior or ongoing federally funded SBIR or STTR work.

DIRECT TO PHASE II PROPOSAL PREPARATION INSTRUCTIONS AND REQUIREMENTS

A. Proposal Requirements. A Direct To Phase II proposal shall provide sufficient information to persuade the AF the proposed technology advancement represents an innovative solution to the scientific or engineering problem worthy of support under the stated criteria.

B. Proprietary Information. Information constituting a trade secret, commercial/financial information, confidential personal information, or data affecting National Security must be clearly marked. It shall be treated in confidence to the extent permitted by law. Be advised, in the event of proposal selection, the Work Plan will be incorporated into the resulting contract by reference. Therefore, DO NOT INCLUDE PROPRIETARY INFORMATION in the work plan. See the DoD BAA regarding proprietary information marking.

C. General Content. Proposals should be direct, concise, and informative. Type shall be no smaller than 11-point on standard 8 ½ X 11 paper, with one-inch margins and pages consecutivelynumbered. Applicants are discouraged from including promotional and non-programmatic items. If included, such material will count toward the page limit.

DIRECT TO PHASE II PROPOSAL FORMAT

Complete proposals must include all of the following:
Volume 1: DoD Proposal Cover Sheet
Note: If selected for funding, the proposal's technical abstract and discussion of anticipated benefits will be publicly released. Therefore, do not include proprietary information in this section.
Volume 2: Technical Volume
Volume 3: Cost Volume
Volume 4: Company Commercialization Report
Volume 5: Supporting Documents, e.g. DoD Form 2345 (if applicable), Militarily Critical Data Agreement (if applicable); etc.
Volume 6: Fraud, Waste, and Abuse Training Completion

Phase II proposals require a comprehensive, detailed description of the proposed effort. AF D2P2 efforts are to be proposed in accordance with the information in these instructions. Commercial and military potential of the technology under development is extremely important. Proposals emphasizing dual-use applications and commercial exploitation of resulting technologies are sought.

All D2P2 research or research and development (R/R&D) must be performed by the small business and its team members in the United States, as defined in the DoD SBIR 24.3 BAA. The Principal Investigator's (PI's) primary employment must be with the small business concern at the time of awardand during the entire period of performance. Primary employment means more than one-half the PI's time is spent in the small business' employ. This precludes full-time employment with another entity. Only one principal investigator/project manager can be designated to a proposal at any given time.

Knowingly and willfully making false, fictitious, or fraudulent statements or representations may be a felony under18 U.S.C. Section 1001, punishable by a fine up to $250,000, up to five years in prison, or both.

Please note the FWA Training must be completed prior to proposal submission. When training is complete and certified, DSIP will indicate completion of the Volume 6 requirement. The proposal cannot be submitted until the training is complete. The DAF recommends completing submission early, as site traffic is heavy prior to solicitation close, causing system lag. **Do not wait until the last minute.** The AF will not be responsible for proposals not completely submitted prior to the deadline due to system inaccessibility unless advised by DoD. The DAF will not accept alternative means of submission outside of DSIP.

DOD PROPOSAL COVER SHEET (VOLUME 1)

Complete the proposal Cover Sheet in accordance with the instructions provided via DSIP. The technical abstract should include a brief description of the program objective(s), a description of the effort, anticipated benefits and commercial applications of the proposed research, and a list of keywords/terms. The technical abstract of each successful proposal will be submitted to the Office of the Secretary of Defense (OSD) for publication and, therefore, must not contain proprietary or classified information.

TECHNICAL VOLUME (VOLUME 2)

The technical proposal includes all items listed below in the order provided. ~~All topics have a page limit of 35 pages.~~ Pages in excess of this count will not be considered by the Government in evaluations.

(1) **Table of Contents:** A table of contents should be located immediately after the Cover Sheet.

(2) **Glossary:** Include a glossary of acronyms and abbreviations used in the proposal.

(3) **Milestone Identification:** Include a program schedule with all key milestones identified.

(4) **Identification and Significance of the Problem or Opportunity:** Briefly reference thespecific technical problem/opportunity to be pursued under this effort.

(5) **Phase II Technical Objectives:** Detail the specific objectives of the Phase II work and describe the technical approach and methods to be used in meeting these objects. The proposal should also include an assessment of the potential commercial application for eachobjective.

(6) **Work Plan:** The work plan shall be a separate and distinct part of the proposal package, using a page break to divide it from the technical proposal. It must contain a summary description of the technical methodology and task description in broad enough detail to provide contractual flexibility. The following is the recommended format for the work plan; begin this section on a new page. **DO NOT include proprietary information.**

a) 1.0 – Objective: This section is intended to provide a brief overview of thespecialty area. It should explain the purpose and expected outcome.
b) 2.0 – Scope: This section should provide a concise description of the work to beaccomplished, including the technology area to be investigated, goals, and majormilestones. The key elements of this section are task development and deliverables, i.e., the anticipated end result and/or the effort's product. This section must also be consistent with the information

in Section 4.0 below.

c) 3.0 – Background: The applicant shall identify appropriate specifications, standards, andother documents applicable to the effort. This section includes information or explanation for, and/or constraints to, understanding requirements. It may include relationships to previous, current, and/or future operations. It may also include techniques previously determined ineffective.

d) 4.0 – Task/Technical Requirements: The detailed individual task descriptions must be developed in an orderly progression with sufficient detail to establish overall program requirements and goals. The work effort must be segregated into major tasks and identified in separately numbered paragraphs.

Each numbered major task should delineate the work to be performed by subtask. The work plan MUST contain every task to be accomplished in definite, realistic, and clearlystated terms. Use "shall" whenever the work plan expresses a binding provision. Use "should" or "may" to express a declaration or purpose. Use "will" when no contractor requirement is involved, i.e., "... power will be supplied by the Government."

(7) **Deliverables:** Include a section clearly describing the specific sample/prototype hardware/ software to be delivered, as well as data deliverables, schedules, and quantities. Be aware of the possible requirement for unique item identification IAW DFARS 252.211-7003, ItemIdentification and Valuation, for hardware. If hardware/ software will be developed but not delivered, provide an explanation. At a minimum, the following reports will be required under ALL Phase II contracts.

a) Scientific and Technical Reports: Rights in technical data, including software, developed under the terms of any contract resulting from a SBIR Announcement generally remain with the contractor. The Government obtains SBIR/STTR data rights in all data developed or generated under the SBIR/STTR contract for a period of 20 years, commencing at contract award. Upon expiration of the 20-year SBIR/STTR license, the Government has Government purpose rights to the SBIR data.

i. Final Report: The first page of the final report will be a single-page project summary, identifying the work's purpose, providing a brief description of the effort accomplished, and listing potential result applications. The summary may be published by DoD. Therefore, it must not contain any proprietary or classified information. The

remainder of the report should contain details of project objectives met, work completed, results obtained, and technical feasibility estimates.

ii. Status Reports: Status reports are due quarterly at a minimum.

b) Additional Reporting: AF may require additional reporting documentation including:

i. Software documentation and users' manuals;
ii. Engineering drawings;
iii. Operation and maintenance documentation

iv. Safety hazard analysis when the project will result in partial ortotal development and delivery of hardware; and
v. Updates to the commercialization results.

(8) **Related Work:** Describe significant activities directly related to the proposed effort, including any previous programs conducted by the Principal Investigator, proposing firm, consultants, or others, and their application to the proposed project. Derscribe how these activities interface with the proposed project and discuss any planned coordination with outside sources. Also list any applicant-identified subject matter experts, regardless of affiliation, providing comments regarding the applicant's knowledge of the state-of-the-art in the specific approach proposed. Describe previous work not directly related to the proposed effort but similar. Provide the following:
a. Short Description
b. Client for which work was performed (including individual to be contacted and phone number)
c. Date of completion

(9) Commercialization Potential:

a) The DoD requires a commercialization plan be submitted with the Phase II proposal,specifically addressing the following questions:
i. What is the first planned product to incorporate the proposed technology?
ii. Who are the probable customers, and what is the estimated market size?
iii. How much money is needed to bring this technology to market and how will it be raised?
iv. Does your firm have the necessary marketing expertise and, if not, how will your firm compensate?
v. Who are the probable competitors, and what price/quality advantage is anticipated by your firm.

b) The commercialization strategy plan should briefly describe the commercialization potential for the proposed project's anticipated results, as well as plans to exploit it. Commercial potential is evidenced by:

i. The existence of private sector or non-SBIR/STTR Governmentalfunding sources demonstrating commitment to Phase II efforts/results.
ii. The existence of Phase III follow-on commitments for the research subject.
iii. The presence of other indicators of commercial technology potential,including the firm's commercialization strategy.

c) If awarded a D2P2, the awardee will be required to update periodically the commercialization results of the project via SBA. These updates will be required at completion of the effort, and subsequently when the contractor submits a new SBIR/STTR proposal to DoD. Firms not submitting a new proposal to DoD will be requested to provide updates annually after the D2P2 completion.
d) Note, the "Commercialization Plan" and the "Company Commercialization Report" are distinct documents. The Company Commercialization Report (CCR) comprises Volume 4 as separately indicated in these instructions.

(10)**Relationship with Future R/R&D Efforts**:

a) State the anticipated results of the proposed approach, specifically addressing plans for Phase III, if any.
b) Discuss the significance of the D2P2 effort in providing a basis for the Phase III R/R&D effort, if planned.

D. **Key Personnel:** In the technical volume, identify all key personnel involved in the project. Include information directly related to education, experience, and citizenship. Atechnical resume for the Principal Investigator, including publications, if any, must also be included. Concise technical resumes for subcontractors and consultants, if any, are also useful. Identify all non-U.S. citizens expected to be involved in the project as direct employees, subcontractors, or consultants. For these individuals, in addition to technical resumes, please provide countries of origin, type of visas or work permits held, and identify the tasks they are anticipated to perform.

Foreign Nationals (also known as Foreign Persons) 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

ALL applicants proposing to use foreign nationals MUST follow the DoD 24.3 BAA and disclose this information regardless of whether the topic is subject to ITAR restrictions.

When the topic area is subject to export control, these individuals, if permitted to participate, are limited to work in the public domain. Further, tasks assigned must not becapable of assimilation into an understanding of the project's overall objectives. This prevents foreign citizens from acting in key positions, such as Principal Investigator, Senior Engineer, etc. Additional information may be requested during negotiations in order to verify foreign citizens' eligibility to perform on a contract awarded under this BAA.

The following will apply to all projects with military or dual-use applications developing beyond fundamental research (basic and applied research ordinarily published and sharedbroadly within the scientific community):

(1) The Contractor shall comply with all U. S. export control laws and regulations, including the International Traffic in Arms Regulations (ITAR), 22 CFR Parts 120 through 130, andthe Export Administration Regulations (EAR), 15 CFR Parts 730 through 799, in the performance of this contract. In the absence of available license exemptions/exceptions, the Contractor shall be responsible for obtaining the appropriate licenses or other approvals, if required, for exports of (including deemed exports) hardware, technical data,and software, or for the provision of technical assistance.
(2) The Contractor shall be responsible for obtaining export licenses, if required, before utilizing foreign persons in the performance of this contract, including instances where thework is to be performed on-site at any Government installation (whether in or outside the

United States), where the foreign person will have access to export-controlled technologies,including technical data or software.

(3) The Contractor shall be responsible for all regulatory record keeping requirements associated with the use of licenses and license exemptions/exceptions.

(4) The Contractor shall be responsible for ensuring that these provisions apply to its subcontractors.

E. **Facilities/Equipment:** Describe instrumentation and physical facilities necessary and available to carry out the D2P2 effort. Justify equipment to be purchased (detail in cost proposal). State whether proposed performance locations meet environmental laws and regulations of Federal, state, and local Governments for, but not limited to, airborne emissions, waterborne effluents, external radiation levels, outdoor noise, solid and bulkwaste disposal practices, and handling and storage of toxic and hazardous materials.

F. **Consultants/Subcontractors**: Private companies, consultants, or universities may be involved in the project. All should be described in detail and included in the cost proposal. In accordance with the Small Business Administration (SBA) SBIR Policy Directive, a minimum of 50% of the R/R&D must be performed by the proposing firm, unless otherwise approved in writing by the Contracting Officer. These requests can only be made upon proposal submission. Signed copies of all consultant or subcontractor letters of intent must be attached to the proposal. These letters should briefly state the contribution or expertise being provided. Include statements of work and detailed cost proposals. Include information regarding consultant or subcontractor unique qualifications. Subcontract copies and supporting documents do not count against the Phase II page limit. Identify any subcontract/consultant foreign citizens per E above.

G. **Prior, Current, or Pending Support of Similar Proposals or Awards:** WARNING: While it is permissible, with proper notification, to submit identical proposals or proposals containing a significant amount of essentially equivalent work forconsideration under numerous Federal program solicitations, it is unlawful to enter into contracts or grants requiring essentially equivalent effort. Any potential for this situation must be disclosed to the solicitation agency(ies) before award. If a proposal submitted in response to this BAA is substantially the same as another proposal previously, currently, or in the process of being funded by another Federal agency/DoD Component or the DAF, the applicant must so indicate on the Cover Sheet and provide the following:

a) The name and address of the Federal agency(ies) or DoD Component(s) towhich proposals were or will be submitted, or from which an awarded is expected or has been received;
b) The proposal submission or award dates;
c) The proposal title;
d) The PI's name and title for each proposal submitted or award received; and
e) Solicitation(s) title, number, and date under which the proposal was or will besubmitted, or under which an award is expected or has been received.
f) If award was received, provide the contract number.
g) Specify the applicable topics for each SBIR proposal submitted or award received.

NOTE: If this section does not apply, state in the proposal, "No prior, current, or pending support for proposed work."

COST VOLUME (VOLUME 3)

A detailed cost proposal must be submitted. Cost proposal information will be treated as proprietary. Proposed costs must be provided by both individual cost element and contractor fiscal year (FY) in sufficient detail to determine the basis for estimates, as well as the purpose, necessity, and reasonableness of each. This information will expedite award if the proposal is selected. Generally, Firm-Fixed-Price contracts are appropriate for Phase II awards. In accordance with the SBA SBIR/STTR Policy Directive, Phase II contracts must include profit or fee.

Cost proposal attachments do not count toward proposal page limitations. The cost proposalincludes:

a) **Direct Labor:** Identify key personnel by name, if possible, and labor category, if not. Direct labor hours, labor overhead, and/or fringe benefits, and actual hourly rates for each individual are also necessary for the CO to determine whether these hours, fringe rates, and hourly rates are fair and reasonable.

b) **Direct Cost Materials:** Costs for materials, parts, and supplies must be justified and supported. Provide an itemized list of types, quantities, prices, and, where appropriate, purpose. If computer or software purchases are planned, detailed information such as manufacturer, price quotes, proposed use, and support for theneed will be required.

c) **Other Direct Costs:** This includes specialized services such as machining or milling, special test/analysis, and costs for temporary use/lease of specialized facilities/ equipment. Provide usage (hours) expected, rates, and sources, as well as brief discussion concerning the purpose and justification. Proposals including leased hardware must include an adequate lease versus purchase rationale.

d) **Special Tooling, Special Test Equipment, and Material:** The inclusion of equipment and materials will be carefully reviewed relative to need and appropriateness to the work proposed. Special tooling and special test equipment purchases must, in the CO's opinion, be advantageous to the Government and relate directly to the effort. These toolings or equipment should not be of a type that an applicant would otherwise possess in the normal course of business. These may include such items as innovative instrumentation and/or automatic test equipment.

e) **Subcontracts:** Subcontract costs must be supported with copies of subcontract agreements. Agreement documents must adequately describe the work to be performed and cost bases. The agreement document should include a SOW, assignedpersonnel, hours and rates, materials (if any), and proposed travel (if any). A letter from the subcontractor agreeing to perform a task or tasks at a fixed price is not considered sufficient. The proposed total of all consultant fees, facility leases or usage fees, and other subcontract or purchase agreements may not exceed one-half of the total contract price, unless

otherwise approved in writing by the Contracting Officer.

The prime contractor must accomplish price analysis, including reasonableness, of the proposed subcontractor costs. If based on comparison with prior efforts, identify the basis upon which the prior prices were determined reasonable. If price analysis techniques are inadequate or the FAR requires subcontractor cost or pricing data submission, provide a cost analysis. Cost analysis includes but is not limited to, consideration of materials, labor, travel, other direct costs, and proposed profit rates.

f) **Consultants:** For each consultant, provide a separate agreement letter briefly stating the service to be provided, hours required, and hourly rate, as well as ashort, concise resume.

g) **Travel:** Each effort should include, at a minimum, a kickoff or interim meeting. Travel costs must be justified as required for the effort. Include destinations, numberof trips, number of travelers per trip, airfare, per diem, lodging, ground transportation, etc. Per Diem and lodging rates may be found in the Joint Travel Regulation (JTR),Volume 2, www.defensetravel.dod.mil.

h) **Indirect Costs:** Indicate proposed rates' bases, e.g., budgeted/actual rates per FY, etc. The proposal should identify the specific rates used and allocation bases to which they are applied. Do not propose composite rates; proposed rates and applications per FY throughout the anticipated performance period are required.

i) **Non-SBIR Governmental/Private Investment:** Non-SBIR Governmental and/or private investment is allowed. However, it is not required, nor will it be a proposal evaluation factor.

NOTE: If no exceptions are taken to an applicant's proposal, the Government may award a contract without exchanges. Therefore, the applicant's initial proposal should contain the applicant's best terms from a cost or price and technical standpoint. If there are questions regarding the award document, contact the Phase I CO identified on the cover page. The Government reserves the right to reopen exchanges later if the CO determines doing so to be necessary.

COMPANY COMMERCIALIZATION REPORT (VOLUME 4)

Completion of the CCR as Volume 4 of the proposal submission in DSIP is required. Please refer to the DoD SBIR 24.3 BAA for full details on this requirement. Information contained in the CCR will not be considered by the Air Force during proposal evaluations.

SUPPORTING DOCUMENTS VOLUME (VOLUME 5)

The following documents may be required if applicable to your proposal:

1. DD Form 2345: For proposals submitted under export-controlled topics either International Traffic in Arms or Export Administration Regulations (ITAR/EAR), a copy of the certified DD Form 2345, Militarily Critical Technical Data Agreement, or evidence of application submission must be included. The form, instructions, and FAQs may be found at the United States/Canada Joint Certification Program website, http://www.dla.mil/HQ/InformationOperations/Offers/Products/LogisticsApplications/JCP/DD2315Ins tructions.aspx. DD Form 2345 approval will be required if proposal if selected for award.
    a. **NOTE:** Applicants for topic number SF243-D004 must submit the **certified** and

completed DD 2345 with the initial proposal submission. Proposals under this topic that do not include the form DD 2345 will not be considered for award.

2. Verification of Eligibility of Small Business Joint Ventures (Attachment 3 to the DOD SBIR 24.3 BAA)
3. Technical Data Rights Assertions (if asserting data rights restrictions)

Feasibility Documentation (required for all proposal submissions, contained within Volume 5, not subject to page limitations)

1. D2P2 proposals require a comprehensive, detailed effort description. Proposals should demonstrate sufficient technical progress or problem-solving results to warrant more extensive RDT&E. Developing technologies with commercial and military potential is extremely important. Particularly, AF is seeking proposals emphasizing technologies' dual-use applications and commercialization.
2. * NOTE: The applicant shall provide information to enable the agency to make the 15 U.S.C. 638(cc) determination of scientific and technical feasibility and merit. Applicants are required to provide information demonstrating scientific and technical merit and feasibility has been established. The DAF will not review the Phase II proposals if it is determined the applicant 1) fails to demonstrate technical merit and feasibility are established or 2) the feasibility documentation does not support substantial performance by the applicant and/or the PI. Refer to the Phase I description within the topic to review the minimum requirements needed to demonstrate scientific and technical feasibility. **Feasibility documentation cannot be based upon or logically extend from any prior or ongoing federally funded SBIR or STTR work.**
3. If appropriate, include a reference or works cited list as the last page.
4. Feasibility efforts detailed must have been substantially performed by the applicant and/or the PI. If technology in the feasibility documentation is subject to intellectual property (IP) rights, the applicant must provide IP rights assertions. Additionally, applicants shall provide a short summary for each item asserted with less than unlimited rights describing restriction's nature and intellectual property intended for use in the proposed research. Please see DoD SBIR 24.3 BAA for technical data rights information.
5. DO NOT INCLUDE marketing material. Marketing material will NOT be evaluated.

FRAUD, WASTE, AND ABUSE TRAINING (VOLUME 6)

Note that the FWA Training must be completed prior to proposal submission. When training is complete and certified, DSIP will indicate completion of the Volume 6 requirement. The proposal cannot be submitted until the training is complete.

DISCRETIONARY TECHNICAL AND BUSINESS ASSISTANCE (TABA)

The DAF does not participate in the Discretionary Technical and Business Assistance (TABA) Program. Proposals submitted in response to DAF topics should not include TABA.

METHOD OF SELECTION AND EVALUATION CRITERIA

D2P2 proposals are evaluated on a competitive basis by subject matter expert scientists, engineers, or other technical personnel. Throughout evaluation, selection, and award, confidential proposal and evaluation information will be protected to the greatest extent possible. D2P2 proposals will be disqualified and not evaluated if the Phase I equivalency documentation does not establish the proposed technical approach's feasibility and technical merit.

Proposals will be evaluated for overall merit in accordance with the criteria outlined in the 24.3 BAA Section 6.0. DAF is seeking varying technical/scientific approaches and/or varying and new technologies that would be responsive to the problem statement(s) and area(s) of interest in the topic. Multiple procurements are planned and anticipated to be awarded as a result of the topic, each proposal is

considered a separate procurement and will be evaluated on its own merit, and that the Government may award all, some, or none of the proposals. Any per-award or per-topic funding caps are budgetary estimates only, and more or less funding may become available. Funding decisions are made with complete disregard to the other awards under the same topic.

In accordance with Section 4 of the SBIR and STTR Extension Act of 2022, the DAF will review all proposals submitted in response to this BAA to assess security risks presented by small business concerns seeking a Federally funded award. The DAF will use information provided by the small business concern in response to the Disclosure of Foreign Affiliations or Relationships to Foreign Countries and the proposal to conduct a risk-based due diligence review on the cybersecurity practices, patent analysis, employee analysis, and foreign ownership of a small business concern, including the small business concern and employees of the small business concern to a foreign country, foreign person, foreign affiliation, or foreign entity. The DAF will also assess proposals utilizing open-source analysis and analytical tools, for the nondisclosures of the information set forth in 15 U.S.C. 638(g)(13). If DAF assesses that a small business concern has security risk(s), DAF will review the proposal, the evaluation, and the security risks and may choose to either 1) create a plan to mitigate the risk(s) or 2) DAF may decide not to select the proposal for award based upon a totality of the review.

MAJORITY OWNERSHIP IN PART BY MULTIPLE VENTURE CAPITAL, HEDGE FUND, AND PRIVATE EQUITY FIRMS

Small business concerns that are owned in majority part by multiple venture capital operating companies (VCOCs), hedge funds, or private equity funds are not eligible to submit applications or receive awards for Department of Air Force Topics.

PERFORMANCE OF WORK REQUIREMENTS AND LOCATION OF WORK

For Phase I, a minimum of two-thirds of the research or analytical effort must be performed by the Awardee. The DAF measures percentage of work by both direct and indirect costs, not including profit. Occasionally, the DAF will consider deviations from this performance of work requirement. **Requests for Performance of Work deviations must be made twice: prior to submission during the topic open period and as part of the initial proposal submission.** For requests prior to the initial proposal submission, the DAF will consider the request and approve or disapprove requesting applicants to proceed with DSIP submission. Upon proposal receipt, the DAF will again consider such requests for approval for the resultant award.

All R/R&D work must be performed in the United States. Based on a rare and unique circumstance, the DAF may approve a particular portion of the R/R&D work to be performed or obtained in a country outside of the United States. The awarding Funding Agreement officer must approve each specific condition in writing. Applicants seeking this approval must make such a request with their initial proposal submission. The DAF will not consider these requests prior to proposal submission.

DAF USE OF SUPPORT CONTRACTORS

Restrictive notices notwithstanding, proposals may be handled for administrative purposes only, by support contractors. These support contractors may include, but are not limited to APEX, Peerless Technologies, Engineering Services Network, HPC- COM, Mile Two, REI Systems, MacB (an Alion company), Montech, Oasis, Astrion/Oasis, and Infinite Management Solutions. In addition, only Government employees and technical personnel from Federally Funded Research and Development Centers (FFRDCs) MITRE and Aerospace Corporations working under contract to provide technical support to AF Life Cycle Management Center and Space Force may evaluate proposals. All support contractors are bound by appropriate non-disclosure agreements. **Contact the AF SBIR/STTR Contracting Officer (Daniel.Brewer.13@us.af.mil) with concerns about any of these contractors**.

PROPOSAL STATUS AND FEEDBACK

The Principal Investigator (PI) and Corporate Official (CO) indicated on the Proposal Cover Sheet will be notified by e-mail regarding proposal selection or non-selection. Small Businesses will receive a notification for each proposal submitted. Please read each notification carefully and note the Proposal Number and Topic Number referenced.

Automated feedback will be provided for proposals designated Not Selected. Additional feedback may be provided at the sole discretion of the DAF.

IMPORTANT: Proposals submitted to the DAF are received and evaluated by different organizations, handled by topic. Each organization operates within its own schedule for proposal evaluation and selection. Updates and notification timeframes will vary. If contacted regarding a proposal submission, it is not necessary to request information regarding additional submissions. Separate notifications are provided for each proposal.

The Air Force anticipates that all proposals will be evaluated and selections finalized within approximately 90 calendar days of solicitation close. Please refrain from contacting the BAA CO for proposal status before that time.

Refer to the DoD SBIR Program BAA for procedures to protest the Announcement.
As further prescribed in FAR 33.106(b), FAR 52.233-3, Protests after Award should be submitted to: Air Force SBIR/STTR Contracting Officer Daniel J. Brewer, Daniel.Brewer.13@us.af.mil.

AIR FORCE SUBMISSION OF FINAL REPORTS

All Final Reports will be submitted to the awarding DAF organization in accordance with Contract instructions. Companies will not submit Final Reports directly to the Defense Technical Information Center (DTIC).

Version 4

Topic Number	Topic Name	Maximum Award Value (proposals that exceed this amount will be disqualified)	Maximum Duration (proposals that exceed this duration will be disqualified)	Technical Volume (Volume 2) Page Limit
SF243-D001	Manufacturing of New Nosetip Materials for Reentry Vehicles	$ 1,800,000.00	24	35
SF243-D002	Low Earth Orbit Space Domain Awareness Optical Fence	$ 1,800,000.00	24	35
SF243-D003	Characterization and Typing of Hard-to-Acquire Targets using Advanced Machine Learning Methods on WFOV Staring Data	$ 1,800,000.00	24	35
SF243-D004	Nitramine Cost Reduction Development	$ 1,800,000.00	24	35
SF243-D005	Event-Based Sensor Readout Integrated Circuit	$ 1,800,000.00	24	35
SF243-D006	Future Space Architectures through Advanced Mission Design and In-Space Development Platforms	$ 1,900,000.00	15	35
SF243-D007	Dynamic Space Operations through Development of Advanced Rendezvous Proximity Operations and Docking (RPOD) Technology	$ 1,900,000.00	15	35
SF243-D008	RETURN (Returning ExoaTmospheric Unique Research is Novel)	$ 1,800,000.00	24	20
SF243-D009	ASAT Launch Detection and Threat Assessment	$ 1,800,000.00	24	35
SF243-D010	Object Transiting Tracking	$ 1,800,000.00	24	35
SF243-D011	Launch Cycle Initiation Detection	$ 1,800,000.00	24	35

SF243-D012	Foreign Space Launch Detection	$ 1,800,000.00	24	35
SF243-D013	CCDM (Camouflage, Concealment, Deception, and Maneuver) Interrogation	$ 1,800,000.00	24	35
SF243-D014	Responsive, Radiation-hardened GEO Rideshare Capability	$ 1,800,000.00	24	35
SF243-D015	Advancing Space Capabilities for Joint Warfighting Opportunities	$ 1,900,000.00	24	35
SF243-D016	Tactical High Orbit Fast Transfer	$ 3,000,000.00	24	35
SF243-D017	Advancing Expeditionary Space Domain Awareness	$ 1,800,000.00	24	35
SF243-D018	Space Sustainment & Maneuver: Advancing Strategic Superiority in Orbital Operations	$ 1,900,000.00	24	35

Version 4

AF NUMBER: SF243-D001

TITLE: Manufacturing of New Nosetip Materials for Reentry Vehicles

TECHNOLOGY AREAS: Nuclear; Weapons; Materials

The technology within this topic is restricted under the International Traffic in Arms Regulation (ITAR), 22 CFR Parts 120-130, which controls the export and import of defense-related material and services, including export of sensitive technical data, or the Export Administration Regulation (EAR), 15 CFR Parts 730-774, which controls dual use items. Offerors must disclose any proposed use of foreign nationals (FNs), their country(ies) of origin, the type of visa or work permit possessed, and the statement of work (SOW) tasks intended for accomplishment by the FN(s) in accordance with section 3.5 of the Announcement. Offerors are advised foreign nationals proposed to perform on this topic may be restricted due to the technical data under US Export Control Laws.

OBJECTIVE: This topic seeks to develop advanced materials and assemblies of non-eroding, shape-stable next-generation reentry from space vehicle nosetips that will enter the atmosphere at ~ Mach 20. The nosetips must be stable in all weather conditions and not rely on an ablator material to control the heat load.

DESCRIPTION: The Department of the Air Force is seeking advanced materials and assemblies for next-generation reentry vehicle nosecones and/or nosetips that can operate in all weather conditions and are non-eroding and shape-stable. This topic seeks to identify next generation materials that are not prime reliant on a coating and can go beyond the performance limits of coated carbon/carbon composites by the incorporation of more durable materials throughout the nosetip structure. While coated carbon/carbon composites may be an important sub-element of an all-weather assembly, the focus should be on new advanced materials that will exceed the performance, operational duration, and environmental limitations of coated carbon/carbon composites. If cooling is required, it should not be done through ablation but accomplished by other mechanisms.

PHASE I: As this is a Direct-to-Phase-II (D2P2) topic, no Phase I awards will be made as a result of this topic. To qualify for this D2P2 topic, the Government expects the applicant(s) to demonstrate feasibility by means of a prior “Phase I-type” effort that does not constitute work undertaken as part of a prior SBIR/STTR funding agreement.

Applicant(s) may have already identified compositions of interest through previous efforts or may identify compositions through this work based on prior observations. Materials of interest include ultra-high temperature ceramic composites, co-continuous ceramics and cermets, and refractory metal or platinum-group alloys and their carbides or nitrides. Thermal-mechanical-physical and environmental property evaluation test results from Phase I-like efforts should be included.

The applicant(s) must have validated the product-market fit between the proposed solution and a potential Air Force stakeholder. The applicant(s) should have defined a clear, immediately actionable plan with the proposed solution and the Air Force customer. The feasibility study should:

(1) identify key potential AF end user(s) for the non-Defense commercial offering that solves the AF need,
(2) describe integration cost and feasibility with current mission-specific products, and
(3) describe how the technology can be used by other DoD or government customers.

PHASE II: Awardee(s) should identify, produce, and qualify candidate materials with thermal-mechanical -physical and environmental property evaluations, along with stress-strain modeling, component geometry optimization, and arc jet testing. Innovative processing techniques, such as field assisted sintering (FAST), additive manufacturing (AM), electro-forming (E-form), polymer infiltration and pyrolysis (PIP), or chemical vapor deposition (CVD) as well as other infiltration methods for composites may be of interest. Shape stability under nosetip surface temperatures ranging from 5000-8000 degrees Fahrenheit should be considered as well as shock-loading relevant to weather conditions consistent with a chosen ballistic trajectory through the atmosphere. Transpiration cooling to achieve shape-stability in these environments is permissible but the offeror must show prior proof of robustness in relevant ground testing. Identification of manufacturing or production issues and business model modifications required to further improve the product or process with relevance to improved sustainment costs, availability, or safety, should be put forward and documented. Air Force sustainment stakeholder engagement is paramount to successful validation of the technical approach. These Phase II awards are intended to provide a path to commercialization, not the final step for the proposed solution. A planned design iteration in conjunction with a plan for testing and a scale-up approach for a beyond-phase-II effort should be proposed.

It is anticipated that this program will require a team approach with several disciplines: [1] material modelers that can use advanced methods to assess candidate materials that will have the thermal, physical, mechanical, dynamic, and environmental properties needed to survive the extreme conditions endured by candidate nosetips, [2] process and performance modelers to build property and life models using different materials with various architectures to provide uniform distribution of pressure and temperature under potential use conditions, and [3] fabricators to produce the identified materials with various configurations. The program is also required to: [4] screen test selected materials or structures fabricated into articles at either a University, Private, or Government test facility, and [5] conduct the final test demonstration test as an arc jet test at a government facility. The shape and size of the nosetips for these tests will be determined in coordination with the government program manager, test facility, and offeror. Finally, the program requires that: [6] the offeror conduct microstructural characterization of the nosetips both pre- and post-testing. The performance and microstructural data shall be used to validate and inform developed models. Test articles should be delivered to the Air Force during the program and upon completion of the Phase II effort.

PHASE III DUAL USE APPLICATIONS: The awardee(s) can expect to pursue commercialization of the shape-stable high temperature compatible materials found during Phase II. The technologies may be transitioned by expanding mission capabilities to a broad range of potential government and civilian users. Direct access with end users and government customers will be provided with opportunities to receive Phase III awards for providing the Government with additional research, development, and diagnostic/performance testing on materials meeting the requirements of Phase II. Additionally, direct procurement of shape-stable refractory materials in specific shapes and sizes of nosetips determined in coordination with the government program manager may be part of the Phase III effort.

REFERENCES:

1. *Savino, R., Criscuolo, L., Di Martino, G. D., Mungiguerra, S. “Aero-thermo-chemical characterization of ultra-high temperature ceramics for aerospace applications” J. Euro. Ceram. Soc. 2018, 38, 2937-2953.

2. *Savino, R., Mungiguerra, S., Di Martino, G. D. “Testing ultra-high-temperature ceramics for thermal protection and rocket applications” Adv. Appl. Ceram. 2018, 117, S9-S18.

3. *H. Minnich, J. Brunner, "Thermostructural Assesment of Erosion Resistant Nosetip Constructions", AFWAL-TR-84-4191, 1985.

4. *J. Brown, "Erosion Performance of Carbon-Carbon Composite Materials", 1980.

5. *M. Sherman, "Hardened Reentry Vehicle Development Program - Erosion Resistant Nosetip Development", DNA 001-74-C-0033, 1975.

6. *R. Diriing, D. Eitman, "Development of Highly Erosion Resistant Nosetip Materials, SAI-061-81-09-08/N60921-80-C-0068, 1981.

7. *M. Abbett, et. al, Passive Nosetip Technology Program, SAMSO-TR-74-96, 1975.

KEYWORDS: refractory materials; ceramic or cermet composites, shape-stable ultra-high temperature materials; reentry nosetips; all weather conditions

Version 4

AF NUMBER: SF243-D002

TITLE: Low Earth Orbit Space Domain Awareness Optical Fence

TECHNOLOGY AREAS: Sensors; Electronics

The technology within this topic is restricted under the International Traffic in Arms Regulation (ITAR), 22 CFR Parts 120-130, which controls the export and import of defense-related material and services, including export of sensitive technical data, or the Export Administration Regulation (EAR), 15 CFR Parts 730-774, which controls dual use items. Offerors must disclose any proposed use of foreign nationals (FNs), their country(ies) of origin, the type of visa or work permit possessed, and the statement of work (SOW) tasks intended for accomplishment by the FN(s) in accordance with section 3.5 of the Announcement. Offerors are advised foreign nationals proposed to perform on this topic may be restricted due to the technical data under US Export Control Laws.

OBJECTIVE: Low earth orbit spacecraft are typically tracked by radar sites, and infrequently by optical telescopes. However, radar sites are expensive to build, operate, and sustain. Likewise, telescopes cannot track the volume of objects overhead. This topic seeks to explore the development of a low cost optical space domain awareness sensor for the tracking of low earth orbit objects that can be proliferated worldwide. These sensors will have high sensitivity and be capable of detecting low earth orbit objects within its field of regard. Due to the amount of data collected, these sensors will have the capability to process data at the edge and send observations to end users directly via a networking solution to the unified data library. These sensors will require little to no maintenance and will be affordable so that they can be easily replaced after a nominal lifespan of several years.

DESCRIPTION: This topic seeks to develop a low cost optical space domain awareness sensor (SDA) to track low earth orbit (LEO) objects as they pass overhead. To accomplish this, a survey of existing optical collection and processing methods will be conducted to determine the best technical approach to develop the sensor. A system will be developed that passively detects LEO objects, computes necessary information at the edge, and sends relevant observations to end users autonomously. Considerations for this sensor should include optical performance, limiting visual magnitude, field of regard, as well as overall cost and complexity. The sensor should be designed with minimal maintenance in mind and be easily replaceable. The end result will be a SDA sensor that can be used as an optical fence for LEO objects.

PHASE I: This topic is intended for technology proven ready to move directly into Phase II. Therefore, Phase I awards will not be made for this topic. The applicant is required to provide detail and documentation in the D2P2 proposal which demonstrates accomplishment of a “Phase I-type” effort, including a feasibility study. This includes determining, insofar as possible, the scientific and technical merit and feasibility of ideas appearing to have commercial potential. It must have validated the product-mission fit between the proposed solution and a potential Air Force and/or Space Force stakeholder. The applicant should have defined a clear, immediately actionable plan with the proposed solution and the DAF customer and end-user.

The feasibility study should have:

1. Clearly identified the potential stakeholders of the adapted solution for solving the Air Force and/or Space Force need(s).

2. Described the pathway to integrating with DAF operations, to include how the applicant plans to accomplish core technology development, navigate applicable regulatory processes, and integrate with other relevant systems and/or processes.

3. Describe if and how the solution can be used by other DoD or Governmental customers.

In addition to the feasibility study applicants should demonstrate a framework algorithm to use a proof of concept for classifying launch events as DA-ASAT launches and identifying training dataset that can be used in model development.

PHASE II: In Phase II a prototype will be created based off the design produced in Phase I. The prototype should be deliverable to the government for bench-top testing and evaluation. Post-delivery the sensor will be characterized by the government and compared to other similar cameras produced by foreign companies.

PHASE III DUAL USE APPLICATIONS: In Phase III the Department of the Air Force will consider ordering several of the produced prototypes, with or without modification, for research and operational space domain awareness sensors. The results of the prototype evaluation will be shared with the customer base and the decision to purchase additional units will be left to the various customer program managers.

REFERENCES:

1. *"Space Doctrine Publication 3-100 Space Domain Awareness." November 2023.

2. *Zimmer, P. McGraw, J.T., and Ackerman, M. R., "Overcoming the Challenges of Daylight Optical Tracking of LEOs." Proceedings of the AMOS Technical Conference, Wailea, HI 2021.

KEYWORDS: Space Domain Awareness; SDA; LEO; Sensing; Autonomous

Systems

Version 4

AF NUMBER: SF243-D003

TITLE: Characterization and Typing of Hard-to-Acquire Targets using Advanced Machine Learning Methods on WFOV Staring Data

TECHNOLOGY AREAS: Battlespace; Information Systems; Air Platform; Space Platforms

The technology within this topic is restricted under the International Traffic in Arms Regulation (ITAR), 22 CFR Parts 120-130, which controls the export and import of defense-related material and services, including export of sensitive technical data, or the Export Administration Regulation (EAR), 15 CFR Parts 730-774, which controls dual use items. Offerors must disclose any proposed use of foreign nationals (FNs), their country(ies) of origin, the type of visa or work permit possessed, and the statement of work (SOW) tasks intended for accomplishment by the FN(s) in accordance with section 3.5 of the Announcement. Offerors are advised foreign nationals proposed to perform on this topic may be restricted due to the technical data under US Export Control Laws.

OBJECTIVE: Develop a prototype software algorithm to perform detection, identification, characterization and typing of hard-to-acquire targets (air-/space-based) using advanced machine learning methods on uncued surveillance data from ground-based, wide field of view (WFOV), electro-optical (EO), staring sensors.

DESCRIPTION: USSPACECOM surveillance architectures have difficulty maintaining track and custody of today's Starlink constellation, despite SpaceX's cooperative diligent self-reporting. The U.S. Government will likely be challenged as foreign entities, like China, begin to deploy their own, potentially uncooperative, mega constellations. Recent public reports from China include a new 12,000+ satellite communications constellation. Imagining that a sufficient global space surveillance capability is available, coalescing and sifting through continuous streams of big data will be nearly impossible using current concepts of operations (CONOPS) and will stress the existing 18th and 19th Space Defense Squadrons' services. The key enabler is being able to efficiently use this vast amount of data in multiple different ways to extract useful information and insights. Employing artificial intelligence/machine learning (AI/ML) algorithms to detect, ID, characterize and type hard-to-acquire targets in large amounts of data from ground-based, WFOV, EO, staring systems is highly desirable and will lead to better security and broader surveillance overall.

PHASE I: Applicant must have developed a concept for a workable prototype or design to address at a minimum the basic capabilities of the stated objective. The documentation provided must substantiate that the offeror has developed a preliminary understanding of the technology to be applied in their Phase II proposal to meet the objectives of this topic. Documentation should include all relevant information including, but not limited to, technical reports, test/real data, prototype designs/models, and performance goals/results. GFE will not be provided. Applicant is expected to procure its own WFOV, EO, staring data on which to test and evaluate their algorithms. Signed Letters of Support from customers and/or end-users are encouraged.

PHASE II: Expand upon the initial software algorithms to meet the needs of the DAF customer leveraging previous Ph I-type feasibility study results and data. Develop a pristine labeled dataset of WFOV sky images with aircraft, satellites, and other visible objects labeled in metadata for the purposes of testing characterization and typing algorithms, training new AI/ML-based algorithms, and fine-tuning existing algorithms.
Evaluate algorithms with common classification metrics including, but not limited to, precision-recall (PR) curves for each algorithm with area under curve (AUC), recall at max or desired precision, precision

at max or desired recall, and max f1 score (harmonic mean of precision and recall); receiver operating characteristics (ROC) curves for each algorithm and AUC metrics; and additional metrics including performance speed and throughput, memory requirements, etc.
Demonstrate how results can be ingested and displayed by existing, operational tools to reach real-world users without costly refactoring or licensing for a new tool. GFE will not be provided.

PHASE III DUAL USE APPLICATIONS: Mature prototype software into a commercial product for commercial Space Domain Awareness; identify government and commercial organizations for transition; and generate the technical and training documentation required for third party integration.
The commercial product should provide a dual-use capability to enable real-time Space Domain Awareness (SDA) and situational understanding to aid the U.S. warfighter with actionable tactical intelligence as well as condition monitoring for the commercial sector and, in general, to ensure spaceflight safety.
Provide services to the government to maximize the utility of the algorithm's results to operations; update software prototype for different applications as necessary; offer pipeline solutions for model training, compression, runtime inference optimization, and deployment to edge devices of accurate, secure, and duplicatable AI/ML models.

REFERENCES:

1. *United States Space Force, "White Paper on Competitive Endurance: A Proposed Theory of Success for the U.S. Space Force", Office of the Chief of Space Operations, Strategic Initiatives Group, 11 January 2024.
https://www.spaceforce.mil/Portals/2/Documents/White_Paper_Summary_of_Competitive_Endurance.pdf.

2. *Bartusiak, Emily R. "Machine Learning for Speech Forensics and Hypersonic Vehicle Applications", Purdue University. Thesis, 2020. https://doi.org/10.25394/PGS.21678095.v1.

3. *G. Martin, J. Wetterer, J. Lau, J. Case, N. Toner, C. Chow, and P. Dao. "Cislunar Periodic Orbit Family Classification from Astrometric and Photometric Observations Using Machine Learning", 21st Advanced Maui Optical and Space Surveillance Technologies (AMOS) Conference, 2020.

4. *Dinsley, Ralph, and Newman, Christopher. "LEO Space Surveillance and Tracking Through a Non-Traditional Lens", Proc. 2nd NEO and Debris Detection Conference, Darmstadt, Germany, 24-26 January 2023.

KEYWORDS: Operational surprise; uncued surveillance; target characterization and typing; uncorrelated track; real-time data processing; wide field-of-view; information exploitation; space domain awareness; artificial intelligence/machine learning; hypersonics

Version 4

AF NUMBER: SF243-D004

TITLE: Nitramine Cost Reduction Development

TECHNOLOGY AREAS: Space Platforms; Materials

The technology within this topic is restricted under the International Traffic in Arms Regulation (ITAR), 22 CFR Parts 120-130, which controls the export and import of defense-related material and services, including export of sensitive technical data, or the Export Administration Regulation (EAR), 15 CFR Parts 730-774, which controls dual use items. Offerors must disclose any proposed use of foreign nationals (FNs), their country(ies) of origin, the type of visa or work permit possessed, and the statement of work (SOW) tasks intended for accomplishment by the FN(s) in accordance with section 3.5 of the Announcement. Offerors are advised foreign nationals proposed to perform on this topic may be restricted due to the technical data under US Export Control Laws.

OBJECTIVE: Design, develop and demonstrate a pilot-production method (~1 kg) for synthesizing precursor material(s) and/or input material(s) for CL-20 production that can scale up to 500 kg with a reduction in material price point. Showcase the ability to control purity, particle size, and crystal morphology (if applicable) for each material generated through synthetic techniques such as nitration, polymerization, or recrystallization. Developed processes shall be capable of purifying materials from sub-quality feedstocks and produce precursor materials with sufficient yields or reduced cost.

DESCRIPTION: Energetic materials are multi-use materials used in private industry, recreational sport, and military applications. Explosives are typically produced at a large-scale, where industrial production facilities range from a couple of pounds to millions of pounds of material each year. Explosives are usually separated by classes (particle granulation sizes) and are produced in accordance with various material specifications that include purity, particle size distributions, and morphology. Since WWII, the US energetics community has relied on a handful of materials as the cornerstones of its explosive arsenal. Combining the high-quality performance metrics of legacy materials, the current existing infrastructure, and their inexpensive production cost, it is logical as to why the energetic community continues to turn to these materials.

Despite increases in performance compared to legacy energetic materials, the explosive CL-20 has struggled to mature into practical use in US propulsion technology. Various factors, such as complex synthesis pathways, difficult to source precursor/input materials, demanding reaction conditions, difficult purification methods, or limited infrastructure has limited CL-20's ability to achieve a footing in the US industrial base. As a result, the same fuel sources have continued to be the go-to choice for US propulsion technologies as fuels leveraging modern CL-20 continue to economically fall short of legacy materials, limiting the business case to mature modern materials.

To invest in maturing modern propulsion technologies, this proposal seeks possible partners that are able to develop production techniques for yield, purity, morphology control for precursor/input materials of CL-20. Maturation of precursor/input materials will not only affect the overall synthesis of the energetic but will reduce the cost to manufacture CL-20, possibly becoming competitive with legacy propulsion energetics on the large scale. With a more defined, cost effective, and commercially viable production pathway for CL-20 precursors/input materials, the propulsion community may begin to develop novel formulations leveraging this higher performing nitramine material. This topic seeks to fund proposals that can develop robust synthetic routes with reduced production cost of CL-20 precursors and/or input materials.

PHASE I: In the last 40 years, CL-20 has historically been up to 10x the cost of legacy explosives, causing manufacturers to have little desire to mature this chemical into a cornerstone manufacturing material. However, because CL-20 was developed in up to 40 years ago, extensive research and development into its synthesis optimization and various synthesis pathways has been investigated. The precursor/input materials required for synthesis are well known and mature, but few have expanded on optimizing these materials to large-scale production due to their poor economical return at the production scale. However, with a new demand for higher performing nitramines, the economical reason to further mature CL-20 precursor/input materials have taken shape. To capitalize on the increased performance of CL-20, with a known precursor/input material base, a focused effort must be made to further mature their development into large production.

As this is a Direct to Phase II (D2P2) SBIR, proposers should provide evidence showing that their technology is mature enough for D2P2. Evidence should stem from previous experimental data generating nitrated precursor/input materials or other high-performance nitramines with a maturity level near ready pilot-scale production.

PHASE II: Develop and demonstrate one or more pilot-scale processes for CL-20 precursor/input material production. Production pathways should exhibit polymorph control (if applicable) and narrow particle size distribution and control along with high purity of precursor/input material generated. Additionally, the process should factor in scalability, limited operator exposure, hazardous waste generation, and show process control measures such as solvent recycling. The process should be applicable to large-scale chemical manufacturing environments and showcase an ability to decease production costs. CL-20 precursor/input materials must be shipped to a DoD customer lab for further evaluation of product quality. Phase 2 deliverables will mature precursor/input material synthesis to a technology readiness level of 4-5, demonstrating the ability to manufacture prototype material in a production relevant environment. The phase will conclude with a full technical data package and transition plan that documents synthetic procedures and achieves consistent reproducibility and cost reduction over current industry processes.

PHASE III DUAL USE APPLICATIONS: One or more of the processes developed in Phase 2 should be transitioned and scaled to production capacity. These processes will demonstrate the ability to control purity, polymorph (if applicable), and particle size distributions of the precursor/input materials chosen. The precursor/input material should also be taken through the rest of the synthesis pathway to demonstrate the ability to produce energetic materials. The input material process from Phase III should be scalable and transition-able to integrate into full-rate chemical production plants. The processes delivered will diminish the production risk and manufacturing cost to meet potential energetic or propellant production surge demand. The Phase III activity should mature the Phase II production methodology of precursor/input material to technology readiness level of 7-8 to demonstrate the ability to establish a Pilot line that can begin full rate production of selected precursor materials. At the conclusion of the research activity, there will be infrastructure and technology investments in place that can consistently manufacture high performance nitramine precursors through CONUS sources to feed into production lines.

REFERENCES:

1. *Nielsen, A, et al. J. Org. Chem. 1990, 55, 1459–1466.

2. *Peng, C, et al. Chin. J. Explosives & Propellants. 2022, 45, 3, 290-299.

3. *Bayat, Y., Taheripouya, G., Zeynali, V., Azizkhani, V. J. Energetic Materials. 2023. 1-35.

KEYWORDS: Precursor; energetic material; nitramine; explosives; chemical production; synthesis optimization; cost reduction

Version 4

AF NUMBER: SF243-D005

TITLE: Event-Based Sensor Readout Integrated Circuit

TECHNOLOGY AREAS: Sensors; Space Platforms

The technology within this topic is restricted under the International Traffic in Arms Regulation (ITAR), 22 CFR Parts 120-130, which controls the export and import of defense-related material and services, including export of sensitive technical data, or the Export Administration Regulation (EAR), 15 CFR Parts 730-774, which controls dual use items. Offerors must disclose any proposed use of foreign nationals (FNs), their country(ies) of origin, the type of visa or work permit possessed, and the statement of work (SOW) tasks intended for accomplishment by the FN(s) in accordance with section 3.5 of the Announcement. Offerors are advised foreign nationals proposed to perform on this topic may be restricted due to the technical data under US Export Control Laws.

OBJECTIVE: This topic seeks to develop a radiation hardened Event-Based Sensor (EBS) readout integrated circuit (ROIC) with small pixel pitch, large format, and the ability to hybridize to commonly available infrared detector material.

DESCRIPTION: Infrared EBS may offer many advantageous capabilities to Intelligence, Surveillance, and Reconnaissance (ISR) missions. Many tracking applications produce extremely high data rates (>10 GBps) that could be drastically reduced using a properly designed infrared EBS. An EBS accomplishes this goal by asynchronously recording data when a change in the pixel irradiance is detected. An EBS ROIC design could also enable reduced background data generation rates with novel design choices. The scope of this project is to design a prototype EBS ROIC demonstrating a signal-integrating unit cell, lower data rates, and downstream asynchronous handshake logic to provide actionable information on scene movement. This design will be optimized for Air Force needs and will be directly compared to a standard framing ROIC to provide a deeper understanding of the image scene and motion detection algorithms.

The key optimization parameters are as follows. The pixel unit size shall be 30 um or smaller, with a desire for options at 10 um and 20 um to match existing optics. The array format shall be 320 x 256 or larger for demonstration purposes, with the ability to scale to 2 MPixel arrays or larger. All three infrared bands (i.e. 1-1.7 um, 3-5 um, and 8-12 um) shall be usable under this design, including both p-on-n and n-on-p designs. To support all of these designs, the ROIC operating temperature shall be 60 – 240 K. The ROIC shall be radiation-hardened for latch-up, single event upset, and total ionizing dose. The ROIC shall also have an integrating mode to compare with its EBS mode.

EBS-specific parameters include the latency, timing accuracy, event rate, and power consumption. The pixel latency shall be less than 10 microseconds and the timing accuracy shall be 10x better (i.e. 1 microsecond). The ROIC shall support event streams of 109 events per second or greater, with a static scene power consumption of 10 mW and a dynamic scene power consumption of 100 mW. These are for operation at 80 K. Contractor shall deliver a Draft ICD and insertion plan into a test dewar for demonstration by the end of Phase II.

PHASE I: To demonstrate Phase I-type feasibility, applicant(s) must demonstrate the following:
1. Unit level devices in relevant IR or Visible bands.
2. Preliminary designs for a prototype device.
3. Items should be suitable for Technology Readiness Level 2.

PHASE II: Prototype devices at relevant format sizes will be constructed and tested for relevant specifications. Tests will be performed against relevant metrics. A final packaged system will be produced that meets the specifications and is suitable for Technology Readiness Level 4. Preliminary designs will be made for phase III device.

PHASE III DUAL USE APPLICATIONS: A field test ready version of the design will be built from a compact and lightweight design and with standard interfaces. A field test ready version shall be robust to intended environments. Manufacturing process will be evaluated and refined to improve yield while reducing cost.

REFERENCES:

1. *Gallego, G., Delbruck, T., Orchard, G., Bartolozzi, C., Taba, B., Censi, A., Leutenegger, S., Davison, A., Conradt, J., Daniilidis, K., Scaramuzza, D., Event-based Vision: A Survey, IEEE Trans. Pattern Anal. Machine Intell. (TPAMI), 44(1):154-180, Jan. 2022.

KEYWORDS: Event Based Sensor; neuromorphic imaging; ROIC; Infrared; read out integrated circuit design; focal plane array design; FPA

Version 4

AF NUMBER: SF243-D006

TITLE: Future Space Architectures through Advanced Mission Design and In-Space Development Platforms

TECHNOLOGY AREAS: Space Platforms; Electronics; Sensors

The technology within this topic is restricted under the International Traffic in Arms Regulation (ITAR), 22 CFR Parts 120-130, which controls the export and import of defense-related material and services, including export of sensitive technical data, or the Export Administration Regulation (EAR), 15 CFR Parts 730-774, which controls dual use items. Offerors must disclose any proposed use of foreign nationals (FNs), their country(ies) of origin, the type of visa or work permit possessed, and the statement of work (SOW) tasks intended for accomplishment by the FN(s) in accordance with section 3.5 of the Announcement. Offerors are advised foreign nationals proposed to perform on this topic may be restricted due to the technical data under US Export Control Laws.

OBJECTIVE: The US Space Force (USSF) looks to accelerate emerging technologies and mature concepts of operations (CONOPs) as it pertains to in-space servicing, assembly, and manufacturing (ISAM) and servicing, mobility, and logistics (SML). By advancing these core capabilities, this topic will meet the Department of Air Force's (DAF) Operational Imperative 1 "Defining Resilient and Effective Space Order of Battle and Architectures," and 7 "Readiness of the Department of the Air Force to transition to a wartime posture against a peer competitor."

As the space operational environment evolves, there is a need for dynamic mission optimization that integrates in-space servicing infrastructure to enhance space operation techniques and tactics that allow for a more sustainable and resilient environment. This topic will examine new technologies and associated mission designs that advance the ability to perform non-traditional dynamic space operations. In addition to mission design and CONOPs development, the topic will further mature future space architectures through the development of persistent, on-orbit assets that enable sustained space operations. There are several aspects to this construct which include the system requirement definition, flexible mission model design and analysis, detailed cost expenditure plans, integration and testing (I&T) breakdown, launch plan and optimized orbit insertion. The primary intent is to gain significant development in the core technologies and capabilities enabling a persistent space asset that supports rapid advancement of dynamic operations in space. Leveraging these emerging ISAM and SML technologies will infuse innovation into the traditional space operations framework by reducing reliance on static mission operations and bespoke space systems.

DESCRIPTION: The Space Force is a large and complex organization consisting of many functions with similar counterparts in the commercial sector. The Space Force wishes to explore innovative technology domains with demonstrated commercial value in the non-Defense sector, i.e., through existing products/solutions, in order to obtain Space Force applications, i.e. Dual-Purpose Technologies/Solutions. It is important that potential solutions have a high probability of keeping pace with technological change. Thus, solutions should be closely tied to commercial technologies and solutions supporting the solution's development. Proposals for this topic should demonstrate a high probability of identifying a product-market fit between a Space Force end user and the proposed solution through a non-Defense commercial solution's adaptation. This is initiated through the proposal of R/R&D being applied to a mature non-Defense technical solution and a starting point to find a Space Force Customer. This topic seeks to explore potential commercial products enabling dynamic space operations in the emerging ISAM market for potential use in on-orbit servicing, sustained space maneuvering, and related space logistics support.

PHASE I: This feasibility demonstration should encompass the evaluation of scientific and technical merit and feasibility of ideas with commercial potential. Additionally, it must validate the product-market between the proposed solution and the USSF customer. The feasibility study should identify the prime potential USSF end users for the Defense-modified commercial offering, describe integration feasibility and costs with current mission-specific products, and explore the potential use by other DoD or Governmental customers.

Documentation should include all relevant information including, but not limited to: technical reports, test data, prototype designs/models, and performance goals/results. Prior work to demonstrate feasibility must meet the minimum technical and scientific merit specified in this description.
Work submitted with the feasibility demonstration must have been substantially performed by the Offeror and/or the Principal Investigator.

PHASE II: The project scope will investigate on-orbit persistent architectures and associated concept of operations (CONOPs) for in-space servicing, assembly, and manufacturing (ISAM) mission development to establish operational tactics and protocols that enable dynamic space operations. To accomplish this, the topic will focus on the following core technology areas:

1) Mission design and CONOPs development: The focus will be to define the architecture necessary to enable the ISAM market for sustained operations in space and increase the resiliency of on-orbit assets. The project will evolve space architectures for multi-mission capabilities and leverage state-of-the-art techniques to unlock the next generation of space operations.

2) Development of a serviceable, on-orbit platform: The project will focus on the development of emerging technologies necessary to establish an in-space asset that will be used to test, develop, and refine ISAM tactics and techniques. The unmanned, multi-mission spacecraft will provide both a prototype testbed facility to validate emerging technologies and a demonstration platform for training and verification of in-space operations. Targeted orbits for operation can be in Low Earth Orbit (LEO), Medium Earth Orbit (MEO) or Geosynchronous Earth Orbit (GEO). The envisioned platform will be capable of operations to include but not limited to rendezvous proximity operations & docking (RPOD), safe fluid transfer for refueling, space robotic manipulators, trusted autonomous fault protection, spacecraft trusted autonomy, advanced state of health monitoring, reconfigurable subsystems and payloads, and safe stable power supply, thermal control, and data transfer via standard docking interface to payloads. In addition, the platform will be capable of integration with a cryptographic unit capable of government-approved encryption for secure uplink, downlink, or crosslink. The topic will mature at least one or more of these foundational capabilities to enable the development of an on-orbit platform as well as an overall concept design.

Successful Phase-II proposals and awards will provide evidence of market fit in a detailed business plan, including total available market (TAM) and served available market (SAM); revenue model and plan; and scaling plan, including supply chain and manufacturing. Project scope should also include an end-to-end capability ready for demonstration in a relevant operational environment, including initial development of design reference missions. The successful Phase-II capability shall achieve TRL-4 or higher, as documented in a final report with laboratory and/or field demonstrations.

PHASE III DUAL USE APPLICATIONS: Some solutions may go from Phase II to Phase III as soon as the product-market fit is verified. Potential Phase III awardees will transition the adapted non-Defense commercial solution to provide expanded mission capability for a broad range of potential Governmental and civilian users and alternate mission applications.

REFERENCES:

1. *Dynamic Space Operations - https://www.airuniversity.af.edu/Portals/10/AEtherJournal/Journals/Special-Edition_Winter2023/Shaw.pdf.

2. *ISAM National Strategy - https://www.whitehouse.gov/wp-content/uploads/2022/04/04-2022-ISAM-National-Strategy-Final.pdf.

3. *In-Space Developmental Test Persistent Platform for US Space Force - https://doi.org/10.2514/6.2022-2464.

4. *https://ntrs.nasa.gov/api/citations/20205007927/downloads/Persistent%20Platform%20AIAA%20paper%20V7.pdf.

5. *TRL Guide - https://www.gao.gov/assets/gao-20-48g.pdf.

6. *https://spacewerx.us/space-prime/.

KEYWORDS: AFWERX, SpaceWERX; Orbital Prime; ISAM; In-space Servicing, Assembly, and Manufacturing; Dynamic Space Operations (DSO); Space Architecture; Space Mobility; Sustained Space Maneuvering (SSM)

Version 4

AF NUMBER: SF243-D007

TITLE: Dynamic Space Operations through Development of Advanced Rendezvous Proximity Operations and Docking (RPOD) Technology

TECHNOLOGY AREAS: Space Platforms; Electronics; Sensors

The technology within this topic is restricted under the International Traffic in Arms Regulation (ITAR), 22 CFR Parts 120-130, which controls the export and import of defense-related material and services, including export of sensitive technical data, or the Export Administration Regulation (EAR), 15 CFR Parts 730-774, which controls dual use items. Offerors must disclose any proposed use of foreign nationals (FNs), their country(ies) of origin, the type of visa or work permit possessed, and the statement of work (SOW) tasks intended for accomplishment by the FN(s) in accordance with section 3.5 of the Announcement. Offerors are advised foreign nationals proposed to perform on this topic may be restricted due to the technical data under US Export Control Laws.

OBJECTIVE: The US Space Force (USSF) looks to advance space domain awareness (SDA) technologies and concepts of operations (ConOps) by accelerating on-orbit inspection, mission planning architecture, and on-orbit maneuvering. By addressing these technological and operational challenges, the topic will lead to scaling and operationalization of in-orbit servicing, assembly, and manufacturing (ISAM) capabilities and sustainable business models. The objective outcome will directly impact Department of Air Force's (DAF) Operational Imperative 1 "Defining Resilient and Effective Space Order of Battle and Architectures," and 7 "Readiness of the Department of the Air Force to transition to a wartime posture against a peer competitor."
To sustain economic and warfighter superiority, this topic will conduct a structured examination of an array of advanced maneuvering and manipulating capabilities. The topic will mature technologies and methodology for de-tumbling prepared and unprepared resident space objects (RSO); robotic manipulators and effector technologies; technologies and methodology for safe approach and docking; and dynamic mission planning and servicing architecture.
The intent is to gain significant development in the core technologies and capabilities, enabling systemic space domain awareness capabilities that support the rapid advancement of dynamic operations in space. Leveraging these emerging ISAM and Space Mobility and Logistics (SML) technologies will infuse innovation into the traditional space operations framework by reducing reliance on static mission operations and bespoke space systems.

DESCRIPTION: The Space Force is a large and complex organization consisting of many functions with similar counterparts in the commercial sector. The Space Force wishes to explore innovative technology domains with demonstrated commercial value in the non-defense sector, i.e., through existing products/solutions, in order to obtain Space Force applications, i.e. Dual-Purpose Technologies/Solutions. This topic seeks ideas and technologies relating to the mission of In-Space Servicing Assembly and Manufacturing (ISAM).

PHASE I: This feasibility demonstration should encompass evaluating the scientific and technical merit and feasibility of ideas with commercial potential. Additionally, it must validate the product market between the proposed solution and the USSF customer. The feasibility study should identify the prime potential USSF end users for the Defense-modified commercial offering, describe integration feasibility and costs with current mission-specific products, and explore the potential use by other DoD or Governmental customers.

Documentation should include all relevant information, including, but not limited to, technical reports, test data, prototype designs/models, and performance goals/results. Prior work to demonstrate feasibility must meet the minimum technical and scientific merit specified in this description.
Work submitted with the feasibility demonstration must have been substantially performed by the Offeror and/or the Principal Investigator.

PHASE II: The topic will focus on three strategic areas:

(1) Technologies and methodology for de-tumbling prepared and unprepared satellites

The focus area will look at the evolving technology needed to engage with both prepared and unprepared resident space objects (RSO). Advancements in technology to detumble a client satellite or RSO and perform safe operations for prepared and unprepared space objects. Explore novel methodologies for stabilizing and detumbling client satellites in orbit. This may involve the development of deployable systems, thruster configurations, or passive techniques to mitigate satellite rotation and facilitate safe rendezvous and docking procedures.

(2) Dexterous robotic manipulators, grapplers, and effector technologies for safe docking

The focus area will look into the development, testing, and integration of radiation-hardened or radiation-tolerant robotic manipulators, grapplers, and end effectors for operation in orbits ranging from low earth orbit (LEO) to geostationary earth orbit (GEO). The scope of work shall appropriately source and test hardware components to ensure the robustness of the hardware and software as it operates in the harsh environment experienced in space. Impact trade studies should be completed to design, procure, or upscreen electronic components that are suitable for a potential demonstration mission while keeping size, weight, power consumption, and cost (SWaP-C) in mind alongside rigorous environmental testing aimed at achieving a Technology Readiness Level (TRL) of 6. The project entails thorough integration efforts to ensure interoperability and compatibility with common small satellite architecture through comprehensive Assembly, Integration, and Testing (AI&T) activities. This alignment is essential for seamless integration into future spacecraft systems and demonstrates the project's commitment to interoperability and mission readiness. The goal will be to have matured the technology to a point ready for a demonstration mission of in-space servicing at the end of the performance period.

(3) Coupled body attitude control and primary propulsion system

The topic will accelerate advancements in maneuverability by examining innovations in small spacecraft inspection and propulsion systems, emphasizing strong advancements in the reliability of electric and chemical propulsion systems. Upon safe docking with a resident space object, the combined mass may significantly exceed that of the visiting spacecraft, and effective attitude control may only be possible by means of the visitor’s main propulsion system. This topic will seek a robust suite of coupled body attitude control algorithms using the main propulsion system of the visiting spacecraft to provide in-space logistics or inspection servicing missions.

Successful Phase-II proposals and awards will provide evidence of market fit in a detailed business plan, including total available market (TAM) and served available market (SAM); revenue model and plan; and scaling plan, including supply chain and manufacturing. Successful proposals will also provide an end-to-end capability demonstration in a relevant laboratory operational environment, including initial field testing to prove that the proposed capability is prepared to move into limited production and operational field testing. The successful Phase-II capability shall achieve TRL-6 or higher, as documented in a final report with laboratory and field demonstration.

PHASE III DUAL USE APPLICATIONS: Some solutions may go from Phase II to Phase III once the product-market fit is verified. Potential Phase III awardees will transition the adapted non-defense commercial solution to provide expanded mission capability for a broad range of potential Governmental and civilian users and alternate mission applications.

REFERENCES:

1. *Space Domain Awareness and On-Orbit Servicing: N. Seckbach, A. Bish, and R. Neuhaus, &quot,On-orbit servicing for space domain awareness,&quot, Acta Astronautica, vol. 179, pp. 263-272, 2021. [DOI: 10.1016/j.actaastro.2020.10.022].

2. *“Space Domain Awareness Doctrine for Space Forces,” Space Doctrine Publication (SDP) 3-100, Space Domain Awareness Space Training and Readiness Command (STARCOM) https://www.starcom.spaceforce.mil/Portals/2/SDP%203-100%20Space%20Domain%20Awareness%20(November%202023)_pdf_safe.pdf.

3. *ISAM National Strategy - https://www.whitehouse.gov/wp-content/uploads/2022/04/04-2022-ISAM-National-Strategy-Final.pdf.

4. *“On-Orbit Satellite Servicing Study Project Report,” NASA-GSFC, https://nexis.gsfc.nasa.gov/images/NASA_Satellite%20Servicing_Project_Report_0511.pdf, October 2010.

5. *TRL Guide - https://www.gao.gov/assets/gao-20-48g.pdf.

6. *https://spacewerx.us/space-prime/.

KEYWORDS: AFWERX, SpaceWERX; Orbital Prime; ISAM; In-space Servicing, Assembly, and Manufacturing; Dynamic Space Operations (DSO); Soft Capture; Hard Capture; Rendezvous Proximity Operations; Space GNC; Robotic Docking

Version 4

AF NUMBER: SF243-D008

TITLE: RETURN (Returning ExoaTmospheric Unique Research is Novel)

TECHNOLOGY AREAS: Space Platforms; Materials

The technology within this topic is restricted under the International Traffic in Arms Regulation (ITAR), 22 CFR Parts 120-130, which controls the export and import of defense-related material and services, including export of sensitive technical data, or the Export Administration Regulation (EAR), 15 CFR Parts 730-774, which controls dual use items. Offerors must disclose any proposed use of foreign nationals (FNs), their country(ies) of origin, the type of visa or work permit possessed, and the statement of work (SOW) tasks intended for accomplishment by the FN(s) in accordance with section 3.5 of the Announcement. Offerors are advised foreign nationals proposed to perform on this topic may be restricted due to the technical data under US Export Control Laws.

OBJECTIVE: This topic seeks to perform concept exploration, prototype development, sub-scale experiments, test and evaluation of reusable technology that enables .5-10 tons of containerized cargo from exoatmospheric altitudes surviving earth re-entry and ejection of payloads before the container survives terrestrial landing.

DESCRIPTION: Launch vehicles are limited in down-mass capacity during earth re-entry which limits the overall mass of delivered payloads. The commercial industry and NASA have matured very small materiel return capsules (100 grams – 35kg). AFRL seeks technologies which will support payload re-entry independent of the launch vehicle after the launch vehicle has reached the desired orbit for separation. Technology includes the capability to decelerate the large containers to survive re-entry and eject payloads to desired location(s) with payloads remaining intact and the cargo container survives landing.

The goal of this effort is to explore key tech challenges associated with a modular downmass capability that can affordably deliver payloads, creating a DoD capability in the .5 – 10 tons class size.
The key element for this solicitation is that the offeror must provide a viable design for the thermal protection system that can downmass this class of payload through reentry. Payload capacity below the .5 ton class equivalent are not of interest for this solicitation. In all cases, DoD seeks to ship existing material without modification. Designs cannot require DOD hardware to be specialized in order to use the rocket transport mode.

The main deliverables will be sub-scale experiments, prototypes, tests, analysis, and demonstrations that advance the operational imperatives.

PHASE I: This topic is intended for technology proven ready to move directly into Phase II. Therefore, a Phase I award is not required. The offeror is required to provide detail and documentation in the Direct to Phase II proposal which demonstrates accomplishment of a “Phase I-type” effort, including a feasibility study. This includes determining, insofar as possible, the scientific and technical merit and feasibility of ideas appearing to have commercial potential. It must have validated the product-market fit between the proposed solution and a potential AF stakeholder. The offeror should have defined a clear, immediately actionable plan with the proposed solution and the AF customer. Relevant areas of demonstrated experience and success include: M&S, cost benefit analysis, risk analysis, concept development, concept demonstration and concept evaluation, laboratory experimentation and field testing.
Phase I type efforts should include the assessment of emerging operational imperatives and how they

show a measurable value and operational impact. The result of Phase I type efforts is to assess and demonstrate whether commercial systems can support the furtherance of the operational imperatives.

PHASE II: Eligibility for a Direct to Phase Two (D2P2) is predicated on the offeror having performed a "Phase I-like" effort predominantly separate from the SBIR/STTR Programs. These efforts will include M&S, simulation of prototype concepts, cost benefit analysis, system-of-systems studies, experimentation and evaluation of operational imperatives to enable future concepts. Prototypes, M&S and experimentation should explore a wide range of integrating commercial capabilities to support the operational imperatives. These capabilities should consider areas that are unique to military operations, logistics, mission planning, mission execution, base sustainment, and logistics.
A goal is for Phase II efforts to conduct sub-scale experiments and provide test articles for further test and demonstration. Experiments should address military-unique requirements that may not be otherwise met by commercial capabilities.

PHASE III DUAL USE APPLICATIONS: Phase III shall include upgrades to the analysis, M&S, T&E results and provide mature prototypes of system concepts. Phase III shall provide a business plan and address the ability to transition technology and system concepts to commercial applications. The adapted non-Defense commercial solutions shall provide expanded mission capability for a broad range of potential Governmental and civilian users and alternate mission applications. Integration and other technical support to operational users may be required.

REFERENCES:

1. *Hughes, S, Dillman, R, Starr, B, Stephan, R, Lindell, M, Inflatable Re-entry Vehicle (IRVE) Design Overiew. AIAA. 11 Nov 2022.

2. *Uyanna, O, Najafi, H, Thermal protection systems for space vehicles: A review on technology development, current challenges and future prospects. Acta Astronautica. November 2020.

KEYWORDS: exoatmospheric, re-entry, return capsules, launch vehicle agnostic, eject payloads, downmass

Version 4

AF NUMBER: SF243-D009

TITLE: ASAT Launch Detection and Threat Assessment

TECHNOLOGY AREAS: Space Platforms

The technology within this topic is restricted under the International Traffic in Arms Regulation (ITAR), 22 CFR Parts 120-130, which controls the export and import of defense-related material and services, including export of sensitive technical data, or the Export Administration Regulation (EAR), 15 CFR Parts 730-774, which controls dual use items. Offerors must disclose any proposed use of foreign nationals (FNs), their country(ies) of origin, the type of visa or work permit possessed, and the statement of work (SOW) tasks intended for accomplishment by the FN(s) in accordance with section 3.5 of the Announcement. Offerors are advised foreign nationals proposed to perform on this topic may be restricted due to the technical data under US Export Control Laws.

OBJECTIVE: Delivery of software capability that accurately assesses and analyzes detected launches and assigns a probabilistic inference classifying said launch as a Direct Ascent Anti-Satellite (DA-ASAT) launch or not. Solution must be able to integrate with existing workflows through open API that can be leveraged with existing systems and meets development and operational environment requirements.

DESCRIPTION: Direct Ascent Anti-Satellite (DA-ASAT) launches pose a significant risk because of the destructive potential they possess. A single DA-ASAT event can cripple ground-based capabilities and cause on-orbit debris that presents further risk to space systems operations. The ability quickly and accurately identify DA-ASAT launch events provides a particular strategic advantage allowing for an increased response time and reducing the element of surprise that would be prevalent in the event of a connecting DA-ASAT launch. While there are manual processes in place to identify and alert of DA-ASAT launches and associated likelihoods, they are labor intensive and there is an inherent risk of an event being overlooked given the magnitude of launch events and large number of variables. A normal space launch carrying satellites is not very different from a DA-ASAT launch except that DA-ASATs impact a target around the time they achieve orbit. Since the goal is impact another satellite, the velocities and trajectories of DA-ASATs will differ from peaceful launches. Leveraging data sources such as two-line elements (TLEs), state vectors, or other similar information available through satellite orbit catalogs, data science methods such as artificial intelligence, machine learning, advanced statistical modeling, or other methods can be used to produce insightful information.
Space Systems Command (SSC) Space Domain Awareness (SDA) Tap Lab is seeking solutions to provide a software capability that can automatically assess and analyze launch events in real-time (or near-real time as possible) and classify launch events as DA-ASAT launch events while also identifying targeted satellites if applicable. There are four key deliverables that the solution must provide.
1) Probabilistic inference classifying the launch event as either a DA-ASAT launch or not
If the event is determined to be a DA-ASAT launch, then the following deliverables are required:
2) List of targeted satellites with associated probability risk scores
3) Time to impact or time to explosion of DA-ASAT
4) Calculated anticipated miss distance
The software product must be able to be integrated into existing toolchains that are used by USSF operators and the SDA Tap Lab. As this capability is only one specific functionality to be used in conjunction with other tools to provide a wholistic understanding of space domain awareness and space operations, it is pivotal that the solution be able to seamless integrate with existing systems through API call. The solution must also meet all development and operational requirements for system integration and use on classified systems.

Potential data sources to leveraged for development of this topic can include but are not limited to:
- Public catalog of orbits via space-track.org and European Space Agency
- Commercially available orbits via Unified Data Library (UDL)
- Publicly available orbits via amateurs and hobbiyists
- Notice to Airmen (NOTAMs)
- Multi-source and publicly available contextual information (news feed, blogs, social media)

PHASE I: This topic is intended for technology proven ready to move directly into Phase II. Therefore, Phase I awards will not be made for this topic. The applicant is required to provide detail and documentation in the D2P2 proposal which demonstrates accomplishment of a "Phase I-type" effort, including a feasibility study. This includes determining, insofar as possible, the scientific and technical merit and feasibility of ideas appearing to have commercial potential. It must have validated the product-mission fit between the proposed solution and a potential Air Force and/or Space Force stakeholder. The applicant should have defined a clear, immediately actionable plan with the proposed solution and the DAF customer and end-user.

The feasibility study should have:

1. Clearly identified the potential stakeholders of the adapted solution for solving the Air Force and/or Space Force need(s).
2. Described the pathway to integrating with DAF operations, to include how the applicant plans to accomplish core technology development, navigate
applicable regulatory processes, and integrate with other relevant systems and/or processes.
3. Describe if and how the solution can be used by other DoD or Governmental customers.

In addition to the feasibility study applicants should demonstrate a framework algorithm to use a proof of concept for classifying launch events as DA-ASAT launches and identifying training dataset that can be used in model development.

PHASE II: Phase II of this project focuses on advancing the capability developed in Phase I to accurately assess and analyze launch events, with a specific emphasis on improving evaluation metrics such as accuracy, precision, and F1 score, and expanding the scope of launch events assessed. The goal is to deliver a software capability that can effectively identify Direct Ascent Anti-Satellite (DA-ASAT) launches in real-time or near-real-time and provide probabilistic inferences classifying these events while also identifying targeted satellites if applicable. Leveraging data sources such as two-line elements (TLEs) and state vectors, advanced data science methods like artificial intelligence and machine learning will be employed to enhance the analysis. The solution must deliver four key functionalities: probabilistic classification of launch events as DA-ASAT or not, identification of targeted satellites with associated probability risk scores, time to impact or explosion of DA-ASAT, and calculated anticipated miss distance. Additionally, seamless integration with existing workflows through an open API is crucial, ensuring compatibility with USSF operators and the Space Systems Command (SSC) Space Domain Awareness (SDA) Tap Lab toolchains. The solution must also meet all development and operational requirements for integration and use on classified systems. Phase II builds upon the Phase I feasibility study, demonstrating scientific and technical merit, validating product-mission fit, and defining an actionable plan for collaboration with Air Force and/or Space Force stakeholders.

PHASE III DUAL USE APPLICATIONS: Phase III of the project aims to scale the finalized model developed in Phase II to encompass the analysis of all launch events, not limited to just DA-ASAT launches. This expansion broadens the scope of the solution to provide comprehensive launch event

analysis, thereby enhancing space domain awareness and operational readiness. In addition to scaling the model, Phase III focuses on expanding notification functionality to ensure timely and actionable alerts regarding significant launch events. This could involve the development of advanced notification systems capable of disseminating critical information to relevant stakeholders in real-time or near-real-time, enabling prompt decision-making and response. Furthermore, Phase III may involve the integration of additional data sources and analytical techniques to enhance the accuracy and reliability of launch event analysis and notification capabilities. Collaboration with key stakeholders, including the Air Force, Space Force, and other governmental agencies, will be essential to ensure alignment with operational requirements and maximize the utility of the solution. Overall, Phase III represents a significant advancement in the development and deployment of the launch event analysis system, furthering its effectiveness and impact in enhancing space situational awareness and mission success.

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1. *P. Saunders, C. Lutes, "China's ASAT Test: Motivations and Implications", National Defence Univ Washington DC Institute for National Strategic Studies, vol. 46, 2007.

2. *A. Kawthalkar, M. Shah, I. Prachchhak, "Modeling and Simulation of a direct-ascent anti-satellite missile using Kerbal Space Program (KSP)", Aerospace Systems, vol. 5, May 2022.

KEYWORDS: Direct Ascent Anti-Satellite (DA-ASAT); launch classification; target identification; threat detection; AI-ML

Version 4

AF NUMBER: SF243-D010

TITLE: Object Transiting Tracking

TECHNOLOGY AREAS: Space Platforms

The technology within this topic is restricted under the International Traffic in Arms Regulation (ITAR), 22 CFR Parts 120-130, which controls the export and import of defense-related material and services, including export of sensitive technical data, or the Export Administration Regulation (EAR), 15 CFR Parts 730-774, which controls dual use items. Offerors must disclose any proposed use of foreign nationals (FNs), their country(ies) of origin, the type of visa or work permit possessed, and the statement of work (SOW) tasks intended for accomplishment by the FN(s) in accordance with section 3.5 of the Announcement. Offerors are advised foreign nationals proposed to perform on this topic may be restricted due to the technical data under US Export Control Laws.

OBJECTIVE: Deliver a software-based functionality that in real-time (or near real-time) can accurately and automatically detect the time, location, and vector of objects transiting through the upper atmosphere (between 200 and 400 km altitude) at "space capable" velocities. Additionally, if the tracked object is Earth-bound, predict the impact location and time.

DESCRIPTION: As space capabilities continue to push the limit of typical behavior it grows more imperative for an increased understanding and awareness of space activities. In recent years there have been examples of non-traditional propulsion and exotic orbits used to evade detection and tracking. The exact extent of these types of behaviors remains generally unknown but present a clear risk to maintain space systems. Furthermore, the use of non-traditional objects, such as high-altitude balloons used by China, highlight this challenge and are a clear demonstration of the domain gap in sensor and C2 systems. The capability to operate in real-time and automatically identify, track, and alert on objects of interest is needed to reduce operational surprise and will be leveraged to enable unclassified tipping and queuing. Space Systems Command (SSC) Space Domain Awareness (SDA) Tap Lab is seeking solutions to provide a software capability that can automatically and in real-time detect the time, location, and vector of objects transiting through the upper atmosphere (200 – 400 km) at a "space capable" velocity is needed to reduce operational surprise. "Space capable" velocities are defined as speeds that are faster than aircraft but not fast enough to obtain a sustainable orbit such as hyper glide vehicles or ballistic missiles. Within this request there are 5 associated subtasks; 1) Process data from ionospheric and geomagnetic, or similar sources; 2) Detect disturbances that may be ingress/egress events; 3) Localize ingress/egress events; 4) Associate multiple detections to a single ingress/egress event; and 5) Generate track (time, position, vector) from associated detections.

Solutions may be presented through creative processes and focus on providing useable outputs that hold meaning for USSF service members. Sample inputs include 1) Scientific ionospheric plasma detection sensors such as SuperDARN; 2) Scientific geomagnetic sensors such as USGS Geomagnetism Program and; 3) Web-accessible Software Defined Radio (SDR). Possible techniques may include but are not limited to 1) Analysis of localized or traveling ionospheric disturbances (e.g. electron depletion); 2) STACOM or GPS signal interference patterns. Consider comparing the geographical distribution of problematic telemetry relative to all telemetry from a single source or; 3) Web-accessible based Software Defined Radio (SDR) signal interference patterns.

The software product must be able to be integrated into existing toolchains that are used by USSF operators and the SDA Tap Lab. As this capability is only one specific functionality to be used in conjunction with other tools to provide a wholistic understanding of space domain awareness and space operations, it is pivotal that the solution be able to seamless integrate with existing systems through API

call. The solution must also meet all development and operational requirements for system integration and use on classified systems.

Information and results generated from analysis of this topic should include tracks that can ideally be published to the Unified Data Library (UDL) for consumption by 3rd parties. A secondary integration path is the expose tracking data via a public facing API.

PHASE I: This topic is intended for technology proven ready to move directly into Phase II. Therefore, Phase I awards will not be made for this topic. The applicant is required to provide detail and documentation in the D2P2 proposal which demonstrates accomplishment of a "Phase I-type" effort, including a feasibility study. This includes determining, insofar as possible, the scientific and technical merit and feasibility of ideas appearing to have commercial potential. It must have validated the product-mission fit between the proposed solution and a potential Air Force and/or Space Force stakeholder. The applicant should have defined a clear, immediately actionable plan with the proposed solution and the DAF customer and end-user.
The feasibility study should have:
1. Clearly identified the potential stakeholders of the adapted solution for solving the Air Force and/or Space Force need(s).
2. Described the pathway to integrating with DAF operations, to include how the applicant plans to accomplish core technology development, navigate
applicable regulatory processes, and integrate with other relevant systems and/or processes.
3. Describe if and how the solution can be used by other DoD or Governmental customers.

In addition to feasibility applicants should demonstrate a framework design to use as proof of concept that can detect and track objects with the given criteria. The tool should be able to accurately identify objects in the upper atmosphere and identify the velocity of said object.

PHASE II: Phase II will focus on developing and refining the concept outlined in Phase I, with a primary goal of enhancing evaluation metrics, model performance, and expanding the scope of input data. Specifically, Phase II aims to deliver a software-based functionality capable of accurately and automatically detecting the time, location, and vector of objects transiting through the upper atmosphere at "space capable" velocities. Additionally, if the tracked object is Earth-bound, Phase II will develop predictive capabilities to forecast the impact location and time. This solution addresses the pressing need for improved space domain awareness, particularly in detecting non-traditional propulsion methods and exotic orbits that pose risks to space systems. The development process will involve processing data from various sources, including ionospheric and geomagnetic sensors, to detect disturbances indicating ingress or egress events. Phase II will also focus on localizing and associating multiple detections to a single event and generating comprehensive tracks that include time, position, and vector information. The solution will be designed to provide actionable outputs for USSF service members, integrating seamlessly with existing toolchains, and meeting all development and operational requirements for use on classified systems. Overall, Phase II will build upon the foundation laid in Phase I by refining the solution, improving evaluation metrics, and expanding its applicability to a wider range of scenarios in the upper atmosphere.

PHASE III DUAL USE APPLICATIONS: Phase III will focus on scaling the finalized model developed in Phase II to encompass the analysis of all launch events, significantly expanding its scope and impact. This expanded capability will enable comprehensive analysis of launch events beyond just those at "space capable" velocities, enhancing space domain awareness and operational readiness. Additionally, Phase III will further enhance notification functionality to provide timely and actionable alerts regarding significant

launch events. This may involve the development of advanced notification systems capable of disseminating critical information to relevant stakeholders in real-time or near-real-time, facilitating prompt decision-making and response. Furthermore, Phase III will involve the integration of additional data sources and analytical techniques to enhance the accuracy and reliability of launch event analysis and notification capabilities. Collaboration with key stakeholders, including the Air Force, Space Force, and other governmental agencies, will be essential to ensure alignment with operational requirements and maximize the utility of the solution. Overall, Phase III represents a significant advancement in the development and deployment of the launch event analysis system, furthering its effectiveness and impact in enhancing space situational awareness and mission success. Additionally, the solution developed in Phase III will have dual-use potential, providing valuable insights and capabilities that can benefit both military and civilian applications, such as commercial satellite operators and space agencies, thereby maximizing its societal and economic impact.

REFERENCES:

1. *P.Hu, X. Zhang, M. Li, Y. Zu, L. Shi, "TSOM: Small Object Motion Detection Neural Network Inspired by Avain Visual Circuit", March 2024.

KEYWORDS: Tracking; transiting; upper atmosphere; nontraditional propulsion; exotic orbit; evade detection; concealment; space domain awareness; SDA

Version 4

AF NUMBER: SF243-D011

TITLE: Launch Cycle Initiation Detection

TECHNOLOGY AREAS: Space Platforms

The technology within this topic is restricted under the International Traffic in Arms Regulation (ITAR), 22 CFR Parts 120-130, which controls the export and import of defense-related material and services, including export of sensitive technical data, or the Export Administration Regulation (EAR), 15 CFR Parts 730-774, which controls dual use items. Offerors must disclose any proposed use of foreign nationals (FNs), their country(ies) of origin, the type of visa or work permit possessed, and the statement of work (SOW) tasks intended for accomplishment by the FN(s) in accordance with section 3.5 of the Announcement. Offerors are advised foreign nationals proposed to perform on this topic may be restricted due to the technical data under US Export Control Laws.

OBJECTIVE: Delivery of software capability that automatically identifies and detects the start of space launch cycles in real-time (or near real-time). Solution must be able to integrate with existing workflows through open API that can be leveraged with existing systems and meets development and operational environment requirements.

DESCRIPTION: Launch cycles are activities and/or events that take place prior to and leading up to a launch event. Launch activities can vary widely in type and indication; everything from troop movement, vehicle movement, strategic posturing, and resource allocation can be included as a part of a launch cycle. A launch cycle can begin with little to no warning and can last minutes, hours, or days. The ability to detect and identify that start of a launch cycle provides an intrinsic value to the SDA community's ability to quickly search and acquire newly launched vehicles. The further left of launch the greater value to space operations. Having early notification of launch cycles will tip and que sensor owners to be on the ready for upcoming launch activities.

Space Systems Command (SSC) Space Domain Awareness (SDA) Tap Lab is seeking solutions to provide a software capability that can automatically and in real-time detect and notify the start of a given space launch cycle. This task includes four subtasks; 1) process data from imagery (or other) sources; 2) Identify features in imagery (or other data types) that indicate launch cycle start; 3) Detect the identified indicators and associated launch cycle start; and 4) Predict the associated launch window.

While the exact functionality and method is left to creative problem solving, solutions can look to possibly leverage techniques for indications and warnings that provide meaningful insight. Such techniques commonly use satellite imagery, weather data, pattern of life assessment, activity-based intelligence, and other open-source data.

The software product must be able to be integrated into existing toolchains that are used by USSF operators and the SDA Tap Lab. As this capability is only one specific functionality to be used in conjunction with other tools to provide a holistic understanding of space domain awareness and space operations, it is pivotal that the solution be able to seamless integrate with existing systems through API call. The solution must also meet all development and operational requirements for system integration and use on classified systems.

PHASE I: This topic is intended for technology proven ready to move directly into Phase II. Therefore, Phase I awards will not be made for this topic. The applicant is required to provide detail and documentation in the D2P2 proposal which demonstrates accomplishment of a "Phase I-type" effort,

including a feasibility study. This includes determining, insofar as possible, the scientific and technical merit and feasibility of ideas appearing to have commercial potential. It must have validated the product-mission fit between the proposed solution and a potential Air Force and/or Space Force stakeholder. The applicant should have defined a clear, immediately actionable plan with the proposed solution and the DAF customer and end-user.
The feasibility study should have:
1. Clearly identified the potential stakeholders of the adapted solution for solving the Air Force and/or Space Force need(s).
2. Described the pathway to integrating with DAF operations, to include how the applicant plans to accomplish core technology development, navigate
applicable regulatory processes, and integrate with other relevant systems and/or processes.
3. Describe if and how the solution can be used by other DoD or Governmental customers.

In addition to feasibility applicants, should demonstrate a framework design to use as proof of concept that can detect and notify operators of a start of a launch cycle. The tool should be able to accurately detect, identify, and locate the start of a launch cycle

PHASE II: Phase II will build upon the concept developed in the "Phase I-type" effort, with a focus on enhancing evaluation metrics, model performance, and expanding the scope of input data to further the analysis of launch events. Specifically, Phase II aims to refine the software capability to automatically detect and notify the start of space launch cycles in real-time or near real-time. This entails four key subtasks: processing data from imagery or other sources, identifying features indicative of launch cycle start, detecting these indicators, and predicting the associated launch window. While the exact methodology is open to creative problem-solving, solutions may leverage techniques such as indications and warnings using satellite imagery, weather data, pattern of life assessment, and activity-based intelligence. The refined software product must seamlessly integrate with existing toolchains used by USSF operators and the SDA Tap Lab, meeting all development and operational requirements for system integration and use on classified systems. Additionally, Phase II will focus on improving evaluation metrics such as accuracy, precision, and F1 score, while also expanding the breadth of input data to further enhance the scope of launch events being assessed.

PHASE III DUAL USE APPLICATIONS: Phase III will concentrate on scaling the finalized model developed in Phase II to encompass the analysis of all launch events, significantly broadening its scope and utility. This expanded capability will enable comprehensive analysis of launch activities beyond the detection of launch cycles, enhancing space domain awareness and operational readiness. Additionally, Phase III will focus on further enhancing notification functionality to provide timely and actionable alerts regarding all significant launch events. This may involve the development of advanced notification systems capable of disseminating critical information to relevant stakeholders in real-time or near-real-time, facilitating prompt decision-making and response. Furthermore, Phase III will involve the integration of additional data sources and analytical techniques to enhance the accuracy and reliability of launch event analysis and notification capabilities. Collaboration with key stakeholders, including the Air Force, Space Force, and other governmental agencies, will be essential to ensure alignment with operational requirements and maximize the utility of the solution. Additionally, the solution developed in Phase III will have dual-use potential, providing valuable insights and capabilities that can benefit both military and civilian applications, thereby maximizing its societal and economic impact.

REFERENCES:

1. *C. Wong, "Feasibility Study of Missle Launch Detection and Trajectory Tracking", Naval Postgraduate School, September 2016.

KEYWORDS: Launch cycle; detection; indications and warnings; satellite imagery; space domain awareness; SDA

Version 4

AF NUMBER: SF243-D012

TITLE: Foreign Space Launch Detection

TECHNOLOGY AREAS: Space Platforms

The technology within this topic is restricted under the International Traffic in Arms Regulation (ITAR), 22 CFR Parts 120-130, which controls the export and import of defense-related material and services, including export of sensitive technical data, or the Export Administration Regulation (EAR), 15 CFR Parts 730-774, which controls dual use items. Offerors must disclose any proposed use of foreign nationals (FNs), their country(ies) of origin, the type of visa or work permit possessed, and the statement of work (SOW) tasks intended for accomplishment by the FN(s) in accordance with section 3.5 of the Announcement. Offerors are advised foreign nationals proposed to perform on this topic may be restricted due to the technical data under US Export Control Laws.

OBJECTIVE: Delivery of software capability that automatically identifies and detects foreign space launches. Solution must be able to integrate with existing workflows through open API that can be leveraged with existing systems and meets development and operational environment requirements.

DESCRIPTION: Early knowledge of space vehicle launches provide a massive value for strategic and tactical purposes. The speed of notification plays a large role in tipping and queuing sensors which leads to early tracking ability of the newly launched vehicle. A space launch starts when the main engine of a space launch vehicle ignites. This activity is typically easy to detect by space-based infrared (IR) sensors and serves as the DoD's primary mechanism to detect launches. The orbit of the launch vehicle is then published to public websites typically within a few hours of launch. Once that information becomes public, commercial sensors can then be tasked to track the launch. Having advanced and/or real-time knowledge of when a launch occurs can enable a commercial sensor to search and track the launch vehicle at a much faster rate than currently happening.

Space Systems Command (SSC) Space Domain Awareness (SDA) Tap Lab is seeking solutions to provide a software capability that can automatically and in real-time detect and notify the time and location of foreign space launches. The solution is open to creative problem solving by the proposing organization but has an expectation to incorporate and leverage open data sources in the analysis. Those data sources include by are not limited to 1) Scientific seismic sensors and networks such as FDSN and IRIS; 2) Cell phone accelerometer data from systems such as Android ShakeAlert system or; 3) Scientific or commercial weather satellite data such as GOES or Himawari. This task includes five subtasks; 1) Process input data from seismic, accelerometer, or other sources; 2) Detect acoustic, seismic, or kinetic events and correlation to launch events; 3) Associate multiple cross domain data detections to a single launch event; 4) Estimate launch location of associated event and; 5) Predict the ascent trajectory of a detected launch event.
The software product must be able to be integrated into existing toolchains that are used by USSF operators and the SDA Tap Lab. As this capability is only one specific functionality to be used in conjunction with other tools to provide a wholistic understanding of space domain awareness and space operations, it is pivotal that the solution be able to seamless integrate with existing systems through API call. The solution must also meet all development and operational requirements for system integration and use on classified systems.

PHASE I: This topic is intended for technology proven ready to move directly into Phase II. Therefore, Phase I awards will not be made for this topic. The applicant is required to provide detail and documentation in the D2P2 proposal which demonstrates accomplishment of a "Phase I-type" effort,

including a feasibility study. This includes determining, insofar as possible, the scientific and technical merit and feasibility of ideas appearing to have commercial potential. It must have validated the product-mission fit between the proposed solution and a potential Air Force and/or Space Force stakeholder. The applicant should have defined a clear, immediately actionable plan with the proposed solution and the DAF customer and end-user.

The feasibility study should have:
1. Clearly identified the potential stakeholders of the adapted solution for solving the Air Force and/or Space Force need(s).
2. Described the pathway to integrating with DAF operations, to include how the applicant plans to accomplish core technology development, navigate
applicable regulatory processes, and integrate with other relevant systems and/or processes.
3. Describe if and how the solution can be used by other DoD or Governmental customers.

In addition to feasibility applicants should demonstrate a framework design to use as proof of concept that can detect a launch event. The tool should be able to accurately detect, identify, and locate a launch event.

PHASE II: Phase II aims to deliver a software capability that automatically identifies and detects the time and location of foreign space launches in real-time or near real-time. This solution will build upon the capabilities developed in Phase I and will incorporate and leverage open data sources such as seismic sensors, accelerometer data from systems like the Android ShakeAlert system, and scientific or commercial weather satellite data. The development process will entail five key subtasks: processing input data from seismic, accelerometer, or other sources; detecting acoustic, seismic, or kinetic events and correlating them to launch events; associating multiple cross-domain data detections to a single launch event; estimating the launch location of associated events; and predicting the ascent trajectory of detected launch events. The refined software product must seamlessly integrate with existing toolchains used by USSF operators and the SDA Tap Lab, meeting all development and operational requirements for system integration and use on classified systems. Additionally, Phase II will focus on improving evaluation metrics such as accuracy, precision, and F1 score, while also expanding the breadth of input data to further enhance the scope of foreign space launch events being assessed.

PHASE III DUAL USE APPLICATIONS: Phase III will focus on scaling the finalized model developed in Phase II to encompass the analysis of all launch events, significantly broadening its scope and utility. This expanded capability will enable comprehensive analysis of launch activities beyond just foreign space launches, enhancing space domain awareness and operational readiness. Additionally, Phase III will further enhance notification functionality to provide timely and actionable alerts regarding all significant launch events. This may involve the development of advanced notification systems capable of disseminating critical information to relevant stakeholders in real-time or near-real-time, facilitating prompt decision-making and response. Furthermore, Phase III will involve the integration of additional data sources and analytical techniques to enhance the accuracy and reliability of launch event analysis and notification capabilities. Collaboration with key stakeholders, including the Air Force, Space Force, and other governmental agencies, will be essential to ensure alignment with operational requirements and maximize the utility of the solution. Additionally, the solution developed in Phase III will have dual-use potential, providing valuable insights and capabilities that can benefit both military and civilian applications, thereby maximizing its societal and economic impact.

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1. *A. Rao et al, "Autonomous Missile Defense System: Integrating Advancded Sonar-Based Tracking for Precise Detection", Turkish Journal of Computer and Mathematics Education (TURCOMAT), vol. 14(2).

2. *E. Ellis, "Misslie Warning & Missile Defense in the South China Sea", 2023, Naval War College.

KEYWORDS: Space launch; launch detection; seismic data; accelerometer data; space domain awareness; SDA

Version 4

AF NUMBER: SF243-D013

TITLE: CCDM (Camouflage, Concealment, Deception, and Maneuver) Interrogation

TECHNOLOGY AREAS: Space Platforms

The technology within this topic is restricted under the International Traffic in Arms Regulation (ITAR), 22 CFR Parts 120-130, which controls the export and import of defense-related material and services, including export of sensitive technical data, or the Export Administration Regulation (EAR), 15 CFR Parts 730-774, which controls dual use items. Offerors must disclose any proposed use of foreign nationals (FNs), their country(ies) of origin, the type of visa or work permit possessed, and the statement of work (SOW) tasks intended for accomplishment by the FN(s) in accordance with section 3.5 of the Announcement. Offerors are advised foreign nationals proposed to perform on this topic may be restricted due to the technical data under US Export Control Laws.

OBJECTIVE: Delivery of software capability that automatically assesses and interrogates characteristics of UCT candidate orbits (or objects classified in the catalog as UNK, debris, rocket body, or in active payload) for likelihood that an object is taking activity associated with camouflage, concealment, deception, or maneuver (CCMD). Solution must be able to integrate with existing workflows through open API that can be leveraged with existing systems and meets development and operational environment requirements.

DESCRIPTION: Operational surprise presents an increased risk to space operations and national security. As space operations continue to grow in demand and variability, there are novel methods used to gain tactical and strategic advantages. The ability to operate and/or maneuver a satellite without detection provides an advantageous posturing for the satellite owner and can be a sign of on-orbit activity that could present value to US space operations. In recent years there has been instances where unknown satellites or objects assumed to be inactive or non-maneuverable suddenly began to maneuver in very deliberate manners. These types of activities, and similarly related ones, need to be identified and notification sent to space operators for professional assessment. Finding these anomalous objects will allow battle managers to triage attention, plan and develop response options, and detect threatening behavior.

Space Systems Command (SSC) Space Domain Awareness (SDA) Tap Lab is seeking solutions to provide a software capability that can automatically detect, interrogate, assess, and notify of activities for evidence of camouflage, concealment, deception, or maneuver (CCMD). Assessment will look at the characteristics listed below of UCT candidate orbits or satellites in the catalog classified as UNK, debris, rocket body, or inactive payload. The solution should provide a method to assess, evaluate, and score the probability (or some other scoring metric) that associates the object with CCMD activities. Characteristics provided below are indicators that have been curated from industry's historical understanding of space-based threats. These are indicators that an unknown object may be a weapon system or a force enhancement capability that support weapon systems. The characteristics include:

- Appears stable
- Stability changed
- Maneuvers or RF detected
- Sub-satellites deployed
- Maneuvers or RF POL out of family
- Violates stated ITU or FCC filing/slots
- Class disagreement between analysts
- Orbit is out of family
- Optical, Radar signature out of family

- Optical, Radar signature mismatch
- Object stimulated by blue
- Area to mass is out of family
- Proximity events are imaging passes
- Maneuver resulted in imaging pass
- Imaging maneuvers also POLV
- Maneuvers in coverage gap, during solar/lunar exclusion
- Sudden Area to mass changes
- Cataloged objects from launch > manifest
- From SLC or SLV known to deploy threats
- UNK/DEB has SMA > parent
- True UCT while in eclipse

Cataloged UCTs (or satellites in the catalog classified as UNK, debris, rocket body, or inactive payload) that have been assessed as an active object should be linked together, if applicable. The solution will need to notify operators of objects assessed at a specified threat assessment level.
The software product must be able to be integrated into existing toolchains that are used by USSF operators and the SDA Tap Lab. As this capability is only one specific functionality to be used in conjunction with other tools to provide a wholistic understanding of space domain awareness and space operations, it is pivotal that the solution be able to seamless integrate with existing systems through API call. The solution must also meet all development and operational requirements for system integration and use on classified systems.

PHASE I: This topic is intended for technology proven ready to move directly into Phase II. Therefore, Phase I awards will not be made for this topic. The applicant is required to provide detail and documentation in the D2P2 proposal which demonstrates accomplishment of a "Phase I-type" effort, including a feasibility study. This includes determining, insofar as possible, the scientific and technical merit and feasibility of ideas appearing to have commercial potential. It must have validated the product-mission fit between the proposed solution and a potential Air Force and/or Space Force stakeholder. The applicant should have defined a clear, immediately actionable plan with the proposed solution and the DAF customer and end-user.

The feasibility study should have:
1. Clearly identified the potential stakeholders of the adapted solution for solving the Air Force and/or Space Force need(s).
2. Described the pathway to integrating with DAF operations, to include how the applicant plans to accomplish core technology development, navigate
applicable regulatory processes, and integrate with other relevant systems and/or processes.
3. Describe if and how the solution can be used by other DoD or Governmental customers.

In addition to feasibility, applicants will demonstrate a framework design to use as proof of concept that can assess and interrogate UCT objects of CCMD activities. The tool should be able to accurately detect, interrogate, and assess the likelihood an object is demonstrating CCMD activities.

PHASE II: Phase II will involve developing and refining the concept outlined in Phase I, with a primary focus on improving evaluation metrics, model performance, and the ability to assess and interrogate Unusual Candidate Track (UCT) objects for characteristics indicative of camouflage, concealment, deception, or maneuver (CCMD) activities. This phase will aim to enhance the software capability to automatically detect, interrogate, assess, and notify of CCMD activities associated with UCT candidate orbits or objects classified in the catalog as UNK, debris, rocket body, or inactive payload.

The development process in Phase II will include refining the assessment methodology and scoring metrics to accurately evaluate the likelihood that an object is demonstrating CCMD activities. Additionally, the solution will be enhanced to integrate seamlessly with existing workflows through open APIs, ensuring compatibility and interoperability with existing systems used by USSF operators and the SDA Tap Lab.

Furthermore, Phase II will involve improving the performance of the software solution by focusing on enhancing evaluation metrics such as accuracy, precision, F1 score, and other relevant metrics. This may involve refining algorithms, optimizing data processing techniques, and expanding the scope of input data to further enhance the analysis of UCT objects and their associated CCMD activities.

PHASE III DUAL USE APPLICATIONS: Phase III will focus on scaling the finalized model developed in Phase II to encompass the analysis of all launch events, broadening its scope beyond UCT objects to include comprehensive analysis of all launch events for potential CCMD activities. This expanded capability will enhance space domain awareness and operational readiness by providing timely detection and assessment of suspicious activities associated with camouflage, concealment, deception, or maneuver (CCMD) in the space environment.

Additionally, Phase III will prioritize expanding notification functionality to provide actionable alerts regarding all significant launch events with potential CCMD indicators. This may involve the development of advanced notification systems capable of disseminating critical information to relevant stakeholders in real-time or near-real-time, facilitating prompt decision-making and response to potential threats.

Furthermore, Phase III will explore the dual-use potential of the solution, identifying opportunities for its application beyond military and national security contexts. This may include adaptation for commercial space operators, international partners, and other stakeholders interested in enhancing their space situational awareness and security.

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1. *S. Lawler, H. Rein, & A. Boley, "Satellite Visibility During the April 2024 Total Eclipse", March 2024.

2. *S. Walsh, B. Wilman, & H. Jerjen, "The Invisibles: A Detection Algorithm to Trace the Faintest Milky Way Satellites", December 2008.

3. *J. Pavur, I. Martinovic, "On Detecting Deception in space Situational Awareness", June 2021.

KEYWORDS: Camouflage, concealment, deception, and maneuver; threat assessment; risk assessment; UCT; unknown space objects; space domain awareness; SDA

Version 4

AF NUMBER: SF243-D014

TITLE: Responsive, Radiation-hardened GEO Rideshare Capability

TECHNOLOGY AREAS: Space Platforms; Battlespace

The technology within this topic is restricted under the International Traffic in Arms Regulation (ITAR), 22 CFR Parts 120-130, which controls the export and import of defense-related material and services, including export of sensitive technical data, or the Export Administration Regulation (EAR), 15 CFR Parts 730-774, which controls dual use items. Offerors must disclose any proposed use of foreign nationals (FNs), their country(ies) of origin, the type of visa or work permit possessed, and the statement of work (SOW) tasks intended for accomplishment by the FN(s) in accordance with section 3.5 of the Announcement. Offerors are advised foreign nationals proposed to perform on this topic may be restricted due to the technical data under US Export Control Laws.

OBJECTIVE: The objectives of this topic are to:
1) Flight qualify a dispenser and associated hardware that has the capability to rapidly (i.e., within 30-60 days of launch and without perturbing/delaying existing schedules) manifest critical rideshare payloads on a primary mission intended for a geostationary orbit (GEO).
2) Demonstrate, either operationally on-orbit or on the ground, the capability to operate, store, maintain thermal and power requirements in a GEO environment for the payload(s) for a pre-determined period of time, and then responsively deploy the payload(s) upon command.

DESCRIPTION: Despite advances in responsive space, the ability to manifest and de-manifest satellites/payloads from a mission, particularly rideshare payloads, still requires either flying a mass simulator in place of a de-manifested payload or re-running a costly and schedule intensive coupled loads analysis (CLA). In both cases, there will be a monetary cost and possible mission delays associated with the change(s). Increases in cost or changes to schedule can be even more deleterious for missions intended for GEO, which can already be difficult for small rideshare payloads to reach. The U.S. Department of Defense (DoD) needs a demonstrated capability that can overcome both manifest and GEO-access issues. This capability would enable responsive manifesting/de-manifesting of payloads on the ground without penalties to cost or schedule. Furthermore, this capability would reduce the interface between any rideshares and the primary mission to a non-unique, standardized interface. Once on orbit, the capability would demonstrate the ability to host and maintain the health of payloads in GEO independent of the primary mission for, potentially, multiple years until the payload is needed to respond to a threat and the capability responsively deploys it.

PHASE I: This topic is intended for technology proven ready to move directly into Phase II. Therefore, Phase I awards will not be made for this topic. The applicant is required to provide detail and documentation in the D2P2 proposal which demonstrates accomplishment of a “Phase I-type” effort, including a feasibility study. This includes determining, insofar as possible, the scientific and technical merit and feasibility of ideas appearing to have commercial potential. It must have validated the product-mission fit between the proposed solution and a potential U.S. Air Force (USAF) and/or U.S. Space Force (USSF) stakeholder. The applicant should have defined a clear, immediately actionable plan with the proposed solution and the U.S. Department of Air Force (DAF) customer and end-user.

The feasibility study should have:

1. Clearly identified potential stakeholders of the adapted solution for solving USAF and/or USSF need(s).

2. Described the pathway to integrating with DAF operations, to include how the applicant plans to accomplish core technology development, navigate applicable regulatory processes, and integrate with other relevant systems and/or processes.

3. Describe if and how the solution can be used by other DoD or U.S. Governmental (USG) customers.

PHASE II: In Phase II, the objective is to develop and flight qualify a dispenser and associated hardware capable of rapidly manifesting critical rideshare payloads for primary missions intended for Geostationary Orbit (GEO). Additionally, the phase involves demonstrating the capability to store, maintain, and then operate payloads in a GEO environment for extended durations, ensuring mission resiliency and reducing costs and schedule risks associated with manifesting and de-manifesting payloads intended for GEO.

PHASE III DUAL USE APPLICATIONS: In Phase III and for dual-use applications, the matured capabilities can be seamlessly integrated into both commercial and military space endeavors necessitating agile payload deployment and replenishment of systems within GEO. For commercial satellite deployment services, this technology offers streamlined payload manifesting, minimizing costs attributed to launch disruptions or revisions on commercial GEO launches. On the military front, these capabilities fortify mission resilience, facilitating swift deployment of vital payloads to counter emergent threats, thereby reinforcing national security interests in space.

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3. *How Hard Is Going To Space?. Many people believe the complexity and… | by Tory Bruno | Medium <https://medium.com/@ToryBrunoULA/how-hard-is-going-to-space-20637c846ea3>.

KEYWORDS: Responsive space, Rideshare missions, Geostationary orbit (GEO), Flight qualification, Dispenser hardware, Payload storage, Mission resiliency

Version 4

AF NUMBER: SF243-D015

TITLE: Advancing Space Capabilities for Joint Warfighting Opportunities

TECHNOLOGY AREAS: Space Platforms; Battlespace

The technology within this topic is restricted under the International Traffic in Arms Regulation (ITAR), 22 CFR Parts 120-130, which controls the export and import of defense-related material and services, including export of sensitive technical data, or the Export Administration Regulation (EAR), 15 CFR Parts 730-774, which controls dual use items. Offerors must disclose any proposed use of foreign nationals (FNs), their country(ies) of origin, the type of visa or work permit possessed, and the statement of work (SOW) tasks intended for accomplishment by the FN(s) in accordance with section 3.5 of the Announcement. Offerors are advised foreign nationals proposed to perform on this topic may be restricted due to the technical data under US Export Control Laws.

OBJECTIVE: To advance affordable, resilient, and interoperable technologies within the Proliferated Warfighter Space Architecture (PWSA) to enhance space capabilities, support joint warfighting operations, and enable all-domain command and control on a global scale.

DESCRIPTION: The proposed D2P2 solution aims to strategically align with key focus areas essential for advancing space capabilities within the PWSA. This effort is driven by the nation's increasing reliance on space infrastructure and the critical need to enhance services provided to joint forces. By focusing on key strategic areas, including advanced space connectivity and integration, enhanced space systems and capabilities, next-generation hardware and security measures, precision timing, and spaceborne clock technologies, as well as radio frequency space data transport solutions, the D2P2 initiative seeks to address challenges and drive innovation.

1. Advanced Space Connectivity and Integration: This encompasses the integration of commercially-sensed data into the transport layer for the benefit of the warfighter at the tactical edge while developing advanced Optical Inter-Satellite Link (OISL) components and technologies to enhance connectivity, time transfer and ranging between satellites and to reduce SWaP-C, mitigate atmospheric effects, and provide all optical routing to enhance connectivity between space vehicles and/or domain agnostic terrestrial users. This area also includes space-processing systems that use OISL and space-to-ground measurements that when fused form an onboard orbit and clock determination (OCDA) application for space-based autonomous navigation.
2. Enhanced Space Systems and Capabilities: This involves advancing the development and application of cyber solutions, networking technologies, in-space processing capabilities, power enhancement for commoditized space vehicle buses, and generic BMC3 hardware and middleware solutions to bolster the overall resilience and capabilities of space systems. Of particular interest are capabilities and technologies whose application would lower the overall data latency associated with moving time critical information from point of creation to point of employment on operationally relevant timelines.
3. Next-Generation Hardware and Security Measures: Implement space-hardened hardware with seamless multi-level security, small SWaP-C cryptography and CPU, affordable cross-domain solutions, and related data and compliant information protection measures that meet NSA certification standards that will safeguard space assets and operations from potential threats and/or compromise.
4. Precision Timing and Spaceborne Clock Technologies: Addressing the crucial need for high-performance, low SWaP-C clocks for space, ensuring precise timekeeping with design updates needed to support operations in the relevant space environment, including thermal, radiation, and vacuum in satellite operations and supporting PNT while avoiding the need for major user terminal recapitalization. This concerted effort aims to leverage previous feasibility demonstrations, driving innovative solutions that

significantly augment existing PNT solutions and require minimal user resource application for success.
5. Radio Frequency Space Data Transport Solutions: Advanced hardware, software and/or firmware solutions for commoditized space vehicles across UHF, L, S, and Ka bands with multi-band transceivers for ground, sea, air, high altitude and sub-orbital platforms. Of particular interest are high duty cycle, low SWaP-C transceiver solutions enabling multi-user, multi-band operations from a single vehicle or set of cross-linked interoperable vehicles.

6. Automate on-orbit PNT situational awareness (SA) capability of L-band spectrum capture of GNSS interference or signal abnormalities and create associated ground-based information products to aid in locating these source emitters.
7. Multi-Mission Processing Module: Develop advanced processing hardware, that leverages commercial, or government developed capability, to allow SDA to fly modular in-space processing to meet varying mission capabilities. These modules will be compliant with a defined spacecraft interface.

PHASE I: This topic is intended for technology proven ready to move directly into Phase II. Therefore, Phase I awards will not be made for this topic. The applicant is required to provide detail and documentation in the D2P2 proposal which demonstrates accomplishment of a "Phase I-type" effort, including a feasibility study. This includes determining, insofar as possible, the scientific and technical merit and feasibility of ideas appearing to have commercial potential. It must have validated the product-mission fit between the proposed solution and a potential Air Force and/or Space Force stakeholder. The applicant should have defined a clear, immediately actionable plan with the proposed solution and the DAF customer and end-user.

The feasibility study should have:

1. Clearly identified the potential stakeholders of the adapted solution for solving the Air Force and/or Space Force need(s).

2. Described the pathway to integrating with DAF operations, to include how the applicant plans to accomplish core technology development, navigate applicable regulatory processes, and integrate with other relevant systems and/or processes.

3. Describe if and how the solution can be used by other DoD or Governmental customers.

PHASE II: The proposed D2P2 solution strategically aligns with key focus areas aimed at advancing affordable, resilient, interoperable technologies inherent or required within the PWSA. This effort to enhance space capabilities comes in response to the nation's growing reliance on space infrastructure while advancing critical services provided to joint forces, enabling truly global joint warfighting operations and all domain command and control. The D2P2 initiative is designed to address these challenges by focusing on key strategic areas:

1. Advanced Space Connectivity and Integration: This encompasses the integration of commercially-sensed data into the transport layer for the benefit of the warfighter at the tactical edge while developing advanced Optical Inter-Satellite Link (OISL) components and technologies to enhance connectivity, time transfer and ranging between satellites and to reduce SWaP-C, mitigate atmospheric effects, and provide all optical routing to enhance connectivity between space vehicles and/or domain agnostic terrestrial users. This area also includes space-processing systems that use OISL and space-to-ground measurements that when fused form an onboard orbit and clock determination (OCDA) application for space-based autonomous navigation.

2. Enhanced Space Systems and Capabilities: This involves advancing the development and application of cyber solutions, networking technologies, in-space processing capabilities, power enhancement for commoditized space vehicle buses, and generic BMC3 hardware and middleware solutions to bolster the overall resilience and capabilities of space systems. Of particular interest are capabilities and technologies whose application would lower the overall data latency associated with moving time critical information from point of creation to point of employment on operationally relevant timelines.

3. Next-Generation Hardware and Security Measures: Implement space-hardened hardware with seamless multi-level security, small SWaP-C cryptography and CPU, affordable cross-domain solutions, and related data and compliant information protection measures that meet NSA certification standards that will safeguard space assets and operations from potential threats and/or compromise.

4. Precision Timing and Spaceborne Clock Technologies: Addressing the crucial need for high-performance, low SWaP-C clocks for space, ensuring precise timekeeping with design updates needed to support operations in the relevant space environment, including thermal, radiation, and vacuum in satellite operations and supporting PNT while avoiding the need for major user terminal recapitalization. This concerted effort aims to leverage previous feasibility demonstrations, driving innovative solutions that significantly augment existing PNT solutions and require minimal user resource application for success.

5. Radio Frequency Space Data Transport Solutions: Advanced hardware, software and/or firmware solutions for commoditized space vehicles across UHF, L, S, and Ka bands with multi-band transceivers for ground, sea, air, high altitude and sub-orbital platforms. Of particular interest are high duty cycle, low SWaP-C transceiver solutions enabling multi-user, multi-band operations from a single vehicle or set of cross-linked interoperable vehicles.

6. Automate on-orbit PNT situational awareness (SA) capability of L-band spectrum capture of GNSS interference or signal abnormalities and create associated ground-based information products to aid in locating these source emitters.

7. Multi-Mission Processing Module: Develop advanced processing hardware, that leverages commercial, or government developed capability, to allow SDA to fly modular in-space processing to meet varying mission capabilities. These modules will be compliant with a defined spacecraft interface.

Research and Development (R&D) efforts selected under this topic shall demonstrate and involve a degree of risk where the technical feasibility of the proposed work has not been fully established.

Further, proposed efforts must be judged to be at a Technology Readiness Level (TRL) 6 or less, but greater than TRL 3 to receive funding consideration. Proposers are asked to estimate the current TRL for their technology at the time of submission as well as the TRL at the conclusion of the D2P2 project. If the TRL is less than 6 at the conclusion of the D2P2 project, proposers are asked to explain in the Commercialization Strategy what further development is required to achieve TRL 6.

TRL 3. (Analytical and Experimental Critical Function and/or Characteristic Proof of Concept)

TRL 6. (System/Subsystem Model or Prototype Demonstration in a Relevant Environment)

Successful Phase-II proposals within these strategic areas will culminate in comprehensive end-to-end capability demonstrations in relevant operational laboratory environments. Such demonstrations should substantially improve the Technical Readiness Level(s) of any developing technologies. Subsequently, initial field testing may be conducted to confirm the readiness of proposed capabilities for limited

production and operational deployment, aligning with the imperative to enhance the warfighting capability of the joint force.

PHASE III DUAL USE APPLICATIONS: The Phase III transition plan for this initiative involves advancing the technology developed in Phase II towards operational integration, emphasizing its dual-use potential for both military and commercial applications. Building on the proven capabilities and advancements achieved in Phase II, Phase III focuses on refining the technology for seamless integration into operational environments within the Space Force while exploring its applications in commercial sectors. Rigorous testing, validation, and evaluations are conducted to ensure the technology's readiness for integration into established Space Force systems while simultaneously identifying commercial use cases and potential markets. Engagement with government transition programs and commercial stakeholders is pivotal to facilitate the technology's seamless integration across both defense and civilian domains. The overarching objective of Phase III is to transition the technology into operational use within the Space Force, ensuring enhanced security, resilience, and operational efficiency for space-based architectures while exploring its potential for broader commercial utilization.

REFERENCES:

1. https://www.sda.mil/home/work-with-us/small-business/

KEYWORDS: Joint Warfighting Operations, PWSA, Space Capabilities Enhancement, In-Space Processing, Radio Frequency Space Data Transport, Precision Timing and Spaceborne Clock Technologies, Optical Inter-Satellite Link, on-orbit PNT (Position Navigation and Timing)

Version 4

AF NUMBER: SF243-D016

TITLE: Tactical High Orbit Fast Transfer

TECHNOLOGY AREAS: Space Platforms

The technology within this topic is restricted under the International Traffic in Arms Regulation (ITAR), 22 CFR Parts 120-130, which controls the export and import of defense-related material and services, including export of sensitive technical data, or the Export Administration Regulation (EAR), 15 CFR Parts 730-774, which controls dual use items. Offerors must disclose any proposed use of foreign nationals (FNs), their country(ies) of origin, the type of visa or work permit possessed, and the statement of work (SOW) tasks intended for accomplishment by the FN(s) in accordance with section 3.5 of the Announcement. Offerors are advised foreign nationals proposed to perform on this topic may be restricted due to the technical data under US Export Control Laws.

OBJECTIVE: This Direct to Phase II (D2P2) Topic, offered by SpaceWERX in partnership with SSC/AAA and USSPACECOM, seeks cutting-edge ideas and state-of-the-art capabilities to rapidly respond to urgent on orbit needs. The primary objective is to demonstrate revolutionary technologies for resilient and responsive dynamic space operations using space transport vehicles via the development, integration, testing, and demonstration of technology to attain responsive, rapid, high delta vee craft. Thus, this effort seeks to accelerate technology developments that lead to a new class of high delta V, responsive, rapid transfer Orbit Transfer Vehicles (OTVs) that will meet military needs.

DESCRIPTION: Tactical High Orbit Fast Transfer (THOFT) is the ability to rapidly respond to needs on High-Orbital Energy orbits on operationally relevant timelines. As evidenced by the investments and numerous deployments of capabilities placed on orbit by actors within the Global Power Competition, Space is a dynamic domain. Before, up to, and during a conflict, space capabilities rely heavily upon U.S. space assets.

The capability deficiency and current mission impact within the realm of space operations for the Department of Defense (DoD) stems from a lack of rapid response capability to respond to emerging threats. This is emphasized where response is needed to beyond LEO orbits where small launch vehicles cannot reach and rideshares often do not target. Current systems have extended response times, ranging from months to years, which renders them unable to effectively counter adversarial action or respond to threats. Inflexibility in current mission planning processes also hampers the DoD's ability to adapt to dynamic situation in space.

Our mission is to reduce United States Space Force (USSF) response times to events and situations in beyond LEO regions from months or years to hours or days. Thus, having a significant impact on U.S. and ally resilience. To meet the Target Performance Goals, a new class of Orbit Transfer Vehicles (OTVs) will need to be developed to demonstrate the ability to reach all regions of the space domain, including high energy orbits (GEO, Cislunar, MEO, etc.) in effectual, operationally-relevant timelines. This involves emplacement of a small spacecraft into a beyond-LEO orbit within hours. Transported via advanced propulsion systems to get to the necessary orbits, and on-orbit operational procedures to include end- of-life disposal. This OTV will exploit proven spacecraft secondary systems that can be implemented with minimal non-recurring engineering, thus allowing greater focus on the technologies that enable the orbital transfer itself (e.g. lightweight structure, propulsion, etc.). The USSF encourages respondents to this topic to enhance future OTV capabilities to offer technological solutions for full prototype OTV development to meet this need, or demonstration of key enabling technology, as well as integration and full ground demonstration of developed technology solutions.

AREAS OF EMPHASIS

1) Space Vehicle propulsion:

- Propulsive systems to provide for High performance mission capability demands to attain a target Delta Vee above 3000 m/s (notional ESPA class vehicle). Similarly, retaining propulsive flexibility; i.e. the ability for orbital adjustment and mission flexibility will demand Multiple re-start capability
- Interest in propellants that are easier to handle/more efficient and quicker to fuel for reduced ground operations. In the case of bi-propellant systems a non-toxic configuration must suffice. All while retaining the ability for storage of short on-orbit mission lifetime (Hours & days with potential expansion to weeks or months with further technology development). This may incur on-orbit cryogenic propellant storage to a degree.
- Responsiveness and ground operations will further require non-toxic propellants for secondary propulsion or Attitude Control systems.

2) Platform enhancement (structure/subsystems):

- Structural, or secondary systems that will affect the dry mass of the system. These may include structure, propellant tanks, secondary components, power systems, etc. Overall impact must be demonstrated at an integrated or rolled up level to address secondary impacts on other subsystems.
- Architecture envisions an easily packaged and deployable solution that accommodate either a single stack (Fits within a small launch vehicle payload fairing with accommodation for an ESPA class spacecraft) or integration into a multi-manifested ride- share mission. Hence compact packaging technologies will further.
- Rapid transition to an operational system, with viable production rate and surge capability. This infers the leverage/use of active commercial space bus, Orbital Transfer Vehicle or other spacecraft production lines now in development but may need to be modified or enhanced to reduce structural mass, etc.

3) Subsystems: Subsystems may need to be addressed, since they do play a role in determining viability of an overall system, but are deemed to be secondary in nature to the focus of this topic. Items such as thermal controls to meet variety of orbital inclinations, internal navigation, on-orbit data processing, avionics and GN&C for complex orbital and suborbital autonomous trajectories and tools and training to quickly conduct optimal transfer trajectory, intercept, orbital alignment, and minimize reliance on ground network.

PHASE I: This topic is intended for technology proven ready to move directly into Phase II. Therefore, Phase I awards will not be made for this topic. The applicant is required to provide detail and documentation in the D2P2 proposal which demonstrates accomplishment of a “Phase I-type” elements, including a feasibility study. This includes determining the scientific and technical merit, as well as potential risk mitigation activities, or initial proof of concept type activities.

PHASE II: Proposals should include prototype development for the key enabling technologies, or an integrated component proof of concept, or ground unit propulsion-bus integration, with full component demonstration and/or test and evaluation of the proposed solution prototype system. Whatever aspect, technology or focus of a phase 2 effort should affect the attainable delta Vee to meet the mission capability, thus the activities should address the challenging propulsion aspects or the secondary components and structure to reduce the mass fraction. These activities should focus specifically on:

1. Evaluating the adapted solution against the proposed objectives and measurable key results.
2. Describing in detail how the installed solution differs from or enhances the non-defense commercial offering to solve the Air Force and/or Space Force need(s), as well as how it can be scaled for wide adoption, i.e., modified for scale, production rate, timeframe for Initial Operational Capability, etc..
3. Identifying the proposed solution's clear transition path, taking into account input from affected stakeholders, including but not limited to, end users, operators, Launch vehicle providers, integrators, etc.
4. Specifying the solution's integration with other current and potential solutions currently in development.

PHASE III DUAL USE APPLICATIONS: Some solutions may go from Phase II to Phase III as soon as the product-market fit is verified. Potential Phase III awardees will transition to the adapted non-Defense commercial solution to provide expanded mission capability for a broad range of potential Governmental and civilian users and alternate mission applications.

REFERENCES:

1. *FitzGerald, B., Sander, A., Parziale, J. (2016). Future Foundry: A New Strategic Approach to Military- Technical Advantage. https://www.cnas.org/publications/reports/future-foundry.

2. *Blank, S. (2016). The Mission Model Canvas - An Adapted Business Model Canvas for Mission-Driven Organizations. https://steveblank.com/2016/02/23/the-mission-model-canvas-an-adapted-business-model-canvas-for-mission-driven-organizations/.

3. *US Department of Defense. (2018). 2018 National Defense Strategy of the United States Summary. https://dod.defense.gov/Portals/1/Documents/pubs/2018-National-Defense-Strategy-Summary.pdf.

4. *Chaplain, C. T. (2016). Space Acquisitions: Challenges Facing DOD as it Changes Approaches to Space Acquisitions. US Government Accountability Office Washington United States. https://www.gao.gov/assets/680/675978.pdf.

5. *Space Capstone Publication, Spacepower (SCP). (2020). https://www.spaceforce.mil/Portals/1/Space%20Capstone%20Publication_10%20Aug%202020.pdf.

KEYWORDS: OTV, fast transfer, Dynamic Space Operations

Version 4

AF NUMBER: SF243-D017

TITLE: Advancing Expeditionary Space Domain Awareness

TECHNOLOGY AREAS: Space Platforms

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OBJECTIVE: The end goal of the Expeditionary Space Domain Awareness (ExSDA) project is to establish a comprehensive system for monitoring and safeguarding activities in space. This system will continuously monitor Low Earth Orbit (LEO) and beyond, detecting potential threats and analyzing patterns of activity. It will enable rapid response to emerging threats, integrating seamlessly with existing assets and international partners. The system will prioritize resilience and sustainability, aiming for cost-effectiveness while adhering to international norms for responsible behavior in space. Ultimately, the ExSDA project aims to enhance space security and stability, supporting continued exploration and utilization of space for future generations.

DESCRIPTION: To achieve the objective of establishing a comprehensive system for monitoring and safeguarding activities in space, several key tasks need to be accomplished. These tasks encompass platform development, sensor integration, AI-enabled command and control, data processing and analytics, interoperability, resilience, cost-effectiveness, international collaboration, testing, and training. By addressing these components, we can create a robust space domain awareness system that enhances security, stability, and sustainability in the space domain.

· Platform Development: Develop ground-based, ocean-based, and high-altitude platforms equipped with advanced sensor technologies for continuous monitoring of the space domain.

· Sensor Integration: Integrate a variety of sensors, including optical, RF, infrared, and other relevant technologies, to provide comprehensive coverage and multi-domain awareness.

· AI-Enabled Command and Control: Implement an AI-enabled command and control system to automate sensor deployment, data collection, and analysis, optimizing resource allocation and response times.

· Data Processing and Analytics: Develop sophisticated algorithms and analytics tools for real-time data processing, change detection, pattern analysis, and anomaly detection, enhancing situational awareness and decision-making capabilities.

· Interoperability and Integration: Ensure interoperability and seamless integration with existing terrestrial and space-based assets, as well as international partners, to facilitate information sharing and collaborative response efforts.

· Resilience and Sustainability: Design the system with built-in redundancy, fail-safe mechanisms, and sustainable practices to ensure continuous operation and minimize disruptions, while also addressing environmental concerns such as space debris.

· Cost-Effectiveness and Scalability: Optimize the system for cost-effectiveness and scalability, leveraging commercial off-the-shelf technologies, maximizing operational efficiency, and accommodating future growth and expansion.

· International Collaboration and Norms: Foster international collaboration and adherence to established norms and guidelines for responsible behavior in space, promoting transparency, cooperation, and mutual trust among space-faring nations.

· Testing and Validation: Conduct rigorous testing and validation exercises to ensure the reliability, effectiveness, and safety of the system under various operational scenarios and conditions.

· Training and Capacity Building: Provide training and capacity-building programs for personnel involved in operating, maintaining, and utilizing the SDA system, empowering them with the necessary skills and knowledge for effective performance.

PHASE I: This topic is intended for technology proven ready to move directly into Phase II. Therefore, Phase I awards will not be made for this topic. The applicant is required to provide detail and documentation in the D2P2 proposal which demonstrates accomplishment of a "Phase I-type" effort, including a feasibility study. This includes determining, insofar as possible, the scientific and technical merit and feasibility of ideas appearing to have commercial potential. It must have validated the product-mission fit between the proposed solution and a potential Air Force and/or Space Force stakeholder. The applicant should have defined a clear, immediately actionable plan with the proposed solution and the DAF customer and end-user.

The feasibility study should have:

1. Clearly identified the potential stakeholders of the adapted solution for solving the Air Force and/or Space Force need(s).

2. Described the pathway to integrating with DAF operations, to include how the applicant plans to accomplish core technology development, navigate applicable regulatory processes, and integrate with other relevant systems and/or processes.

3. Describe if and how the solution can be used by other DoD or Governmental customers.

PHASE II: During the Phase II period of performance, the primary objective is to further develop the concepts and prototypes established in Phase I into a well-defined deliverable prototype. The following outlines the Phase II objectives, expectations, and prototyping requirements:

1. Platform Development: Refine and optimize the design of ground-based, ocean-based, and high-altitude platforms to ensure robustness, reliability, and scalability. Develop detailed specifications for each platform, including operating parameters such as altitude, endurance, and sensor capabilities.

2. Sensor Integration: Finalize the integration of various sensors, including optical, RF, infrared, and other relevant technologies, ensuring seamless interoperability and compatibility. Conduct thorough testing to validate sensor performance and accuracy under different environmental conditions.

3. Command and Control Enhancement: Enhance the AI-enabled command and control system to improve automation, decision-making, and response capabilities. Implement advanced algorithms for data processing, anomaly detection, and pattern analysis to enhance situational awareness and reduce response times.

4. Data Processing and Analytics: Further develop analytics tools and algorithms for real-time data processing, change detection, and pattern recognition. Conduct extensive testing to validate the effectiveness and accuracy of the analytics tools in detecting and analyzing space domain activities.

5. Interoperability and Integration: Continue efforts to ensure seamless integration with existing terrestrial and space-based assets, as well as international partners. Conduct interoperability testing to verify compatibility and information sharing capabilities.

6. Resilience and Sustainability Optimization: Refine resilience and sustainability features, including redundancy, fail-safe mechanisms, and environmental considerations such as space debris mitigation. Conduct thorough testing to validate the system's resilience and sustainability under various scenarios.

7. Cost-Effectiveness and Scalability: Optimize the system for cost-effectiveness and scalability, leveraging commercial off-the-shelf technologies and maximizing operational efficiency. Develop a scalable architecture capable of accommodating future growth and expansion.

8. International Collaboration and Norms Adherence: Strengthen efforts to foster international collaboration and adherence to established norms and guidelines for responsible behavior in space. Expand partnerships and information-sharing mechanisms with allied and partner nations.

9. Testing and Validation: Conduct comprehensive testing and validation exercises to verify the reliability, effectiveness, and safety of the prototype under realistic operational conditions. Include performance testing, stress testing, and scenario-based simulations to assess system performance and resilience.

10. Training and Documentation: Develop training programs and documentation for personnel involved in operating, maintaining, and utilizing the SDA system. Ensure that users are proficient in system operation, troubleshooting, and response procedures.

Success criteria for Phase II will include the delivery of a well-defined, fully functional prototype that meets the specified operational parameters and performance requirements. Additionally, success will be measured by the system's ability to enhance space domain awareness, improve decision-making capabilities, and contribute to space security, stability, and sustainability.

PHASE III DUAL USE APPLICATIONS: Phase III represents the transition of SBIR/STTR-funded research and development efforts into Department of Defense (DoD) and/or commercial applications using non-SBIR/STTR funds. The expected Phase III effort, TRL at Phase III entry, and transition planning considerations are outlined below:

1. Expected Phase III Effort:

· Phase III will focus on further maturing the technology developed during Phases I and II into deployable solutions for DoD and/or commercial applications.

· Efforts will include refining the prototype into a production-ready system, conducting additional testing and validation, and addressing any remaining technical challenges or performance improvements.

· Emphasis will be placed on scaling production, enhancing reliability, and meeting specific operational requirements for end-users.

2. Expected TRL at Phase III Entry:

· The expected Technology Readiness Level (TRL) at Phase III entry will vary depending on the specific technology and its intended applications.

· Ideally, the technology will enter Phase III at TRL 8 or higher, indicating that it has been demonstrated in an operational environment and is ready for transition to end-users.

3. Transition Planning:

· Transition planning will involve identifying potential government and commercial partners, customers, and stakeholders interested in adopting the technology.

· Efforts will include engaging with acquisition programs, military units, agencies, and industry partners to facilitate technology transition and adoption.

· Plans will be developed to navigate any necessary government approvals, certifications, or regulatory requirements to enable the deployment and use of the technology.

· Additional funding sources and investment opportunities will be explored to support the commercialization and widespread adoption of the technology beyond SBIR/STTR funding.

· Collaboration with Defense Acquisition Framework (DAF) customers and other DoD entities will be pursued to identify additional transition opportunities and potential funding mechanisms for continued development and sustainment.

REFERENCES:

1. *https://www.ssc.spaceforce.mil/Program-Offices/Space-Domain-Awareness-Combat-Power.

KEYWORDS: Space domain awareness; Continuous monitoring; Sensor integration; Command and control; Data processing; Interoperability; Resilience; Cost-effectiveness; International collaboration; Training; Sustainability; Anomaly detection; Pattern analysis; Decision support; Space security

Version 4

AF NUMBER: SF243-D018

TITLE: Space Sustainment & Maneuver: Advancing Strategic Superiority in Orbital Operations

TECHNOLOGY AREAS: Space Platforms

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OBJECTIVE: The end state of this project is to establish a robust and sustainable framework for Space Sustainment and Maneuver, enabling companies to facilitate movement within the space domain across all orbital regimes, including travel to and from the moon. This initiative aims to overcome current limitations in maneuverability, thereby providing strategic advantages in space operations, such as maintaining initiative, achieving surprise, and outmaneuvering adversaries. By fostering innovation in areas such as on-orbit servicing, refueling, orbital transfer/maneuvers , and payload capabilities, the project seeks to ensure the survivability and effectiveness of space assets in NextGen Warfare scenarios.

DESCRIPTION: While we do not seek conflict in space, we must be prepared for one. There is an evolving threat landscape, and our current assets were designed for a past era of competition. The United States Space Force (USSF) requires the ability to relocate our assets from contested areas to positions where they can be part of the solution, as our conflicts will be dynamic, and our adversaries will also adapt. These abilities to maneuver assets are strategic and focused on deterrence. By maximizing our current capabilities and reconstituting them elsewhere, we enhance our sustained space maneuverability, which allows us to position our forces optimally to achieve mission objectives, deter adversaries by gaining a first-mover advantage, negotiate from a position of strength, and generate flexible combat power across all domains. This approach also reduces the burden of reconstituting our orbital capabilities. Enabling this strategy requires augmented training to reflect combat conditions, policies to provide greater freedom of maneuverability, space domain awareness, modernized communication infrastructure, optimized space operator performance, and commercial support for on-orbit servicing.

OBJECTIVES

1) Develop a broad range of capabilities and core competencies, to include responsive mobility, refueling, modularity, and autonomous technologies that help provide an asymmetric advantage in our ability to protect, defend and sustain space assets.
2) Capitalize and develop both the “Movement” part of this equation and the “effects” that can be delivered (and negated/warded against).

Based on internal knowledge and market research conducted with industry and academia, USSPACECOM has identified an initial set of focus areas to bring structure to the crowdsourcing process for this Challenge. Please see below for details, including desired capabilities and relevant technologies for each focus area.

Version 4

CONTEXT

The Sustained Space Maneuver Challenge is essential because while we hope to avoid conflict in space, we must be prepared for the possibility. Current space assets were not designed nor are they flexible enough to address today's threats effectively, as USSPACECOM indicated. To counteract these challenges, it is vital to strategically relocate and sustain our assets to deter our adversaries. This strategy enhances our ability to position forces flexibly and deny adversaries first-mover advantages. It also reduces the burden of reconstituting our orbital capabilities and maximizes our combat power across multiple domains. However, achieving these goals involves overcoming significant hurdles, such as inadequate training practices, competing priorities, and outdated communication infrastructures. Moreover, operators have insufficient space domain awareness and high cognitive demands. Additionally, reliance on commercial support for on-orbit servicing remains uncertain, further complicating our ability to maneuver freely in space.

FOCUS AREAS:

1) Maneuver: Support sustained maneuver by optimizing spacecraft mobility and autonomous/semi-autonomous decision making for survivability and maneuver without regret.
    - Key Capabilities
        - Software architecture: parameter procurement/reactive maneuver
        - Novel and versatile propulsion systems for enhanced mobility
        - Autonomy of on-orbit decision-making
        - Modularity via split payload and propulsion
        - Moving large high-value assets
    - Enabling Technologies of Interest:
        - Methods for validation and verification of autonomous decision-making such as training datasets and data fusion
        - Suite of space situational awareness integrated sensors and associated algorithms for collision avoidance maneuvers for objects in close proximity
        - Autonomous guidance, navigation, and control algorithms for in-space navigation
        - Multi-mode propulsion system consisting of classical mono-prop or bi-prop systems in combination with electric propulsion systems
        - Novel designs for integrated power processing unit (PPU) for multi-mode propulsion system
        - Novel technology advancements allowing for propulsion subsystem reconfigurable modular design including fuel pumps, tanks, connectors, thrusters, and valves
        - Design and manufacture standardized, adaptable connectors capable of concurrently transmitting fluids, gases, power and data between modules assembled in space
        - P/L to Bus interface must be operable by low cost, simple robotic arms, and end effectors

2) Space Domain Awareness (SDA): SDA data needs to be accomplished when we need and where we need it - timely, relevant, accurate, and actionable. SDA provides requisite foundational, current, and predictive knowledge, and characterization of space objects within the space domain. SDA data needs to be optimized to enable safety of maneuver.
    - Key Capabilities
        - High fidelity and frequency Resident Space Object (RSO) information
        - Enablement of Rendezvous and Proximity Operations (RPO)/Zero Proximity Operation (ZPO)
        - Improved data processing, infusion, collation, and integration
        - Improved characterization, identification, and cyber validation of spacecraft
        - A low-latency, resilient, and scalable pipeline that provides integrated sensing
    - Enabling Technologies of Interest:
        - High throughput processors capable of operating with parallel processing for trusted onboard processing for missions and functions with high processing, programming, and data needs such as SDA Identification
        - Space-rated (rad hardened or tolerant) GPUs, FPGAs, DSP, and microprocessors (comparable to SOTA for AI/ML image processing techniques) for improved on-board processing and real-time image processing for RPO/ZPO
        - High fidelity and frequency RSO info: Pervasive and novel methods and visualization tools focused on interaction between autonomous systems and human users

3) RPO & ZPO: Autonomous and/or semi-autonomous RPO and ZPO utilizing advanced sensors for effective tracking, enhanced mission planning, and a robust modeling and simulation capability that ensures “Do No Harm” to high value on-orbit assets.
    - Key Capabilities
        - Precise navigation and control through autonomous and semi-autonomous operations
        - Enhanced SDA through high-resolution imaging and proximity sensing
        - Real-time monitoring and automated maneuvering for collision avoidance
        - Improved spacecraft self-awareness via SW/HW data collection and fusion
        - Precision propulsive control systems for RPO and ZPO
    - Enabling Technologies of Interest:
        - Advanced optical, radar/lidar, and infrared sensors and imaging systems
        - High-performance edge computing and onboard processing
        - Navigation and control systems
        - Laser and radio frequency inter-satellite communication links
        - Advanced propulsion systems
        - High-fidelity simulations and digital twins
        - Data encryption protection and security

4) On-Orbit Servicing: Servicing framework to support a resilient orbital economy utilizing contract vehicles to reduce risk and increase effectiveness.
    - Key capabilities
        - Rapid removal/replacement structural interface
        - In-space Assembly and Manufacturing (ISAM)
        - Modular subsystem design (primarily propulsion) to enable ease of repair and assembly, scalable from 6U sized satellites and upwards
        - Low cost robotic and dexterous manipulators
        - Transportation and storage of service material or modular systems either from earth-to-space or space (depot)-to-serviced satellite RPO services for inspection
        - In-space sustainment enterprise
    - Enabling Technologies of Interest:
        - Autonomous and semi-autonomous operations
        - Grappling and docking
        - Low-cost in-space robotics, including dexterous repair manipulators
        - Technology integration discussed in the other focus areas for a system or mission solution
        - Novel approaches for resource allocation, distribution, and scheduling to enable a servicing mission to be planned and executed within 72 hours of authorization

5) Payloads: Common modular interfaces and standards.
    - Key Capabilities:
        - Advanced power systems
        - Rad hardening and redundancy on key components
        - Advanced health monitoring and telemetry
        - Mission configurable payloads
        - Modularity via split payload and propulsion or ISAM
    - Enabling Technologies of Interest:
        - Novel technologies enabling continuous sensor utilization and long life
        - Low thermal footprint devices
        - Multi-use components with primary and secondary functions
        - Universal BUS interfaces with established standards
        - Modular plug-and-play interfacing with industry/government standard products
        - Open-source interfaces for future adaptability and reuse
        - Design and manufacture standardized, adaptable connectors capable of concurrently transmitting power and data between modules assembled in space
        - Payload to bus interface operable by low cost, simple robotic arms, and end effectors

6) Refueling: Means of storing and moving fuel; systems to either re-purpose existing fuel, refueling capability, or offer alternative propulsion.
    - Key Capabilities
        - Servicing, including autonomous servicing
        - Fuel transfer operations with fuel metering
    - Enabling Technologies of Interest:
        - In-space refueling enterprise architecture
        - Adaptor refueling interface
        - Novel/common fluid transfer mechanism for all types of propellants and a majority of cap and valves used in US systems (hydrazine, electric-prop propellants, xenon, cryogenics, etc.)
        - Propellant distribution architecture design
        - Propellant depots and servicing vehicles

PHASE I: This topic is intended for technology proven ready to move directly into Phase II. Therefore, Phase I awards will not be made for this topic. The applicant is required to provide detail and documentation in the D2P2 proposal which demonstrates accomplishment of a "Phase I-type" effort, including a feasibility study. This includes determining, insofar as possible, the scientific and technical merit and feasibility of ideas appearing to have commercial potential. It must have validated the product-mission fit between the proposed solution and a potential Air Force and/or Space Force stakeholder. The applicant should have defined a clear, immediately actionable plan with the proposed solution and the DAF customer and end-user.

The feasibility study should have:

1. Clearly identified the potential stakeholders of the adapted solution for solving the Air Force and/or Space Force need(s).

2. Described the pathway to integrating with DAF operations, to include how the applicant plans to accomplish core technology development, navigate applicable regulatory processes, and integrate with other relevant systems and/or processes.

3. Describe if and how the solution can be used by other DoD or Governmental customers.

PHASE II: Phase II will focus on further developing the Space Sustainment and Maneuver project to produce a well-defined deliverable prototype. The objectives and expectations for Phase II include:

1. Core Technology Development: Refining and optimizing the proposed solutions identified in Phase I, with a focus on enhancing maneuverability, sustainment, operational efficiency, survivability, and strategic advantage in space operations.

2. Prototyping Expectations: Developing and testing prototypes of key components and systems related to payloads, refueling capabilities, orbital transfer/maneuvers strategies, logistics architecture, autonomous maneuver and RPO, and security measures. Prototyping will involve rigorous testing in simulated and real-world space environments to validate performance and reliability.

3. Advanced Payload Systems: Developing and integrating advanced payload systems that may include but not be limited to cognitive radios, SDA, EMS and servicing capabilities.

4. Innovative Refueling Technologies: Exploring and implementing innovative refueling technologies, such as optimized propellant selection, architecture that enables on-orbit refueling capabilities. These technologies will extend the operational lifespan of space assets and enhance their maneuverability by providing a sustainable source of propulsion.

5. Next-Generation Orbital transfer and Maneuver Strategies: Developing next-generation orbital transfer and maneuver strategies to prolong the operational lifespan of space assets and optimize their positioning for strategic advantage. This will involve the utilization of advanced propulsion systems and autonomous navigation algorithms to efficiently maneuver space assets within orbital regimes.

6. Logistics Architecture for Extended Lifespan Support: Designing and implementing robust logistics architecture to support extended lifespan operations in space. This includes developing systems for resource management, maintenance, and repair to ensure the continued functionality of space assets over extended durations.

7. Enhanced Security Measures: Implementing advanced security measures, including data protection protocols, cybersecurity mechanisms, and edge computing solutions, to safeguard space assets against emerging threats and vulnerabilities. This will involve leveraging state-of-the-art encryption techniques, anomaly detection algorithms, and secure communication protocols to mitigate cybersecurity risks.

8. Integration with Existing Systems: Ensuring seamless integration of developed technologies with existing space infrastructure and systems. This will involve compatibility testing, interoperability assessments, and integration with relevant operational processes to facilitate smooth deployment and operation within the Air Force and/or Space Force ecosystem.

9. Performance Evaluation and Optimization: Establishing rigorous testing requirements and success criteria for the developed prototypes. Conducting comprehensive performance evaluations in simulated and real-world space environments to validate interoperability, functionality, reliability, and performance. Continuously optimizing and refining the prototypes based on feedback and evaluation results to ensure alignment with operational objectives and requirements.

Through a collaborative approach involving industry, military, and academia partners, Phase II will drive innovation and technological advancement to achieve strategic superiority in space operations

PHASE III DUAL USE APPLICATIONS: Phase III represents the culmination of the Sustained Space Maneuver (SSM) project, where the Department of Defense (DoD) and/or commercial applications of the SBIR/STTR-funded R&D are developed using non-SBIR/STTR funds. The transition from Phase II to Phase III involves transitioning the developed technologies and capabilities into operational use within the DoD and commercial sectors.

Expected Phase III Effort:

During Phase III, the focus will be on further maturing and transitioning the SSM technologies and capabilities to achieve operational readiness. The expected efforts include:

1. Technology Maturation: Continuing the refinement and maturation of the developed prototypes to achieve Technology Readiness Level (TRL) 9, indicating full-scale implementation and operational deployment.

2. Commercialization and Integration: Exploring opportunities for commercialization and integration of the space sustainment and maneuver technologies into commercial space operations, leveraging

partnerships with industry stakeholders to broaden the applicability and adoption of the developed solutions.

3. Government Approvals: Obtaining necessary government approvals, certifications, and clearances for the deployment and integration of the space sustainment and maneuver technologies within the DoD's space infrastructure. This may include compliance with regulatory frameworks such as ITAR (International Traffic in Arms Regulations) and EAR (Export Administration Regulations).

4. Transition Planning: Developing a comprehensive transition plan outlining the steps and milestones for transitioning the space sustainment and maneuver technologies from the research and development phase to operational deployment. This plan will include timelines, resource allocations, risk mitigation strategies, and stakeholder engagement strategies to ensure successful transition and adoption.

5. Additional DAF Customer Opportunities: Identifying additional Department of the Air Force (DAF) customer opportunities for the deployment and utilization of the space sustainment and maneuver technologies. This may involve collaborating with various Air Force units, commands, and agencies to identify specific mission requirements and operational needs that can be addressed by the sustainment and maneuver capabilities.

Expected TRL at Phase III Entry:

At the entry into Phase III, the expected TRL of the sustainment and maneuver technologies will be at TRL 7 or higher. This indicates that the technologies have been demonstrated in a relevant space environment and are ready for further development and integration into operational systems.

Transition Planning:

Transition planning will involve close collaboration between the project team, government stakeholders, industry partners, and potential end-users to ensure a seamless transition of the sustainment and maneuver technologies from the research and development phase to operational deployment. Key elements of transition planning will include:

1. Stakeholder Engagement: Engaging with relevant stakeholders, including DoD agencies, commercial partners, and end-users, to gather feedback, assess requirements, and align objectives for successful technology transition and adoption.

2. Risk Management: Identifying and mitigating risks associated with technology transition, including technical, operational, regulatory, and financial risks. Developing contingency plans and risk mitigation strategies to address potential obstacles and ensure project success.

3. Resource Allocation: Allocating resources, including funding, personnel, and infrastructure, to support the transition effort. Securing necessary resources and support from both government and industry partners to facilitate technology transition and deployment.

4. Technology Transfer: Implementing processes and mechanisms for technology transfer from the research and development environment to operational users. This may include licensing agreements, technology transfer agreements, and knowledge transfer activities to facilitate the adoption and utilization of the sustainment and maneuver technologies.

5. Monitoring and Evaluation: Establishing mechanisms for monitoring and evaluating the progress of technology transition efforts. Tracking key performance indicators, milestones, and outcomes to ensure

alignment with project objectives and facilitate continuous improvement throughout the transition process.

REFERENCES:

1. *https://www.spacecom.mil/Newsroom/News/Article-Display/Article/3370546/usspacecom-outlines-requirements-for-sustained-maneuver-dynamic-space-operations/.

KEYWORDS: Sustained Space Maneuver (SSM); Orbital Operations; NextGen Warfare; Maneuverability; Strategic Superiority

Cleared for Public Release
VERSION 2

CHEMICAL AND BIOLOGICAL DEFENSE PROGRAM
FY24.3 Small Business Innovation Research (SBIR)
Proposal Submission Instructions

The approved FY24.3 topics included in the Chemical and Biological Defense (CBD) Small Business Innovation Research (SBIR) Program is provided in this document. Offerors responding to this Announcement must follow all general instructions provided in the Department of Defense (DoD) Program Announcement, as well as the CBD SBIR Instructions provided below, detailing specific CBD SBIR program requirements.

Proposers are encouraged to thoroughly review the DoD Program Broad Agency Announcement (BAA), as well as register for the DoD SBIR/STTR Innovation Portal (DSIP) Listserv to remain apprised of important programmatic and contractual changes.

- The DoD Program BAA: https://www.dodsbirsttr.mil/submissions/solicitation-documents/active-solicitations. Be sure to select the tab for the appropriate BAA cycle.
- Register for the DSIP Listserv at: https://www.dodsbirsttr.mil/

Please read the entire DoD Announcement and these CBD SBIR instructions carefully prior to submitting your proposal. Important programmatic changes have been incorporated as required by the SBIR and STTR Extension Act of 2022 (Pub. L. 117-183). Also, go to https://www.sbir.gov/about/about-sbir#sbir-policy-directive to read the SBIR/STTR Policy Directive issued by the U. S. Small Business Administration (SBA).

INTRODUCTION

In response to Congressional interest in the readiness and effectiveness of U.S. Nuclear, Biological and Chemical (NBC) warfare defenses, Title XVII of the National Defense Authorization Act for Fiscal Year 1994 (Public Law 103-160) requires the Department of Defense (DoD) to consolidate management and oversight of the Chemical and Biological Defense Program (CBDP) into a single office – Office of the Assistant Secretary of Defense for Nuclear, Chemical and Biological Defense Programs. The Joint Science and Technology Office for Chemical and Biological Defense (JSTO CBD), located at the Defense Threat Reduction Agency (DTRA), provides the management for the Science and Technology component of the Chemical and Biological Defense Program. Technologies developed under the Small Business Innovation Research (SBIR) Program have the potential to transition to the Joint Program Executive Office for Chemical Biological Radiological and Nuclear Defense (JPEO CBRND) if the appropriate level of technology maturity is demonstrated. The JSTO CBD Science & Technology programs and initiatives improve defensive capabilities against Chemical and Biological Weapons of Mass Destruction. The SBIR portion of the CBD Program is managed by JSTO CBD.

The mission of the Chemical and Biological Defense Program is to ensure that the U.S. Military has the capability to operate effectively and decisively in the face of chemical or biological warfare threats at home or abroad. Numerous factors continually influence the program and its technology development priorities. Improved defensive capabilities are essential in order to mitigate the overall impact of chemical and biological threats. The U.S. military requires the finest state-of-the-art equipment and instrumentation available to permit our Joint Force to 'detect to warn' and avoid contamination, if possible – and to be able to sustain operations in a potentially contaminated environment. Further information is available at the Office of the Assistant Secretary of Defense for Nuclear, Chemical, and Biological Defense Programs homepage at https://www.acq.osd.mil/ncbdp/cbd/.

The overall objective of the CBD SBIR Program is to improve the transition or transfer of innovative Chem-Bio technologies to the end user – the Joint Force – in addition to commercializing technologies

within the private sector for mutual benefit. The CBD SBIR Program targets those technology efforts that maximize a strong defensive posture in a biological or chemical environment using passive and active means as deterrents. These technologies include chemical and biological detection for both point and stand-off capabilities; individual and collective protection; hazard mitigation (decontamination); medical pre-treatments (e.g., vaccine development and delivery); medical therapeutics (chemical and biological countermeasures); medical diagnostics; Digital Battlespace Management (a.k.a., information systems technology) to include but not limited to modeling and simulation (e.g., meteorological dispersion), disease surveillance, data fusion, and health & human effects to include wearable technologies.

All proposals submitted to the CBD SBIR program must comply to the terms of this Announcement. CBD SBIR reserves the right to limit awards under any topic, and only those proposals of superior scientific and technical quality, as determined by Technical Evaluation Team and the CBD SBIR program office will be funded. CBD SBIR reserves the right to withdraw from negotiations at any time prior to contract award. The Government may withdraw from negotiations at any time for any reason to include matters of national security (foreign persons, foreign influence or ownership, or other related issues).

Use of Foreign Nationals (also known as Foreign Persons), Green Card Holders, and Dual Citizens

See the "Foreign Nationals" section of the DoD SBIR Program Announcement for the definition of a Foreign National (also known as Foreign Persons).

It is the responsibility of ALL offerors proposing who use foreign nationals, green-card holders, or dual citizens, to disclose this information regardless of whether the topic is subject to export control restrictions. Offerors MUST identify any foreign nationals or individuals holding dual citizenship expected to be involved on this project as a direct employee, subcontractor, or consultant. For these individuals, specify their country of origin, the type of visa or work permit under which they are performing and an explanation of their anticipated level of involvement on the project. You may be asked to provide additional information during contract negotiations in order to verify the foreign citizen's eligibility to participate on a SBIR contract. Supplemental information provided in response to this paragraph will be protected in accordance with the Privacy Act (5 U.S.C. 552a), if applicable, and the Freedom of Information Act (5 U.S.C. 552(b)(6)).

Proposers responding to a topic in this BAA must follow all general instructions provided in the Department of Defense (DoD) SBIR Program BAA, paying special attention to the new requirements under the SBIR and STTR Extension Act of 2022 (Pub. L. 117-183). The Chemical and Biological Defense SBIR Program requirements are provided in the instructions below.

Specific questions pertaining to the administration of the Chemical and Biological Defense SBIR Program and these proposal preparation instructions should be directed to: Ms. Abigail L. Roots, Chemical and Biological Defense SBIR/STTR Program Manager, JSTO CBD, at dtra.belvoir.rd.mbx.jsto-cbd-chem-bio-defense-sbir@mail.mil.

PHASE I PROPOSAL GUIDELINES

The Defense SBIR/STTR Innovation Portal (DSIP) is the official portal for DoD SBIR/STTR proposal submission. Firms are required to submit proposals via DSIP; proposals submitted by any other means will be disregarded. Detailed instructions regarding registration and proposal submission are provided in the DoD SBIR Program BAA.

Proposal Coversheet (Volume 1)

The proposal coversheet must follow the instructions and requirements provided in the DoD SBIR Program BAA.

The offeror shall certify that to the best of its knowledge and belief, its eligibility information under the SBIR Program is accurate, complete, and current as of the date of the offer.

Technical Volume (Volume 2)

The technical volume is not to exceed 20-pages and must follow the formatting requirements provided in the DoD SBIR Program BAA. No other information included in the other proposal volumes will count against the 20-page Proposal Technical Volume page limit. Pages provided exceeding this length will not be considered for review. The proposal must not contain any font type smaller than 10-point font size (except as a legend on reduced drawings, but not in the tables).

The maximum dollar amount for a Phase I proof-of-concept/feasibility study is $204,582.00 for a period of performance (PoP) of up to six (6) months. The CBD SBIR Program will not accept proposals exceeding $204,582.00 for the Phase I effort.

The entire proposal submission must be through the Defense SBIR/STTR Innovation Portal (DSIP) located at: https://www.dodsbirsttr.mil. Any questions pertaining to the DoD SBIR/STTR submission process and system should be directed to DSIP Support: DoDSBIRSupport@reisystems.com.

Selection of Phase I proposals will be based upon the three (3) evaluation criteria as mentioned in the DoD BAA. The CBD SBIR Program reserves the right to limit awards under any topic, and only those proposals of superior scientific and technical quality deemed by the Technical Evaluation Team will be funded. All SBIR contract awards, both Phase I and Phase II, are subject to availability of funding.

The brief Period of Performance available for a Phase I project precludes plans that include research involving human or animal subjects as all associated DoD requirements and the necessary approvals must be strictly adhered to and require considerable coordination and significant time for final protocol approvals. See "Research Involving Human Subjects, Biospecimens, and/or Animal Use," below for further information.

Proposals not conforming to the terms of this Announcement, and any unsolicited proposals, will not be considered. All awards are subject to the availability of funding and successful completion of contract negotiations. The Chemical and Biological Defense Program is not responsible for any funds expended by the proposer prior to contract award.

Cost Volume (Volume 3)

The Cost Volume must follow all instructions and requirements provided in the DoD SBIR Program BAA. The Phase I Base amount must not exceed $204,582.00. Total Base cost for Phase I must be clearly identified on the Proposal Cover Sheet (Volume 1) and in Volume 3.

Company Commercialization Report (CCR) (Volume 4)

Completion of the CCR is required and included in Volume 4 of the DSIP portal. Please refer to the DoD SBIR Program BAA for full details on this requirement. Information contained in the CCR will not be considered by the Chemical and Biological Defense Program in the proposal evaluations.

Supporting Documents (Volume 5)

Please note proposals are required to include additional forms, as listed below. Failure to submit the following document to Volume 5 will automatically result in disqualification of the Small Business Concern (SBC) from receiving an SBIR award for that proposal:

1. Contractor Certification Regarding Provision of Prohibition on Contracting for Certain Telecommunications and Video Surveillance Services or Equipment

Offerors are welcome to provide Supporting Documents in this section, however these documents will not be considered by the Chemical and Biological Defense Program in the proposal evaluations.

Fraud, Waste and Abuse (Volume 6)

All offerors must complete the Fraud, Waste, and Abuse training through the DSIP portal (https://www.dodsbirsttr.mil). Please follow the guidance provided via DSIP to complete the required training prior to proposal submission.

To Report Fraud, Waste, or Abuse, please contact:
DoD Inspector General (IG) Fraud, Waste & Abuse
Hotline: (800) 424-9098
hotline@dodig.mil

Additional information on Fraud, Waste and Abuse may be found in the DoD Announcement.

Disclosures of Foreign Affiliations or Relationships to Foreign Countries (Volume 7)

Small business concerns must complete the Disclosures of Foreign Affiliations or Relationships to Foreign Countries webform in Volume 7 of the DSIP proposal submission. Please be aware that the Disclosures of Foreign Affiliations or Relationships to Foreign Countries WILL NOT be accepted as a PDF Supporting Document in Volume 5 of the DSIP proposal submission. Do not upload any previous versions of this form to Volume 5. For additional details, please refer to the DoD SBIR Program BAA.

DIRECT TO PHASE II PROPOSAL GUIDELINES

The Chemical and Biological Defense SBIR Program is not currently participating in Direct to Phase II topics.

PHASE II PROPOSAL GUIDELINES

Offerors may only submit a Phase II proposal after receipt of a Phase I award.

Phase II is the demonstration of the technology that was found feasible in Phase I. A Phase II proposal may not be submitted until sufficient Phase I progress can be evaluated and assessed, and the PoP is nearing completion. The SBC may not submit a Phase II proposal sooner than five (5) months from the date of the Phase I contract award, and upon receiving instructions from the CBD program office.

All Phase II proposal submissions must be submitted on the DSIP portal: https://www.dodsbirsttr.mil.

At the DSIP website, Phase II proposals MUST be submitted to 'CBD SBIR' regardless of which DoD contracting office negotiated and awarded the Phase I contract. Additional instructions regarding the Phase II proposal submission process including submission key dates will be provided to Phase I awardees after the Phase I contract is awarded.

The Phase II proposal must include a concise summary of the Phase I project including the specific technical problem or opportunity addressed in the proposal. The proposal must also include an objective statement, the type of research conducted, findings and/or results of the research, and technical feasibility of the technology. Due to limited funding, the CBD SBIR program reserves the right to limit awards under any topic and only proposals considered to be of superior quality will be funded.

All proposers are required to submit a commercialization plan that describes the SBC's marketing and manufacturing approach to developing the technology. The Offeror is required to submit a budget for the entire 24-month Phase II Period of Performance. During contract negotiation, the Contracting Officer may require a Cost Volume for a base year and an option year; thus, proposers are advised to be aware of this possibility. These costs must be submitted using the Cost Volume format within the DSIP website. The total proposed amount should be indicated on the Proposal Cover Sheet as the Proposed Cost. At the Contracting Officer's discretion, Phase II projects may be evaluated for technical progress prior to the end of the base year (year one) in order to determine whether to extend the funding for the option year (year two).

The CBD SBIR Program is committed to minimizing the funding gap between Phase I and Phase II activities. The CBD SBIR Program typically funds a cost-plus fixed fee Phase II award at the discretion of the Contracting Officer but may award a firm fixed price contract.

It is recommended that Phase II awardees have a Defense Contract Audit Agency (DCAA) approved accounting system. If you do not have a DCAA approved accounting system, this could delay/prevent a Phase II contract award. Visit https://www.dcaa.mil/Customers/Small-Business for more information on DCAA approved accounting systems.

DISCRETIONARY TECHNICAL AND BUSINESS ASSISTANCE (TABA)
Currently, the CBD SBIR Program does not participate in the Technical and Business Assistance (TABA) Program.

EVALUATION AND SELECTION
All proposals will be evaluated in accordance with the evaluation criteria listed in the DoD SBIR Program BAA.

Offerors will be notified of selection or non-selection within the 90-day window requirement at the close of the BAA. The CBD SBIR Program Office will notify the firm via e-mail to the firm's Corporate Official (Business Point of Contact) and Principal Investigator, as listed on the Cover Page of the proposal.

The firm may submit an email request to the CBD SBIR/STTR inbox, dtra.belvoir.rd.mbx.jsto-cbd-chem-bio-defense-sbir@mail.mil, to request a technical debrief. The CBD SBIR Program Office will send a debriefing statement within 30-days of the request. The debriefing statement will only be provided to the Corporate Official and the Principal Investigator, as listed on the Cover Page of the proposal. Requests made by the offeror for further information will not be provided.

Refer to the DoD SBIR Program BAA for guidance concerning protests. As further prescribed in FAR 33.106(b), FAR 52.233-3, Protests after Award should be submitted to Ms. Abigail L. Roots, Chemical

and Biological Defense (CBD) SBIR/STTR Program Manager, Joint Science and Technology Office for Chemical and Biological Defense (JSTO CBD), dtra.belvoir.rd.mbx.jsto-cbd-chem-bio-defense-sbir@mail.mil.

RESEARCH INVOLVING HUMAN SUBJECTS, BIOSPECIMENS, AND/OR ANIMAL USE

Any research under a Phase I or Phase II contract involving human subjects, human anatomical substances (e.g., whole blood, cell lines, tissue), and/or animal use must undergo the regulatory review requirements per DoD Instruction 3216.02 and DoD Instruction 3216.01, respectively.

DoD-level review and approval of human and/or animal use are separate from, and in conjunction with the Institutional Review Board (IRB) and/or the Institutional Animal Care and Use Committee (IACUC).

CBD SBIR Projects Requiring Animal Subjects

Refer to the DoD Program BAA for Research Involving Animal Subjects.

Companies should plan carefully for any research involving animal subjects, in addition to the use of any chemical or biological warfare agents, and use of any agents associated with "Dual Use Research of Concern (DURC)". The mandatory DoD level review of this research is typically a period of no greater than four (4) months.

Projects under CBD SBIR awards involving the use of animal subjects shall not be proposed for any Phase I Period of Performance but may be proposed during the Phase II proposal submission.

Written authorization to begin animal research under the applicable protocol(s) proposed as part of the CBD SBIR/STTR program will be issued after the contract award in the form of an approval memo from the U.S. Army Medical Research and Development Command (MRDC), Animal Care and Use Review Office (ACURO), and the Research Oversight Board (ROB) of the Defense Threat Reduction Agency (DTRA), both of which provide DoD compliance oversight to the CBD SBIR and STTR program office.

The offeror is expressly forbidden from using or subcontracting for the use of animals in any manner prior to these approvals. Furthermore, modifications to approved protocols require review and approval by the ACURO prior to implementation.

Non-compliance with these terms and conditions may result in withholding of funds and/or the termination of the award. The ACURO and DTRA ROB reviews are separate from, and in addition to the responsible Institutional Animal Care and Use Committee (IACUC) review(s). Further information may be required if the proposal is successful.

CBD SBIR Projects Requiring Human Subjects, Human Anatomical Substances, and/or Human Data

Refer to the DoD Program BAA for Research Involving Human Subjects and Recombinant DNA Molecules.

Companies should plan carefully for any research involving human subjects, human data, and/or human biospecimens (human anatomical substances; e.g., blood, saliva, tissue), to include cadaveric specimens, hereafter referred to as "research", in addition to the use of any chemical or biological warfare agents, and use of any agents associated with "Dual Use Research of Concern (DURC)". The mandatory DoD level review of this research is typically no greater than four (4) months.

Projects under CBD SBIR awards involving the use of human subjects shall not be proposed for any Phase I Period of Performance but may be proposed during the Phase II proposal submission.

Written authorization to begin the research under the applicable protocol(s) proposed as part of the CBD SBIR/STTR program will be issued after the contract award in the form of an approval memo from the U.S. Army Medical Research and Development Command (MRDC), Office of Human Research Oversight (OHRO), and the Research Oversight Board (ROB) of the Defense Threat Reduction Agency (DTRA), both of which provide DoD compliance oversight to the CBD SBIR and STTR program office.

The offeror is expressly forbidden from beginning the research in any manner prior to these approvals. Furthermore, modifications to approved protocols require review and approval by the OHRO prior to implementation.

Non-compliance with these terms and conditions may result in withholding of funds and/or the termination of the award. The OHRO and DTRA ROB reviews are separate from, and in addition to the responsible Institutional Review Board (IRB) review(s). Further information may be required if the proposal is successful.

CBD SBIR 24.3 Topic Index

CBD243-001 Compact Hyperspectral micro-Raman Aerosol Detector

CBD243-002 Multiplexed Agent Detector with Cavity Ring-Down Spectroscopy (MADCaRS)

CBD243-003 A room temperature PbS/PbSe photoconductive detector for the mid-infrared wavelength region.

~~CBD243-004 Technologies for the quick and easily detection, decontamination and to prevent the spread of Novichok Contamination~~

CBD243-001 Compact Hyperspectral micro-Raman Aerosol Detector

OUSD (R&E) CRITICAL TECHNOLOGY AREA(S): Biotechnology

OBJECTIVE: Develop a micro-Raman aerosol detector that meets the size, weight, power, and cost (SWaP-C) requirements for UAV-delivery and is capable of semi-continuously collecting and analyzing particles from the ambient atmosphere using hyperspectral Raman spectroscopy. The system may use additional spectroscopic or light scattering techniques to achieve an adequate measurement rate and should be able to store raw data and provide processed data for integration into data fusion systems.

DESCRIPTION: Micro-Raman spectroscopy is considered an attractive method for early warning of chemical and biological threats because of its broad applicability—including detection of aerosols, explosives, and pharmaceuticals—adaptability, and lack of sample preparation [1]. Unfortunately, the adoption of automated micro-Raman spectroscopy is limited by several challenges that hinder its utility. For example, luminescence is known to overwhelm signals from biological or mineral particles; spectra from heterogeneous, or mixed composition, particles can be difficult to interpret; high laser intensity can alter the spectra of particles; and "long" analyses (seconds) for smaller particles (< 10 μm) has slowed the speed of identification. Moreover, a hyperspectral approach—e.g., line-scanning [2] or fiber-array [3]—is needed to obtain spectra from adequate numbers of particles.

Recent technological advancements make early warning applications of Raman spectroscopy more attainable. These include decreases in laser size, weight, and power for Raman spectroscopy systems; the availability of compact energy efficient deep-UV lasers [4]; and the use of Raman and fluorescence from deep-UV excitation to aid in identification [5] Other developments such as the use of shifted-excitation Raman difference spectroscopy [6] time-resolved spectroscopy [7] also enhance Raman signals relative to background. A early version of this technology is the REBS (Battelle, Dayton, OH), which uses electrostatic precipitation coupled to a line-scanning hyperspectral Raman system, though compact, UAV-use requires even greater reduction in SWaP-C [2].

It is feasible to envisage the development of a small, lightweight hyperspectral micro-Raman aerosol detector-airborne (HRAD-A). The HRAD-A should be able to measure Raman spectra of individual aerosol particles as small as 500 nm (e.g., polystyrene latex spheres) and analyze over 150 one-μm size particles sampled at an atmospherically relevant concentration in 15 minutes (e.g., ammonium nitrate, bacillus spores, paracetamol). The HRAD-A should provide greater situational awareness and capability of force protection by providing information on a wide range of harmful airborne particles [8], including chemical or biological agents and particles affecting visibility and/or communications. The US Army Training and Doctrine Command (TRADOC) Force Operating Capabilities calls for robotic platforms that provide environmental risk assessment from an established baseline [9], and can allow for remote CBRN reconnaissance [10, 11]. These elements should be able to be integrated with battlefield information management and data fusion systems to provide actionable information [9].

The HRAD-A should be designed to be a portable, low SWaP-C sensor capable of being distributed throughout an area of operations to achieve an increased situational understanding and provide CBRN and environmental background surveillance data as needed. For example, a sensor might be placed in an austere location by a UAV and then run off a solar panel for remote surveillance. Additionally, a system with open-source hardware and software that can be integrated into data-fusion systems ensures future compatibility as part of the multi-domain operations battlespace. Further, if the system is modular—i.e., the optical path can be switched—it can enable integration with future systems.

PHASE I: Design the HRAD-A to sample and analyze ambient aerosol particles leveraging hyperspectral Raman spectroscopy from multiple particles at a time. Use of other techniques to aid in

discrimination, such as fluorescence (excited by the same laser for the Raman), is encouraged. Particles of interest include such as polystyrene latex spheres (0.5 µm), 1 µm bacterial/mold spores, chemical simulants, ammonium nitrate, and pharmaceuticals. Minimum specification of the design includes operating from DC 8-16V, a size of < 3L, weight of < 10kg, and sufficient power for 4 hours of operation. The aerosol system should be able to run continuously for several days connected to mains power without human intervention. The deliverables for Phase I will include: the design for the HRAD-A including specific concept details; a description of why the HRAD-A is likely to perform as desired; proof of concept results, if obtained; how this concept can be prototyped; and criteria Phase II validation.

PHASE II: In Phase II a prototype will be fabricated and validated. Deliverables will include a prototype capable of collecting aerosol particles measuring Raman spectra from polystyrene latex spheres as small as 500nm, collecting and measuring Raman spectra from 150 particles in 15 minutes, and demonstration of semi-continuous sampling in the ambient outdoor environment, in accordance with the validation success criteria developed in Phase I.

PHASE III: In Phase III a low-SWaP-C HRAD-A will be provided for long-term surveillance for ambient aerosol hazards and for measuring particles which affect visibility and communications. The desired HRAD-A could also be used (on a UAV/UGV) to investigate areas for potential hazards, e.g., chem/bio agents. Commercialization of the technologies will also be pursued. The ability of the optical pathway to be used for other purposes also has significant utility. Employed in a handheld manner, Raman spectroscopy can be used to non-destructively determine the composition of materials inside plastic bags and some plastic and glass containers.

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KEYWORDS: Raman, detection, chem-bio, atmosphere,
UAV

CBD243-002 Multiplexed Agent Detector with Cavity Ring-Down Spectroscopy (MADCaRS)

OUSD (R&E) CRITICAL TECHNOLOGY AREA(S): Biotechnology

OBJECTIVE: Develop an infrared cavity ring-down spectroscopy-based system possessing a large dynamic range for the rapid, sensitive, and selective identification of vapor phase and aerosol phase chemical warfare agents (CWA).

DESCRIPTION: Vapor phase detection techniques of CWAs are often not specific or are restricted to very specific and/or narrow concentration ranges, causing frequent false positive and dynamic range issues. Additionally, current commercial technology that has greater specificity or a larger dynamic range are typically benchtop systems and not portable for the warfighter. Vapor and aerosol challenges are not static and can continuously evolve both in type of challenge and in concentration; therefore, there is a need for a robust system that can detect chemical warfare agents and other toxic industrial compounds (TICs) and can be carried by the warfighter. While some systems exist and claim to have a large dynamic range, the ability to detect a library of compounds, and are man-portable, no known man-portable systems exist that can provide rapid, sensitive, and selective chemical identification, even on unknown compounds outside of a pre-built library, over a large dynamic range. This infrared-based prototype will provide the warfighter with rapid feedback of any potential threats within the local vapor environment.

The goal of this project is to develop an infrared cavity ring-down spectroscopy-based system with a large dynamic range from 100 ppb to 1000 ppm of all traditional agents (VX, GB, and HD), potential for non-traditional agents (NTAs), TICs such as phosgene, ammonia, or cyanide, as well as aerosolized liquid CWA. The lower end of the dynamic range will be of focus for the CWAs whereas the higher end of the dynamic range will be the focus for the TICs. The final prototype must not be limited to this set of challenges and must be able to update detection algorithms for new compounds. The final prototype must be less than 10 pounds, less than 16 L in volume, and continuously read in at least 60 second intervals with capability to modify interval length. The final prototype must be completely contained (i.e. not require outside gases, etc.) and can run on battery (warfighter portable), shore power (leave in place/perimeter applications), or through the means necessary for an unmanned system. The form factor must be amenable to deployment in adverse environments with temperature and humidity fluctuations from 0C to 45C and from 0% relative humidity (RH) to 90% (or non-saturating at respective temperature range). The system must be able to clear back to baseline signal within five minutes. Additionally, the prototype must use artificial intelligence/machine learning (AI/ML) for library building and/or spectral matching to enhance detection capabilities.

PHASE I: Establish proof of concept by developing a bread-board device that clears down in the appropriate amount of time and can capture signal at or below 1 ppm of two CWA simulants at room temperature and approximately 50% RH. The signal capture must take no more than 60 seconds and provide a result. Identify optimized geometry for prototype and establish any logistic requirements for prototyping.

PHASE II: Demonstrate system feasibility meeting outlined requirements including environmental requirements across at least two different temperatures and two different relative humidities which includes laboratory method validation and assessment of instrumentation. The prototype must meet the concentration requirements for at least two of the listed compounds (including one CWA) and must have detectability within the range for all compounds listed with the target range for the CWAs on the lower end of the dynamic range and the range for the TICs at the higher end of the dynamic range. CWA testing must be completed in an approved surety laboratory. The sensitivity for each listed compound will be established. A user assessment will be conducted to identify general improvements.

PHASE III: Continued development and assessment at remaining temperatures and humidity levels and optimization of user interface. Finalize design/form factor for commercialization. Conduct final user assessment to incorporate modifications to design.

PHASE III DUAL USE APPLICATIONS: This technology would be useful to civilian first responders, leave-in-place detectors at large social events, or in perimeter monitoring around various municipal facilities for vapor leakage.

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KEYWORDS: CRDS, IR, vapor, agent, rapid, aerosol

CBD243-003 A room temperature PbS/PbSe photoconductive detector for the mid-infrared wavelength region.

OUSD (R&E) CRITICAL TECHNOLOGY AREA(S): Biotechnology

OBJECTIVE: Develop a room temperature photoconductive detector for the mid-infrared (2 to 4.5 μm) wavelength region based on lead salt detection elements.

DESCRIPTION: The chemical and biological defense community has the need for a small lightweight sensor for detection of chemical/biological agents and simulants. Infrared absorption spectroscopy has proven to be a very useful tool in the detection and identification of airborne chemicals and aerosols. Pattern recognition is used to compare the infrared spectrum of library molecules against the infrared spectra of airborne contaminants. In particular chemical warfare agents and toxic industrial chemicals have distinctive absorption lines in the infrared region. Infrared spectroscopy has been used to detect chemicals at very low concentrations. Infrared spectroscopy also holds the promise of low false alarm rates due to the spectral pattern matching over a large number of spectral bins. The size, weight, and power requirements of current infrared spectrometers have limited their utility in field environments. Current infrared spectrometers are too expensive to be deployed in large numbers.

Lead sulfide (PbS) is one of the oldest and most commonly used materials in use for the fabrication of infrared detectors. PbS and lead selenide (PbSe) detector cells make use of the photoconductive effect in which electrical resistance decreases with the application of infrared radiation. PbS and PbSe photoconductive detectors have high detection performance and fast response. They also have the advantage of room temperature operation. PbS and PbSe are very good candidates to fill the existing gap in the photonic and uncooled infrared detectors sensitive to the MWIR photons. Lead Salt detectors are a serious alternative to others uncooled technologies in the low cost infrared detection market. The number of potential applications is very large and includes infrared imagers, enhanced vision systems, and chemical/biological sensors.

Uncooled detectors will likely dominate the majority of the future IR detection applications. Considerable advances have taken place with thermal detectors in recent years. However it is not clear that thermal detectors are the best technology at the shorter wavelengths in the mid-infrared region. New methods of processing PbS and PbSe based on silicon technology are compatible with standard CMOS circuitry. The compatibility with CMOS allows for easy integration with electronic circuitry and fabrication based on existing lithographic methods.

The goal of this effort is to examine innovative methods for fabrication of detectors based on lead salts and to examine methods for manufacturing of polycrystalline PbS and/or PbSe with good electro optical characteristics. In particular three areas need to be addressed. 1) In Chem/Bio applications PbS/PbSe detectors will be required to detect infrared radiation over a fairly large spectral range (2 to 4.5 μm). Uncooled operation of the detector over this entire wavelength region will require some care. The use of external coolers is discouraged. 2) The fabrication of the new photoconductive detectors will need to be compatible with existing CMOS technology to allow for easy integration with electrical components and to minimize noise and signal loss associated with non-ideal interfaces to readout electronics. 3). Commercially available PbS/PbSe detectors are known to possess a non-linear response to the irradiance of MWIR radiation illuminating the detector. This non-linear response severely limits the utility of PbS/PbSe detectors in spectroscopic applications. The new fabrication method will need to minimize this non-linearity.

PHASE I: Examine new methods for the fabrication of PbS/PbSe photoconductive detectors. The new detector elements should have good detection capability over the entire 2 to 4.5 µm region of the spectrum at room temperature with no external cooling required. A detectivity (D*) of 10^10 Jones or better is desired over the entire spectral range. The new detector should be compatible with CMOS fabrication. The non-linearity of the new detector with response to the irradiance of MWIR radiation illuminating the detector should be minimized. Design a fabrication process for improved photoconductive detectors based on lead salts. Perform necessary experiments as needed.

PHASE II: Based on the results of the Phase I effort, fabricate a PbS/PbSe photoconductive detector array that is suitable for spectroscopic application. The array should have at least 256 elements (16x16) with spacing and size suitable for spectroscopic applications. The detector elements should have a detectivity (D*) of 10^10 Jones or better. The detectors should be able to detect mid-IR radiation over the 2 to 4.5 µm region of the spectrum at room temperature with no external cooling. Design and build all necessary readout electronics. Test and characterize the system. Use the results of the testing to update the sensor design.

PHASE III DUAL USE APPLICATIONS: There are environmental applications for a small robust, chemical sensor. A rugged, inexpensive chemical sensor will benefit the manufacturing community by providing inexpensive monitoring of chemical processes. Also first responders such as Civilian Support Teams and Fire Departments have a critical need for a rugged, inexpensive sensor that can be transported to the field to test for possible contamination by CW agents.

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KEYWORDS: Chemical Detection, uncooled infrared detector, lead selenide, lead sulfide, focal-plane-array

~~CBD243-004~~ [Topic removed]

Defense Health Agency (DHA)
2024.3 Small Business Innovation Research (SBIR)
Proposal Submission Instructions

INTRODUCTION

The Defense Health Agency (DHA) SBIR Program seeks small businesses with strong research and development capabilities to pursue and commercialize medical technologies. DHA SBIR encourages participation in innovation and entrepreneurship by women and socially or economically disadvantaged persons.

Proposers responding to a topic in this BAA must follow all general instructions provided in the Department of Defense (DoD) SBIR Program BAA. DHA requirements in addition to or deviating from the DoD Program BAA are provided in the instructions below. Only Government personnel will evaluate proposals submitted under this solicitation cycle.

Proposers are encouraged to thoroughly review the DoD Program BAA and register for the DSIP Listserv to remain apprised of important programmatic and contractual changes.

- The DoD Program BAA is located at: https://www.dodsbirsttr.mil/submissions/solicitation-documents/active-solicitations. Be sure to select the tab for the appropriate BAA cycle.
- Register for the DSIP Listserv at: https://www.dodsbirsttr.mil/submissions/login.

Specific questions pertaining to the administration of the DHA SBIR Program and these proposal preparation instructions should be directed to:

DHA SBIR Program Management Office (PMO) Email: usarmy.detrick.medcom-usamrmc.mbx.dhpsbir@health.mil

For technical questions about a topic during the pre-release period, contact the Topic Author(s) listed for each topic in the BAA. To obtain answers to technical questions during the formal BAA period, visit the Topic Q&A: https://www.dodsbirsttr.mil/submissions/login.

PHASE I PROPOSAL GUIDELINES

The Defense SBIR/STTR Innovation Portal (DSIP) is the official portal for DoD SBIR/STTR proposal submission. Proposers are required to submit proposals via DSIP; proposals submitted by any other means will be disregarded. Detailed instructions regarding registration and proposal submission via DSIP are provided in the DoD SBIR Program BAA.

Technical Volume (Volume 2)

The technical volume is not to exceed **20 pages** and must follow the format and content requirements provided in the DoD SBIR Program BAA. Do not duplicate the electronically-generated Cover Sheet or put information associated with the Technical Volume in other sections of the proposal as these will count toward the 20-page limit.

Only the electronically-generated Cover Sheet and Cost Volume are excluded from the 20-page limit. Technical Volumes that exceed the 20-page limit will be deemed non-compliant and will not be evaluated.

Cost Volume (Volume 3)

The Phase I Base amount must not exceed $250,000 over a 6-month period of performance. Costs must be clearly identified on the Proposal Cover Sheet (Volume 1) and in Volume 3.

Please review the updated Percentage of Work (POW) calculation details included in the DoD Program BAA. DHA will occasionally accept deviations from the POW requirements with written approval from the Funding Agreement Officer.

Travel must be justified and relate to the project needs for direct Research Development Test & Evaluation (RDT&E) Technology Readiness Level (TRL) increasing costs. Travel costs must include the purpose of the trip(s), number of trips, origin and destination, length of trip(s), and number of personnel.

Company Commercialization Report (CCR) (Volume 4)
Completion of the CCR as Volume 4 of the proposal submission in DSIP is required. Please refer to the DoD SBIR Program BAA for full details on this requirement. Information contained in the CCR will be considered by DHA during proposal evaluations.

Supporting Documents (Volume 5)
All proposing small business concerns are REQUIRED to submit the following document to Volume 5:

1. Contractor Certification Regarding Provision of Prohibition on Contracting for Certain Telecommunications and Video Surveillance Services or Equipment

Please refer to the DoD Program BAA for more information.

Fraud, Waste and Abuse Training (Volume 6)
Fraud, Waste and Abuse training material can be found in the Volume 6 section of the proposal submission module in DSIP and must be thoroughly reviewed once per year in order to proceed with proposal submission.

Disclosures of Foreign Affiliations or Relationships to Foreign Countries (Volume 7)
Small business concerns must complete the Disclosures of Foreign Affiliations or Relationships to Foreign Countries webform in Volume 7 of the DSIP proposal submission. Please be aware that the Disclosures of Foreign Affiliations or Relationships to Foreign Countries WILL NOT be accepted as a PDF Supporting Document in Volume 5 of the DSIP proposal submission. Do not upload any previous versions of this form to Volume 5. For additional details, please refer to the DoD SBIR Program BAA.

PHASE II PROPOSAL GUIDELINES

Phase II proposals may only be submitted by Phase I awardees. Phase II is the demonstration of the technology found feasible in Phase I. The details on the due date, content, and submission requirements of the Phase II proposal will be provided by the DHA SBIR PMO typically in month five of the Phase I contract.

Due to limited funding, the DHA SBIR Program reserves the right to limit awards under any topic and only proposals considered to be of superior quality will be funded. Small businesses submitting a proposal are required to develop and submit a Commercialization Strategy describing feasible approaches for transitioning and/or commercializing the developed technology in their Phase II proposal. This plan shall be included in the Technical Volume.

The Cost Volume must contain a budget for the entire 24-month Phase II period not to exceed the

maximum dollar amount of $1,300,000. Budget costs must be submitted using the Cost Volume format (accessible electronically on the DoD submission site) and shall be presented side-by-side on a single Cost Volume Sheet.

DHA SBIR Phase II proposals have six volumes: Proposal Cover Sheets, Technical Volume, Cost Volume, Company Commercialization Report, Supporting Documents, and Fraud, Waste, and Abuse.

The Technical Volume has a 40-page limit including: table of contents, pages intentionally left blank, references, letters of support, appendices, technical portions of subcontract documents (e.g., statements of work and resumes) and any attachments. Technical Volumes that exceed the 40-page limit will be deemed non-compliant and will not be evaluated.

DISCRETIONARY TECHNICAL AND BUSINESS ASSISTANCE (TABA)
The DHA SBIR Program does not participate in the Technical and Business Assistance (formerly the Discretionary Technical Assistance Program). Contractors shall not submit proposals that include Technical and Business Assistance.

The DHA STTR Program has a Commercialization Readiness Program that provides technical and commercialization assistance to small businesses that have Phase I and Phase II projects.

EVALUATION AND SELECTION
All proposals will be evaluated in accordance with the evaluation criteria listed in the DoD SBIR Program BAA.

Proposing firms will be notified of selection or non-selection status for a Phase I award within 90 days of the closing date of the BAA. Non-selected companies may request feedback within 15 calendar days of the non-select notification. The Corporate Official identified in the firm's proposal shall submit the feedback request to the SBIR Office at usarmy.detrick.medcom-usamrmc.mbx.dhpsbir@health.mil. Feedback is provided in an official PDF via email to the Corporate Official identified in the firm proposal within 60 days of receipt of the request. Requests for oral feedback will not be accommodated. If contact information for the Corporate Official has changed since proposal submission, a notice of the change on company letterhead signed by the Corporate Official must accompany the feedback request.

NOTE: Feedback is not the same as a FAR Part 15 debriefing. Acquisitions under this solicitation are awarded via "other competitive procedures". Therefore, offerors are neither entitled to nor will they be provided FAR Part 15 debriefs.

Refer to the DoD SBIR Program BAA for procedures to protest the Announcement. Protests after Award, as further prescribed in FAR 33.106(b), FAR 52.233-3, should be submitted to:

Ms. Samantha L. Connors SBIR/STTR Chief, Contracts Branch 8
Contracting Officer
U.S. Army Medical Research Acquisition Activity
Email: Samantha.l.connors.civ@health.mil

AWARD AND CONTRACT INFORMATION
Phase I awards will total up to $250,000 for a 6-month effort and will be awarded as Firm-Fixed-Price Purchase Orders.

Phase II awards will total up to $1,300,000 for a 24-month effort and will typically be Firm-Fixed-Price contracts. If a different contracting type is preferred, such as cost-plus, the rational as to why must be included in the proposal.

Phase I/Phase II awardees will be informed of contracting and Technical Point of Contact/Contract Officer Representative upon award.

ADDITIONAL INFORMATION

RESEARCH INVOLVING HUMAN SUBJECTS, HUMAN SPECIMENS/DATA, OR ANIMAL RESEARCH

The DHA SBIR Program highly discourages offerors from proposing animal or human use research during Phase I due to the significant lead time required to prepare documentation and secure approval, which could substantially delay the performance of the Phase I award.

Prior to contract award when an IRB is indicated, proposers must demonstrate compliance with relevant regulatory approval requirements that pertain to proposals involving human subjects, human specimens, or research with animals. If necessary, approvals are not obtained within two months of notification of selection, the decision to award may be terminated.

Offerors are expressly forbidden to use, or subcontract for the use of, laboratory animals in any manner without the express written approval of the U.S. Army Medical Research and Development Command (USAMRDC) Animal Care and Use Review Office (ACURO). Written authorization to begin research under the applicable protocol(s) proposed for this award will be issued in the form of an approval letter from the USAMRDC ACURO to the recipient. Modifications to previously approved protocols require re-approval by ACURO prior to implementation.

Research under this award involving the use of human subjects, to include the use of human anatomical substances or human data, shall not begin until the USAMRDC's Office of Human Research Oversight (OHRO) provides formal authorization. Written approval to begin a research protocol will be issued from the USAMRDC OHRO, under separate notification to the recipient. Written approval from the USAMRDC OHRO is required for any sub-recipient using funds from this award to conduct research involving human subjects. If the Offeror intends to submit research funded by this award to the U.S. Food and Drug Administration, Offerors shall propose a regulatory strategy for review.

*NOTE: Exempt animal or human research use shall also reflect 'yes' on the proposal coversheet for USAMRDC ACURO and OHARO records.

Non-compliance with any provision may result in withholding of funds and or termination of the award.

FEDERAL FACILITY USE

The DHA SBIR Program highly discourages small business concerns (SBCs) from subcontracting to a federal facility and/or utilizing for testing due to the significant lead time required to secure approval, which could substantially delay the performance of the award.
Use of federal facilities is prohibited without an approved waiver from the DHA SBIR/STTR Office.

An SBC whose proposed work includes federal facility use is required to provide a written justification, uploaded to the Supporting Documents (Volume 5), that includes the following information:

1. An explanation of why the SBIR/STTR research project requires the use of the federal facility, including data that verifies the absence of non-federal U.S. facilities, in support of the overall mission and research area.

2. Evidence that there is no applicable U.S. facility that has the ability or expertise to perform the specified work.
3. Why the Federal Agency will not and cannot fund the use of the Federal facility or personnel for the SBIR/STTR project with non-SBIR/STTR money.

The DHA SBIR Program has the right of refusal. Companies that fail to meet requirements specified above will be at risk of delay to award or funding.

If the proposal is selected, the U.S. Army Medical Research Acquisition Activity (USAMRAA) will assist in establishing the waiver for DHA SBIR/STTR Office approval. If approved, the proposer will subcontract directly with the federal facility and not a third-party representative.

Transfer of funds between a company and a Military Lab must meet the following APAN 15-01 requirements (the full text of this notice can be found at https://usamraa.health.mil/SiteAssets/APAN%2015-01%20Revised%20Feb%202018.pdf):

(1) The DoD Intramural Researcher must obtain a letter from his/her commanding officer or Military Facility director authorizing his/her participation in the Extramural Research project. This letter must be provided to the Extramural Organization for inclusion in the proposal or application.

(2) The DoD Intramural Researcher must also coordinate with his/her local RM office (or equivalent) to prepare a sound budget and justification for the estimated costs. Where there are no DoD-established reimbursement rates [e.g., institution review board (IRB) fees, indirect cost rates, etc.], the Military Facility's RM office (or equivalent) must provide details of how the proposed rates were determined. The DoD Intramural Researcher must use the budget and justification form enclosed in APAN 15-01 when developing the estimated costs and provide it to the Extramural Organization for inclusion in the proposal or application.

(3) The Extramural Research proposal or application must include a proposed financial plan for how the Military Facility's Intramural Research costs will be supported [i.e., directly funded by DoD, resources (other than award funds) provided by the Awardee to the Military Facility, or award funds provided by the Awardee to the Military Facility (in accordance with the requirements below)].

(4) The DoD Intramural Researcher should also coordinate with his/her technology transfer office.

INTERNATIONAL TRAFFIC IN ARMS REGULATION (ITAR)

For topics indicating ITAR restrictions or the potential for classified work, limitations are generally placed on disclosure of information involving topics of a classified nature or those involving export control restrictions, which may curtail or preclude the involvement of universities and certain nonprofit institutions beyond the basic research level. Small businesses must structure their proposals to clearly identify the work that will be performed that is of a basic research nature and how it can be segregated from work that falls under the classification and export control restrictions. As a result, information must also be provided on how efforts can be performed in later phases, such as Phase III, if the university/research institution is the source of critical knowledge, effort, or infrastructure (facilities and equipment).

DHA SBIR 24.3 Topic Index

DHA243-001 TITLE: Vaccine Delivery Vehicle for the Sustained Release of an HIV Vaccine

OUSD (R&E) CRITICAL TECHNOLOGY AREA(S): Military Infectious Disease

OBJECTIVE: Production of a vehicle for the sustained release of a human immunodeficient virus (HIV) vaccine for long-lasting antigen expression in large animal models of HIV infection and a prototype for human use. Production of this dual-use product for military and civilian use will lead to increased military medical readiness resulting in more efficacious vaccine products to protect the warfighter in large scale combat operations (LSCO) as well as in garrison.

DESCRIPTION: U.S. military personnel are exposed to and impacted by the diverse global HIV epidemic. Despite advances in non-vaccine prevention, the US military experiences a steady epidemic of approximately 350 new HIV infections every year. Effective prevention and therapeutic modalities are of utmost importance in combatting HIV/AIDS in the DoD. The US Military HIV Research Program (MHRP) is engaged in collaborative research with multiple academic, corporate, and governmental partnerships to develop and test immunologic approaches to prevention and therapy.

Conventional immunization strategies involve the delivery of vaccines in a bolus or a series of bolus injections. Natural exposure to HIV and other infectious diseases, however, result in the exposure of increasing levels of antigens and inflammation over days to weeks. Animal studies in mice have shown that the administration of HIV antigen and adjuvant over a 1-to-2-week period through repeated injections or using osmotic pumps resulted in 10-fold increases in antibody production compared to a bolus vaccination post prime. In another study, solid pyramidal microneedle (MN) arrays were implanted in the epidermis of mice and released HIV antigens over a 2-week period. Results from the study showed an approximately 1,300-fold increase of serum IgG titers, higher germinal center (GC) B cell responses, and a 16-fold increase in bone marrow (BM) plasma cells when compared to bolus immunization. While these studies have demonstration that vaccine kinetics and the timing of antigen and adjuvant delivery impacts immune responses to subunit vaccines, platforms to control the release or exact vaccine kinetics are not currently sufficient. The development of technology to support the sustained release of an HIV vaccine candidate is the desired end-state of this effort. The development of this technology would not only apply to the field of HIV, but also be applicable to other vaccines as well.

PHASE I: Phase I consists of the development of a proof-of-concept vehicle that demonstrates scientific, technical, commercial merit and feasibility of a platform technology that relies on sustained antigen delivery for a successful HIV vaccine. The proof-of concept should demonstrate proof of feasibility of the vehicle in vitro by demonstrating the ease of use and the sustained release of stable antigen with a favorable antigenicity profile. Research could be built upon similar existing technology for other products such as sustained release hydrogels, sustained release silica microparticles, or pulsatile-release PLGA microspheres. Phase I will focus on technology conceptualization of sustained release vaccine technology (including performance parameters) and initial in vitro demonstration. The performer will design a sustained, timed release platform technology for the administration of an HIV vaccine. These methods may include the administration of vaccine via an intramuscular or subcutaneous injection, implantable device, or biomaterial that does not require removal. The platform should have the potential to deliver antigen over a minimum of a 2-week period, preferably in escalating dose. Upon completion of Phase I, a vehicle for sustained vaccine delivery will have been developed and undergone in vitro testing.

PHASE II: After successful completion of Phase I, the focus is on optimizing and further development of the technology of at least one suitable deliverable developed in Phase I in a relevant small animal model (e.g., mice, rabbits or guinea pigs) as well as developing a prototype for clinical delivery. As described in Phase I, administration of the vaccine may be via an intramuscular or subcutaneous injection, implantable device, or biomaterial that does not require removal. The device or platform must not be large enough to

inhibit movement or compromise Soldiers in an austere environment. A suitable prototype having already demonstrated to be suitable for use for further development as described in Phase I, will be further developed, evaluated, and optimized in a small animal model relevant to evaluating antibody responses to HIV vaccination. Initial efficacy and safety studies will be conducted in vivo.
Studies should be conducted to demonstrate proof-of-concept that improved levels of serum IgG binding antibody titers, virus neutralization potency and breadth, and germinal center (GC) B cell responses can be achieved in animal models using this technology to deliver sustained release HIV antigens. A delivery prototype designed for the administration of a sustained release HIV vaccine in clinical settings will be developed and tested. The prototype specifications will be defined based on feedback from animal data to meet the requirements of the delivery system in humans. The expected Phase II end-state is a qualified, delivery modality to administer HIV vaccines using a sustained release platform technology. Enough of the deliverable should be produced to complete the objectives and testing as described in Phase III.

Upon completion of Phase II of this project, the following will be completed:
(1) Have developed a prototype for delivery of the sustained release HIV vaccine technology.
(2) Have demonstrated immunogenicity of sustained release HIV vaccine technology in a small animal model relevant to HIV vaccine antibody responses.
(3) A prototype product for the sustained delivery of an HIV vaccine for subsequent use in large animal models.
(4) A strategy on how on how regulatory/FDA approval will be obtained for the product.

PHASE III DUAL USE APPLICATIONS: In Phase III, the provider may continue, derive, or conclude the research conducted in the Phase II including testing validation in non-human primates (NHPs). Funding from non-SBIR/STTR government sources and/or the private/civilian sector will need to be obtained to develop or transition the prototype into a viable FDA-regulated product or service for clinical testing and subsequent deployment in military populations as well as commercialization and application in the civilian sector, domestically and even internationally. For example, funding could be obtained from the civilian or government sectors. Government sources of funding could include funding pathways via the Defense Health Agency (DHA) Pharmaceuticals, Devices, and Medical Support Systems (PDMSS), DHA Product Managers, and the Joint Program Executive Office for Chemical, Biological, Radiological and Nuclear Defense (JPEO-CBRND) Medical. A data package plan will also be required for application to the FDA after successful large field testing of the assay prototype. For HIV applications, the technology and/or product generated from the Phase III SBIR could be integrated in MHRP's objective of developing an HIV vaccine for the prevention of HIV/AIDS in support of the Infectious Disease Program Objective Memorandum (POM) to the HIV program in the 6.2 and 6.3 space. A potential method of transition for this product could be through the Army Futures Command. In addition, civilian commercialization of this product is likely to include GLP production and GMP manufacture and distribution.

The end-state for this product is a commercially viable, FDA approved technology that will be commercially viable in the civilian sector, but also will support the Army's strategy of developing countermeasures against HIV/AIDS as well as global health applications for the deployment of an effective HIV vaccine. It may also be utilized as platform for the delivery of other vaccines and, thus, would benefit the field of vaccine development beyond HIV applications for both military and broader civilian populations.

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1. Boopathy A.V. et al. Enhancing humoral immunity via sustained-release implantable microneedle patch vaccination. Proc. Natl Acad Sci. USA 116, 16473-16478 (2019). https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6697788/

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3. Cirelli, K. M. et al. Slow delivery immunization enhances HIV neutralizing antibody and germinal center responses via modulation of immunodominance. Cell 177, 1153–1171 (2019). https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6619430

KEYWORDS: Human Immunodeficiency Virus; Autoimmune diseases syndrome; vaccine; therapeutics; antibodies; antigen; delivery; sustained release

DHA243-002 TITLE: Nanoparticle-based Drug Delivery Platform(s) for Traumatic Brain Injury

OUSD (R&E) CRITICAL TECHNOLOGY AREA(S): Combat Casualty Care

OBJECTIVE: To develop and validate a non-aggregating brain-targeted nanoparticle drug delivery platform for traumatic brain injury (TBI) capable of extended/sustained release of neuroprotective drug(s) to mitigate neuroinflammation, oxidative stress, and/or edema that can be safely administered to the injured Warfighter in far-forward and austere prolonged field care settings.

DESCRIPTION: TBI is a significant health issue affecting military service members during both wartime and peacetime. To date, there are no FDA-approved pharmacological treatments available for TBI that are clinically effective. Moreover, there is a critical need for point-of-injury therapeutics capable of mitigating the acute neuropathological effects of TBI during future prolonged field care scenarios. On the battlefield, supportive measures prior to medical evacuation usually include hemorrhage control, restoration of blood pressure and tissue oxygenation through resuscitation, or control of intracranial hypertension with hypotonic saline. However, these measures require dedicated medical personnel and secure treatment settings, which are often not available during active combat and don't directly treat the brain injury. Development of evidence-based therapeutic products that can be safely administered by a Combat Medic/Corpsman and have the capability to reduce TBI morbidity and mortality during prolonged field and enroute care is essential to address this key gap in prehospital care for both military and civilian TBI casualties. Nanoparticle (NP) drug delivery platforms utilize precisely engineered nanoscale materials (200 nm or less) capable of bypassing the blood-brain barrier (BBB) and releasing their drug payload to specific neuronal cell types while minimizing potentially adverse systemic drug effects (Bharadwaj et al., 2018; Ribovski et al., 2021). Additionally, NP-mediated drug delivery platforms can provide controlled and sustained release of neuroprotective drug(s) directly to injured brain cell types which may facilitate neuroprotective outcomes during extended prehospital enroute care and prolonged field care which may range from 1 to more than 7 days in future combat scenarios (Natarajan et al., 2014; Bai et al., 2022). The desired end-product would be a stable, non-aggregating, portable, and potentially multi-drug capable NP platform that provides sustained delivery of FDA-approved drug(s) which have shown significant evidence of therapeutic benefit in the preclinical TBI literature. The developed product should target TBI patients presenting with moderate to severe TBI. The system should be designed to facilitate controlled and continuous release of individual or multiple neuroprotective agents, including but not limited to anti-inflammatory drugs to prevent cellular damage, brain swelling, and herniation and antioxidants to reduce oxidative stress and improve mitochondrial function. The release of drugs should be specific to brain cell types (e.g. neurons, astrocytes, oligodendrocytes, or other glial cells).

PHASE I: Phase I will demonstrate the feasibility by providing a proof-of-concept of a safe nanoparticle drug delivery platform capable of delivering neuroprotective drug(s) over time in a tissue-specific manner for TBI. The proof-of-concept should explain the prototype development plan and provide in vitro data showing drug release rates of nanoparticle-encapsulated neuroprotective drug(s) to be tested in vivo during Phase II. Additional considerations for the prototype plan may include potential biophysical barriers which may limit biodistribution in the brain such as BBB, drug release kinetics of a range of drug concentrations, nanoparticle toxicity, encapsulation efficiency, and clearance. Animal subjects should not be used during Phase I.

PHASE II: Phase II studies shall validate the proposed proof-of-concept plan from Phase I by completing pre-clinical in vivo exploratory studies in established small (i.e., rat) animal models of TBI to (1) demonstrate the safety of the nanoparticle product, (2) evaluate drug pharmacokinetics and pharmacodynamics (PK/PD) with nanoparticle-based drug delivery, and (3) demonstrate effective target engagement and therapeutic efficacy of the nanoparticle-drug(s) system for TBI. PK evaluation shall include drug bioavailability, half-life, stability, and clearance in brain tissue and blood/plasma. Drug

candidates of interest include, but are not limited to, dexamethasone, memantine, simvastatin, bumetanide, and candesartan. Evaluation of blood-based TBI biomarkers and neuroimaging for advanced studies would be desirable. Preclinical evaluation is encouraged to include systems that deliver multiple drugs simultaneously.

Phase II deliverables:
1. Technical data and results of experiments demonstrating safety, drug PK/PD in serum and drug PK in brain tissue, and therapeutic efficacy of candidate nanoparticle platform + drug formulation(s) in defined non-Good Laboratory Practice (GLP) small (e.g. rodent) animal models of TBI.
2. Plan for securing FDA approval/clearance.

PHASE III DUAL USE APPLICATIONS: Phase III shall focus on transitioning the product from pre-clinical research, through FDA-regulated pathways, to operational capability. This period shall include confirmational testing in large animal models of TBI and securing an FDA application for Phase I (safety) clinical testing. The desired end-product should be suitable for use and procurement in austere battlefield/prehospital environments at role of care (ROC) 1 and 2 levels. During this phase, plans to conduct studies under a formally FDA-regulated framework for product safety and toxicity, PK/PD, optimal dosing concentration and administration regimen(s), release, and shelf-life stability should be formalized with appropriate statistical power for measuring therapeutic efficacy. Considerations at this phase should also include manufacturing readiness to support Phase II and III clinical trials, drug packaging and distribution partnerships, and a plan for scaling to GMP certified manufacturing partners if needed. During this phase, early interactions with the Defense Health Agency Advanced Development Program Management Office would ensure product alignment with military-relevant use requirements outlined in the current concepts of operations as well as establishing relations with respective Product Managers to facilitate communications with the TBI Drug Treatment (TBI-DT) Advanced Development Program. Additional funding may be solicited from the Congressional Directed Medical Research Program's (CDMRP) Joint Warfighter Medical Research Program (JWMRP) who support TBI-related military health efforts. TBI affect both military and civilian populations. Realization of dual-use technology applicable for both military and civilian sector stakeholders could be achieved by analysis for commercial viability for use in prehospital settings, to include first responders, paramedics, and ambulance transport, as well as hospital settings.

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2. Ribovski L, Hamelmann NM, Paulusse JMJ. Polymeric Nanoparticles Properties and Brain Delivery. Pharmaceutics. 2021 Nov 30;13(12):2045. https://doi.org/10.3390/pharmaceutics13122045
3. Natarajan JV, Nugraha C, Ng XW, Venkatraman S. Sustained-release from nanocarriers: a review. J Control Release. 2014 Nov 10;193:122-38 https://doi.org/10.1016/j.jconrel.2014.05.029
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KEYWORDS: Nanoparticles, drug delivery, traumatic brain injury, penetrating brain injury, extended drug release, TBI, skull fracture

Defense Threat Reduction Agency (DTRA)
DoD 2024.3 Small Business Innovation Research (SBIR) Program
Proposal Submission Instructions

INTRODUCTION

The Defense Threat Reduction Agency (DTRA) mission is to enable the DoD, the U.S. Government, and International Partners to counter and deter Weapons of Mass Destruction (WMD) Chemical Biological, Radiological, Nuclear) and Improvised Threat Networks. The DTRA SBIR program is consistent with the purpose of the Federal SBIR/STTR Program, i.e., to stimulate a partnership of ideas and technologies between innovative small business concerns and through Federal-funded research or research and development (R/R&D).

The approved FY24.3 topics solicited for the Defense Threat Reduction Agency (DTRA) Small Business Innovation Research (SBIR) Program are included in these instructions followed by the full topic description. Offerors responding to this Broad Agency Announcement (BAA) must follow all general instructions provided in the related Department of Defense Annual Program BAA and submit proposals by the date and time listed in this release. Specific DTRA requirements that add to or deviate from the DoD Annual Program BAA instructions are provided below with references to the appropriate section of the DoD document.

Proposers are encouraged to thoroughly review the DoD Annual Program BAA and register for the DSIP Listserv to remain apprised of important programmatic and contractual changes.

• The DoD Program BAA is located at: https://www.dodsbirsttr.mil/submissions/solicitation-documents/active-solicitations. Be sure to select the tab for the appropriate BAA cycle.
• Register for the DSIP Listserv at: https://www.dodsbirsttr.mil/submissions/login.

The DTRA Small Business Innovation Research (SBIR) Program is implemented, administered, and managed by the DTRA SBIR/STTR Program Office. Specific questions pertaining to the administration of the DTRA SBIR program, and these proposal preparation instructions should be directed to:

Mr. Mark D. Flohr
DTRA SBIR/STTR Program Manager
Mark.D.Flohr.civ@mail.mil
Tel: (571) 616-6066

Defense Threat Reduction Agency
8725 John J. Kingman Road
Stop 6201
Ft. Belvoir, VA 22060-6201

For technical questions about specific topic requirements during the pre-release period, contact the DTRA Technical Point of Contact (TPOC) for that specific topic. To obtain answers to technical questions during the formal BAA open period, visit: https://www.dodsbirsttr.mil/submissions/login. For questions regarding the Defense SBIR/STTR Innovation Portal, contact DSIP Support at: dodsbirsupport@reisystems.com.

Proposals not conforming to the terms of this announcement will not be considered. DTRA reserves the right to limit awards under any topic, and only those proposals of superior scientific and technical quality as determined by DTRA will be funded.

DTRA may withdraw from negotiations at any time for any reason to include matters of national security (foreign persons, foreign influence or ownership, inability to clear the firm or personnel for security clearances, or other related issues).

This release contains an open topic. As outlined in section 7 of the SBIR and STTR Extension Act of 2022, innovation open topic activities—

(A) Increase the transition of commercial technology to the Department of Defense;
(B) Expand the small business nontraditional industrial base;
(C) Increase commercialization derived from investments of the Department of Defense; and
(D) Expand the ability for qualifying small business concerns to propose technology solutions to meet the needs of the Department of Defense.

Unlike conventional topics, which specify the desired technical objective and output, open topics can use generalized mission requirements or specific technology areas to adapt commercial products or solutions to close capability gaps, improve performance, or provide technological advancements in existing capabilities.

A small business concern may only submit one (1) proposal to each open topic. If more than one proposal from a small business concern is received for a single open topic, only the most recent proposal to be certified and submitted prior to the submission deadline will receive an evaluation. All prior proposals submitted by the small business concern for the same open topic will be marked as nonresponsive and will not receive an evaluation.

PHASE I PROPOSAL GUIDELINES

The Defense SBIR/STTR Innovation Portal (DSIP) is the official portal for DoD SBIR/STTR proposal submission. Proposers are required to submit proposals via DSIP; proposals submitted by any other means will be disregarded. Detailed instructions regarding registration and proposal submission via DSIP are provided in the DoD SBIR Program BAA.

Technical Volume (Volume 2)

The technical volume is not to exceed a 20-page limit and must follow the formatting requirements provided in the DoD SBIR Program BAA. Any pages in the technical volume over 20 pages will not be considered in proposal evaluations.

Content of the Technical Volume

A Phase I Proposal Template is available to provide helpful guidelines for completing each section of your Phase I technical proposal. This can be found at Training Materials (dodsbirsttr.mil)

Offerors should follow the DoD SBIR Program BAA guidelines regarding Technical Volume content.

Cost Volume (Volume 3)

The Phase I Base amount must not exceed $200,000. For the Cost Volume, The Defense Threat Reduction Agency requires the use of a Microsoft excel spread sheet which is available on the DSIP portal. Note: The DTRA Cost Volume template will be accessible once the Cost Volume is initiated.

Important: when completing the cost volume, enough information should be provided to allow the agency to understand how you plan to use the requested funds if a contract is awarded. Itemized costs of any subcontract or consultant should be provided to the same level as for the

prime small business. If an unsanitized version of costs cannot be provided with the proposal, the Government may request it during negotiations if selected. Refer to the instruction provided in the DoD Annual SBIR program BAA for additional details on the content of the Cost Volume.

Note: Cost for travel funds must be justified and related to the needs of the project.

The Phase I Base amount, notwithstanding the amount allocated for TECHNICAL AND BUSINESS ASSISTANCE (TABA), must not exceed $200,000.00. All costs must be clearly identified on the Proposal Cover Sheet (Volume 1) and in Volume 3. [DTRA requires the use of an excel spreadsheet for the Cost Volume. The cost template becomes visible to the offeror when the Cost Volume is initiated.]

Please review the updated Percentage of Work (POW) calculation details included in the DoD Program BAA. For SBIR projects, DTRA normally will not accept any deviation to the POW requirements however if discovered during review in Contracting the offeror may be allowed to revise the cost proposal to be in line with the POW requirements.

Page Limit, Cost and Duration:

Project Phase	Technical Vol Page Limit	Cost	Duration
Phase I	20 pages	$200,000.00	7 Months
Phase II	40 pages	$1,300,000.00	24 Months

Company Commercialization Report (CCR) (Volume 4)

Completion of the CCR as Volume 4 of the proposal submission in DSIP is required. Please refer to the DoD SBIR Program BAA for full details on this requirement. Information contained in the CCR will not be considered by DTRA during proposal evaluations.

Supporting Documents (Volume 5)

Volume 5 is provided for proposing small business concerns to submit additional documentation to support the Coversheet (Volume 1), Technical Volume (Volume 2), and the Cost Volume (Volume 3). Please refer to the DoD Program BAA for more information as to additional supporting documents or information that may be included in Volume 5.

Fraud, Waste and Abuse Training (Volume 6)
Fraud, Waste and Abuse training material can be found in the Volume 6 section of the proposal submission module in DSIP and must be thoroughly reviewed once per year to proceed with proposal submission.

Disclosures of Foreign Affiliations or Relationships to Foreign Countries (Volume 7)
Small business concerns must complete the Disclosures of Foreign Affiliations or Relationships to Foreign Countries webform in Volume 7 of the DSIP proposal submission. Please be aware that the Disclosures of Foreign Affiliations or Relationships to Foreign Countries WILL NOT be accepted as a PDF Supporting Document in Volume 5 of the DSIP proposal submission. Do not upload any previous versions of this form to Volume 5. For additional details, please refer to the DoD SBIR Program BAA.

PHASE II PROPOSAL GUIDELINES

Phase II proposals may only be submitted by Phase I awardees.

Those small business concerns submitting a Phase II proposal should plan to submit a fully developed proposal into the DSIP proposal system within thirty (30) days after the end of the Phase I period of performance. The small business concern may or may not be automatically notified of the recommended proposal due date.

The Phase II proposal Technical Volume should generally follow the outline and structure of the Phase I to include benefits or lessons learned from the Phase I effort.

DTRA plans on a Phase II project not to exceed $1,300,000.00 notwithstanding TABA, and two (2) years duration.

DISCRETIONARY TECHNICAL AND BUSINESS ASSISTANCE (TABA)

In accordance with the Small Business Act (15 U.S.C. 632), DTRA will authorize the recipient of a Phase I or Phase II STTR award to purchase Discretionary Technical & Business Assistance services, such as access to a network of scientists and engineers engaged in a wide range of technologies, or access to technical and business literature available through on-line data bases, for the purpose of assisting in areas such as:

- making better technical decisions concerning such projects,
- solving technical problems which arise during the conduct of such projects,
- minimizing technical risks associated with such projects,
- developing/ commercializing new commercial products/processes resulting from such projects; and meeting cyber security requirements.

If you are proposing use of Discretionary Technical and Business Assistance (TABA), you must provide a cost breakdown in the Cost Volume under "Other Direct Costs (ODCs)" and provide a one-page description of the vendor you will use and the Technical and Business Assistance you will receive. For the Phase I project, the amount for TABA may not exceed $6,500 per award. For the Phase II project, the TABA amount may be less than, equal to, but not more than $50,000 per project. **The description should be included in Volume 5 of the proposal.**

Approval of Discretionary Technical and Business Assistance is not guaranteed and is subject to review of the contracting officer.

For Discretionary Technical and Business Assistance, small business concerns may propose one or more vendors. Additionally, business-related services aimed at improving the commercialization success of a small business concern may be obtained from an entity, such as a public or private organization or an agency or other entity established or funded by a State that facilitates or accelerates the commercialization of technologies or assists in the creation and growth of private enterprises that are commercializing technology.

EVALUATION AND SELECTION

All proposals will be evaluated in accordance with the evaluation criteria listed in the DoD SBIR Program BAA.

Proposing firms will be notified of selection or non-selection status for a Phase I award within 90 days of

the closing date of the BAA. DTRA has a single Evaluation Authority (EA) for all proposals received under this solicitation. The EA either selects or rejects Phase I and Phase II proposals based upon the results of the review and evaluation process plus other considerations including limitation of funds, and investment balance across all the DTRA topics in the solicitation. To provide this balance, a lower rated proposal in one topic could be selected over a higher rated proposal in a different topic. DTRA reserves the right to select all, some, or none of the proposals in a particular topic.

Notifications.

Following the EA decision, the DTRA SBIR/STTR office will release notification e-mails of selection or non-selection status for a Phase I award within 90 days of the closing date of the BAA. The E-mails will be sent to the addresses provided for the Principal Investigator and Corporate Official.

Offerors may request a debriefing of the evaluation of their not selected proposal and should submit this request via email to: dtra.belvoir.RD.mbx.sbir@mail.mil and include **"SBIR 24.3 / Topic XX Debriefing Request" in the subject line**. Debriefings are provided to help improve the offeror's potential response to future solicitations. Debriefings do not represent an opportunity to revise or rebut the EA decision.

For selected offers, DTRA will initiate contracting actions which, if successfully completed, will result in contract award. DTRA Phase I awards are issued as fixed-price purchase orders with a maximum period of performance of seven-months. DTRA may complete Phase I awards without additional negotiations by the contracting officer or without opportunity for revision for proposals that are reasonable and complete.

DTRA Support Contractors

Select DTRA-employed support contractors may have access to contractor information, technical data or computer software that may be marked as proprietary or otherwise marked with restrictive legends. Each DTRA support contractor performs under a contract that contains organizational conflict of interest provisions and/or includes contractual requirements for nondisclosure of proprietary contractor information or data/software marked with restrictive legends. These contractors require access while providing DTRA such support as advisory and assistance services, contract specialist support, and support of the Defense Threat Reduction Information Analysis Center (DTRIAC). The contractor, by submitting a proposal or entering into this contract, is deemed to have consented to the disclosure of its information to DTRA's support contractors.

The following are, at present, the prime contractors anticipated to access such documentation: ASRC Federal (contract specialist support); Kent, Campa and Kate, Inc. (contract closeout support), ARServices (Program Management Advisory and Assistance Services A&AS), Systems Planning and Analysis, Inc. (Subject Matter Expertise A&AS), Amentum (A&AS), Polaris Consulting (Small Business Program Support), Seventh Sense Consulting, LLC (Acquisition Support), Savantage Solutions (Accounting and Financial Systems Support); TekSynap Corporation and Kapili Services, LLC (DTRIAC). This list is not all inclusive (e.g., subcontractors) and is subject to change.

Protests.

Refer to the DoD SBIR Program BAA for procedures to protest the Announcement.

As further prescribed in FAR 33.106(b), FAR 52.233-3, Protests after Award should be submitted to:

(a) Protests, as defined in section 33.101 of the Federal Acquisition Regulation, that are filed directly with an agency, and copies of any protests that are filed with the Government Accountability Office (GAO), shall be served on the Contracting Officer (addressed to Mr. Herbert Thompson, Contracting Officer, as follows) by obtaining written and dated acknowledgment of receipt from (if mailed letter) Defense Threat Reduction Agency, ATTN: AL-ACQ (Mr. Herbert Thompson), 1991 Wyoming Boulevard, SE, Kirtland AFB, NM 87117. If Federal Express is used for the transmittal, the appropriate address is Defense Threat Reduction Agency, ATTN: AL-ACQ (Mr. Herbert Thompson), 8151 Griffin Avenue SE, Building 20414, Kirtland AFB, NM 87117-5669.

AWARD AND CONTRACT INFORMATION

DTRA plans on Phase I projects for a seven (7) month period of performance with six months devoted to the research and the final month for the final report. The award size of the Phase I contract is no more than $200,000.00 notwithstanding a maximum of $6,500.00 for Discretionary Technical and Business Allowance (TABA). For a Phase II project, DTRA plans on a 24-month period of performance. The award size of a Phase II contract is no more than $1,300,000.00 notwithstanding a maximum of $50,000.00 for Discretionary Technical and Business Allowance (TABA) for the entire project.

ADDITIONAL INFORMATION

The International Traffic in Arms Regulations (ITAR), 22 CFR Parts 120 through 130, and the Export Administration Regulations (EAR), 15 CFR Parts 730 through 799, will apply to all projects with military or dual-use applications that develop beyond fundamental research, which is basic and applied research ordinarily published and shared broadly within the scientific community. More information is available at https://www.pmddtc.state.gov/ddtc_public.

The technology within some DTRA topics is restricted under export control regulations including the International Traffic in Arms Regulations (ITAR) and the Export Administration Regulations (EAR). ITAR controls the export and import of listed defense-related material, technical data and services that provide the United States with a critical military advantage. EAR controls military, dual-use and commercial items not listed on the United States Munitions List or any other export control lists. EAR regulates export-controlled items based on user, country, and purpose. **The offeror must ensure that their firm complies with all applicable export control regulations.**

NOTE: Export control compliance statements found in these proposal instructions are not meant to be all inclusive. They do not remove any liability from the submitter to comply with applicable ITAR or EAR export control restrictions or from informing the Government of any potential export restriction as fundamental research and development efforts proceed.

Cyber Security

Any Small Business Concern receiving an SBIR award is required to provide adequate security on all covered contractor information systems. Specific security requirements are listed in DFARS 252.204.7012, and compliance is mandatory.

Feedback

To encourage participation in, and improve the overall SBIR award process, offerors may submit feedback on the SBIR solicitation and award process to: dtra.belvoir.RD.mbx.sbir@mail.mil for consideration for future SBIR BAAs.

DTRA SBIR 24.3 Topic Index

DTRA243-001 TITLE: High/Ultra Performance Concrete Standoff Detection and Diagnosis

OUSD (R&E) CRITICAL TECHNOLOGY AREA(S): Advanced Materials

OBJECTIVE: DTRA seeks technologies that demonstrate capabilities to detect, identify, and differentiate high performance concrete (HPC) and ultra-high performance concrete (UHPC). Ideal systems will provide the end user with a portable, lightweight system that can detect high performance concrete from a large standoff distance. In addition, it is desired for these systems to have the ability to detect flaws and vulnerable areas within concrete structures. The technologies employed to provide advancements in these capabilities may include, but not limited to ultrasonic pulse velocity (UPV), pulsed fiber lasers, laser induced plasma shockwave generation, acoustic technologies, laser-based ultrasonic testing, laser scanning technologies (ex. LiDAR), and laser-induced breakdown spectroscopy (LIBS). The purpose of these technologies is to detect high/ultra performing concrete by assessing the concrete surface, thickness, material property assessment, surface composition, and foundational crack detection. The concrete detection technologies should be able to assess and diagnose high and ultra performance concrete within a short period of time. The end user requires the ability to assess the foundational structures for evidence of HPC or UHPC.

DESCRIPTION: HPC and UHPC offer enhanced performance compared to regular conventional concrete. They both offer higher strength levels, durability and resistance to environmental conditions, low porosity and permeability, enhanced ductility and can be tailored to specific project designs. These characteristics make them favored for high value targets, and their presence may be an important indicator for warfighters regarding structures of interest. The envisioned capability would allow for ground forces or drones to diagnose contrete to aid in creating targeting packages for the best selection of the sometimes limited and highly expensive warheads/weapons to be used.

HPC and UHPC are both advanced types of concrete designed to exhibit superior strength, however, HPC and UHPC have distinct differences. UHPC typical has a much higher compressive and flexural strength compared to HPC. UHPC can achieve compressive strengths exceeding 21,000 psi (145 MPa), while HPC typically ranges from 6,000 to 12,000 psi (41 to 83 MPa). Similarly, UHPC exhibits higher flexural strength, often exceeding 3,000 psi (20 MPa), whereas HPC typically ranges from 500 to 1,500 psi (3.5 to 10 MPa). HPC and UHPC's both utilize very fine powders like silica fume and have an extremely low water to cement ratio. UHPC's may often also incorporate steel or synthetic fibers to enhance toughness and ductility. HPC tends to have lower costs for materials and is more readily available and easier to produce. UHPC requires specialized equipment and expertise to ensure the mixing, casting, and curing fits the project needs.

PHASE I: PHASE I: Conceptual Design
Phase I will result in a final report assessing current capabilities, comparing the technologies results and listing the most promising technologies and methods to provide the capability. Demonstrate the ability to create a device with the technologies to enable the end user to detect HPC and UHPC. Develop initial concept design and model key elements of various technologies that can be utilized within these devices. These devices should be able to identify and differentiate between HPC and UHPC, while assessing the vulnerability of concrete formations at varying distances. Develop and demonstrate prototypes that fit the listed requirements. Phase I close out requires key component technological milestones for at least two prototypes.

PHASE II: PHASE II: Prototype Development
Based on Phase I modeling and design, Phase II begins with prototype development. Construct and demonstrate the basic capabilities of the technology. Initial prototypes should at a minimum have an

effective standoff distance of 30 feet with 5 feet variability. Complete hardware and software development and begin limited basic field-testing objectives; demonstrate the prototypes and their capabilities. Phase II should include an evaluation of the prototype in a realistic environment.

PHASE III DUAL USE APPLICATIONS: PHASE III: Test and Selection
Once the prototypes are developed and have demonstrated success in HPC/UHPC detection, further testing of the equipment should be conducted against various other technologies and results should be compared. Assess the ability of the devices selected to differentiate between HPC and UHPC in addition to assessing concrete foundational vulnerabilities. Testing priorities: 1. Accuracy in HPC and UHPC detection; 2. Effective standoff distance (1000ft); 3. Detecting vulnerabilities and foundational weaknesses within concrete structures. Phase III will be completed once a suitable technological device with the desired is selected. All data collected during the testing and demonstration events of the final chosen system will be included in the final report along with a user's manual.

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KEYWORDS: High performance concrete; sensor; WMD facilities; laser; targeting; ultrasonic pulse velocity (UPV); ultra-high performance concrete

DTRA243-002 TITLE: Quantification of Cumulative Blast Dose to Servicemembers from Repeated Exposures During Heavy Weapon firing in Combat Scenarios

OUSD (R&E) CRITICAL TECHNOLOGY AREA(S): Advanced Computing and Software

OBJECTIVE: Develop computational modeling tools to reconstruct heavy weapon repeated firing events in combat scenarios and to quantify blast exposure and risk injury scores to service members. These tools should enable accurate prediction of the blast dose from a single exposure and the cumulative blast dose from repeated exposures encountered during prolonged firing in combat operations. In combination with the previous effort on computational blast injury modeling, this project will provide supporting information to answer questions from the battalion commanders and the command surgeons.

DESCRIPTION: U.S. Servicemembers experience repeated blast exposures during training and combat. Cumulative effects of such exposure may cause short- and long-term cognitive and neurological effects [1,2, 3]. Unfortunately, objective quantification of the acute and cumulative dose to the whole body and to injury sensitive organs, human brain in particular, remains elusive. Without quantifiable blast dose in the battlefield scenarios, it is difficult to establish correlation between blast exposure and neuro-deficits. Prediction of the single exposure blast loads on the warfighter body (dose) is feasible using either computationally expensive computational fluid dynamics (CFD) tools [4,5] or experimentally calibrated fast running tools [6,7]. Concurrently, a large database has been established characterizing weapon blast signatures from field tests with Tier 1 weapon systems [8]. The video data of the weapon firing crew during training can be used to reconstruct the weapon training scene involving all serviceman. However, weapon firing scene in combat can be vastly different from the weapon firing on training ranges in terms of firing place (desert, concrete, soft sol, gravel, forest, trench, through a window), environment, number and type of fired rounds, firing frequency, proximity of serviceman, and other variables.

Currently there are no computational models that could quantify the cumulative blast dose from repeated blast exposures. Predicted or recorded maximum blast overpressure and impulse on the human body on a training range are useful but not sufficient for physics-based objective quantification of the cumulative dose. Self-reported, carrier-long cumulative exposure blast dose measures (e.g., GBEV) have high uncertainty and cannot be used in the acute period [8]. Servicemen who are repeatedly exposed to weapons blasts often cannot pinpoint a specific traumatic event, recall their role in the combat crew, recall the number and type of fired rounds or remember their altered state of consciousness [1].

PHASE I: In Phase I the modeling framework should be validated on at least three weapons systems, including mortar, artillery and shoulder mounted rifles using existing field weapon training data. A novel, mechanistic model of the cumulative blast dose from repeated exposures in various combat scenarios should be formulated and discussed with the DTRA team.

PHASE II: In Phase II, the work shall focus on generating blast exposure scenes for key Tier I weapons and validating the blast dose model on existing field data for both the training and live-fire rounds. It will also include virtually reconstructing weapon firing scenes with prolonged multiple firings typical to combat, developing a reduced-order model of blast energy deposition/absorption in injury-sensitive organs, and creating a user-friendly version of the computational tools for different computing platforms, such as tablets and cell phones. Finally, these tools shall be applicable for incorporation into the DTRA Reachback environment providing 24/7 supporting to customers from US Services.

PHASE III DUAL USE APPLICATIONS: The program will be used to support Reachback operation once the model is constructed.

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KEYWORDS: Blast dose, computational modeling, exposure, injuries, battlefield

DTRA243-003 TITLE: AI/ML Data Extraction from Scientific Documents

OUSD (R&E) CRITICAL TECHNOLOGY AREA(S): Advanced Computing and Software;Human-Machine Interfaces

OBJECTIVE: The Defense Threat Reduction Agency (DTRA) seeks to develop AI/ML models and pipelines capable of identifying, extracting, and processing elements from scanned technical and scientific documents. This project aims to automate the extraction of tables, plots, photos, and other elements embedded within structured and unstructured text, ensuring high fidelity and accuracy in a production environment.

DESCRIPTION: The Defense Threat Reduction Information Analysis Center (DTRIAC) houses a wealth of technical documents and multimedia related to national nuclear projects. Much of this information is still non-digital, and the digitized documents often suffer from structural inconsistencies. This project proposes the development of AI/ML models and pipelines to automate the extraction and processing of document elements, enhancing the fidelity of digitized information and increasing the throughput of scanning processes. The solution will comply with DoD and NIST guidelines, ensuring secure and efficient operations.

Key Features:
- Identification and Extraction: Automatically identify and extract elements such as tables, plots, and photos from scientific documents.
- Additional Processing: Perform additional processing on extracted elements, such as transposing tables and identifying explicit and implicit axis values in plots.
- Automation: Ensure every step – identification, extraction, and processing – is fully automated and system agnostic.
- Deployment: Develop models and pipelines that are containerized, capable of being hardened, and ready for immediate deployment in a production environment.

ATTRIBUTES DESIRED:
- Compatibility: The solution must ingest documents in common formats (e.g., PDF) and output data in standard formats (e.g., JSON, XML).
- Robustness: The models must handle digitized documents with readability artifacts and be stable for long-term use.
- Modularity: The solution should be modular, pipeline, and system agnostic, and interoperable with other modern software.
- Security: All computations must be performed locally with no off-premises resource access, ensuring data security and compliance with DoD and NIST standards.

POTENTIAL MARKET:
The primary customer for this technology is the Defense Threat Reduction Agency (DTRA). Additionally, the broader U.S. defense sector, including various military branches and defense contractors, can benefit from this technology by automating the extraction and processing of scientific and technical document elements.

EXPECTED OUTCOMES:
- Standalone Pipeline: A fully operational pipeline capable of running in an air-gapped environment without internet connectivity.
- Comprehensive Data Extraction Tool: A tool that processes scientific documents, extracting and processing elements such as tables and plots, and providing the data in standard, machine-readable formats.

PHASE I: PHASE I – Proof of Concept:
Objective:
Define, develop, and determine the feasibility of AI/ML models for identifying, extracting, and processing elements from scientific documents.

Required Efforts:

1. Literature Review and Requirements Analysis:
    - Conduct a comprehensive review of existing technologies and methodologies related to document element and layout extraction.
    - Identify specific requirements and constraints of DTRIAC's documents.
2. Development of Initial Models:
    - Element Identification and Extraction: Develop AI/ML models to identify and extract elements like tables, plots, and photos.
    - Additional Processing: Implement techniques to process extracted elements (e.g., transposing tables, identifying axis values).
3. Integration and Testing:
    - Integrate the initial models into a cohesive proof-of-concept pipeline.
    - Test the pipeline using a representative sample set of documents.
    - Evaluate the performance of the models in terms of accuracy, efficiency, and usability.
4. Technical Report:
    - Prepare a detailed technical report summarizing the proof of concept.
    - Include results from initial testing, highlighting the performance of the models and identifying any areas for improvement.
    - Propose a detailed plan for Phase II prototype development, outlining the steps required to refine and expand the models and pipeline.

Deliverables:

- Technical Report: A comprehensive report detailing the literature review, development process, testing results, and Phase II plan.
- Proof-of-Concept Pipeline: An initial version of the pipeline demonstrating the feasibility of the proposed solution.

PHASE II: PHASE II – Prototype Development:
Objective:
Develop, demonstrate, and validate a fully functional prototype of the AI/ML data extraction and processing system, ready for deployment and evaluation.

Required Efforts:

1. Refinement and Optimization:
    - Refine the AI/ML models based on feedback and results from Phase I.
    - Optimize the models for improved accuracy, efficiency, and scalability.
2. Prototype Development:
    - Develop a robust and scalable pipeline integrating refined models.
    - Ensure the pipeline can operate in a standalone, air-gapped environment without internet connectivity.
    - Implement server-side functionality to support user-side applications, ensuring compatibility with both traditional application-centric and on-premises cloud services environments.
3. Functional and Security Testing:

- Conduct comprehensive functional testing to ensure the pipeline accurately identifies, extracts, and processes document elements.
- Perform security testing to verify the pipeline's resilience against potential security threats and vulnerabilities.

4. User Interface and Usability Testing:
   - Develop a user-friendly interface to present the extracted information to end-users.
   - Conduct usability testing with potential end-users to gather feedback and make necessary improvements.
5. Documentation and Training:
   - Prepare detailed documentation covering the installation, operation, and maintenance of the prototype.
   - Provide training materials and sessions for end-users to ensure effective use of the system.

Deliverables:

- Functional Prototype: A fully operational prototype ready for deployment and evaluation.
- Testing Reports: Comprehensive reports detailing the results of functional, security, and usability testing.
- Documentation: Complete user manuals, operational guides, and maintenance documentation.
- Training Materials: Training resources, including guides and sessions, to support end-users in utilizing the prototype effectively.

PHASE III DUAL USE APPLICATIONS:

PHASE III – Prototype Refinement:

Objective: Refine the AI/ML data extraction and processing system developed in Phase II. Apply the prototype to DTRA-specific scenarios.

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KEYWORDS: table extraction, chart extraction, document analysis, information extraction, automated classification review, artificial intelligence, natural language processing, machine learning

DTRA243-004 TITLE: Predictive Methodology for Tamped Direct Laser Impulse Parameter Optimization

OUSD (R&E) CRITICAL TECHNOLOGY AREA(S): Advanced Materials

The technology within this topic is restricted under the International Traffic in Arms Regulation (ITAR), 22 CFR Parts 120-130, which controls the export and import of defense-related material and services, including export of sensitive technical data, or the Export Administration Regulation (EAR), 15 CFR Parts 730-774, which controls dual use items. Offerors must disclose any proposed use of foreign nationals (FNs), their country(ies) of origin, the type of visa or work permit possessed, and the statement of work (SOW) tasks intended for accomplishment by the FN(s) in accordance with the Announcement. Offerors are advised foreign nationals proposed to perform on this topic may be restricted due to the technical data under US Export Control Laws.

OBJECTIVE: Develop and demonstrate a fast-running approach, tool, or methodology for determining the necessary laser and tamper parameters to achieve a desired impulse on a material or 3D structure of interest.

DESCRIPTION: Since the cessation of underground nuclear testing, the Department of Defense has utilized multiple types of simulators to impart relevant impulses to materials, structures, and systems. Recently, it has become possible to utilize lasers to impart relevant impulses directly on material coupon samples and 3D structures on the 1-1000 cm2 scale, with or without the use of transparent tampers. It is known that the resultant impulse imparted into a material, structure, or system will depend on the laser parameters (energy, pulse shape, wavelength), tamper parameters (material, thickness, adhesion layer), and substrate material thickness and geometry. While it is possible to model with varying degrees of uncertainty the relevant physics and materials interaction to predict the resulting impulse for a given set of parameters, there doesn't currently exist a predictive tool for experimental design that can work backwards from a desired impulse strength and profile to calculate the appropriate laser and tamper parameters.

Multiple modeling uncertainties and experimental variabilities complicate predictive modeling of the resultant impulse. It is desired that any technical approach, method, or tool for predicting direct laser impulse be able to determine and propagate these uncertainties to inform and bound experimental design. Experimental variabilities include, but are not limited to, laser power, laser timing and pulse shape, laser spatial uniformity, tamper uniformity, tamper adhesion, substrate surface preparation, and diagnostic response.

Of particular interest are laser parameters between 6J/cm2 and 30J/cm2 with square laser pulses between 5-20ns at 2ω (0.53 μm). Substrate materials of interest include, but are not limited to, aluminum, titanium, stainless steel, and tape wound carbon phenolics. Tamper materials of interest include, but are not limited to, PTFE tape, fused silica, sapphire, and LiF.

PHASE I: The primary deliverable of Phase 1 is a technical approach, conceptual method, or tool concept for backward calculating laser and tamper parameters to deliver a specified impulse and predict diagnostic signals, such as PDI. A proof of concept with 1D code, flat samples, and limited materials is acceptable for Phase 1.

PHASE II: Phase 2 should focus on the development and refinement of the technical approach, method, or tool from Phase 1, including the addition of multiple substrate and tamper materials. Phase II should include an approach to 3D structures and graded tampers as well as propagation of uncertainties. It is

suggested that Phase 2 include verification and validation through a comparison to existing experimental data.

PHASE III DUAL USE APPLICATIONS: Phase 3 may involve additional refinement of the technical approach, method, or tool developed in prior phases as well as integration of prior test data and diagnostic outputs. Further, Phase 3 may include automation, development of user interfaces, and additional substrates and tamper materials. Verification and validation with multiple experimental results would also be expected in Phase 3.

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KEYWORDS: NIF-DLI, Direct Laser Impulse, Tamper

DTRA243-005 TITLE: Nuclear Plume Advisory Algorithm

OUSD (R&E) CRITICAL TECHNOLOGY AREA(S): Integrated Sensing and Cyber

OBJECTIVE: DTRA seeks methods to detect the plume from an atmospheric nuclear explosion and derive plume characteristics (height, extent, direction of movement, radiation hazard, etc.) from multisource satellite observations.

DESCRIPTION: The United States, its allies, and its partners must be capable of conducting continuous combat operations in a nuclear environment. Accordingly, to mitigate the severity of nuclear weapon effects on military operations, the Department of Defense needs the ability to give sufficient warning so units can maneuver and avoid areas of impending or actual residual radiation.

With advancements in Earth observation (EO) satellites, the possibility of spaceborne products for aerosol layer height or plume injection height have recently emerged with increased global-scale spatiotemporal resolution. However, there is still a need to evaluate the nuclear plume column radiative effects, develop satellite remote-sensing techniques, and refine algorithms for retrieving plume characteristics.
This effort will demonstrate the ability to produce detailed information on nuclear plume movements and projected fallout hazard areas to support planning and conduct operations in a fallout-contaminated environment.

PHASE I: This effort will focus on determining which satellite products are most appropriate for deriving plume characteristics near a nuclear detonation event and estimating downwind plume rise height under multiple aerosol loadings.

PHASE II: This effort will develop prototype algorithms and demonstrate on simulated scenes representing satellite products from modeled nuclear plumes that will be made available during at the start of the phase.

PHASE III DUAL USE APPLICATIONS: This effort will develop an application to collect satellite data; execute the nuclear advisory algorithms for producing a fallout plume forecast; and provide a graphical display tool for viewing the various satellite and residual radiation datasets. The components of the application should be able to operate in a decision support mode or an archive mode. The archive mode allows the user to re-run with new user-specified parameters and view historical datasets. The application must be able to deploy onto a DoD network with the appropriate software cyber security. The dual-use application is as a system for civilian use in support of crisis response following a nuclear detonation.

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KEYWORDS: Nuclear detonation; radiation; fallout; plume; meteorology; multispectral; operational algorithm

DTRA243-P01 TITLE: Open Topic - Synthetic and Game Environments for Information Resilience Training and Exercises

OUSD (R&E) CRITICAL TECHNOLOGY AREA(S): Trusted AI and Autonomy

OBJECTIVE: Develop synthetic and game environments for information resilience training and exercises to understand and mitigate Foreign Malign Influence (FMI).

DESCRIPTION: Foreign Malign Influence (FMI) campaigns pose a significant risk to DTRA and related US government (USG) programs by targeting them with disinformation and propaganda. Information resilience is crucial for understanding and mitigating FMI risks to missions such as building capabilities for counter-proliferation and biosafety. Information Resilience is the ability to proactively anticipate, prepare, and adapt to changing global information environment conditions and better defend an agency, its people, and its partners in the face of foreign malign influence activities. Instilling information resilience skills in the workforce requires ongoing training and exercises that provides awareness of the evolving information environment, threat landscape, and mitigating actions. Games and synthetic environments can bring an immersive experience that improves learning and the user experience far beyond what is possible with more static, less interactive text- or video-based training aids alone. Serious games have been used for establishing awareness of the information environment and threat actors. Artificial Intelligence (AI) has been used to generate scenario-driven, realistic synthetic social media environments (e.g., via large language models), create agents that can dynamically respond to user interactions, and thus increase realism and customizability of training and exercises for a variety of missions and scenarios.

PHASE I: Phase I effort will identify available and emerging concepts and technologies for fostering information resilience and develop a prototype training game that addresses FMI in a relevant mission space. The survey will examine relevant games and gaming technology and their applicability, realism, customizability, user engagement, configuration effort, data requirements, and other relevant factors. Phase I effort will also create or adapt a proof-of-concept information resilience game or game-like environment for training purposes and conduct an objective assessment of the game and the game development effort. Phase I will deliver the game software and documentation along with a final report.

PHASE II: Phase II will effort focus on evolving the Phase I proof-of-concept into a prototype that can also support information resilience training in exercise context. This will require modifications to support increased realism/fidelity and exercise-specific pedagogical objectives, scenarios, and data. Phase II will deliver the software and documentation along with a final report that includes an objective assessment of the training software in an exercise context.

PHASE III DUAL USE APPLICATIONS: The performer will refine the Phase II prototype by increasing its applicability and usability to support a broader range of mission training/exercise scenarios and training objectives. It is anticipated that the company will be able to leverage the innovative technologies associated with this topic to provide compelling strategic gaming products for the commercial market.

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KEYWORDS: foreign malign influence, disinformation, training, synthetic environments, serious games, PAI, information environment, AI

Missile Defense Agency (MDA)
24.3 Small Business Innovation Research (SBIR)
Proposal Submission Instructions

INTRODUCTION

The Missile Defense Agency's (MDA) mission is to develop and deploy a layered Missile Defense System to defend the United States, its deployed forces, allies, and friends from missile attacks in all phases of flight.

The MDA Small Business Innovation Research (SBIR) Program is implemented, administered, and managed by the MDA SBIR/Small Business Technology Transfer (STTR) Program Management Office (PMO), located within the Innovation, Science, & Technology (DV) directorate.

Offerors responding to a topic in this Broad Agency Announcement (BAA) must follow all general instructions provided in the Department of Defense (DoD) SBIR Program BAA. MDA requirements in addition to or deviating from the DoD Program BAA are provided in the instructions below.

Proposers are encouraged to thoroughly review the DoD Program BAA and register for the Defense SBIR/STTR Innovation Portal (DSIP) Listserv to remain apprised of important programmatic and contractual changes.

- Full component-specific instructions and topic descriptions are available on DSIP at https://www.dodsbirsttr.mil/submissions/solicitation-documents/active-solicitations. Be sure to select the tab for the appropriate BAA cycle.
- Register for the DSIP Listserv at: https://www.dodsbirsttr.mil/submissions/login.

Specific questions pertaining to the administration of the MDA SBIR Program and these proposal preparation instructions should be directed to:

Missile Defense Agency
SBIR/STTR Program Management Office
MDA/DVA
Bldg. 5224, Martin Road
Redstone Arsenal, AL 35898
Email: sbirsttr@mda.mil

PLEASE NOTE: It is possible that proposals not conforming to the terms of this announcement will not be considered for negotiation and/or award. MDA reserves the right to limit awards under any topic, and only those proposals of superior scientific and technical quality as determined by MDA will be funded. MDA reserves the right to withdraw from negotiations at any time prior to contract award. The Government may withdraw from negotiations at any time for any reason to include, but not limited to, matters of national security (foreign persons, foreign influence or ownership, inability to clear the firm or personnel for security clearances, or other related issues).

Please read the entire DoD Announcement and MDA instructions carefully prior to submitting your proposal. Please go to https://www.sbir.gov/about#policy-directive to read the SBIR/STTR Policy Directive issued by the Small Business Administration.

PHASE I PROPOSAL GUIDELINES

DSIP is the official portal for DoD SBIR/STTR proposal submission. Offerors are required to submit proposals via DSIP; proposals submitted by any other means will be disregarded. Detailed instructions regarding registration and proposal submission via DSIP are provided in the DoD SBIR Program BAA.

DSIP (available at https://www.dodsbirsttr.mil) will lead you through the preparation and submission of your proposal. Read the front section of the DoD announcement for detailed instructions on proposal format and program requirements. Proposals not conforming to the terms of this announcement may not be considered.

MDA's objective for Phase I is to determine the merit and technical feasibility of the concept. The contract period of performance for Phase I is six months.

Proposal Cover Sheet (Volume 1)

On DSIP at https://www.dodsbirsttr.mil/submissions, prepare the Proposal Cover Sheet.

Technical Volume (Volume 2)

The technical volume is not to exceed 15 pages and must follow the formatting requirements provided in the DoD SBIR Program BAA. Any pages submitted beyond the 15 page limit will not be evaluated.

Content of the Technical Volume

For technical volume format guidance, please refer to the "Format of Technical Volume" section within the DoD SBIR 24.3 BAA.

If including a letter(s) of support and/or Technical and Business Assistance (TABA) request, it must be included as part of Volume 5 and will not count towards the 15 page Technical Volume (Volume 2) limit. Any technical data/information that should be in the Technical Volume (Volume 2) but is contained in other Volumes will not be considered.

Cost Volume (Volume 3)

The Phase I Base amount must not exceed $180,000 or not to exceed $185,000 if TABA is included. MDA does not utilize the Phase I Option.

Company Commercialization Report (CCR) (Volume 4)

Completion of the CCR as Volume 4 of the proposal submission in DSIP is required. Please refer to the DoD SBIR Program BAA for full details on this requirement. Information contained in the CCR will not be considered by MDA during proposal evaluations.

Supporting Documents (Volume 5)

MDA will accept the following documents under Volume 5:

1. Contractor Certification Regarding Provision of Prohibition on Contracting for Certain Telecommunications and Video Surveillance Services or Equipment (Required)
2. TABA Request (Optional)
3. Letter of Support (Optional)

   Please refer to the DoD Program BAA for more information regarding Contractor Certification Regarding Provision of Prohibition on Contracting for Certain Telecommunications and Video Surveillance Services or Equipment

   If including a request for TABA, the MDA Phase I TABA Form MUST be completed and uploaded using the "Other" category within Volume 5 of DSIP.

If including letters of support, they MUST be uploaded using the "Letters of Support" category within Volume 5 of DSIP. A qualified letter of support is from a relevant commercial or Government Agency procuring organization(s) working with MDA, articulating their pull for the technology (i.e., what MDS need(s) the technology supports and why it is important to fund it), and possible commitment to provide additional funding and/or insert the technology in their acquisition/sustainment program. Letters of support shall not be contingent upon award of a subcontract.

Any additional documentation included as part of Volume 5 WILL NOT be considered.

Fraud, Waste and Abuse Training (Volume 6)
Small business concerns must complete the Fraud, Waste, and Abuse training module available on DSIP.

Disclosures of Foreign Affiliations or Relationships to Foreign Countries (Volume 7)
Small business concerns must complete the Disclosures of Foreign Affiliations or Relationships to Foreign Countries webform in Volume 7 of the DSIP proposal submission. Please be aware that the Disclosures of Foreign Affiliations or Relationships to Foreign Countries WILL NOT be accepted as a PDF Supporting Document in Volume 5 of the DSIP proposal submission. Do not upload any previous versions of this form to Volume 5. For additional details, please refer to the DoD SBIR Program BAA.

PHASE II PROPOSAL GUIDELINES

Phase II proposals may only be submitted by Phase I awardees. Details on the due date, format, content, and submission requirements of the Phase II proposal will be provided by the MDA SBIR/STTR PMO during the fourth month of the Phase I period of performance.

MDA will evaluate and select Phase II proposals using the Phase II evaluation criteria listed in the DoD Program announcement. While funding must be based upon the results of work performed under a Phase I award and the scientific and technical merit, feasibility and commercial potential of the Phase II proposal, Phase I final reports will not be reviewed as part of the Phase II evaluation process. The Phase II proposal should include a concise summary of the Phase I effort including the specific technical problem or opportunity addressed and its importance, the objective of the Phase I effort, the type of research conducted, findings or results of this research, and technical feasibility of the proposed technology. Due to limited funding, MDA reserves the right to limit awards under any topic and only proposals considered to be of superior quality will be funded.

All Phase II awardees must have a Defense Contract Audit Agency (DCAA) approved accounting system. It is strongly urged that an approved accounting system be in place prior to the MDA Phase II award timeframe. If you do not have a DCAA approved accounting system, this will delay/prevent Phase II contract award. Please visit https://www.dcaa.mil/Customers/Small-Business for more information on obtaining a DCAA approved accounting system.

DISCRETIONARY TECHNICAL AND BUSINESS ASSISTANCE (TABA)

The SBIR/STTR Policy Directive allows agencies to enter into agreements with suppliers to provide technical assistance to SBIR and STTR awardees, which may include access to a network of scientists and engineers engaged in a wide range of technologies or access to technical and business literature available through on-line databases.

All requests for TABA must be completed using the MDA SBIR/STTR Phase I TABA Form and included as a part of Volume 5 using the "Other" category within DSIP. MDA will not accept requests

for TABA that do not utilize the MDA SBIR/STTR Phase I TABA Form or are not provided as part of Volume 5 of the Phase I proposal package.

A SBIR firm may acquire the technical assistance services described above on its own. Firms must request this authority from MDA and demonstrate in its SBIR proposal that the individual or entity selected can provide the specific technical services needed. In addition, costs must be included in the cost volume of the offeror's proposal. The TABA provider may not be the requesting firm, an affiliate of the requesting firm, an investor of the requesting firm, or a subcontractor or consultant of the requesting firm otherwise required as part of the paid portion of the research effort (e.g. research partner or research institution).

If the awardee supports the need for this requirement sufficiently as determined by the Government, MDA will permit the awardee to acquire such technical assistance, in an amount up to $5,000 per year. This will be an allowable cost on the SBIR award. The per year amount will be in addition to the award and is not subject to any burden, profit or fee by the offeror. The per-year amount is based on the original contract period of performance and does not apply to period of performance extensions. Requests for TABA funding outside of the base period of performance (6 months) for Phase I proposal submission will not be considered.

The purpose of this technical assistance is to assist SBIR awardees in:

1. Making better technical decisions on SBIR projects;
2. Solving technical problems that arise during SBIR projects;
3. Minimizing technical risks associated with SBIR projects; and
4. Developing and commercializing new commercial products and processes resulting from such projects including intellectual property protections.

The MDA Phase I TABA form can be accessed here: (https://www.mda.mil/global/documents/pdf/SBIR_STTR_PHI_TABA_Form.pdf) and must be included as part of Volume 5 using the "Other" category.

EVALUATION AND SELECTION

All proposals will be evaluated in accordance with the evaluation criteria listed in the DoD SBIR Program BAA. Selections will be based on best value to the Government considering the evaluation criteria listed in the DoD SBIR Program BAA which are listed in descending order of importance.

MDA reserves the right to award none, one, or more than one contract under any topic. MDA is not responsible for any money expended by the offeror before award of any contract. Due to limited funding, MDA reserves the right to limit awards under any topic and only proposals considered to be of superior quality as determined by MDA will be funded.

Please note that potential benefit to the MDS will be considered throughout all the evaluation criteria and in the best value trade-off analysis. When combined, the stated evaluation criteria are significantly more important than cost or price.

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

AWARD AND CONTRACT INFORMATION

The MDA SBIR/STTR PMO will distribute selection and non-selection email notices to all firms who submit an MDA SBIR proposal. Proposing firms will be notified of selection or non-selection status for a Phase I award within 90 days of the closing date of the BAA. The email will be distributed to the "Corporate Official" and "Principal Investigator" listed on the proposal coversheet and will originate from the sbirsttr@mda.mil email address. MDA cannot be responsible for notification to a company that provides incorrect information or changes such information after proposal submission.

MDA will provide written feedback to unsuccessful offerors regarding their proposals upon request. Requests for feedback must be submitted in writing to the MDA SBIR/STTR PMO within 30 calendar days of non-selection notification. Non-selection notifications will provide instructions for requesting proposal feedback. Only firms that receive a non-selection notification are eligible for written feedback. Refer to the DoD SBIR Program BAA for procedures to protest the announcement.

As further prescribed in Federal Acquisition Regulation (FAR) 33.106(b), FAR 52.233-3, Protests after award should be submitted to Candace Wright via email: sbirsttr@mda.mil.

The MDA will issue all contract awards. The cognizant Government Contracting Officer is the only Government official authorized to enter into any binding agreement or contract on behalf of the Government.

Offeror Small Business Eligibility Requirements

Each offeror must qualify as a small business at time of award per the Small Business Administration's (SBA) regulations at 13 CFR 121.701-121.705 and certify to this in the Cover Sheet section of the proposal. Small businesses that are selected for award will also be required to submit a Funding Agreement Certification document and be registered with Supplier Performance Risk System https://www.sprs.csd.disa.mil/ prior to award.

Ownership Eligibility

Prior to award, MDA may request business/corporate documentation to assess ownership eligibility as related to the requirements of SBIR/STTR Program Eligibility. These documents include, but may not be limited to, the Business License; Articles of Incorporation or Organization; By-Laws/Operating Agreement; Stock Certificates (Voting Stock); Board Meeting Minutes for the previous year; and a list of all board members and officers. If requested by MDA, the offeror shall provide all necessary documentation for evaluation prior to SBIR award. Failure to submit the requested documentation in a timely manner as indicated by MDA may result in the offeror's ineligibility for further consideration for award.

Performance Benchmark Requirements for Phase I Eligibility

MDA does not accept proposals from firms that are currently ineligible for Phase I awards as a result of failing to meet the benchmark rates at the last assessment. Additional information on Benchmark Requirements can be found in the DoD SBIR/STTR Program BAA.

References to Hardware, Computer Software, or Technical Data

In accordance with the SBIR/STTR Policy Directive, the work within the SBIR/STTR contracts are to conduct feasibility-related experimental or theoretical Research/Research and Development (R/R&D) related to described agency requirements. The purpose for Phase I is to determine the scientific and technical merit and feasibility of the proposed effort.

It is not intended for any formal end-item contract delivery and ownership by the Government of your hardware, computer software, or rights in your technical data. As a result, your technical proposal should not contain any reference to the term "Deliverables" when referring to your hardware, computer software,

or technical data. Instead use the term: "Products for Government Testing, Evaluation, Demonstration, and/or possible destructive testing."

The standard (if applicable) formal deliverables for a Phase I are the:
A001: Report of Invention(s), Contractor, and/or Subcontractor(s) // Patent Application for Invention
A002: Status Report // Phase I Bi-monthly Status Report
A003: Contract Summary Report // Phase I Final Report
A004: Certification of Compliance // SBIR Funding Agreement Certification - Life Cycle Certification
A005: Computer Software Product // Product Description
A006: Technical Report - Study Services // Prototype Design and Operation Document

FAR 52.203-5 Covenant Against Contingent Fees
As prescribed in FAR 3.404, the following FAR 52.203-5 clause shall be included in all contracts awarded under this BAA:

(a) The Contractor warrants that no person or agency has been employed or retained to solicit or obtain this contract upon an agreement or understanding for a contingent fee, except a bona fide employee or agency. For breach or violation of this warranty, the Government shall have the right to annul this contract without liability or to deduct from the contract price or consideration, or otherwise recover, the full amount of the contingent fee.

(b) Bona fide agency, as used in this clause, means an established commercial or selling agency, maintained by a contractor for the purpose of securing business, that neither exerts nor proposes to exert improper influence to solicit or obtain Government contracts nor holds itself out as being able to obtain any Government contract or contracts through improper influence.

"Bona fide employee," as used in this clause, means a person, employed by a contractor and subject to the contractor's supervision and control as to time, place, and manner of performance, who neither exerts nor proposes to exert improper influence to solicit or obtain Government contracts nor holds out as being able to obtain any Government contract or contracts through improper influence.

"Contingent fee," as used in this clause, means any commission, percentage, brokerage, or other fee that is contingent upon the success that a person or concern has in securing a Government contract.

"Improper influence," as used in this clause, means any influence that induces or tends to induce a Government employee or officer to give consideration or to act regarding a Government contract on any basis other than the merits of the matter.

ADDITIONAL INFORMATION

Federally Funded Research and Development Centers (FFRDCs) and Support Contractors
Only Government personnel with active non-disclosure agreements will evaluate proposals. Non-Government support contractors and FFRDCs (consultants) to the Government may review and provide support in proposal evaluations during source selection. Consultants may have access to the offeror's proposals, may be utilized to review proposals, and may provide comments and recommendations to the Government's decision makers. Consultants will not establish final assessments of risk and will not rate or rank offerors' proposals. They are also expressly prohibited from competing for MDA SBIR awards in the SBIR topics they review and/or on which they provide comments to the Government.

All consultants are required to comply with procurement integrity laws. Consultants will not have access to proposals or pages of proposals that are properly labeled by the offerors as "Government Only."

Pursuant to FAR 9.505-4, the MDA contracts with these organizations include a clause which requires them to (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. In addition, MDA requires the employees of those support contractors that provide technical analysis to the SBIR/STTR Program to execute non-disclosure agreements. These agreements will remain on file with the MDA SBIR/STTR PMO.

Non-Government consultants will be authorized access to only those portions of the proposal data and discussions that are necessary to enable them to perform their respective duties. In accomplishing their duties related to the source selection process, employees of the aforementioned organizations may require access to proprietary information contained in the offerors' proposals.

SBA Company Registry

Per the SBIR/STTR Policy Directive, all applicants are required to register their firm at SBA's Company Registry prior to submitting a proposal. Upon registering, each firm will receive a unique control Identification number to be used for submissions at any of the participating agencies in the SBIR or STTR program. For more information, please visit the SBA's Firm Registration Page: http://www.sbir.gov/registration.

Organization Conflicts of Interest (OCI)

The basic OCI rules for Contractors that support development and oversight of SBIR topics are covered in 9.505-1 through FAR 9.505-4 as the means of avoiding, neutralizing, or mitigating organizational conflicts of interest.

All applicable rules under the FAR 9.5 apply.

If you, or another employee in your company, developed or assisted in the development of any SBIR requirement or topic, please be advised that your company may have an OCI. Your company could be precluded from an award under this BAA if your proposal contains anything directly relating to the development of the requirement or topic. Before submitting your proposal, please examine any potential OCI issues that may exist with your company to include subcontractors and understand that if any exist, your company may be required to submit an acceptable OCI mitigation plan prior to award.

In addition, FAR 3.101-1 states that "Government business shall be conducted in a manner above reproach and, except as authorized by statute or regulation, with complete impartiality and with preferential treatment for none." The general rule is to avoid strictly any conflict of interest or even the appearance of a conflict of interest in Government-contractor relationships. An appearance of impropriety may arise where an offeror may have gained an unfair competitive advantage through its hiring of, or association with, a former Government official if there are facts indicating the former Government official, through their former Government employment, had access to non-public, competitively useful information. (See *Health Net Fed. Svcs*, B-401652.3; *Obsidian Solutions Group*, LLC, B-417134, 417134.2). The existence of an unfair competitive advantage may result in an offeror being disqualified and this restriction cannot be waived.

It is MDA policy to ensure all appropriate measures are taken to resolve OCI's arising under FAR 9.5 and unfair competitive advantages arising under FAR 3.101-1 to prevent the existence of conflicting roles that might bias a contractor's judgment and deprive MDA of objective advice or assistance, and to prevent contractors from gaining an unfair competitive advantage.

Use of Foreign Nationals (also known as Foreign Persons), Green Card Holders, and Dual Citizens

See the "Foreign Nationals" section of the DoD SBIR Program announcement for the definition of a Foreign National (also known as Foreign Persons).

ALL offerors proposing to use foreign nationals, green-card holders, or dual citizens, MUST disclose this information regardless of whether the topic is subject to export control restrictions. Identify any foreign nationals or individuals holding dual citizenship expected to be involved on this project as a direct employee, **subcontractor, or consultant.** For these individuals, please specify their country of origin, the type of visa or work permit under which they are performing and an explanation of their anticipated level of involvement on this project. You may be asked to provide additional information during negotiations in order to verify the foreign citizen's eligibility to participate on a SBIR contract. Supplemental information provided in response to this paragraph will be protected in accordance with the Privacy Act (5 U.S.C. 552a), if applicable, and the Freedom of Information Act (5 U.S.C. 552(b)(6)).

Proposals submitted to export control-restricted topics and/or those with foreign nationals, dual citizens, or green card holders listed will be subject to security review during the contract negotiation process (if selected for award). MDA reserves the right to vet all un-cleared individuals involved in the project, regardless of citizenship, who will have access to Controlled Unclassified Information (CUI) such as export controlled information. If the security review disqualifies a person from participating in the proposed work, the contractor may propose a suitable replacement. In the event a proposed person and/or firm is found ineligible by the Government to perform proposed work, the Contracting Officer will advise the offeror of any disqualifications but is not required to disclose the underlying rationale.

Export Control Restrictions

The technology within most MDA topics is restricted under export control regulations including the International Traffic in Arms Regulations (ITAR) and the Export Administration Regulations (EAR). ITAR controls the export and import of listed defense-related material, technical data and services that provide the United States with a critical military advantage. EAR controls military, dual-use and commercial items not listed on the United States Munitions List or any other export control lists. EAR regulates export controlled items based on user, country, and purpose. The offeror must ensure that their firm complies with all applicable export control regulations. Please refer to the following URLs for additional information: https://www.pmddtc.state.gov/ and https://www.bis.doc.gov/index.php/regulations/export-administration-regulations-ear.

Most MDA SBIR topics are subject to ITAR and/or EAR. If the topic write-up indicates that the topic is subject to ITAR and/or EAR, your company may be required to submit a Technology Control Plan (TCP) during the contracting negotiation process.

Flow-Down of Clauses to Subcontractors

The clauses to which the prime contractor and subcontractors are required to comply include, but are not limited to the following clauses: MDA clause H-08 (Public Release of Information), DFARS 252.204-7000 (Disclosure of Information), DFARS clause 252.204-7012 (Safeguarding Covered Defense Information and Cyber Incident Reporting), and DFARS clause 252.204-7020 (NIST SP 800-171 DoD Assessment Requirements). Your proposal submission confirms that any proposed subcontract is in accordance to the clauses cited above and any other clauses identified by MDA in any resulting contract. All proposed universities will need to provide written acceptance of the Flow-Down Clauses in both SBIR and STTR proposals.

MDA Clause H-08 Public Release of Information (Publication Approval)

MDA Clause H-08 pertaining to the public release of information is incorporated into all MDA SBIR contracts and subcontracts without exception. Any information relative to the work performed by the

contractor under all MDA SBIR contracts must be submitted to the Procuring Contracting Officer (PCO) for review and approval prior to its release to the public. This mandatory clause also includes subcontractors, who shall provide their submission through the prime contractor for MDA's approval for release.

a. In addition to the requirements of 32 Combined Federal Regulation, Part 117 National Industrial Security Program Operations Manual, all foreign and domestic contractor(s) and its subcontractors are required to comply with the following:

1) Any official MDA information/materials that a contractor/subcontractor intends to release to the public that pertains to any work under performance of this contract, MDA will perform a prepublication review prior to authorizing any release of information/materials.

2) At a minimum, these information/materials may be technical papers, presentations, articles for publication, key messages, talking points, speeches, and social media or digital media, such as press releases, photographs, fact sheets, advertising, posters, videos, etc.

b. Subcontractor public information/materials must be submitted for approval through the prime contractor to MDA.

c. Upon request to the MDA PCO, contractors shall be provided the "Request for Industry Media Engagement" form (or any superseding MDA form).

d. At least 45 calendar days prior to the desired release date, the contractor must submit the required form and information/materials to be reviewed for public release to MDAPressOperations@mda.mil, and simultaneously provide courtesy copy to the appropriate PCO.

e. All information/materials submitted for MDA review must be an exact copy of the intended item(s) to be released, must be of high quality and are free of tracked changes and/or comments. Photographs must have captions, and videos must have the intended narration included. All items must be marked with the applicable month, day, and year.

f. No documents or media shall be publically released by the contractor without MDA Public Release approval.

g. Once information has been cleared for public release, it resides in the public domain and must always be used in its originally cleared context and format. Information previously cleared for public release but containing new, modified or further developed information must be re-submitted.

Rights in Noncommercial Technical Data and Computer Software – SBIR Program (DFARs 252.227-7018 Class Deviation 2020-O0007 Revision 1)
Use this link for full description of Data Rights:
https://www.acq.osd.mil/dpap/policy/policyvault/USA001352-23-DPC.pdf

Fraud, Waste, and Abuse
All offerors must complete the fraud, waste, and abuse training (Volume 6) that is located on DSIP (https://www.dodsbirsttr.mil). Please follow guidance provided on DSIP to complete the required training.

To Report Fraud, Waste, or Abuse, Please Contact:
MDA Fraud, Waste & Abuse

Hotline: (256) 313-9699
MDAHotline@mda.mil

DoD Inspector General (IG) Fraud, Waste & Abuse
Hotline: (800) 424-9098
hotline@dodig.mil

Additional information on Fraud, Waste and Abuse may be found in the DoD Instructions of this announcement.

Proposal Submission

All proposals MUST be submitted online using DSIP (https://www.dodsbirsttr.mil). Any questions pertaining to the DoD SBIR/STTR submission system should be directed to the DoD SBIR/STTR Help Desk: DoDSBIRSupport@reisystems.com.

It is recommended that potential offerors email topic authors to schedule a time for topic discussion during the pre-release period.

Classified Proposals

Classified proposals **ARE NOT** accepted under the MDA SBIR Program. The inclusion of classified data in an unclassified proposal MAY BE grounds for the Agency to determine the proposal as non-responsive and the proposal not to be evaluated. Contractors currently working under a classified MDA SBIR contract must use the security classification guidance provided under that contract to verify new SBIR proposals are unclassified prior to submission. Phase I contracts are not typically awarded for classified work. However, in some instances, work being performed on Phase II contracts will require security clearances. If a Phase II contract will require classified work, the offeror must have a facility clearance and appropriate personnel clearances in order to perform the classified work. For more information on facility and personnel clearance procedures and requirements, please visit the Defense Counterintelligence and Security Agency Web site at: https://www.dcsa.mil.

Use of Acronyms

Acronyms should be spelled out the first time they are used within the technical volume (Volume 2), the technical abstract, and the anticipated benefits/potential commercial applications of the research or development sections. This will help avoid confusion when proposals are evaluated by technical reviewers.

Communication

All communication from the MDA SBIR/STTR PMO will originate from the sbirsttr@mda.mil email address. Please white-list this address in your company's spam filters to ensure timely receipt of communications from our office.

Proposal titles, abstracts, anticipated benefits, and keywords of proposals that are selected for contract award will undergo an MDA Policy and Security Review. Proposal titles, abstracts, anticipated benefits, and keywords are subject to revision and/or redaction by MDA. Final approved versions of proposal titles, abstracts, anticipated benefits, and keywords may appear on DSIP and/or the SBA's SBIR/STTR award site (https://www.sbir.gov/sbirsearch/award/all).

MDA SBIR 24.3 Topic Index

MDA243-001 TITLE: Radar Innovation Testbed

OUSD (R&E) CRITICAL TECHNOLOGY AREA(S): Integrated Sensing and Cyber; Hypersonics

The technology within this topic is restricted under the International Traffic in Arms Regulation (ITAR), 22 CFR Parts 120-130, which controls the export and import of defense-related material and services, including export of sensitive technical data, or the Export Administration Regulation (EAR), 15 CFR Parts 730-774, which controls dual use items. Offerors must disclose any proposed use of foreign nationals (FNs), their country(ies) of origin, the type of visa or work permit possessed, and the statement of work (SOW) tasks intended for accomplishment by the FN(s) in accordance with the Announcement. Offerors are advised foreign nationals proposed to perform on this topic may be restricted due to the technical data under US Export Control Laws.

OBJECTIVE: Develop, construct, integrate and test an open-air Radio Frequency (RF) testbed for emerging radar technologies with a focus on Next Generation AN/TPY-2.

DESCRIPTION: An innovative, low-cost, transportable, subscale, open-air RF Next Generation AN/TPY-2 Radar Innovation Testbed that could accommodate a range of technical components and be relocated to take advantage of future testing opportunities. This testbed is needed because no existing AN/TPY-2 radar can be used to demonstrate and reduce the risks of next generation hardware technologies such as RF digital aperture (digital transmit & receive beamforming), advanced gallium nitride (GaN) transmit/receive modules, and Electronic Protection (EP) augmentations.

Previous technology insertions such as the GaN Transmit/Receive Integrated Multichannel Module (TRIMM) have been constrained by a lack of an AN/TPY-2 testbed. This testbed is needed to integrate and test independent technologies such as the Advanced Waveform Generator and digital front-end components such as advanced Digital Receiver/Exciter (DREX) designs. This testbed is also a pathfinder for a low-cost, rapidly-deployable AN/TPY-2 derivative that would expand capabilities against advanced threats. To aid in minimizing cost and maximizing transportability, we anticipate using a CONEX ("Container, express") form-factor box to host the testbed with the digital RF aperture at one end.

PHASE I: • In coordination with the Government and the AN/TPY-2 Prime Contractor, develop requirements, sizing analyses, preliminary designs and costs for an open-air Radar Innovation Testbed that includes:

- An open-air Radio Frequency (RF) test fixture architecture that accommodates, as a minimum, a single AN/TPY-2 digital subarray; but the testbed infrastructure should be scalable to support a fully populated 5.6 m^2 digital RF aperture in a CONEX form-factor box.
- Testbed infrastructure, prime power, cooling, processing throughput and memory, data recording, and controls & displays.
- Provisions for supporting built-in test and performance monitoring.
- Prepare an Interface Control Document (ICD) & user guide for integrating components. This documentation should be sufficiently detailed and transparent to support Model Based Systems Engineering representation.

Note: The digital interface to the RF/digital aperture components under test, associated prime power and cooling needs, and the external digital interfaces for data recording and controls & displays would be Government Furnished Information (GFI).

PHASE II: Acquire the components and construct the Innovation Testbed. Note: RF/digital components for demonstration would be GFE.

• Collaboratively develop an initial test plan.
• Prepare an updated ICD and user guide for integrating components into the testbed.

PHASE III DUAL USE APPLICATIONS: Continue testing next-generation components and techniques. Fill-out the RF/digital aperture and demonstrate military utilities such as secondary functional roles and enhanced electronic protection techniques.

REFERENCES:

1. "GaN-based Components for Transmit/Receive Modules in Active Electronically Scanned Arrays", Mike Harris, Robert Howard and Tracy Wallace, GTRI, CS MANTECH Conference, May 13th - 16th, 2013, New Orleans, Louisiana, USA https://csmantech.org/wp-content/acfrcwduploads/field_5e8cddf5ddd10/post_2542/030.pdf
2. CONEX diagrams: https://www.americanconex.com/shipping-container-drawings/
3. MATLAB Tech Talks: Why Digital Beamforming is Useful for Radar https://www.mathworks.com/videos/why-digital-beamforming-is-useful-for-radar-1672814788501.html

KEYWORDS: Radar; digital beamforming; gallium nitride (GaN) transmit/receive modules

MDA243-002 TITLE: Low-Cost Passive Panels

OUSD (R&E) CRITICAL TECHNOLOGY AREA(S): Integrated Sensing and Cyber; Hypersonics; Microelectronics

The technology within this topic is restricted under the International Traffic in Arms Regulation (ITAR), 22 CFR Parts 120-130, which controls the export and import of defense-related material and services, including export of sensitive technical data, or the Export Administration Regulation (EAR), 15 CFR Parts 730-774, which controls dual use items. Offerors must disclose any proposed use of foreign nationals (FNs), their country(ies) of origin, the type of visa or work permit possessed, and the statement of work (SOW) tasks intended for accomplishment by the FN(s) in accordance with the Announcement. Offerors are advised foreign nationals proposed to perform on this topic may be restricted due to the technical data under US Export Control Laws.

OBJECTIVE: Evaluate the application of commercial-based, low-cost, phased-array panels to support auxiliary and multi-static distributed arrays for Missile Defense Agency (MDA) X-band radars.

DESCRIPTION: Commercial industry is investing ~$3B/year Non-Recurring Engineering (NRE) in Radio Frequency (RF)/digital technology for 5G, satellite internet, and communications applications. Starlink consumer terminal production has achieved a channel cost of ~$0.30 in contrast to the ~$8K channel cost of existing MDA radars which have much higher transmit power and wider instantaneous bandwidth requirements. (Channel cost is the recurring cost of a radiating element, associated RF hardware, and apportioned cost of the array infrastructure and backend electronics.) These low-cost, phased-array panel antennas are built from RF/digital multilayer circuit boards and utilize Silicon Germanium (SiGe) RF components to minimize cost which constrains transmit power so that they are not practical for constructing Missile Defense transmit & receive arrays. However, this technology is very attractive for constructing large Receive-Only arrays from multiple panels providing distributed digital beamforming on receive.

The availability of affordable receive-only arrays to augment existing MDA radar systems would provide low cost options to enhance radar sensitivity and electronic protection capabilities. This effort would test the coherence, synchronization, dynamic range, and other channel capacities of a set of existing panel arrays to path find development of a large receive-only array.

PHASE I:
• Develop reference model for X-band commercial-off-the-shelf (COTS) panels based on available products
• Survey existing X-band COTS panels developed for radar, satellite communications (SATCOM), and other applications
• Develop array requirements
• Produce plan for constructing sparse-array testbed to demonstrate multiple-panel including timing and control infrastructure.

PHASE II:
• Design array to be capable of independent orientation and positioning of each panel.
• Define coherence and synchronization techniques and metrics needed for constructing large arrays from panels
• Develop acquisition and construction plan to construct sparse array from Phase I.

PHASE III DUAL USE APPLICATIONS:

• Acquire requisite commercial panels, enabling electrical/mechanical infrastructure, and supporting ancillary equipment such as signal sources.
• Construct array.
• Demonstrate array operation with external signal sources.
• Collect panel-level data to demonstrate relative stability over diurnal and thermal cycling, polarization, and adjustment of the panel orientation and positioning.
• Collect data over entire operating bandwidth.
Provide technology roadmap to develop required panel technical characteristics including bandwidth for X-band Missile Defense application making maximum leverage of COTS technology and production base.

REFERENCES:

1. "Dual-radar coherently combining: generalised paradigm and verification example", The Institution of Engineering and Technology, Xinghua Liu , Zhenhai Xu, Luoshengbin Wang, Wei Dong, Shunping Xiao
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KEYWORDS: Radar; antenna receive arrays; multi-static