Space Development Agency (SDA)
22.4 Small Business Innovation Research (SBIR)
Release 1, Proposal Submission Instructions

February 15, 2022: Topic issued for pre-release
February 22, 2022: SDA begins accepting proposals via DSIP
March 24, 2022: DSIP Topic Q&A closes to new questions at 12:00 p.m. ET
April 12, 2022: Deadline for receipt of proposals no later than 12:00 p.m. ET

The Space Development Agency SBIR Program aims to facilitate the transition of basic research to applied research by collaborations between academic researchers and small businesses, as well as stimulating technological innovation, strengthening the role of small business in meeting DoD research and development needs, fostering and encouraging participation by minority and disadvantaged persons in technological innovation, and increasing the commercial application of DoD-supported research or research and development results. The SDA SBIR program invites submissions of innovative research concepts supporting the advancement of our national defense space capabilities.

Offerors responding to this BAA must follow all general instructions provided in the Department of Defense (DoD) 22.4 SBIR Program BAA. Specific SDA SBIR requirements that add to or deviate from the DoD Program BAA instructions are provided in the instructions below.

Specific questions pertaining to the SDA SBIR Program should be submitted to SDA SBIR POC, osd.pentagon.ousd-r-e.mbx.sda-sbir-sttr@mail.mil.

PHASE 1 PROPOSAL GUIDELINES
Phase I is to determine, to the extent possible, the scientific, technical, and commercial merit and feasibility of ideas submitted under the SBIR Program. Proposals should concentrate on research or research and development which will significantly contribute to proving the scientific and technical feasibility, and commercialization potential of the proposed effort, the successful completion of which is a prerequisite for further DoD support in Phase II. **Phase I proposals should clearly articulate the basic research advances that will be exploited. Phase I proposals should also include a tentative plan for Phase II. Evaluation of the Phase I proposal will include an assessment of not only the feasibility studies planned for Phase I but the overall approach and product proposed at the end of Phase II.** SDA reserves the right to not fund a topic if the proposals received have insufficient merit.

The Phase I Base amount must not exceed $275,766 over a period of exactly 6 months. Costs for the Base must be clearly identified on the Proposal Cover Sheet (Volume 1) and in the Cost Volume (Volume 3).

Awards will be made on the basis of technical evaluations using the criteria described in the DoD SBIR Program BAA and availability of SDA SBIR funds.

PHASE I PROPOSAL SUBMISSION REQUIREMENTS
The following MUST BE MET or the proposal will be deemed noncompliant and may be REJECTED

- **Proposal Cover Sheet (Volume 1).** As specified in DoD SBIR Program BAA.

- **Technical Proposal (Volume 2).** Technical Proposal (Volume 2) must meet the following requirements:

    - Content is responsive to evaluation criteria as specified in DoD SBIR Program BAA and below.
    - Not to exceed 20 pages.
    - Phase II commercialization strategy shall not exceed 5 pages. This should be the last section of the Technical Volume and will not count against the 20-page limit. Proposals must follow the formatting requirements provided in the DoD SBIR Program BAA.
    - Single column format, single-space typed lines
    - Standard 8 ½" x 11" paper
    - Page margins one-inch on all sides. A header and footer may be included in the one-inch margin.
    - No font smaller than 10-point*

    *For headers, footers, listed references, and imbedded tables, figures, images, or graphics that include text, a font size smaller than 10-point is allowable; however, proposers are cautioned that the text may be unreadable by evaluators.

- **Cost Volume (Volume 3).** The Phase 1 Base amount must not exceed $275,766 over a period of exactly 6 months. Costs for the Base must be clearly identified on the Proposal Cover Sheet (Volume 1) and in the Cost Volume (Volume 3). Proposer MUST comply with the template provided in SDA Attachment 1 –TEMPLATE VOLUME 3: COST PROPOSAL TEMPLATE (Excel Spreadsheet), located on DSIP during proposal submission and at https://rt.cto.mil/rtl-small-business-resources/sbir-sttr/.

- **Period of Performance.** The Phase 1 Base Period of Performance must be exactly six (6) months.

- **Company Commercialization Report (Volume 4).** As specified in DoD SBIR Program BAA. Information contained in the CCR will be considered during proposal evaluations.

- **Supporting Documents (Volume 5).** SDA will only accept Supporting Documents required by the DoD SBIR Program BAA.
    1. Contractor Certification Regarding Provision of Prohibited Video Surveillance and Telecommunications Services and Equipment (REQUIRED)
    2. Foreign Ownership or Control Disclosure (BAA Attachment 2) (Proposers must review Attachment 2: Foreign Ownership or Control Disclosure to determine applicability)

- **Fraud, Waste and Abuse Training (Volume 6).** Please refer to instructions provided in the DoD SBIR Program BAA.

Proposals not conforming to the terms of the DoD Program BAA and these supplemental instructions will not be considered.

PHASE II PROPOSAL GUIDELINES

The details on the due date, content, and submission requirements of the Phase II proposal will be provided to Phase I awardees by the SDA SBIR PMO via subsequent notification. This will be the only opportunity to submit a Phase II proposal for the SDA topics. The SDA SBIR Program *cannot* accept proposals outside the Phase II submission dates established. Proposals received by the DoD at any time other than the submission period will not be evaluated.

Phase II will have a cost of up to $1,838,436 for a duration not to exceed 24 months.

DIRECT TO PHASE II PROPOSAL SUBMISSION REQUIREMENTS

SDA is currently accepting and seeking proposals that are applicable for Direct to Phase II (DP2) awards. Please refer to DoD SBIR Program BAA on criteria for eligibility for submitting a DP2 proposal. The following MUST BE MET or the proposal will be deemed noncompliant and may be REJECTED

- **Proposal Cover Sheet (Volume 1).** On the Defense SBIR/STTR Innovation Portal (DSIP) at https://www.dodsbirsttr.mil/submissions/, prepare the Proposal Cover Sheet.

  The Cover Sheet must include a brief technical abstract of no more than 200 words that describes the proposed R&D project with a discussion of anticipated benefits and potential commercial applications. **Do not include proprietary or classified information in the Proposal Cover Sheet**. If your proposal is selected for award, the technical abstract and discussion of anticipated benefits may be publicly released on the Internet. Once the Cover Sheet is saved, the system will assign a proposal number. You may modify the cover sheet as often as necessary until the BAA closes.

- **Technical Proposal (Volume 2).** Technical Proposal (Volume 2) must follow the requirements established in SDA Attachment 2 - DIRECT TO PHASE II TEMPLATE – VOLUME 2: FEASIBILITY DOCUMENTATION AND TECHNICAL PROPOSAL, located at https://rt.cto.mil/rtl-small-business-resources/sbir-sttr/.

- **Cost Volume (Volume 3).** The Phase II Base and Option amount must not exceed $1,838,436. Costs for the Base and Options must be clearly identified on the Proposal Cover Sheet (Volume 1) and in the Cost Volume (Volume 3). Proposer MUST comply with the template provided in SDA Attachment 3 –TEMPLATE VOLUME 3: COST PROPOSAL TEMPLATE (Excel Spreadsheet), located on DSIP during proposal submission and at https://rt.cto.mil/rtl-small-business-resources/sbir-sttr/.

- **Period of Performance.** The DP2 Base and Option Period of Performance must not exceed twenty four (24) months.

- **Company Commercialization Report (Volume 4).** As specified in DoD SBIR Program BAA. Information contained in the CCR will be considered during proposal evaluations.

  The Company Commercialization Report (CCR) allows companies to report funding outcomes resulting from prior SBIR and STTR awards. SBIR and STTR awardees are required by SBA to update and maintain their organization's CCR on SBIR.gov. Commercialization information is required upon completion of the last deliverable under the funding agreement. Thereafter, SBIR

and STTR awardees are requested to voluntarily update the information in the database annually for a minimum period of 5 years.

If the proposing firm has prior DoD and/or non-DoD Phase I and/or Phase II SBIR/STTR awards, regardless of whether the project has any commercialization to date, a PDF of the CCR must be downloaded from SBIR.gov and uploaded to the Firm Forms section of DSIP by the Firm Admin. Firm Forms are completed by the DSIP Firm Admin and are applied across all proposals the firm submits. The DSIP CCR requirement is fulfilled by completing the following:

1. Log into the firm account at https://www.sbir.gov/.
2. Navigate to My Dashboard > My Documents to view or print the information currently contained in the Company Registry Commercialization Report.
3. Create or update the commercialization record, from the company dashboard, by scrolling to the "My Commercialization" section, and clicking the create/update Commercialization tab under "Current Report Version". Please refer to the "Instructions" and "Guide" documents contained in this section of the Dashboard for more detail on completing and updating the CCR. **Ensure the report is certified and submitted.**
4. Click the "Company Commercialization Report" PDF under the My Documents section of the dashboard to download a PDF of the CCR.
5. Upload the PDF of the CCR (downloaded from SBIR.gov in previous step) to the Company Commercialization Report in the Firm Forms section of DSIP. This upload action must be completed by the Firm Admin.

This version of the CCR, uploaded to DSIP from SBIR.gov, is inserted into all proposal submissions as Volume 4.

During proposal submission, the proposer will be prompted with the question: "Do you have a new or revised Company Commercialization Report to upload?". There are three possible courses of action:

a. If the proposing firm has prior DoD and/or non-DoD Phase I and/or Phase II SBIR/STTR awards, and **DOES have a new or revised CCR from SBIR.gov to upload to DSIP**, select YES.
   - If the user is the Firm Admin, they can upload the PDF of the CCR from SBIR.gov directly on this page. It will also be updated in the Firm Forms and be associated with all new or in-progress proposals submitted by the firm. If the user is not the Firm Admin, they will receive a message that they do not have access and must contact the Firm Admin to complete this action.
   - **WARNING:** Uploading a new CCR under the Firm Forms section of DSIP or clicking "Save" or "Submit" in Volume 4 of one proposal submission is considered a change for ALL proposals under any open BAAs or CSOs. If a proposing firm has previously certified and submitted any Phase I or Direct to Phase II proposals under ***any*** BAA or CSO ***that is still open***, those proposals will be automatically reopened. Proposing firms will have to recertify and resubmit such proposals. If a proposing firm does not recertify or resubmit such proposals, they will not be considered fully submitted and will not be evaluated.

b. If the proposing firm has prior DoD and/or non-DoD Phase I and/or Phase II SBIR/STTR awards, and **DOES NOT have a new or revised CCR from SBIR.gov to upload to DSIP**, select NO.

- If a prior CCR was uploaded to the Firm Forms, the proposer will see a file dialog box at the bottom of the page and can view the previously uploaded CCR. This read-only access allows the proposer to confirm that the CCR has been uploaded by the Firm Admin.
- If no file dialog box is present at the bottom of the page that is an indication that **there is no previously uploaded CCR in the DSIP Firm Forms**. To fulfill the DSIP CCR requirement the Firm Admin must follow steps 1-5 listed above to download a PDF of the CCR from SBIR.gov and upload it to the DSIP Firm Forms to be included with all proposal submissions.

c. If the proposing firm has **NO** prior DoD and/or non-DoD Phase I and/or Phase II SBIR/STTR awards, the upload of the CCR from SBIR.gov is not required and firm will select NO. The CCR section of the proposal will be marked complete.

While all proposing firms with prior DoD and/or non-DoD Phase I and/or Phase II SBIR/STTR awards must report funding outcomes resulting from these awards through the CCR from SBIR.gov and upload a copy of this report to their Firm Forms in DSIP, **please refer to the Component-specific instructions for details on how this information will be considered during proposal evaluations.**

- **Supporting Documents (Volume 5).** SDA will only accept Supporting Documents as specified in Attachment 2 - DIRECT TO PHASE II TEMPLATE – VOLUME 2: FEASIBILITY DOCUMENTATION AND TECHNICAL PROPOSAL.

- **Fraud, Waste and Abuse Training (Volume 6).** The Fraud, Waste and Abuse (FWA) training is **required** for Direct to Phase II proposals. FWA training provides information on what represents FWA in the SBIR/STTR program, the most common mistakes that lead to FWA, as well as the penalties and ways to prevent FWA in your firm. This training material can be found in the Volume 6 section of the proposal submission module in DSIP and must be thoroughly reviewed once per year. Plan ahead and leave ample time to complete this training based on the proposal submission deadline. FWA training must be completed by one DSIP firm user with read/write access (Proposal Owner, Corporate Official or Firm Admin) on behalf of the firm.

Proposals not conforming to the terms of the DoD Program BAA and these supplemental instructions will not be considered.

EVALUATION AND SELECTION
SDA will evaluate and select Phase I, Phase II, and Direct to Phase II Proposals using the evaluation criteria in the DoD SBIR Program BAA.

If the offeror proposes to employ a foreign national, refer to the DoD SBIR Program BAA for definitions and reporting requirements. Please ensure no Privacy Act information is included in this submittal.

DISCRETIONARY TECHNICAL AND BUSINESS ASSISTANCE (TABA)
Technical and Business Assistance is not offered for the SDA topics.

NOTIFICATION SCHEDULE OF PROPOSALS STATUS AND DEBRIEFS
Once the selection process is complete, the SDA SBIR Program Manager will send an email to the "Corporate Official" listed on the Proposal Coversheet with an attached notification letter indicating selection or non-selection. Small Businesses will receive a notification letter for each proposal they submitted.

PROTEST PROCEDURES

Protests to this BAA and proposal submission must be directed to the DoD SBIR/STTR BAA Contracting Officer, or filed with the GAO. Contact information for the DoD SBIR/STTR BAA Contracting Officer can be found in the DoD STTR Program BAA.

As further prescribed in FAR 33.106(b), FAR 52.233-3, Protests after Award should be submitted to: usarmy.rtp.aro.mail.sttr-pmo@mail.mil

SDA SBIR 22.4 Topic Index
Release 1

SDA224-001 Integrated Architecture Technology

SDA224-001 TITLE: Integrated Architecture Technology

OUSD (R&E) MODERNIZATION PRIORITY: Space; Network Command, Control, and Communications

TECHNOLOGY AREA(S): Space Platforms

The technology within this topic is restricted under the International Traffic in Arms Regulation (ITAR), 22 CFR Parts 120-130, which controls the export and import of defense-related material and services, including export of sensitive technical data, or the Export Administration Regulation (EAR), 15 CFR Parts 730-774, which controls dual use items. Offerors must disclose any proposed use of foreign nationals (FNs), their country(ies) of origin, the type of visa or work permit possessed, and the statement of work (SOW) tasks intended for accomplishment by the FN(s) in accordance with 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: To develop and demonstrate an Integrated Architecture Technology solution in the form of a Modeling, Simulation and Analysis (MS&A) Testbed that incorporates all elements of the National Defense Space Architecture (NDSA). An innovative successful solution will be used to produce traceable requirements that inform a government-owned reference architecture suitable for acquisition purposes. Successful elements include:

1. Models and templated model definitions that enable 3rd party model developers to integrate usable elements (e.g., spacecraft, orbit propagation, lighting, terrain, power, thermal, payload behaviors, data flow, etc.)
2. Outcomes that facilitate comparative analysis, trade space development, and scenario scoring (e.g., link budgets, coverage, constellation design, network routing, optimization, threat impacts, trade space analysis, CONOPs and Use Case design and assessment, etc.)
3. Modularity that enables broad interoperability (e.g., loose coupling of simulation components; behavioral vs. truth-based models; ability to model all layers of the NDSA; reusable; interoperability with existing Government-Off-The-Shelf (GOTS), Commercial-Off-The-Shelf (COTS), and open-source products; etc.)
4. Architecture that benefits from commercial best practices and is extensible and configurable (e.g., stand-alone, distributed, and cloud-based configurations; repeatable; service-oriented; multi-level security; etc.)

The Integrated Architecture Technology MS&A Testbed will enable realistic and informative mission design that facilitates the formation of traceable requirements. Architecture simulation/emulation demonstrations of all NDSA layers, components, and mission areas will be used to assess military utility and conduct trades. Data and results will contribute to NDSA architecture element and acquisition requirements generation.

DESCRIPTION: SDA is responsible for orchestrating the development and fielding of the DoD's future threat-driven NDSA, a resilient military sensing and data transport capability via a proliferated space architecture primarily in LEO. To achieve this mission, SDA uses novel approaches to accelerate the development and fielding of military space capabilities necessary to ensure U.S. technological and military advantage in space for national defense.

The National Defense Space Architecture consists of the following:

1. Transport Layer – assured, resilient, low-latency military data and connectivity worldwide to the full range of warfighter platforms
2. Battle Management Layer – automated space-based battle management through command and control, tasking, mission processing and dissemination to support time-sensitive kill web closure at campaign scales
3. Tracking Layer – global indications, warning, tracking, and targeting of advanced missile threats, including hypersonic missile systems
4. Custody Layer – 24/7, all-weather custody of time-sensitive, left-of-launch surface mobile targets to support targeting for advanced weapons
5. Emerging Capabilities Layer – new mission concepts for future proliferation
6. Navigation Layer – alternate positioning, navigation, and timing (PNT) for potential Global Positioning System (GPS)-denied environments
7. Support Layer - enable ground systems and launch capabilities to support a responsive and resilient space architecture

SDA seeks proposals from Small Businesses designed to enhance our Model-Based Systems Engineering (MBSE) and MS&A capabilities. SDA will consider Phase I proposals however SDA's distinct preference is for a Direct-to-Phase II proposal whose output would be a new capability suitable for use at the completion of the effort.

PHASE I: If a Phase I proposal is selected as the limit of the bid, this effort shall define and document the concept of the Integrated Architecture Technology MS&A Testbed to be implemented in Phase II. Establishment of performance metrics and a methodology to predict performance of the MS&A Testbed shall be developed. The proposed concept shall be defined sufficiently to develop key milestones that define the path from the current state of the technology to a high-TRL state. The final milestone shall present an Integrated Architecture Technology MS&A Testbed capability design suitable for input into SDA's NDSA acquisition process with associated schedule, full capability cost estimate, associated risks and mitigations, and expected outputs.

The Phase I effort shall provide the following:

1. Integrated Architecture Technology MS&A Testbed End-to-End Design Concept and Implementation: Demonstration of and/or direct experience with execution of modeling and simulation efforts with a flexible architecture to produce data and metrics to inform the planned innovation to be used by SDA in further NDSA development efforts.
2. Phase II Implementation Plan: This plan shall consist of:
    a. Summary of approach for an Integrated Architecture Technology MS&A Testbed resident on the Digital Enterprise Environment for DoD processing up to TS/SCI level (request use of existing capabilities to avoid schedule slips and little to no cost).
    b. Capability maturity roadmap for Integrated Architecture Technology MS&A Testbed.
    c. Anticipated Phase II Outputs to be used in Phase III (include Phase III targets).
    d. Summary of anticipated Integrated Architecture Design MS&A Testbed end-state system capabilities including space-related requirements output, integration gap analyses, and support for various fidelities of payloads and components.

This Phase will produce a design roadmap of an MS&A Testbed to evaluate various trade studies, assess military utility, and will document demonstration success criteria.

This topic is accepting Direct to Phase II (DP2) proposals. Proposers interested in submitting a DP2

proposal must provide documentation to substantiate that the scientific and technical merit and feasibility described above 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.

PHASE II: Phase II Integrated Architecture Technology MS&A Testbed will enable mission analyses that will establish performance parameters to inform requirements development and design decisions. The MS&A Testbed will enable the SDA to buy down risk through experimentation and simulation, leading to prototype fabrication and tests for a space or ground system. For behavioral models and truth-based input, consideration will be given to those technologies capable of integrating with other space stakeholders to include the US Space Force, USSPACECOM, NRO, NGA, and other space assets.

Phase II is a prototype implementation of an Integrated Architecture Technology MS&A Testbed including necessary support instrumentation as defined in the Phase II Development Plan. This includes any needed Government Furnished Information (GFI).

SDA requests for the proposer to deliver an automated capability which interlinks existing Commercial Off-the-Shelf (COTS), Government Off-The-Shelf (GOTS), and open source tools necessary to conduct MS&A and generate model based systems engineering artifacts needed to inform requirements development.

The Phase II prototype will be able to consider the transient needs of various and multiple end users and identify requirements of the NDSA constellation that provides maximum utility. The MS&A Testbed shall provide end-users with the ability to capture scenario configurations; replay, modify, and share configurations; resume a scenario from any point; run in any timescale; operate at multiple levels of fidelity; and simulate the full breadth of the space domain with families of constellations and space debris, when desired. The prototype shall produce human-readable, MBSE-compatible output in templated formats for ease of integration into the SDA's acquisition process.

Detailed design and validation test reports comprise the Phase II. This, in addition to the prototype that shall be delivered at the end of the Phase II period of performance. The prototype shall be demonstrated in accordance with the demo success criteria developed in Phase I.

PHASE III DUAL USE APPLICATIONS: Phase III work targets lifecycle support for the Integrated Architecture Technology MS&A Testbed. Development of this capability will be hosted on the Digital Enterprise Environment up to the TS/SCI level, capable of being easily ported to other environments as needed. Integrated Architecture Technology MS&A Testbed expansion to the Design and Development through Fielding and Disposal as needed to support major events including launch events, capstones, and Warfighter CONOPs/TTPs planning. Successful efforts will have the ability to take Integrated Architecture Technology MS&A Testbed, coupled with use of a Live-Virtual-Constructive (LVC) capability, to provide real assets being used for important decision making based on human (Live and/or Constructive) and non-human in the loop (virtual).

REFERENCES:

(R&E), OUSD. (2022). Under Secretary of Defense for Research and Engineering. Retrieved from Digital Engineering: https://ac.cto.mil/digital_engineering/

Department of Defense (DOD) High Performance Computing Modernization Program (HPCMP). (2022). DOD HPCMP Centers. Retrieved from https://centers.hpc.mil/

Dessault Systems. (2022). CAMEO SYSTEMS MODELER. Retrieved from https://www.3ds.com/products-services/catia/products/no-magic/cameo-systems-modeler/

Naval Air Warfare Center Training Systems Division. (2022). Next Generation Threat System. Retrieved from https://www.navair.navy.mil/nawctsd/sites/g/files/jejdrs596/files/2018-11/2017-ngts.pdf

Pheonix Integration. (2022). Pheonix Model Center. Retrieved from https://www.phoenix-int.com/

Space Development Agency. (2022). Space Development Agency. Retrieved from https://www.sda.mil/

WRIGHT-PATTERSON AFB. (2022). Advanced Framework for Simulation, Integration and Modeling software. Retrieved from https://www.wpafb.af.mil/News/Art/igphoto/2001709929

KEYWORDS:
Digital Thread, Modeling, Simulation, Analysis, Model-based, Automation, GOTS, Government-Owned, Live, Virtual, Constructive, Systems Engineering, Automation