Broad Agency Announcement

Multi Modal Materials Analysis (MMoMA)

Defense Sciences Office

HR001126S0013

June 17, 2026

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), Defense Sciences Office (DSO)
- **Funding Opportunity Title** – Multi Modal Materials Analysis (MMoMA)
- **Announcement Type –** Initial Announcement
- **Funding Opportunity Number –** HR001126S0013
- **Assistance Listing Number:** 12.910 Research and Technology Development
- **Dates/Time - All Times are Eastern Time Zone (ET)**
    - Posting Date: June 17, 2026
    - Proposers Day: June 23, 2026
    - Question Submittal Closed: July 1, 2026, at 4:00 p.m.
    - Proposal Abstract Due Date: July 8, 2026, at 4:00 p.m.
- **Anticipated individual awards** - Multiple awards are anticipated.
- **Types of instruments that may be awarded** – Procurement contracts, cooperative agreements, or Other Transaction Agreements for Prototype.
- **NAICS Code**: 541715
- **Agency contact**

    Points of Contact
    - The BAA Coordinator for this effort may be reached at: MMoMA@darpa.mil
    - DARPA/DSO
      ATTN: HR001126S0013
      675 North Randolph Street
      Arlington, VA 22203-2114

SECTION I: FUNDING OPPORTUNITY DESCRIPTION

The Defense Advanced Research Projects Agency (DARPA) is soliciting innovative solutions in the technical area of materials analysis, including surface and bulk analysis of molecular structure, elemental composition, trace elements and isotope ratios in samples, to be conducted under ambient conditions, without the need for special sample preparation. Proposed research should investigate innovative approaches that enable revolutionary advances in science, devices, or systems. Specifically excluded is research that primarily results in evolutionary improvements to the existing state of practice.

1.1 INTRODUCTION

The Multi Modal Materials Analysis (MMoMA) program aims to explore innovative methods to combine a single excitation source of continuously variable intensity with multiple detection methods and in-situ data fusion for assessing features such as a sample's composition, origin, production method, processing location, and/or other signatures of interest. The MMoMA goal is to swiftly extract the maximum possible amount of information from a single sample of any composition (e.g., organic, inorganic, special nuclear materials) under ambient conditions, requiring zero sample preparation. Phase 1 and Phase 2 of the MMoMA program will determine the power of this approach and lay the foundation for future field deployable capabilities.

The **MMoMA vision** is to shift from the state-of-the-art (SOA) serial analysis approach to a new parallel materials analysis paradigm. The program's goal is to maximize information extraction from a sample by developing analytical capabilities that use a single configurable excitation source to generate and detect multiple surface and bulk material signatures in parallel under ambient conditions. Multimodal signature detection combined with data fusion methods will enable adaptive feedback for signature optimization during active scanning. In-situ data fusion will further enable the correlation identification in multimodal signatures, ultimately resulting in faster and better materials identification when compared to sequential analysis.

The MMoMA **Phase 1 goal** is to determine the power of multimodal materials analysis and data fusion compared to SOA sequential analysis.

The **Phase 2 goals** are to demonstrate the power of this approach in laboratory-based demonstrations with samples that represent high impact use cases, and for those use cases determine the tradeoffs between: 1) the value of each type of information, 2) the accuracy of that information, and 3) the reduced size, weight, and power (SWaP) required. MMoMA seeks to develop the ability to provide information on samples and materials (including molecular, atomic, isotope, and trace element signatures) suitable for a series of critical defense needs including supply chain integrity (e.g., verification of components and raw materials for additive manufacturing, determination of the process history and provenance of parts), forensics and attribution (e.g., conventional and nuclear forensics), and tamper detection and authentication (e.g. identification of counterfeit products, food and drug contents). Future use cases could include remote prospecting (i.e., in space), where the ability to identify unknown materials without access to traditional labs is critical.

Proposers must address these key requirements of the MMoMA program:

- **Ambient Conditions**: Sample analysis is to be conducted under ambient conditions of pressure and temperature in a laboratory (during development) or natural environment (upon deployment), not requiring samples to be placed into a vacuum chamber.
- **Sample**: A sample (specimen) may be any material (organic, inorganic, special nuclear materials) in a solid or liquid state. Gaseous samples are optional. Sample size can be assumed to be ~0.1 mm to 10 cm-scale.
- **Sample Preparation**: No sample preparation shall be necessary before analysis. Chemical purification, polishing or coating are out of scope.
- **Excitation source**: A configurable and continuously tunable source of photons (lasers), electrons, ions (particle accelerators) for generation of signatures in materials analysis. Currently available excitation sources can be adapted but the development of novel, unproven classes of excitation sources is out of scope.
- **Surface Analysis**: Analysis of the top few microns of samples, analysis of molecular structure, (trace) elemental composition and isotope content.
- **Bulk Analysis**: Determination of elemental composition, trace element and isotope content in cm-scale and larger specimens to a depth of 10 cm of steel. An approach for radiography with penetrating radiation should be included.
- **Detectors**: The program is not prescriptive regarding detectors, spectrometers and mass analyzers (including for optical photons, x-rays, gammas, neutrons, molecular and atomic ions). Detectors should cover signatures across a broad range (e.g., photon energies) as resulting from excitations that are scanned continuously across a range of intensities. Currently available detectors can be adapted but the development of novel, unproven classes of detectors is out of scope.
- **Data Fusion**: Multimodal data fusion combines information from multiple detectors and spectrometers to provide in-situ feedback during analysis scans and to create N-dimensional data landscapes for correlation analysis, aiding the ability to pinpoint specimens with increased accuracy compared to single-modality systems.
- **Field-deployable**: For design purposes, proposers should consider a cargo or flat-bed truck as a target platform vehicle for future field-deployable capability and for estimating SWaP constraints. In Phase 1 and Phase 2, performers will conduct laboratory experiments to lay the foundations for a future field-deployable capability.

In addition to specifying how the proposed solutions will address the above constraints, successful submissions must also provide the following, including a clear technical justification for the approach in each aspect and category:

1. Description of the proposed multimodal materials analysis capability with a single, configurable excitation source (e.g., laser, particle accelerator) capable of supporting an integrated system that maximizes the amount of useful information from a material sample, providing insight into its molecular structure, elemental composition, trace element content, and isotope ratios.
2. Methods for surface analysis (top few microns of a sample) for characterization of:
    a. Molecular structure
    b. Elemental composition (≤0.1 atomic %)
    c. Trace element content (<1 ppm)
    d. Isotope ratios of main elements (with δ~20, e.g. for $^{13}C/^{12}C$, with δ = (ratio in analyte/ratio in standard - 1) * 1000).

3. Methods for bulk analysis for characterization of elemental composition, trace element content and isotope ratios, complementing surface analysis. Bulk analysis methods must be able to characterize specimens to a depth roughly equivalent to 10 cm in steel and include a radiography option (i.e., with energetic x-rays and/or neutrons).
4. An integrated multimodal data fusion module that structures the signature data produced by the surface and bulk analysis methods and identifies correlations in signatures. Data fusion will provide adaptive in-situ feedback during excitation intensity scans that analyze a sample. A strategy for developing automated, integrated workflows should be included, with an explanation of how they will lead to a quantifiable information advantage.

Specifically excluded from this effort:

1. Developing unproven, low TRL (≤3) excitation sources and detectors. Adaptations of existing excitation sources and detectors are in scope.
2. Surface and/or bulk material analysis detectors that will not work with samples under ambient conditions of temperature and pressure or that require specialized sample preparation.
3. Bulk analysis methods incapable of characterizing materials across a depth equivalent of about 10 cm of steel.
4. Data fusion techniques that are not capable of integrating data from surface and bulk analysis methods, and that cannot provide adaptive feedback during analysis scans in real-time.
5. Techniques incompatible with integration into a field-deployable capability.

1.2 PROGRAM STRUCTURE AND SCOPE

The MMoMA program is a 36-month effort structured into two initial phases with four complementary Focus Areas (FAs). Proposers must address both phases and all four FAs in their abstract.

- Focus Area 1: Integrated Materials Analysis.
  - Goal: Design, build, and demonstrate a proof-of-concept capability (laboratory based) that uses a single, configurable excitation source to generate multiple signatures (molecular, elemental composition, trace elements, isotope ratios) across a continuous range of excitation intensity from a sample for surface and bulk analysis.
- Focus Area 2: Foundations for Surface Analysis.
  - Goal: Develop novel methods for multimodal surface analysis utilizing FA1's capabilities and FA4's optimization. Perform design studies and proof-of-concept experiments for an advanced, single-source architecture capable of surface analysis.
- Focus Area 3: Foundations for Bulk Analysis.
  - Goal: Develop novel methods for multimodal bulk analysis utilizing FA1's capabilities and FA4's optimization. Perform design studies and proof-of-concept experiments for an advanced, single-source architecture capable of penetrating bulk analysis.
- Focus Area 4: Multimodal Data Fusion.
  - Goal: Design, build, and demonstrate the ability to process multimodal surface and bulk analysis data in-situ for real time adaptive feedback during analysis scans with

varying excitation intensities. Demonstrate optimization of selected signatures during analysis trials based on adaptive feedback. Explore novel correlations in multimodal signatures that support sample analysis and identification. Other external data sources may be integrated into data fusion models in addition.

Addressing the four focus areas of MMoMA will require expertise from diverse technical domains, including: lasers and particle accelerators; surface analysis techniques based on optical spectrometry, mass spectrometry, molecular spectrometry, x-ray spectrometry, gamma spectrometry, neutron spectrometry; bulk analysis by gamma and neutron spectrometry, radiography; multi-channel, event-mode data acquisition; data fusion methods.

Proposers are strongly encouraged to submit novel ideas for integrated workflows and for data usage in MMoMA systems, such as correlations between signatures from a given excitation pulse and spatial location on a sample or tuning of excitation conditions to optimize spatiotemporal correlations. Proposers are highly encouraged to create integrated teams across technical areas.

1.2.1 Phase 1

During Phase 1 (18 months) performers will focus on developing proof-of-concept capabilities and demonstrating the value of multimodal excitation, detection, and data fusion capabilities by analyzing samples and comparing results to SOA sequential analysis practices. These capabilities will be used to demonstrate the ability to analyze solid and liquid samples and generate at least four distinct signatures (one from each class: molecular, elemental, trace elemental and isotopic).

Performers will:

- Implement and adapt a single excitation source capable of analyzing samples and generating excitations of molecular, atomic and nuclear signatures. Further, including the ability to scan the excitation intensity continuously for optimization of selected signatures with in-situ feedback.
- Integrate a series of spectrometers and detectors that capture emissions as the excitation intensity is scanned to extract the maximum amount of information from a sample for surface and bulk analysis.
- Demonstrate multimodal excitation and detection capabilities.
- Develop data fusion methods that can analyze data of signature streams in real time to provide in-situ adaptive feedback to modules (spectrometers, detectors, and the excitation source) during analysis scans.
    - The development of data fusion models will procced in parallel to capability development including with use of simulated data and data from conventional sequential analysis of samples of interest.
    - Other data sources and reference materials may be integrated as well.
    - Performers will be expected to explore novel correlations and signatures that become accessible during scans of excitation intensities, including novel types of spatiotemporal correlations in emissions that could complement information from standard signatures.

At the end of Phase 1, performer's systems will be expected to answer questions such as: Where did this sample come from? Who made it? Was it altered? As an example, consider an aircraft

component made by additive manufacturing – MMoMA systems should be able to determine the manufacturing locations, shipping ports, constituent materials, any deviations from expected materials, and more, in-situ, without sample preparation, under ambient conditions.

Performers will conduct round-robin studies, and an Independent Verification and Validation (IV&V) team (a Government team) will compare the data obtained from multimodal signatures and data fusion to those obtained through a series of separate SOA capabilities with no data correlation analysis. The results from these round-robin studies will inform the decision to continue into Phase 2 and any down-selections. For additional details, see Program Evaluation and Metrics.

Phase 1 Goals:

- Multimodal Capability Development: Proof-of-concept multimodal capability for measuring of solid and liquid samples at ambient temperatures without sample preparation. No size constraints in place for Phase 1, but initial evaluation of a development path to a transportable capability is required.
- Integrated Signature Generation: Generation of at least four distinct material signatures from a single sample multimodal capabilities. The suite of signatures must include at least one from each of the following classes for surface analysis:
  - Molecular structure
  - Elemental composition
  - Trace elements
  - Isotope ratios

  and the following four classes for bulk analysis:
  - Elemental composition
  - Trace elements
  - Isotope ratios
  - Options for a form of radiography.
- Data Fusion Advantage: Provide evidence that parallel analysis with data fusion provides a significant information advantage for material analysis compared to SOA sequential analysis. Data shall include data from a series of detection modules, from signature analysis, and can include additional information from external data sources. Data Fusion is expected to contribute to success in multiple ways:
  - Demonstrating that relatively lower quality (i.e., in sensitivity or specificity) signatures can be utilized to achieve the same or better performance than best-in-class stand-alone materials analysis capabilities.
  - Demonstrating, for a set of blind fiducial samples, a quantifiably superior material identification capability compared to the sequential application of SOA techniques.
  - Correctly identifying a counterfeit material that SOA methods fail to distinguish from the genuine article.
  - Identifying which signature and detection modes are the most essential, and which contribute to a lesser degree to the quality of materials analysis and identification.

1.2.2 Phase 2

Phase 2 (18 months) will focus on refining multimodal signatures as well as studying the feasibility of developing a future field-deployable MMoMA capability. Development will be

driven by expanding the number of samples to cover five high impact use cases, requiring answers to questions such as fraud detection and provenance, with time to results as a key metric.

Performers will:

- Develop a configurable excitation source (including intensity and pulse structure) with the ability to optimize signals and reduce noise.
- Add additional measurement capabilities if needed based on Phase 1 results and Phase 2 use cases.
- Develop the hardware needed for near-real time adaptive feedback control of the excitation source and detectors enabling optimized operational protocols.
- Develop flexible strategies and protocols to optimize information extraction, speed, accuracy, and precision depending on the use case.
- Expand data fusion methods to all Phase 2 use cases using extensible techniques
- Demonstrate data fusion techniques using near real-time feedback control.
- Develop an initial design for a future field-deployable capability based on Phase 1 and 2 results after engaging in a design review process consisting of preliminary and critical design reviews.

Performers can anticipate a wide variety of challenges relevant to operational use cases, such as questions of process history in parts from additive manufacturing, trace element tagged samples, isotope-tagged samples, contraband simulants, tampering scenarios, attribution, and items from the stream of commerce. Realistic levels of sample background information will be provided for each use case by the IV&V team. The specific samples will be determined with input from DARPA mission partners. For additional details, see Program Evaluation and Metrics.

Phase 2 Goals:

The overall goal of Phase 2 is to prove out the utility of the multimodal approach through mission driven use cases and assess the value of a potential future field-deployable prototype.

Multimodal Capability Development:

- Expand multimodal analysis utility through successful and expedient analysis of 5 additional samples derived from identified mission partner needs. This could include adding additional analytical capabilities or improving the sensitivity of techniques developed in Phase 1
- Demonstrate near real-time feedback control and quantify potential benefits compared to sequential techniques and results from Phase 1
- Complete field-deployable system design studies based on learning from Phase 1 to examine the feasibility of making the capability mobile on a cargo or flat-bed truck. This includes ruggedization of key components and subsystems needed for operation in the field. If successful, the designs could lead to the construction of a field-deployable prototype in a follow-up program.

Integrated Signature Refinement:

- Expand signatures across the four surface and four bulk measurements developed in Phase 1 for five additional samples derived from identified mission partner needs.

Data Fusion:

- Expand algorithms to incorporate the new signatures and additional external data sources as appropriate of the five Phase 2 use cases
- Demonstrate intelligent controls for optimized automated near-real time sample analysis.
- Quantify improvements over SOA sequential analysis methods.

1.3 PROGRAM EVALUATION AND METRICS

A Government Team will serve as the IV&V team. The IV&V team will procure and develop samples for capability testing and provide baseline data sets using typical sequential analytical techniques. Fiducial samples will be provided for benchmarking and development. Use case samples will also be provided to establish ground truth sample compositions, processing times, and provenance. The selected samples will exemplify high value use cases (i.e., in forensics and supply chain integrity) with input from stakeholders and government team members.

The Phase 1 evaluation will assess initial MMoMA materials analysis performance compared to SOA serial materials analysis processes and ex situ data analysis and quantify the potential performance advantage of an optimized MMoMA capability in terms of analysis time and achievable accuracy in determination of e.g. sample provenance. Samples of interest from selected use cases will be prepared by the Government Team and analyzed by conventional, sequential analysis as well as by performers using their emerging MMoMA capabilities in initial round-robin studies.

The Phase 2 evaluation will assess optimized MMoMA materials analysis performance compared to SOA serial materials analysis processes. The comparison with SOA techniques may also be used to refine the multimodal approach, i.e., highlighting required spectral resolution and sensitivity in a signature channel needed to get reliable answers with high confidence most of the time from correlated signatures (>95%).

The nominal metrics for MMoMA (all phases) are shown in Table 1. These metrics should be taken as the minimum acceptable performance anticipated and subject to revision based on actual program performance. Proposers may suggest additional or alternative metrics to better characterize the technical approach proposed.

<table>
<tr><th colspan="4">Phase 1 Metrics</th><th colspan="3">Phase 2 Metrics</th></tr>
<tr><td colspan="4">Learn how much information we can extract from a sample by multi-modal analysis vs. SOA. Enough to warrant further evaluation of multi-modal analysis ?</td><td colspan="3">Determine if multimodal analysis is superior across a range of high impact use cases in lab demos and warrants in-field demonstrations.</td></tr>
<tr><td rowspan="5">Data Generation</td><td rowspan="5">Achieve required sensitivity, initial inter-lab studies

Initial analysis of path to field capability (van scale)</td><td>Signatures</td><td>Required sensitivity, selectivity for potential applications</td><td rowspan="5">Demonstrate Effectiveness of Multi-modal Analysis</td><td rowspan="5">Inter-lab, round-robin comparisons of multi-modal data fusion for DARPA selected challenge problems (with transition partner input)

Answers equal or exceed performance of SOA serial analysis in <5 h (sample received to answer)</td><td>Cover >90% of use cases with >95% confidence</td></tr>
<tr><td>Molecular structure</td><td>m/dm>1000 optical: ~0.1 nm, ~1 cm^{-1}</td><td rowspan="4">Example challenge problems:

• Do these components match the expected composition, structure, processing history ?</td></tr>
<tr><td>Atomic composition</td><td>≤0.1% (1E-3)</td></tr>
<tr><td>Nuclear, isotope ratios</td><td>Delta +/-20</td></tr>
<tr><td>Trace elements</td><td><1 ppm (1E-6)</td></tr>
<tr><td>Data Analysis</td><td>Multimodal data fusion</td><td colspan="2">Sets with ≥4 signature components, correlation analysis</td></tr>
<tr><td>Samples</td><td>Universal</td><td colspan="2">Solid or liquid, ~0.1 mm to 10 cm scale, any composition, analysis under ambient conditions of pressure and temperature, no sample preparation required</td><td>Samples</td><td>Universal</td><td>Any composition, ~0.1 mm to 10 cm, ambient conditions, no sample prep</td></tr>
</table>

Table 1. MMoMA metrics.

1.4 PROGRAM MILESTONES, DELIVERABLES, AND SCHEDULE

Performers must propose specific deliverables (e.g., report, data, product, prototype, etc.) that demonstrate completion of a milestone or metric. The content of each deliverable will vary from task to task but must be designed such that the government can evaluate performer progress towards the end goals of the MMoMA program.

1.4.1 Program Milestones and Deliverables

Milestones and Deliverables	
Phase 1:	- **Program Kickoff.** Deliverable: Slide deck summarizing technical approach and anticipated risks. - **Quarterly Reviews.** Deliverable: Comprehensive quarterly technical reports due within 15 days of the end of the given quarter describing progress made on the specific milestones as required in the Statement of Work (SOW). - **Phase 1 Multi-Mode Impact Assessment**, Month 16. Deliverable: Participation in round-robin studies designed by the IV&V team. - **Phase 1 Final Report and Delivery of Prototype**, Month 18. Deliverable: A written report summarizing the design concepts and results of the initial 18-month effort that includes but is not limited to outlining the design concepts of different excitation, detection and data fusion techniques and key properties used, and addressing the Phase I metrics. Teams may use materials from prior deliverables. Must be submitted within 30 days of the end of phase.

Phase 2:	- **Quarterly Reviews**. Deliverable: Comprehensive quarterly technical reports due within 15 days of the end of the given quarter describing progress made on the specific milestones as required in the (SOW). - **Preliminary Design Review**, Month 21. Deliverable: A written report and/or slide deck summarizing a transportable design concept based on Phase 1 results and learning to date. FA1: Include capability specifications, and a transportable system concept. FA2, FA3: Include design/design modifications and performance specifications. FA4: Include study algorithms, data sets, and near real-time feedback control scheme. - **Optimization Summary Report**, Month 27. Deliverable: A written report detailing lessons learned and optimizations for signature generation, detection methods and data fusion. Teams may use materials from prior deliverables. - **Critical Design Review**, Month 33. Deliverable: A written report and/or slide deck summarizing the final transportable design. Report must contain sufficient detail and assessment for a potential prototype build. FA1: Include capability specifications, and ruggedization strategies for key components and subsystems. FA2, FA3: Include final design/design modifications and performance specifications. FA4: Summary of finalized algorithms, data sets, and near real-time feedback control scheme. - **Phase 2 Impact Assessment**, Month 32. Deliverable: Participation in round-robin studies designed by the IV&V team. - **Demonstration Completion Report**, Month 35. Deliverable: A written report summarizing results and performance from five use cases. Teams may use materials from prior deliverables. - **Phase 2 Final Report and Delivery of Prototype**, Month 36. Deliverable: A written report summarizing the entire 36-month effort, addressing all metrics. This includes the detailing of the proof-of-concept of the integrated approach, with modeling results and a preliminary design of future transportable instrument. Teams may use materials from prior deliverables. Must be submitted within 30 days of the end of program.

Performers may be expected to provide other negotiated deliverables specific to the objectives of the individual efforts as determined during contract negotiations. These may include additional reports; experimental protocols; publications; data management plans; software libraries, code, and APIs, including documentation and user manuals; and/or a comprehensive assemblage of design documents, models, modeling data and results, and model validation data.

All proposals must include the following meetings and travel in the proposed schedule and costs:

- A virtual kick-off meeting will be held at the start of the program, followed by a one-day site visit by the DARPA Program Manager at the proposer's facility.

- Regular teleconference meetings will be scheduled with the government team for progress reporting, problem identification, and mitigation.
- Proposers should anticipate at least one site visit per phase by the DARPA Program Manager, usually in association with major milestones, during which they will have the opportunity to demonstrate progress towards agreed-upon milestones.
- Any additional proposed travel should be limited to critical activities only.

1.4.2. Intellectual Property and Data Rights

DARPA expects most research accomplished under MMoMA to be fundamental research. DARPA intends to retain Unlimited Rights in all MMoMA deliverables (applicable to Focus Area 1, 2, 3, and 4), including in all final reports, underlying data, and source code. Proposers that do not intend to open-source aspects of their research must explain their rationale in their proposal.

1.4.3. Program Schedule

The MMoMA program schedule is shown in the table below.

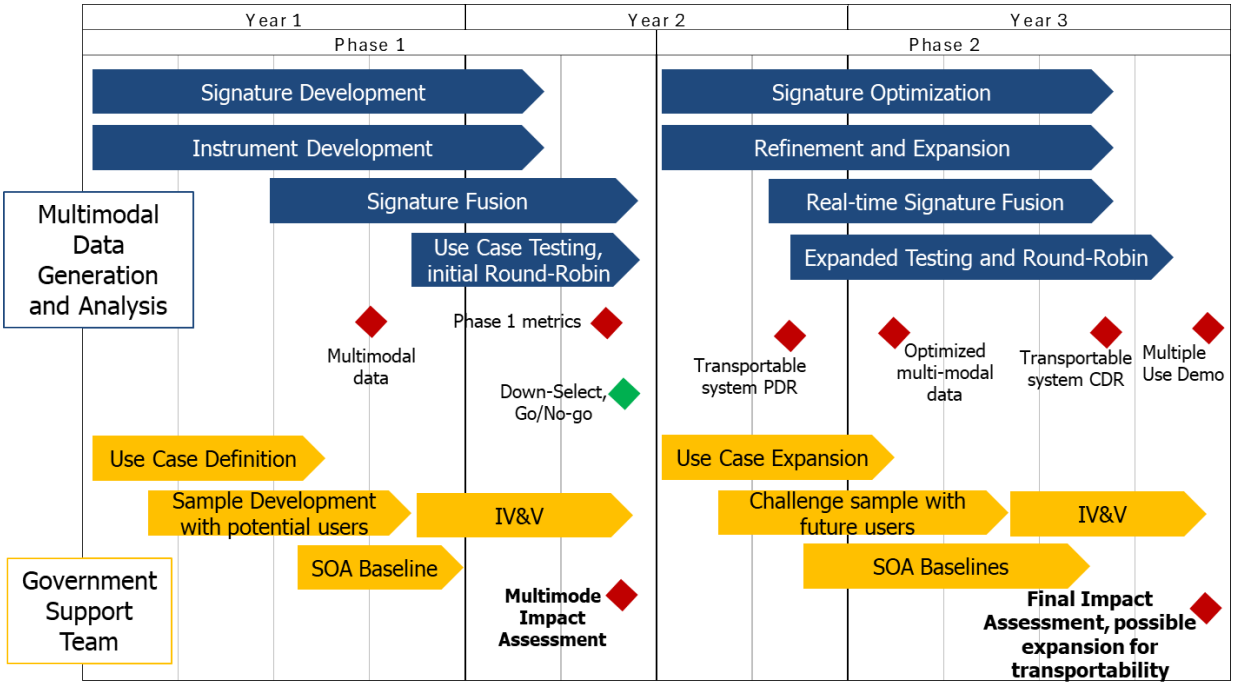

Table 2. MMoMA Program Schedule

1.5 DSO FUNDAMENTAL DEFENSE RESEARCH TALENT AWARD (FDRTA) OPTION

University proposers are invited to include an optional task for the DSO Fundamental Defense Research Talent Award (FDRTA) in their abstract, to be further elaborated on in a proposal, if invited (FDRTA is limited to one award per Prime proposer). This option is intended to foster

the development of the next generation of clearable scientific talent in strategically important areas of research by providing supplementary funding for a U.S. citizen graduate student or postdoctoral researcher involved in the proposed fundamental research.

If this option is proposed, the Government may, at its discretion, provide an additional award of up to $150,000 per year for the duration of the effort. Award of the FDRTA option is contingent upon the successful award of the base proposal. FDRTA funding decisions will be made independently based on the availability of funds and an assessment of the option's merits.

The FDRTA may be exercised only once an eligible graduate student or postdoctoral researcher has been identified and confirmed. A U.S. citizen graduate student assigned under this option can only be replaced by another U.S. citizen graduate student. If the U.S. citizen graduate student departs before the end of the option period, and no eligible replacement can be identified, the option PoP will be de-scoped to reflect the work completed, and any remaining funds will be returned to DARPA. DARPA recognizes that identifying an eligible graduate student may take time; however, the replacement process must be executed in a timely manner to ensure continued progress with the option period. Additional instructions for proposing this option will be included in the proposal instructions issued to selectable abstract submitters.

SECTION II: SUBMISSION INFORMATION

- This announcement allows for multiple award instrument types to be awarded to include Procurement Contracts, Cooperative Agreements, and Other Transaction Agreements 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.

  Proposers must review the following links:

  - **Proposer Instructions: General Terms and Conditions**: https://www.darpa.mil/about/offices/contracts-management/proposer-general-terms
  - **Procurement Contracts**: https://www.darpa.mil/about/offices/contracts-management/proposer-procurement
  - **Cooperative Agreements**: https://www.darpa.mil/about/offices/contracts-management/proposer-grants
  - **Other Transaction Agreements**: https://www.darpa.mil/about/offices/contracts-management/proposer-transactions

- All technical, contractual, and administrative questions regarding this notice must be emailed to MMoMA@darpa.mil. Emails sent directly to the Program Manager, or any other address, may result in a delayed or no response. DARPA will attempt to answer all questions in a timely manner and post a "Frequently Asked Questions" document on the DARPA website. This will be updated on an ongoing basis until the closing date listed above.

- **This solicitation outlines a strict two-step submission process for the DARPA Multi-Modal Materials Analysis (MMoMA) program.**

  - Mandatory Step 1 (Abstract): Proposers must submit an abstract.

  - Conditional Step 2 (Full Proposal): Only those evaluated as "Selectable" and formally invited by DARPA may submit a full proposal. Uninvited proposals will be rejected without evaluation.

- Mandatory Step 1 (Abstract): This solicitation contains a REQUIRED abstract phase. Proposers are required to submit an abstract to DARPA to be considered for full proposal submission. DARPA will review the abstracts in accordance with the abstract evaluation criteria detailed below and issue an Invitation to Submit a full Proposal Package to submitters of abstracts deemed selectable. Abstracts are due no later than the date and time stated in the Overview section. Additional instructions for abstract submission are contained below and within **Attachments A** and **B.**

Abstracts shall address both Phase 1 and Phase 2 and:

- Provide preliminary technical rationale of how the proposed solution can achieve the program goals and metrics, including, but not limited to, supporting empirical data, relevant literature citations, and/or calculations. Any quantitative performance figures must be supported by discussion or mathematical theory.

- Identify potential use-cases for the developed multimodal materials analysis technology and provide a clear justification for each.

Abstracts may be deemed non-conforming and not considered for further review if they:

- Present generic, boilerplate, or broadly aggregated content lacking mission-specific synthesis.
- Fail to address the entire solicitation by offering only partial solutions.
- Address only one Phase.
- Are received through mechanisms other than DARPA's Broad Agency Announcement Tool (BAAT), such as through Grants.gov or directly to the MMoMA@darpa.mil e-mail.

All proposal abstracts are required to be submitted via DARPA's Broad Agency Announcement Tool (BAAT). Please visit Proposer Instructions and General Terms and Conditions for instructions on how to submit your abstract through DARPA's BAAT.

ABSTRACT EVALUATION

Abstracts will be evaluated by DARPA using the evaluation criteria listed below in descending order of importance, and not against other abstracts submitted in response to this BAA. As stated above, proposers are required to submit an abstract for evaluation by DARPA to be considered for any subsequent award. DARPA will respond to proposed abstracts with a statement as to whether DARPA invites the submission of proposal package. Upon review of abstracts, the Government may elect to invite all, some, or none of the proposers to submit proposal package. ***Only abstract submitters invited by DARPA to submit a proposal package are eligible to provide one. Proposals submitted by entities who were not invited to submit will be deemed non-conforming and will not be evaluated.***

Abstracts will be evaluated against the following evaluation criteria outlined below.

- **Technical Rationale and Approach**: The proposed idea is innovative and addresses the technical problem posed in the Solicitation. Scientific understanding is accurate, and technical challenges are identified. The proposed idea is supported by clear calculations or preliminary data.
- **Technical Ability**: The proposer has a demonstrated ability to realistically meet the program milestones laid out in the Solicitation.
- **Relevance to the DARPA Mission:** Proposed work is likely to provide value to the DoW and contribute to innovative solutions in combining a single excitation source of continuously variable intensity with multiple detection methods and in-situ data fusion for assessing features such as a sample's composition, origin, production method, processing location, and/or other signatures of interest.
- **Cost Rough Order of Magnitude (ROM) and Task Assessment:** The tasks proposed are feasible to complete in the allotted time. The tasks collectively align to achieve the program milestones. The cost ROM is realistic and commensurate with the work proposed, including the cost ROM for the FRDTA option, if proposed.

DARPA's policy is to ensure impartial, equitable, and comprehensive abstract evaluations based on the evaluation criteria listed above and to select the source (or sources) whose abstract meets DARPA's technical, policy, and programmatic goals. DARPA will conduct a review of each conforming abstract, and all evaluations will be based solely on the evaluation criteria in this section.

For the purposes of this abstract evaluation process, DARPA defines a "selectable" abstract as follows:

- ***Selectable:*** *An abstract is considered selectable when the Government has evaluated against the evaluation criteria listed in the BAA, and the positive aspects outweigh the negative aspects.*

For the purposes of this abstract evaluation process, DARPA defines a "non-selectable" abstract as follows:

- ***Non-Selectable:*** *An abstract is considered non-selectable when the Government has evaluated it against the evaluation criteria listed in the BAA, and the positive aspects do not outweigh the negative aspects.*

ABSTRACT FEEDBACK
DARPA anticipates sending notification letters via email to all designated Technical and Administrative POC(s) for abstract submissions. Each letter will communicate one of three outcomes:

- Nonconforming: Proposers will be informed that their abstract was found nonconforming and was not reviewed. The Government's determination will be accompanied by rationale for this decision.
- Non-Selectable: Proposers will be informed that DARPA is not interested in the proposed concept and they are not invited to submit a full proposal. The Government's determination will be accompanied by rationale for this decision.
- Selectable: Proposers will be informed that DARPA is interested in the proposed concept and is inviting the submission of a full proposal. The Government's determination will be accompanied by an invitation to submit a full proposal, and proposal instructions along with any necessary attachments and templates. The Full Proposal Guidance is in Attachment C, which is provided with this solicitation for informational purposes only. While the four full proposal Evaluation Criteria detailed in Section III of this solicitation are fixed and will not change, other administrative, technical, and template details within Attachment C may be updated. The final version of Attachment C, along with the formal proposal instructions provided in the Invitation to Submit a Full Proposal, will supersede any previous information provided in this solicitation.

- **BAA Attachments**:
  - **(required and must be submitted with Abstract) Attachment A**: Abstract Summary Slide Template
  - **(required and must be submitted with Abstract) Attachment B**: Abstract Instructions and Template

SECTION III: EVALUATION CRITERIA FOR FULL PROPOSALS

DARPA will evaluate full proposals using the following criteria to abstract submitters deemed selectable. Proposals will not be evaluated against other proposals submitted against the BAA. These criteria are listed in descending order of importance: Overall scientific and technical merit,

potential contribution and relevance to the DARPA mission, cost and schedule realism, and proposer's capabilities or related experience. These criteria will remain unchanged in the invitation to submit a full proposal and will be provided in writing to all abstract submitters deemed selectable as part of their invitation package. Guidance for submitting a full proposal is provided for informational purposes in Attachment C.

- **Overall Scientific and Technical Merit**: The proposed technical approach is innovative, feasible, achievable, and complete. Detailed technical rationale is provided delineating why the proposed approach can achieve the program goals and metrics. Task descriptions and associated technical elements provided are complete and logically sequenced, with all proposed deliverables clearly defined so the final outcome of the award's work achieves the goal. 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 and Schedule Realism**: The proposed costs and schedule are realistic for the technical and management approach and accurately reflect the technical goals and objectives of the solicitation. All proposed labor, material, and travel costs are necessary to achieve the program metrics, are consistent with the proposer's SOW, and reflect a sufficient understanding of the costs and level of effort needed to successfully accomplish the proposed technical approach. The costs for the prime proposer and proposed subawardees 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). It is expected that the effort will leverage all available, relevant, prior research to obtain the maximum benefit from the available funding. For proposals containing cost share, the proposer has provided sufficient rationale regarding the appropriateness of the cost share arrangement, relative to the objectives of the proposed solution (e.g., high likelihood of commercial application, etc.). The proposed schedule aggressively pursues performance metrics in an efficient time frame that accurately accounts for the anticipated workload. The proposed schedule identifies and mitigates any potential schedule risk.

- **Proposer's Capabilities or Related Experience**: The proposer's prior experience in similar efforts clearly demonstrates an ability to deliver products that meet the proposed technical performance within the proposed budget and schedule. The proposed team has the expertise to manage the cost and schedule. Similar efforts completed/ongoing by the proposer in this area are fully described including identification of other Government sponsors.

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: General Terms and Conditions

- **BAA Attachment:**
    - **(informational and subject to administrative/technical updates; Evaluation Criteria for Full Proposals remains fixed) Attachment C**: Full Proposal Guidance

SECTION IV: 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 takes 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 solicitation, all proposal submissions are anticipated to be unclassified.
- University-Affiliated Research Centers (UARCs), Federally Funded Research and Development Centers (FFRDCs), Government Entities, and National Laboratories
- Due to their specialized roles and longstanding regulatory relationships with the Government, Federally Funded Research and Development Centers (FFRDCs), University Affiliated Research Centers (UARCs), and Government Entities to include National Laboratories present potential conflicts and advantages that would compromise fair and open competition. These entities typically may only receive funding through existing awards they hold with their sponsoring agencies. If these entities are proposed as subawardees, their costs must be clearly segregable in cost proposals. If scientifically merited, DARPA may fund work proposed by these entities with the following caveats:
- FFRDCs: (1) FFRDCs must clearly demonstrate that the proposed work is not otherwise available from the private sector. (2) FFRDCs must provide a letter, on official letterhead from their sponsoring organization, that (a) cites the specific authority establishing their eligibility to propose to Government solicitations and compete with industry, and (b) certifies the FFRDC's compliance with the associated FFRDC sponsor agreement's terms and conditions. DARPA, under this solicitation, will not award separate contracts to FFRDCs as prime or subawardees but will instead leverage their existing sponsors' agreements.
- UARCs: While UARCs typically have statutory authority to compete with industry, internal DARPA policy views them as trusted advisors who are only eligible to act as performers in fields where they do not serve in an advisory role. Even in those situations, DARPA still

considers UARCs as having organizational conflicts of interest (OCI) when applying for a performer role. Proposals with UARCs as prime or subawardees must include an OCI mitigation plan.

- For this solicitation, DARPA will not establish new contractual agreements for their participation. Accordingly, any proposal submitted directly by these entities in a prime contractor capacity may be deemed non-conforming and not evaluated. Proposals that include a UARC, FFRDC, Government entities, or National Laboratory as a subcontractor may also be deemed non-conforming unless: (1) their role is clearly defined in the technical proposal with a point of contact, and (2) a rough order of magnitude cost is provided in the technical proposal only—cost proposals must exclude their funding, as DARPA will not fund them through the prime. It is important to note that if funded, these organizations will be required to share their work and findings with other performers also supporting the same program. Additionally, DARPA may contact these entities directly to discuss proposed activities.

- As of the date of publication of this solicitation, the Government expects that program goals as described herein may be met by proposers intending to perform fundamental research and does not anticipate applying publication restrictions of any kind to individual awards for fundamental research that may result from this solicitation. Notwithstanding this statement of expectation, the Government is not prohibited from considering and selecting research proposals that, while perhaps not qualifying as fundamental research under the foregoing definition, still meet the solicitation criteria for submissions. If proposals are selected for award that offer other than a fundamental research solution, the Government will either work with the proposer to modify the proposed statement of work to bring the research back into line with fundamental research or else the proposer will agree to restrictions in order to receive an award. For additional information on fundamental research, please visit Proposer Instructions: 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: General Terms and Conditions.

- For certain research projects, it may be possible that although the research to be performed by a potential awardee is non-fundamental research, its proposed sub-awardee's effort may be fundamental research. It is also possible that the research performed by a potential awardee is fundamental research while its proposed sub-awardee'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.

- DARPA's Fundamental Research Risk-Based Security Review Process (FRRBS) 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. DARPA will create risk assessments of all proposed Senior/Key Personnel selected for negotiation of fundamental research awards (to include cooperative agreements and Other Transactions). 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 and Proposer Instructions: Other Transactions.

- The APEX Accelerators program, formerly known as the Procurement Technical Assistance Program (PTAP), focuses on building 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 government prime contractors. See www.apexaccelerators.us/ for more information.

  APEX Accelerators helps businesses:
  o Complete registration with a wide range of databases necessary for them to participate in the government marketplace (e.g., SAM).
  o Identify which agencies and offices may need their products or services and how to connect with buying agencies and offices.
  o Determine whether they are ready for government opportunities and how to position themselves to succeed.
  o Navigate solicitations and potential funding opportunities.
  o Receive notifications of government contract opportunities on a regular basis.
  o Network with buying officers, prime contractors, and other businesses.
  o 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, and 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.

- 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 www.DARPAConnect.us to leverage on-demand learning and networking resources.

- DSO has been using new solicitation formats to speed award timelines. These include Disruption Opportunities (DOs, also known as "Disruptioneering"), Advanced Research

Concepts (ARC), Pitch Days, and the accelerated award option for the Office-wide BAA. These are focused, milestone-based contracts designed to reduce negotiations and emphasize the quality of the idea and its potential for disruption over the proposer's ability to write a proposal. The milestone structure, where payment is tied to research execution rather than meeting aggressive metrics, is intended to incentivize ideas with high potential for disruption even if they are riskier. DARPA is seeking feedback regarding these mechanisms from our proposer community. Please consider completing the survey at this link: https://events.sa-meetings.com/esurvey/126974

- **Cybersecurity Maturity Model Certification (CMMC) Requirements**

Applicable to awards under this Broad Agency Announcement that will result in procurement contracts:

1. General Applicability
   a. Awards resulting from this Broad Agency Announcement (BAA) that take the form of procurement contracts are subject to the Cybersecurity Maturity Model Certification (CMMC) requirements prescribed in 32 CFR Part 170 and DFARS 252.204-7021, Cybersecurity Maturity Model Certification Requirements.
   b. The Government will designate the required CMMC level (1, 2, or 3) in each resulting contract based on the sensitivity of the information involved—Federal Contract Information (FCI) or Controlled Unclassified Information (CUI).
   c. Proposers must demonstrate compliance with the applicable CMMC level at the time of contract award and maintain that level for the duration of contract performance.
   d. CMMC requirements must be flowed down to all subcontractors whose performance involves processing, storing, or transmitting FCI or CUI.

It is anticipated that Procurement Contracts resulting from this BAA will require CMMC Level 1 compliance.

a) Applicability:
Applies when the contractor will handle Federal Contract Information (FCI) only.
b) Requirement:
Contractors shall implement the 17 basic safeguarding requirements in FAR 52.204-21, Basic Safeguarding of Covered Contractor Information Systems, and maintain practices equivalent to CMMC Level 1.
c) Assessment:
Prior to award, the proposer shall have a current CMMC Level 1 Self-Assessment recorded in the Supplier Performance Risk System (SPRS) in accordance with DFARS 252.204-7021.
d) Certification Status:
A valid and current Level 1 certification is a condition of award. Proposer that do not possess the required certification at the time of award shall be ineligible for contract award.
e) Flow-Down:
The Contractor shall ensure that any subcontractor processing, storing, or transmitting FCI also maintains a current Level 1 Self-Assessment in SPRS.

f) Verification:
The Contractor shall maintain its Level 1 certification for the full contract period. The Government will verify certification status in SPRS and may request access to assessment results or supporting evidence at any time.