OSD/STRATEGIC CAPABILITIES OFFICE (SCO)
20.3 Small Business Innovation Research (SBIR)
Program Direct to Phase II Proposal Submission
Instructions

The Strategic Capabilities Office (SCO) seeks small businesses with strong research and development capabilities to pursue and commercialize specific technologies to meet SCO objectives.

The 2020.3 SCO SBIR Direct to Phase II proposal submission instructions are intended to clarify the Department of Defense (DoD) instructions as they apply to SCO requirements. This Announcement is for Direct to Phase II proposals only. All Phase II proposals must be prepared and submitted through the DoD SBIR/STTR electronic submission site: https://www.dodsbirsttr.mil/. The offeror is responsible for ensuring that their proposal complies with the requirements in the most current version of instructions. Prior to submitting your proposal, please review the latest version of these instructions as they are subject to change before the submission deadline.

Specific questions pertaining to the SCO SBIR Program should be submitted to the SCO SBIR Program office at:

E-mail – sbir@sco.mil

1. DIRECT TO PHASE II

15 U.S.C. §638 (cc), as amended by NDAA FY2012, Sec. 5106, and further amended by NDAA FY2019, Sec. 854, PILOT TO ALLOW PHASE FLEXIBILITY, allows the Department of Defense to make an award to a small business concern under Phase II of the SBIR Program with respect to a project, without regard to whether the small business concern was provided an award under Phase I of an SBIR Program with respect to such project. SCO is conducting a "Direct to Phase II" implementation of this authority for this 20.3 SBIR Announcement and does not guarantee Direct to Phase II opportunities will be offered in future Announcements.

SCO Direct to Phase II Proposals are different from traditional SCO SBIR Phase I proposals. The chart below explains some of these differences.

<table>
<thead>
<tr>
<th>STANDARD SCO SBIR PROCESS</th>
<th>SCO D2P2</th>
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<tbody>
<tr>
<td><strong>PHASE 1 TYPICAL FUNDING LEVEL</strong></td>
<td>$250,000</td>
</tr>
<tr>
<td>*<em>PHASE 1 TECHNICAL <em>POP DURATION</em></em></td>
<td>6 months</td>
</tr>
<tr>
<td><strong>PHASE 2 TYPICAL FUNDING LEVEL</strong></td>
<td>$1,500,000</td>
</tr>
<tr>
<td>*<em>PHASE 2 TECHNICAL <em>POP DURATION</em></em></td>
<td>24 months</td>
</tr>
</tbody>
</table>

*POP= Period of Performance
2. **INTRODUCTION**

Direct to Phase II proposals must follow the steps outlined below:

1. Offerors must create a Cover Sheet using the DoD Proposal submission system. Offerors must provide documentation that satisfies the Phase I feasibility requirement* that will be included in the Phase II proposal. Offerors must demonstrate that they have completed research and development through means other than the SBIR/STTR Program to establish the feasibility of the proposed Phase II effort based on the criteria outlined in the topic description.

2. Offerors must submit a Phase II proposal using the SCO Phase II proposal instructions below.

* NOTE: Offerors are required to provide information demonstrating that the scientific and technical merit and feasibility has been established. SCO will not evaluate the offeror's related Phase II proposal if it determines that the offeror has failed to demonstrate that technical merit and feasibility has been established or the offeror has failed to demonstrate that work submitted in the feasibility documentation was substantially performed by the offeror and/or the Principal Investigator (PI).

3. **PROPOSAL SUBMISSION**

The complete proposal, i.e., DoD Proposal Cover Sheet, technical volume, cost volume, and Company Commercialization Report, must be submitted electronically at https://www.dodsbirsttr.mil/. Ensure your complete technical volume and additional cost volume information is included in this sole submission.

Complete proposals must include all of the following:

a. DoD Proposal Cover Sheet (Volume 1)
b. Technical Volume (Volume 2):
   Part 1: Phase I Justification (5 Pages Maximum)
   Part 2: Phase II Technical Proposal (15 Pages Maximum)
c. Cost Volume (Volume 3)

The SCO SBIR Program is accepting Volume 5 (Supporting Documents). This volume should not exceed 15 pages.

Phase II proposals require a comprehensive, detailed submission of the proposed effort. SCO SBIR Direct to Phase II periods of performance are 24 months. SCO may award SBIR Direct to Phase II efforts up to a maximum value of $1,500,000 per contract award. Commercial and military potential of the technology under development is extremely important. Proposals emphasizing dual-use applications and commercial exploitation of resulting technologies are sought.

4. **Direct to Phase II PROPOSAL PREPARATION INSTRUCTIONS AND REQUIREMENTS**

PROPOSAL FORMAT
A. **Cover Sheet.** As instructed on the DoD SBIR proposal submission website, prepare a Proposal Cover Sheet. Proposal Abstract and Expected benefits and Government or private sector applications of the proposed research should also be summarized in the space provided. The abstract/benefits of selected proposals will be submitted for publication with unlimited distribution. Therefore, the summary should not contain classified or proprietary information.

B. **Volume II (20 pages)**

1. **Phase I Justification (5 Pages Maximum).** Offerors are required to provide information demonstrating the establishment of the scientific and technical merit and feasibility. Feasibility documentation MUST NOT be solely based on work performed under prior or ongoing Federally funded SBIR or STTR work.

2. **Phase II Technical Objectives and Approach (15 Pages Maximum).** List the specific technical objectives of the Phase II research and provide a detailed technical approach in order to meet these objectives.

   - **Phase II Work Plan.** Provide an explicit, detailed description of the Phase II approach. The plan should indicate what is planned, how and where the work will be carried out, a schedule of major events, and the final product to be developed. A Phase II effort should attempt to accomplish the technical feasibility demonstrated in Phase I, including potential commercialization of results. Phase II is the principal research and development effort and is expected to produce a well-defined deliverable product or process.

   - **Related Work.** Describe significant activities directly related to the proposed effort, including those conducted by the Principal Investigator, the proposing firm, consultants, or others. Report how the activities interface with the proposed project and discuss any planned coordination with outside sources. The proposers’ awareness of the state-of-the-art in the technology and associated science must be demonstrated.

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

   - **Technology Transition and Commercialization Strategy (note 5 pages within VOLII).** Describe your company’s strategy for converting the proposed SBIR research, resulting from your proposed Phase II contract, into a product or non-R&D service with widespread commercial use -- including private sector and/or military markets. Note that the commercialization strategy is separate from the Commercialization Report described in Section 4.L below. The strategy addresses how you propose to commercialize this research, while the Company Commercialization Report covers what you have done to commercialize the results of past Phase II awards. Historically, a well-conceived commercialization strategy is an excellent indicator of ultimate Phase III success. The commercialization strategy must address the following questions:

SCO DPII 3
1. List all key personnel by name as well as number of hours dedicated to the project as direct labor.
2. Special Tooling, Test Equipment, and Materials Costs:
   a. Special tooling, test equipment, and materials costs may be included under Phase II. The inclusion of equipment and material will be carefully reviewed relative to need and appropriateness for the work proposed; and
   b. The purchase of special tooling and test equipment must, in the opinion of the Contracting Officer, be advantageous to the Government and should be related directly to the specific effort.
3. Cost for travel funds must be justified and related to the needs of the project.

5. METHOD OF SELECTION AND EVALUATION CRITERIA

A. Evaluation Criteria. All proposals will be reviewed for overall merit based on the evaluation criteria published in the DoD SBIR Program BAA:

SCO DPII 4
1. The soundness, technical merit, and innovation of the proposed approach and its incremental progress toward topic or subtopic solution.
2. The qualifications of the proposed principal/key investigators, supporting staff, and consultants. Qualifications include not only the ability to perform the research and development, but also the ability to commercialize the results.
3. The potential for commercial (Government or private sector) application and the benefits expected to accrue from this commercialization.

6. CONTRACTUAL CONSIDERATIONS

A. Awards. The number of Direct to Phase II awards will depend upon the quality of the Phase II proposals and the availability of funds. Each Phase II proposal selected for award under a negotiated contract requires a signature by both parties before work begins. SCO awards Phase II contracts to Small Businesses based on results of the agency priorities, scientific, technical, and commercial merit of the Phase II proposal.

B. Reports. For incrementally funded Phase II projects an interim, midterm written report may be required (at the discretion of the awarding agency).

C. Payment Schedule. SCO Phase II Awards Level of Effort Firm Fixed Price contracts. Monthly invoices are based on the labor hours recorded and the monthly costs associated with the project.

D. Markings of Proprietary Information. Per DoD SBIR Program BAA, section 5.3.

E. Copyrights, Patents and Technical Data Rights. Per DoD SBIR Program BAA.

F. Security Information. SCO anticipates work produced in Phase II may become classified. Note: The prospective contractor(s) must be U.S. owned and operated with no foreign influence as defined by DoD 5220.32-M, National Industrial Security Program Operating Manual, unless acceptable mitigating procedures can and have been implemented and approved by the Defense Counterintelligence and Security Agency (DCSA). The selected company will be required to safeguard classified material IAW DoD 5220.32-M during the advanced phases of this contract.

Contractors wishing to submit classified proposals must send an unclassified email to sbir@sco.mil requesting classified submission instructions, and a DD Form 254 issued by SCO security. Contractors will ensure all industrial, personnel, and information systems processing security requirements are in place and at the appropriate level.

7. TECHNICAL AND BUSINESS ASSISTANCE (TABA)

The SCO SBIR Program will not participate in the Technical and Business Assistance.
SCO SBIR Direct to Phase II 20.3 Topic Index

SCO203-001  Machine Learned Cyber Threat Behavior Detection
SCO203-002  Small Satellite Experiment
SCO203-001 TITLE: Machine Learned Cyber Threat Behavior Detection

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

OBJECTIVE: Develop unsupervised machine learn algorithms to evaluate Zeek logs of common inbound and outbound perimeter network traffic protocols to provide high confident anomaly detection of suspicious and/or malicious network traffic.

The algorithms must be able to be run from a 1U commodity hardware on small to large networks. Report outputs from the algorithms should be retrievable as json or csv formatted files and contain sufficient information for ingestion and correlation against various databases or SIEM systems. At a minimum, the output reports should provide enough data to understand the suspicious threat anomalies identified, corresponding Zeek metadata associated with the detection for correlation and enrichment with other databases, date/time, confidence associated with the detection, and technical reasoning behind the confidence levels and detections made. The government must be equipped with the ability to specify how reporting is generated based confidence thresholds.

DESCRIPTION: Machine Learning of Cyber Behavior

PHASE I: SCO is accepting Direct to Phase II proposals ONLY. Proposers must demonstrate that the following achievements:

Provide a detailed summary of current research and development and/or commercialization of artificial intelligence methodologies used to identify cyber threats. The summary shall include:

a) Specific models used in previous research and how they would be applicable for this SBIR. Explain the maturation of these models and previous successes and known limitations in meeting the SBIR goals.
b) Detailed description of the training data available to the company. Identify whether the proposed training corpus will be accessible in-house, accessed via an open source corpus, or purchased from a commercial training corpus site. Provide the cost to access the proposed training corpus throughout the SBIR period of performance.
c) Describe the previous work done with the training corpus, specifically the methodologies used and resulting findings.
d) Finally, include an attachment detailing the schema to be assessed by the proposed algorithm and indicate if the schema was already tested in prior research efforts (NOTE: this schema list does not to count against the maximum number of pages. If this is considered Proprietary information, the company shall indicate this with additional handling instructions).

PHASE II: This SBIR is a direct to Phase II effort. Awardee(s) will be responsible for providing their own hardware and software, chargeable to the contract, but not to exceed the SBIRS’ maximum funding limits. During the SBIR Phase II effort, neither SCO, nor its partners, will provide access to any training material, government furnished information, or equipment.

Proposals must describe in detail how the proposed solution will take data from decrypted bi-directional perimeter network traffic and provide a repeatable solution tested against multiple network sizes. Proposals will provide a detailed description of training criteria and schema of the perimeter traffic evaluated. It should also explain the selection criteria for assessed traffic, and any non-selected criteria with reason why it was not used to train the system. The awardee may compliment their machine learning-based anomaly detection work with other analytical methods to achieve the final product but the core of the overall detection approach must be the result of machine learning (i.e. data modeling, etc). If
complimented with open source behavior or signatures analysis, the proposal must include (as an attachment not counting toward the SBIR page count limit), all signatures and analysis tools being considered and the source for each.

Awardees are responsible for providing their own training corpuses, and must be able to fully describe said corpuses, what criteria will be used to teach the system, and maintain continued/regular access to said training corpus in the Phase II proposals. The training corpus may be any government, commercial, academic, proprietary, or open source data set, or a combination of any or all. Loss of access to the training corpus before or during the SBIR program will result in cessation of participation of the contract. At the close of the SBIR process, awardees will deliver to the government:

1) A successful software operational prototype with full government use rights
2) Associated artifacts of all documentation required to replicate the build and use of the ML algorithms. Artifacts include, but are not limited to, a fully developed reference guide and detailed schema packages, specific machine learning criteria and teaching corpus description, detailed hardware/software requirements, all algorithms and unique/proprietary software needed to run the analysis, and all internal test plans and results.
3) If applicable, any open source behavior or signatures analysis and analytical tools being used, and the source for each

Awardees may use any developed efforts for other governmental or commercial opportunities, including continued service support in any Phase III options. However, none of the artifacts shall be presented as proprietary or otherwise restricted data, and the government shall have unlimited use rights to the resulting hardware, software, algorithms or other deliverables from this SBIR.

PHASE III DUAL USE APPLICATIONS: Private sector commercial potential includes using the developed tools in a network security environment either as a service provider or as a supplier to network security service providers.

REFERENCES:
http://resources.sei.cmu.edu/library/asset-view.cfm?AssetID=633583;

KEYWORDS: Machine Learning; Cyber Defense; Threat Behavior Analysis
SCO203-002    TITLE: Small Satellite Experiment

RT&L FOCUS AREA(S): Space
TECHNOLOGY AREA(S): Space Platform

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

OBJECTIVE: This Direct to Phase II SBIR is to build and operate the second of two small satellites hosting a common RF communications payload in a string of pearls configuration. This project will assess the feasibility and affordability of multi-spacecraft cooperative payload operations to include simultaneous interaction with multiple, existing ground terminals. Additional benefits are payload redundancy, expanded opportunities to collect data, and expanded RF coverage for the overall constellation. The selected vendor will need to be able to incorporate their activities into the existing Program.

DESCRIPTION:

PHASE I: In order to be considered for a Direct to Phase II, proposals must show evidence of:

A. Demonstrated understanding of 6U cubesat designs, manufacturing and system integration.
B. Demonstrated capability to produce small satellites with RF payloads that have relevance to this mission area.
C. Demonstrated understanding of opportunities, processes and constraints for ground communications links, satellite operations and low cost launch, primarily through ridesharing.

The second vehicle must supply a 6U CubeSat bus with enough size, weight and power (SWAP) to host a RF payload with simultaneous receive and transmit capability to a designated ground site while flying that payload in conjunction with a similar small sat for cooperative operations. The second CubeSat platform must be capable of quickly, demonstrating on-orbit efficacy/CONOPs, in LEO, for a high-gain antenna/communication system, while providing 1.9U of platform space to permit cost savings for other possible government payloads in need of a stable spacecraft bus platform.

PHASE II: This Direct to Phase II SBIR is to design and build a second, nearly identical vehicle built in a previous program to launch and operate in conjunction with the first in a 6 month on orbit demonstration. The vehicle must be capable of cooperative operation with the existing CubeSat and be compatible with the existing fixed and mobile ground control systems. This second vehicle will greatly expand the number of opportunities to contact the spacecraft and investigate the operational parameters and performance of the payload as well as enhance the initial investment by better enabling RF coverage for the data collection.

The current Program structure incorporates a six-month design period and one year for the manufacture, integration and test of the first bus and RF payload and a 6-month on-orbit demonstration. Awardee(s) will be responsible for providing their own hardware and software, chargeable to the contract, but not to exceed the SBIRS’ maximum funding limits. During the SBIR Phase II effort, neither SCO,
nor its partners, will provide access to any training material, government furnished information, or equipment.

Proposals must describe in detail how the proposed solution will demonstrate cooperative operation and on-orbit efficacy for the high-gain RF antenna/communication system, while providing additional platform space to permit cost savings for other government payloads in need of a stable and proven spacecraft bus platform. Proposals will provide a detailed description of how the solution will leverage an existing CubeSat bus design/architecture and be able to integrate into an existing ground control center, operations planning, and portable ground site to provide enhanced coverage for the demonstration.

The awardee will expose hardware to the expected operating environment to assure a high probability of successful performance in space, including verifying that designs meet performance requirements, identifying defects in material and workmanship, and discovering unexpected interactions between subassemblies. The testing shall include Thermal Vacuum, Random Vibration, pre- and post-environments functional as well as deployments of solar arrays and experiments commensurate with a class D mission risk.

Awardees are responsible for integrating operation of this system with the extant program system to achieve a successful cooperative outcome. Awardees shall perform the system engineering and mission design necessary to ensure that the satellite bus meets all of the requirements (including derived requirements) requisite to host and operate the RF and other government payloads as applicable.

At the close of the SBIR process, awardees will deliver to the government:

4) A successful operational unit compatible with the StreamLINK mission control system and extant ground segment (FSK UHF uplink/BPSK S-Band downlink).
5) 1.9U of remaining available payload space (beyond the 2U needed for the RF antenna payload) suitable to support the integration of an additional government payload (TBD) if required.

Awardees may use any developed efforts for other governmental or commercial opportunities, including continued service support in any Phase III options.

PHASE III DUAL USE APPLICATIONS: Private sector commercial potential includes a marketable, reusable Cubesat bus configuration with a large, generic, payload volume capable of very rapid integration of multiple payloads; additional potential for a constellation of Cubesats with control from both fixed and mobile ground terminals.

REFERENCES:

1. SpaceNews August 2018, Small Satellites are at the Center of a Space Industry Transformation, SpaceNews https://spacenews.com/small-satellites-are-at-the-center-of-a-space-industry-transformation/

KEYWORDS: SmallSat; Satellite; RF comm payload