Missile Defense Agency
22.4 Small Business Innovation Research
Direct to Phase II Proposal 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 Innovation Research (SBIR) Program is implemented, administered, and managed by the MDA SBIR/STTR Program Management Office (PMO), located within the Innovation, Science, & Technology directorate. Specific questions pertaining to the administration of the MDA SBIR/STTR Programs should be submitted to:

Missile Defense Agency
SBIR/STTR Program Management Office
MDA/DVR
Bldg. 5224, Martin Road
Redstone Arsenal, AL 35898
Email: sbirsttr@mda.mil | Phone: 256-955-2020

Proposals not conforming to the terms of this Direct to Phase II (DP2) announcement may 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. Due to limited funding, 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 following MDA DP2 proposal instructions carefully prior to submitting your proposal.

Please note: Awards are contingent on Congressional reauthorization of the SBIR/STTR Program.

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 SBIR/STTR awards in the SBIR/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 that are labeled by the offerors as "Government Only." Pursuant to FAR 9.505-4, the MDA contracts with these organizations include a clause which requires them to (1) protect the offerors' information from unauthorized use or disclosure for as long as it remains proprietary and (2) refrain from using the information for any purpose other than that for which it was furnished. In

addition, MDA requires the employees of those support contractors that provide technical analysis to the SBIR/STTR Program to execute non-disclosure agreements. These agreements will remain on file with the MDA SBIR/STTR PMO.

Non-Government consultants will be authorized access to only those portions of the proposal data and discussions that are necessary to enable them to perform their respective duties. In accomplishing their duties related to the source selection process, employees of the aforementioned organizations may require access to proprietary information contained in the offerors' proposals.

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 participating agencies in the SBIR/STTR programs. For more information, please visit the SBA's Firm Registration Page: http://www.sbir.gov/registration.

III. ORGANIZATIONAL CONFLICTS OF INTEREST (OCI)

The basic OCI rules for Contractors which support development and oversight of SBIR topics are covered in FAR Section 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 SBIR/STTR requirement or topic, please be advised that your company may have an OCI. Your company could be precluded from an award under this announcement if your proposal contains anything directly relating to the development of the requirement or topic. Before submitting your proposal, please examine any potential OCI issues that may exist with your company to include subcontractors and understand that if any exist, your company may be required to submit an acceptable OCI mitigation plan prior to award.

In addition, FAR 3.101-1 states that Government business shall be conducted in a manner above reproach and, except as authorized by statute or regulation, with complete impartiality and with preferential treatment for none. The general rule is to avoid strictly any conflict of interest or even the appearance of a conflict of interest in Government-contractor relationships. An appearance of impropriety may arise where an offeror may have gained an unfair competitive advantage through its hiring of, or association with, a former government official if there are facts indicating the former government official, through their former government employment, had access to non-public, competitively useful information. (See *Health Net Fed. Svcs*, B-401652.3; *Obsidian Solutions Group*, LLC, B-417134, 417134.2). The existence of an unfair competitive advantage may result in an offeror being disqualified and this restriction cannot be waived.

It is MDA policy to ensure all appropriate measures are taken to resolve OCI's arising under FAR 9.5 and unfair competitive advantages arising under FAR 3.101-1 to prevent the existence of conflicting roles that might bias a contractor's judgment and deprive MDA of objective advice or assistance, and to prevent contractors from gaining an unfair competitive advantage.

IV. USE OF FOREIGN NATIONALS (also known as foreign persons)

See the "Foreign Nationals" section of the DoD SBIR Program Announcement for the definition of a Foreign National (also known as Foreign Persons).

ALL offerors proposing to use foreign nationals, green-card holders, or dual citizens, MUST disclose this information regardless of whether the topic is subject to export control restrictions. Identify any foreign nationals or individuals holding dual citizenship expected to be involved on this project as a direct employee, **subcontractor, or consultant.** For these individuals, please specify their country of origin, the type of visa or work permit under which they are performing and an explanation of their anticipated level of involvement on this project. You may be asked to provide additional information during negotiations in order to verify the foreign citizen's eligibility to participate on an SBIR/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 un-cleared individuals involved in the project, regardless of citizenship, who will have access to Controlled Unclassified Information (CUI) such as export controlled information. If the security review disqualifies a person from participating in the proposed work, the contractor may propose a suitable replacement. In the event a proposed person 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.

If the topic write-up indicates that the topic is subject to ITAR and/or EAR, your company may be required to submit a Technology Control Plan (TCP) during the contracting negotiation process.

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 SBIR/STTR contracts and subcontracts without exception. Any information relative to the work performed by the contractor under MDA SBIR/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 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

If selected for award, MDA may request business/corporate documentation to assess ownership eligibility as related to the requirements of the Guide to SBIR 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 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.dodsbirsttr.mil). Please follow guidance provided on DSIP to complete the required training.

To report fraud, waste, or abuse, please contact:

MDA Fraud, Waste & Abuse
Hotline: (256) 313-9699

MDAHotline@mda.mil

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

X. DP2 PROPOSAL SUBMISSION GUIDELINES AND REQUIREMENTS

Proposal Submission

The MDA SBIR 22.4 DP2 proposal submission instructions are intended to clarify the Department of Defense (DoD) instructions (https://www.dodsbirsttr.mil) as they apply to MDA requirements. This announcement is for MDA SBIR 22.4 DP2 topics only. The offeror is responsible for ensuring that DP2 proposals comply with all requirements. Prior to submitting your proposal, please review the latest version of these instructions as they are subject to change before the submission deadline.

All proposals MUST be submitted online using DSIP (https://www.dodsbirsttr.mil). Any questions or technical issues pertaining to DSIP should be directed to the DoD SBIR/STTR Help Desk: DoDSBIRSupport@reisystems.com. It is recommended that potential offerors email the topic author(s) to schedule a time for topic discussion during the pre-release period.

Classified Proposals

Classified proposals ARE NOT accepted under the MDA SBIR/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 SBIR/STTR contract must use the security classification guidance provided under that contract to verify new SBIR/STTR proposals are unclassified prior to submission. 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, the anticipated benefits/potential commercial applications, and the keywords section of the proposal. This will help avoid confusion when proposals are evaluated by technical reviewers.

Communication

All communication from the MDA SBIR/STTR PMO will originate from the "sbirsttr@mda.mil" email address. Please white-list this address in your company's spam filters to ensure timely receipt of communications from our office. In some instances, the MDA SBIR/STTR PMO may utilize the DoD Secure Access File Exchange (SAFE) website (https://safe.apps.mil) to provide information and/or documentation to offerors.

Proposal Status

The MDA SBIR/STTR PMO will distribute selection or non-selection email notices to all firms who submit a 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.

Proposal Layout

For MDA DP2 proposals, MDA has provided a template that may be used to create the technical volume, Volume 2, of the DP2 proposal. The Volume 2 template can be found here: https://www.mda.mil/global/documents/pdf/MDA%20SBIR%20phase%20II.pdf

All pages within the technical volume (Volume 2) must be numbered consecutively. Proposals may not exceed 25 pages, may not have a font size smaller than 10-point, must use a font type of Times New Roman, and must be submitted 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 DSIP. The header must be included in the one-inch margin.

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 guidance 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 SBIR/STTR awardees, which may include access to a network of scientists and engineers engaged in a wide range of technologies or access to technical and business literature available through on-line databases.

All requests for TABA must be completed using the MDA SBIR/STTR Phase II TABA Form (https://www.mda.mil/global/documents/pdf/SBIR_STTR_PHII_TABA_Form.pdf) and must be included as a part of Volume 5 of the proposal package using the "Other" category. MDA WILL NOT accept requests for TABA that do not utilize the MDA SBIR/STTR Phase II TABA Form or are not uploaded using the DSIP "Other" category as part of Volume 5 of the Phase II proposal package.

An SBIR/STTR firm may acquire the technical assistance services described above on its own. Firms must request this authority from MDA and demonstrate in its SBIR/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 $10,000. This will be an allowable cost on the SBIR/STTR award. The amount will be in addition to the award and is not subject to any burden, profit or fee by the offeror. The amount is based on the original contract period of performance and does not apply to period of performance extensions and/or enhancements. Requests for TABA funding outside of the base Phase II period of performance (24 months) will not be considered.

The purpose of this technical assistance is to assist SBIR/STTR awardees in:

1. Making better technical decisions on SBIR/STTR projects;
2. Solving technical problems that arise during SBIR/STTR projects;
3. Minimizing technical risks associated with SBIR/STTR projects; and
4. Developing and commercializing new commercial products and processes resulting from such projects including intellectual property protections.

SBIR/STTR Proposal Funding

All MDA SBIR/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

Proposal Submission Requirements and Proposal Format

Proposals submitted to an MDA SBIR DP2 topic must provide documentation to substantiate that the scientific and technical merit and feasibility described in the Phase I section of the topic has been met and describes the potential commercial applications. Documentation should include all relevant information including, but not limited to: technical reports, test data, prototype designs/models, and performance goals/results. Work submitted within the proposal must have been substantially performed by the offeror and/or the principal investigator (PI).

A complete DP2 proposal consists of five volumes (six if including letters of support and/or Technical and Business Assistance (TABA) funding):

- Volume 1: Proposal Cover Sheet
- Volume 2: Technical Volume **(25 page maximum)**
- Volume 3: Cost Volume
- Volume 4: Company Commercialization Report
- Volume 5: Contractor Certification Regarding Provision of Prohibited Video Surveillance and Telecommunications Services and Equipment (required), Foreign Ownership or Control Disclosure (Proposers must review Attachment 2 in the DoD SBIR 22.4 BAA: Foreign Ownership or Control Disclosure to determine applicability), Letters of Supports (optional), and/or Technical and Business Assistance (optional).

- Volume 6: Fraud, Waste, and Abuse Certification

Volume 1 – Proposal Coversheet (Required)

- A coversheet will be automatically generated by DSIP and placed at the beginning of your PDF proposal package document.

Volume 2 – Technical Volume (Required – 25 page maximum)

- Use of the MDA provided DP2 template is recommended. The template can be obtained at the following URL: https://www.mda.mil/global/documents/pdf/MDA%20SBIR%20phase%20II.pdf . The technical volume should include the following 11 sections:

(1) **Executive Summary.**
Provide a summary of the key objectives that will be accomplished in the DP2 effort.

(2) **Phase I Proof of Feasibility.**
The offeror must describe work performed that substantiates Phase I feasibility as described in the topic.

Proposers interested in participating in DP2 must include Phase I feasibility documentation that substantiates the scientific and technical merit and ensure that the Phase I feasibility described in the topic has been met and describe the potential commercialization applications. The documentation provided must validate that the proposer has completed development of technology as stated in Phase I above in previous work or research completed. Documentation should include all relevant information including, but not limited to: technical reports, test data, prototype designs/models, and performance goals/results. Work submitted within the feasibility documentation must have been substantially performed by the proposer and/or the principal investigator (PI).

Provide documentation to substantiate that the scientific and technical merit and feasibility described in the Phase I section of the topic has been met and describes the potential commercial applications. Documentation should include all relevant information including, but not limited to: technical reports, test data, prototype designs/models, and performance goals/results.

Work submitted within the feasibility documentation must have been substantially performed by the proposer and/or the principal investigator (PI).

(3) **Description of Proposed DP2 Technical Effort and Objectives.**
Define the specific technical problem or opportunity addressed and its importance.

(4) **Phase II Technical Objective and Statement of Work**.
Enumerate the specific objectives of the Phase II work, and describe the technical approach and methods to be used in meeting these objectives. The statement of work should provide an explicit, detailed description of the Phase II 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.

(5) **Related Work.**
Describe significant activities directly related or similar to the proposed effort, including any conducted by the principal investigator, the proposing firm, consultants, or stakeholders. Describe how these activities interface with the proposed project and discuss any planned coordination with outside sources. The proposal must accentuate its state-of-the-art technology and how it relates to the topic to capture the Government's interest for further development. In addition, please indicate whether your firm has performed on a classified government contract in the past as either a prime or subcontractor.

(6) **Relationship with Future Research or Research and Development.**
State the anticipated results if the project is successful. Discuss the significance of the Phase II effort in providing a foundation for Phase III research and development or commercialization.

(7) **Key Personnel.**
Identify at least two key personnel who will be involved in the Phase II effort including information on directly related education and experience. A concise resume of the Principal Investigator (PI) that includes a list of relevant publications (if any) authored by the PI, must be submitted. All resumes count toward the page limitation in the technical volume.

a) **Foreign Persons**: ALL offerors proposing to use foreign persons, 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 an SBIR/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 un-cleared individuals involved in the project, regardless of citizenship, who will have access to Controlled Unclassified Information (CUI) such as export controlled information. If the security review disqualifies a person from participating in the proposed work, the contractor may propose a suitable replacement. In the event a proposed person 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.

(8) **Facilities/Equipment**

Describe the equipment and physical facilities necessary to carry out the Phase II effort. Items of equipment to be purchased (as detailed in the cost proposal) shall be justified under this section. Also, certify that the facilities where the proposed work that will be performed meet environmental laws and regulations of federal, state (name), and local governments (name) for, but not limited to, the following groupings: airborne emissions, waterborne effluents, external radiation levels, outdoor noise, solid and bulk waste disposal practices, and handling and storage of toxic and hazardous materials.

(9) **Subcontractors/Consultants**.

Involvement of a university or other subcontractors or consultants in the project may be appropriate. If such involvement is intended, it should be described in detail and identified in the Cost Volume. A minimum of one-half of the research and/or analytical work in Phase II, as measured by direct and indirect costs, must be carried out by the offeror, unless otherwise approved in writing by the Contracting Officer.

(10) **Prior, Current or Pending Support of Similar Proposals or Awards.**

While it is permissible to submit identical proposals or proposals containing a significant amount of essentially equivalent work for consideration under numerous federal program solicitations or Broad Agency Announcements (BAA), 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.

(11) **Commercialization Strategy.**

The Commercialization Strategy must address the following questions:

a) What is the first product that this technology will go into (identify the components of the Missile defense System (MDS) and areas within the commercial marketplace where you can transition this technology)?
b) Who will be your customers, and what is your estimate of the market size?
c) How much funding will you need to bring the technology to market, how will you acquire the necessary funds, and how do you expect to integrate this technology into the MDS?
d) Does your company have marketing expertise? If yes, please elaborate. If not, how do you intend to bring that expertise into the company?
e) Who are your competitors, and what makes you more competitive with your technology?

The commercialization strategy must also include a schedule showing the 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 at least annually.

Volume 3 – Cost Volume (Required)
Complete the on-line cost proposal in DSIP. Your cost volume may not exceed $1,800,000 (or $1,810,000 if TABA is included – use of the MDA Phase II TABA form is required if applying for TABA). Proposals whose cost volumes exceed $1,800,000 (or $1,810,000 if TABA is included) will not be evaluated or considered for award. Phase II Period of Performance is generally 24 months.

Volume 4 – Company Commercialization Report (CCR) (Required)
The Company Commercialization Report (CCR) allows companies to report funding outcomes resulting from prior SBIR and STTR awards. The Company Commercialization Report (CCR) is required for DP2 proposals. The information contained in the CCR will not be considered by MDA during proposal evaluations.

Small businesses must complete the CCR by logging into their account at https://www.sbir.gov. To view or print the information currently contained in the Company Registry Commercialization Report, navigate to My Dashboard > My Documents. To create or update the commercialization record, from the company dashboard, scroll to the "My Commercialization" section, and click the create/update Commercialization tab under "Current Report Version". Please refer to the "Instructions" and "Guide" documents contained in the DSIP Dashboard for more detail on completing and updating the CCR.

Once the report is certified and submitted on SBIR.gov, click the "Company Commercialization Report" PDF under the My Documents section of the dashboard to download a PDF of the CCR. This PDF of the CCR must be uploaded to Volume 4: Company Commercialization Report in the Firm Information section of DSIP by the Firm Admin. All other firm users will have read-only access to the CCR from the proposal submission page, in order to confirm that the CCR has been uploaded by the Firm Admin to complete the Volume 4 requirement.

Volume 5 – Supporting Documents
MDA will only accept the following four documents as part of Volume 5:
1. Contractor Certification Regarding Provision of Prohibited Video Surveillance and Telecommunications Services and Equipment (Required).
2. Foreign Ownership or Control Disclosure (Proposers must review Attachment 2 in the DoD SBIR 22.4 BAA: Foreign Ownership or Control Disclosure to determine applicability)
3. Request for TABA using the MDA Phase II TABA form (optional).
4. Letters of support (optional).

If including a request for TABA, the Phase II TABA Form MUST be completed and uploaded using the "Other" category within Volume 5 of DSIP.

If including letters of support, they MUST be uploaded using the "Letters of Support" category within Volume 5 of DSIP. A qualified letter of support is from a relevant commercial or Government Agency procuring organization(s) working with MDA, articulating their pull for the technology (i.e., what MDS need(s) the technology supports and why it is important to fund it), and possible commitment to provide additional funding and/or insert the technology in their acquisition/sustainment program. Letters of support shall not be contingent upon award of a subcontract.

Any documentation other than the prohibited Video Surveillance and Telecommunications Services and Equipment form, Foreign Ownership or Control Disclosure, letter(s) of support, or requests for TABA included as part of Volume 5 WILL NOT be considered.

Volume 6 – Fraud, Waste, and Abuse Certification (Required)
All offerors must complete the fraud, waste, and abuse training that is located on DSIP.

XI. REFERENCES TO HARDWARE, COMPUTER SOFTWARE, OR TECHNICAL DATA

In accordance with the SBIR/STTR Policy Directive, SBIR contracts are to conduct feasibility-related experimental or theoretical Research/Research & Development (R/R&D). Phase II is not for formal end-item contract delivery or ownership by the Government of the contractor's hardware, computer software, or technical data.

The SBIR/STTR Policy Directive states that Agencies may issue Phase II awards for testing and evaluation of products, services, or technologies for use in technical or weapons systems.

As a result, the technical proposal should not use the term "Deliverables" when referring to your hardware, computer software, or technical data. Instead use the term: "Products for Testing, Evaluation, and/or Demonstration (possibly destruction)."

The standard formal deliverables for a Phase II are the:
(a) Report of Invention and Disclosure
(b) Contract Summary Report: Final Report
(c) Certificate of Compliance: SBIR_STTR Life-Cycle Certification
(d) Status Report: Quarterly Status Reports
(e) Computer Software Product: Product Description (if applicable, for Government Testing, Evaluation, and/or Demonstration ONLY)
(f) Technical Report - Study Services: Prototype Design and Operation Document
(g) Contract Summary Report: Phase III Plan
(h) Final Summary Chart: SBIR/STTR Transition Summary Chart
(i) Government Property Inventory Report: Government Furnished Property (GFP) and Contractor Acquired Property (CAP) Listing

XII. 52.203-5 COVENANT AGAINST CONTINGENT FEES

As prescribed in FAR 3.404, the following FAR 52.203-5 clause shall be included in all contracts awarded under this BAA:

(a) The Contractor warrants that no person or agency has been employed or retained to solicit or obtain this contract upon an agreement or understanding for a contingent fee, except a bona fide employee or agency. For breach or violation of this warranty, the Government shall have the right to annul this contract without liability or to deduct from the contract price or consideration, or otherwise recover, the full amount of the contingent fee.

(b) Bona fide agency, as used in this clause, means an established commercial or selling agency, maintained by a contractor for the purpose of securing business, that neither exerts nor proposes to exert improper influence to solicit or obtain Government contracts nor holds itself out as being able to obtain any Government contract or contracts through improper influence.

"Bona fide employee," as used in this clause, means a person, employed by a contractor and subject to the contractor's supervision and control as to time, place, and manner of performance, who neither exerts nor proposes to exert improper influence to solicit or obtain Government contracts nor holds out as being able to obtain any Government contract or contracts through improper influence.

"Contingent fee," as used in this clause, means any commission, percentage, brokerage, or other fee that is contingent upon the success that a person or concern has in securing a Government contract.

"Improper influence," as used in this clause, means any influence that induces or tends to induce a Government employee or officer to give consideration or to act regarding a Government contract on any basis other than the merits of the matter.

XIII. MDA PROPOSAL EVALUATIONS AND SELECTION

MDA will evaluate DP2 proposals using scientific review criteria based upon technical merit and other criteria as discussed in this 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.

DP2 proposals will be evaluated based on the criteria outlined below, including potential benefit to the MDS. Selections will be based on best value to the Government considering the following factors:

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 its commercialization.

Please note that potential benefit to the MDS will be considered throughout all the evaluation criteria and in the best value trade-off analysis. When combined, the stated evaluation criteria are significantly more important than cost or price.

It cannot be assumed that reviewers are acquainted with the firm or key individuals or any referenced experiments. Technical reviewers will base their conclusions on information contained in the proposal. Relevant supporting data such as journal articles, literature, including Government publications, etc., should be contained in Volume 2 and will count toward the applicable page limit. Qualified letters of support and/or requests for TABA, if included, MUST be uploaded as part of Volume 5 and will not count towards the Volume 2 page limit. Letters of support shall not be contingent upon award of a subcontract.

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 reference www.dcaa.mil/small_business/Accounting_System.pdf for more information on obtaining a DCAA approved accounting system.

Proposing firms will be notified of selection or non-selection status for a Direct to Phase II award within 90 days of the closing date of the BAA. The email will be distributed to the "Corporate Official" and "Principal Investigator" listed on the proposal coversheet and will originate from the sbirsttr@mda.mil email address. MDA cannot be responsible for notification to a company that provides incorrect information or changes such information after proposal submission.

MDA will provide written feedback to unsuccessful offerors regarding their proposals upon request. Requests for feedback must be submitted in writing to the MDA SBIR/STTR PMO within 30 calendar days of non-selection notification. Non-selection notifications will provide instructions for requesting proposal feedback. Only firms that receive a non-selection notification are eligible for written feedback. Refer to the DoD STTR Program BAA for procedures to protest the Announcement.

Approved for Public Release (instructions)
22-MDA-11201 (6 Jul 22)

MDA SBIR 22.4 Topic Index
Release 1

MDA22-D001 TITLE: Radiation Hardened Microelectronics Storefront

OUSD (R&E) MODERNIZATION PRIORITY: Space; Microelectronics;

TECHNOLOGY AREA(S): Sensors; Electronics; Space Platforms

The technology within this topic is restricted under the International Traffic in Arms Regulation (ITAR), 22 CFR Parts 120-130, which controls the export and import of defense-related material and services, including export of sensitive technical data, or the Export Administration Regulation (EAR), 15 CFR Parts 730-774, which controls dual use items. Offerors must disclose any proposed use of foreign nationals (FNs), their country(ies) of origin, the type of visa or work permit possessed, and the statement of work (SOW) tasks intended for accomplishment by the FN(s) in accordance with 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: Show feasibility of a methodology to create a central repository for microelectronics intellectual property (IP) and/or the sale of rad-hard parts with the goal of providing access to different contractors in order to reduce time, cost, and duplication of the same IP which should improve technology access for small businesses.

DESCRIPTION: The consolidation of manufacturers of radiation hardened electronics has resulted in only a handful of radiation hardened electronic storefronts. This topic will focus on developing a new set of storefronts run by small businesses for transactions in either rad-hard parts (digital and/or analog), rad-hard intellectual property, or both.

The proposed solution should define a methodology by which a small business would leverage open source rad-hard IP to provide a secure storefront for rad-hard electronic parts and/or rad-hard IP. The solution should be able to describe how existing technology for business-to-business interactions will create a centralized location for IP and rad-hard parts and how this will reduce costs in development and production of radiation hardened devices. The proposed solution should appeal to a broad market, meeting the needs of Energy, Medical, Space, Automotive and Defense applications. During the performance of the direct to Phase II, the proposed solution should be able to demonstrate a prototype storefront.

The storefront for either electronic parts or IP will need to address licensing, export control, and warranty/support. Additionally, the storefront will need to address contracting with onshore fabrication, radiation testing of the parts, and quality control of the results.
Further, the proposed solution should address the business model which will be used to sustain the storefront. Outline how external funds will be used for a potential phase III award. Explain any dual-purpose uses for the storefront's products such as how product families could meet the needs of multiple markets. Outline the transition path or paths for rad-hard IP or electronics to and from the storefront showing the commercialization of the storefront itself and the content provided to industry. Include letters of support from potential storefront customers.

The storefront should focus on FPAs (Focal Plane Arrays), ROICs (Readout Integrated Circuits), processors, memory, mixed-signal analog parts, and power parts that meet the specifications in the table below. Ideally, the performer would select a family of a specific part type to develop and present in the storefront. These should be designed with performance and size, weight, power and cost (SWAP-

C) in mind while utilizing an onshore foundry with smaller node sizes such as the GlobalFoundries 12 SOI or the Intel 16nm.

Parameter	(Objective, Threshold)
Total Ionizing Dose (SiO2)	>= 1 mrad (SiO2)
Single Event Upset Rate	1E-10 (errors/device-day)
Single Event Latch-Up	>=90 (LET)
Dose Rate Upset	>=1E10 (rad(Si)/s)
Dose Rate Survivability	>=1E12 (rad(Si)/s)
Displacement Damage	>=1E14 (1MeV equiv. neutrons/cm2)

PHASE I: This is a Direct to Phase 2 (D2P2) topic. “Phase I” -like proposals will not be evaluated and will be rejected as nonresponsive. For this topic, the Government expects the small business would have accomplished the following in a Phase I-like effort via some other means, e.g., independent research and development (IRAD) or other source, a concept for a workable prototype or design to address, at a minimum, the basic capabilities of the stated objective above. Proposal must show, as appropriate, a demonstrated technical feasibility or nascent capability of virtual reality and/or telepresence and techniques compatible with low latency communications and/or data transfer. Proposal may provide example cases of this new capability on a specific application. The documentation provided must substantiate the proposer’s development of a preliminary understanding of the technology to be applied in their Phase II proposal in meeting topic objectives. Documentation should comprise all relevant information including, but not limited to, technical reports, test data, prototype designs/models, and performance goals/results

Feasibility Documentation: Proposers interested in participating in Direct to Phase II must include in their responses to this topic, Phase I feasibility documentation that substantiates the scientific and technical merit and Phase I feasibility described in Phase I above has been met (i.e., the small business must have performed a proof of concept “Phase I”-type research and development related to the topic, but feasibility documentation MUST NOT be solely based on work performed under prior or ongoing federally funded SBIR/STTR Phase I work) and describes the potential commercialization applications. The documentation provided must validate that the proposer has completed development of technology as stated in Phase I above in previous work or research completed. Documentation should include all relevant information including, but not limited to: technical reports, test data, prototype designs/models, and performance goals/results. Work submitted within the feasibility documentation must have been substantially performed by the proposer and/or the principal investigator (PI).

PHASE II: In Phase II, within 12 months of contract award, a prototype storefront should be demonstrated which utilizes existing technology for business-to-business interactions to create a centralized location for IP and rad-hard parts. The prototype storefront should leverage open source rad-hard IP to provide a secure storefront for rad-hard electronic parts and/or rad-hard IP.
The storefront for either electronic parts or IP will need to address licensing, export control, and warranty/support. Additionally, the storefront will need to address contracting with onshore fabrication, radiation testing of the parts, and quality control of the results.

The storefront should have a sustainable business model with potential customers and support from industry. A clear path to how external funds will be used for a potential phase III award should be identified. The storefront products should be applicable to multiple markets such as Medical, Automotive, Space, Defense, Energy, etc.

PHASE III DUAL USE APPLICATIONS: Explain any dual-purpose uses for the storefront's products such as how product families could meet the needs of multiple markets such as Energy, Space, Medical, Automotive and Defense. Include letters of support from potential storefront customers.

REFERENCES:

1. https://www.mda.mil/global/documents/pdf/bmds.pdf
2. https://semiengineering.com/mitigating-the-effects-of-radiation-on-advanced-automotive-ics
3. https://nepp.nasa.gov/DocUploads/392333B0-7A48-4A04-A3A72B0B1DD73343/Rad_Effects_101_WebEx.pdf

KEYWORDS: Radiation; Microelectronics; Space; Rad-Hard Electronics; Focal Plane Array (FPA); Readout Integrated Circuit (ROIC); Processor; Commercialization; E-Commerce; Business-to-Business; Memory

MDA22-D002 TITLE: Improved Polishing and Finishing Processes for Conformal Optical Materials

OUSD (R&E) MODERNIZATION PRIORITY: Hypersonics

TECHNOLOGY AREA(S): Materials

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

OBJECTIVE: Develop a cost-efficient and timely method to effectively polish and finish conformal ceramic window materials to optical-grade quality.

DESCRIPTION: Conformal optical materials are desirable for future seeker window applications due to their ability to provide enhanced aerodynamic properties while providing environmental protection and seeker visibility. Common material selections for these windows include hard ceramics such as AlON, Spinel, and ZnS. The high hardness and polycrystalline form of these materials present fabrication challenges due to high removal rates, preferential grain removal, and extensive optical quality testing. Shaping these materials into conformal windows with complex geometries also creates significant processing challenges. Though manual grinding and polishing can provide better depth control than automatic processes, automatic processes generally yield higher-quality, faster, repeatable results. Current processes associated with conformal ceramic optical material grinding, polishing, and finishing are high-cost and fairly inefficient due to the challenges mentioned above. This topic seeks to develop a polishing and finishing method for conformal window materials that improves upon the time, cost, and quality of existing processes. The polishing and finishing process developed in this effort should demonstrate a 2-3x reduction in lead time compared to existing processes. Relevant geometries should include conformal windows with minimum dimensions of 2” x 4” x 0.26” (5.08cm x 10.16cm x 0.66cm) and complex conformal geometries (e.g. ogive-based, gullwing aspheres, double curvature geometry). Optical quality should be better than 80-50 scratch-dig (MIL-PRF-13830B standard). Roughness on optical faces should be less than 60 Angstroms RMS, and perimeter surface roughness should be better than 220 grit. A clear aperture of greater than 40 mm in centered diameter is required. The produced window should have a transmitted wavefront distortion of < 1 wave at 632.8 nm. Plane-parallelism on the optical faces should be better than +/- 5 arc-seconds.

PHASE I: This is a Direct to Phase 2 (D2P2) topic. “Phase I” -like proposals will not be evaluated and will be rejected as nonresponsive. For this topic, the Government expects the small business would have accomplished the following in a Phase I-like effort via some other means, e.g., independent research and development (IRAD) or other source, a concept for a workable prototype or design to address, at a minimum, the basic capabilities of the stated objective above. Proposal must show, as appropriate, a demonstrated technical feasibility or nascent capability of virtual reality and/or telepresence and techniques compatible with low latency communications and/or data transfer. Proposal may provide example cases of this new capability on a specific application. The documentation provided must substantiate the proposer’s development of a preliminary understanding of the technology to be

applied in their Phase II proposal in meeting topic objectives. Documentation should comprise all relevant information including, but not limited to, technical reports, test data, prototype designs/models, and performance goals/results

Feasibility Documentation: Proposers interested in participating in Direct to Phase II must include in their responses to this topic, Phase I feasibility documentation that substantiates the scientific and technical merit and Phase I feasibility described in Phase I above has been met (i.e., the small business must have performed a proof of concept "Phase I"-type research and development related to the topic, but feasibility documentation MUST NOT be solely based on work performed under prior or ongoing federally funded SBIR/STTR Phase I work) and describes the potential commercialization applications. The documentation provided must validate that the proposer has completed development of technology as stated in Phase I above in previous work or research completed. Documentation should include all relevant information including, but not limited to: technical reports, test data, prototype designs/models, and performance goals/results. Work submitted within the feasibility documentation must have been substantially performed by the proposer and/or the principal investigator (PI).

PHASE II: Mature existing process development through design, analysis, and experimentation. Optimize processing parameters for yield, cost, and quality applicable to complex geometries mentioned in the Description. Demonstrate process maturity through testing on a 2" x 4" x 0.26" (5.08cm x 10.16cm x 0.66cm) (minimum) conformal window. Phase II should identify an insertion opportunity.
PHASE III DUAL USE APPLICATIONS: Work with a seeker window manufacturer to iteratively design, fabricate, polish, and finish prototype seeker windows with complex geometries such as those mentioned in the Description. A successful Phase III would provide the necessary technical data to transition the technology into an applicable interceptor development program.

REFERENCES:

1. J. DeGroote Nelson, A. Gould, N. Smith, K. Medicus, and M. Mandina,
2. "Advances in freeform optics fabrication for conformal window and dome applications," Proc. SPIE 2013, Volume 8708 paper 870815
3. N. E. Smith, A. R Gould, T. Hordin, K. Medicus, et. al, "Conformal window manufacturing process development and demonstration for polycrystalline materials," Proc. SPIE 2013.
4. R. E. Chinn, Ceramography: Preparation and Analysis of Ceramic Microstructures, Chap. 4, 2002.

KEYWORDS: Polishing; Grinding; Seeker Window; Conformal Window

MDA22-D003 TITLE: Innovative Non-Destructive Wafer Level Screening of Infrared Detectors

OUSD (R&E) MODERNIZATION PRIORITY: Space; Microelectronics

TECHNOLOGY AREA(S): Sensors; Materials; Electronics

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OBJECTIVE: Develop and demonstrate an innovative hardware/software system that achieves full-wafer infrared non-destructive material screening of large-format Focal Plane Array (FPA) wafers to enable significant reductions in manufacturing cost and time.

DESCRIPTION: During the last decade, several Government-funded programs resulted in a groundbreaking new infrared detector material using Sb-based III-V Semiconductor Type-II Superlattice (T2SL) technology with bandgap-engineered device architectures. With inherent cost, operability, uniformity, and stability advantages and enhanced performance in Mid, Long and Very Long Wavelength Infrared bands, T2SL FPAs have become very attractive candidates for various DOD sensor platforms such as air, space, ships, and missiles.

Today, T2SL wafers, starting materials of the FPA, are grown on very-large diameterGallium Antimonide (GaSb) substrates in multi-wafer Molecular Beam Epitaxy (MBE) reactors at commercial growth foundries. These foundries are in the early throws of ramping up for full-scale production and are challenged by issues such as limited reactor uptime, wafer throughput, and slow destructive testing capability that sacrifices a single wafer per run, both between wafer runs and for final product. This topic specifically calls for development, demonstration and implementation of a non-destructive, quick-turn, full-wafer screening capability. The proposed solutions should be capable of non-destructively measuring the bandgap and the minority carrier lifetime of the T2SL absorber layers and their uniformity across the wafer at cryogenic temperatures. We seek to improve the usability and reliability of infrared wafer mapping systems to reduce process time and allow foundries to quickly calibrate and maintain the reactor conditions for consistent high quality detector wafer growth. Additionally, the proposed solution should be applicable to other detector materials such as Mercury Cadmium Telluride (MCT) and not limited to III-V T2SL material. The specific goals are listed below:

- Measuring the bandgap of the infrared absorbers sensitive from 2 to 12 micrometer infrared bands at cryogenic temperatures at least as low as 50 K
- Measuring minority carrier lifetimes from 5 ns to 50 microseconds in infrared materials and at temperatures specified above
- System should allow measurements of 75 mm, 100 mm, 125 mm, and 150 mm diameter wafers as well as piece parts

The proposers are encouraged to work with commercial Sb-based III-V Semiconductor T2SL material growth foundries and/or MCT detector material growth and processing houses.

PHASE I: This is a Direct to Phase 2 (D2P2) topic. “Phase I” -like proposals will not be evaluated and will be rejected as nonresponsive. For this topic, the Government expects the small business would have accomplished the following in a Phase I-like effort via some other means, e.g., independent research and development (IRAD) or other source, a concept for a workable prototype or design to address, at a minimum, the basic capabilities of the stated objective above. Proposal must show, as appropriate, a demonstrated technical feasibility or nascent capability of virtual reality and/or telepresence and techniques compatible with low latency communications and/or data transfer. Proposal may provide example cases of this new capability on a specific application. The documentation provided must substantiate the proposer’s development of a preliminary understanding of the technology to be applied in their Phase II proposal in meeting topic objectives.

Feasibility Documentation: Proposers interested in participating in Direct to Phase II must include in their responses to this topic Phase I feasibility documentation that substantiates the scientific and technical merit and Phase I feasibility described in Phase I above has been met (i.e., the small business must have performed a proof of concept “Phase I”-type research and development related to the topic, but feasibility documentation MUST NOT be solely based on work performed under prior or ongoing federally funded SBIR/STTR Phase I work) and must describe the potential commercialization applications. The documentation provided must validate that the proposer has completed development of technology as stated in Phase I above in previous work or research completed. Documentation should include all relevant information including, but not limited to: technical reports, test data, prototype designs/models, and performance goals/results. Work submitted within the feasibility documentation must have been substantially performed by the proposer and/or the principal investigator (PI).

PHASE II: Demonstrate and deliver a complete minority carrier lifetime and wafer mapping system for testing on MWIR and LWIR (2 – 12 micrometer wavelength) wafers. At least one more mapping system should be developed that is capable of mapping dual-color wafers.
PHASE III DUAL USE APPLICATIONS: If sufficient performance of the two-color mapping system can be demonstrated, a field upgrade will be made to the delivered system to enable dual-color functionality.

REFERENCES:

1. David Z. Ting, Alexander Soibel, Arezou Khoshakhlagh, Sam A. Keo, Anita M. Fisher, Sir B. Rafol, Linda Höglund, Cory J. Hill, Brian J. Pepper, and Sarath D. Gunapala, “Long wavelength InAs/InAsSb superlattice barrier infrared detectors with p-type absorber quantum efficiency enhancement”, Appl. Phys. Lett. 118, 133503 (2021).
2. Scott A. Nelson, Joel M. Fasteneau, Dmitri Lubyshev, Michael Kattner, Philip Frey, Amy W. K. Liu, Mark J. Furlong, "Volume MBE production trends for GaSb-based IR photodetector structures," Proc. SPIE 11741, Infrared Technology and Applications XLVII, 1174111 (12 April 2021).
3. Shaner, Eric A., Olson, Ben V., and Kadlec, Emil A. Method and Apparatus for Semiconductor Defect Characterization, https://doi.org/10.2172/1592874.
4. B. V. Olson, E. A. Kadlec, J. K. Kim, J. F. Klem, S. D. Hawkins, E. A. Shaner, and M. E. Flatté, Intensity- and Temperature-Dependent Carrier Recombination in InAs/InAs1−xSbx Type-II Superlattices, Phys. Rev. Applied 3, 044010, 2015.

KEYWORDS: Infrared Material; IR sensor; FPAs; Wafer screening; minority carrier lifetime; IR detector; LWIR; MWIR; Super-lattice detector, Mercury-Cadmium -Telluride (MCT)

MDA22-D004 TITLE: Space-Based Propulsion Systems

OUSD (R&E) MODERNIZATION PRIORITY: Space

TECHNOLOGY AREA(S): Weapons; Space Platforms

The technology within this topic is restricted under the International Traffic in Arms Regulation (ITAR), 22 CFR Parts 120-130, which controls the export and import of defense-related material and services, including export of sensitive technical data, or the Export Administration Regulation (EAR), 15 CFR Parts 730-774, which controls dual use items. Offerors must disclose any proposed use of foreign nationals (FNs), their country(ies) of origin, the type of visa or work permit possessed, and the statement of work (SOW) tasks intended for accomplishment by the FN(s) in accordance with 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 higher performing propellant/propulsion systems to be used in Divert and Attitude Control Systems (DACS) or an axial motor for an on-orbit system.

DESCRIPTION: Proposed solutions could include but are not limited to monopropellant systems, solid rocket propulsion systems, or bipropellant systems.
The propellant/propulsion system must be able to withstand the radiation environment at Low Earth Orbit (LEO) for long term storage in space for a minimum of five years.

System is to fit within a compact payload and have the ability to scale down to a 5 inch diameter.
The system should offer future concepts a highly responsive propulsion system with a minimum thrust to weight ratio of 5. The propellant/propulsion system must be able to perform rapid orbital plane maneuvers. The propulsion system can be designed for highly maneuverable axial motor or for a Divert and Attitude and Control System (DACS). Key parameters to optimize include thrust to weight ratio, mass specific impulse, density specific impulse, and propellant mass fraction. Key parameters to optimize specifically for divert and attitude control system configurations include minimum impulse bit and ability to maintain center of gravity control.

The proposer must submit a technology that has already been proven in a laboratory setting.
To allow the greatest selection of solutions that maximize performance, Naval shipboard safety is not a requirement for this topic.

PHASE I: This is a Direct to Phase 2 (D2P2) topic. “Phase I” -like proposals will not be evaluated and will be rejected as nonresponsive. For this topic, the Government expects the small business would have accomplished the following in a Phase I-like effort via some other means, e.g., independent research and development (IRAD) or other source, a concept for a workable prototype or design to address, at a minimum, the basic capabilities of the stated objective above. Proposal must show, as appropriate, a demonstrated technical feasibility or nascent capability of virtual reality and/or telepresence and techniques compatible with low latency communications and/or data transfer. Proposal may provide example cases of this new capability on a specific application. The documentation provided must substantiate the proposer’s development of a preliminary understanding of the technology to be applied in their Phase II proposal in meeting topic objectives. Documentation should comprise all relevant information including, but not limited to, technical reports, test data, prototype designs/models, and performance goals/results.

Feasibility Documentation: Proposers interested in participating in Direct to Phase II must include in their responses to this topic Phase I feasibility documentation that substantiates the scientific and technical merit and Phase I feasibility described in Phase I above has been met (i.e., the small business must have performed a proof of concept "Phase I"-type research and development related to the topic, but feasibility documentation MUST NOT be solely based on work performed under prior or ongoing federally funded SBIR/STTR Phase I work) and describe the potential commercialization applications. The documentation provided must validate that the proposer has completed development of technology as stated in Phase I above in previous work or research completed. Documentation should include all relevant information including, but not limited to: technical reports, test data, prototype designs/models, and performance goals/results. Work submitted within the feasibility documentation must have been substantially performed by the proposer and/or the principal investigator (PI).

PHASE II: Characterize propulsion system through experimentation and analysis. Optimize propellant formulation and manufacturing of propulsion system based on experimentation results. Demonstrate production of propellant batches of sufficient size to conduct hot fire tests. Phase II should include a heavyweight hot fire test to demonstrate propulsion system design performance parameters in a relevant environment. Phase II should identify an insertion opportunity and conclude with a matured propellant formulation/manufacturing process.

PHASE III DUAL USE APPLICATIONS: Work with propulsion system manufacturers/designers to implement the propulsion system with propellant formulation and manufacturing of propulsion system into a full-scale testing of a lightweight system. A successful Phase III would provide the necessary technical data to transition the technology into a missile defense application.

REFERENCES:

1. https://ntrs.nasa.gov/citations/19780005279
2. https://ntrs.nasa.gov/api/citations/19980237012/downloads/19980237012.pdf
3. https://ntrs.nasa.gov/api/citations/19720019028/downloads/19720019028.pdf
4. https://ntrs.nasa.gov/api/citations/20120011680/downloads/20120011680.pdf
5. https://commons.erau.edu/cgi/viewcontent.cgi?article=1101&context=edt

KEYWORDS: Propellant; Chemistry; Propulsion; Space; Propellant Manufacturing

MDA22-D005 TITLE: Sensor Fusion for Navigation in GPS Denied Environments

OUSD (R&E) MODERNIZATION PRIORITY: Space; Microelectronics; Hypersonics; Artificial Intelligence/ Machine Learning

TECHNOLOGY AREA(S): Sensors

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OBJECTIVE: Develop fused sensor solution for navigation in Global Positioning System (GPS) denied environment using innovative solutions that leverage modern miniaturized electronics to demonstrate improvements to the size, weight, power, cost (SWAP-C), performance, and/or capabilities of existing missile system avionics.

DESCRIPTION: This topic seeks novel fused sensor solutions with the ability to improve the size, weight, power, cost (SWAP-C), performance, and capabilities benefiting current and future missile systems operating in GPS denied environments. The primary anchoring mechanism for flight avionics is routine GPS updates. During extended periods without GPS, missile avionics systems are reliant on components that are subject to errors such as bias instability that can quickly propagate into significant navigational discrepancies. The general solution for correcting bias instability in avionics systems involves the implementation of high-precision systems that are less prone to these issues; however, these solutions also come with increased cost, weight, and availability implications. The Government is seeking an alternative solution that implements a homogenous sensor fusion approach to overcome the cost, weight, and availability implications of high-precision avionics components while maintaining similar performance characteristics.

Evaluation criteria for proposed solutions include:

• Feasibility of integration into current and/or future missile systems; demonstrable improvements in SWAP-C, performance, and/or functional capabilities over existing high-precision avionics systems
• Manufacturability and/or component availability improvements that indicate a reduction in procurement lead times, increased reliability, and/or diminished component lifecycle limitations while providing high quality consistent components
• Ability to provide functional system/subsystem model or prototype demonstration in environments relevant to missile system application at completion of SBIR Phase II development

PHASE I: This is a Direct to Phase 2 (D2P2) topic. “Phase I” -like proposals will not be evaluated and will be rejected as nonresponsive. For this topic, the Government expects the small business would have accomplished the following in a Phase I-like effort via some other means, e.g., independent research and development (IRAD) or other source, a concept for a workable prototype or design to address, at a minimum, the basic capabilities of the stated objective above. Proposal must show, as appropriate, a

demonstrated technical feasibility or nascent capability of virtual reality and/or telepresence and techniques compatible with low latency communications and/or data transfer. Proposal may provide example cases of this new capability on a specific application. The documentation provided must substantiate the proposer's development of a preliminary understanding of the technology to be applied in their Phase II proposal in meeting topic objectives. Documentation should comprise all relevant information including, but not limited to, technical reports, test data, prototype designs/models, and performance goals/results.

Feasibility Documentation: Proposers interested in participating in Direct to Phase II must include in their responses to this topic Phase I feasibility documentation that substantiates the scientific and technical merit and Phase I feasibility described in Phase I above has been met (i.e., the small business must have performed a proof of concept "Phase I"-type research and development related to the topic, but feasibility documentation MUST NOT be solely based on work performed under prior or ongoing federally funded SBIR/STTR Phase I work) and describe the potential commercialization applications. The documentation provided must validate that the proposer has completed development of technology as stated in Phase I above in previous work or research completed. Documentation should include all relevant information including, but not limited to: technical reports, test data, prototype designs/models, and performance goals/results. Work submitted within the feasibility documentation must have been substantially performed by the proposer and/or the principal investigator (PI).

PHASE II: Show evidence of selection criteria justifying technical direction and advantages over existing technologies. Document substantive analysis and testing of solution to verify applicability in the necessary functional environments associated with flight testing. Conduct manufacturing assessments for innovative production techniques that provide identifiable reduction in lead times, increase in reliability, and high-quality/consistent components. Provide functional system/subsystem model or prototype demonstration in environments relevant to missile system application at the completion of Phase II development. Detail transition plan for integration and insertion into existing or future missile systems directed at demonstration of solution in an operational environment.
PHASE III DUAL USE APPLICATIONS: Demonstrate use of full-scale prototype components in operational missile system environments. Develop full-scale manufacturing capabilities providing data on quality and reliability of components. Provide full-scale cost assessments for production.

REFERENCES:

1. O. T. Waheed and I. M. Elfadel, "FPGA sensor fusion system design for IMU arrays," 2018 Symposium on Design, Test, Integration & Packaging of MEMS and MOEMS (DTIP), 2018, pp. 1-5, doi: 10.1109/DTIP.2018.8394227.
2. R. Rasoulzadeh and A. M. Shahri, "Implementation of A low-cost multi-IMU hardware by using a homogenous multi-sensor fusion," 2016 4th International Conference on Control, Instrumentation, and Automation (ICCIA), 2016, pp. 451-456, doi: 10.1109/ICCIAutom.2016.7483205.

KEYWORDS: Technology Enhancement; Instrumentation; Sensors; Sensor Fusion; Avionics; Guidance Navigation and Control; GNC

MDA22-D006 TITLE: Hyperspectral Sensor for Scene Characterization

OUSD (R&E) MODERNIZATION PRIORITY: Space

TECHNOLOGY AREA(S): Sensors

The technology within this topic is restricted under the International Traffic in Arms Regulation (ITAR), 22 CFR Parts 120-130, which controls the export and import of defense-related material and services, including export of sensitive technical data, or the Export Administration Regulation (EAR), 15 CFR Parts 730-774, which controls dual use items. Offerors must disclose any proposed use of foreign nationals (FNs), their country(ies) of origin, the type of visa or work permit possessed, and the statement of work (SOW) tasks intended for accomplishment by the FN(s) in accordance with 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 target-based hyperspectral sensor technology for use in missile system flight tests capable of collecting scene spectral data for multiple bands of interest while retaining the size, weight, power, cost (SWAP-C) of existing systems.

DESCRIPTION: This topic seeks the development of a target-based fly-along hyperspectral sensor capability for collecting spectral data across multiple bands with a single imaging device during a flight test engagement. The size, weight, power, cost (SWAP-C) and performance of the hyperspectral sensor should be equivalent to or in exceedance of current imaging technology. Use of hyperspectral imaging poses a benefit for current and future Government missile system testing as it can provide multiple spectral datasets for scene characterization and analysis.

Evaluation criteria for proposed solutions include:

- Capability of system to produce hyperspectral image data for use in flight test scene characterization
- Feasibility of integration into current and/or future missile systems; demonstrable equivalence or improvement in SWAP-C and performance over existing imaging systems
- Manufacturability and/or component availability improvements that indicate a reduction in procurement lead times, increased reliability, and/or diminished component lifecycle limitations while providing high quality consistent components
- Ability to provide functional system/subsystem model or prototype demonstration in environments relevant to missile system application at completion of SBIR Phase II development

PHASE I: This is a Direct to Phase 2 (D2P2) topic. “Phase I” -like proposals will not be evaluated and will be rejected as nonresponsive. For this topic, the Government expects the small business would have accomplished the following in a Phase I-like effort via some other means, e.g., independent research and development (IRAD) or other source, a concept for a workable prototype or design to address, at a minimum, the basic capabilities of the stated objective above. Proposal must show, as appropriate, a demonstrated technical feasibility or nascent capability of virtual reality and/or telepresence and techniques compatible with low latency communications and/or data transfer. Proposal may provide example cases of this new capability on a specific application. The documentation provided must substantiate the proposer’s development of a preliminary understanding of the technology to be applied in their Phase II proposal in meeting topic objectives. Documentation should comprise all

relevant information including, but not limited to, technical reports, test data, prototype designs/models, and performance goals/results.

Feasibility Documentation: Proposers interested in participating in Direct to Phase II must include in their responses to this topic Phase I feasibility documentation that substantiates the scientific and technical merit and Phase I feasibility described in Phase I above has been met (i.e., the small business must have performed a proof of concept "Phase I"-type research and development related to the topic, but feasibility documentation MUST NOT be solely based on work performed under prior or ongoing federally funded SBIR/STTR Phase I work) and describe the potential commercialization applications. The documentation provided must validate that the proposer has completed development of technology as stated in Phase I above in previous work or research completed. Documentation should include all relevant information including, but not limited to: technical reports, test data, prototype designs/models, and performance goals/results. Work submitted within the feasibility documentation must have been substantially performed by the proposer and/or the principal investigator (PI).

PHASE II: Show evidence of selection criteria justifying technical direction and advantages over existing technologies. Document substantive analysis and testing of solution to verify applicability in the necessary functional environments associated with flight testing. Conduct manufacturing assessments for innovative production techniques that provide identifiable reduction in lead times, increase in reliability, and high-quality/consistent components. Provide functional system/subsystem model or prototype demonstration in environments relevant to missile system application at the completion of Phase II development. Detail transition plan for integration and insertion into existing or future missile systems directed at demonstration of solution in an operational environment.
PHASE III DUAL USE APPLICATIONS: Demonstrate use of full-scale prototype components in operational missile system environments. Develop full-scale manufacturing capabilities providing data on quality and reliability of components. Provide full-scale cost assessments for production.

REFERENCES:

3. 1. Workshop on Hyperspectral Imaging and Signal Processing: Evolution in Remote Sensing (WHISPERS)
4. 2. Jon Atli Benediktsson; Pedram Ghamisi, Spectral-Spatial Classification of Hyperspectral Remote Sensing Images, Artech, 2015.

KEYWORDS: Technology Enhancement; Instrumentation; Sensors; Hyperspectral; Imaging