

Amendment 2

The purpose of Amendment 2 to DARPA 24.D Release 1 is to update the deadline for proposals to 12:00 pm ET, April 16, 2024 (change highlighted on page 2)

**Defense Advanced Research Projects Agency (DARPA)
DoD 24.D Small Business Technology Transfer (STTR) Annual Broad Agency Announcement
(BAA)
Proposal Submission Instructions Release 1**

INTRODUCTION

DARPA's mission is to make strategic, early investments in breakthrough science and technology that will have long-term positive impacts on our national security. As part of this mission, DARPA makes high-risk, high-reward investments in science and technology that have the potential to disrupt current understandings and/or approaches. The pace of discovery in both science and technology is accelerating worldwide, resulting in new fields of study and the identification of scientific areas ripe for small business utilization through the Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs. Small businesses are critical for developing technology to support national security. Proposers are encouraged to consider whether the Research/Research and Development (R/R&D) being proposed to Department of Defense (DoD) Components also has private sector potential, either for the proposed application or as a base for other applications. The topics below focus on technical domains important to DARPA's mission, pursuing innovative research concepts that fall within one of its technology offices. More information about DARPA's technical domains and research topics of interest may be found at: <http://www.darpa.mil/about-us/offices>

Proposers responding to a topic in this BAA must follow all general instructions provided in the DoD STTR Program BAA. DARPA requirements in addition to or deviating from the DoD Program BAA are provided in the instructions below. All DARPA SBIR and STTR proposals must be submitted electronically through the Defense SBIR/STTR Innovation Portal (DSIP) as described in the Proposal Preparation and Submission sections of these instructions. It is recommended that firms register as soon as possible upon identification of a proposal opportunity to avoid delays in the proposal submission process. Proposers are encouraged to submit proposals as early as possible in order to avoid unexpected delays due to a high volume of traffic during the final hours before a BAA closes. *DARPA is unable to accept any late proposals.*

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

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

Specific questions pertaining to the administration of the DARPA Program and these proposal preparation instructions should be directed to: DARPA Small Business Programs Office at SBIR_BAA@darpa.mil. DSIP Topic Q&A will NOT be available for these DARPA topics. Technical questions related to improving the understanding of a topic's requirements must be submitted to SBIR_BAA@darpa.mil by the deadline listed below.

The following dates apply to this DARPA Topic release:

February 13, 2024: Topics issued for pre-release
February 28, 2024: Topics open; DARPA begins accepting proposals via DSIP

Amendment 2

March 25, 2024: Deadline for technical question submission

April 16, 2024: Deadline for receipt of proposals no later than **12:00 pm ET**

PHASE I PROPOSAL GUIDELINES

The Defense SBIR/STTR Innovation Portal (DSIP) is the official portal for DoD SBIR/STTR proposal submission. Proposers 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 Appendix A.

Current Release Award Structure by Topic

Topic Number	Phase I		
	Technical Volume	Award Amount	Period of Performance (PoP)
HR0011ST2024D-01	25 pages	\$200,000	4 months

Technical Volume (Volume 2)

The technical volume is not to exceed 20 pages and must follow the formatting requirements provided in the DoD STTR 24.D Program BAA. Phase I 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.

Content of the Technical Volume

Proposers should refer to the DARPA Phase I Proposal Instructions, provided on the DARPA Small Business site (<https://www.darpa.mil/work-with-us/for-small-businesses/participate-sbir-sttr-program>).

Cost Volume (Volume 3)

Please see the chart above for award amounts listed by topic. Proposers are required to use the Phase I – Volume 3: Cost Proposal Template (Excel Spreadsheet) provided on the DARPA Small Business site (<https://www.darpa.mil/work-with-us/for-small-businesses/participate-sbir-sttr-program>).

Content of the Cost Volume

Proposers should refer to the DARPA Phase I Proposal Instructions, provided in Appendix A and on the DARPA Small Business site (<https://www.darpa.mil/work-with-us/for-small-businesses/participate-sbir-sttr-program>).

Please review the updated Percentage of Work (POW) calculation details included in the DoD Program BAA. DARPA cannot accept deviations from the POW requirements for STTR proposals.

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 STTR Program BAA for full details on this requirement. Information contained in the CCR will not be considered by DARPA during proposal evaluations.

Supporting Documents (Volume 5)

Amendment 2

In addition to the documents required by DoD, small businesses may also submit additional documentation to support the Technical Volume (Volume 2) and the Cost Volume (Volume 3) in Volume 5. See Appendix A Introduction for required certifications that must be included in Volume 5. For additional information, see the SBIR 24.4 Annual Program BAA at <https://www.defensesbirsttr.mil/SBIR-STTR/Opportunities/>.

PHASE II PROPOSAL GUIDELINES

Phase II proposals may only be submitted by Phase I awardees. Should DARPA have funding available and decide to proceed with a Phase II, proposers awarded a Phase I contract will be eligible to submit a proposal for Phase II and will be contacted by the DARPA Small Business Programs Office at the appropriate time during their Phase I period of performance. Phase II proposals will be evaluated in accordance with the applicable DoD or DARPA SBIR/STTR BAA. Phase II selection(s) are at the sole discretion of the Government and are subject to funding availability and Phase I performance. Phase II Instructions are available at <https://www.darpa.mil/work-with-us/for-small-businesses/participate-sbir-sttr-program>.

Current Release Award Structure by Topic

Topic Number	Phase II				
	Tech Volume	Award Amount	Period of Performance (PoP)	Option Amount	Option PoP
HR0011ST2024D-01	45 pages	\$1,800,000	24 months	\$1,800,000	12 months

Technical Volume (Volume 2)

The technical volume is not to exceed 45 pages. The Phase II commercialization strategy shall not exceed 5 pages. This should be the last section of the Technical Volume, and is included in the 45-page total. Any pages in the technical volume over 45 pages will not be considering in proposal evaluations.

DISCRETIONARY TECHNICAL AND BUSINESS ASSISTANCE (TAB A)

DARPA does not offer TAB A funding.

EVALUATION AND SELECTION

All proposals will be evaluated in accordance with the evaluation criteria listed in the DoD STTR 24.D BAA. DARPA will conduct an evaluation of each conforming proposal. Proposals that do not comply with the requirements detailed in this BAA and the research objective(s) of the corresponding topic are considered non-conforming and therefore are not evaluated nor considered for award.

Using the evaluation criteria, the Government will evaluate each proposal in its entirety, documenting the strengths and weaknesses relative to each evaluation criterion, and, based on these identified strengths and weaknesses, determine the proposal's overall selectability. 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 topic.

Awards will be made to proposers whose proposals are determined to be the most advantageous to the Government, consistent with instructions and evaluation criteria specified in the DoD STTR 24.D BAA and availability of funding.

Amendment 2

For the purposes of this proposal evaluation process, a selectable proposal is defined as follows:

Selectable: A selectable proposal is a proposal that has been evaluated by the Government against the evaluation criteria listed in the BAA and topic, and the strengths of the overall proposal outweighs its weaknesses. Additionally, there are no accumulated weaknesses that would require extensive negotiations and/or a resubmitted proposal.

For the purposes of this proposal evaluation process, a non-selectable proposal is defined as follows:

Non-Selectable: A proposal is considered non-selectable when the proposal has been evaluated by the Government against the evaluation criteria listed in the BAA and topic, and the strengths of the overall proposal do not outweigh its weaknesses.

Proposing firms will be notified of selection or non-selection status for a Phase I award within 90 days of the closing date of the BAA. It is the policy of DARPA to treat all proposals as source selection information and to disclose their contents only for the purpose of evaluation. Restrictive notices notwithstanding, during the evaluation process, submissions may be handled by support contractors for administrative purposes and/or to assist with technical evaluation. All DARPA support contractors are expressly prohibited from performing DARPA-sponsored technical research and are bound by appropriate nondisclosure agreements. Input on technical aspects of the proposals may be solicited by DARPA from other Government and/or non-Government consultants/experts who are strictly bound by the appropriate non-disclosure requirements. No submissions will be returned. Upon completion of the evaluation and selection process, an electronic copy of each proposal received will be retained at DARPA.

Proposal titles, abstracts, anticipated benefits, and keywords of proposals that are selected for contract award will undergo a DARPA Policy and Security Review. Proposal titles, abstracts, anticipated benefits, and keywords are subject to revision and/or redaction by DARPA. Final approved versions of proposal titles, abstracts, anticipated benefits, and keywords may appear on the DoD SBIR/STTR awards website and/or the Small Business Administration's (SBA's) SBIR/STTR award website (<https://www.sbir.gov/sbirsearch/award/all>).

Refer to the DoD STTR 24.D Program BAA for procedures to protest the Announcement. As further prescribed in FAR 33.106(b), FAR 52.233-3, Protests regarding the selection decision should be submitted to:

DARPA
Contracts Management Office (CMO)
675 N. Randolph Street
Arlington, VA 22203
E-mail: CMO_SBIRProtests@darpa.mil and sbir@darpa.mil

AWARD AND CONTRACT INFORMATION

1. General Award Information

Multiple awards are anticipated. DARPA may award Federal Acquisition Regulation (FAR)-based Government contracts (Firm-Fixed Price or Cost-Plus Reimbursement) or Other Transactions (OT) for Prototypes agreement (under the authority of 10 U.S.C. § 4022) subject to approval of the Contracting Officer or Agreements Officer, respectively. The resources made available under each topic issued under this BAA will depend on the quality of the proposals received and the availability of funds.

The Government reserves the right to select for negotiation all, some, one, or none of the proposals received in response to this announcement and to make awards with or without communications with

Amendment 2

proposers. Additionally, the Government reserves the right to award all, some, one, or none of the options on the contract(s)/agreement(s) of the performers based on available funding and technical performance. If warranted, portions of resulting awards may be segregated into pre-priced options. Additionally, DARPA reserves the right to accept proposals in their entirety or to select only portions of proposals for award. In the event that DARPA desires to award only portions of a proposal, negotiations may be opened with that proposer. The Government reserves the right to fund proposals in phases with options for continued work, as applicable.

The Government reserves the right to request any additional, necessary documentation once it makes the award instrument determination. The Government reserves the right to remove a proposal from award consideration should the parties fail to reach agreement on award terms, conditions, and price within a reasonable time, and/or the proposer fails to provide requested additional information within three business days.

In all cases, the Government Contracting Officer reserves the right to select award instrument type, regardless of instrument type proposed, and to negotiate all instrument terms and conditions with selectees. DARPA will apply publication or other restrictions, as necessary, if it determines that the research resulting from the proposed effort will present a high likelihood of disclosing performance characteristics of military systems or manufacturing technologies that are unique and critical to defense. Any award resulting from such a determination will include a requirement for DARPA permission before publishing any information or results on the program. For more information on publication restrictions, see the DoD STTR 24.D Program BAA.

Because of the desire to streamline the award negotiation and program execution process, proposals identified for negotiation will result in negotiating a type of instrument for award that is in the best interest of the Government. In the case of an OT for Prototype agreement under DARPA's authority to award OTs for prototype projects, 10 U.S.C. § 4022, use of an OT provides significant opportunities for flexible execution to assist in meeting DARPA's aggressive SBIR/STTR program goals.

All proposers that wish to consider an OT award should carefully read the following:

The flexibility of the OT award instrument is beneficial to the program because the Performer will be able to apply its best practices as required to carry out the research project that may be outside of the FAR process-driven requirements. Streamlined practices will be used, such as milestone-driven performance, intended to reduce time and effort on award administration tasks and permit performers to focus on the research effort and rapid prototyping. Because of this ability, OTs provide the Agreements Officer the flexibility to create an award instrument that contains terms and conditions that promote commercial transition, reduce some administratively burdensome acquisition regulations, and meet SBIR/STTR program goals.

Proposers must only propose an OT agreement with fixed payable milestones. Fixed payable milestones are fixed payments based on successful completion of the milestone accomplishments agreed to in the milestone plan. Refer to the Other Transactions for Prototypes Fact Sheet and Other Transaction for Prototype Agreement, available at <https://www.darpa.mil/work-with-us/for-small-businesses/participate-sbir-sttr-program>. Specific milestones will be based upon the research objectives detailed in the topic. Please see <https://www.darpa.mil/work-with-us/for-small-businesses/participate-sbir-sttr-program> for more information on OTs.

2. Transition and Commercialization Support Program (TCSP)

DARPA will provide services to Phase II awardees upon contract execution through the Transition and Commercialization Support Program (TCSP) at no cost to awardees. The TCSP goal is to maximize the

Amendment 2

potential for SBIR/STTR companies to move their technology beyond Phase II and into other research and development programs for further maturity or into solutions or products for DoD acquisition programs, other Federal programs, and/or the commercial market. Please visit <https://www.darpa.mil/work-with-us/for-small-businesses/commercialization-continued> for more information on DARPA TCSP.

3. Embedded Entrepreneurship Initiative

Awardees of STTR funding pursuant to this BAA may be eligible to participate in the DARPA Embedded Entrepreneurship Initiative (EEI). Invitation to participate in EEI is at the sole discretion of the Government based on evaluation of technical and commercial factors and subject to program balance and the availability of funding. EEI is a limited scope program offered by DARPA, at DARPA's discretion, to a small subset of awardees. The goal of DARPA's EEI is to increase the likelihood that DARPA-funded technologies take root in the U.S. and provide new capabilities for national defense. EEI supports DARPA's mission "to make pivotal investments in breakthrough technologies and capabilities for national security" by accelerating the transition of innovations out of the lab and into new capabilities for the Department of Defense (DoD). EEI investment supports development of a robust and deliberate Go-to-Market strategy for DARPA-funded advanced technology, into high-value products and capabilities for the government and commercial markets, and positions DARPA awardees to attract U.S. private investment. The following is for informational and planning purposes only and does not constitute solicitation of proposals to the EEI.

There are three elements to DARPA's EEI: (1) A Senior Commercialization Advisor (SCA) from DARPA who works with the Program Manager (PM) to examine the business case for the awardee's technology and uses commercial methodologies to identify steps toward achieving a successful transition of technology to the government and commercial markets; (2) Connections to potential U.S. industry and private investor partners via EEI's Investor Working Groups; and (3) Additional funding to hire an embedded entrepreneur to achieve specific milestones in a Go-to-Market strategy for transitioning the technology into products that serve both defense and commercial markets. This embedded entrepreneur's qualifications should include business experience within the target industries of interest, experience in commercializing early-stage technology, and the ability to communicate and interact with technical and non-technical stakeholders, and customers. Funding for EEI is typically no more than \$310,000 per awardee over the duration of the award. An awardee will attend one commercialization workshop, and also may apportion EEI funding to hire more than one embedded entrepreneur, if achieving the milestones requires a unique expertise that can be obtained without exceeding the awardee's total EEI funding.

EEI Application Process:

After receiving an SBIR/STTR award, awardees interested in being considered for EEI should notify their DARPA Program Manager (PM) during the period of performance. If the DARPA PM determines that EEI could be of benefit to transition the technology to product(s) the Government needs, the PM will refer the performer to the DARPA Commercial Strategy Team. A Senior Commercial Advisor will then contact the performer, assess fitness for EEI and determine, in consultation with the PM, and Commercial Strategy Team, whether or not to invite the performer to participate in the EEI. Factors that are considered in determining fitness for EEI include DoD/Government need for the technology; competitive approaches to enable a similar capability or product; risks and impact of the Government's being unable to access the technology from a sustainable source; Government and commercial markets for the technology; cost and affordability; manufacturability and scalability; supply chain requirements and barriers; regulatory requirements and timelines; Intellectual Property and Government Use Rights, and available funding.

After SCA review, the Commercial Strategy Team may request the SBIR/STTR awardee to submit additional tasks for review and/or apply separately to the Commercial Strategy "Commercial Solutions Opening" for additional review at <https://sam.gov/opp/0b1cda40f5f0486a9180649312107987/view>

Amendment 2

EEI awards are at the sole discretion of DARPA and subject to program balance and the availability of funding. For more information, please refer to the EEI website <https://eei.darpa.mil/>.

ADDITIONAL INFORMATION

DARPA intends to use electronic mail for all correspondence regarding these topics. Questions related to the technical aspect of the research objectives and awards specifically related to a topic should be emailed to SBIR_BAA@darpa.mil. Please reference the topic number in the subject line. All questions must be in English and must include the name, email address, and the telephone number of a point of contact.

DARPA will attempt to answer questions in a timely manner; however, questions submitted within seven (7) calendar days of the proposal due date listed herein may not be answered. DARPA will post a consolidated Frequently Asked Questions (FAQ) document. To access the posting please visit: <http://www.darpa.mil/work-with-us/opportunities>. Under the topic number summary, there will be a link to the FAQ. The FAQ will be updated on an ongoing basis until one week prior to the proposal due date.

Technical support for the Defense SBIR/STTR Innovation Portal (DSIP) is available Monday through Friday, 9:00 a.m. – 5:00 p.m. ET. Requests for technical support must be emailed to DoDSBIRSupport@reisystems.com with a copy to SBIR_BAA@darpa.mil.

Appendix A: DARPA PHASE I PROPOSAL INSTRUCTIONS

I. Introduction

A complete proposal submission consists of:

Volume 1: Proposal Cover Sheet

Volume 2: Technical Volume

Volume 3: Cost Volume

Volume 4: Company Commercialization Report

Volume 5: Supporting Documents

a. Contractor Certification Regarding Provision of Prohibition on Contracting for Certain Telecommunications and Video Surveillance Services or Equipment (Attachment 1)

MANDATORY

b. Disclosures of Foreign Affiliations or Relationships to Foreign Countries (Attachment 2)

MANDATORY

c. Verification of Eligibility of Small Business Joint Ventures (Attachment 3), if applicable

d. Disclosure of Funding Sources (Attachment 4) MANDATORY

e. Other supporting documentation

A completed proposal submission in DSIP does NOT indicate that the mandatory supporting documents have been uploaded. It is the responsibility of the proposing small business concern to ensure that the mandatory documents listed above have been uploaded and included with the proposal submission.

Volume 6: Fraud, Waste and Abuse Training

The Defense SBIR/STTR Innovation Portal (DSIP) provides a structure for building the proposal volumes and submitting a consolidated proposal package. If this is your first time submitting an STTR proposal using DSIP, please review detailed training guides at <https://www.dodsbirsttr.mil/submissions/learning-support/training-materials>. It is the responsibility of the proposing firm to ensure that a complete proposal package is certified and submitted by the close date listed in the topic to which they are responding. *DARPA cannot accept late proposals.*

To assist in proposal development, templates for Volume 2: Technical Volume and Volume 3: Cost Volume have been provided as attachments on the DARPA Small Business website, under SBIR/STTR Forms and Templates at <https://www.darpa.mil/work-with-us/for-small-businesses/participate-sbir-sttr-program>. Use of the DARPA Cost Proposal template is mandatory.

II. Proprietary Information

Proposers that include in their proposals data that they do not want disclosed to the public for any purpose, or used by the Government except for evaluation purposes, shall follow instructions in the DoD STTR 24.D BAA regarding marking propriety proposal information.

III. Phase I Proposal Instructions

a. Proposal Cover Sheet (Volume 1)

The Cover Sheet must include a brief technical abstract of no more than 3000 characters 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.

a. Format of Technical Volume (Volume 2) – Standard Proposal Format

1. Type of file: 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.**
2. Length: The length of the technical volume will be specified by the corresponding topic. The Government will not consider pages in excess of the page count limitations.
3. Layout: 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. Please refer to the document titled Phase I Template – Volume 2: Technical Volume at <https://www.darpa.mil/work-with-us/for-small-businesses/participate-sbir-sttr-program> for additional details.

b. Content of the Technical Volume (Volume 2) – Standard Proposal Format

The Technical Volume should cover the following items in the order given below:

1. **Identification and Significance of the Problem or Opportunity.** Define the specific technical problem or opportunity addressed and its importance.
2. **Phase I Technical Objectives.** Enumerate the specific objectives of the Phase I work, including the questions the research and development effort will try to answer to determine the feasibility of the proposed approach.
3. **Phase I Statement of Work (including Subcontractors' Efforts)**
 - a) Provide an explicit, detailed description of the Phase I approach. The Statement of Work should indicate what tasks are planned, how and where the work will be conducted, a schedule of major events, and the final product(s) to be delivered. The Phase I effort should attempt to determine the technical feasibility of the proposed concept. The methods planned to achieve each objective or task should be discussed explicitly and in detail. This section should be a substantial portion of the Technical Volume section.
 - b) The topic may have been identified by the Program Manager as research or activities involving Human/Animal Subjects and/or Recombinant DNA. In the event that Phase I performance includes performance of these kinds of research or activities, please identify the applicable protocols and how those protocols will be followed during Phase I. Please note that funds cannot be released or used on any portion of the project involving human/animal subjects or recombinant DNA research or activities until all of the proper approvals have been obtained (see DoD SBIR 24.4/STTR 24.D BAA).

4. **Related Work.** Describe significant activities directly related to the proposed effort, including any conducted by the PI, the proposing firm, consultants, or others. Describe how these activities interface with the proposed project and discuss any planned coordination with outside sources. The technical volume must persuade reviewers of the proposer's awareness of the state-of-the-art in the specific topic. Describe previous work not directly related to the proposed effort but similar. Provide the following: (1) short description, (2) client for which work was performed (including individual to be contacted and phone number), and (3) date of completion.

5. **Relationship with Future Research or Research and Development**
 - a) State the anticipated results of the proposed approach if the project is successful.
 - b) Discuss the significance of the Phase I effort in providing a foundation for Phase II research or research and development effort.
 - c) Identify the applicable clearances, certifications and approvals required to conduct Phase II testing and outline the plan for ensuring timely completion of said authorizations in support of Phase II research or research and development effort.

6. **Key Personnel.** Identify key personnel who will be involved in the Phase I effort including information on directly related education and experience. A concise technical resume of the PI, including a list of relevant publications (if any), must be included (Please do not include Privacy Act Information). All resumes will count toward the page limit for Volume 2, as specified in the topic.

7. **Foreign Citizens.** Identify any foreign citizens or individuals holding dual citizenship expected to be involved on this project as a direct employee, subcontractor, or consultant. For these individuals, please specify their country of origin, the type of visa or work permit under which they are performing and an explanation of their anticipated level of involvement on this project. Refer to DoD SBIR 24.4/STTR 24.D BAA for more information.

Supplemental information provided in response to this paragraph will be protected in accordance with the Privacy Act (5 U.S.C. 552a), if applicable, and the Freedom of Information Act (5 U.S.C. 552(b)(6)).

8. **Facilities/Equipment.** Describe available instrumentation and physical facilities necessary to carry out the Phase I effort. Justify equipment purchases in this section and include detailed pricing information in the Cost Volume. State whether or not the facilities where the proposed work will be performed meet environmental laws and regulations of federal, state (name), and local Governments for, but not limited to, the following groupings: airborne emissions, waterborne effluents, external radiation levels, outdoor noise, solid and bulk waste disposal practices, and handling and storage of toxic and hazardous materials.

9. **Subcontractors/Consultants.** Subcontractor means any supplier, distributor, vendor, firm, academic institution, research center, or other person or entity that furnishes supplies or services pursuant to a subcontract, at any tier. Involvement of a university or other subcontractors or consultants in the project may be appropriate. If such involvement is

intended, it should be identified and described according to the Cost Breakdown Structure at <https://www.dodsbirsttr.mil/submissions/learning-support/firm-templates>. Please refer to DoD SBIR 24.4/STTR 24.D BAA for detailed eligibility requirements as it pertains to the use of subcontractors/consultants.

10. **Prior, Current, or Pending Support of Similar Proposals or Awards.** If a proposal submitted in response to a corresponding topic is substantially the same as another proposal that was funded, is now being funded, or is pending with another Federal Agency, or another DoD Component or DARPA, you must reveal this on the Proposal Cover Sheet and provide the following information:
- a) Name and address of the Federal Agency(s) or DoD Component to which a proposal was submitted, will be submitted, or from which an award is expected or has been received.
 - b) Date of proposal submission or date of award.
 - c) Title of proposal.
 - d) Name and title of the PI for each proposal submitted or award received.
 - e) Title, number, and date of BAA(s) or solicitation(s) under which the proposal was submitted, will be submitted, or under which award is expected or has been received.
 - f) If award was received, state contract number.
 - g) Specify the applicable topics for each proposal submitted or award received.

Note: If this does not apply, state in the proposal "No prior, current, or pending support for proposed work."

11. **Transition and Commercialization Strategy.** DARPA is equally interested in dual use commercialization of SBIR/STTR project results to the U.S. military, the private sector market, or both, and expects explicit discussion of key activities to achieve this result in the transition and commercialization strategy part of the proposal. Phase I is the time to plan for and begin transition and commercialization activities. The small business must convey an understanding of the market, competitive landscape, potential stakeholders and end-users, and preliminary transition path or paths to be established during the Phase I project. The Phase I transition and commercialization strategy shall not exceed 5 pages. It should be the last section of the technical volume and include the following elements:

- a) **A summary of transition and commercialization activities conducted during prior SBIR/STTR efforts if applicable, and the Technology Readiness Level (TRL) achieved.**
- b) **Problem or Need Statement.** Briefly describe the problem, need, or requirement, and its significance relevant to a Department of Defense application and/or a private sector application that the SBIR/STTR project results would address. Is there a broader societal need you are trying to address? Please describe.
- c) **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.
- d) **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? Describe the resources you expect will be needed to implement your business models. Discuss your plan and expected timeline to secure these resources. Understanding DARPA's goal of creating and sustaining a U.S. military advantage, describe how you intend to develop your product and supply chains to enable this differentiation.

- e) **Target Market.** Describe the market and addressable market for the innovation. Describe the customer sets you propose to target, their size, their growth rate, and their key reasons they would consider procuring the technology. Discuss the business economics and market drivers in the target industry. Describe competing technologies existent today on the market as well as those being developed in the lab. How has the market opportunity been validated? Describe the competition. How do you expect the competitive landscape may change by the time your product/service enters the market?
- f) **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.).
- g) **Transition and Commercialization Risks.** Describe the major technology, market and team risks associated with achieving successful transition and commercialization of the DARPA funded technology. DARPA is not afraid to take risks but we want to ensure that our awardees clearly understand the risks in front of them. What are the key risks in bringing your innovation to market? What are actions you plan to undertake to mitigate these risks?
- h) **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.)?
- i) **Anticipated Transition and Commercialization Results.** Include a schedule showing the anticipated quantitative transition and commercialization results from the Phase II project at one year after the start of Phase II, at the completion of Phase II, and after the completion of Phase II (i.e., amount of additional investment, sales revenue, etc.). After Phase II award, the company is required to report actual sales and investment data in its Company Commercialization Report at least annually.

Advocacy Letters (OPTIONAL)* Feedback received from potential Commercial and/or DoD customers and other end-users regarding their interest in the technology to support their capability gaps. Advocacy letters that are faxed or e-mailed separately will NOT be accepted.

Letters of Intent/Commitment (OPTIONAL)* Relationships established, feedback received, support and commitment for the technology with one or more of the following: Commercial customer, DoD Program Management (PM)/ Program Executive Office (PEO), a Defense Prime, or vendor/supplier to the Primes and/or other vendors/suppliers identified as having a potential role in the integration of the technology into fielded systems/products or those under development. Letters of Intent/Commitment that are faxed or e-mailed separately will NOT be

accepted.

*Advocacy Letters and Letters of Intent/Commitment are optional, and should ONLY be submitted to substantiate any transition or commercialization claims made in the commercialization strategy. Please DO NOT submit these letters just for the sake of including them in your proposal. These letters DO NOT count against any page limit.

In accordance with section 3-209 of DOD 5500.7-R, Joint Ethics Regulation, letters from government personnel will NOT be considered during the evaluation process.

c. Format of Cost Volume (Volume 3)

Proposers are required to use the Phase I – Volume 3: Cost Proposal Template (Excel Spreadsheet) provided at <https://www.darpa.mil/work-with-us/for-small-businesses/participate-sbir-sttr-program>.

d. Content of the Cost Volume (Volume 3)

Some items in the Cost Breakdown Guidance below may not apply to the proposed project. If such is the case, there is no need to provide information on each and every item.

Cost Breakdown Guidance:

- List all key personnel by name as well as by number of hours dedicated to the project as direct labor.
- Special tooling and test equipment and material cost may be included. The inclusion of equipment and material 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 Contracting Officer, be advantageous to the Government and should be related directly to the specific topic. These may include such items as innovative instrumentation and/or automatic test equipment. Title to property furnished by the Government or acquired with Government funds will be vested with DARPA; unless it is determined that transfer of title to the contractor would be more cost effective than recovery of the equipment by the DARPA.
- Cost sharing is permitted for proposals under this announcement; however, cost sharing is not required nor will it be an evaluation factor in the consideration of a proposal.
- If Subcontractors will be performing Fundamental Research under the effort please incorporate the following into proposal: 1) a separate SOW outlining the specific work that the proposer finds to qualify as Fundamental Research; OR 2) Within Prime contractor SOW identify which tasks are to be performed that are fundamental research.

For more information about cost proposals and accounting standards associated with contract awards, see the Defense Contract Audit Agency (DCAA) publication titled “Audit Process Overview – Information for Contractors” available at <http://www.dcaa.mil>.

e. Company Commercialization Report (Volume 4)

The Company Commercialization Report (CCR) allows companies to report funding outcomes resulting from prior SBIR and STTR awards. The Company Commercialization Report (CCR) is required for Phase I and Direct to Phase II proposals. Please refer to the DoD STTR Program BAA for full details on this requirement. Information contained in the CCR will not be considered by DARPA during proposal evaluations.

f. Supporting Documents (Volume 5)

In addition to required DoD documentation and certifications, small businesses may also submit additional documentation to support the Technical Volume (Volume 2) and the Cost Volume (Volume 3) in Volume 5. See Introduction for **required** certifications that must be included in Volume 5. For additional information, see the STTR 24.D Annual Program Broad Agency Announcement (BAA) at <https://www.defensesbirsttr.mil/SBIR-STTR/Opportunities/>.

g. Fraud Waste and Abuse (Volume 6)

The Fraud, Waste and Abuse (FWA) training is required for Phase I and 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 must be thoroughly reviewed once per year. Plan ahead and leave ample time to complete this training based on the proposal submission deadline. Knowingly and willfully making any false, fictitious, or fraudulent statements or representations may be a felony under the Federal Criminal False Statement Act (18 U.S.C. Sec 1001), punishable by a fine of up to \$10,000, up to five years in prison, or both. Understanding the indicators and types of fraud, waste, and abuse that can occur is critical for the SBIR/STTR awardees' role in preventing the loss of research dollars.

DARPA STTR 24.D Topic Index
Release 1

HR0011ST2024D-01 Optical-Atomic System Integration & Calibration (OASIC)

OUSD (R&E) CRITICAL TECHNOLOGY AREA(S): Advanced Materials, Quantum Science

OBJECTIVE: Create a user facility for an atom-based quantum testbed for accelerated prototyping, validation, and benchmarking of nanophotonic, optoelectronic, and electronic components and sub-systems that can enable the realization of scalable, low-SWaP atom-based quantum sensors, clocks, computing architectures and other integrated or chip-scale quantum technologies.

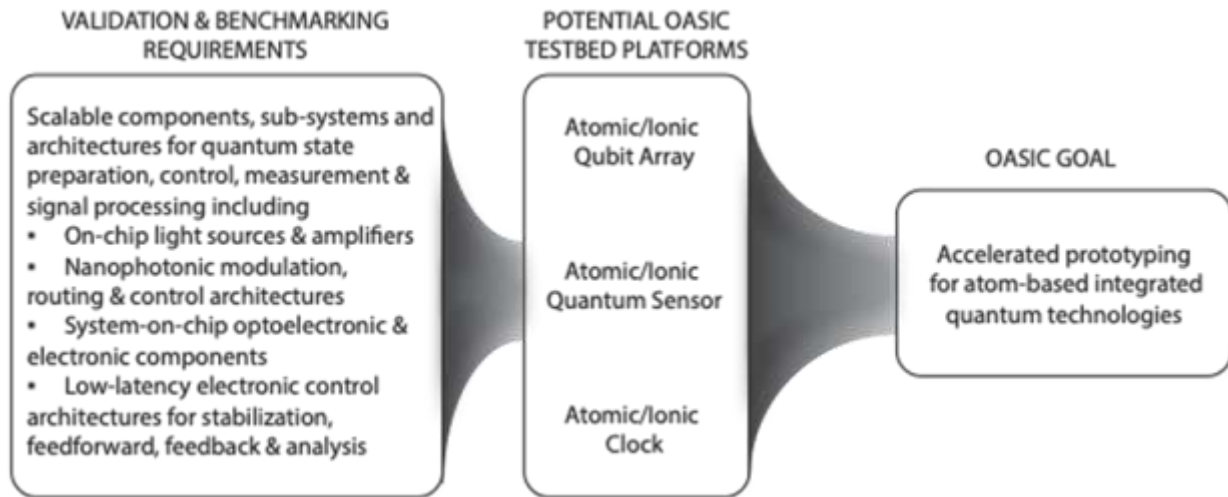


Figure 1: Goal of the OASIC quantum testbeds.

DESCRIPTION: Laser-cooled or ultracold atomic systems have long offered the promise of the highest accuracy, precision, and long-term stability for applications to quantum-enhanced sensing and time-keeping. Techniques of quantum state preparation, manipulation, control, and measurement of these systems have been demonstrated at quantum levels of precision in several atomic, molecular, and optical (AMO) experimental platforms. Building upon these developments, neutral atom-based quantum computing platforms have also made dramatic progress in recent years. In conjunction, these developments augur wide-ranging and disruptive opportunities for atom-based quantum technologies in numerous applications of DoD and commercial relevance.

Despite this promise, the transition of atom-based quantum devices from laboratory-scale demonstrations to robust, high-TRL systems has been disappointingly slow. On the one hand, some of the requisite technologies required for integrated atomic quantum systems such as compact vacuum cells, ion pumps, and chip-scale trapping techniques have made significant progress. On the other hand, there remains a large set of essential technologies required for robust cooling, optical confinement, interrogation and quantum control that have yet to meet the stringent performance requirements needed to supplant larger, laboratory-scale infrastructure. This void has stymied the transition of such atom-based quantum devices to widely deployable, low-SWaP technologies as well as the future scalability of such systems to address a growing landscape of applications in sensing, PNT, and computing.

In the latter context, there has been encouraging progress in the development of integrated photonic and electronic platforms for a variety of capabilities ranging from on-chip narrow-linewidth laser sources and amplifiers¹⁻⁸ at wavelengths of relevance to workhorse atomic species; microcomb-driven photonic integrated circuits for the stabilization and distribution of light⁹; low-loss optical modulators and filters

that could be harnessed for on-chip trapping, quantum control and interrogation of atoms ; and high-speed optical routing and processing architectures. Similarly, innovative designs of low-latency system-on-chip (SoC) optoelectronic and electronic control architectures¹⁰⁻¹³ have also made rapid advances to potentially enable operation of integrated atom-based technologies with greater autonomy. Although the current performance of these enabling technologies is still some distance away from matching the performance of conventional equipment, it is anticipated that continued progress in these areas can lead to the maturation of these enabling technologies at a level that can match, and eventually surpass the performance of large-scale laboratory setups. It is also anticipated that the development of such chip-scale or integrated sub-systems can lead to advances and novel capabilities in atom-based quantum technologies that are not currently accessible with current techniques.^{14, 15}

One of the main bottlenecks in the development of such enabling technologies is the lack of rigorous testing and evaluation procedures that are compatible with the stringent, quantum-limited performance requirements of SoA atom-based sensors, clocks, and computing architectures. While testing methodologies using conventional optical or electronic test equipment are a necessary first step in refining these technologies, such benchmarking data are rarely as informative as benchmarking these photonic or electronic sub-systems against SoA atom-based platforms. Indeed, the most relevant and reliable benchmarking procedures invariably involve measurements and characterizations using ultracold atomic systems as a ‘sensor’ or a validation testbed. For example, standard laser characterization measurements of phase noise, linewidth, and stability of integrated or chip-scale laser sources, while informative, do not compare favorably to the detailed information that can be gleaned by using these laser sources to prepare, interrogate, or control SoA atomic clocks or neutral atom qubits.¹⁶ Similar analogies can be made in the context of other photonic and electronic enabling technologies that are necessary for the development of higher-TRL atom-based quantum technologies. In fact, the development of high performance SoC architectures for quantum control and measurement may also have important implications for a deeper understanding and subsequent scalability of several atom-based quantum platforms.¹⁷ While preliminary demonstrations of the utility of electronic control architectures have been demonstrated in superconducting qubit platforms¹⁸, their implementation in atomic platforms which demand optical, electronic, and optoelectronic controls is at a much more nascent state. The realization of atom-based testbeds can accelerate the maturation of such components and sub-systems required for the development of next-generation atom-based quantum technologies. Concomitantly, the miniaturization and integration of SoC optical and optoelectronic control systems will lead to enhanced scalability and eventual cost reduction of a wide range of atomic sensors, clocks, and computing architectures.

Access to such atom-based facilities is currently limited, constraining the iterative design, testing, and development process that is necessary for the maturation of such integrated and on-chip components. It is also the case that such atom-based computing architectures, clocks, or sensing platforms are rarely constructed so as to facilitate the incorporation and testing of a wide range of photonic or electronic sub-systems. This solicitation seeks to develop flexible, high-performance quantum testbeds to fill this void, with the goal of creating widely accessible prototyping capabilities for the accelerated testing, evaluation, and validation of a wide range of components and sub-systems that can enable the realization of atom-based integrated quantum technologies for sensing, computing, and PNT capabilities.

PHASE I:

Phase I will produce a design and analysis of the performance and operation of the proposed quantum testbed user facility, as well as a detailed operation and business plan for the facility. The design documentation must describe the concept, construction, and performance metrics of the proposed testbed. The operation and business plan must describe how facility will allow for broad-scale government, academic, and commercial access, and the long-term funding and sustainment plan. This plan must include an assessment of how the proposed facility will balance the technical requirements of rigorous evaluation and validation of component subsystems against the commercial interests of rapid task

sequencing and high throughput. In addition, the documentation must address the following topics to enable assessment of the proposed testbed and its alignment with the goals of the OASIC solicitation:

- **Proposed testbed system and metrics**

The design documentation must contain a detailed description of the proposed testbed system (e.g. atomic or ionic qubit array, interferometer, sensor etc.) and the base performance metrics of the system (e.g. sensitivity, Allan variance, single- and multi-qubit gate fidelity etc.). The documentation should contain a discussion of how the proposed testbed with these performance metrics can enable more rigorous evaluation and validation of hardware components and sub-systems than can be obtained with conventional, more widely accessible, and non-atom based test equipment. The documentation should contain sufficient justification that the proposed system can be constructed and benchmarked in accordance with the proposed Phase II schedule.

- **Modularity/Flexibility**

The design documentation must contain a discussion of the modularity and flexibility of the proposed quantum testbed so as to enable the incorporation and testing of a wide range of nanophotonic, optoelectronic, and electronic components and sub-systems. It is anticipated that successful designs that will be selected to move forward to Phase II will feature innovative solutions to enable rapid and seamless incorporation of test components into the quantum testbed to benchmark or validate the performance of such components against various requirements of atom-based sensing, computing or information processing. Examples of such requirements include robust cooling and quantum state preparation, control, interrogation, stabilization of the atom-based systems at requisite levels, feedback and feedforward protocols, and system-on-chip signal processing and analysis. The design documentation should include estimates of task scheduling timescales, latencies, and expected throughput for incorporation, testing, and benchmarking of exemplar components and sub-systems relevant to the aforementioned requirements.

- **Testing capabilities and range of components that can be tested and/or benchmarked**

Atom-based integrated quantum systems such as sensors, clocks, or scalable computing architectures require a wide range of enabling components and technologies including, but not limited to, on-chip light sources and amplifiers; nanophotonic modulators, filters, and other optical routing architectures; low-latency SoC optoelectronic and electronic control architectures for various tasks such as optical cooling, quantum state preparation, control, stabilization, feedforward, and measurement. The design documentation must contain a comprehensive discussion of the testing capabilities of the proposed testbed; the benchmarking precision that can be achieved for these various components; and a clear justification of how the proposed testbed can enable the prototyping and validation of such components at a level beyond conventional (or non-atom-based) benchmarking capabilities.

- **Documentation and accessibility**

The design documentation must contain a description of the documentation that will be provided to the potential consumer base to facilitate the requisite benchmarking or characterization measurements of various components or sub-systems. An important goal of the OASIC solicitation is to democratize access to SoA atom-based architectures for the evaluation of a wide range of components of relevance to atom-based quantum information technologies. As such, the documentation should also contain a discussion of how the quantum testbed will be made accessible to a wide consumer base including those from non-traditional and non-AMO communities, so as to enable a broad and multi-faceted exploration and evaluation of components, sub-systems, architectures and other enabling technologies for the realization of atom-based integrated quantum devices.

- **Operation logistics and management**

The design documentation must contain a discussion of the proposal and evaluation process by which the consumer base may be provided access to the quantum testbed to evaluate or benchmark their

components. This discussion should include measures to assure transparency of the testing and validation processes; proposed cost structure; the proposed personnel requirements to perform the benchmarking tests; and management and oversight over the benchmarking processes, generated data and intellectual property. The management documentation must include the long-term operation and financial plan to ensure the facility is kept at the forefront of quantum and optical technologies. To ensure broad access, it is preferred that the facility be located at an academic site within close proximity to the small business leading the effort, while the business entity maintain responsibility for operation and management. Working with or creating a consortium that includes multiple academic institutions with a single commercial entity as the lead is encouraged but not necessary. If the construction of the proposed testbed facility will use components or hardware fabricated or demonstrated at another institution, the design should also document any required licensing agreements to use the components or hardware in question. There should also be a detailed description of how the testbed, when realized, will achieve the Phase II goals detailed below. The Phase I period of performance is 4 months.

PHASE II:

Phase II will construct and demonstrate an atom-based quantum testbed based on the Phase I design. The Phase II period of performance is 24 months and should conform to the schedule indicated below. As per this schedule, the construction and benchmarking of the quantum testbed at its design metrics should be completed by Month 20 of Phase II. The final report, due by Month 24, should describe the use of the quantum testbed to test, validate, and benchmark exemplar components using the quantum testbed at a level of precision and rigor that surpasses conventional testing and benchmarking measurements conducted on SoA non-atom-based test equipment.

Phase II fixed payable milestones should include:

- Month 2: Report on the acquisition and fabrication schedule of all components required in the Phase I design of the quantum testbed; and a delivery, assembly, and testing schedule for these components. As applicable, the report shall also document the need for researching, developing, and implementing any customized scientific techniques that are required to meet the required capabilities of the quantum testbed.
- Month 6: Interim report describing component fabrication, testing and performance with comparisons relative to specifications of Phase I design.
- Month 9: PI meeting presentation material, including demonstration of progress to date, presentations of accomplishments, upcoming tasks, and near-term schedule.
- Month 12: Interim report describing progress on assembly of quantum testbed, preliminary tests and/or demonstrations of operation of completed sub-systems. The report shall include a discussion of any differences between the realized system and/or sub-system performance and the design requirements, and the impact of such differences on the performance of the final quantum testbed. Significant differences between Phase I design metrics and realized performance should include appropriate risk mitigation strategies that will be implemented to ensure adequate testbed performance.
- Month 16: PI meeting presentation material, including demonstration of progress to date, presentations of accomplishments, upcoming tasks, and near-term schedule.
- Month 20: Report describing the complete construction and characterization of the quantum testbed at the requisite metrics specified in the Phase I design. The report shall document any modifications to the original design, departures from design metrics, and the impact of such modifications or departures on the eventual capabilities of the quantum testbed.
- Month 24: Final Phase II report describing demonstration of testing, characterization, and/or benchmarking of exemplar nanophotonic, optoelectronic, or electronic components and/or sub-systems using the quantum testbed facility. Report of these benchmarking tests should include a comparison of the benchmarking results against SoA non-atom based tests of the same components and/or sub-systems. The report should include a discussion of how the quantum testbed enabled measurements and benchmarking beyond the capabilities of SoA non-atom based measurements. Lastly, the report shall document the

scientific advances and customized scientific techniques that were achieved under the program to enable the realization of the testbed facility.

PHASE III DUAL USE APPLICATIONS: The development of integrated, low-SWaP quantum systems for applications to sensing, PNT, and atom-based quantum computing architectures are each of critical relevance to several DoD applications. In addition, these technologies are crucial for various commercial markets including communications, logistics, exploration of natural resources, pharmaceuticals, and scientific research. It is anticipated that the OASIC quantum testbeds will be a crucial enabler for the rapid design, development, and prototyping of a range of hardware components that are necessary for the realization of such atom-based integrated quantum technologies.

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KEYWORDS: Quantum, Testbed, Qubits, Sensors, PNT, Nanophotonics, Control, Integration, Rydberg, Quantum Computing, Photonic Integrated Circuits, Chip-scale Quantum Technologies