

**DEPARTMENT OF DEFENSE  
SMALL BUSINESS INNOVATION RESEARCH (SBIR) PROGRAM  
STTR 20.C Program Broad Agency Announcement (BAA)**

**AMENDMENT 2, October 27, 2020**

**The purpose of Amendment 2 is to extend the deadline for receipt of proposals to Thursday, November 5, 2020 at 12:00 PM ET. Changes are noted in red text below.**

**August 25, 2020:** DoD BAA issued for pre-release

**September 23, 2020:** DoD begins accepting proposals

**November 5, 2020: Deadline for receipt of proposals no later than 12:00 p.m. ET**

Participating DoD Components:

- Missile Defense Agency (MDA)
- National Geospatial-Intelligence Agency (NGA)

**IMPORTANT**

**Deadline for Receipt:** Proposals must be **completely** submitted no later than **12:00 p.m.** ET, **November 5, 2020**. Proposals submitted after 12:00 p.m. will not be evaluated. The final proposal submission includes successful completion of all firm level forms, all required volumes, and electronic corporate official certification.

**Classified proposals will not be accepted under the DoD STTR Program.**

This BAA and the Defense SBIR/STTR Innovation Portal (DSIP) sites are designed to reduce the time and cost required to prepare a formal proposal. The 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. Effective with this announcement, firms are required to register for a login.gov account and link it to their DSIP account. See section 4.14 for more information regarding registration.

The Small Business Administration, through its SBIR/STTR Policy Directive, purposely departs from normal Government solicitation formats and requirements and authorizes agencies to simplify the SBIR/STTR award process and minimize the regulatory burden on small business. Therefore, consistent with the SBA SBIR/STTR Policy Directive, the Department of Defense is soliciting proposals as a Broad Agency Announcement.

**SBIR/STTR Updates and Notices:** To be notified of SBIR/STTR opportunities and to receive e-mail 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.

**Help Desk:** If you have questions about the Defense Department's SBIR or STTR Programs, please call the DoD SBIR/STTR Help Desk at 1-703-214-1333, or email to [DoDSBIRSupport@reisystems.com](mailto:DoDSBIRSupport@reisystems.com) (Monday through Friday, 9:00 a.m. to 5:00 p.m. ET).

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## **1.0 INTRODUCTION**

MDA and NGA hereafter referred to as DoD Components, invite small business firms and research institutions to jointly submit proposals under this BAA for the Small Business Technology Transfer (STTR) Program. Firms with the capability to conduct research and development (R&D) in any of the defense-related topic areas described in Section 12.0 and to commercialize the results of that R&D are encouraged to participate.

The STTR Program, although modeled substantially on the Small Business Innovation Research (SBIR) Program, is a separate program and is separately financed. Subject to availability of funds, DoD Components will support high quality cooperative research and development proposals of innovative concepts to solve the listed defense-related scientific or engineering problems, especially those concepts that also have high potential for commercialization in the private sector. Partnerships between small businesses and Historically Black Colleges and Universities (HBCUs) or Minority Institutions (MIs) are encouraged, although no special preference will be given to STTR proposals from such proposers.

This BAA is for Phase I proposals only. A separate BAA will not be issued requesting Phase II proposals, and unsolicited proposals will not be accepted. All firms that are awarded Phase I awards originating from this BAA will be eligible to participate in Phases 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 firm 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 the availability of funds. DoD is not responsible for any monies expended by the proposer before the issuance of any award.

## **2.0 PROGRAM DESCRIPTION**

### **2.1 Objectives**

The objectives of the DoD STTR 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.

## RT&L Technology Focus Area Definitions

Focus Area	Description
<b>5G</b>	Technologies enabling the 5G spectrum to increase speed over current networks, to be more resilient and less susceptible to attacks, and to improve military communication and situational awareness.
<b>Artificial Intelligence (AI)/ Machine Learning (ML)</b>	Systems that perceive, learn, decide, and act on their own. Machine-learning systems with the ability to explain their rationale, characterize their strengths and weaknesses, and convey understanding of how they will behave in the future.
<b>Autonomy</b>	Technology that can deliver value by mitigating operational challenges such as: rapid decision making; high heterogeneity and/or volume of data; intermittent communications; high complexity of coordinated action; danger to mission; and high persistence and endurance.
<b>Biotechnology</b>	Biotechnology is any technological application that harnesses cellular and biomolecular processes. Most current biotech research focuses on agent detection, vaccines, and treatment. Future advances in biotechnology will improve the protection of both the general public and military personnel from biological agents, among numerous other potential applications.
<b>Cybersecurity</b>	Prevention of damage to, protection of, and restoration of computers, electronic communications systems, electronic communications services, wire communication, and electronic communications, including information contained therein, to ensure its availability, integrity, authentication, confidentiality, and nonrepudiation.
<b>Directed Energy (DE)</b>	Technologies related to production of a beam of concentrated electromagnetic energy, atomic, or subatomic particles.
<b>Hypersonics</b>	Innovative concepts or technologies that enable, or directly support, weapons or aircraft that fly at or near hypersonic speeds and/or innovation that allows for enhancing defensive capability against such systems.
<b>Microelectronics</b>	Critical microcircuits used in covered systems, custom-designed, custom-manufactured, or tailored for specific military application, system, or environment.
<b>Networked Command, Control, and Communications (C3)</b>	Fully networked command control and communications including: command and control (C2) interfaces, architectures, and techniques (e.g., common software interfaces and functional architectures and improved C2 processing/decision making techniques); communications terminals (e.g., software-defined radio (SDRs)/apertures with multiple networks on the same band and multi-functional systems); and apertures and networking technologies (e.g., leveraging/managing a diverse set of links across multiple band and software defined networking/ network slicing).
<b>Nuclear</b>	Technologies supporting the nuclear triad-including nuclear command, control, and communications, and supporting infrastructure. Modernization of the nuclear force includes developing options to counter competitors' coercive strategies, predicated on the threatened use of nuclear or strategic non-nuclear attacks.
<b>Quantum Science</b>	Technologies related to matter and energy on the atomic and subatomic level. Areas of interest: clocks and sensors; networks; computing enabling technologies (e.g., low temperature amplifiers, cryogenics, superconducting circuits, photon detectors); communications (i.e., sending/receiving individual photons); and manufacturing improvements.
<b>Space</b>	Technologies supporting space, or applied to a space environment.
<b>General Warfighting Requirements (GWR)</b>	Warfighting requirements not meeting the descriptions above; may be categorized into Reliance 21 areas of interest.

The DoD SBIR/STTR Programs follow the policies and practices of the Small Business Administration (SBA) SBIR Policy Directive updated on May 2, 2019. 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 Policy Directive is available at: [https://www.sbir.gov/sites/default/files/SBIR-STTR\\_Policy\\_Directive\\_2019.pdf](https://www.sbir.gov/sites/default/files/SBIR-STTR_Policy_Directive_2019.pdf).

## **2.2 Three Phase Program**

The STTR 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 STTR Program. Phase I awards are made in accordance with the SBA Policy Directive guidelines, current version. 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. Proposers 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 firms on the basis of 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 SBA Policy Directive guidelines, current version. 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 Proposer is required to obtain funding from either the private sector, a non-STTR 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. STTR Phase III refers to work that derives from, extends, or completes an effort made under prior STTR funding agreements, but is funded by sources other than the STTR Program. Phase III work is typically oriented towards commercialization of STTR research or technology.

## **3.0 DEFINITIONS**

The following definitions from the SBA STTR Policy Directive and the Federal Acquisition Regulation (FAR) apply for the purposes of this BAA:

### **3.1 Performance Benchmarks for Progress toward Commercialization**

In accordance with the SBA SBIR-STTR Policy Directive Sec 6(a)(7), DoD established a threshold for the application of a benchmark where it is applied only to Phase I applicants that have received more than twenty (20) awards over the prior five (5) fiscal years as determined by the Small Business Administration. The ratio of Phase II awards received to Phase I awards received during this period must be at least 0.25. Additional information on performance benchmarking for Phase I applicants can be found at <https://www.sbir.gov/performance-benchmarks>.

### **3.2 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.

### **3.3 Cooperative Research and Development**

For the purposes of the STTR Program this means research and development conducted jointly by a small business concern and a research institution in which not less than 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. The percentage of work is usually measured by both direct and indirect costs; however, proposers should verify how it will be measured with their DoD contracting officer during contract negotiations.

### **3.4 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.

### **3.5 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.pmdrtc.state.gov/ddtc\\_public](https://www.pmdrtc.state.gov/ddtc_public).

NOTE: Export control compliance statements found in the individual component 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.

### **3.6 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.

### **3.7 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.

### **3.8 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 STTR Program training related to Fraud, Waste and Abuse is available at: <https://www.sbir.gov/tutorials/fraud-waste-abuse/>. See Section 4.18 for reporting Fraud, Waste, and Abuse.

### **3.9 Funding Agreement**

Any contract, grant, or cooperative agreement entered into between any Federal Agency and any small business concern for the performance of experimental, developmental, or research work, including products or services, funded in whole or in part by the federal Government. Only the contract method will be used by DoD Components for all STTR awards.

### **3.10 HBCU/MI - Historically Black Colleges and Universities and Minority Institutions**

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>.

### **3.11 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).

### **3.12 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 small business firm or research institution 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 firm or research institution. 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 small business firm 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.

### **3.13 Proprietary Information**

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

### **3.14 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/>.

### **3.15 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.

### **3.16 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.

### **3.17 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. Proposers 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.

### **3.18 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/2013/06/NIH\\_Guidelines.pdf](https://osp.od.nih.gov/wp-content/uploads/2013/06/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.

### **3.19 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).

### **3.20 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](http://www.sba.gov/size).)

### **3.21 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.

### **3.22 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.

### **3.23 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 that:

- 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 firm has the capability to implement the technical approach, i.e., has or can obtain people and equipment suitable to the task.

#### 4.2 Proposer Eligibility and Performance Requirements

- a. Each proposer must qualify as a small business for research or research and development purposes and certify to this on the Cover Sheet 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 3.15 of this BAA). Proposers must meet eligibility requirements for Small Business Ownership and Control (see 13 CFR § 121.702 and Section 4.4 of this BAA).
- b. A minimum of 40% of each STTR project must be conducted by the small business concern and a minimum of 30% of the effort performed by the single research institution, as defined in Section 3.10. The percentage of work is usually measured by both direct and indirect costs.
- c. For both Phase I and II, the principal investigator must be primarily employed with the small business firm or the research institution. At the time of award of a Phase I or Phase II contract, the small business concern must have at least one employee in a management position whose primary employment is with the small business and who is not also employed by the research institution. Primary employment means that more than one half (50%) of the employee'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.** Proposers with prior SBIR/STTR awards must meet two benchmark requirements for Progress towards Commercialization as determined by the Small Business Administration (SBA) on June 1 each year.
  - (1) For all proposers 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) For all proposers with greater than 15 Phase II awards over the last ten fiscal years excluding the last two years, the proposer 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 STTR work equal to or greater than 15% of the number of Phase II awards received during the period.

Consequence of failure to meet the benchmarks:

- SBA will identify and notify Agencies on June 1<sup>st</sup> of each year the list of companies which fail to meet minimum performance requirements. These companies will not be eligible to submit a proposal for a Phase I award for a period of one year from that date.
- Because this requirement only affects a company's eligibility for new Phase I awards, a company that fails to meet minimum performance requirements may continue working on its current ongoing SBIR/STTR awards and may apply for and receive new Phase II and Phase III awards.
- To provide companies with advance warning, SBA notifies companies on April 1<sup>st</sup> if they are failing the benchmarks. If a company believes that the information used was not complete or accurate, it may provide feedback through the SBA Company Registry at [www.sbir.gov](http://www.sbir.gov).
- In addition, SBA has posted a [Guide to SBIR/STTR Program Eligibility](#) to help small businesses understand program eligibility requirements, determine if they will be eligible at the time of award, and accurately complete necessary certifications.

- The benchmark information on the companies will not be available to the public.
  - More detail is available at <https://www.sbir.gov/performance-benchmarks>.
- f. A small business concern must negotiate a written agreement between the small business and the research institution allocating intellectual property rights and rights to carry out follow-on research, development, or commercialization (see [Model Agreement for the Allocation of Rights](#)).

#### **4.3 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.

#### **4.4 Majority Ownership in Part**

Majority ownership in part by multiple venture capital, hedge fund, and private equity firms: Small businesses that are 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. Please check Component instructions for further information.

#### **4.5 Conflicts of Interest**

Contract awards to firms 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.

#### **4.6 Classified Proposals**

Classified proposals will not be accepted under the DoD STTR Program. If topics will require classified work during Phase II, the proposing firm must have a facility clearance in order to perform the Phase II work. For more information on facility and personnel clearance procedures and requirements, please visit the Defense Security Service Web site at: <http://www.dss.mil/index.html>.

#### **4.7 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 3.13).

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 Federalwide 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. Proposers 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 subjects 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 in order to avoid potential delay of contract award.**

#### **4.8 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 3.12).

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 in order to avoid potential delay of contract award.**

#### **4.9 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.

#### **4.10 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.

#### **4.11 Pre-Award and Post Award BAA Protests**

Interested parties have the right to protest as prescribed in FAR 33.106(b) and FAR 52.233-2. For purposes of pre-award protests related to the terms of this BAA, protests should be served to the Contracting Officer

(listed below). For the purposes of a protest related to a 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 Contracting Officer listed below (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 firm may also be made to the Small Business Administration.

Washington Headquarters Services (WHS)  
Acquisition Directorate  
1155 Defense Pentagon  
Washington, DC 20301-1155

Ms. Chrissandra Smith  
DoD SBIR/STTR BAA Contracting Officer  
E-mail: [chrissandra.smith.civ@mail.mil](mailto:chrissandra.smith.civ@mail.mil)

#### 4.12 Phase I Award Information

All Phase I and Direct to Phase II proposals will be evaluated and judged on a competitive basis. Proposals will be initially screened to determine responsiveness. Proposals passing this initial screening will be technically evaluated by engineers or scientists to determine the most promising technical and scientific approaches. Each proposal will be judged on its own merit. DoD is under no obligation to fund any proposal or any specific number of proposals in a given topic. It also may elect to fund several or none of the proposed approaches to the same topic.

- a. **Number of Phase I Awards.** The number of Phase I awards will be consistent with the Component's RDT&E budget, the number of anticipated awards for interim Phase I modifications, and the number of anticipated Phase II contracts. No Phase I contracts will be awarded until evaluation of all qualified proposals for a specific topic is completed.
- b. **Type of Funding Agreement.** Each Phase I proposal selected for 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 firms 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.** The Phase I contract value varies among the DoD Components; it is therefore important for proposing firms to review Component-specific instructions for the Component to which they are applying for any specific instructions regarding award size.
- d. **Timing.** The SBA STTR Policy Directive, Section 7(c)(1)(ii), states that agencies should issue the Phase I award no more than 180 days after the closing date of the BAA. However, across DoD, the median time between the date that the STTR BAA closes and the award of a Phase I contract is approximately four months. Normally proposing firms will be notified of selection or non-selection status for a Phase I award within 90 days of the closing date for this BAA.

#### 4.13 Questions about this BAA and BAA Topics

##### a. General STTR Questions/Information.

- (1) **Help Desk.** The DoD SBIR/STTR Help Desk is prepared to address general questions about this BAA, the proposal preparation and electronic submission process and other program-related areas. The Help Desk may be contacted from 9:00 a.m. to 5:00 p.m. ET Monday through Friday at:

- Phone: 1-703-214-1333
- E-mail: [DoDSBIRSupport@reisystems.com](mailto:DoDSBIRSupport@reisystems.com)

(2) **Websites.** The Defense SBIR/STTR Innovation Portal (DSIP) Web site at <https://www.dodsbirsttr.mil/submissions/login> has information on the DoD SBIR/STTR Program, including:

- SBIR and STTR Program opportunities
- Topics Search engine
- Topic Q&A (formerly SITIS)
- All Electronic Proposal Submission for Phase I and Phase II Proposals. Firms submitting through this site for the first time will be asked to register on <https://www.dodsbirsttr.mil/submissions>.

(3) **SBIR/STTR Updates and Notices:** To be notified of SBIR/STTR opportunities and to receive e-mail 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.

- b. **General Questions about a DoD Component.** General questions pertaining to a particular DoD Component should be submitted in accordance with the instructions given at the beginning of that Component's topics, in Section 12.0 of this BAA.
- c. **Direct Contact with Topic Authors.** From Aug 25, 2020 to Sep 22, 2020, this BAA is issued for Pre-Release with the names of the topic authors and their phone numbers and e-mail addresses. During the pre-release period, proposing firms have an opportunity to contact topic authors by telephone or e-mail 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 firms 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 (formerly SITIS). After this period questions must be asked through SITIS as described below.
- d. **Topic Q&A (formerly SITIS).** Once DoD begins accepting proposals on Sep 23, 2020, no further direct contact between proposers and topic authors is allowed, unless the Topic Author is responding to a question submitted during the Pre-release period. However, proposers may submit written questions through Topic Q&A at <https://www.dodsbirsttr.mil/submissions/login>. In Topic Q&A, the questioner and respondent remain anonymous and all questions and answers are posted electronically for general viewing.

Questions 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, will not receive a response. Proposing firms may locate the topic to which they want to submit a technical question by using the Topic Search feature on this Web site. 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 **Aug 25, 2020** and closes to new questions on **Oct 8, 2020 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 firms are advised to monitor Topic Q&A during the BAA period for questions and answers. Proposing firms should also frequently monitor DSIP for updates and amendments to the topics.**

#### **4.14 Registrations and Certifications**

Proposing firms must be registered in the Defense SBIR/STTR Innovation Portal (DSIP) in order to prepare and submit proposals. All users will be required to register for a login.gov account and link it to their DSIP account. To register in Login.gov, click the Login/Register button in the top right corner on the DSIP Submissions homepage and follow the steps to register. 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, here: <https://www.dodsbirsttr.mil/submissions/learning-support/training-materials>.

Please note that 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 DUNS number and your Firm PIN in order 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 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 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.

**It is recommended that you complete your Login.gov setup as soon as possible to avoid any delays in your proposal submissions.**

Before the DoD Components can award a contract, proposing firms must be registered in the System for Award Management (SAM). If you were previously registered in CCR, your information has been transferred to SAM. However, it is in the firm's interest to visit SAM and ensure that all of the firm's data is up to date from SAM and other databases to avoid delay in award. SAM replaced the Central Contractor Registration (CCR), Online Representations and Certifications Application (ORCA), and the Excluded Parties List System (EPLS). SAM allows firms interested in conducting business with the federal government to provide basic information on business capabilities and financial information. To register, visit [www.sam.gov](http://www.sam.gov).

Follow instructions found on the SAM Web site on how to obtain a Commercial and Government Entry (CAGE) code and Data Universal Numbering System (DUNS) number. Once a CAGE code and DUNS number are obtained, update the firm's profile on the Defense SBIR/STTR Innovation Portal (DSIP) at <https://www.dodsbirsttr.mil/submissions/>.

In addition to the standard federal and DoD procurement certifications, the SBA STTR Policy Directive requires the collection of certain information from firms at time of award and during the award life cycle.

Each firm 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.

#### **4.15 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.

#### **4.16 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 3.3) for consideration under numerous federal program BAAs and solicitations, it is unlawful to enter into contracts or grants 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 5.4.c(11).

#### **4.17 Fraud and False Statements**

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 Department of Defense, Office of Inspector General Hotline (“Defense Hotline”) is an important avenue for reporting fraud, waste, abuse, and mismanagement within the Department of Defense. 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 <http://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 e-mail addressed to [hotline@dodig.mil](mailto:hotline@dodig.mil).

#### **4.18 State and Other Assistance Available**

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

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

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

#### **4.19 Discretionary Technical and Business Assistance (TABA)**

DoD is not mandating 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. However, proposers 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 the Defense SBIR/STTR Innovation Portal (DSIP) sites are designed to reduce the time and cost required to prepare a formal proposal. The 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. It is recommended that firms register as soon as possible upon identification of a proposal opportunity to avoid delays in the proposal submission process.

Since the guidance on allowable content may vary by Component, it is the proposing firm's responsibility to consult the Component-specific instructions for detailed guidance.

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 – not in use for 20.C BAA
- Volume 5: Supporting Documents
- Volume 6: Fraud, Waste and Abuse Training

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 proposer 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 award, the DoD Component program will contact the proposer for signatures at the time of award.

#### **5.2 Summary of Component Programs**

The tables below are provided for your convenience. Information provided in the Component instructions take precedence over any figures listed below. Please refer to the Component instructions for the topic of interest prior to proposal submission.

<b>DoD Component</b>	<b>Cost</b>	<b>Duration</b>	<b>Phase I Option</b>	<b>Technical and Business Assistance</b>
<b>MDA</b>	\$125,000	6 months	Not Applicable	Accepted
<b>NGA</b>	\$100,000	9 months		Not Applicable

DoD Component	Volume 5 – Supporting Documents	Volume 6 – Fraud, Waste & Abuse	Technical Volume Page Limits
<b>MDA</b>	Accepted	Required	15 pages
<b>NGA</b>	Accepted	Accepted	20 pages

### 5.3 Marking Proprietary Proposal Information

Proposers that include in their proposals data that 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 proposer 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 the Defense SBIR/STTR Innovation Portal (DSIP) may be handled, for administrative purposes only, by support contractors. All support contractors are bound by appropriate non-disclosure agreements.

### 5.4 Phase I Proposal Instructions

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

On the Defense SBIR/STTR Innovation Portal (DSIP) at <https://www.dodsbirsttr.mil/submissions/>, prepare the Proposal Cover Sheet. The Cover Sheet must include a brief technical abstract of no more than 200 words that describes the proposed R&D project with a discussion of anticipated benefits and potential commercial applications. **Do not include proprietary or classified information in the Proposal Cover Sheet.** If your proposal is selected for award, the technical abstract and discussion of anticipated benefits may be publicly released on the Internet. Once the Cover Sheet is saved, the system will assign a proposal number. You may modify the cover sheet as often as necessary until the BAA closes.

**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 firm'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 company name, topic number, and proposal number assigned by the Defense SBIR/STTR Innovation Portal (DSIP) site when the Cover Sheet was 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. In the event that 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 of the proper approvals have been obtained. (See Sections 4.7- 4.9.). **Submitters proposing research involving human and/or animal use are encouraged**

**to separate these tasks in the technical proposal and cost proposal in order 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 firm, 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 proposer's awareness of the state-of-the-art in the specific topic. Describe previous work not directly related to the proposed effort but similar. Provide the following:

- a. short description,
- b. client for which work was performed (including individual to be contacted and phone number), and
- c. date of completion.

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

- a. State the anticipated results of the proposed approach 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 company'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 STTR project that your company expects to achieve. The Commercialization Readiness Program has been extended to STTR.

(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. Proposers frequently assume that individuals with dual citizenship or a work permit will be permitted to work on an STTR project and do not report them. This is not necessarily the case and a proposal will be rejected if the requested information is not provided. Therefore, firms should report any and all individuals expected to be involved on this project that are considered a foreign national as defined in Section 3.5 of the BAA. You may be asked to provide additional information during negotiations in order to verify the foreign citizen's eligibility to participate on a STTR 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 or not the facilities where the proposed work will be performed meet environmental laws and regulations of federal, state (name), and local Governments

for, but not limited to, the following groupings: airborne emissions, waterborne effluents, external radiation levels, outdoor noise, solid and bulk waste disposal practices, and handling and storage of toxic and hazardous materials.

(10) **Subcontractors/Consultants.** Involvement of a research institution in the project is required and the institution should be identified and described according to the [Cost Breakdown Guidance](#). A minimum of 40% of the research and/or analytical work in Phase I, as measured by direct and indirect costs, must be conducted by the proposing firm, unless otherwise approved in writing by the Contracting Officer. STTR 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, proposers 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/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 STTR 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 the Defense SBIR/STTR Innovation Portal (DSIP). Some items in the Cost Breakdown Guidance may not apply to the proposed project. If that is the case, there is no need to provide information on each and every item. What matters is that enough information be provided to allow 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; however, 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 must be detailed at the same level as prime contractor costs with regards to labor, travel, equipment, etc. Provide detailed substantiation of subcontractor costs in your cost proposal. Enter this information in the Explanatory Material section of the on-line cost proposal form. The Supporting Documents Volume (Volume 5) may be used if additional space is needed.

When a proposal is selected for 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 the DCAA publication called “Information for Contractors” available at <http://www.dcaa.mil>. Click on “Guidance” and then click on “Audit Process Overview Information for Contractors.”

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

The Company Commercialization Report (CCR) will NOT be available during the 20.C BAA cycle for Phase I or Direct to Phase II proposals. No Commercialization Achievement Index (CAI) will be generated. The CCR will be available for future DoD BAA cycles. If the CCR is available at the time of the Phase II submission for any awarded Phase I efforts resulting from this BAA, the proposing firm is required to submit the CCR for its Phase II proposal.

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

Volume 5 is provided for small businesses to submit additional documentation to support the Technical Volume (Volume 2), and the Cost Volume (Volume 5).

Documents that are acceptable and may be included in Volume 5 are:

- 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. Other

Refer to the Component-specific instructions for Volume 5 requirements.

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

Refer to the Component-specific instructions for the Fraud, Waste and Abuse Training (Volume 6) requirements.

## 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 best value 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 reasonableness and realism shall also be considered to the extent appropriate.

Technical reviewers will base their conclusions only on information contained in the proposal. It cannot be assumed that reviewers are acquainted with the firm 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.

## 7.0 PHASE II PROPOSAL INFORMATION

### 7.1 Introduction

Unless the Component is participating in the 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, may be rejected without evaluation. Phase II proposal preparation and submission instructions will be provided by the DoD Components to Phase I awardees. See Component-specific instructions for more information on Direct to Phase II Program preparation and submission instructions.

If the Company Commercialization Report (CCR) is available at the time of Phase II submission for any awarded Phase I efforts resulting from this BAA, the proposing firm is required to submit the CCR for its Phase II proposal.

### 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 into contracts or grants requiring essentially equivalent effort. If there is any question concerning this, it must be disclosed to the soliciting agency or agencies 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 firm 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 Directives provide that, at the agency's discretion, projects awarded a Phase I under a BAA or solicitation for SBIR may transition in Phase II to STTR and vice versa. A firm 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 company contain marketing expertise and, if not, how will that expertise be brought into the company?
- (5) Who are the proposing firm'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 company is required to report actual sales and investment data in its Company Commercialization Report (see Section 5.4.e) 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**

In order to reduce risk to the small business and avoid potential contracting delays, it is suggested that companies interested in pursuing Phase II SBIR/STTR contracts and other contracts of similar size with the Department of Defense (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: <http://www.dcaa.mil> and click on "Guidance" and then click on "Audit Process Overview – Information for Contractors," and also at: <http://www.dcaa.mil> and click on "Checklists and Tools" and then click on "Pre-award Accounting System Adequacy Checklist".

## **7.7 Phase II Enhancement Policy**

To further encourage the transition of STTR 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 STTR funding if the company can match the additional STTR funds with non-STTR 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 establishes the Commercialization Pilot Program (CPP) as a long-term program titled the Commercialization Readiness Program (CRP).

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

The Small Business and Technology Partnerships Office 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:

Mr. Matthew B. Williams  
OUSD (R&E) Technology Portfolio Manager  
[matthew.b.williams10.civ@mail.mil](mailto:matthew.b.williams10.civ@mail.mil)

Mr. Jason Talley  
OUSD (R&E) Small Business and Technology Partnerships Manager  
[jason.m.talley2.ctr@mail.mil](mailto:jason.m.talley2.ctr@mail.mil)

## **8.0 CONTRACTUAL REQUIREMENTS**

### **8.1 Other Contract Requirements**

Small Business Concerns (SBCs) are strongly encouraged to engage with their Contracting/Agreements Office to determine what measures can be taken in the event contract performance is affected due to the COVID-19 situation. SBCs are encouraged to monitor the CDC Website, engage with your employees to share information and discuss COVID-19 concerns employees may have. Please identify to your Contracting/Agreements Officer potential impacts to the welfare and safety of your workforce and any

contract/OT performance issues. Most importantly, keep in mind that only your Contracting/Agreements Officer can affect changes to your contract/OT.

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 outline that follows is 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. While a Phase II contract may include some or all of the provisions below, additional provisions will be required. Copies of complete general provisions will be made available prior to award.

- a. **Standards of Work.** Work performed under the contract must conform to high professional standards.
- b. **Inspection.** Work performed under the contract is subject to Government inspection and evaluation at all reasonable times.
- c. **Examination of Records.** The Comptroller General (or a fully authorized representative) shall have the right to examine any directly pertinent records of the contractor involving transactions related to this contract.
- d. **Default.** The Government may terminate the contract if the contractor fails to perform the work contracted.
- 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 (that is, 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 STTR funding agreement, purchase only American-made items whenever possible.
- 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. **Publication Approval.** Government review and approval will be required prior to any dissemination or publication, except within and between the Contractor and any subcontractors, of classified 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 22.1803.
- 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. Therefore, 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 STTR 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.

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

Section 890 of the National Defense Authorization Act (NDAA) for Fiscal Year (FY) 2020 prohibits 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 an exception applies. See [provision 252.225-7974 Class Deviation 2020-00005](#) “Prohibition on Contracting with Persons that have Business Operations with the Maduro Regime.

## 8.3 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.

## 8.4 Patents

Small business firms 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 USC 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 Invention Reporting in Section 11.6.

## 8.5 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 five 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. Upon expiration of the five-year restrictive license, the Government has unlimited rights in the STTR data. During the license period, the Government may not release or disclose STTR 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](#), "Rights in Noncommercial Technical Data and Computer Software – Small Business Technology Transfer (STTR) Program."

If a proposer plans to submit assertions in accordance with DFARS 252.227-7017, those assertions must be identified, and assertion of use, release, or disclosure restriction **MUST** be included with your proposal submission. The contract cannot be awarded until assertions have been approved.

## 8.6 Invention Reporting

STTR 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](http://www.iEdison.gov) for those agencies participating in iEdison.

## 8.7 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. (The Report Documentation Page may be prepared and printed from the DoD Submission Web site at [http://www.dtic.mil/dtic/submit/guidance\\_on\\_submitting\\_docs\\_to\\_dtic.html](http://www.dtic.mil/dtic/submit/guidance_on_submitting_docs_to_dtic.html). 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 company in its Phase II proposal to report Phase I progress may also be used in the final report.
  - (2) For each unclassified report, the company submitting the report 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/STTR Program Office." *Note: Data developed under a STTR contract is subject to STTR Data Rights which allow for protection under DFARS 252.227-7018 (see Section 11.5, Technical Data Rights). The sponsoring DoD activity, after reviewing the company'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](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 STTR 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 terms "STTR Report".
- c. **Submission:** In accordance with DoD Instruction 3200.12 and DFARS clause 252.235-7011, a copy of the final report shall be submitted (electronically or on disc) to DTIC:

Defense Technical Information Center  
ATTN: DTIC-OA (SBIR/STTR)  
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 STTR Data Rights protected under DFARS 252.227-7018.

**Missile Defense Agency (MDA)**  
**20.C Small Business Technology Transfer (STTR)**  
**Proposal Submission Instructions**

**I. 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 Technology Transfer (STTR) Program is implemented, administered, and managed by the MDA SBIR/STTR Program Management Office (PMO), located within the Advanced Technology (DV). Specific questions pertaining to the administration of the MDA STTR Program should be submitted to:

**Missile Defense Agency**  
**SBIR/STTR Program Office**  
**MDA/DVR**  
**Bldg. 5222, Martin Road**  
**Redstone Arsenal, AL 35898**

**Email: [sbirsttr@mda.mil](mailto:sbirsttr@mda.mil)**  
**Phone: 256-955-2020**

Proposals not conforming to the terms of this Announcement will not be considered. 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 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 a proposal. Please go to [https://www.sbir.gov/sites/default/files/SBIR-STTR\\_Policy\\_Directive\\_2019.pdf](https://www.sbir.gov/sites/default/files/SBIR-STTR_Policy_Directive_2019.pdf) to review the SBIR/STTR Policy Directive issued by the Small Business Administration.

**Federally Funded Research and Development Centers (FFRDCs) and Support Contractors**

Only Government personnel with active non-disclosure agreements will evaluate proposals. Non-Government technical consultants (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 STTR awards in the STTR 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 advisors 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.

## **II. 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 prior to award.

### **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 an application. Upon registering, each firm will receive a unique control ID to be used for submissions at any of the eleven (11) participating agencies in the SBIR or STTR programs. For more information, please visit the SBA's Firm Registration Page: <http://www.sbir.gov/registration>.

### **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 Instructions of this Announcement.

## **III. ORGANIZATIONAL CONFLICTS OF INTEREST (OCI)**

The basic OCI rules for Contractors which support development and oversight of STTR topics are covered in FAR 9.5 as follows (the Offeror is responsible for compliance):

- (1) the Contractor's objectivity and judgment are not biased because of its present or planned interests which relate to work under this contract;
- (2) the Contractor does not obtain unfair competitive advantage by virtue of its access to non-public information regarding the Government's program plans and actual or anticipated resources; and
- (3) the Contractor does not obtain unfair competitive advantage by virtue of its access to proprietary information belonging to others.

All applicable rules under the FAR Section 9.5 apply.

If you, or another employee in your company, developed or assisted in the development of any STTR 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.

#### **IV. USE OF FOREIGN NATIONALS**

See the “Foreign Nationals” section of the DoD STTR 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 STTR 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 uncleared 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 is found ineligible by the government to perform proposed work, the contracting officer will advise the offeror of any disqualifications but may not disclose the underlying rationale. In the event a firm is found ineligible to perform proposed work, the contracting officer will advise the offeror of any disqualifications but may not disclose the underlying rationale.

#### **V. 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 <http://www.bis.doc.gov/index.php/regulations/export-administration-regulations-ear>.

Most MDA STTR topics are subject to ITAR and/or EAR. If the topic write-up indicates that the topic is subject to International Traffic in Arms Regulation (ITAR) and/or Export Administration Regulation (EAR), your company may be required to submit a Technology Control Plan (TCP) during the contracting negotiation process.

## **VI. CLAUSE H-08 PUBLIC RELEASE OF INFORMATION (Publication Approval)**

Clause H-08 pertaining to the public release of information is incorporated into all MDA STTR contracts and subcontracts without exception. Any information relative to the work performed by the contractor under MDA STTR contracts must be submitted to MDA for review and approval prior to its release to the public. This mandatory clause also includes the subcontractor who shall provide their submission through the prime contractor for MDA's review for approval.

## **VII. 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 \(Disclosure of Information\)](#), and [DFARS clause 252.204-7012 \(Safeguarding Covered Defense Information and Cyber Incident Reporting\)](#). 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.

## **VIII. OWNERSHIP ELIGIBILITY**

Prior to award, MDA may request business/corporate documentation to assess ownership eligibility as related to the requirements of 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 contractor shall provide all necessary documentation for evaluation prior to STTR 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.

## **IX. FRAUD, WASTE, AND ABUSE**

All offerors must complete the fraud, waste, and abuse training (Volume 6) that is located on the Defense SBIR/STTR Innovation Portal (DSIP) (<https://www.dodsbirstr.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](mailto:MDAHotline@mda.mil)

DoD Inspector General (IG) Fraud, Waste & Abuse  
Hotline: (800) 424-9098  
[hotline@dodig.mil](mailto:hotline@dodig.mil)

Additional information on Fraud, Waste and Abuse may be found in the DoD Instructions of this Announcement.

Per section 8, paragraph (d), part 1 of the SBIR/STTR Policy Directive, (1) A small business concern (SBC), before receiving an STTR award, must negotiate a written agreement between the SBC and the partnering Research Institution, allocating Intellectual Property rights and rights, if any, to carry out follow-on research, development, or Commercialization. The SBC must submit this agreement to the awarding agency with the proposal. The SBC must certify in all proposals that the agreement is satisfactory to the SBC.

## **X. PROPOSAL FUNDAMENTALS**

### **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: 703-214-1333 or [DoDSBIRSupport@reisystems.com](mailto:DoDSBIRSupport@reisystems.com) (Monday through Friday, 9:00 a.m. to 5:00 p.m. ET). It is recommended that potential offerors email topic authors to schedule a time for topic discussion during the pre-release period from 25 August 2020 – 22 September 2020.

### **Classified Proposals**

Classified proposals **ARE NOT** accepted under the MDA STTR 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 STTR contract must use the security classification guidance provided under that contract to verify new STTR 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](mailto: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 Status**

The MDA SBIR/STTR PMO will distribute selection or non-selection email notices to all firms who submit a MDA STTR proposal. The email will be distributed to the "Corporate Official" and "Principal Investigator" listed on the proposal coversheet. MDA cannot be responsible for notification to a company that provides incorrect information or changes such information after proposal submission. Selection and non-selection notifications will be distributed to all offerors in the January 2021 timeframe.

### **Proposal Feedback**

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.

### **Technical and Business Assistance (TABA)**

The [SBIR/STTR Policy Directive](#) allows agencies to enter into agreements with suppliers to provide technical assistance to 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 data bases.

All requests for TABA must be completed using the MDA SBIR/STTR Phase I TABA Form ([https://www.mda.mil/global/documents/pdf/SBIR\\_STTR\\_PHI\\_TABA\\_Form.pdf](https://www.mda.mil/global/documents/pdf/SBIR_STTR_PHI_TABA_Form.pdf)) and included as a part of Volume 5 of the proposal package. 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.

An STTR firm may acquire the technical assistance services described above on its own. Firms must request this authority from MDA and demonstrate in its STTR 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 STTR 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 STTR awardees in:

1. Making better technical decisions on STTR projects;
2. Solving technical problems that arise during STTR projects;
3. Minimizing technical risks associated with STTR 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](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.

### **STTR Proposal Funding**

All MDA STTR contracts are funded with 6.2/6.3 funding which is defined as:

1. Applied Research (6.2), Systematic study to gain knowledge or understanding necessary to determine the means by which a recognized and specific need may be met.

2. Advanced Technology Development (6.3), Includes all efforts that have moved into the development and integration of hardware for field experiments and tests.

As stated in Section VI “CLAUSE H-08 PUBLIC RELEASE OF INFORMATION”, MDA requires prior review and approval before public release of any information arising from STTR-sponsored research. As such, MDA does not consider STTR-sponsored research as fundamental research.

### **Protests Procedures**

Refer to the DoD Program Announcement 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:  
Tina Barnhill | 256-450-2817 | [sbristtr@mda.mil](mailto:sbristtr@mda.mil)

## **XI. PHASE I PROPOSAL GUIDELINES**

The Defense SBIR/STTR Innovation Portal (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 will not be considered. To be considered for evaluation the proposal package must be formally submitted on DSIP.

<p style="text-align: center;"><b>MAXIMUM PHASE I PAGE LIMIT FOR MDA IS <u>15 PAGES</u> FOR VOLUME 2, TECHNICAL VOLUME</b></p>
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Any pages submitted beyond the 15-page limit within the Technical Volume (Volume 2) will not be evaluated. If including a letter(s) of support and/or 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.

MDA’s objective for the Phase I effort is to determine the merit and technical feasibility of the concept. The contract period of performance for Phase I shall be six (6) months and the award shall not exceed \$125,000. A list of topics currently eligible for proposal submission is included in these instructions, followed by full topic descriptions. These are the only topics for which proposals will be accepted at this time.

### **Phase I Proposal**

**A complete Phase I proposal consists of four volumes (five if TABA and/or Letters of Support are provided):**

- Volume 1 (required): Proposal Cover Sheet (*does not count towards 15-page limit*)
- Volume 2 (required): Technical Volume (maximum of 15 pages)
- Volume 3 (required): Cost Volume (*does not count towards 15-page limit*)
- Volume 4 (not required): DSIP not accepting Volume 4 at this time.
- Volume 5 (optional): Letters of Support and/or TABA (*does not count towards 15-page limit*)
- Volume 6 (required): Fraud, Waste, and Abuse Training Certification

### **Volume 5 Information**

MDA will only accept letters of support and/or TABA as part of Volume 5. Any other type of documentation included as part of Volume 5 will not be considered. Letters of support should be loaded within Volume 5 using the “Letters of Support” category on DSIP. TABA should be loaded using the [Phase I TABA form](#) within Volume 5 using the “Other” drop-down category.

### **References to Hardware, Computer Software, or Technical Data**

In accordance with the SBIR/STTR Policy Directive, SBIR/STTR contracts are to conduct feasibility-related experimental or theoretical 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 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.”

### **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 Broad Agency Announcement (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.

## **XII. PHASE I PROPOSAL SUBMISSION CHECKLIST**

**1. The following have been submitted electronically through the DoD submission site by 12:00 p.m. (noon) EDT 5 November 2020.**

- ✓ Volume 1: DoD Proposal Cover Sheet

- ✓ Volume 2: Technical Volume (**DOES NOT EXCEED 15 PAGES**): **Any pages submitted beyond this will not be evaluated. Your Proposal Cover Sheet, Cost Volume, and Company Commercialization Report DO NOT count toward your maximum page limit.**

**If proposing to use foreign nationals, green card holders, and/or dual citizens; identify the personnel you expect to be involved on this project, the type of visa or work permit under which they are performing, country of origin and level of involvement.**

- ✓ Volume 3: Cost Volume. (**Online Cost Volume form is REQUIRED by MDA**)
- ❖ Volume 4: (NOT REQUIRED). DSIP not accepting Volume 4 at this time.
- ✓ Volume 5 (optional): Letters of Support and/or TABA.
- ✓ Volume 6 (required): Fraud, Waste, and Abuse Training Certification.

\_\_\_\_2. Phase I proposal is not to exceed \$125,000. (or not to exceed \$130,000 if TABA is included)

\_\_\_\_3. The proposal must be formally submitted on DSIP. Proposals that are not submitted will not be evaluated.

#### **XIV. MDA SECURITY REVIEW OF ABSTRACTS, BENEFITS, AND KEYWORDS**

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>).

#### **XIV. MDA PROPOSAL EVALUATIONS**

MDA will evaluate and select Phase I and Phase II proposals using scientific review criteria based upon technical merit and other criteria as discussed in this announcement document. 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.

Phase I proposals will be evaluated based on the criteria outlined below, including potential benefit to the BMDS. Selections will be based on best value 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.

Please note that potential benefit to the BMDS 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.

Qualified letters of support, if provided, must be included as part of Volume 5 within the “Letters of Support” category on the DoD submission site and will **not** count towards the 15-page Volume 2 page limit. Letters of support will be evaluated towards criterion C if included as part of Volume 5, but are not required for Phase I or Phase II. Letters of support shall not be contingent upon award of a subcontract.

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 BMDS requirements does the technology support 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. This letter must be included as Volume 5. Letters of support which are faxed, e-mailed separately, or otherwise not included as part of Volume 5 will NOT be considered.

### **Phase II Proposal Submission**

Per DoD STTR Phase II Proposal guidance, all Phase I awardees from the 20.C Phase I announcement will be permitted to submit a Phase II proposal for evaluation and potential award selection. Details on the due date, content, and submission requirements of the Phase II proposal will be provided by the MDA SBIR/STTR PMO on/around the fourth month of the Phase I period of performance. Only firms who receive a Phase I award resulting from the 20.C announcement may submit a Phase II proposal.

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. MDA does not participate in the DoD Fast Track program.

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.

## **\MDA STTR 20.C Phase I Topic Index**

MDA20-T001	Reduction of Solid Propellant Infrared (IR) Signature
MDA20-T002	Non Real-Time Hardware Assisted Computer System Simulation
MDA20-T003	Autonomous Missile Detection using Bio-Inspired Sensors
MDA20-T004	Inherently Radiation Hardened Microelectronic Components
MDA20-T005	Advanced Particle Accelerators to Support Heavy-Ion Radiation Testing of Electronics
MDA20-T006	Radiation Hardened By Design (RHBD) Technologies Designed Using On-Shore 22nm FinFETs

MDA20-T001 TITLE: Reduction of Solid Propellant Infrared (IR) Signature

RT&L FOCUS AREA(S): Hypersonics, General Warfighting Requirements (GWR)

TECHNOLOGY AREA(S): Ground Sea, Weapons, 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:** Develop a solid propellant that greatly reduces the exhaust IR signature emitted while maintaining the thrust to mass ratio of the existing solid propellant.

**DESCRIPTION:** This topic seeks to develop solid propellants that exhibit reduced IR signatures while maintaining thrust to mass ratio performance. Detection of missile launch and booster burnout are important threat identification points. Since remote IR surveillance is often used to detect and track missile launches, the ability to avoid detection through IR signature reduction would be beneficial for mobile defense platforms as well as forward deployed offensive assets.

**PHASE I:** Develop a proof of concept solid rocket motor propellant that greatly reduces the exhaust IR signature. Perform an analysis to demonstrate the concept and an initial understanding of the signature calculations while maintaining the thrust to mass ratio. Phase I should be a feasibility concept study that supports the proposed design solution and down selection of alternatives.

**PHASE II:** Enhance and refine the proposed propellant based on the results and findings of Phase I and expand its capabilities. Validate the feasibility of the Phase I concept by development and demonstrations that will be tested to ensure performance objectives are met. The Phase II effort should result in a prototype with substantial commercialization potential.

**PHASE III DUAL USE APPLICATIONS:** Productize the propellant to expand the capabilities to other interested users. Develop and execute a Phase III incremental test & integration plan that produces a final prototype.

**REFERENCES:**

1. M. Keith Hudson, Robert B. Shanks, Dallas H. Snider, Diana M. Lindquist, Chris Luchini, and Sterling Rooke, UV, Visible, and Infrared Spectral Emissions in Hybrid Rocket Plumes, Department of Applied Science, Univ of Ark at Little Rock.
2. Advisory Group for Aerospace Research & Development, Advisory Report 287, Terminology and Assessment Methods of Solid Propellant Rocket Exhaust Signatures, February 1993.

3. Sam Judd, Matthew Vernacchia, Solid Rocket Propellant Combustion, Massachusetts Institute of Technology.
4. R.C. Farmer, S.D. Smith, B.L. Myruski, Radiation from Advanced Solid Rocket Motor Plumes, SECA-FR-94-18, NASA.

KEYWORDS: Solid Propellant, Reduced IR Signature, maintain thrust to mass ratio

TPOC-1: LCDR Chester Hewitt  
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MDA20-T002 TITLE: Non Real-Time Hardware Assisted Computer System Simulation

RT&L FOCUS AREA(S): Autonomy

TECHNOLOGY AREA(S): Information Systems

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:** Resolve restrictions of the Linux Kernel Virtual Machine (KVM) to enable control of the time stamp counter to keep software execution rate consistent with non real-time simulation time.

**DESCRIPTION:** This topic seeks to develop an accurate timing source for software execution on a KVM to enable non real-time simulations. The Linux KVM supports the use of physical computer cores to accelerate the execution of virtual machines. In this paradigm, peripheral hardware is simulated in a user space (ie. non-privileged space) process (ie. the allocation of memory and time) while streams of machine instructions to be executed by the virtual cores are supplied to the KVM module of the operating system, which executes those streams on real hardware. Timing accuracy is not as much of a concern as control of the time stamp counter for non real-time simulation time control instead of its intended virtualization use. Several aspects of this virtualization method prove challenging when the streams of machine instructions are intended to be executed as part of a simulation model rather than a virtualization tool. Among the most challenging are (1) determining how the KVM populates the time stamp counter register of the virtual core, and (2) accounting for the number of instructions to be executed by the KVM between returns to user space which cannot be controlled directly by the user space process. This impedes the use of the time stamp counter as a timing source because it cannot be matched to a non real-time simulation and it prevents the presentation of a consistent rate of execution to the software hosted on the virtual machine for use in non real-time simulations.

**PHASE I:** Develop the proposed approach to a sufficient level to demonstrate its viability and identify requirements for full development. The following are anticipated at the conclusion of Phase I: a) A demonstration/proof-of-concept of the viability of the proposed approach. b) An algorithmic/process description of the developed approach, to include use-case descriptions and descriptions or demonstrations of output. c) A plan for the development of an initial working prototype capability, to include cyber security efforts to gain approval to operate on government computers.

**PHASE II:** Deliver an initial working prototype capability. The following are anticipated by the conclusion of Phase II: a) A demonstration of initial capability. b) Prototype software for

experimental trials by government users. c) Documentation, including software scan results, to support approval decisions to load software onto government computer systems. d) Documentation of the initial capability sufficient to support trial use. e) Documentation of the software architecture, its algorithms/processes, and output formats. f) A plan for development of a full operational capability.

**PHASE III DUAL USE APPLICATIONS:** Deliver phased incremental improvements to the prototype until a full operational capability is achieved. At each increment, the following are anticipated: a) Demonstrations of incremental additions/improvements. b) A software release for use/testing by the government. c) Documentation, including software scan results, to support approval decisions to load software onto government computer systems. d) Updated user documents. e) Updated architecture, algorithms/processes, and output format documentation. At the conclusion of Phase III, the final software and documentation should be delivered.

#### REFERENCES:

1. Zachary Amsden. Timekeeping Virtualization for X86-Based Architectures. Accessed 14 April 2020: <https://www.kernel.org/doc/Documentation/virtual/kvm/timekeeping.txt>.
2. T. Yeh and M. Chiang, "On the interface between QEMU and SystemC for hardware modeling," 2010 International Symposium on Next Generation Electronics, Kaohsiung, 2010, pp. 73-76.
3. Ozmen, Ozgur, Nutaro, James J., Sanyal, Jibonananda, and Olama, Mohammed M. Simulation-based Testing of Control Software. United States: N. p., 2017. Web. doi:10.2172/1343541.

**KEYWORDS:** Simulation Time Management, KVM, non real-time, emulation

TPOC-1: Jeremy Gneiting  
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MDA20-T003 TITLE: Autonomous Missile Detection using Bio-Inspired Sensors

RT&L FOCUS AREA(S): Biotechnology, Microelectronics, Hypersonics, Autonomy, Artificial Intelligence

TECHNOLOGY AREA(S): Ground Sea, 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:** Develop innovative designs for a bio-inspired sensor that is optimized for autonomously detecting, identifying, tracking, and reporting dim missile threats in cluttered and noisy scenes.

**DESCRIPTION:** This topic seeks innovative solutions for autonomously (i.e. without a cue from another sensor) detecting dim missile threats in cluttered and noisy scenes using passive sensors. An example application could be detection of a distant (e.g. 100 kilometers away) re-entering missile using a ground-based infrared search and track sensor. In addition to the background and sensor noise, the scene might be cluttered by moving sources to include (but not limited to) clouds, dust, precipitation, weapon effects, the sun, the moon, stars, meteors, satellite flares, auroras, birds, insects, and aircraft. Such a scene could be challenging for conventional detection approaches, and would require increased size, weight, and power (SWaP) in order to reject noise and clutter while increasing target sensitivity.

Biological vision systems are SWaP-efficient and well adapted for ignoring clutter and noise, detecting motion, and compressing visual information. A sensor that artificially emulates all or part of a biological vision system might outperform conventional sensors for detecting, identifying, tracking, and reporting dim missile threats in cluttered and noisy scenes.

This topic seeks innovative sensor designs that artificially mimic biological vision systems wherever feasible and are capable of overcoming the challenges described above. Offerors should propose complete designs, to include everything from the optics taking in the scene to the final processor outputting target reports. These designs should incorporate technologies that are projected to mature (preferably driven by commercial investments) within the next 10 years, and that would be available (as early prototypes) for experiments during Phase II.

The focus of this topic is not on the development of any one particular technology but rather the integration of multiple emerging technologies into a novel solution. The Research Institute partner should be a key member of the design team and a source of many of the innovative ideas, rather than supplying one or two services or subcomponents. Offerors may use the example

application described above or propose their own notional application and corresponding sensor configuration (e.g. waveband, field-of-view, etc.) as long as its feasibility and suitability for missile defense applications can be established.

In addition to performance, there are other considerations that determine the acceptability of a sensor concept for deployment. These considerations include manufacturability, ease-of-calibration, ability to handle multiple simultaneous targets, minimization of (or compensation for) non-linearities and non-uniformities, insensitivity to (or compensation for) vibration and temperature changes, hardening against radiation and EMP, ability to be programmed and trained, and system support requirements (e.g. cooling, data-link, and off-board processing requirements). The bio-inspired sensor design should address these considerations.

**PHASE I:** Develop an initial design for a bio-inspired sensor. Study the scientific and technical feasibility of the proposed approach. Estimate its performance using low-fidelity calculations, models, and simulations. Develop an initial plan for fabricating a prototype in Phase III. Assess the availability and maturity of enabling technologies and subcomponents within the next 5-10 years based on market projections. Identify risk areas and mitigation plans that would be implemented in Phase II. Complete a plan for Phase II and contact suppliers to verify the plan is executable.

**PHASE II:** Conduct integration, risk-reduction, and proof-of-concept experiments using early prototype subcomponents and subassemblies in order to inform models and increase confidence in the feasibility and benefit of the proposed design. Improve the design based on these experimental results. Conduct medium-fidelity calculations, models, and simulations to estimate sensor performance, behavior, and support requirements. Complete a detailed plan for fabricating a prototype in Phase III.

**PHASE III DUAL USE APPLICATIONS:** Fabricate and test a complete bench-top prototype of the bio-inspired sensor. Identify design modifications that could be made to serve other customers and applications. Complete plans for a transportable, ruggedized, and miniaturized prototype that could be field-tested.

#### REFERENCES:

1. J. H. Pantho, P. Bhowmik and C. Bobda, "Neuromorphic Image Sensor Design with Region-Aware Processing," 2019 IEEE Computer Society Annual Symposium on VLSI (ISVLSI), Miami, FL, USA, 2019, pp. 459-464.
2. M. A. Massie et. al. Neuromorphic infrared focal plane performs sensor fusion on-plane local-contrast-enhancement spatial and temporal filtering, Proc. SPIE 1961, Visual Information Processing II, 27 August 1993.
3. K. I. Schultz et. al. Digital-Pixel Focal Plane Array Technology, MIT Lincoln Laboratory Journal, Vol. 20, No. 2, December 2014.
4. G. P. Luke, C. H. G. Wright and S. F. Barrett, "A Multiaperture Bioinspired Sensor With Hyperacuity," in IEEE Sensors Journal, vol. 12, no. 2, pp. 308-314, Feb. 2012.
5. D. Scribner, T. Petty and P. Mui, "Neuromorphic readout integrated circuits and related spike-based image processing," 2017 IEEE International Symposium on Circuits and Systems (ISCAS), Baltimore, MD, 2017, pp. 1-4.

KEYWORDS: Bio-inspired, Missile Defense, Sensor

TPOC-1: Aaron Williams

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MDA20-T004 TITLE: Inherently Radiation Hardened Microelectronic Components

RT&L FOCUS AREA(S): Space, Microelectronics, Hypersonics

TECHNOLOGY AREA(S): Sensors, Electronics, Space Platform

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 radiation hardened electronic components capable of surviving and operating through exposure to radiation environments encountered in space.

**DESCRIPTION:** This topic seeks the design and fabrication of inherently radiation hardened microelectronic components. Electronic components and systems exposed to radiation in space may experience power resets, safing (de-arming), performance degradation, and/or temporary or permanent failure due to cumulative effects of long-term exposure or high energetic particle and/or photon fluence. Radiation sources in space include particles geo-magnetically confined in radiation belts (protons, electrons, heavy ions); particles from solar winds, coronal mass ejections (proton rich) or flares (heavy ion rich); omnidirectional free space particles (galactic cosmic rays, heavy ions); or particles and photons from man-made events (X-rays, Gamma-rays, neutrons, radioactive debris) as well as electro-magnetic pulse (EMP). Typically, systems employ a combination of methods for radiation protection: shielding, part redundancy, circumvent and recovery (C&R), rad-hard by design (RHD), and hardened parts. Using shielding and redundant parts imposes mass penalties. C&R places a system in a protective mode until a radiation event passes leaving the system vulnerable during the down time. RHD develops radiation tolerant circuits that minimize single point failures. The hardened parts approach involves design, fabrication, selection and screening of parts for radiation tolerance.

New manufacturing techniques and recent developments in nano-materials create an opportunity to develop electronic components that are inherently insensitive to radiation effects. In particular, vacuum field effect component technology (e.g. diodes, triodes, transistors) and functional devices made from these components (e.g. OPAMPs, simple logic devices) using high density three dimensional (3D) radiation hardened capability requiring minimal shielding and/or C&R.

Desire parts able to survive and operate through space radiation environments with recommended total ionizing dose (TID) >300 krad(Si), single event upsets (SEU) < 10-10 errors/bit-day, and immunity to single event latch-up (SEL) at linear energy transfer (LET) levels > 100 MeV cm<sup>2</sup>/mg. Development of a radiation hardened field-programmable gate array, with a technology node less than 45nm, is a specific government application for this technology.

PHASE I: Design radiation insensitive component(s), simple circuit(s), and/or 3D fabrication technique(s). Provide analysis substantiating proposed component(s), simple circuit(s), and/or 3D fabrication technique(s) can survive and operate through realistic radiation environments. Fabricate simple proof of principle prototypes and establish baseline performance parameters.

PHASE II: Optimize design(s) to improve baseline performance, increase survivability and level of operability in realistic radiation environments. Fabricate and test optimized parts in realistic radiation environments and against standard military temperature cycling specification. Work with a vendor/trusted foundry/fabrication house and/or military prime contractor on part(s) manufacturability/producibility. Incorporate hardened parts in a representative space avionic subsystem/system application and test in realistic space radiation environments.

PHASE III DUAL USE APPLICATIONS: Team with a vendor/trusted foundry/fabrication house and/or military prime contractor to develop and space qualify radiation-hardened parts. Work with the transition partner to establish a pathway to insert technology into an existing or planned missile defense application.

#### REFERENCES:

1. Demming, A., Vacuum technology comeback immunizes nanoelectronics from radiation, *Physics World*, IOP Publishing, 31 Aug 2013. <https://physicsworld.com/a/vacuum-technology-comeback-immunizes-nanoelectronics-from-radiation>
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4. Srisonphan, S., Jung, Y. & Kim, H. Metal-oxide-semiconductor field-effect transistor with a vacuum channel. *Nature Nanotech* 7, 504-508 (2012). <https://www.nature.com/articles/nnano.2012.107>

KEYWORDS: Vacuum, Channel, Tube, Nanotechnology, Nanomaterials, Microelectronics, Transistor, Radiation, Hardening

TPOC-1: James Michael Madewell  
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MDA20-T005 TITLE: Advanced Particle Accelerators to Support Heavy-Ion Radiation Testing of Electronics

RT&L FOCUS AREA(S): Space, Microelectronics, Hypersonics  
TECHNOLOGY AREA(S): Sensors, Electronics, Space Platform

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 new capability that transforms low energy accelerators to high energy accelerators or develops a brand new accelerator specifically designed for high energy heavy ion testing of electronics.

DESCRIPTION: This topic seeks a flexible testing facility capable of delivering high energy beams which can test electronics in a representative configuration and reduce the overall testing cost while fully characterizing the Single Event Effects (SEE) response of each part. The United States and its military are sending more, and increasingly complex, computer-run devices into orbit each year. Once in orbit, the circuits within these devices are bombarded by ionizing radiation that can lead to failure. Given the increasing expense of launching space based systems and the microelectronics which reside in them, the testing of these integrated circuits at heavy-ion beam facilities is essential to prevent costly losses due to radiation failure.

The increasing complexity of electronic circuits, with smaller feature sizes and larger overlayers, has made it harder to test at ion beam facilities as the circuits require expensive and difficult preparation for the low-energy ion beams currently in use. In space, high energy ionizing particles can easily traverse the overlayers to reach the sensitive volume where SEE occur. Accelerator facilities performing SEE testing use lower-energy ion beams, which have difficulty reaching these sensitive volumes. Therefore, costly de-lidding of parts is required which is a destructive process removing the outermost layers of a circuit and leaving the exposed circuit in a state that can be difficult to test (e.g. thermal properties are altered) and which is not representative of the on-orbit configuration of the circuit.

PHASE I: Develop a concept to improve existing low energy test capabilities (10 MeV/n or less ion accelerators) and increase their energy to 100 MeV/n or more. Or develop a concept to create a new accelerator that reaches 100 MeV/n or more and can fit into a standard shipping container. Standard ISO shipping container dimensions are: 8ft (2.43m) wide, 8.5ft (2.59m) high and 40ft (6.06m) (Threshold) or 20ft (12.2m) (Objective) long. Provide a detailed report documenting the concept design and its expected max energy levels. For new designs, provide a

phased plan of the critical elements to be prototyped if the entire design cannot be prototyped in one follow-on phase.

PHASE II: For designs enhancing current accelerators: Create and provide a prototype of the improved elements/subcomponents for upgrading or adapting a current ion accelerator design to reach the enhanced energy level documented in Phase I. Provide modeling and simulation to demonstrate a complete final design along with a documented approach for implementing these elements and enhancements on a current accelerator design. Identify potential accelerator facilities or manufacturers with which to partner for Phase III implementation.

For new designs: Create and provide a prototype of the new design. If the full prototype cannot be completed in this phase, create and provide prototypes of the critical parts/subcomponents of a new design that would be essential for meeting the increased energy benchmark of 100 MeV/n or more along with modeling and simulation of the final design to demonstrate the capability to fit into a standard shipping container.

PHASE III DUAL USE APPLICATIONS: Build an operational, improved, or new design ion accelerator that can reach 100 MeV/n or more and operate for 2,000 hours per year. For a design that is an improvement on existing accelerators, if necessary, partner with existing ion testing facilities and/or a manufacturer of current accelerators to demonstrate implementation of the improved design. For new designs, build the final accelerator to fit within a standard shipping container.

#### REFERENCES:

1. Pellish, Jonathan A. et al., Heavy ion testing at the galactic cosmic ray energy peak, IEEE - 2009 European Conference on Radiation and Its Effects on Components and Systems (RADECS), Sept. 14-18, 2009.
2. Schwank, James R. et al, Radiation Hardness Assurance Testing of Microelectronic Devices and Integrated Circuits: Test Guideline for Proton and Heavy Ion Single-Event Effects, IEEE-Transactions on Nuclear Science, Vol. 60, No. 3, June 2013.

KEYWORDS: Ionizing radiation, testing, SEE, Heavy-ion, accelerator, microelectronics

TPOC-1: Courtney Matzkind

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MDA20-T006 TITLE: Radiation Hardened By Design (RHBD) Technologies Designed Using On-Shore 22nm FinFETs

RT&L FOCUS AREA(S): Space, Microelectronics, Hypersonics  
TECHNOLOGY AREA(S): Sensors, Electronics, Space Platform

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 RHBD products and Intellectual Property (IP) based on on-shore 22nm FinFET technology to meet long term performance and availability needs for defense applications in natural and hostile radiation environments.

DESCRIPTION: This topic seeks to leverage the current 22nm on-shore production capability and its inherent Total Ionizing Dose (TID) hardness by:

1. Developing RHBD mitigation approaches to known susceptibilities to low energy particle exposure to allow for long term design solutions across platforms.
2. Developing U.S. based IP for the RHBD designs which allows for easy modification by various government programs depending on the intended application.
3. Conducting additional hardening and testing of the RHBD 22nm FinFET technology for performance in hostile environments to provide an even greater depth of its use across platforms and applications.

It is critical to the development and sustainment of defense programs to identify, invest in, and advance secure, on-shore manufacturing and packaging of RHBD technology and IP, including characterizing the technology in radiation environments. 22nm FinFET technology is a proven commercial technology with current on-shore production, allowing for advanced size, weight, and power considerations in new designs.

PHASE I: Design radiation insensitive component(s), simple circuit(s), and/or 3D fabrication technique(s) using 22nm FinFET technology. Provide analysis substantiating proposed component(s), simple circuit(s), and/or 3D fabrication technique(s) can survive and operate through realistic radiation environments (both natural space and weapon induced). Fabricate simple proof of principle prototypes and establish baseline performance parameters. Conduct initial operational and evaluation testing in prompt dose-rate radiation environments. Characterize survivability and operability in realistic natural space and prompt dose rate radiation environments, and against standard military temperature cycling specification environments.

PHASE II: Optimize design(s) to improve baseline performance and increase survivability and level of operability in realistic natural space and weapon-induced radiation environments. Fabricate and test optimized parts in realistic natural space and prompt dose rate radiation environments and against standard military temperature cycling specification environments. Work with a vendor, trusted foundry, fabrication house, and/or military prime contractor on part(s) manufacturability and producibility. Incorporate hardened parts in a representative space avionic subsystem/system application and test in a realistic space radiation environment.

PHASE III DUAL USE APPLICATIONS: Team with a vendor, trusted foundry, fabrication house, and/or military prime contractor to develop and space qualify the radiation hardened parts. Work with the transition partner to establish a pathway to inserting the technology into an existing or planned missile defense application.

#### REFERENCES:

1. Lee, H.J et al., Intel 22nm FinFET (22FFL) Process Technology for RF and mm Wave Applications and Circuit Design Optimization for FinFET Technology, IEEE-2018 IEEE International Electron Devices Meeting (IEDM).
2. Guillorn, M. et al., FinFET performance advantage at 22nm: An AC perspective, Guillorn, M. et al., IEEE-2008 Symposium on VLSI Technology.
3. Royer, Pablo et al., Evolution of radiation-induced soft errors in FinFET SRAMs under process variations beyond 22nm, IEEE-Proceedings of the 2015 IEEE/ACM International Symposium on Nanoscale Architectures (NANOARCH'15).
4. Sanjana S.R. et al., Design and Performance Analysis of 6T SRAM Cell in 22nm CMOS and FINFET Technology Nodes, IEEE-2017 International Conference on Recent Advances in Electronics and Communication Technology (ICRAECT).

Approved for Public Release  
20-MDA-10521 (2 Jul 20)

KEYWORDS: Radiation, RHDB, 22nm, microelectronics, state-of-the-art, foundry, on-shore, defense, sensors

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Approved for Public Release  
20-MDA-10521 (2 Jul 20)

**NATIONAL GEOSPATIAL-INTELLIGENCE AGENCY**  
**20.C Small Business Technology Transfer (STTR)**  
**Proposal Submission Instructions**

**GENERAL INFORMATION**

The National Geospatial-Intelligence Agency has a responsibility to provide the products and services that decision makers, warfighters, and first responders need, when they need it most. As a member of the Intelligence Community and the Department of Defense, NGA supports a unique mission set. We are committed to acquiring, developing and maintaining the proper technology, people and processes that will enable overall mission success.

Geospatial intelligence, or GEOINT is the exploitation and analysis of imagery and geospatial information to describe, assess and visually depict physical features and geographically referenced activities on the Earth. GEOINT consists of imagery, imagery intelligence and geospatial information.

With our unique mission set, NGA pursues research that will help guarantee the information edge over potential adversaries. Additional information pertaining to the National Geospatial-Intelligence Agency's mission can be obtained by viewing the website at <http://www.nga.mil>.

Inquiries of a general nature or questions concerning the administration of the STTR program should be addressed to:

National Geospatial-Intelligence Agency  
Attn: SBIR/STTR Program Manager, RA, MS: S75-RA  
7500 GEOINT Dr., Springfield, VA 22150-7500  
Email: [SBIR@nga.mil](mailto:SBIR@nga.mil)

For technical questions and communications with Topic Authors, see DoD Instructions, Section. 4.15. For general inquiries or problems with electronic submission, contact DoD SBIR/STTR Help Desk at [DoDSBIRSupport@reisystems.com](mailto:DoDSBIRSupport@reisystems.com) or 1-703-214-1333 between 9:00 am and 5:00 pm ET (Monday – Friday).

**PHASE I PROPOSAL INFORMATION**

Follow the instructions in the DoD STTR Program BAA for program requirements and proposal submission instructions at <https://rt.cto.mil/rtl-small-business-resources/sbir-sttr/>.

NGA has developed topics to which small businesses may respond to in this fiscal year 2020 STTR Phase I iteration. These topics are described on the following pages. **The maximum amount of STTR funding for a Phase I award is \$100,000 and the maximum period of performance for a Phase I award is nine months.** While NGA participates in the majority of STTR program options, NGA does not participate in the Commercialization Pilot, Discretionary Technical and Business Assistance (TABAs) or Phase II Enhancement programs.

The entire STTR proposal submission (consisting of a Proposal Cover Sheet, the Technical Volume, and Cost Volume) must be submitted electronically through the DoD SBIR/STTR Proposal Submission system located at <https://www.dodsbirsttr.mil/submissions/> for it to be evaluated.

- **Proposal Cover Sheet (Volume 1):** The Cover Sheet must include a brief technical abstract of no more than 200 words that describes the proposed R&D project with a discussion of anticipated benefits and potential commercial applications. Do not include proprietary or classified information in the Proposal Cover Sheet. If your proposal is selected for award, the technical abstract and discussion of anticipated benefits may be publicly released.
- **Format of Technical Volume (Volume 2):** 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. The length of each part of the technical volume is limited to 20 pages. The Government will not consider pages in excess of the page count limitations. Number all pages of your proposal consecutively. Font size should not be smaller than 12 point Times New Roman font, with at least a one-inch margin on top, bottom, and sides, on 8½” by 11” paper. The header on each page of the Technical Volume should contain your company name, topic number, and proposal number assigned by DSIP when the Cover Sheet was created. The header may be included in the one-inch margin.
  - (1) Significance of the Problem. 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, and describe the technical approach and methods to be used in meeting these objectives.
  - (3) Phase I Statement of Work. The statement of work should provide an explicit, detailed description of the Phase I approach, indicate what is planned, how and where the work will be carried out, a schedule of major events and the final product to be delivered. 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 total proposal. Include how and where the work will be carried out, a schedule of major events and the final product to be delivered. The methods planned to achieve each objective or task should be discussed explicitly and in detail.
  - (4) Related Work. Describe significant activities directly related to the proposed effort, including any conducted by the PI, the proposer, consultants or others. Describe how these activities interface with the proposed project and discuss any planned coordination with outside sources. The proposal must persuade reviewers of the proposer's awareness of the state of the art in the specific topic. Describe previous work not directly related to the proposed effort but similar. Provide the following: (1) short description, (2) client for which work was performed (including individual to be contacted and phone number) and (3) date of completion.
  - (5) Relationship with Future Research or Research and Development. State the anticipated results of the proposed approach if the project is successful.
  - (6) Key Personnel. Identify key personnel who will be involved in the Phase II effort including information on directly related education and experience. A concise resume of the PI, including a list of relevant publications (if any), must be included. All resumes count toward the page limitation.
  - (7) Foreign Citizens. Identify any foreign nationals you expect to be involved on this project.
  - (8) Facilities/Equipment. Describe available instrumentation and physical facilities necessary to carry out the Phase I effort. Items of equipment to be purchased (as detailed in the cost proposal) shall be justified under this section. If proposing to perform classified activities during the period of performance you need to provide the following: 1) Will the information include controlled unclassified information (CUI) and; 2) What unclassified IT systems will be required.

- (9) 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 according to the Cost Breakdown Guidance. Please refer to section 4.2 of this BAA for detailed eligibility requirements as it pertains to the use of subcontractors/consultants.
- 10) Prior, Current or Pending Support of Similar Proposals or Awards. If a proposal submitted in response to this 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 the PI 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 proposal submitted or award received. Note: If this does not apply, state in the proposal "No prior, current, or pending support for proposed work."
- (11) Commercialization Strategy. NGA is equally interested in dual use commercialization of SBIR/STTR projects that result in products sold to the U.S. military, the private sector market, or both. NGA expects explicit discussion of key activities to achieve this result in the commercialization strategy part of the proposal. The Technical Volume of each Direct to Phase I proposal must include a commercialization strategy section. The Phase I commercialization strategy shall not exceed 5 pages. The commercialization strategy should include the following elements:
  - a) Problem or Need Statement. Briefly describe what you know of the problem, need, or requirement, and its significance relevant to a Department of Defense application and/or a private sector application that the SBIR/STTR project results would address.
  - b) Description of Product(s) and/or System Application(s). Identify the commercial product(s) and/or DoD system(s), or system(s) under development, or potential new system(s). Identify the potential DoD endusers, Federal customers, and/or private sector customers who would likely use the technology.
  - c) Business Model(s)/Procurement Mechanism(s). Discuss your current business model hypothesis for bringing the technology to market. Describe plans to license, partner, or self-produce your product. How do you plan to generate revenue? Understanding NGA's goal of creating and sustaining a U.S. military advantage, describe how you intend to develop your product and supply chains to enable this differentiation.
  - d) Target Market. Describe the market and customer sets you propose to target, their size, their growth rate, and their key reasons they would consider procuring the technology. Describe competing technologies existent today on the market as well as those being developed in the lab.
  - e) Funding Requirements. Describe your company's funding history. How much external financing have you raised? Describe your plans for future funding sources (internal, loan, angel, venture capital, etc.).
  - f) Commercialization Risks. Describe the major technology, market and team risks associated with achieving successful transition of the NGA funded technology. NGA is not afraid to take risks but we want to ensure that our awardees clearly understand the risks in front of them.

- g) Expertise/Qualifications of Team/Company Readiness. Describe the expertise and qualifications of your management, marketing/business development and technical team that will support the transition of the technology from the prototype to the commercial market and into government operational environments. Has this team previously taken similar products/services to market? If the present team does not have this needed expertise, how do you intend to obtain it? What is the financial history and health of your company (e.g., availability of cash, profitability, revenue growth, etc.)?
- **Format of Cost Volume (Volume 3):** The Cost Volume (and supporting documentation) DOES NOT count toward the page limit of the Technical Volume. Some items in the Cost Breakdown Guidance below may not apply to the proposed project. If such is the case, there is no need to provide information on each and every item. ALL proposed costs should be accompanied by documentation to substantiate how the cost was derived. For example, if you proposed travel cost to attend a project-related meeting or conference, and used a travel website to compare flight costs, include a screen shot of the comparison. Similarly, if you proposed to purchase materials or equipment, and used the internet to search for the best source, include your market research for those items. You do not necessarily have to propose the cheapest item or supplier, but you should explain your decision to choose one item or supplier over another. It's important to provide enough information to allow contracting personnel to understand how the proposer plans to use the requested funds. If selected for award, failure to include the documentation with your proposal will delay contract negotiation, and the proposer will be asked to submit the necessary documentation to the Contracting Officer to substantiate costs (e.g., cost estimates for equipment, materials, and consultants or subcontractors). It is important to respond as quickly as possible to the Contracting Officer's request for documentation. Cost Breakdown Guidance:
  - List all key personnel by name as well as by number of hours dedicated to the project as direct labor.
  - Special tooling and test equipment and material cost may be included. The inclusion of equipment and material will be carefully reviewed relative to need and appropriateness for the work proposed. The purchase of special tooling and test equipment must, in the opinion of the Contracting Officer, be advantageous to the Government and should be related directly to the specific topic. These may include such items as innovative instrumentation and/or automatic test equipment. Title to property furnished by the Government or acquired with Government funds will be vested with NGA; unless it is determined that transfer of title to the contractor would be more cost effective than recovery of the equipment by NGA.
  - Cost for travel funds must be justified and related to the needs of the project.
  - Cost sharing is permitted for proposals under this announcement; however, cost sharing is not required nor will it be an evaluation factor in the consideration of a proposal.
  - All subcontractor costs and consultant costs must be detailed at the same level as prime contractor costs in regard to labor, travel, equipment, etc. Provide detailed substantiation of subcontractor costs in your cost proposal. The Supporting Documents Volume (Volume 5) may be used if additional space is needed. For more information about cost proposals and accounting standards, see the DCAA publication titled "Audit Process Overview – Information for Contractors" available at: <http://www.dcaa.mil>.
- **Company Commercialization Report (Volume 4):** Not available for 20.C
- **Supporting Documents (Volume 5):** The vendor may submit supporting documents (Volume 5) but that material WILL NOT be rated by the evaluation team as part of the proposal evaluation. Items that may go into, not all inclusive, are additional cost proposal information, Completed Form SF326, advocacy letters, etc.
- **Fraud, Waste and Abuse Training (Volume 6):** Will be addressed at time of contract award.

Selection of Phase I proposals will be in accordance with the evaluation procedures and criteria discussed in this BAA (refer to Section 6.0 of the BAA).

Proposals not conforming to the terms of this BAA, and unsolicited proposals, will not be considered. Awards are subject to the availability of funding and successful completion of contract negotiations.

The NGA STTR Program reserves the right to limit awards under any topic, and only those proposals of superior scientific and technical quality in the judgment of the technical evaluation team will be funded. The offeror must be responsive to the topic requirements, as solicited.

If a small business concern is selected for a STTR award they must negotiate a written agreement between the small business and their selected Research Institution that allocates intellectual property rights and rights to carry out follow-on research, development, or commercialization. Please refer to the DoD Instructions, section 4.2.f to view a "Model Agreement for the Allocation of Rights".

**An unsuccessful offeror has 3 days after notification that its proposal was not selected to submit a written request for a debriefing to the CO.** Those offers who get their written request in within the allotted timeframe above will be provided a debriefing.

Federally Funded Research and Development Contractors (FFRDC) and other government contractors, whom have signed Non-Disclosures Agreements, may be used in the evaluation of your proposal. NGA typically provides a firm fixed price contract for Phase I awards. The type of contract is at the discretion of the Contracting Officer.

Phase I contracts will include a requirement to produce monthly status reports, a more detailed interim report not later than 7 months after award, a final report no later than 9 months after award and any software/algorithms/documentation from items developed in Phase I. These reports shall include the following sections:

- A summary of the results of the Phase I research to date
- A summary of the Phase I tasks not yet completed, with an estimated completion date for each task
- A statement of potential applications and benefits of the research.
- A summary of any risks or issues

The interim report (draft final report) and final report shall be prepared single spaced in 12 point Times New Roman font, with at least a one-inch margin on top, bottom, and sides, on 8½" by 11" paper. The pages shall be numbered.

## **PHASE II GUIDELINES**

Phase II is the demonstration of the technology found feasible in Phase I. All NGA STTR Phase I awardees from this BAA will be allowed to submit a Phase II proposal for evaluation and possible selection. To minimize the gap between the Phase I and Phase II, it is suggested that if the vendor submit their proposal during month 7 of the Phase I award.

Small businesses submitting a Phase II Proposal must use the DoD SBIR/STTR electronic proposal submission system (<https://www.dodsbirsttr.mil/submissions/>). This site contains step-by-step instructions for the preparation and submission of the Proposal Cover Sheets, the Cost Volume, and how to upload the Technical Volume. For general inquiries or problems with proposal electronic submission, contact the

DoD SBIR/STTR Help Desk at (1-703-214-1333) or Help Desk email at [dodsbirsupport@reisystems.com](mailto:dodsbirsupport@reisystems.com) (9:00 am to 5:00 pm ET Monday – Friday)).

NGA STTR Phase II Proposals have three UNCLASSIFIED Volumes: Proposal Cover Sheets, Technical Volume, and Cost Volume. 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. Do not include blank pages, duplicate the electronically generated Cover Sheets or put information normally associated with the Technical Volume in other sections of the proposal as these will count toward the 40-page limit.

Technical Volumes that exceed the 40-page limit will be reviewed only to the last word on the 40th page. Information beyond the 40th page will not be reviewed or considered in evaluating the offeror's proposal. To the extent that mandatory technical content is not contained in the first 40 pages of the proposal, the evaluator may deem the proposal as non-responsive and score it accordingly.

Selection of Phase II proposals will be in accordance with the evaluation procedures and criteria discussed in this BAA (refer to Section 6.0 of the BAA). As part of subfactor c in the evaluation criteria, the vendor will be evaluated on how it addresses the following five questions on the overall commercialization strategy:

- (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 company contain marketing expertise and, if not, how will that expertise be brought into the company?
- (5) Who are the proposing firm's competitors, and what is the price and/or quality advantage over those competitors?

The NGA SBIR Program reserves the right to limit awards under any topic and only proposals considered to be of superior quality will be funded.

NGA typically provides a firm fixed price contract as a Phase II award. The type of contract is at the discretion of the Contracting Officer.

**Phase II proposals shall be limited to \$1,000,000 over a two-year period with a Period of Performance not exceeding 24 months.** A work breakdown structure that shows the number of hours and labor category broken out by task and subtask, as well as the start and end dates for each task and subtask, shall be included.

Phase II contracts shall include a requirement to produce one-page monthly status and financial reports, an interim report not later than 10 months after contract award, a prototype demonstration not later than 23 months after contract award and a final report not later than 24 months after contract award. These reports shall include the following sections:

- A summary of the results of the Phase II research to date
- A summary of the Phase II tasks not yet completed with an estimate of the completion date for each task
- A statement of potential applications and benefits of the research.
- A summary of any risks or issues

The interim and final report shall be prepared single spaced in 12 point Times New Roman font, with at least a one-inch margin on top, bottom, and sides, on 8½” by 11” paper. The pages shall be numbered.

## **USE OF FOREIGN NATIONALS**

**Due to the nature of the NGA mission and operations, foreign nationals are restricted from participating or working under certain NGA contracts. The participation of foreign nationals on NGA SBIR contracts is limited to only those that are scoped, proposed and awarded as exclusively Fundamental Research. For contracts that are scoped, proposed and awarded with either a portion of fundamental research, or no fundamental research, the Principle Investigator must be a US citizen, and participation of foreign nationals prohibited. Additionally, foreign nationals are prohibited from exposure to Controlled Unclassified Information.**

## **CONTROLLED UNCLASSIFIED INFORMATION (CUI)**

Controlled Unclassified Information (CUI) is information that requires safeguarding or dissemination controls pursuant to and consistent with applicable law, regulations, and government-wide policies but is not classified under Executive Order 13526 or the Atomic Energy Act, as amended.

Executive Order 13556 "Controlled Unclassified Information" (the Order), establishes a program for managing CUI across the Executive branch and designates the National Archives and Records Administration (NARA) as Executive Agent to implement the Order and oversee agency actions to ensure compliance. The Archivist of the United States delegated these responsibilities to the Information Security Oversight Office (ISOO).

32 CFR Part 2002 "Controlled Unclassified Information" was issued by ISOO to establish policy for agencies on designating, safeguarding, disseminating, marking, decontrolling, and disposing of CUI, self-inspection and oversight requirements, and other facets of the Program. The rule affects Federal executive branch agencies that handle CUI and all organizations (sources) that handle, possess, use, share, or receive CUI—or which operate, use, or have access to Federal information and information systems on behalf of an agency.

During performance of this contract, if the government provides the vendor a dataset that is not publically released, the vendor must be CUI Compliant to receive it. For more information on this compliance please see DFARS Clause 252.204-7012, NIST Special Publication SP 800-171 and the National Archives and Records Administration (NARA) website (<https://www.archives.gov/cui/about>).

## **CERTIFICATE PERTAINING TO FOREIGN INTERESTS**

Offers must submit a SF-328 in Volume 5 in order to be considered for award. If after review of the form, the offeror may be found ineligible for award if the offerors foreign interest are found to be unacceptable. The form can be found at <https://www.gsa.gov/forms-library/certificate-pertaining-foreign-interests>.

## **252.204-7000 DISCLOSURE OF INFORMATION**

(a) The Contractor shall not release to anyone outside the Contractor's organization any unclassified information, regardless of medium (e.g., film, tape, document), pertaining to any part of this contract or any program related to this contract, unless-

(1) The Contracting Officer has given prior written approval;

(2) The information is otherwise in the public domain before the date of release; or  
(3) The information results from or arises during the performance of a project that involves no covered defense information (as defined in the clause at DFARS 252.204-7012, Safeguarding Covered Defense Information and Cyber Incident Reporting) and **has been scoped and negotiated by the contracting activity with the contractor and research performer and determined in writing by the contracting officer to be fundamental research\* (which by definition cannot involve any covered defense information)**, in accordance with National Security Decision Directive 189, National Policy on the Transfer of Scientific, Technical and Engineering Information, in effect on the date of contract award and the Under Secretary of Defense (Acquisition, Technology, and Logistics) memoranda on Fundamental Research, dated May 24, 2010, and on Contracted Fundamental Research, dated June 26, 2008 (available at DFARS PGI 204.4).

(b) Requests for approval under paragraph (a)(1) shall identify the specific information to be released, the medium to be used, and the purpose for the release. The Contractor shall submit its request to the Contracting Officer at least 10 business days before the proposed date for release.

(c) The Contractor agrees to include a similar requirement, including this paragraph (c), in each subcontract under this contract. Subcontractors shall submit requests for authorization to release through the prime contractor to the Contracting Officer.

**\*Note: This has to be negotiated prior to award of the contract. A request for determination after award will not be entertained.**

#### **5X252.204-7000-90 PUBLIC RELEASE OF INFORMATION**

(a) Except as provided in paragraph (b) of this clause, information pertaining to this contract shall not be released to the public unless authorized by the Contracting Officer in accordance with DFARS 252.204-7000, Disclosure of Information. Requests for approval to release information pertaining to this contract shall be submitted to the Contracting Officer by means of NGA Form 5230-1, National Geospatial-Intelligence Agency Request for Clearance for Public Release.

(b) The contractor may provide past performance information regarding this contract, without Contracting Officer approval, to the Office of the Director of National Intelligence (ODNI), the Central Intelligence Agency (CIA), the National Reconnaissance Office (NRO), the National Security Agency (NSA), the Defense Intelligence Agency (DIA), and NGA to support source selections at those agencies. The contractor is responsible for the proper classification and handling of such information and shall provide a copy of the information provided to the Contracting Officer.

#### **5X52.227-9000 UNAUTHORIZED USE OF NGA NAME, SEAL AND INITIALS**

(a) As provided in 10 U.S.C. Section 425, no person may, except with the written permission of the Director, National Geospatial-Intelligence Agency, knowingly use the words "National Geospatial-Intelligence Agency", "National Imagery and Mapping Agency" or "Defense Mapping Agency", the initials "NGA", "NIMA" or "DMA", the seal of the National Geospatial-Intelligence Agency, National Imagery and Mapping Agency or the Defense Mapping Agency, or any colorable imitation of such words, initials, or seal in connection with any merchandise, retail product, impersonation, solicitation, or commercial activity in a manner reasonably calculated to convey the impression that such is approved, endorsed, or authorized by the Director, NGA.

(b) Whenever it appears to the U.S. Attorney General that any person is engaged or about to engage in an act or practice which constitutes or will constitute conduct prohibited by paragraph (a), the Attorney

General may initiate a civil proceeding in a district court of the United States to enjoin such act or practice. Such court shall proceed as soon as practicable to hearing and determination of such action and may, at any time before such final determination, enter such restraining orders or prohibition, or take such other action as is warranted, to prevent injury to the United States, or to any person or class of persons whose protection the action is brought.

## NGA STTR 20.C Phase I Topic Index

NGA20C-001 Algorithm Performance Evaluation with Low Sample Size

NGA20C-001 TITLE: Algorithm Performance Evaluation with Low Sample Size

RT&L FOCUS AREA(S): Artificial Intelligence/Machine Learning  
TECHNOLOGY AREA(S): Information Systems

OBJECTIVE: Develop novel techniques and metrics for evaluating machine learning -based computer vision algorithms with few examples of labeled overhead imagery.

DESCRIPTION: The National Geospatial Intelligence Agency (NGA) produces timely, accurate and actionable geospatial intelligence (GEOINT) to support U.S. national security. To exploit the growing volume and diversity of data, NGA is seeking a solution to evaluate the performance of a class of algorithms for which there are a limited quantities of training data and evaluation data samples. This is important because statistical significance of the evaluation results is directly tied to the size of the evaluation dataset. While significant effort has been put forth to train algorithms with low sample sizes of labelled data [1-2], open questions remain for the best representative evaluation techniques under the same constraint.

Of specific interest to this solicitation are innovative approaches to rapid evaluation of computer vision algorithms at scale, using small quantities of labelled data samples, and promoting extrapolation to larger data populations. The central challenge to be addressed is the evaluation of performance with the proper range and dimension of data characteristics, when the labeled data represents a small portion of the potential operating conditions. An example is when performance must be evaluated as a function of different lighting conditions, but most of the labelled data was collected under full sun.

The study will be based on panchromatic electro-optical (EO) imagery using a subset (selected by the STTR participants) of the xView detection dataset, although extension to other sensing modalities is encouraged. Solutions with a mathematical basis are desired.

PHASE I: Develop and demonstrate methods and metrics to evaluate machine learning -based computer vision algorithm performance with low sample sizes of labeled EO imagery. The characteristics of the selected data subset should include variation across at least two operating conditions, such as (for example) geographic diversity and object size . Offerors should state those characteristics that will vary in their selected dataset. Offerors should detail anticipated challenges associated with this problem, and how to address those challenges, together with methods to provide uncertainty estimates for assessment results. Phase I will result in proof-of-concept performance assessment on the selected dataset. Phase I will deliver all data collected or curated, and a final report that contains: description of technical approach, assessment results, and identify methods to extend to different data sources and conditions.

PHASE II: Develop refinements to address identified deficiencies from Phase I. Extend Phase I capabilities through application to video, infrared, or multi-spectral sensor imagery, and demonstrate against an operational dataset for both EO panchromatic imagery and the additional sensing type(s). Extend the Phase I dataset to include more sparsely represented data characteristics, which also include additional variation. Deliverables include assessment results and code.

PHASE III DUAL USE APPLICATIONS: Virtually all domains face an issue of lack of labeled data so better prediction and understanding the likely performance and potential range of that performance, given few examples for empirical performance evaluation, will have wide ranging military and commercial applications. Military applications include assessing algorithms for automated tracking, search and rescue, and hazardous target detection; commercial applications also include tracking, search and rescue, and agriculture.

REFERENCES:

1. L. Fei-Fei, R. Fergus and P. Perona. "One-Shot learning of object categories." IEEE Transactions on Pattern Analysis and Machine Intelligence, 28(4), 594 - 611, 2006.;
2. W. Wang, et al. "A Survey of Zero-Shot Learning: Settings, Methods, and Applications." ACM Transactions on Intelligent Systems and Technology, 10(2), article 13, 2019.

KEYWORDS: Performance Evaluation; Algorithm Assessment; Low Sample Size; Machine Learning; Deep Learning; Few Shot Learning; Unsupervised Learning

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