Broad Agency Announcement

Microsystems Induced CAtalysis (MICA)

Microsystems Technology Office

HR001125S0007

January 21, 2025

This publication constitutes a Broad Agency Announcement (BAA) as contemplated in Federal Acquisition Regulation (FAR) 6.102(d)(2) and 35.016 and 2 CFR § 200.203. Any resultant award negotiations will follow all pertinent law and regulation, and any negotiations and/or awards for procurement contracts will use procedures under FAR 15.4, Contract Pricing, as specified in the BAA.

OVERVIEW INFORMATION:

- **Federal Agency Name:** Defense Advanced Research Projects Agency (DARPA), Microsystems Technology Office
- **Funding Opportunity Title:** Microsystems Induced CAtalysis (MICA)
- **Announcement Type:** Initial announcement
- **Funding Opportunity Number:** HR001125S0007
- **Assistance Listing Number:** Not applicable
- **Dates/Time: All Times are Eastern Time Zone (ET)**
  - Posting Date: January 21, 2025
  - Proposers Day: January 23, 2025
  - Proposal Abstract Due Date: February 5, 2025, at 1:00 p.m.
  - Question Submittal Closed: February 26, 2025, at 4:00 p.m.
  - Proposal Due Date: March 20, 2025, at 1:00 p.m.
  - Estimated Period of Performance start: August 1, 2025
- **Anticipated Individual Awards:** Multiple awards are anticipated
- **Types of Instruments That May Be Awarded:** Procurement contract or Other Transaction for Prototype
- **NAICS Code:** 541713
- **Agency Contact:**

  The BAA Coordinator for this effort may be reached at:

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Broad Agency Announcement
HR001125S0007

Microsystems Induced CAtalysis (MICA)
Defense Advanced Research Projects Agency (DARPA)
Microsystems Technology Office (MTO)

Section I: Funding Opportunity Description

The Defense Advanced Research Projects Agency (DARPA) is soliciting innovative proposals for the research and development of advanced concepts for modeling, simulation and fabrication of microsystem-based control of catalytic molecules. Proposed research should investigate innovative approaches that enable revolutionary advances in science, devices, and systems. Specifically excluded is research that primarily results in evolutionary improvements to the existing state of practice.

A. Background

The Microsystems Induced CAtalysis (MICA) program aims to create modeling and simulation tools and fabrication techniques that enable the control of catalytic activity of molecular catalysts, immobilized to microsystem surfaces, by physical forces generated by the microsystem. The ability to accurately predict and control catalytic activity requires co-design of both the molecule(s) and the microsystem. Catalyst activity has been controlled by various physical forces and has proven capable of executing reactions that provide insights into biological function. However, spatiotemporal control of catalyst activity is limited as registration between molecules and microsystems cannot be controlled with high precision at the nanoscale. Computational approaches to catalyst engineering have demonstrated novel molecules with desired chemistry and high structural accuracy. However, predicting catalytic activity remains a challenge, especially when catalysts are immobilized to inorganic surfaces due to dynamic interactions between the catalyst, its substrate(s), solvents, immobilization chemistries, and the inorganic surface. Accurate co-design of such molecular microsystems is enabled by closed-loop feedback between modeling and simulation and fabrication. Accurate co-design and fabrication will pioneer a “platform” molecular microsystem capability, enabling new molecular microsystem architectures for applications including novel materials synthesis, medical therapeutics and interventions, and biothreat detection and mitigation.

This vision requires the creation of accurate modeling and simulation tools as well as high-precision nanoscale fabrication approaches. Model accuracy is a measure of simulated structure and catalytic activity compared to a measurement of the physical instantiation. Fabrication accuracy is a measure of the ability to immobilize molecules with high precision while maintaining molecule structure and function compared to the design model. Current technologies require a trade-off between accuracy, performance, and yield. MICA seeks to break this limitation by improving model and fabrication accuracies while increasing the fabrication process yield.

State-of-the-Art Limit:

Current microsystem interactions with biological systems are limited to systems that respond to conventional microelectronic stimuli (e.g., neurologic or electro-stimulatory systems that respond to electromagnetic fields and/or current injection). Because current microsystems cannot directly synthesize molecules, biological systems that transfer information through molecular signaling (e.g., hormone production by the thyroid) cannot be interacted with directly. Technological limitations, such as the

inability to predict and simulate catalyst structure and function at inorganic interfaces, prevent the design and fabrication of molecular microsystems that can control the activity of catalysts whose products drive biological function. Limitations of today's state-of-the-art (SOTA) approaches include:

- *Inability to accurately predict the structure and function of molecules at inorganic interfaces.* Accurate prediction of catalyst structure and function at an inorganic interface enables the ability to predict catalytic activity. The force fields typically used for modeling and simulation of molecules are parameterized for interactions between molecular fragments in relevant solvents (e.g., proteins in water). These are not good approximations for interactions with inorganic surfaces that are typical of microsystems, which have force fields that drive different structural and physio-chemical properties in catalysts. Force fields for describing catalyst–surface, catalyst–solvent, and surface–solvent interactions in atomic detail are limited. An additional limitation is that current tools (e.g., molecular dynamics, course-grain models) cannot apply these force fields to multiple molecules simultaneously.

- *Inability to place single molecules with high-accuracy relative to microsystem active features*. Single catalyst molecules are roughly 5 x 5 x 5 nm with surface attachment sites < 1 nm. The dimensions of attachment sites are smaller than the current resolution of today's photolithographic capability, the dominant patterning technology. This limits the ability to pattern and order individual molecules to enable multi-catalyst reaction cascades.

- *Inability to simultaneously achieve high-accuracy catalytic activity of multiple molecules at high yield*. Given the current limitations in modeling, simulation, and fabrication of molecular microsystems, it is unclear how sensitive induced catalytic activity will be to molecule/microsystem misalignment and how that will ultimately affect molecular microsystem yield during fabrication. Studies of multi-catalytic cascades indicate that sequentially ordering catalysts in close proximity (on the order of 10s of nanometers) through immobilization to scaffolds is sufficient to improve catalytic activity by > 7x, but underlying mechanisms remain unclear.

B. Program Description

The MICA program will develop hardware demonstrations of molecular catalysts immobilized on microsystem surfaces with catalytic activity controlled by physical forces generated by the microsystem. Additionally, the program will seek high-accuracy modeling and simulation of such integrated molecular microsystems. While open to a broad range of molecular catalysts, an emphasis is placed on biomolecular catalysts. Through these demonstrations, MICA aims to answer three critical questions: (i) how can microsystems be used to actively control molecules? (ii) what are the different microsystem physics that can be used to drive catalyst function? and (iii) what co-design approaches can be used to integrate the different physics of microsystems and molecules? To achieve the program objectives, MICA will seek demonstrations in the following two technical areas.

TA1: Functional Co-Design

The main objective of TA1 is to develop multiscale modeling and simulation tools that accurately predict the catalytic activity of attached catalysts in response to physical forces generated by the microsystem. The program will realize modeling and simulation tools that accurately predict the structure and function of immobilized catalysts, with an emphasis on accurate prediction of the performance of integrated molecular microsystems. TA1 performers will develop the data sets, algorithms, and/or software required

to demonstrate the program metrics outlined in Table 1 and to provide these resources to the government independent validation and verification (IV&V) team.

TA1 proposals should include comprehensive discussions of how microsystem force fields interact with molecules at the microsystem interface, driving attachment and conformational changes that enable controlled catalysis. Modeling and simulation tools are expected to meet program accuracy methods for each TA2 approach. Therefore, TA1 approaches should accommodate a wide range of (i) molecular catalysts, (ii) microsystem designs and control physics, and (iii) device integration approaches.

TA2: Attachment Co-Design

The main objective of TA2 is to develop design and fabrication approaches that result in accurate placement and robust attachment of catalytic molecules to microsystems to enable multi-catalyst reaction cascades. The program will realize robust-by-design interface solutions capable of achieving predictable catalytic performance. TA2 performers will develop the data sets, algorithms, and/or software required to demonstrate the program metrics outlined in Table 1 and provide these resources to the government IV&V team.

Catalytic molecules and relevant reactions are performer-defined; however, proposals should include molecules whose structure and function can be predicted with high accuracy. Proposals should also include a comprehensive discussion of how the proposed catalyst type(s) drive chemical reactions with high-impact products. MICA is an unclassified program. DARPA expects that program goals will be met with a combination of fundamental research and non-fundamental research. However, DARPA is not interested in the production of chemicals that are listed on the US Munitions List (https://www.ecfr.gov/current/title-22/chapter-I/subchapter-M/part-121) or the Commerce Control List (CCL) (https://www.bis.doc.gov/index.php/regulations/export-administration-regulations-ear). If any proposal selected includes the production or use of a chemical that is controlled in either the U.S. Munitions list or the CCL or considered Controlled Technical Information (CTI) those chemicals will be replaced with alternatives during contract negotiations. If you are unsure if the chemical is listed on the CCL or US Munitions List, work with your export control team, and reach out to the Bureau of Industry and Security at the U.S. Department of Commerce or MTO_Security@darpa.mil to obtain guidance.

The microsystem platform, immobilization chemistries, and control physics are also performer defined; however, proposed approaches should include coupling to a digital logic platform (e.g., FPGA, ASIC) with a clear path to compatibility with standard microelectronics manufacturing and assembly flows. Integrated systems are expected to meet program performance, accuracy, and yield metrics in Table 1 while dynamically controlling a single catalyst type (Phase 1) and a reaction cascade (Phase 2).

C. Program Structure

MICA will be a 39-month, two-phase program that will be executed in two separate but aligned technical areas. Proposers should anticipate working directly and collaboratively with teams in the other technical area through Associate Contractor Agreements (described in Attachment K). ACAs must be executed prior to kickoff in each phase. **A single proposal shall not address both technical areas.** However, proposers may submit two separate proposals, each addressing a single technical area. In most cases, organizations can not be part of multiple proposal teams. The exception is foundries providing fabrication capabilities in TA2, under the provision that there is no technical approach overlap across proposals. Proposals should address phases within a technical area, with Phase 1 as the Base period and Phase 2 as an Option period. DARPA anticipates down-selection at the end of Phase 1. Phase 2 Option awards may be exercised, at the

Government's sole discretion, based on meeting the Phase 1 program metrics, proposals with compelling Phase 2 technical plan, a clearly formulated strategy to maintain and sustain MICA technology beyond program completion, and funding availability.

Phase 1

Both TAs will run concurrently during the 21-month Phase 1, which will prove the feasibility of predictably controlling catalytic activity. Performers will demonstrate predictable control of the activity of at least one catalytic chemistry with three or more unique physical forces generated by a microsystem. This could be a single molecule executing a single catalytic reaction under the control of a minimum of three independent physical forces. Alternatively, this could be three unique molecules, each under the control of one specific physical force, that all execute the same chemistry.

TA1: Functional Co-Design

TA1 performers will demonstrate the ability to accurately predict the structure and function of the molecule(s) when immobilized to, and under the influence of, the proposed microsystem. TA1 performers will demonstrate this ability for each TA2 performer.

TA2: Attachment Co-Design

TA2 performers will demonstrate the ability to engineer molecules to execute the desired chemistry, attach to the microsystem, and dynamically control catalytic activity (over relevant ranges) in response to physical forces generated by the microsystem. TA2 performers will demonstrate the ability to accurately attach molecules to the microsystem per their proposed design, with a placement yield of properly attached molecules as defined in Table 1. A demonstration of at least 100 attachment sites is required to show scalability. TA2 performers must attach at least one catalyst type per attachment site, with the maximum number of discrete molecules defined by the number necessary to generate the performer-defined product at relevant and measurable concentrations.

General Phase 1 Considerations

The Phase 1 schedule allows for multiple design-fabrication-characterization cycles resulting in a demonstration of controlled catalytic activity of at least one catalyst type with at least 100 independent attachment sites. A preliminary design review (PDR) for a Phase 2 demonstration will capture modeling and simulation for multiple unique catalysts with an expanded range of control physics and incorporate key experimental learning from the Base effort.

Phase 2

The 18-month Phase 2 effort will focus on scaling the number of catalytic reactions, thus expanding on the predictive design and fabrication capabilities demonstrated in Phase 1. The 1000 attachment site design will be presented at the system design and simulation review prior to committing to fabrication. A key challenge that will be addressed in Phase 2 is increasing the accuracy of both models and fabrication approaches over a larger number of attachment sites and catalyst types. Performers will demonstrate predictable control of six unique catalyst types using three different control physics. The catalysts will work together, in at least one multi-catalyst reaction cascade. As in Phase 1, the reaction cascade(s) must generate high-impact products.

Examples of microsystem control physics include, but are not limited to, photonics, electronics, acoustics, magnetics, thermodynamics, and chemistry. Catalyst types are defined by the chemical reaction catalyzed, with examples including, but not limited to, hydrolysis of peptide bonds, keto-acid decarboxylation, and peroxide oxidation.

A summary of the program metrics is presented in Table 1.

Table 1. Program Metrics

	Metric	Phase 1 (21mo) Predictability	Phase 2 (18mo) Extensibility
TA1 & TA2: Scale	Catalyst type and control physics(1)	≥ 1 and ≥ 3	≥ 6 and ≥ 3
TA1 & TA2: Functional co-design	Structural accuracy (Å RMSD)(2)	≤ 10	≤ 5
	Functional accuracy (%)(3)	≥ 50	≥ 90
TA2: Attachment co-design	Attachment sites(4)	≥ 100	≥ 1000
	Placement accuracy (nm)(5)	≤ 100	≤ 50
	Placement yield (%)(6)	≥ 50	≥ 90

Table 1 notes:

1. Catalyst type refers to a catalytic chemistry that transforms substrate(s) into product(s) that could drive biological function or synthesize relevant material. Control physics refers to the force(s) generated by the microsystem that control the activity of the catalyst.
2. Structural accuracy is measured as the root mean square deviation (RMDS measured in angstroms [Å]) of a physical molecule attached to a surface, compared to the model.
3. Functional accuracy is measured as the relative activity of a molecule (with units of moles of product generated per second), attached to the surface and under the influence of the physical force delivered by the microsystem, compared to that predicted by the model.
4. Attachment sites are discrete locations on the microsystem where molecules are immobilized.
5. Placement is measured as the distance between the actual location of the attached molecule and the intended location of the attached molecule. This measurement will be applied across all successful attachments. The average difference in distance must be at or below the placement accuracy metric, measured in nanometers.
6. Placement yield is the fraction of physically attached molecules that meet the placement accuracy metric.

Verification and Validation

All TA1 proposals should outline technical tasks required to compare simulations to actual molecular microsystems. This includes comparison to dynamic catalyst structure before, during, and after attachment to the microsystem, as well as comparison to catalyst activity in response to stimuli from the microsystem. All TA2 proposals should outline technical tasks regarding test plans and test capability to demonstrate meeting or exceeding the program metrics. This includes characterizing catalyst placement and structure on the microsystem and measuring catalyst activity in response to microsystem stimuli. Innovations in test and evaluation to support demonstration of program metrics are acceptable and expected where proposals demonstrate necessity. Direct experimental demonstrations of program metrics are strongly encouraged; however, a combination of experimental tests or a combination of testing and simulations may be appropriate if viability can be proven. If planning to leverage government test facility capabilities, please see Section IV: Special Considerations.

Ethical, Legal and Societal Implications

Without appropriate controls, technologies that interact with biology can pose certain risks. It is an ambition of the MICA program that engineering controls can be applied to address the ethical, legal, and societal implications (ELSI) of MICA technologies. It is anticipated that the Government will convene an ELSI panel operating separate from, but parallel to, the technical program to deliver a report on this topic. This panel will be composed of subject matter experts selected by the Government. Accordingly, proposals should include a concise narrative on the ethical, legal, and societal implications (ELSI) of their work in the MICA program. In addition, each proposer team should designate a team member to serve as their ELSI advocate to participate in and contribute to activities that manage ELSI for their respective technologies and for the MICA program overall. These activities will include quarterly virtual meetings with the ELSI panel to report on and discuss approaches to efficiently manage ELSI for MICA technologies. For more information on ELSI, please refer to https://www.darpa.mil/news/2024/podcast-integrating-elsi and https://www.darpa.mil/news/podcast/episode-79.

D. Schedule, Milestones and Deliverables

Program Schedule

A summary of the program schedule is presented in Figure 1. For planning and budgetary purposes, proposers should assume a program start date of August 1, 2025. A post-award program kickoff meeting will be held to present the technical approaches, to discuss technical and programmatic items of concern, and to interact with the Government team and other program performers. The end of each phase represents a major technical milestone in the program; end-of-phase review meetings will be scheduled approximately six weeks before the end of each phase. These meetings will be used to assess technical progress toward the metrics during the entire phase. Technical progress toward the metrics of the program is a significant deciding factor for continuation into subsequent phases and will be monitored through monthly teleconference calls and periodic site visits by the DARPA program manager and other members of the Government team.

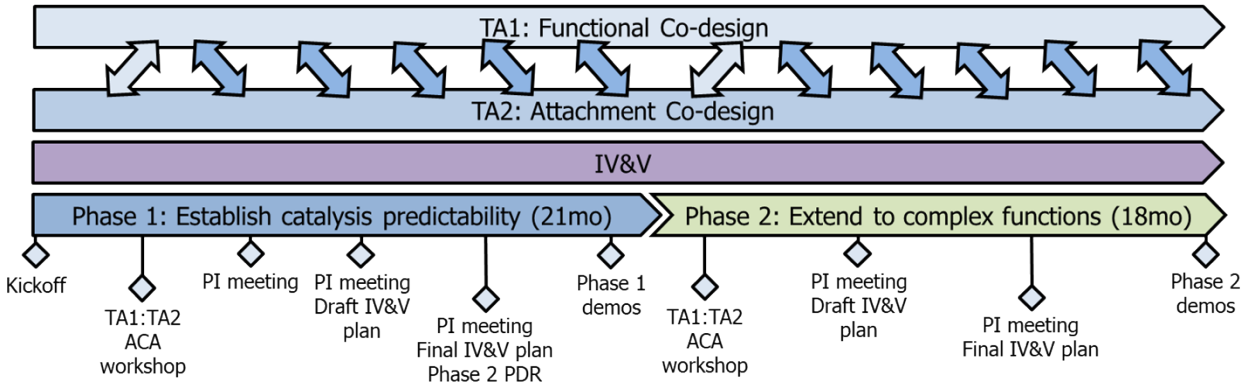

Figure 1. Program schedule. Arrows between TAs indicate frequent interactions between TA1 and TA2 teams.

Deliverables

Principal Investigator Meetings

Principal investigator meetings, held in person with leading members of each team, will occur approximately every six months. The meeting deliverable will be a technical slide presentation. Additional program reviews with all performers are anticipated to be held in person at the beginning of each program phase and may replace the technical review meetings.

End-of-Phase Meeting

DARPA anticipates an end-of-phase meeting with each individual performer approximately six weeks before the end of each phase. Prior to each end-of-phase meeting, performers will provide a written report covering a) technical results and b) charts with explanations of how the approach meets, exceeds, or falls short of specified program metrics (as described in this BAA), with an emphasis on development and demonstration to the Government of catalysts, control physics, and the microsystem. Templates may be provided for the technical review teleconferences and will include technical updates with simulated and measured results to demonstrate progress toward the program metrics, as well as an up-to-date financial spend plan.

Monthly Technical Reports

Technical review meetings with the MICA Program Manager are anticipated to be held every month, usually as a teleconference. Written technical reports should be submitted monthly beginning after the kick-off meeting and either two working days prior to each subsequently scheduled technical review meeting or within 10 days from the beginning of each month, whichever is closest to the beginning of the month. Other proposed deliverables specific to the objectives of the individual efforts may include registered reports, experimental protocols, publications, data management plan, intermediate and final versions of software libraries, code and application programming interfaces (APIs), documentation and user manuals, and/or a comprehensive assemblage of design documents, models, modeling data and results, and model validation data.

Monthly Financial Reports

The financial report shall describe resources expended, resources available, any deviation from planned expenditures, and any potential issues requiring the attention of the Government team. This report should be provided within 10 days from the end of each month.

TA1:TA2 Collaboration Workshop

The purpose of the TA1:TA2 collaboration workshop is to facilitate the exchange of technical information between TA1 and TA2 performer teams. At a minimum, the expectation for this workshop is to define the data sets, algorithms, and/or software to be exchanged between teams, and the delivery schedule.

Independent Verification and Validation Plan

The Government expects to conduct performance testing of MICA approaches to independently validate performer progress toward achieving program goals. It is expected that each performer team will collaborate with the Government IV&V team to develop a performer specific IV&V plan that details the timeline and technical approaches used to evaluate performer demonstrations to program metrics in Table 1. It is anticipated that this plan will incorporate the performer-defined test and evaluation approaches documented in each proposal.

End of Phase Demonstrations and Delivery

Performers will demonstrate capabilities at the end of each phase and performance will be measured to relevant metrics from Table 1, per the IV&V plan. Immediately following these demonstrations, performers should anticipate delivering to the Government hardware, devices, data sets, algorithms, and/or software required to demonstrate the program metrics outlined in Table 1 to the Government per program milestones and deliverables outlined in Table 2.

Phase 2 Preliminary Design Review Report

Near the end of Phase 1, the Government expects performers in each technical area to provide a preliminary design review (PDR) report for a Phase 2 demonstration, prior to committing to Phase 2 fabrication. This report will describe proposed Phase 2 approaches for achieving metrics in Table 1, incorporating key experimental learning from Phase 1.

Final Report

After the end of each phase, the final report shall summarize the effort in a comprehensive text document.

Proposers may clearly identify additional deliverables (reports and other than reports) in the Statement of Work (SOW), Work Breakdown Structure (WBS), or Task Description Document (TDD).

Milestone Schedule

A summary of the program milestones and deliverables is presented in Table 2. Performers are expected to include additional milestones based on their technical execution plan. Examples include planned fabrication dates and key hardware performance demonstrations.

Table 2. Program Milestones and Deliverables

Milestone/Deliverable	Date (Program Month)
Phase 1	
ACAs executed	Prior to kickoff
Technical and financial reports	Monthly
Teleconference slides	Monthly
Performer technical execution milestones	Performer defined
Kickoff	1
TA1:TA2 Collaboration Workshop	2
Principal Investigator Meeting	6
Draft IV&V Plan	12
Principal Investigator Meeting	12
Final IV&V plan	18
Phase 2 preliminary design review report	18
Principal Investigator Meeting	18
End-of-Phase TA1 and TA2 demonstrations and delivery	19
End-of-Phase Report	20
Phase 2	
Technical and financial reports	Monthly
Teleconference slides	Monthly
Performer technical execution milestones	Performer defined
Kickoff	1
TA1:TA2 Collaboration Workshop	2
Principal Investigator Meeting	6
Draft IV&V Plan	12
Principal Investigator Meeting	12
Final IV&V plan	17
Principal Investigator Meeting	17
End-of-Phase TA1 and TA2 demonstrations and delivery	18
End-of-Phase Report	18

E. Intellectual Property

Proposers responding to this announcement shall follow the applicable rules and regulations and, in all cases, should appropriately identify any potential restrictions on the Government's use of any intellectual property. This includes both noncommercial items and commercial items. Please refer to Section 15 (Intellectual Property) of Attachment D, Proposal Instructions and Volume I Template (Technical and Management).

Section II: Evaluation Criteria

- Proposals will be evaluated using the following criteria listed in ***descending order of importance***: Overall Scientific and Technical Merit; Potential Contribution and Relevance to the DARPA Mission; and Cost Realism.
    - **Overall Scientific and Technical Merit**: The proposed technical approach is innovative, feasible, achievable, and complete. The proposed technical team has the expertise and experience to accomplish the proposed tasks. Task descriptions and associated technical elements provided are complete and in a logical sequence with all proposed deliverables clearly defined such that a final

outcome that achieves the goal can be expected as a result of award. The proposal identifies major technical risks and planned mitigation efforts are clearly defined and feasible.

- **Potential Contribution and Relevance to the DARPA Mission**: The potential contributions of the proposed effort bolster the national security technology base and support DARPA's mission to make pivotal early technology investments that create or prevent technological surprise. The proposed intellectual property restrictions (if any) will not significantly impact the Government's ability to transition the technology.
- **Cost Realism**: The proposed costs are realistic for the technical and management approach and accurately reflect the technical goals and objectives of the announcement. The proposed costs are consistent with the proposer's Statement of Work and reflect a sufficient understanding of the costs, skill mix, and level of effort needed to successfully accomplish the proposed technical approach. The costs for the prime proposer and proposed sub awardees are substantiated by the details provided in the proposal (e.g., the type and number of labor hours proposed per task, the types and quantities of materials, equipment and fabrication costs, travel and any other applicable costs and the basis for the estimates). The effort leverages all available relevant prior research in order to obtain the maximum benefit from the available funding. For efforts with a likelihood of commercial application, appropriate direct cost sharing has been proposed.

- Unless otherwise specified in this announcement, for additional information on how DARPA reviews and evaluates proposals through the Scientific Review Process, please visit: Proposer Instructions and General Terms and Conditions.

Section III: Submission Information

- This announcement allows for multiple award instrument types to be awarded to include Procurement Contracts and Other Transactions for Prototype. Some award instrument types have specific cost-sharing requirements. The following websites are incorporated by reference and contain additional information regarding overall proposer instructions, general terms and conditions, and each specific award instrument type.
  - **Proposer Instructions and General Terms and Conditions**: Proposer Instructions and General Terms and Conditions
  - **Procurement Contracts**: Proposer Instructions: Procurement Contracts
  - **Other Transaction agreements**: Proposer Instructions: Other Transactions

- This announcement contains an abstract phase. Abstracts are strongly encouraged. Abstracts are due no later than the due date and time stated in the Overview section. Additional instructions for abstract submission are contained within **Attachments A and B**.

- Full proposals are due no later than the due date and time stated in the Overview section. **Attachments C, D, E, and F (plus G, H, and I for Other Transactions)** contain specific instructions and templates and constitute a full proposal submission. Please visit Proposer Instructions and General Terms and Conditions for specific information regarding submission methods through the Broad Agency Announcement Tool (BAAT).

- **Required BAA Attachments**:
  - **Attachment A**: Abstract Summary Slide Template

- **Attachment B**: Abstract Instructions and Template
- **Attachment C**: Proposal Summary Slide Template
- **Attachment D**: Proposal Instructions and Volume I Template (Technical and Management)
- **Attachment E**: Proposal Instructions and Volume II Template (Cost)
- **Attachment F**: DARPA Standard Cost Proposal Spreadsheet
- **Attachment G (for Other Transactions only)**: Other Transaction Certification Template
- **Attachment H (for Other Transactions only)**: Task Description Document (TDD) Template
- **Attachment I (for Other Transactions only)**: Schedule of Milestones and Payments
- **Informational MICA Attachments**
  - **Attachment J: Model Other Transaction for Prototype (Any entity requesting Other Transactions must confirm acceptance of the model, or alternately request minor revisions to articles with accompanying rationale)**
  - **Attachment K: Associate Contractor Agreement (ACA)**
  - **Attachment L: MICA Controlled Unclassified Information (CUI) Guide (January 16, 2025)**
  - **Attachment M (for Contracts only): Baseline Model Contract (Small Businesses)**
  - **Attachment N (for Contracts only): Baseline Model Contract (Large Businesses)**
  - **Attachment O (for Contracts only): Baseline Model Contract Addendum**

- All technical, contractual, and administrative questions regarding this notice must be emailed to MICA@darpa.mil. Emails sent directly to the Program Manager or any other address may result in delayed or no response. All questions must be in English and must include the name, email address, and telephone number of a point of contact. DARPA will attempt to answer all questions in a timely manner and post an FAQ list on the DARPA/MTO Opportunities page at (http://www.darpa.mil/work-with-us/opportunities). The list will be updated on an ongoing basis until date and time indicated in the overview.

Section IV: Security Information

- **Controlled Unclassified Information (CUI):** For Unclassified proposals containing controlled unclassified information (CUI), applicants will ensure personnel and information systems processing CUI security requirements are in place.

- **CUI Proposal Marking:** If an unclassified submission contains CUI or the suspicion of such, as defined by Executive Order 13556 and 32 CFR Part 2002, the information must be appropriately and conspicuously marked CUI in accordance with DoDI 5200.48. Identification of what is CUI about this DARPA program will be detailed in the MICA Controlled Unclassified Information Guide (CUIG) and is provided as Attachment L to the BAA.

- **CUI Submission Requirements:** Unclassified submissions containing CUI may be submitted via DARPA's BAA Website (https://baa.darpa.mil) in accordance with Section III or Section IV of this BAA. Proposers submitting proposals involving the pursuit and protection of DARPA information designated as CUI must have, or be able to acquire prior to contract award, an information system authorized to process CUI information IAW NIST SP 800-171 and DoDI 8582.01.

- **CUI Submissions:** DARPA anticipates that submissions received under this BAA will be unclassified and may be CUI. However, should a proposer wish to submit classified information, an unclassified email must be sent to the MICA mailbox notifying the MTO Program Security Officer. Security classification guidance and direction via a Security Classification Guide (SCG) and/or DD Form 254, "DoD Contract Security Classification Specification," will not be provided at this time. If a determination is made that the award instrument may result in access to classified information, a SCG and/or DD Form 254 will be issued by DARPA and attached as part of the award. Please see the CUIG for additional information.

Section V: Special Considerations

- This announcement, stated attachments, and websites incorporated by reference constitute the entire solicitation. In the event of a discrepancy between the announcement, attachments, or websites, the announcement shall take precedence.

- All responsible sources capable of satisfying the Government's needs, including both U.S. and non-U.S. sources, may submit a proposal that shall be considered by DARPA. Historically Black Colleges and Universities, Small Businesses, Small Disadvantaged Businesses and Minority Institutions are encouraged to submit proposals and join others in submitting proposals; however, no portion of this announcement will be set aside for these organizations' participation due to the impracticality of reserving discrete or severable areas of this research for exclusive competition among these entities. Non-U.S. organizations and/or individuals may participate to the extent that such participants comply with any necessary nondisclosure agreements, security regulations, export control laws, and other governing statutes applicable under the circumstances.

- As of the time of publication of this announcement, all proposal submissions are anticipated to be unclassified.

- This program is subject to Attachment K: Associate Contractor Agreement.

- This program is subject to Attachment M: MICA Controlled Unclassified Information (CUI) Guide signed January 16, 2025. All individuals accessing CUI agree to protect CUI in accordance with *DoD Instruction 5200.48 CONTROLLED UNCLASSIFIED INFORMATION (CUI)* and *NIST Special Publication 800-171 Protecting Controlled Unclassified Information in Nonfederal Systems and Organizations*.

- DARPA encourages technical solutions from all responsible sources capable of satisfying the government's needs. To ensure fair competition across the ecosystem, DARPA prohibits contractors/performers from concurrently providing Systems Engineering Technical Assistance (SETA), Advisory and Assistance Services (A&AS), or similar support services and being a technical performer, unless the DARPA Deputy Director grants a written waiver. DARPA extends this prohibition to University-Affiliated Research Centers (UARCs), Federally Funded Research and Development Centers (FFRDCs), and government laboratories including National Laboratories.

- UARCs, FFRDCs, and government laboratories are prohibited from proposing as performers. UARCs, FFRDCs, and government laboratories interested in this solicitation must contact the Agency Point of Contact (POC) listed in the Overview section to discuss potential participation as part of the government team. Please note that this paragraph supersedes the "Special Eligibility Considerations for Federally Funded Research and Development Centers (FFRDCs) and Government Entities" section found at Proposer Instructions and General Terms and Conditions.

- As of the date of publication of this announcement, the Government expects that program goals as described herein may be met by proposed efforts for both fundamental research and non-fundamental research. Some proposed research may present a high likelihood of disclosing performance characteristics of military systems or manufacturing technologies that are unique and critical to defense. Based on the anticipated type of proposer (e.g., university or industry) and the nature of the solicited work, the Government expects that some awards will include restrictions on the resultant research that will require the awardee to seek DARPA permission before publishing any information or results relative to the program. For additional information on fundamental research, please visit Proposer Instructions and General Terms and Conditions.

  Proposers should indicate in their proposal whether they believe the scope of the research included in their proposal is fundamental or not. While proposers should clearly explain the intended results of their research, the Government shall have sole discretion to determine whether the proposed research shall be considered fundamental and to select the award instrument type. Appropriate language will be included in resultant awards for non-fundamental research to prescribe publication requirements and other restrictions, as appropriate. This language can be found at Proposer Instructions and General Terms and Conditions.

  It may be possible that although the research to be performed by a potential awardee is non-fundamental research, its proposed subawardee's effort may be fundamental research. It is also possible that the research performed by a potential awardee is fundamental research while its proposed subawardee's effort may be non-fundamental research. In all cases, it is the potential awardee's responsibility to explain in its proposal which proposed efforts are fundamental research and why the proposed efforts should be considered fundamental research. These considerations along with the ability to work with CUI should factor into each proposer's teaming arrangements.

- DARPA has utilized an alternate structured approach for the determination of a reasonable fee basis for Cost-Plus-Fixed-Fee (CPFF) procurement contracts under MICA, in accordance with DFARS 215.404-4(b)(1)(C). **The fee calculation percentage range determined reasonable for procurement contract awards under MICA is 6.0% - 8.8%.** This was determined based on consideration of factors such as: performance risk; contract type risk; facilities capital employed; anticipated award size; available transition path; markets (commercial, Government, international); IP rights; chances of award; time to production; and solicitation complexity.

  Proposers should propose a fee that falls within the above range. Because that fee range already has been determined to be reasonable relative to MICA, proposals need not include any further fee justification. Elimination of fee as a negotiation item is expected to result in reduced contracting timelines for any proposal selected for award negotiation. It should be noted that this structured approach may not apply to other transactions requested by nontraditional defense contractors.

- DARPA's Fundamental Research Risk-Based Security Review Process (formerly CFIP, now FERBS) is an adaptive risk management security program designed to help protect the critical technology and performer intellectual property associated with DARPA's research projects by identifying the possible vectors of undue foreign influence. The DARPA team will create risk assessments of all proposed Senior/Key Personnel selected for negotiation of a fundamental research grant or cooperative agreement award. The DARPA risk assessment process will be conducted separately from the DARPA

scientific review process and adjudicated prior to final award. For additional information on this process, please visit Proposer Instructions: Grants/Cooperative Agreements.

- DARPA is interested in whether, and to what extent, proposers are using artificial intelligence (AI) tools to contribute to Volume 1 of proposals submitted in response to DARPA solicitations. Therefore, proposers must answer the following questions on the cover sheet of Volume 1 of this solicitation:
    - 1) Did you use AI tools to assist in preparing this proposal?
    - 2) If yes, what tools did you employ?

  Any content in Volume 1 that utilized an AI tool to generate information, assist in technical understanding, or guide the technical work should have a citation and a corresponding reference in the Bibliography section of Volume 1. The citation should specify the tool, content, and purpose. For example, "[AI tool] was used to understand existing state-of-the-art in manufacturing."

  NOTE – THIS INFORMATION WILL NOT BE USED FOR EVALUATION PURPOSES. Proposals will be evaluated in accordance with the Evaluation Criteria outlined in the solicitation regardless of whether AI tools were employed.

- The APEX Accelerators program, formerly known as the Procurement Technical Assistance Program (PTAP), focuses on building a strong, sustainable, and resilient U.S. supply chains by assisting a wide range of businesses that pursue and perform under contracts with the DoD, other federal agencies, state and local governments and with government prime contractors. See https://www.apexaccelerators.us/ for more information. APEX Accelerators helps businesses:
    - Complete registration with a wide range of databases necessary for them to participate in the government marketplace (e.g., SAM).
    - Identify which agencies and offices may need their products or services and how to connect with buying agencies and offices.
    - Determine whether they are ready for government opportunities and how to position themselves to succeed.
    - Navigate solicitations and potential funding opportunities.
    - Receive notifications of government contract opportunities on a regular basis.
    - Network with buying officers, prime contractors, and other businesses.
    - Resolve performance issues and prepare for audit, only if the service is needed, after receiving an award.

- Project Spectrum is a nonprofit effort funded by the DoD Office of Small Business Programs to help educate the Defense Industrial Base (DIB) on compliance. Project Spectrum is vendor-neutral and available to assist businesses with their cybersecurity and compliance needs. Their mission is to improve cybersecurity readiness, resilience, and compliance for small/medium-sized businesses and the federal manufacturing supply chain. Project Spectrum events and programs will enhance awareness of cybersecurity threats within the manufacturing, research, and development, as well as knowledge-based services sectors of the industrial base. Project Spectrum will leverage strategic partnerships within and outside of the DoD to accelerate the overall cybersecurity compliance of the DIB. www.Projectspectrum.io is a web portal that will provide resources such as individualized dashboards, a marketplace, and Pilot Program to help accelerate cybersecurity compliance.

- Per Section 8123 of the Department of Defense Appropriations Act, 2015 (Pub. L. 113-235), all grant awards must be posted on a public website in a searchable format. To comply with this requirement, proposers requesting grant awards must submit a maximum one (1) page abstract that may be

publicly posted and explains the program or project to the public. The proposer should sign the bottom of the abstract confirming the information in the abstract is approved for public release. Proposers are advised to provide both a signed PDF copy, as well as an editable (e.g., Microsoft word) copy. Abstracts contained in grant proposals that are not selected for award will not be publicly posted.

- DARPAConnect offers free resources to potential performers to help them navigate DARPA, including "Understanding DARPA Award Vehicles and Solicitations," "Making the Most of Proposers Days," and "Tips for DARPA Proposal Success." Join DARPAConnect at https://www.darpaconnect.us to leverage on-demand learning and networking resources.

- DARPA has streamlined our Broad Agency Announcements and is interested in your feedback on this new format. Please send any comments to DARPAsolicitations@darpa.mil.