DEPARTMENT OF THE ARMY

DoD 24.4 Small Business Innovation Research (SBIR)
Annual Broad Agency Announcement (BAA)
Component-Specific Proposal Instructions
Release 7

February 1, 2024: Topics issued for pre-release
February 15, 2024: Army begins accepting proposals via DSIP
March 6, 2024: DSIP Topic Q&A closes to new questions at 12:00 p.m. ET
March 20, 2024: Deadline for receipt of proposals no later than 12:00 p.m. ET

INTRODUCTION

The future Army must be capable of conducting Multi-Domain Operations (MDO) as part of an integrated Joint Force across an array of situations in multiple theaters by 2035. The MDO concept describes how the Army will support the Joint Force in the rapid and continuous integration of all domains of warfare – land, sea, air, and cyberspace – to deter and prevail as we compete short of conflict, and fight and win if deterrence fails. The Army must provide game-changing capabilities to our Soldiers. To capitalize on small business innovation and reduce the time from solicitation to award, the Army has implemented an approach to advertise SBIR funding opportunities through the Department of Defense (DoD) Annual BAA process, outside of the three pre-determined BAA cycles.

Proposers are encouraged to thoroughly review the DoD Program BAA and register for the Defense SBIR/STTR Innovation Portal (DSIP) Listserv to remain apprised of important programmatic and contractual changes.

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

CONTACT INFORMATION

Direct specific questions pertaining to the administration of the Department of the Army SBIR Program and proposal preparation instructions to the Point of Contact identified in the Topic announcement. General questions can be directed to the following:

Email: usarmy.pentagon.hqda-asa-alt.mbx.army-applied-sbir-program@army.mil
Website: https://www.armysbir.army.mil/
Mailing Address:
Army Applied SBIR Office
2530 Crystal Drive, Suite 11192
Arlington, Virginia 22202

RESPONSIVENESS AND TIMELINESS

Proposals will only be evaluated in response to an active, corresponding Army topic. Proposals will be initially screened to determine responsiveness and timeliness. Proposals passing this initial screening will be technically evaluated by engineers or scientists, through a peer or scientific review process, to determine the most promising technical and scientific approaches. Assessment of responsiveness may continue during technical evaluation and after selection. If at any point the proposal is deemed untimely, unresponsive, ineligible, or non-responsible, the proposal will be disqualified/rejected, and a contract will not be awarded.

Interested firms shall follow the DoD Program BAA instructions as well as the Army's component-specific proposal instructions herein, when preparing and submitting proposals. The DoD 24.4 SBIR Program BAA can be found here: https://www.defensesbirsttr.mil/SBIR-STTR/Opportunities/.

The Government reserves the right to disqualify/reject proposals for failing to meet any of the requirements of the SBA SBIR/STTR Policy Directive, the DoD Program BAA instructions, the Army's component-specific

proposal instructions herein, and/or in the topic itself. The following include, but are not limited to, the common reasons for which proposals are disqualified/rejected:

- System for Award Management is not properly updated at time of proposal submission.
- The proposal is missing required number of signatures and/or content.
- Minimum Performance Percentage of Work is not allocated properly.
- Work as proposed does not meet the definition of Research and Development required for funding.
- Proposal submitted beyond deadline.
- Commercialization Plan is submitted in a format other than the prescribed template at Appendix D – Commercialization Plan Template, enclosed herein.
- Price exceeds the stated award guideline limitation identified within the corresponding SBIR opportunity.
- Proposal exceeds the stated page count(s) or formatting requirements
- Firm is NOT an eligible small business.
- Firm does NOT meet the ownership and control requirements.
- Firm is 50% or more owned or managed by a corporate entity that is not a small business.
- Firm will NOT perform the prescribed percentage of the research and/or analytical work.
- Primary employment of the Principal Investigator for this project is NOT with the firm.
- Firm has been convicted of a fraud-related crime.
- Principal Investigator or Corporate Official has been convicted of a fraud-related crime.
- Firm and affiliates have employed, on average over the last 24 months, more than 500 employees.
- Firm has been awarded a contract from the US Government for essentially equivalent work.
- Claiming data rights assertions without including a Data Rights Assertions Table.
- Lack of proper documentation for research utilizing human/animal subjects or recombinant DNA.
- Lack of information or negative information concerning use of foreign nationals.
- Offeror requests to award to a different firm/entity after proposal submission.
- Failure or refusal to submit certified or other than certified cost data in accordance with Defense Federal Acquisition Regulation Supplement (DFARS) Clause 252.215-7010, Requirements for Certified Cost or Pricing Data and Data Other Than Certified Cost or Pricing Data.
- Proposal is for a topic other than that which is identified.

SYSTEM FOR AWARD MANAGEMENT (SAM)
Interested firms are required to be registered and active in SAM (www.sam.gov) before submitting a proposal and shall continue to be registered until time of award, during performance, and through final payment of any contract. The proper North American Industry Classification System (NAICS) code and Product and Service Code (PSC) are as follows:

NAICS: 541715, Research and Development in the Physical, Engineering, and Life Sciences (except Nanotechnology and Biotechnology)
PSC: AC12, National Defense R&D Services; Department of Defense - Military; Applied Research

Proposing firms with no SAM registration, inactive SAM registration(s), or SAM registration(s) with improper representations and certifications will be disqualified.

A firm may NOT submit an offer on behalf of another entity. The proposed firm's Entity Information shall match the Entity Information (Commercial and Government Entity (CAGE) Code / DoD Activity Address Code (DoDAAC) / Unique Entity Identifier (UEI)) contained in the proposal to be eligible for award.

ELIGIBILITY
The eligibility requirements for the SBIR/STTR programs are unique and do not correspond to those of other small business programs. Please refer to Section 4.2, Proposing Small Business Concern Eligibility and Performance Requirements, of BAA 24.4, to include any amendments, for full eligibility requirements.

Ownership in Part by Multiple Venture Capital, Hedge Fund, and Private Equity Firms
Proposing small business concerns that are owned in majority part by multiple venture capital operating companies (VCOCs), hedge funds, or private equity funds are eligible to submit applications or receive awards for this topic.

- Proposing small business concerns shall identify each foreign national, foreign entity, or foreign government holding or controlling greater than a 5% equity stake in the proposing small business concern, whether such equity stake is directly or indirectly held.

- The proposing small business concern shall also identify any and all of its ultimate parent owner(s) and any other entities and/or individuals owning more than a 5% equity stake in its chain of ownership.

VCOCs, hedge funds and private equity firms are allowed to hold minority shares of SBIR/STTR awardee so long as they do not have control of the awardee company and so long as their affiliation with the awardee, if any, does not put the awardee firm over the size limit.

If the VCOC is itself more than 50% directly owned and controlled by one or more individuals who are citizens or permanent resident aliens of the United States, the VCOC is allowed to have majority ownership and control of the awardee. In that case, the VCOC and the awardee, and all other affiliates, shall have a total of 500 employees or less.

Anticipated Structure/Award Information
For this topic, Department of the Army will accept Phase I proposals for the cost of up to $250,000 for up to a 6-month period of performance and Direct to Phase II proposals for the cost of up to $2,000,000 for an 18-month period of performance.

Proposals that do not comply with the requirements detailed in the DoD Program BAA, these Component Instructions, and the research objectives of the topic are considered non-conforming and therefore shall not be evaluated nor considered for award.

In response to this topic Phase I proposals shall include the following:

- Volume 1: Proposal Coversheet
- Volume 2: Technical Volume (breakdown below)
    - Technical Proposal (5 pages maximum)
    - Commercialization Plan (8 slides maximum saved as PDF – Offerors shall utilize the template found at Appendix D – Commercialization Plan Template)
- Volume 3: Cost Volume
- Volume 4: Company Commercialization Report (Auto generated for prior Federal SBIR or STTR awardees)
- Volume 5: Supporting Documents (Please see requirements outlined in the DoD Program BAA for more information)
    - Contractor Certification Regarding Provision of Prohibition on Contracting for Certain Telecommunications and Video Surveillance Services or Equipment
    - Disclosures of Foreign Affiliations or Relationships to Foreign Countries
    - Disclosure of Funding Sources
- Volume 6: Fraud, Waste, and Abuse Training Certificate

In response to topics eligible for DP2, proposals shall include the following:

- Volume 1: Proposal Coversheet
- Volume 2: Technical Volume (breakdown below)
    - Feasibility Documentation – Part One A (5 Pages maximum)

    - Technical Proposal – Part One B (10 pages maximum)
    - Commercialization Plan – Part Two (8 slides maximum saved as PDF – Offerors shall utilize the template found at Appendix D – Commercialization Plan Template)
- Volume 3: Cost Volume
- Volume 4: Company Commercialization Report (Auto generated for prior Federal SBIR or STTR awardees)
- Volume 5: Supporting Documents (Please see requirements outlined in the DoD Program BAA for more information)
    - Contractor Certification Regarding Provision of Prohibition on Contracting for Certain Telecommunications and Video Surveillance Services or Equipment
    - Disclosures of Foreign Affiliations or Relationships to Foreign Countries
    - Disclosure of Funding Sources
- Volume 6: Fraud, Waste, and Abuse Training Certificate

PHASE I PROPOSAL INSTRUCTIONS

The DSIP is the official portal for DoD SBIR/STTR proposal submission. Proposers (also referred to herein as "offeror(s)") are required to submit proposals via DSIP; proposals submitted by any other means will be disregarded. Detailed instructions regarding registration and proposal submission via DSIP are provided in the DoD SBIR Program BAA.

Volume 1 - Proposal Coversheet

The proposal coversheet shall follow the instructions and requirements provided in the DoD SBIR Program BAA.

The offeror shall certify that to the best of its knowledge and belief, its eligibility information under the SBIR Program is accurate, complete, and current as of the date of the offer.

Volume 2 - Technical Volume

These following instructions supersede those stated in section 5.3.c of the DoD Program BAA.

The technical volume shall not exceed five (5) pages and shall follow the formatting requirements provided in the DoD SBIR Program BAA. Proposing small business concerns shall also submit an eight (8) slide Commercialization Plan, utilizing the template found at Appendix D – Commercialization Plan Template attached hereto. The Commercialization Plan shall be converted to a pdf and attached to the end of the five (5) page technical volume, resulting in one pdf file to be uploaded to DSIP as Volume 2. The Commercialization Plan does not count towards the technical volume 5-page limit. Any proposals submitted without a Commercialization Plan, or in a format other than the template provided at Appendix D – Commercialization Plan Template, shall be deemed unresponsive, and will not be evaluated nor considered for award.

Volume 2a - Part One Technical Proposal

The technical proposal shall contain two (2) key sections – technical approach and team qualifications. The technical approach section shall contain details on how the proposer is going to solve the problem. It shall detail key elements of the firm's approach, any risks, relevant past work and how success was measured along with how success will be measured for this effort. The team qualifications section shall highlight the key personnel working on the project, and the resources that will be brought to bear on solving the problem. Further, if proposing the use of Foreign National personnel as defined at section 3 of the DoD Program BAA, offerors shall specify each Foreign National's country of origin, the type of visa or work permit under which they are performing, and provide an explanation of their anticipated level of involvement on this project - Offerors may be asked to provide additional information during negotiations in order to verify the foreign citizen's eligibility to participate in the SBIR. 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).

Volume 2b - Part Two Commercialization Plan
Offerors shall refer to and utilize the eight (8) slide template found at Appendix D – Commercialization Plan Template, attached hereto, when preparing the commercialization plan.

The commercialization plan content requirements, as described at Appendix D, include:

1. SBIR Project Title: Opening slide that includes the SBIR project title, principal investigator name/title key (or other relevant) personnel, and subcontractors, firm name, topic number, and proposal number.
2. Bottom Line Up Front (BLUF): Slide that outlines/summarizes key areas of the Commercialization Plan. See slide 2 of Appendix D.
3. Company Information & Background: Focused objectives/core competencies; Specialization area(s); Products with significant sales; Concise history of previous Federal and non-Federal funding, Regulatory experience (if applicable), Past commercialization successes; and Past failure and how your firm overcame
4. Customer and Competition: Clear description of key technology objectives; Current competition and/or alternative solutions; Advantages of company's solution compared to competing products or services; Description of hurdles to acceptance of the proposed innovation; and Description of possible areas where your technology may be utilized or is underutilized.
5. Market: Provide an analysis of market size, and estimated market share after first year sales and after 5 years; Explain milestones target dates of plan to obtain market share; Respond to specific questions regarding your qualifications and approach to bring the product to market (See slide 5 of Appendix D)
6. Intellectual Property: Patent status, technology lead, trade secrets or other demonstration of a plan to achieve sufficient protection to realize the commercialization stage and attain at least a temporal competitive advantage; Describe how you will protect the intellectual property that enables commercialization of its products while keeping competitors at bay.
7. Financing: Plans for securing necessary non-SBIR funding; Describe your firm's revenue stream generation.
8. Assistance and mentoring: Plans for securing needed technical or business assistance through mentoring, partnering, or through arrangements with government sponsored (e.g., State assistance programs, Federally-funded research laboratories, Manufacturing Extension Partnership centers), not-for-profits (e.g., SBDC), commercial accelerators, DOD Prime Contractors, or other assistance provider.

Volume 3 - Cost Volume
The Cost Volume shall follow all instructions and requirements provided in the DoD SBIR Program BAA. The following instructions supersede those stated in section 5.3. d of the DoD Program BAA.

Unless otherwise noted in the topic, the Phase I award amount shall not exceed $250,000 for a 6-month period of performance. Phase I Options are not anticipated at this time. If an option is identified in the topic posting, costs for the Base and Option shall be separated and clearly identified on the Proposal Cover Sheet (Volume 1) and in Volume 3.

For pricing purposes, offerors should assume a contract or agreement start date of approximately ninety (90) days after submission of the proposal. Awards are executed as FAR-based firm-fixed-price contracts. Fixed price payments shall be tied to measurable milestones, as agreed to by the Government.

In the event that adequate price competition, as defined in FAR 15.403-1(1), is not realized, the Government will conduct additional proposal analysis, in accordance with the techniques identified

at FAR 15.404-1. In accordance with FAR 15.402(a), Contracting officers shall purchase supplies and services from responsible sources at fair and reasonable prices. If the Contracting Officer is unable to deem the offeror as responsible (FAR 9.1), the offeror will be disqualified. Proposals lacking a fair and reasonable price will be eliminated.

Volume 3 - Content of the Cost Volume
ALL proposed costs shall be accompanied by documentation to substantiate how the cost was derived. For example, if you proposed travel costs to attend a project-related meeting or conference, and used a travel website to compare flight costs, include a screenshot 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 evaluators and contracting personnel to understand how the proposer plans to use the requested funds. Some items in the cost breakdown may not apply to the proposed project. If that is the case, there is no need to provide information on each and every item.

Cost Breakdown Guidance:

- LABOR:
    - List all key personnel by name as well as by number of hours dedicated to the project as direct labor.
    - Explain the basis of proposed labor hours, including required tasks, and substantiating documentation for the costs (e.g. payroll reports).
- MATERIAL/TOOLING/EQUIPMENT:
    - Explain the basis of proposed material and equipment costs. This support should include a consolidated priced summary of individual material and equipment quantities and substantiating documentation for the costs (e.g. vendor quotes, invoice prices, competitive bids, etc.). If your choice isn't the lowest cost available, explain the decision to choose one item or supplier over another.
    - Ensure all materials are American-made to the maximum extent practicable. Offerors who propose to use a foreign-made product in its technology may be required to find an American-made equivalent.
    - While special tooling and test equipment and material cost may be included, it will be carefully reviewed relative to need and appropriateness for the work proposed. The purchase of special tooling and test equipment shall, in the opinion of the Procurement/Government 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.
- TRAVEL:
    - Explain the basis of proposed travel, including to/from locations, number of trips, number of travelers per trip, and number of days/nights per trip. Include

substantiating documentation for the costs (e.g. screenshots of flight cost comparison, rental car quotes, etc.). NOTE: Virtual meetings shall be utilized to the maximum extent practicable.

- In accordance with FAR 31.205-46 Travel costs incurred shall not exceed the maximum per diem rates set forth in Federal Travel Regulation, Joint Travel Regulation, or standard regulations, unless the travel is special or considered unusual. Any special or unusual travel costs shall be supported with substantiating documentation for review and consideration. Per diem rate lookup can be located at https://www.gsa.gov/travel/plan-book/per-diem-rates?gsaredirect=perdiem.

- SUBCONTRACTS: A subcontract is any agreement, other than one involving an employer-employee relationship, entered into by the prime contractor (awardee) calling for supplies or services for the performance of the contract.

  - All subcontractor costs and consultant costs shall be detailed at the same level as prime contractor costs in regard to labor, travel, equipment, etc.

  - Explain the basis of proposed subcontract costs. Include documented support of the offeror's price analyses and degree of competition of all subcontractor proposals. All subcontractor costs and consultant costs, such as labor, travel, equipment, materials, shall be detailed at the same level as prime contractor costs. Provide detailed substantiation of subcontractor costs in your cost proposal.

  - Certify that the following requirements are met: For Phase I, the offeror shall perform a minimum of two-thirds of the research and/or analytical effort. One third may be subcontracted to another firm or research organization/facility. The percentage of work is measured by both direct and indirect costs.

  - Offerors shall not propose to subcontract to the issuing agency, to any other Federal Government agency, or to other units of the Federal Government, except Federal Laboratories in rare circumstances. As defined in 15 United States Code (U.S.C.) 3703, Federal Laboratory means any laboratory, any federally funded research and development center, or any center established under 15 U.S.C. 3705 and 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.

  - Offerors shall not propose to subcontract to any prohibited sources, as prescribed at FAR 25.7 – Prohibited Sources, and its supplements. Proposals identifying a subcontractor/vendor arrangement with a prohibited source may be rejected.

  - Offerors shall ensure subcontracting arrangements are with United States Small Businesses to the maximum extent practicable. Offerors proposing a subcontractor arrangement with other than a United States Small Business (such as, a large business, foreign firm, foreign government, educational institution, unit of Federal Government, etc.) may be required to submit further explanation, and/or have the submitted proposal disqualified.

- INDIRECT COSTS:

  - Explain the basis of the proposed indirect expense rates including overhead, general and administrative, material handling, and fringe benefits.

- If a Defense Contract Audit Agency (DCAA) Audit has been conducted within the last five (5) years, include the audit compliance documentation in the cost proposal documents. The documentation should also include the offeror's DCAA Point of Contact (if applicable).

- Offerors shall provide any current Forward Pricing Rate Agreements (FPRA) in effect at time of proposal submission.

If selected for award, failure to include the documentation with your proposal may delay any potential contract award, as the proposer will be asked to submit the necessary documentation to the Contracting Officer to substantiate costs. It is important to respond as quickly as possible to the Contracting Officer's request for documentation. Failure or refusal to provide documentation may result in dissolution of the contract action.

Volume 4 - Company Commercialization Report (CCR)
Completion of the CCR as Volume 4 of the proposal submission in DSIP is required for prior SBIR/STTR awardees. Please refer to the DoD SBIR Program BAA for full details on this requirement. Information contained in the CCR will be considered by the Department of the Army during proposal evaluations.

Volume 5 - Supporting Documents
Volume 5 is provided for proposers to submit additional documentation to support the Cover Sheet (Volume 1) and the Technical Volume (Volume 2), and the Cost Volume (Volume 3).

All proposing small business concerns are REQUIRED to submit the following documents to Volume 5:

1. Contractor Certification Regarding Provision of Prohibition on Contracting for Certain Telecommunications and Video Surveillance Services or Equipment
2. Disclosures of Foreign Affiliations or Relationships to Foreign Countries
3. Disclosure of Funding Sources - Please refer to the DoD Program BAA for more information.

In addition to the Volume 5 requirements outlined in the DoD Program BAA, the Department of the Army may accept the following documents in Volume 5:

- Additional Cost Information
- Funding Agreement Certification
- Technical Data Rights (Assertions)
- Lifecycle Certification
- Allocation of Rights
- Other (only as specified in the topic)

Please only submit documents that are identified immediately above and in the DoD Program BAA. All other documents submitted will be disregarded.

Volume 6 Fraud, Waste and Abuse Training
Follow instructions provided in the DoD Program BAA for completion of the Fraud, Waste and Abuse training in DSIP.

DIRECT TO PHASE II (DP2) PROPOSAL INSTRUCTIONS
The DSIP is the official portal for DoD SBIR/STTR proposal submission. Proposers (also referred to herein as "offeror(s)") are required to submit proposals via DSIP; proposals submitted by any other means will be disregarded. Detailed instructions regarding registration and proposal submission via DSIP are provided in the DoD SBIR Program BAA.

Proposers interested in submitting a DP2 proposal in response to these topics shall 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.

The Army will not evaluate the proposer's related Phase II proposal if it determines that the proposer has failed to demonstrate that technical merit and feasibility has been established or the proposer has failed to demonstrate that work submitted in the feasibility documentation was substantially performed by the proposer and/or the PI.

Feasibility documentation cannot be based upon any prior or ongoing federally funded SBIR or STTR work and DP2 proposals MUST NOT logically extend from any prior or ongoing federally funded SBIR or STTR work.

Volume 1 - Proposal Coversheet
The proposal coversheet shall follow the instructions and requirements provided in the DoD SBIR Program BAA.

The offeror shall certify that to the best of its knowledge and belief, its eligibility information under the SBIR Program is accurate, complete, and current as of the date of the offer.

Volume 2 - Technical Volume
These following instructions supersede those stated in section 5.3.c of the DoD Program BAA.

The Technical Volume shall include three (3) parts:

- Feasibility Documentation (Part One A);
- Technical Proposal (Part One B); and
- Commercialization Plan (Part Two).

The technical volume shall not exceed 15 pages, inclusive of the Feasibility Determination (Part One A), which is subject to a maximum of five (5) pages, and the Technical Proposal (Part One B), which is subject to a maximum of 10 pages. Proposing small business concerns shall also submit an eight (8) slide Commercialization Plan, utilizing the template found at Appendix D – Commercialization Plan Template attached hereto. The Commercialization Plan shall be converted to a pdf and attached to the end of the five (5) page technical volume, resulting in one pdf file to be uploaded to DSIP as Volume 2. The Commercialization Plan does not count towards the technical volume 5-page limit. Any proposals submitted without a Commercialization Plan, or in a format other than the template provided at Appendix D – Commercialization Plan Template, shall be deemed unresponsive, and will not be evaluated nor considered for award.

Offerors shall number all pages of their proposal consecutively. Font size should not be 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 DSIP when the Cover Sheet was created. The header may be included in the one-inch margin. Except as stated herein, the Technical Volume shall follow the formatting requirements provided in the DoD SBIR Program BAA Any proposals submitted in a different format, or exceeding the page count limits shall not be reviewed.

Volume 2 - PART ONE: Feasibility and Technical Proposal
Offerors are free to structure each section of Volume 2, PART ONE as they like, so long as it provides sufficient detail for evaluators to understand the proposed work, who will carry it out, and how the business plans to commercialize results. Volume 2, PART ONE shall include the following:

Volume 2 - PART ONE A: Feasibility Documentation (5 pages):

- The offeror shall provide documentation in its proposal to substantiate that the scientific and technical merit and feasibility described in the Phase I section of the topic component-specific instructions has been met and describes the potential commercial applications. Documentation shall include all relevant information including, but not limited to: technical reports (summary and citation), test data, prototype designs/models, and performance goals/results from the Phase I effort.
- If references exist, the offeror shall include a reference list or works cited list as the last page of the feasibility documentation. This will count towards the total page limit.
- Work listed within the feasibility documentation must have been substantially performed by the offeror and/or the Principal Investigator (PI) during the Phase I effort.
- If technology in the feasibility documentation is subject to Intellectual Property (IP), the offeror must either own the IP, or must have obtained license rights to such technology prior to proposal submission, to enable it and its subcontractors to legally carry out the proposed work. Documentation of IP ownership or license rights shall be included in the Technical Volume of the proposal.

Volume 2, PART ONE B: Technical Proposal (10 pages). At a minimum, the technical proposal shall address all of the following:

- What are you trying to do? Describe your firm's technical approach/solution. Articulate your firm's objectives without jargon.
- What is new in your firm's approach and why will your firm be successful?
- If you firm is successful, what difference will this technology make?
- What are the technical risks?
- What is the Period of Performance? In other words, how long will it take to complete the contract, including a milestone schedule to justify the requested period of performance.

Volume 2b - Part TWO - Commercialization Plan

Offerors shall refer to and utilize the eight (8) slide template found at Appendix D – Commercialization Plan Template, attached hereto, when preparing the commercialization plan.

The commercialization plan content requirements, as described at Appendix D, include:

1. SBIR Project Title: Opening slide that includes the SBIR project title, principal investigator name/title key (or other relevant) personnel, and subcontractors, firm name, topic number, and proposal number.
2. Bottom Line Up Front (BLUF): Slide that outlines/summarizes key areas of the Commercialization Plan. See slide 2 of Appendix D.
3. Company Information & Background: Focused objectives/core competencies; Specialization area(s); Products with significant sales; Concise history of previous Federal and non-Federal funding, Regulatory experience (if applicable), Past commercialization successes; and Past failure and how your firm overcame
4. Customer and Competition: Clear description of key technology objectives; Current competition and/or alternative solutions; Advantages of company's solution compared to competing products or services; Description of hurdles to acceptance of the proposed innovation; and Description of possible areas where your technology may be utilized or is underutilized.
5. Market: Provide an analysis of market size, and estimated market share after first year sales and after 5 years; Explain milestones target dates of plan to obtain market share; Respond to specific questions regarding your qualifications and approach to bring the

product to market (See slide 5 of Appendix D)

6. Intellectual Property: Patent status, technology lead, trade secrets or other demonstration of a plan to achieve sufficient protection to realize the commercialization stage and attain at least a temporal competitive advantage; Describe how you will protect the intellectual property that enables commercialization of its products while keeping competitors at bay.
7. Financing: Plans for securing necessary non-SBIR funding; Describe your firm's revenue stream generation.
8. Assistance and mentoring: Plans for securing needed technical or business assistance through mentoring, partnering, or through arrangements with government sponsored (e.g., State assistance programs, Federally-funded research laboratories, Manufacturing Extension Partnership centers), not-for-profits (e.g., SBDC), commercial accelerators, DOD Prime Contractors, or other assistance provider.

Volume 3 - Cost Volume

The Cost Volume shall follow all instructions and requirements provided in the DoD SBIR Program BAA. The following instructions supersede those stated in section 5.3. d of the DoD Program BAA.

Unless otherwise noted in the topic, the Army will accept DP2 proposals for a cost up to $2,000,000 for an 18-month period of performance. Proposers are required to use the Cost Proposal method as provided on the DSIP submission site. The Cost Volume (and supporting documentation) DOES NOT count toward the page limit of the Technical Volume.

For pricing purposes, offerors should assume a contract or agreement start date of approximately ninety (90) days after submission of the proposal. Awards are executed as FAR-based firm-fixed-price contracts. Fixed price payments shall be tied to measurable milestones, as agreed to by the Government.

In the event that adequate price competition, as defined in FAR 15.403-1(1), is not realized, the Government will conduct additional proposal analysis, in accordance with the techniques identified at FAR 15.404-1. In accordance with FAR 15.402(a), Contracting officers shall purchase supplies and services from responsible sources at fair and reasonable prices. If the Contracting Officer is unable to deem the offeror as responsible (FAR 9.1), the offeror will be disqualified. Proposals lacking a fair and reasonable price will be eliminated.

Volume 3 - Content of the Cost Volume

ALL proposed costs shall be accompanied by documentation to substantiate how the cost was derived. For example, if you proposed travel costs to attend a project-related meeting or conference, and used a travel website to compare flight costs, include a screenshot 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 evaluators and contracting personnel to understand how the proposer plans to use the requested funds. Some items in the cost breakdown may not apply to the proposed project. If that is the case, there is no need to provide information on each and every item.

Cost Breakdown Guidance:

- LABOR:
    - List all key personnel by name as well as by number of hours dedicated to the project as direct labor.
    - Explain the basis of proposed labor hours, including required tasks, and

substantiating documentation for the costs (e.g. payroll reports).

- MATERIAL/TOOLING/EQUIPMENT:

    - Explain the basis of proposed material and equipment costs. This support should include a consolidated priced summary of individual material and equipment quantities and substantiating documentation for the costs (e.g. vendor quotes, invoice prices, competitive bids, etc.). If your choice isn't the lowest cost available, explain the decision to choose one item or supplier over another.

    - Ensure all materials are American-made to the maximum extent practicable. Offerors who propose to use a foreign-made product in its technology may be required to find an American-made equivalent.

    - While special tooling and test equipment and material cost may be included, it will be carefully reviewed relative to need and appropriateness for the work proposed. The purchase of special tooling and test equipment shall, in the opinion of the Procurement/Government 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.

- TRAVEL:

    - Explain the basis of proposed travel, including to/from locations, number of trips, number of travelers per trip, and number of days/nights per trip. Include substantiating documentation for the costs (e.g. screenshots of flight cost comparison, rental car quotes, etc.). NOTE: Virtual meetings shall be utilized to the maximum extent practicable.

    - In accordance with FAR 31.205-46 Travel costs incurred shall not exceed the maximum per diem rates set forth in Federal Travel Regulation, Joint Travel Regulation, or standard regulations, unless the travel is special or considered unusual. Any special or unusual travel costs shall be supported with substantiating documentation for review and consideration. Per diem rate lookup can be located at https://www.gsa.gov/travel/plan-book/per-diem-rates?gsaredirect=perdiem.

- SUBCONTRACTS: A subcontract is any agreement, other than one involving an employer-employee relationship, entered into by the prime contractor (awardee) calling for supplies or services for the performance of the contract.

    - All subcontractor costs and consultant costs shall be detailed at the same level as prime contractor costs in regard to labor, travel, equipment, etc.

    - Explain the basis of proposed subcontract costs. Include documented support of the offeror's price analyses and degree of competition of all subcontractor proposals. All subcontractor costs and consultant costs, such as labor, travel, equipment, materials, shall be detailed at the same level as prime contractor costs. Provide detailed substantiation of subcontractor costs in your cost proposal.

- Certify that the following requirements are met: For DP2, the offeror shall perform a minimum of one-half of the research and/or analytical effort. Less than one-half may be subcontracted to another firm or research organization/facility. The percentage of work is measured by both direct and indirect costs.

- Offerors shall not propose to subcontract to the issuing agency, to any other Federal Government agency, or to other units of the Federal Government, except Federal Laboratories in rare circumstances. As defined in 15 United States Code (U.S.C.) 3703, Federal Laboratory means any laboratory, any federally funded research and development center, or any center established under 15 U.S.C. 3705 and 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.

- Offerors shall not propose to subcontract to any prohibited sources, as prescribed at FAR 25.7 – Prohibited Sources, and its supplements. Proposals identifying a subcontractor/vendor arrangement with a prohibited source may be rejected.

- Offerors shall ensure subcontracting arrangements are with United States Small Businesses to the maximum extent practicable. Offerors proposing a subcontractor arrangement with other than a United States Small Business (such as, a large business, foreign firm, foreign government, educational institution, unit of Federal Government, etc.) may be required to submit further explanation, and/or have the submitted proposal disqualified.

- INDIRECT COSTS:

  - Explain the basis of the proposed indirect expense rates including overhead, general and administrative, material handling, and fringe benefits.

  - If a Defense Contract Audit Agency (DCAA) Audit has been conducted within the last five (5) years, include the audit compliance documentation in the cost proposal documents. The documentation should also include the offeror's DCAA Point of Contact (if applicable).

  - Offerors shall provide any current Forward Pricing Rate Agreements (FPRA) in effect at time of proposal submission.

If selected for award, failure to include the documentation with your proposal may delay any potential contract award, as the proposer will be asked to submit the necessary documentation to the Contracting Officer to substantiate costs. It is important to respond as quickly as possible to the Contracting Officer's request for documentation. Failure or refusal to provide documentation may result in dissolution of the contract action.

Volume 4 - Company Commercialization Report (CCR)
Completion of the CCR as Volume 4 of the proposal submission in DSIP is required for prior SBIR/STTR awardees. Please refer to the DoD SBIR Program BAA for full details on this requirement. Information contained in the CCR will be considered by the Department of the Army during proposal evaluations.

Volume 5 - Supporting Documents
Volume 5 is provided for proposers to submit additional documentation to support the Cover Sheet

(Volume 1) and the Technical Volume (Volume 2), and the Cost Volume (Volume 3).

All proposing small business concerns are REQUIRED to submit the following documents to Volume 5:

4. Contractor Certification Regarding Provision of Prohibition on Contracting for Certain Telecommunications and Video Surveillance Services or Equipment
5. Disclosures of Foreign Affiliations or Relationships to Foreign Countries
6. Disclosure of Funding Sources - Please refer to the DoD Program BAA for more information.

In addition to the Volume 5 requirements outlined in the DoD Program BAA, the Department of the Army may accept the following documents in Volume 5:

- Additional Cost Information
- Funding Agreement Certification
- Technical Data Rights (Assertions)
- Lifecycle Certification
- Allocation of Rights
- Other (only as specified in the topic)

Please only submit documents that are identified immediately above and in the DoD Program BAA. All other documents submitted will be disregarded.

Volume 6 Fraud, Waste and Abuse Training
Follow instructions provided in the DoD Program BAA for completion of the Fraud, Waste and Abuse training in DSIP.

DISCRETIONARY TECHNICAL AND BUSINESS ASSISTANCE
The Army, at its discretion, may provide Technical and Business Assistance (TABA). The Army will select a preferred vendor(s) for the Army SBIR TABA program through a competitive process. Alternately, a small business concern may, by subcontract or otherwise, select one or more vendors to assist the firm in meeting the TABA goals. The Applicant must request the authority to select its own TABA provider in its Army SBIR proposal and must demonstrate that the vendor is uniquely postured to provide the specific technical and business services required by providing documentation in Volume 5, Supporting Documentation. TABA funding will be denied if the offeror fails to include the cost and detailed explanation in its proposal. If you prefer to use the Army preferred vendor, you may opt for that support after selection if chosen to receive a contract award.

Participation in the Army SBIR TABA program is voluntary for each Army SBIR awardee. Services provided to Army SBIR firms under the auspices of the TABA program may include, but are not limited to:

1. Access to a network of scientists, engineers, and technologists focused on commercialization and transition considerations such as protected supply chain management, advanced manufacturing, process/product/production scaling, etc.;
2. Assistance with intellectual property protections, such as legal considerations, intellectual property rights, patent filing, patent fees, licensing considerations, etc.;
3. Commercialization and technology transition support such as market research, market validation, development of regulatory or manufacturing plans, brand development; and
4. Regulatory support such as product domain regulatory considerations, regulatory planning, and regulatory strategy development.

The Army SBIR program sponsors participation in the TABA program. The resource limitation for each firm is as follows:

- Phase I Firms:
  - Army-Preferred Vendor: If approved, the contractor may receive up to $6,500 worth of assistance services per project (in addition to the base SBIR award amount).
  - Firm-Selected Vendor: If approved, the contractor may receive up to $6,500 in contract obligation (in addition to the base SBIR award amount) per project.

- Phase II Firms:
  - Army-Preferred Vendor: If approved, the contractor may receive up to $50,000 worth of assistance services per project (in addition to the base SBIR award amount).
  - Firm-Selected Vendor: If approved, the contractor may receive up to $50,000 in contract obligation (included in the base SBIR award amount) per project.

EVALUATION AND SELECTION

The Army shall conduct an evaluation of each responsive, timely, eligible proposal in accordance with the evaluation criteria listed in the DoD Program BAA, as supplemented herein. It is the policy of the Army to ensure equitable and comprehensive proposal evaluations based on the evaluation criteria and to select the source (or sources) whose offer meets the Government's technical, policy, and programmatic goals. Designated support contractors may review submissions for the purposes of technical evaluation. All support contractors are bound by appropriate non-disclosure agreements.

As previously stated herein, timeliness, responsiveness, and eligibility will be assessed upon initial screening, during evaluation, and after selection. Proposals that do not comply with the instructions and requirements detailed in this document, the DoD Program BAA, or the corresponding Topic posting (including the research objective(s)), will be considered ineligible, nonresponsive, untimely, or non-conforming and therefore will not be evaluated or considered for award.

Using the evaluation criteria, the Government will evaluate each responsive, timely, eligible proposal in its entirety. Proposals will not be evaluated against each other during the evaluation process, but rather evaluated on their own individual merit to determine how well the proposal meets the criteria stated in this BAA and the corresponding opportunity.

Consistent with the instructions and evaluation criteria specified in the DoD Program BAA (see Section 6.0 – Phase I Evaluation Criteria), as supplemented by the component-specific instructions herein (e.g. Appendix A, B & C, as applicable), and the corresponding Topic posting, selected proposals are those that, through a peer or scientific review, have been determined to be a best value to the Government as they have demonstrated the strongest understanding of the problem to be solved and offered the most capable solutions with the greatest overall benefit and potential to meet the Government’s requirement and determined to be the most advantageous to the Government.

Proposing firms will be notified via email of selection or non-selection status for a Phase I or direct to Phase II within 90 days of the closing date of the Topic. The notification will be sent to the Corporate Official listed on the proposal cover sheet from the Army SBIR Program Office mailbox. The Army promotes transparency regarding the technical evaluation for all Army SBIR proposals. The Army will provide a technical evaluation narrative to the proposer in accordance with the SBA Policy Directive, Appendix I, paragraph 4. The selection decision notice contains instructions for retrieving the technical evaluation narrative.

Selected proposals are not guaranteed a contract award. Proposers shall not regard the notification email (selection decision notice) as an authorization to commit or expend funds. Upon selection, proposals are forwarded to a Government Contracting Officer for contract negotiation and further consideration. The Government Contracting Officer shall evaluate selected proposal(s) for price reasonableness utilizing the various proposal analysis techniques described at FAR 13.106-3, or 15.404-1, to ensure a fair and reasonable

price is paid. A Government Contracting Officer may contact the proposer in order to discuss and request additional information required for award. This may include representations and certifications, certified or other than certified cost data, subcontracting plan for small businesses, and/or other information as applicable to the proposed award. Proposers shall not regard these communications as an authorization to commence work or commit or expend funds. In the event that an Offeror has not provided fair and reasonable pricing, the Offeror shall be eliminated from further consideration for award.

Upon an affirmative determination of price reasonableness and responsibility, the Contracting Officer may proceed with an award, subject to the availability of funds. Unless a Government Contracting Officer signs an award document (e.g., contract), no obligations to provide funding are made. The Government may reject the proposal or dissolve award of the contract action at any time.

If signed by the Government Contracting Officer, the award document is the official and authorizing instrument, thereafter, referred to as the "contract". The period of performance will begin upon award of the contract. The Contracting Officer will email the signed contract to the principal investigator (PI) and/or an authorized organization representative.

FEEDBACK

The Army promotes transparency regarding the technical evaluation for all Army SBIR proposals. The Army will provide feedback to applicants that are not selected for further consideration in accordance with the SBIR Policy Directive, Appendix I, Subsection 4, Paragraph (d). The selection decision notice contains instructions for obtaining feedback in the form of a ValidEval Report. The Army shall not provide any additional feedback beyond the ValidEval report. Offerors are entitled to no more than one feedback per proposal.

NOTE: Feedback is not the same as a FAR Part 15 debriefing. Acquisitions conducted under 15 U.S.C. § 638 are awarded via "other competitive procedures" in accordance with the SBIR Policy Directive and FAR 6.102(d)(2). These "other competitive procedures" are distinct from "competitive proposals" as identified at FAR 6.401(b). Therefore, offerors are neither entitled to, nor will they be provided FAR Part 15 debriefs.

PROTESTS

Refer to the DoD SBIR Program BAA for procedures to protest the Announcement. As further prescribed in FAR 33.106(b), FAR 52.233-3, Protests after Award shall be submitted to:

Email: usarmy.pentagon.hqda-asa-alt.mbx.army-applied-sbir-program@mail.mil
Mailing Address:

Army Applied SBIR Office
2530 Crystal Drive; Suite 11192
Arlington, Virginia 22202

For protests filed with the Government Accountability Office (GAO), a copy of the protest shall be submitted to the Component POC (identified above) within one day of filing with the GAO. Protests of small business status of a selected proposing small business concern may also be made to the Small Business Administration.

Appendix A
Phase I Evaluation Criteria

Applied SBIR Phase I Proposal Review v2-0-3 Evaluation Criteria Defined

		DEFINITION
INTRODUCTION	weight 5%	Write a clear, concise description of what your innovation does or will do, and where you are in your evolution. Make clear its intended impact on the Army. Evaluators should "get it" after reading this.
POTENTIAL FOR ARMY IMPACT	OPERATIONAL IMPACT	At the scale of a single Army end-user, argue that their jobs or lives will be significantly improved if your solution is adopted. What is the impact of your solution for a soldier/Army civilian vs. today's solutions?
weight 25%	POTENTIAL SCALE OF IMPACT	Here, we're looking for an idea of how broad the impact you described above could be. Look into the future to a time when your solution is both technically mature and actively in use by Army personnel. Describe the scale and scope of your impact within the context of the Army.
TECHNICAL FEASIBILITY	SCIENTIFIC FEASIBILITY	Is the science behind the solution sound? Convince readers who don't have deep expertise in your field that your innovation is built atop sound scientific and engineering principles.
	ENABLING TECHNOLOGIES	Point to the foundational technologies that you rely on to deliver your solution. Do the required enabling technologies introduce added risk? Using proven (and ideally Army-fielded) underlying technologies and techniques helps to lower technical risk.
	ALTERNATIVE TECHNICAL APPROACHES	From a technologist's perspective, why is your proposed solution the best choice for the Army? Refute the alternative engineering approaches others are using. Why does your technology win?
weight 25%	TECHNICAL RISK MITIGATION	No matter your current technology readiness level, technical risks remain. Identify those risks. Present a credible plan to tackle those risks.
TRANSITION	ARMY TRANSITION PATHWAY	Planning for success, what's next for you after this SBIR award? Describe the next type of deal you aim to make with the Army, e.g. a CRADA, a different SBIR contract, a CSO, etc. Briefly outline your current plan to unlock that next opportunity and/or share the biggest risks you see post this SBIR award.
weight 20%	SBIR MILESTONE SCHEDULE	Please share with us a thoughtful execution plan. Strike a balance between giving us a sense of the detailed thinking behind the scenes and the need for your contracting officer to manage a reasonably small number of milestones during your period of performance.
FIRM CASH FLOW	FIRM SURVIVAL RISK	SBIR funds are meant to fuel growth rather than stave off a firm's impending financial failure. Demonstrate that your company will survive financially as a going concern through the early stages of a Phase III contract, sometimes referred to as "transitioning" into use by Army personnel.
	OTHER PEOPLE'S MONEY	Make the case that non-Army and/or non-DoD dollars will continue to fund improvements to your solution from which the Army will benefit in the future. Companies who cannot demonstrate non-Army and/or non-DoD funding sources for future solution enhancements are less attractive to the Applied SBIR program.
weight 10%	FINANCIAL PROFIT POTENTIAL	Through the Applied SBIR program, the Army wants to take advantage of the speed and scalability of dual-use companies. Make your best case that your product is or will be profitable. If you have more than one product, please focus your argument on the product / solution presented for this SBIR program.
TEAM ABILITY	weight 10%	Prove your team has executed well as a group. Please draw clear distinctions between private sector, DoD and civilian government work. What milestones have you accomplished as a group in this company?
SUBMISSION QUALITY	QUALITY OF PROSE	Prove you write clearly. Prove you argue convincingly.
weight 5%	DATA QUALITY & ATTRIBUTION	Support your arguments with relevant, properly attributed data to enhance your credibility.

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Appendix B
Direct to Phase II Evaluation Criteria

Applied SBIR D2P2 Proposal Review v2-0-4 Evaluation Criteria Defined

		DEFINITION
INTRODUCTION	weight 2%	Write a clear, concise description of what your innovation does or will do, and where you are in your evolution. Make clear its intended impact on the Army. Evaluators should "get it" after reading this.
POTENTIAL FOR ARMY IMPACT	OPERATIONAL IMPACT	At the scale of a single Army end-user, argue that their jobs or lives will be significantly improved if your solution is adopted. What is the impact of your solution for a solder/Army civilian vs. today's solutions?
weight 20%	POTENTIAL SCALE OF IMPACT	Here, we're looking for an idea of how broad the impact you described above could be. Look into the future to a time when your solution is both technically mature and actively in use by Army personnel. Describe the scale and scope of your impact within the context of the Army.
TECHNICAL FEASIBILITY	SCIENTIFIC FEASIBILITY	Is the science behind the solution sound? Convince readers who don't have deep expertise in your field that your innovation is built atop sound scientific and engineering principles.
	ENABLING TECHNOLOGIES	Point to the foundational technologies that you rely on to deliver your solution. Do the required enabling technologies introduce added risk? Using proven (and ideally Army-fielded) underlying technologies and techniques helps to lower technical risk.
	ALTERNATIVE TECHNICAL APPROACHES	From a technologist's perspective, why is your proposed solution the best choice for the Army? Refute the alternative engineering approaches others are using. Why does your technology win?
weight 30%	TECHNICAL RISK MITIGATION	No matter your current technology readiness level, technical risks remain. Identify those risks. Present a credible plan to tackle those risks.
TRANSITION	ARMY TRANSITION PATHWAY	Planning for success, what's next for you after this SBIR award? Describe the next type of deal you aim to make with the Army, e.g. a CRADA, a different SBIR contract, a CSO, etc. Briefly outline your current plan to unlock that next opportunity and/or share the biggest risks you see post this SBIR award.
weight 20%	SBIR MILESTONE SCHEDULE	Please share with us a thoughtful execution plan. Strike a balance between giving us a sense of the detailed thinking behind the scenes and the need for your contracting officer to manage a reasonably small number of milestones during your period of performance.
FIRM CASH FLOW	FIRM SURVIVAL RISK	SBIR funds are meant to fuel growth rather than stave off a firm's impending financial failure. Demonstrate that your company will survive financially as a going concern through the early stages of a Phase III contract, sometimes referred to as "transitioning" into use by Army personnel.
	OTHER PEOPLE'S MONEY	Make the case that non-Army and/or non-DoD dollars will continue to fund improvements to your solution from which the Army will benefit in the future. Companies who cannot demonstrate non-Army and/or non-DoD funding sources for future solution enhancements are less attractive to the Applied SBIR program.
weight 15%	FINANCIAL PROFIT POTENTIAL	Through the Applied SBIR program, the Army wants to take advantage of the speed and scalability of dual-use companies. Make your best case that your product is or will be profitable. If you have more than one product, please focus your argument on the product / solution presented for this SBIR program.
TEAM ABILITY	weight 10%	Prove your team has executed well as a group. Please draw clear distinctions between private sector, DoD and civilian government work. What milestones have you accomplished as a group in this company?
SUBMISSION QUALITY	QUALITY OF PROSE	Prove you write clearly. Prove you argue convincingly.
weight 3%	DATA QUALITY & ATTRIBUTION	Support your arguments with relevant, properly attributed data to enhance your credibility.

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Appendix C
Phase II Evaluation Criteria

Applied SBIR Phase II Proposal Review v2-0-3 Evaluation Criteria Defined

		DEFINITION
INTRODUCTION	weight 2%	Write a clear, concise description of what your innovation does or will do, and where you are in your evolution. Make clear its intended impact on the Army. Evaluators should "get it" after reading this.
POTENTIAL FOR ARMY IMPACT	OPERATIONAL IMPACT	At the scale of a single Army end-user, argue that their jobs or lives will be significantly improved if your solution is adopted. What is the impact of your solution for a soldier/Army civilian vs. today's solutions?
weight 20%	POTENTIAL SCALE OF IMPACT	Here, we're looking for an idea of how broad the impact you described above could be. Look into the future to a time when your solution is both technically mature and actively in use by Army personnel. Describe the scale and scope of your impact within the context of the Army.
TECHNICAL FEASIBILITY	SCIENTIFIC FEASIBILITY	Is the science behind the solution sound? Convince readers who don't have deep expertise in your field that your innovation is built atop sound scientific and engineering principles.
	ENABLING TECHNOLOGIES	Point to the foundational technologies that you rely on to deliver your solution. Do the required enabling technologies introduce added risk? Using proven (and ideally Army-fielded) underlying technologies and techniques helps to lower technical risk.
	ALTERNATIVE TECHNICAL APPROACHES	From a technologist's perspective, why is your proposed solution the best choice for the Army? Refute the alternative engineering approaches others are using. Why does your technology win?
weight 25%	TECHNICAL RISK MITIGATION	No matter your current technology readiness level, technical risks remain. Identify those risks. Present a credible plan to tackle those risks.
TRANSITION	ARMY TRANSITION PATHWAY	Planning for success, what's next for you after this SBIR award? Describe the next type of deal you aim to make with the Army, e.g. a CRADA, a different SBIR contract, a CSO, etc. Briefly outline your current plan to unlock that next opportunity and/or share the biggest risks you see post this SBIR award.
weight 25%	SBIR MILESTONE SCHEDULE	Please share with us a thoughtful execution plan. Strike a balance between giving us a sense of the detailed thinking behind the scenes and the need for your contracting officer to manage a reasonably small number of milestones during your period of performance.
FIRM CASH FLOW	FIRM SURVIVAL RISK	SBIR funds are meant to fuel growth rather than stave off a firm's impending financial failure. Demonstrate that your company will survive financially as a going concern through the early stages of a Phase III contract, sometimes referred to as "transitioning" into use by Army personnel.
	OTHER PEOPLE'S MONEY	Make the case that non-Army and/or non-DoD dollars will continue to fund improvements to your solution from which the Army will benefit in the future. Companies who cannot demonstrate non-Army and/or non-DoD funding sources for future solution enhancements are less attractive to the Applied SBIR program.
weight 20%	FINANCIAL PROFIT POTENTIAL	Through the Applied SBIR program, the Army wants to take advantage of the speed and scalability of dual-use companies. Make your best case that your product is or will be profitable. If you have more than one product, please focus your argument on the product / solution presented for this SBIR program.
TEAM ABILITY	weight 5%	Prove your team has executed well as a group. Please draw clear distinctions between private sector, DoD and civilian government work. What milestones have you accomplished as a group in this company?
SUBMISSION QUALITY	QUALITY OF PROSE	Prove you write clearly. Prove you argue convincingly.
weight 3%	DATA QUALITY & ATTRIBUTION	Support your arguments with relevant, properly attributed data to enhance your credibility.

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Commercialization Strategy Template

General Instructions/Guidance:

1. As stated above, small business firms shall prepare an eight (8) slide commercialization plan, utilizing the template and format below. The commercialization plan shall be converted to a pdf and attached to the end of the end of Volume 2 – Technical Volume (see page limitations in the instructions above), resulting in one pdf file to be uploaded to DSIP as Volume 2.

2. Font size shall be no smaller than 10-point font.

3. Slides should display the slide number in bottom right corner

4. All text (including tables, charts, plots, axis labels, legends, captions) shall be readable without zooming and understandable without voice-over

5. For plots and charts:
   a. Include title/bullet describing importance of plot/chart, and/or data (be specific)
   b. Axis shall be meaningfully labeled (to be understandable by non-experts) and include scale

6. Avoid jargon; define technical terms

7. To insert images, capture a screenshot of the image and paste it into the slide. Please do not drag-drop a file into the presentation or use the Insert Pictures menu function.

8. Use PowerPoint's "Compress Pictures" feature to reduce file size
   a. Select 96ppi resolution
   b. Uncheck “For this picture only"

9. Replace the boilerplate footer below with distribution markings as appropriate, i.e. sensitive, proprietary, intellectual property

To be considered valid proposals, Commercialization Plan submissions shall follow the number and content of each slide as contained in the attached template.

Firm Name

SBIR Project Title

Principal Investigator Name / Title
Key (or other relevant) Personnel, and

Subcontractors

BLUF: Bottom Line Up Front

- BLUF:
  1. **Company information and background** : Core competencies, significant sales, previous funding, commercialization successes.
  2. **Customer and Competition** : Clear description of key technology objectives, current competition, and advantages.
  3. **Market**: Plan to obtain market share.
  4. **Intellectual Property**: Patent status, technology lead, trade secrets or other demonstration of a plan to protect the company's technical advantage.
  5. **Financing/Revenue**: Plans for securing necessary non -SBIR funding.
  6. **Assistance and mentoring** : Plans for securing needed technical or business assistance.

Company Information and Background

- Core competencies and areas of specialization.
- Products with significant sales.
- Concise history of previous Federal and non -Federal funding/investments.
- Regulatory experience (if applicable).
- Past commercialization successes.
- Past failure and how you overcame.

Customer & Competition

- Description of key technology objectives.
- Current competition and/or alternative solutions.
- Advantages of company's offer compared to competing products or services.
- Hurdles to acceptance of the proposed innovation.
- Description of possible areas where your technology may be utilized or is under utilized.

Market

- Analysis of market size and 1 and 5 year forecasted market share.
- Explanation of milestones and target dates of plan to obtain that market share.
- What experience do you have with marketing to this target market?
- What commercialization strategy appears to be the best for bringing this product to the target market?
- What experience do you have with bringing products to market – either through this company or though other companies with which you have worked.
- Does the company currently market, manufacture, or license technology? Describe what you do.

Intellectual Property

- Patent status, technology lead, trade secrets or other demonstration of a plan to achieve sufficient protection to realize the commercialization stage and attain at least a temporary competitive advantage.

- Describe how you will protect the intellectual property that enables commercialization of its products while keeping competitors at bay. Note any actions you may consider to attain at least a temporary competitive advantage. Also consider your company's prior record in this area. Comment on your

Financing

- Plan for securing non -SBIR, private or government funding necessary to enter low rate of production of anticipated technical solution.
- Describe your revenue stream generation to include but not limited to:
  - Manufacture and direct sales
  - Sales through value added resellers or other distributors
  - Joint venture

Assistance & Mentoring

- Plans for securing needed technical or business assistance through mentoring, partnering, or arrangements with government sponsored (e.g., SBIR funded Discretionary Technical and Business Assistance (TABA), State assistance programs, Federally-funded research laboratories, Manufacturing Extension Partnership centers), not -for-profits (e.g., Small Business Development Center (SBDC) or Small Business Technical Development Center (SBTDC)), commercial accelerators, DOD Prime Contractors, SBA Mentor - Protégé program, Procurement Technical Assistance Center (PTAC) or other assistance provider.

Army SBIR 24.4 Topic Index
Release 7

A244-007 TITLE: Large Scale Mobilization Operations Analysis

OUSD (R&E) CRITICAL TECHNOLOGY AREA(S): Advanced Computing and Software; Sustainment and Logistics

OBJECTIVE: The U.S. Army Reserve (USAR) recognizes challenges throughout the mobilization process and looks to clearly identify those challenges and create efficiencies in the process to better support the needs of combatant commanders. The USAR must mobilize and equip Soldiers quickly to support combatant commanders worldwide in the event of Large-Scale Combat Operations (LSCO) through Large Scale Mobilization Operations (LSMO).

DESCRIPTION: Lengthened Soldier mobilization timelines from the reserve component into active-duty roles affect the readiness of Army units to deploy. This ramp-up period impacts the timeliness of the support needed for combatant commanders to conduct operations. USAR leadership are exploring opportunities to improve the processes and create efficiency within LSMO by evaluating the outcomes from past mobilization training exercises and receiving insight from subject matter experts on how each process operates. Using this research, the USAR seeks to enhance the mobilization process, increasing the overall readiness and support for combatant commanders for LSCO. The program will share its findings with Army National Guard partners to support sister service processes.

PHASE I: This topic is accepting Direct to Phase II (DP2) proposals. Proposers interested in submitting a DP2 proposal must provide documentation to substantiate that the scientific and technical merit and feasibility equivalent to a Phase I project has been met. Documentation can include data, reports, specific measurements, success criteria of a prototype, etc.

(DIRECT TO) PHASE II: In a direct-to-Phase 2 (DP2) transition context, a mathematical framework establishes the technical feasibility and proof of concept work typically associated with a Phase 1 effort. During Phase 1, companies rigorously assess their proposed solutions' viability and technical feasibility. Validation of deterministic and stochastic modeling techniques, coupled with deploying widely used tools like Python and RStudio, has gained significant recognition and support from numerous academic institutions. These techniques have been rigorously studied and tested and shown their effectiveness through real-world implementation across various academic and industrial settings. One of the key strengths lies in their practical application, as evidenced by the successful creation of deterministic activity networks that comprehensively capture the essential structural elements of complex processes such as mobilization. Stochasticity has also strengthened the models, making them more adaptable and resilient in the face of uncertainty. This widespread validation and practical demonstration affirm the robustness and versatility of these techniques, making them valuable assets in addressing complex challenges like mobilization processes in both academic and real-world contexts. Furthermore, the US Army Reserve (USAR) actively adopting the DOD product ADVANA and the existing installation of RStudio on USAR computers underscore the practicality and readiness of this approach. This demonstrates the ease of implementation and compatibility with the organization's operational environment. In summary, our DP2 transition approach is firmly grounded in technical feasibility and a proven concept, with practical solutions already in place and validated through an equivalent Phase 1 effort.

PHASE III DUAL USE APPLICATIONS:

- Primary commercial dual use potential for LSMOA technology is supply chain forecasting.
- The MIT CTL roundtable emphasizes the importance of predictive modeling in supply chains for its strategic role in enhancing operational efficiency and risk management by accurately forecasting demand, event timings, and potential disruptions.
- Top potential dual-use market applications for predictive data modeling technologies include:

- Supply chain forecasting: Predicting everything from equipment maintenance and mobilization to traffic control and demand forecasting.
- Weather risk intelligence: Enabling everything from crop intelligence to meteorological and natural disaster risk prevention.
- Banking and Financing: Crucial for significantly enhancing decision-making and financial performance, and necessitating investments.

REFERENCES:

1. https://armyeitaas.sharepoint-mil.us/sites/USAR

KEYWORDS: Mobilization; Operations; Large-Scale Combat Operations (LSCO); Large Scale Mobilization Operations (LSMO); Efficiency; Soldier readiness; Reserve; Combatant Commanders;

A244-008 TITLE: Biometrics for Multi Factor Authentication

OUSD (R&E) CRITICAL TECHNOLOGY AREA(S): Biotechnology; Advanced Computing and Software

OBJECTIVE: To supplement the DoD's Identity Credential and Access Management (ICAM) modernization strategy, and to enable alignment with Zero Trust principles, the Army needs innovative approaches and solutions to use biometrics as one of several factors in multi-factor authentication (MFA).

DESCRIPTION: The use of biometrics, such as fingerprint and facial recognition, are popular in commercial applications because of how easy they are for the end user. While these technologies continue to gain popularity in the commercial space, the use of biometrics in Army tactical remains a significant challenge due to the environment and constraints under which the Army must operate. Depending on the constraints, a Soldier may not be able to expose their fingers, face, eyes, or voice for recognition. This device should encrypt an authentication token or password that is only exposed when end users meet one of several biometric criteria. A hardened, small form-factor biometric authentication device would reduce authentication latency and resolve common issues associated with single-factor authentication, such as password reuse and shared credentials. This solution should support multiple biometric authentication mechanisms, including fingerprints, facial, retina and voice recognition. It should also support common authentication protocols and standards. Firms must design the authentication method to operate under the following conditions: Denied, Disrupted, Intermittent or Limited. Current authentication methods require the end user to have a token or key and to remember specific information, such as a complex password.

PHASE I: We are looking for a proof of concept, in the form of a whitepaper, that details the feasibility of developing a small form factor device, or using existing hardware capabilities (i.e., camera on laptop) in the current PEO C3T portfolio, that utilizes a single biometric factor such as but not limited to fingerprint or facial recognition. The proof of concept must take into consideration the limiting factors of a tactical Denied, Degraded, Intermittent, or Limited (DDIL) environment in which the device might not always have the capability to reach back to enterprise/centralized services to perform the verification of authentication. The proof of concept must also take into consideration other environmental and operation factors such as sand, heat/cold, water, and Soldier protective gear that could limit the device's ability to capture the biometric factor.

PHASE II: The prototype can be a vendor developed device or utilize a PEO C3T system like the Mounted Family of Computer Systems (MFOCS), that will demonstrate the ability to authenticate to both a centrally managed service and more importantly, to authenticate in a disconnect state. If feasible, the vendor will demonstrate in a government facility lab, or if not possible, in a vendor provided facility. The vendor will detail the methods in which the device is able to authenticate in disconnected state. The capability could include authenticating to a local cache, defaulting to another form of biometric, or by other means. The future capability must be able to tie into an Army Identity, Credential and Access Management (ICAM) implementation.

PHASE III DUAL USE APPLICATIONS: Primary commercial dual use potential for biometric identification and sensing technology is related to an individual's security and authentication protocols.Potential dual-use market applications for biometric identification technologies include:

- Banking and Financing: Enhancing secure transactions and customer authentication.
- Personal identification: Since 2017, facial recognition software for user authentication, has been the gold standard for major U.S. telecom companies including Apple, and Google.
- Weapon safety: Ensures authorized use of firearms.
- Database access: Providing secure, efficient access control to sensitive information.

- Voter registration: Safeguarding electoral integrity by verifying voter identity.
- Workplace security: Fortifies access control and employee verification systems.

REFERENCES:

1. https://www.tam.usace.army.mil/Portals/53/docs/UDC/Training/Biometrics%20101.pdf
1. https://www.army.mil/article/232346/army_modernizes_its_biometric_processing_capabilities
2. https://www.army.mil/article/262016/army_unveils_new_army_biometric_program_directive

KEYWORDS: Multi-Factor Authentication (MFA); Identity Credential and Access Management (ICAM); Biometrics; Small form factor; Credentials; Device; Zero Trust Principles

A244-009 TITLE: Forward Looking Infrared (FLIR) Dual Band Focal Plane Array in High Definition Format

OUSD (R&E) CRITICAL TECHNOLOGY AREA(S): Microelectronics; Advanced Materials; Integrated Sensing and Cyber

OBJECTIVE: The U.S. Army seeks to develop dual-band Mid-wave Infrared/Long-Wave Infrared (MWIR/LWIR) Infrared Focal Plane Array (IR FPA) technology that can meet Third Generation Forward Looking Infrared (3GEN FLIR) performance objectives, such as clusters, dark current, noise, quantum efficiency, operability, spectral crosstalk, modulation transfer function, non-uniformity correction (NUC) stability, etc. This project benefits all forms of Army and DOD night vision sensors, including individual soldier, ground vehicle, unmanned vehicles, and aircraft wherein dual-band thermal sensors are used. The combination of MWIR & LWIR imaging increases the ability to penetrate fog and dust clouds and provides resilience against stray light artifacts from bright sources. Image fusion between the spectral bands also enhances target detection.

DESCRIPTION: The Mercury Cadmium Telluride (HgCdTe) supplier has been the incumbent detector material system for advanced sensors, but remarkable progress has been made in the electro-optical performance of IR FPAs made from Antimonide-based strained layer superlattices (SLS) resulting in the adoption of sensors based on this technology for fielded systems. A cost-effective and high yield SLS detector material will provide broad benefits to the Army & DoD for maintaining dominance of the electro-magnetic spectrum on the battlefield, particularly in the domain of thermal infrared imaging. The innovative approach of using SLS detectors to solve high-volume high-performance night vision imaging systems will be a game changer for the new class of ground and airborne systems. The SLS material for dual-band FPAs can be made cost-effectively in commercial growth foundries, which were established during the Vital Infrared Sensor Technology Acceleration (VISTA) program. This initiative enables manufactures to access high quality SLS materials in larger size (up to 5” diameter) wafers to streamline high yield, low-cost unit production while meeting stringent FPA specifications. The spatial uniformity of the SLS material is far superior and results in longer DRI range for the infrared system than can be obtained with the incumbent material.

PHASE I: This topic is accepting Direct to Phase II (DP2) proposals. Proposers interested in submitting a DP2 proposal must provide documentation to substantiate that the scientific and technical merit and feasibility equivalent to a Phase I project has been met. Documentation can include data, reports, specific measurements, success criteria of a prototype, etc.

(DIRECT TO) PHASE II: Demonstrate fabrication capability of MWIR/LWIR dual-band SLS FPAs that can meet 3GEN FLIR performance objectives. During Phase II, the awardee will fabricate multiple lots (minimum 3 lots) of MWIR/LWIR dual-band FPAs with progressively improved key performance matrices such as dark-current, quantum efficiency, Noise, operability, modulation transfer function, and non-uniformity correction (NUC) stability. The awardee will work with growth foundries to qualify optimized starting SLS material wafers for fabrication of FPAs. Awardees will perform FPA qualification tests in a laboratory Dewar under 3 GEN FLIR relevant operation conditions. The company/companies must have demonstrated the ability to make large format small pitch arrays using SLS detector material. They must show some examples of what they have done in the past on SLS detector arrays with some significant detector metrics.

PHASE III DUAL USE APPLICATIONS: Dual use potential is primarily centered around infrared (IR) applications that require high sensitivity, detection range, and/or capture rate that is enabled by cooled infrared focal plane array (FPA) technology, like SLS detectors. SLS detectors have cost, fabrication, and

performance advantages over the incumbent cooled IR FPA of choice, HgCdTe, but still have higher cost and cooling requirements than uncooled IR FPAs.
Market applications for SLS-enabled infrared optics could potentially include:

- Enhanced vision for emergency response (e.g., firefighter situation assessment, thermal imaging for search and rescue)
- Earth observation (e.g., environmental monitoring, satellite imagery)
- Autonomous driving (e.g., sensing through poor weather conditions)
- Maritime navigation (e.g., collision prevention, autonomous operation)
- Security systems

REFERENCES:

1. http://physicsnet.co.uk/a-level-physics-as-a2/materials/stress-strain/
2. U.S. Pat. No. 7,485,799, "Stress-induced bandgap-shifted semiconductor photoelectrolytic/photocatalytic/photovoltaic surface and method for making same," John M. Guerra, Priority date May 7, 2002. Assigned to Nanoptek Corporation.
3. II-V Compound Semiconductor Superlattices for Infrared Photodetector Applications" Opt. Eng 26 249-255 (1987).

KEYWORDS: Mid-wave Infrared/Long-Wave Infrared (MWIR/LWIR); Infrared Focal Plane Arrays (IR FPA); Strained Layer Superlattices (SLS); Third Generation Forward Looking Infrared (3GEN FLIR); HgCdTe; Sensors; Materials; Imaging

A244-010 TITLE: Non-RF Transceiver Alternative Communicator (NRF-TAC)

OUSD (R&E) CRITICAL TECHNOLOGY AREA(S): Integrated Sensing and Cyber; Advanced Materials

OBJECTIVE: The U.S Army seeks to develop a small energy efficient self-contained transceiver capable of communicating between two points wirelessly without using the traditional RF transport medium. The U.S. Army is interested in developing an NRF-TAC device that can transmit and receive signaling of up to 300 meters without the use of the traditional radio frequency. The goal for the NRF-TAC solution is to utilize a non-standard means of signal communication, such as magnetic, acoustic, or infrared that is difficult to detect and report in an environment of highly covert activity. Utilization of the NRF-TAC will create new mission deployment possibilities for operation and control of remote sensors.

DESCRIPTION: Efficient and effective operation of an unattended Non-RF Transceiver Alternative Communicator (NRF-TAC) is needed in an environment of highly mobile activity requiring the ability to remotely communicate on-demand with a very small Size, Weight, and Power (SWAP) profile. The signal communication medium may be, but not limited to, acoustic, infrared, or ultraviolet. The messaging between NRF-TAC devices must be highly resistant to interference, detection, and exploitation to ensure consistent and stable operations. The NRF-TAC must be self-contained (i.e., require no external cabling), be man-portable, be easily concealable, and be field programmable. The NRF-TAC must be able to operate for at least 800 hours without operator intervention. The SBIR effort will be to design and build an innovative NRF-TAC prototype device capable of being demonstrated in a realistic field application. This effort aligns with multiple areas of the Army including smart sensing as well as providing an innovative alternate means of low probability of detection (LPD) and low probability of interception (LPI) communications.

PHASE I: The evaluation of the Phase I proposals will be based on probability of functionality, form, durability and sustainability. During Phase I, up to 5 awardees will create and deliver a plausible design to communicate wirelessly without the use of RF between two points with at least one point remotely configurable operating without external power. In the development of the design, a fully documented rationale supporting the design shall be created. The rationale shall be based on research, sound engineering, component availability and market surveys capturing a performance-based analysis including effective signaling, efficiencies in autonomous operation, maximum distance between two points and reliability. The proposed final product cost assessment shall also be provided. Each awardee shall complete Phase I by submitting the hardware design, a documented description of operation and written narrative as to the rationale supporting the solution as designed. Additionally, a proposed means of assessing performance by using test methods that include inspection, analysis, demonstrate or test for each performance factor captured in a spreadsheet, commonly referred to as a verification cross-reference matrix (VCRM).

PHASE II: Each Phase II awardee will develop and test a prototype that demonstrates the ability to communicate between two points without RF autonomously without external power in accordance with the TPOC-approved VCRM derived from phase I. The distance between points, as well as effective signaling will also be evaluated. The prototype system shall demonstrate the ability to deploy and sustain operations without external power or operator intervention. Operating efficiencies including longevity of operation without refresh and the programmability will also be evaluated. All awardees will complete phase II by delivering a fully documented prototype system including operating instructions, interface control document (ICD), programmability commands and characterization.

PHASE III DUAL USE APPLICATIONS:

- Academic research has shown the efficacy of NRF sensor technology, like magnetic and infrared sensors, in environments where RF sensors' ability is abated and needs more energy to operate.
- Research has further underscored that NRF sensors are preferred over RF for commercials uses like home security, automotive crash sensing, and additive manufacturing.
- Current market applications, including start-up usage, for NRF-TAC include:
    - Internet of Things (IoT), which enables commercial applications like home security, healthcare, and underwater monitoring.
    - Additive manufacturing, ranging from infrared and ultraviolet quality control.
    - Automotive and transportation industry, augmenting automobile and railroad safety as well as enabling autonomous vehicles, via infrared and acoustic sensing.

REFERENCES:

1. A Novel Magnetic Induction Communication Transmitter Based on a Mechanical Antenna (02/2020, Liu, Cao, Gong) https://ieeexplore.ieee.org/document/8991013
2. Tracking an LED array transmitter for visible light communications in the driving situation (09/2010, Nagura, Yamazato, Katayama, Yendo, Fujii, Okada) https://ieeexplore.ieee.org/document/5624361
3. Modeling of Short-Range Ultraviolet Communication Channel Based on Spherical Coordinate System (02/2019, Wu, Ma, Su, Yuan, Cheng) https://ieeexplore.ieee.org/document/8598725
1. Design and implementation of a new infrared transmitter and receiver (05/2012, Wang, Li, Zhao) https://ieeexplore.ieee.org/document/6201434

KEYWORDS: Transceiver; Non-RF; Signal Communication; Alternative Communicator; NRF-TAC; Sensors; Low Probability of Detection (LPD)

A244-011 TITLE: Off the Visor Heads Up Display (HUD)

OUSD (R&E) CRITICAL TECHNOLOGY AREA(S): Integrated Sensing and Cyber; Advanced Materials; Microelectronics

OBJECTIVE: This topic involves the development of available daylight readable off-the-visor display solutions for use in mixed reality (MR) head mounted display (HMD) systems with the goal of moving on to a Phase 2 applied SBIR where the most optimal off-the-visor solution can be designed, produced, delivered, and characterized for use in future soldier vision products. This new see-through heads-up display component would enable use of low-cost visor optics to complete a display system with performance compatible with the Army's Integrated Visual Augmentation System (IVAS) requirements. Additionally, the technology may provide increased display-image performance over current systems, allowing the Warfighter to comfortably view sensor and computer-generated information during long-duration missions while continuing to maintain full situational awareness and light security on the battlefield. An optimal product or solution would also provide ergonomic benefits of lower weight and improved center of gravity and achieve affordability objectives consistent with wide-spread system fielding.

DESCRIPTION: Mixed Reality (MR) is the ability to improve someone's situational awareness without degrading their natural ability to witness and interact with their surroundings. Advances in reduced size, weight, and power micro-displays (less than 1 inch diagonal) with low-profile off-the-visor see-through optics can deliver up to 2000fL of daytime contrasting light to the user's eye, which is essential during combat and training conditions. The recent availability of man-portable power methods that run these electro-optics throughout an entire mission, coupled with these high transmission optics (>50%) will finally enable an overmatching MR capability for dismounted soldiers. An awardee will need to have experience with image alignment to avoid eye fatigue and user discomfort in these future vision capabilities.

PHASE I: Research and define three viable see-through vision technology configurations. This phase will focus on developing three viable designs for an off-the-visor HUD solution. Under Phase I, the awardee will research and document the trade-space for off-the-visor HUDs to include various optical configurations and image sources. By the end of phase I, the awardee will have defined three viable see through HUD designs, documenting the benefits and deficiencies of each.

PHASE II: Prototype most ideal see-through vision technology configurations. During Phase II, the awardee will produce a single prototype off-the-visor HUD, based on a design developed in the Phase I effort. At a minimum, the HUD prototype will have the ability to display static imagery or video content to the wearer at a brightness suitable for daytime use. The prototype should support at least a 30-degree field of view. The prototype will also provide a minimally distorted view through the visor of the real world in front of the wearer, such that walking and other mobility tasks are not impeded.

PHASE III DUAL USE APPLICATIONS: Primary commercial dual use potential is tied to the workforce and automotive industries providing hands-free critical information within complex environments.

- Many commercial HUD applications for see-through optics have daylight contrast requirements that necessitate high display brightness.
- Potential dual-use market applications for heads up display include:
    - Manufacturing workers using HUDs to receive instructions, visualize assembly processes, or monitor equipment status.
    - Automotive applications in both vehicles and motorcycle helmets
    - Environmental monitoring in hazardous sites (e.g., mining and construction)
    - Healthcare applications, such as vital sign monitoring in the operating room

- Immersive entertainment including gaming and media consumption.

REFERENCES:

1. Hamer, et. al., ""High-performance OLED microdisplays made with multi-stack OLED formulations on CMOS backplanes"", SPIE Proceedings Volume 11473, Organic and Hybrid Light Emitting Materials and Devices XXIV; 114730F (2020), https://doi.org/10.1117/12.2569848 2. Vogel, et. al., ""OLED microdisplays in near-to-eye applications: challenges and solutions"", SPIE Proceedings Volume 10335, Digital Optical Technologies 2017; 1033503 (2017) https://doi.org/10.1117/12.2270224
2. Vogel, et. al., ""OLED microdisplays in near-to-eye applications: challenges and solutions"", SPIE Proceedings Volume 10335, Digital Optical Technologies 2017; 1033503 (2017) https://doi.org/10.1117/12.2270224

KEYWORDS: Mixed Reality (MR); Head Mounted Display; Integrated Visual Augmentation System (IVAS); Low-cost visor optics; off-the-visor; sensors; micro-displays

A244-012 TITLE: Quantum Enhanced RF Components

OUSD (R&E) CRITICAL TECHNOLOGY AREA(S): Quantum Science; Advanced Computing and Software

OBJECTIVE: Through quantum phenomenology, businesses can create sensitive Radio Frequency (RF) components to enhance the performance of current communication systems. The enhancement of detection of current RF systems would produce lower noise levels for each of the components. Lowering the noise levels for the components will enable the detection of weaker signals, which could mean the radar detection of previously unseen targets.

DESCRIPTION: Quantum research made breakthroughs in innovative technologies enabling the creation of new RF components that can exceed existing performances. Literature has shown that quantum-based RF components can be used to decrease noise in RF components. Examples of quantum-based RF components of interest included but are not limited to amplifiers, mixers, and oscillators. All the components can be used to increase the detection efficiencies of signals whether it be for communications or radar systems. These components will be developed such that they can be integrated with current existing systems. Once integrated with the current systems the components would provide enhancements over the components that they are replacing. The end user of the components would fall within the Army Intelligence, Surveillance and Reconnaissance Task Force (ISR TF).

PHASE I: Delivery for Phase I would be a series of reports outlining feasibility of RF component with mathematical models for feasibility of quantum phenomena.

PHASE II: Delivery for Phase II would be a working prototype demonstrated at the end of the contract. In addition to the prototype, a report documenting the bounds of the prototype and any necessary control software required to operate the prototype.

PHASE III DUAL USE APPLICATIONS:

- Various security systems rely on RF detection to verify user access, utilizing Quantum enhanced components will enhance efficacy of the systems.
- Currently, RF interference can disrupt police and first responder communications systems. Integration of Quantum Enhanced RF components will help minimize disruptions and identify the source of interference.
- Maritime and Aviation vehicles currently utilize RF frequencies for navigation and timing. Implementation of quantum enhanced components will make it easier to communicate between vessels and traffic controllers, as well as have a wider range than traditional RF devices.

REFERENCES:

1. https://www.nature.com/articles/s41567-022-01929-w
2. https://journals.aps.org/prx/abstract/10.1103/PhysRevX.12.021061
3. https://journals.aps.org/prapplied/abstract/10.1103/PhysRevApplied.17.044009

KEYWORDS: Radio Frequency (RF); Noise level reduction; communication; components, Quantum-based RF; radar detection; Enhancement; Performance; Signals

A244-013 TITLE: User and Entity Behavior Analysis

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

OBJECTIVE: This User and Entity Behavioral Analysis (UEBA) will streamline authentication to the network and services while transparently securing mission critical services such a warfighting applications, through granular role-based access control. As implemented, this UEBA solution will be a critical enabler to the Army's Zero Trust Architecture (ZTA) implementation. It would substantially improve the tactical network's cybersecurity posture.

DESCRIPTION: The U.S. Army requires a novel User and Entity Behavioral Analysis (UEBA) capability that serves as or feeds a Policy Decision Point (PDP) in the Tactical Zero Trust Architecture (ZTA). Behavior analysis is the process of collecting activity data on people and nonperson entities, applying advanced analytics and comparing the results to accepted baselines and peer activities. This UEBA will leverage data that is already collected and normalized by the Elastic Stack. This data includes Active Directory Domain, Active Directory Certificate Services, Windows endpoint, Linux endpoint, Palo Alto Firewall, Suricata Intrusion Detection System, Zeek Network Sensor, Netflow, and Cisco IOS events. It will also incorporate Nessus Security Center vulnerability and asset scan reports. This capability can execute within the Elastic Stack as a collection of detection engine rules, entity analytics or a Machine Learning model, or it can execute as a stand-alone virtual machine or container. The UEBA should include a well-documented and flexible REST API that enables Policy Enforcement Points (PEPs) to obtain necessary telemetry to obtain and enforce authorization decisions.

PHASE I: The government is looking for a proof of concept, in the form of a whitepaper, that details the feasibility of developing a novel User and Entity Behavioral Analysis (UBEA) capability that serves as a policy decision point. The proof of concept will assume the ability to utilize data already collected by systems in the PEO C3T portfolio and normalized by the Elastic Stack implementation deployed on the tactical network. The model shall determine a user's normal battle rhythm and be able to alert a human in the loop of a change in the user's risk score. The authoritative human in the loop will be able to make a decision to terminate the user's session or elevate for further analysis.

PHASE II: The prototype will be developed to demonstrate the UEBA ability to collect and interpret data. The demonstration shall also show the ability to display a risk score change of a user based on behavioral anomalies and the ability for a human in the loop to make a decision on access based on that alert.

PHASE III DUAL USE APPLICATIONS:

- UEBA seeks to embed AI/ML pattern recognition into cybersecurity operations to automatically detect anomalous behavior in a digital environment.
- Regarding zero trust (ZT) requirements, corporate research underscores that UEBA architecture inherently gives users a ZT solution as it provides maximum network visibility into all users, devices, asset, and entities.
- Corporates and investors forecast start-ups augmenting current UEBA technology will imbue it with predictive analytics, creating "contextually aware" multimodal algorithms, and/or ensuring more robust interoperable and API infrastructure.
- Current market applications, including start-up usage, for UEBA are:
    - Internet of Things (IoT) – UEBA can monitor both human activity on devices as well as anomalous behavior on connected devices.
    - Healthcare – similar to IoT, the healthcare use case includes patient portals and securing hardware.
    - Finance – track and flag suspicious behavior across a myriad of devices.

REFERENCES:

1. https://www.varonis.com/blog/user-entity-behavior-analytics-ueba
2. https://learn.microsoft.com/en-us/azure/sentinel/identify-threats-with-entity-behavior-analytics
3. https://www.forbes.com/sites/forbestechcouncil/2022/04/28/implementing-a-zero-trust-architecture-be-sure-to-include-behavioral-analytics-to-bolster-security/?sh=c927b8777a4a

KEYWORDS: User and Entity Behavioral Analysis (UEBA); Zero Trust Architecture; Authentication; Network; Data; Active Directory