DEPARTMENT OF THE ARMY

DoD 23.4 Small Business Innovation Research (SBIR)
Annual Broad Agency Announcement (BAA)
Component-Specific Proposal Instructions
Release 18

August 8, 2023: Topics issued for pre-release
August 24, 2023: Army begins accepting proposals via DSIP
September 19, 2023: DSIP Topic Q&A closes to new questions at 12:00 p.m. ET
September 26, 2023: 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 fail. The Army must provide game-changing capabilities to our Soldiers. To capitalize on small business innovation, 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. This approach also strives to create a more rapid award time from solicitation to closing.

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

- The DoD Program BAA is located at: https://www.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 Dr.; Ste 11192
Arlington, VA 22202

RESPONSIVENESS AND TIMELINESS

All proposals will be evaluated and judged on a competitive basis. 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 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 rejected / the contract action will be cancelled.

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 23.4 SBIR Program BAA can be found here: https://www.defensesbirsttr.mil/SBIR-STTR/Opportunities/.

The Government reserves the right to disqualify 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:

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.
Price exceeds the maximum funding amount.
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 DFARS 252.215-7010.
Proposal is for a topic other than that which is identified.
Etc.

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 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

PHASE I PROPOSAL INSTRUCTIONS

The Defense SBIR/STTR Innovation Portal (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.

Proposal Coversheet (Volume 1)

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

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

Technical Volume (Volume 2)

The technical volume proposal is not to exceed 5 word document pages and must follow the formatting requirements provided in the DoD SBIR Program BAA. A commercialization plan must also accompany the technical volume proposal and must be 8 slides. The required content to include within these slides are described in Appendix D. The commercialization plan must be converted from slides to pdf and attached to the end of the technical volume proposal, resulting in one pdf file to be uploaded to DSIP as Volume 2. The commercialization plan does not count towards the proposal 5-page limit. Any proposals submitted without a commercialization plan or in a format other than that provided in these Component Instructions and by the BAA will be deemed unresponsive and will not be reviewed.

Content of the Technical Volume

The content of the Technical Volume should address three key areas: the technical approach, the team carrying out the work (and the accompanied resources), and the commercialization strategy. 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 is measured. 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. The commercialization plan should include:

- Company information: Focused objectives/core competencies; specialization area(s); products with significant sales; and history of previous Federal and non-Federal funding, regulatory experience, and subsequent commercialization successes.
- Customer and Competition: Clear description of key technology objectives, current competition, and advantages compared to competing products or services; description of hurdles to acceptance of the innovation.
- Market: Milestones, target dates, analyses of market size, and estimated market share after first year sales and after 5 years; explanation of plan to obtain market share.
- 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.
- Financing: Plans for securing necessary non-SBIR funding.
- 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., Small Business Development Centers or Procurement Technical Assistance Centers), commercial accelerators, DOD Prime Contractors, or other assistance provider.

Proposers are free to structure each section 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.

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

Cost Volume (Volume 3)
The Cost Volume must follow all instructions and requirements provided in the DoD SBIR Program BAA. Supplemental requirements are as follows:

The Phase I Base amount must not exceed $200,000 for a 6-month period of performance, unless otherwise specified in the topic description pages. Phase I Options are not anticipated at this time. If an option is identified in the topic posting, costs for the Base and Option must be separated and clearly identified on the Proposal Cover Sheet (Volume 1) and in Volume 3. Awards for these topics will be in the form of a firm fixed price contract.

Please review the updated Percentage of Work (POW) calculation details included in section 5.3 of the DoD Program BAA. Army Applied SBIR will occasionally accept deviations from the POW requirements with written approval from the Funding Agreement officer.

For pricing purposes, offerors shall assume a contract or agreement start date of approximately ninety (90) days after submission of the proposal. For this BAA, adequate price competition (APC), as defined in FAR 15.403-1(c), is anticipated. In the event that adequate price competition is not realized (i.e. only one proposal is received for a given topic), the Government may choose to conduct additional proposal analysis, in accordance with the techniques identified at FAR 15.404-1. Additionally, offerors are to provide any current Forward Pricing Rate Agreements (FPRA) in effect at time of proposal submission.

Content of the Cost Volume (Volume 3)
ALL proposed costs should be accompanied by documentation to substantiate how the cost was derived. Substantiating documentation guidance is as follows:

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). Volume 5, Supporting Documents, may be used if additional space is needed.

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. Volume 5, Supporting Documents, may be used if additional space is needed.

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 must, in the opinion of the Component Contracting Officer, be advantageous to the Government and should be related directly to the specific topic. These may include such items as innovative instrumentation or automatic test equipment. Title to property furnished by the Government or acquired with Government funds will be vested with the DoD Component, unless it is determined

that transfer of title to the contractor would be more cost effective than recovery of the equipment by the DoD Component.

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. Volume 5, Supporting Documents, may be used if additional space is needed.

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 must 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, must be detailed at the same level as prime contractor costs. Provide detailed substantiation of subcontractor costs in your cost proposal. Volume 5, Supporting Documents, may be used if additional space is needed.

Certify that the following requirements are met: For Phase I, the offeror must 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 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. 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.

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).

If selected, failure to include the documentation with your proposal may delay 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 cancellation of the contract action.

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

Supporting Documents (Volume 5)
Volume 5 is provided for proposers to submit additional documentation to support the Cover Sheet (Volume 1), 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.

DIRECT TO PHASE II PROPOSAL INSTRUCTIONS
The Defense SBIR/STTR Innovation Portal (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 must provide documentation to substantiate that the scientific and technical merit and feasibility described in the Phase I section of the topic has been met and describes the potential commercial applications. Documentation should include all relevant information including, but not limited to: technical reports, test data, prototype designs/models, and performance goals/results. Work submitted within the 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.

Proposal Coversheet (Volume 1)
The proposal coversheet must follow the instructions and requirements provided in the DoD SBIR Program BAA.

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

Format of Technical Volume (Volume 2)
The Technical Volume must include two parts, the Feasibility Documentation, and the Technical Proposal.

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

The length of the Feasibility Documentation is not to exceed 5 pages and the length of the Technical Proposal is not to exceed 10 pages. A commercialization plan must also accompany the technical proposal and should be 8 slides. Any proposals submitted in a different format or exceed the page count limits will not be reviewed.

Number all pages of your 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.

Content of the Technical Volume: (Volume 2)

PART ONE: Feasibility and Technical Proposal (15 pages maximum)

Content of the Feasibility Documentation (Volume 2a)

The content of the Feasibility Documentation Proposers should 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.

If you have references, 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 submitted within the feasibility documentation must have been substantially performed by the proposer and/or the Principal Investigator (PI).

If technology in the feasibility documentation is subject to Intellectual Property (IP), the proposer 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.

At a minimum, the technical proposal should address:

- What are you trying to do? Articulate your objectives without jargon.
- How is it done today, and what are the limits of current practice?
- What is new in your approach and why do you think it will be successful?
- Who cares? If you are successful, what difference will it make?
- What are the risks?
- How much will it cost?
- How long will it take?
- How do you measure success?
- What team will accomplish your mission?
- What existing / related SBIR, STTR, or other research proposals support this technology?
- What is the commercialization strategy for the proposed technology?

Content of the Technical Proposal (Volume 2b; part 1 continued)

The content of the Technical Volume should address three key areas: the technical approach, the team carrying out the work (and the accompanied resources), and the commercialization strategy. 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 is measured. 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. The commercialization plan should include:

- Company information: Focused objectives/core competencies; specialization area(s); products with significant sales; and history of previous Federal and non-Federal funding, regulatory experience, and subsequent commercialization successes.
- Customer and Competition: Clear description of key technology objectives, current competition, and advantages compared to competing products or services; description of hurdles to acceptance of the innovation.
- Market: Milestones, target dates, analyses of market size, and estimated market share after first year sales and after 5 years; explanation of plan to obtain market share.
- 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.
- Financing: Plans for securing necessary non-SBIR funding.
- 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., Small Business Development

Centers or Procurement Technical Assistance Centers), commercial accelerators, DOD Prime Contractors, or other assistance provider.

Proposers are free to structure each section 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.

PART TWO: Commercialization Plan (8 slides/pages maximum, saved as a PDF and attached with the Technical Proposal as part of the Technical Volume).

The Army is equally interested in dual use commercialization of SBIR/STTR projects that result in products sold to the U.S. military, the private sector market, or both. The Army expects explicit discussion of key activities to achieve this result in the commercialization strategy part of the proposal.

The commercialization strategy should include the following elements:

- A summary of transition and commercialization activities, and the Technology Readiness Level (TRL) achieved. Discuss how the preliminary transition and commercialization path or paths may evolve during the Phase II project.
- Describe key proposed technical milestones during Phase II that will advance the technology towards product such as: prototype development, laboratory and systems testing, integration, testing in operational environment, and demonstrations.
- Description of Product(s) and/or System Application(s). Identify the commercial product(s) and/or DoD system(s), or system(s) under development, or potential new system(s). Identify the potential DoD end- users, Federal customers, and/or private sector customers who would likely use the technology.
- Business Model(s)/Procurement Mechanism(s). Discuss your current business model hypothesis for bringing the technology to market. Describe plans to license, partner, or self-produce your product. How do you plan to generate revenue? Understanding the Army's goal of creating and sustaining viable small businesses that support and generate advanced Army technologies, describe how you intend to develop your product and supply chains to enable this differentiation.
- Target Market. Describe the market and customer sets you propose to target, their size, their growth rate, and their key reasons they would consider procuring the technology.
- Describe competing technologies existent today on the market as well as those being developed in the lab.
- Funding Requirements. Describe your company's funding history. How much external financing have you raised? Describe your plans for future funding sources (internal, loan, angel, venture capital, etc.).
- Commercialization Risks. Describe the major technology, market and team risks associated with achieving successful transition of the Army funded technology.
- Expertise/Qualifications of Team/Company Readiness. Describe the expertise and qualifications of your management, marketing/business development and technical team that will support the transition of the technology from the prototype to the commercial market and into government operational environments. Has this team previously taken similar products/services to market? If the present team does not have this needed expertise, how do you intend to obtain it? What is the financial history and health of your company (e.g., availability of cash, profitability, revenue growth, etc.)?
- Anticipated Commercialization Results. Include a schedule showing the anticipated quantitative commercialization results from the Phase II project at one year after the start

of Phase II, at the completion of Phase II, and after the completion of the Sequential Phase II (i.e., amount of additional investment, sales revenue, etc.). After a Phase II award, the company is required to report actual sales and investment data in its Company Commercialization Report at least annually.

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

Cost Volume (Volume 3)

Unless otherwise noted in the topic description, the Army will accept Direct to Phase II proposals for a cost up to $1,900,000 for a 24-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.

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. For this BAA, adequate price competition (APC), as defined in FAR 15.403-1(c), is anticipated. In the event that adequate price competition is not realized (i.e. only one proposal is received for a given topic), the Government may choose to conduct additional proposal analysis, in accordance with the techniques identified at FAR 15.404-1. Additionally, offerors are to provide any current Forward Pricing Rate Agreements (FPRA) in effect at time of proposal submission.

Content of the Cost Volume (Volume 3, cont.)

ALL proposed costs should 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 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:
ALL proposed costs should be accompanied by documentation to substantiate how the cost was derived. Substantiating documentation guidance is as follows:

- 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). Volume 5, Supporting Documents, may be used if additional space is needed.

- 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. Volume 5, Supporting Documents, may be used if additional space is needed.

    - 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 must, in the opinion of the Component Contracting Officer, be advantageous to the Government and should be related directly to the specific topic. These may include such items as innovative instrumentation or automatic test equipment. Title to property furnished by the Government or acquired with Government funds will be vested with the DoD Component, unless it is determined that transfer of title to the contractor would be more cost effective than recovery of the equipment by the DoD Component.

- 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. Volume 5, Supporting Documents, may be used if additional space is needed.

- 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 must 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, must be detailed at the same level as prime contractor costs. Provide detailed substantiation of subcontractor costs in your cost proposal. Volume 5, Supporting Documents, may be used if additional space is needed.

- Certify that the following requirements are met: For Phase I, the offeror must 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 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. 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.

- 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).

If selected, failure to include the documentation with your proposal may delay 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 cancellation of the contract action.

For more information about cost proposals and accounting standards, see the DCAA publication titled "Audit Process Overview – Information for Contractors" available at: http://www.dcaa.mil.

Company Commercialization Report (CCR) (Volume 4; no page limitations)

Completion of the CCR as Volume 4 of the proposal submission in DSIP is required. Please refer to the DoD SBIR Program BAA https://www.dodsbirsttr.mil/submissions/baa-schedule/broad-agency-announcements for full details on this requirement. Information contained in the CCR will be considered by the Department of the Army during proposal evaluations.

Supporting Documents (Volume 5; no page limitations)

Volume 5 is provided for proposers to submit additional documentation to support the Cover Sheet (Volume 1), 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 will accept the following documents in Volume 5:

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

DISCRETIONARY TECHNICAL AND BUSINESS ASSISTANCE (TABA)

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 contract 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;

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 per year (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 per year.
- 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 (must be included in base SBIR award amount) per project.

EVALUATION AND SELECTION

The Army will conduct an evaluation of each responsive, timely, eligible proposal in accordance with the evaluation criteria listed in the DoD Program BAA. 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.

Selected proposals are those determined to be the most advantageous to the Government, consistent with instructions and evaluation criteria specified in the DoD Program BAA, the component-specific instructions herein, the corresponding Topic posting, and availability of funding.

Proposing firms will be notified via email of selection or non-selection status for a Phase I or direct to Phase II award 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.

Proposers must not regard the notification email (selection decision notice) as an authorization to commit or expend funds. After the Army SBIR Office has recommended a proposal for award, 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 must not regard these communications as an authorization to commit or expend funds. Unless a Government Contracting Officer signs the award document (i.e. contract), no obligations to provide funding are made. The Government may reject the proposal or cancel the contract action at any time.

If signed by the Government Contracting Officer, the award document is the official and authorizing instrument (i.e. contract). The anticipated period of performance start date will be determined at time of award. The Contracting Officer will email the signed, authorizing award instrument to the principal investigator (PI) and/or an authorized organization representative.

PROTESTS
Refer to the DoD SBIR Program BAA for procedures to protest the Announcement.

Feedback will be provided to applicants that are not selected for further consideration. A notification letter will include instructions for obtaining feedback in the form of a 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 under this solicitation are awarded via "other competitive procedures (FAR 6.102(d)(2))." Therefore, offerors are neither entitled to nor will they be provided FAR Part 15 debriefs. As further prescribed in FAR 33.106(b), FAR 52.233-3, Protests after Award shall be submitted to the Point of Contract identified in the topic solicitation:

Email: usarmy.pentagon.hqda-asa-alt.mbx.army-applied-sbir-program@mail.mil
Mailing Address:
Army Applied SBIR Office
2530 Crystal Dr.; Ste 11192
Arlington, VA 22202

Appendix A
Phase I Evaluation Criteria

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

U.S. ARMY APPLIED SBIR

		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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Page 1 of 2

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Appendix B

Direct to Phase II Evaluation Criteria

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

U.S. ARMY APPLIED SBIR

		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 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

U.S. ARMY APPLIED SBIR

		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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Appendix D
Commercialization Plan Template

General Instructions/Guidance:

1. The slide deck must be 8 slides total, per Component Instructions, and follow the formatting contained in the template. Font size shall be no smaller than 10-point font.
2. Slides should display the slide number in bottom right corner
3. All text (including tables, charts, plots, axes labels, legends, captions) must be readable without zooming and understandable without voice-over
4. For plots and charts:
    a. Include title/bullet describing importance of plot/chart, and/or data (be specific)
    b. Axes must be meaningfully labeled (to be understandable by non-experts) and include scale
5. Avoid jargon; define technical terms
6. Convert from slide format to a PDF file for submission to DSIP alongside the technical volume proposal
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
10. Do not put any company logos (Twitter, Reddit, GitHub, etc) on your slides

To be considered valid proposals, Commercialization Plan submissions must 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

.....

Insert Topic Number
Insert Proposal Number

Distribution markings as appropriate for your organization

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.

Distribution markings as appropriate for your organization 2

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.

Appendix D
Commercialization Plan Template cont.

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 bring 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 company's strategy to build a sustainable business through protection of intellectual property.

Appendix D
Commercialization Plan Template cont.

Financing

- Plan for securing non-SBIR, private or government funding necessary to enter low rate of production of anticipated technical solution.
- Describe your revenue steam 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 23.4 Topic Index
Release 18

A234-024	Low Cost SWIR Laser Sensor
A234-025	Medium-Format Displays for Mixed Reality (MR) Systems
A234-026	Porting RTK to High Assurance Kernel

A234-024 Low Cost SWIR Laser Sensor

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

OBJECTIVE: Develop a Short-Wave Infrared (SWIR) detector capable of asynchronously locating short laser pulses for target marking with the potential of an order of magnitude lower cost than current sensors. Utilize new detector technology to lower manufacturing cost for SWIR sensors. A lower cost laser sensor would enable integration into platforms that support Soldier Lethality and Next Generation Combat Vehicles (NGCV).

DESCRIPTION: Short Wave InfraRed (SWIR) cameras with Asynchronous Laser Pulse Detection (ALPD) are an emerging technology. This has the potential to be used as a multi-function solution for various marking and detection tasks. The major barrier to the proliferation of current SWIR ALPD cameras is cost. At high price points, these SWIR ALPD cameras are unlikely to proliferate across the armed forces. A low-cost, next-generation laser detection sensor is needed. Current detectors use Indium Gallium Arsenide (InGaAs) focal plane arrays (FPA) that are meticulously bump bonded onto a Read Out Integrated Circuit (ROIC). This process requires both expensive materials and intensive labor, thus lowering yield and driving costs up. Previous efforts to lower the cost of this technology have proven unsuccessful. This SBIR effort aims to pair a low-cost detector material, such as quantum dots or other innovations, to a ROIC with laser detection capability. A novel approach to laser detection could have significant cost implications in production. This moderate-risk, high-payoff approach to a low-cost SWIR laser detector should produce a device that can detect laser pulses at operationally relevant ranges for marking tasks.

PHASE I: This is a Direct to Phase II (DP2) topic. A DP2 award is requested because of the demonstrations we have observed during lab and field evaluations of the candidate technology. The Colloidal Quantum Dots (CQD) material and process has been successfully applied to a standard ROIC and does have sensitivity in the SWIR spectrum to detect the laser spots. Awarding a phase II SBIR would allow for the development of the CQD process on a Read Out Integrated Circuit (ROIC) designed for laser pulse detection, as well as optimizing the quantum dot sensitivity at the laser wavelength. Much of the potential in this technology has been identified and we wish to expand its application to better fit our customers' needs.

(DIRECT TO) PHASE II: Develop and demonstrate a 2D SWIR detector with asynchronous laser pulse detection. This device should use a detector material and process that has the potential to be significantly lower cost than existing solutions in production quantities. An imaging function is desired but not a requirement for this effort.

PHASE III DUAL USE APPLICATIONS: This system could be used in a broad range of military applications where laser detection is necessary. Optimize system design for size, weight and power, to include ruggedization to survive in a military environment. Recent advances in methods for synthesis and surface functionalization of CQDs have driven the commercialization of display and lighting applications and provide promising developments in the related fields of lasing and IR sensors. Current market applications, including start-up usage, for quantum dot technology embedded into semiconductors include:

- Multimedia technology provides more immersive and realistic experiences.
- Smartphone sensing recognition and augmented facial ID recognition.
- Augment solar panels energy collection capabilities, which can be leveraged for renewable energy as well as agriculture production.

- Medical usage, namely bio-imaging and modeling of protein structures as well as infrared sensing.
- Quantum computing research in the nascent and pivotal future sector.

KEYWORDS: Sensors; Short Wave InfraRed (SWIR); Lasers; Detection; Cameras; Colloidal Quantum Dots (CQD); Low Cost; Read Out Integrated Circuit (ROIC)

REFERENCES:

1. ST's Quantum Dot Sensor set for volume Swir Imaging. ST's quantum dot sensor set for volume SWIR imaging | Imaging and Machine Vision Europe. (2021, December 15). https://www.imveurope.com/news/sts-quantum-dot-sensor-set-volume-swir-imaging
2. Palomaki, P., & Keuleyan, S. (2022a, November 22). Move over, CMOS: Here come snapshots by Quantum Dots. IEEE Spectrum. https://spectrum.ieee.org/move-over-cmos-here-come-snapshots-by-quantum-dots
3. SWIR Vision Systems. (2022). SWIR Vision Systems Acuros® vs Sony® IMX990: A Closer Look at Key Metrics and Performance [White paper]. https://www.swirvisionsystems.com/wp-content/uploads/WhitePaper_SWIR-Vision-Systems-Acuros-vs-Sony.pdf

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TPOC-2: John Nettleton
Email: john.e.nettleton.civ@army.mil

A234-025 Medium-Format Displays for Mixed Reality (MR) Systems

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

OBJECTIVE: Recent advances in head-mounted displays have identified an opportunity for low-cost and high-performance systems based on medium format size display panels, where the diagonal is on the order of 2.0"" - 3.5"" as opposed to the older techniques using small ""microdisplays"" with diagonal screen sizes of 1.0"" or less. Likewise, the pixel pitch of the larger medium format displays is on the order of 15-80 microns, as opposed to 9-12 microns for the micro-displays. The larger scale of the medium format relieves the requirement for magnification by the eyepiece optics, and hence a lower cost system can result. The problem is in obtaining military-grade medium format display panels with sufficient pixel resolution, since the commercial market for medium formats is more focused on low-pixel resolutions devices such as the iWatch. Also, daylight readability is a requirement not currently met by commercial units. This topic involves the development of daylight readable, medium format (1.6” – 3.0” diag.) display panels for use in mixed reality (MR) head mounted display systems.

DESCRIPTION: Perform research & fabrication for a medium format (1.6" - 3.5" diag) display with at least 1280 x 720 color pixels, frame rate 60 Hz, adjustable brightness from 1 to 800 fL for daylight readability, contrast ratio of 1000:1, and AA-battery powered drive electronics to receive external video input. The display's physical size & weight shall be minimized to support packaging into a head-mounted display system. Deliverables shall include as appropriate design review materials, electrical schematics, trade study results, and functioning hardware samples & test data. This device will help solve many problems encountered by the Integrated Visual Augmentation System (IVAS). This new display component would enable the use of low-cost visor optics to complete a display system with performance compatibility.

PHASE I: This is a Direct to Phase II topic. A Direct to Phase II (DP2) is recommended because the Government has received a proof of concept monochrome version of the medium format display as well as research regarding the path to achieve full color operation using similar principles. The level of maturity that the new display device offers indicates that a Phase I can justifiably be foregone and prototyping can begin to complete the desired development timeline.

DIRECT TO PHASE II: Upon acknowledging and (potentially) utilizing the research provided in Phase 1 description as premises for technical approach within proposal submission, awardees will then begin Prototype Kickoff, Design Review, Fabrication, Test, Delivery/Demonstration.

PHASE III DUAL USE APPLICATIONS:

- The high-resolution display market has received attention and capital from large tech companies.
    - Google and LG completed a joint venture to create a high-resolution OLED VR headset, which leverages identical technology to OLED displays.
- Current market applications, including start-up usage, for OLED high-resolution display panels include:
    - VR/AR augmentation, especially the ability to create a more vibrant and realistic environment.
        - This especially benefits the video game industry.
    - Video games, TV, mobile phones, and computer monitors will have brighter portable displays, thereby creating a better user experience.

- Healthcare and surgery capabilities can leverage OLED displays that are less harmful because they are cooler to the touch.

KEYWORDS: Display systems; Micro-displays; Integrated Visual Augmentation System (IVAS); Visor optics; panels

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

TPOC-1: John Hall
Email: john.m.hall2.civ@army.mil

A234-026 Porting RTK to High Assurance Kernel

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

OBJECTIVE: Develop innovative techniques and tools to run the Robotic Technology Kernel (RTK) software library securely and efficiently on a high-assurance separation kernel. Demonstrate feasibility via proof-of-concept and practical prototype. Validate the new capabilities using a high-assurance separation kernel, Robot Operating System (ROS) test suite, RTK applications and a representative hardware platform under realistic concept of operations.

DESCRIPTION: This topic seeks innovative technology and demonstration that showcases the feasibility, security and performance of running the RTK and ROS software library on a high-assurance separation kernel. Supported by the DARPA High-Assurance Cyber Military Systems (HACMS) program, both seL4 and CertiKOS have made great leaps in terms of software capabilities and maturity. However, significant challenges exist to bridge the gap between research prototypes and adoption. It is critical to leverage such innovative techniques and tools and build assured systems based on appropriate techniques and tools applying sound security design and engineering principles. The ported RTK/ROS over a separation kernel should function and perform with added security and it should maintain the features of (1) cross-platform: new RTK capabilities can be leveraged by all RTK-enabled platforms; (2) cross-controller: any RTK-enabled platforms can be controlled by any RTK compatible controller; and (3) cross-effort: an effort delivers new capabilities to the RTK, which in turn is leveraged for new efforts. In addition to memory isolation, the ported RTK/ROS should be amenable to other security checks such as the concept of Monitor and Policy Enforcement, as applicable and needed in DoD use cases including Autonomy and Swarm.

PHASE I: Develop the technical approach, analyze trade-off options, and justify design choices. All design choices, including a representative hardware platform, should be made in agreement with the Government counterpart. Finalize the overall design that can securely and efficiently run RTK (and ROS) on a high-assurance separation kernel. Analyze the costs and benefits, accounting for practical implementation constraints in Army platforms and use cases. Prepare the path for a proof-of-concept demonstration. Document all lessons learned for way forward.

PHASE II: Fully develop the technology and a practical prototype. Test and evaluate the security and performance of the ported RTK (and ROS) running on a high-assurance separation kernel, under various ROS/RTK test cases as well as relevant mission scenarios. Demonstrate the capabilities using a representative hardware platform under realistic concept of operations, such as those adopted in previous Army efforts [5]. Enhance and mature the technology and prototype for transition.

PHASE III DUAL USE APPLICATIONS:

- High Assurance Kernel Technology and Robotic Technology Kernel (RTK) have medium adoption across a range of industries including autonomous vehicles, aerospace and defense, and Internet of Things (IoT). The use of this technology helps to enable security, reliability, and trustworthiness of critical systems.
- The IoT and software segment registers in highest share of revenue as well as innovation. The growing use of digital manufacturing and IoT integration in production of smart and autonomous vehicles will likely drive continued growth.
- The integration of high assurance kernel security solutions will enable companies to improve their cybersecurity stature as well as offer more security in a myriad of arenas, including the continued growth of autonomous offerings, signaling sustained demand for this technology in

future years as technology evolves and new economies accelerate digitalization and industrialization in manufacturing processes.

KEYWORDS: Robotics; Robot Operating System; Robot Technology Kernel; Cybersecurity; Software; Performance

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