Broad Agency Announcement
Modular Efficient Laser Technology (MELT)
Microsystems Technology Office
HR001122S0017
January 28, 2022

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PART I: OVERVIEW INFORMATION

- **Federal Agency Name**: Defense Advanced Research Projects Agency (DARPA), Microsystems Technology Office (MTO)
- **Funding Opportunity Title:** Modular Efficient Laser Technology (MELT)
- **Announcement Type:** Initial Announcement
- **Funding Opportunity Number:** HR001122S0017
- **Catalog of Federal Domestic Assistance Numbers (CFDA):** Not applicable.
- **Dates:** (All times listed herein are Eastern Time)
    - Posting Date: January 28, 2022
    - Proposers Day: February 18, 2022
    - Request for SCG, CUI and Classified Addendums: Must be made by February 22, 2022 at 5:00pm (ET)
    - Abstract Due Date: March 7, 2022
    - FAQ Submission Deadline: April 18, 2022
    - Proposal Due Date: May 2, 2022
    - Estimated period of performance start: October 2022
- **Concise description of the funding opportunity:** The DARPA Microsystems Technology Office seeks innovative proposals in the area of high energy laser (HEL) source technology, with the goal to demonstrate the next generation of scalable HEL sources. Because of the nature of the work, proposers will require personnel with collateral SECRET clearances and access to both an accredited facility and secure communications in order to support classified development OR proposers must team with an organization that has personnel with collateral SECRET clearances and access to both an accredited facility and secure communications in order to support classified development.
- **Anticipated Program Funding Available:** $60M over five years
- **Anticipated individual awards**: Multiple awards are anticipated
- **Anticipated funding type:** 6.3
- **Types of instruments that may be awarded:** Procurement contract or Other Transaction
- **Agency contact:**
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      DARPA/MTO
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PART II: FULL TEXT OF ANNOUNCEMENT

I. Funding Opportunity Description

The Defense Advanced Research Projects Agency (DARPA) often selects its research efforts through the Broad Agency Announcement (BAA) process. This BAA is being issued, and any resultant selection will be made, using the procedures under Federal Acquisition Regulation (FAR) 6.102(d)(2) and 35.016 and 2 C.F.R. § 200.203. Any negotiations and/or awards will use procedures under FAR 15.4, Contract Pricing. Proposals received as a result of this BAA shall be evaluated in accordance with evaluation criteria specified herein through a scientific review process.

DARPA BAAs are posted on the SAM website, under the Contract Opportunities (FBO) link, at https://sam.gov/. The following information is for those wishing to respond to the BAA.

The Microsystems Technology Office at DARPA seeks innovative proposals in the area of high energy laser (HEL) sources for directed energy applications. Of particular interest are proposals for the development of a compact, scalable, actively coherently beam combined semiconductor-based (direct diode) HEL source technology with excellent beam quality. Modular Efficient Laser Technology (MELT) aims to exploit technologies such as novel semiconductor fabrication techniques, coherent beam combining, photonic integration, and three-dimensional (3D) integration and packaging. Proposed research should investigate innovative approaches that enable revolutionary advances in devices. Specifically excluded is research that primarily results in evolutionary improvements to the existing state of practice.

Today's Laser Weapon Systems (LWS) are not scalable across the full mission space due to the use of multiple beam-combined high-power fiber amplifiers as the HEL sources and large complex optical subsystems needed to condition and project the laser beam. Alternatively, coherent beam combined tiled array HEL sources are scalable by eliminating the need for these large subsystems. Coherently beam combined tiled arrays offer a path to better HEL sources because of (1) the ability to generate and project the LWS beam directly without bulk optics, (2) the intrinsic scalability of a tiled array with no inherent limits, (3) the ability to perform non-mechanical beam steering for beam jitter corrections, and (4) the ability to apply complex phase corrections to compensate for atmospheric disturbances.

A Controlled Unclassified Information (CUI) addendum, collateral SECRET classified addendum, and collateral SECRET Security Classification Guide (SCG) has been created to provide additional details on the MELT program. Please see BAA Attachment 4 "Controlled Unclassified Information (CUI) Addendum Request Form" and BAA Attachment 5 "Security Classification Guide and Classified Addendum Request Form" for instructions on receiving these additional documents. Because of the nature of the work, proposers will require personnel with collateral SECRET clearances and access to both an accredited facility and secure communications in order to support classified development OR proposers must team with an organization that has personnel

with collateral SECRET clearances and access to both an accredited facility and secure communications in order to support classified development.

A. Background

The proliferation of small, low-cost Unmanned Aircraft Systems (UAS) on the battlefield requires a layered defense that includes low-cost Directed Energy. The deep magazines of Laser Weapon Systems (LWS) are ideally suited to counter swarms of hostile UAS. A variety of other compelling Service LWS applications have been identified, particularly since LWS have the potential to achieve very low operational cost assuming low production costs can be achieved. The market for counter UAS and other applications encompasses HEL sources with a broad range of power levels from a few kilowatts to megawatts. Today, however, each new LWS demands a high level of design and engineering.

B. Program Description

MELT seeks to develop a laser tile as the building block for compact, scalable, panelized HEL sources. It is envisioned that the laser tiles will be integrated into planar arrays for scalable HEL sources with comparable or better performance than current HEL sources.

By program end, MELT seeks to demonstrate a 3x3 panelized array of laser tiles with excellent beam quality (BQ) as a scalable HEL source.

The mass, volume, and size goals for the laser tiles and panelized array of laser tiles include the semiconductor amplifier emitters, optics, phase sensing and control, power delivery/conversion, thermal dissipation, computing, external connections, inter-tile electrical, coolant, and data connections. Excluded from the mass, volume, and size goals are the seed laser, chiller, backplane for array of tiles, and electrical and coolant leads leading to the array of tiles.

There are at least two different laser diode technologies that can generate high optical power with excellent beam quality: (1) vertical-cavity surface-emitting laser (VCSEL) diodes, and (2) edge emitting laser diodes. Both technologies are limited to watt-class output power per emitter and therefore a large number of emitters need to be combined to realize a high energy laser weapon system. The challenge in adapting these emitter technologies to directed energy applications is maintaining excellent beam quality while scaling power, which requires coherent beam combining (CBC) of the multiple individual emitters.

Single-mode VCSEL devices (500 mW) and two-dimensional (2D) arrays of single-mode VCSEL devices (100 watt-class CW power) have been grown in III-V wafers to form laser oscillators, consisting of an active region with a relatively low-gain section sandwiched between highly-reflective Bragg mirrors. Since 2D VCSEL arrays can be fabricated and tested at the wafer level, they can be manufactured cheaply, with an efficient use of semiconductor material. However, demonstrations of passive CBC of VCSEL laser oscillators configured in a common, coupled cavity geometry have shown the combining efficiency suffers severe degradation when element counts become larger than ~10. Furthermore, demonstrations using VCSEL 2D arrays have been limited to low power with poor prospects for scalability.

Arrays of single-mode edge emitters have been demonstrated at 100 watt-class continuous wave (CW) power from a monolithic 2D stack. By forming a waveguide in the wafer plane, edge emitters can achieve long interaction lengths for high gain as an optical amplifier. Operating edge-emitter devices as amplifiers with a common master oscillator has been shown to maintain high combining efficiency and high output power with element counts greater than 200. However, the semiconductor materials used to generate these amplifiers suffer from high optical loss and are poorly suited for direct photonic integration. Packaging edge-emitting devices into one-dimensional arrays is also labor intensive, with poor scaling to 2D.

To realize HEL power levels and excellent beam quality, the MELT program envisions combining the favorable attributes of both semiconductor laser technologies. Each MELT tile will contain a 2D array of laser emitters whose phase can be continuously sensed and controlled to achieve coherent beam combination. For scalable output power, several to several hundred of these tiles may be arranged as a panelized, gimbal-mounted laser weapon source that produces a directly usable output beam. The arbitrary phase control necessary to implement CBC on the panelized array can be leveraged for fine pointing and wavefront correction.

In order to realize such compact HEL sources without reduction in performance, proposed solutions must address the following Technical Challenges:

Technical Challenge #1 (TC1): Achieving a dense planar tiled array of amplifiers with uniform spacing and emission normal to the 2D surface. Achieving this challenge will require the development of new fabrication methods to assemble semiconductor amplifier emitters in 2D planar arrays. Estimates indicate that an opto-mechanical alignment tolerance with very high spatial precision will be needed to meet the goal of a planar 2D array and coherent beam combining goals. Emission from individual emitters must have excellent beam quality with Power Conversion Efficiency (PCE) comparable to fiber lasers, and the output from a large number of emitters in a dense 2D planar array must be beam-combined. Of particular interest in MELT will be architectures for which the PCE of the entire array approaches that achieved in state-of-the-art (SoA) watt-class single mode semiconductor amplifier type emitters.

Technical Challenge #2a (TC2a): Realizing a scalable phase sensing architecture for a panelized HEL source. The phase of individual semiconductor amplifiers must be measured and controlled to enable active coherent beam combining. The current state-of-the-art (SoA) architecture for coherent beam combining uses external bulk optics and detectors to estimate the phase of each optical amplifier. The configuration of the bulk optics, and the number of detectors required, depend on the control algorithm used (See TC2b, below); however, the specific volume of all current phase sensing methods scale non-linearly with the number of optical amplifiers. Achieving a scalable phase sensing architecture will require the development of new methods to perform phase sensing on the tile without external bulk optics.[1]

[1] Roberts et al., "Coherent Beam Combining Using an Internally Sensed Optical Phased Array of Frequency-Offset Phase Locked Lasers" Photonics 7, no. 4: 118. https://doi.org/10.3390/photonics7040118, (2020)

Technical Challenge #2b (TC2b): Realizing a scalable phase control architecture for a panelized HEL source. Achieving a scalable phase control architecture capable of an RMS phase error less than $\lambda/20$ at the objective closed loop bandwidth will require the development of new phase control methodologies. SoA architectures have been demonstrated with a root mean square (RMS) phase error $<\lambda/20$, sufficient to obtain a coherent HEL beam, but are limited in scalability and bandwidth.[2] Optical heterodyne detection (OHD) requires an optical reference and a detector for each channel, limiting its scalability. Locking of Optical Coherence via Single detector Electronic frequency Tagging (LOCSET) uses a single detector, however, each channel is "tagged" with a unique frequency making it infeasible to expand to high channel counts. Nested stochastic parallel gradient descent (SPGD) uses a detector for each inner loop with an additional detector for final global combination, and may have insufficient bandwidth for high channel (N) counts since the bandwidth scales as N^{-1}.

Technical Challenge #3 (TC3): Realizing a compact scalable cooling solution to remove the anticipated thermal load from a panelized HEL source. SoA cooling techniques for high-performance digital processors have demonstrated removal of significant thermal load by adding spacers to circulate coolants.[3] But using spacers will reduce the achievable density of a planar 2D array and therefore negatively affect the fill factor and associated BQ. Aperture-scale cooling of the MELT array without tremendous size and weight growth will require developing new techniques for cooling beyond those currently used in high-performance digital systems that can be integrated with the MELT tiles.

C. Program Structure

The MELT program will be a 60-month program, divided into three phases, with a 24-month Phase 1 (base), 24-month Phase 2 (option), and 12-month Phase 3 (option). It is expected that fewer performers may be funded to participate in Phase 2 and Phase 3 of the program. Options may be exercised, at the Government's sole discretion, based on technical progress measured against the metrics and milestones defined in the BAA and funding availability. Each phase has a specific technical goal.

All proposals in response to this BAA must address all three phases. Partial submissions will be considered nonconforming and will not be evaluated.

[2] Shay et al., "Self-Synchronous and Self-Referenced Coherent Beam Combination for Large Optical Arrays" Selected Topics in Quantum Electronics, IEEE Journal of. 13. 480 – 486, https://doi.org/10.1109/JSTQE.2007.897173, (2007)

[3] Bar-Cohen et al., "The ICECool Fundamentals Effort on Evaporative Cooling of Microelectronics" IEEE Trans. Components, Packaging and Manufacturing Technology, https://doi.org/10.1109/TCPMT.2021.3111114, (2021)

D. Technical Area

The goal of this program is to develop a mass-producible, low Size, Weight, and Power (SWaP), scalable laser source. This will require the development of a new type of HEL source, as current HEL technologies are very complex, have high part counts, and require skilled labor to manufacture and assemble. In addition, due to the use of brightness converters, the potential for further SWaP reductions of current HEL technologies beyond SoA levels is very limited. The MELT program is thus interested only in semiconductor diode-based laser technologies that do not include optically-pumped brightness converters.

To maintain the SWAP, high beam quality, and scalability goals, beam combination is expected to be performed coherently, rather than spectrally or incoherently. Active coherent beam combination allows for advanced features which passive coherent, spectral, and incoherent combining cannot perform, such as non-mechanical beam steering and atmospheric turbulence compensation.[4, 5, 6] Therefore, passive coherent, spectral, and incoherent beam combination are not within the scope of this solicitation.

The MELT program envisions the building block of the scalable laser technology to be a single tile, which is composed of many laser emitters. These tiles shall be four-side-abuttable, which allows an array of tiles to be created in any planar configuration (e.g., MxN). Necessary support functions (e.g., power delivery/conversion, thermal dissipation, computing, phase sensing and control, and external connections) should be integrated in the tile and contained within the tile footprint to allow scalability. While any backplane used for mechanical integration of the 3x3 panelized array is not included in the mass and volume metrics, it is desirable for the backplane to be of minimal thickness. Electrical and coolant leads leading to the tiled array will also not be included in these metrics; however, inter-tile electrical, coolant and data connections are included.

The actual size of a tile will be the result of trades made by the performer. Larger size allows for fewer piece parts and a greater footprint for support functions but comes at the cost of manufacturing yield for both the semiconductor wafer and micro-optics. The number of emitters on each tile is not defined by the program; however, DARPA is particularly interested in solutions that meet the program goals for power density, beam quality, and non-mechanical beam steering. A smaller emitter pitch allows for maintaining higher beam quality across a larger steering angle, but presents challenges for packaging and thermal management. Performers may find that low power emitters of higher beam quality and smaller pitch may provide a better solution than fewer emitters operating at or near the power limit.

The need for support functions to reside within the footprint of each tile may require performers to exploit manufacturing and packaging techniques which take advantage of the third dimension

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[4] Atmospheric turbulence compensation is outside the scope of the current solicitation; however, higher active coherent beam combining bandwidths lend to more efficient atmospheric compensation which would be important for potential follow-on research.

[5] K. J. Creedon et al., "High efficiency coherent beam combining of semiconductor optical amplifiers," Opt. Lett. 37, 5006-5008, https://doi.org/10.1364/OL.37.005006 (2012)

[6] S. M. Redmond et al., "Active coherent beam combining of diode lasers," Opt. Lett. 36, 999-1001, https://doi.org/10.1364/OL.36.000999 (2011)

(i.e., through the side opposite of the emitting surface).[7] Novel methods of waste heat dissipation will also need to be developed, as emitter spacing and tile packaging will prevent diffusion in the plane of the tiles. Convective dissipation from the emitting surface will prove to be insufficient for the required run times and is not within the scope of this solicitation. Forced convection across the emitting surface is also not within the scope of this solicitation. The assumed operating environment should be room temperature (20°C to 25°C) in a laboratory.

Each tile will need optics to collimate the beams from each emitter. The design and manufacturing process for these optics are not defined by the program; however, program mass and volume metrics may necessitate microlens arrays or similar architectures. It is desired that the manufacturing of these optics adheres to the mass producibility and low- cost goals of the program. It is also desired that the prescription used for a single tile be the same for all other tiles. Solutions which create unique prescriptions for each individual tile are not within the scope of this solicitation.

The MELT program will have a single Technical Area (TA) divided into three phases as follows:

Phase 1 (base - 24 months) focuses on developing the fundamental emitter technologies (TC1), phase sensing and phase control architectures (TC2), and heterogenous integration approaches that include compact, scalable power distribution and cooling solutions (TC3). **The scope of the Phase 1 demonstration applies to a planar array of emitters, but it is not necessary to demonstrate functionality on a *full* laser tile-sized array; however, traceability to a fully-integrated laser tile must be shown.** See the key metrics and supplemental metrics, including associated footnotes, listed in the CUI and classified addendums for further details. The performer is expected to demonstrate critical functionalities, such as coherent beam combination and non-mechanical beam steering, in a laboratory. Near field and far field images will be taken by the performer to test for equal divergence and co-directionality of the emitters in the sub-tile array. The spot sizes in the far field will determine if the divergences are equal; the separation between spots will determine if the launch angles are parallel. The Government Team, as described in Section E, will witness the performer conducted tests to validate performance against the program key metrics.

Phase 2 (option 1 - 24 months) will focus on developing the fully 3D integrated laser tile with semiconductor amplifier array (TC1), phase sensing and control (TC2), and power and thermal management (TC3). Successful completion of Phase 2 will be demonstrations of the key metrics across the fully-integrated laser tile, including a full array beam combination test to show traceability to integration in a panelized array with minimal degradation in beam quality. The Government Team will witness the performer conducted tests to validate performance against the program key metrics listed in the CUI and classified addendums.

Phase 3 (option 2 - 12 months) will focus on demonstrating the laser tiles operated in a panelized configuration to show traceability to a scalable HEL source. Specifically, successful completion of Phase 3 will be a 3x3 tiled array meeting the specific mass, specific volume, output power, beam quality and steerability metrics for the panelized HEL. The Government Team will witness the

[7] S. J. Ben Yoo et al., "Heterogeneous 2D/3D photonic integrated microsystems," Microsystems & Nanoengineering 2, 16030; https://doi.org/10.1038/micronano.2016.30 (2016)

performer conducted tests to validate performance against the program key metrics, as listed in the CUI and classified addendums, at the end of Phase 3.

The program key metrics and supplemental metrics are listed in the CUI and classified addendums. The metrics were identified as the primary characteristics that will enable MELT to be a scalable HEL source. Phase 1 metrics are chosen to promote a dense planar amplifier array solution that is capable of coherent beam combination and non-mechanical beam steering. Phase 2 metrics are designed to yield a fully integrated compact laser tile solution with performance equivalent to today's SoA HEL sources. The goal of Phase 3 is to demonstrate a 3x3 panelized array of laser tiles to show traceability to a scalable HEL source.

E. Schedule/Milestones

The detailed MELT program schedule is presented in Figure 1, and a list of the MELT program events is shown in Table 1. MELT is a 60-month program with an anticipated start in October 2022. A program kickoff meeting will be held at the beginning of each phase to present the technical approach, discuss technical and programmatic items of concern, and to interact with the government team. Monthly technical interchange meetings, design reviews, and quarterly program reviews will also be held, in accordance with the schedule below, to discuss planned work, specifics of the technical approach, technical progress, and any technical or programmatic items of concern. These meetings will be used to communicate technical progress toward the metrics throughout each phase. Technical progress towards the program metrics and traceability to the next phase program metrics are the major deciding factor for continuation into subsequent phases and will be monitored through these meetings and occasional site visits by the DARPA program manager and other members of the Government Team.

The three phases of the program are structured to retire the major risks in achieving the program goals as detailed in the CUI and classified addendums. Proposals must clearly explain how the proposed approaches overcome or obviate the risks in each phase of the program.

A planned Government Team, consisting of John Hopkins University – Applied Physics Lab (JHU-APL), the Office of Naval Research (ONR), Air Force Research Laboratory (AFRL), and the U.S. Army will execute in parallel to the performer(s) throughout the five-year program. The Government Team will evaluate performer(s) progress through program review meetings, design reviews, on-site performer visits, and technical reports throughout each phase. Further, the Government Team will witness the performer conducted demonstrations at the end of each phase to validate performance against the program key metrics. The performer will provide the Government Team with the raw performance data from each demonstration for independent verification and validation. During Phase 1, the Government Team will identify off-ramps for MELT and conduct application studies. In Phase 2 and Phase 3, the Government Team will conduct risk reduction activities, mission analysis, and architecture studies. The panelized array deliverable will be made available to the transition partner(s) and Service Labs after the completion of the MELT program.

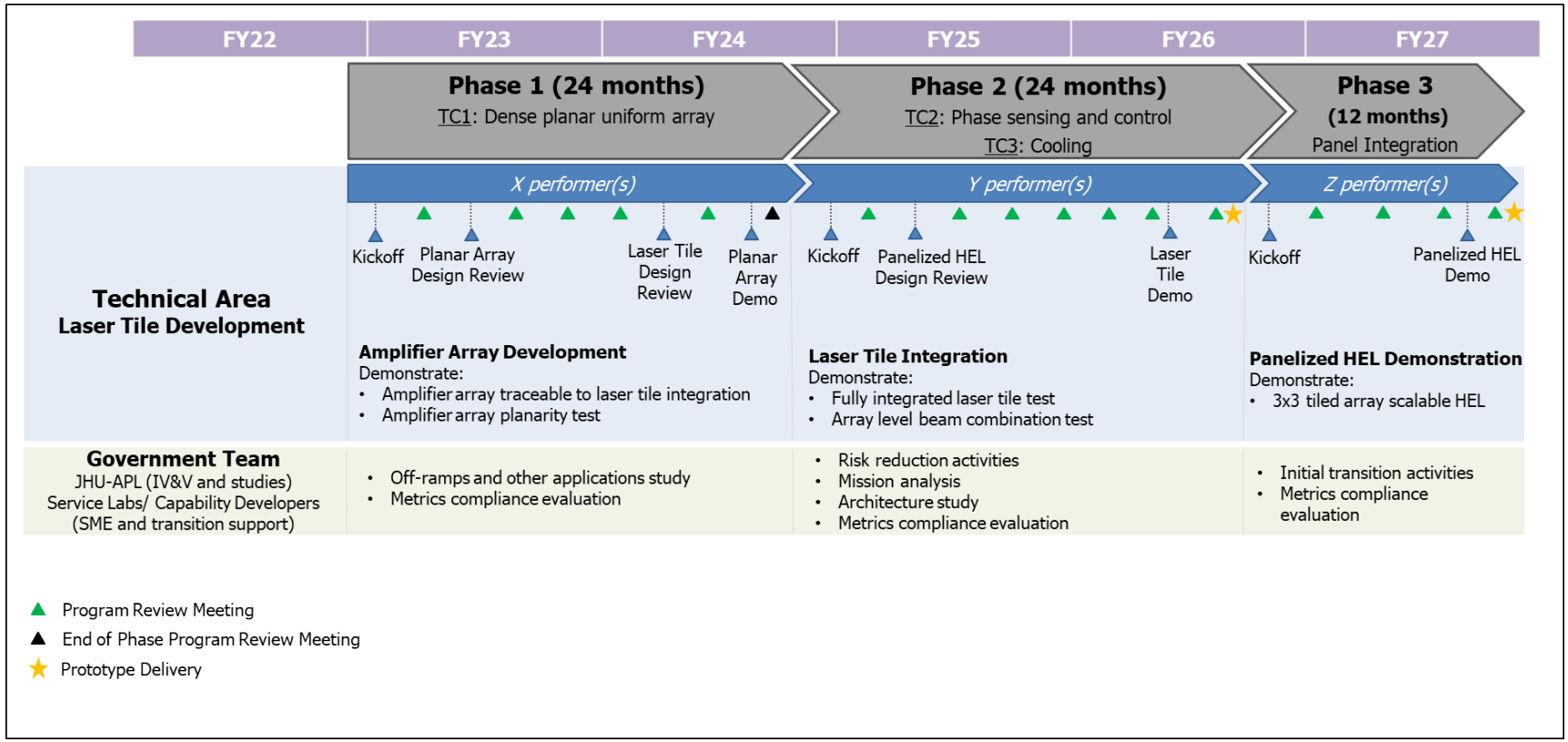

Figure 1. MELT Program Schedule

Table 1. MELT Program Event Schedule

Date*	Event	Location**
Phase 1		
Month 1	Phase 1 Kick-off Meeting	DARPA
Month 3	Program Review Meeting	Performer site
Month 6	Planar Array Design Review	Performer site
Month 9	Program Review Meeting	Virtual
Month 12	Program Review Meeting	DARPA
Month 15	Program Review Meeting	Performer site
Month 18	Laser Tile Design Review	Performer site
Month 21	Program Review Meeting	Virtual
Month 22	Planar Array Demonstration	Performer site
Month 23	End of Phase 1 Program Review Meeting	DARPA
Phase 2		
Month 25	Phase 2 Kick-off Meeting	DARPA
Month 27	Program Review Meeting	Performer site
Month 30	Panelized HEL Design Review	Performer site
Month 33	Program Review Meeting	Virtual
Month 36	Program Review Meeting	DARPA
Month 39	Program Review Meeting	Performer site
Month 42	Program Review Meeting	Performer site
Month 45	Program Review Meeting	Virtual
Month 46	Laser Tile Demonstration	Performer site
Month 47	End of Phase 2 Program Review Meeting	DARPA
Phase 3		
Month 49	Phase 3 Kick-off Meeting	DARPA
Month 51	Program Review Meeting	Performer site
Month 54	Program Review Meeting	Virtual
Month 57	Program Review Meeting	DARPA
Month 58	Panelized HEL Demonstration	Performer site
Month 59	End of Phase 3 Program Review Meeting	DARPA

* Dates are after contract award

**In person meetings may be changed to virtual meetings at the discretion of the DARPA PM.

F. Deliverables

The MELT program deliverables are listed in Table 2 and detailed below.

Table 2. MELT Program Deliverables

Date*	Deliverable
Phase 1	
Month 1	Kick-off meeting package and presentation
Month 2	Science and Technology Protection Implementation Plan
Month 6	Planar array design review package and presentation
Months 3, 6, 9, 12, 15, 18, 21	Quarterly program review reports
Months 3, 9, 12, 15, 21	Quarterly program review presentations
Month 18	Laser tile design review package and presentation
Month 22	Planar array demonstration, test plan, and test results
Month 23	End of phase program review report
Month 23	End of phase program review presentation
Months 1, 2, 4, 5, 7, 8, 10, 11, 13, 14, 16, 17, 19, 20, 22	Monthly technical reports
Months 1, 2, 4, 5, 7, 8, 10, 11, 13, 14, 16, 17, 19, 20, 22	Monthly technical status update overview slides
Months 1-24	Monthly financial reports
Month 24	Phase 1 Final Report and critical design package
Phase 2	
Month 25	Kick-off meeting package and presentation
Month 26	Science and Technology Protection Implementation Plan
Month 30	Panelized HEL design review package, presentation, and manufacturing plan
Months 27, 33, 36, 39, 42, 45	Quarterly program review reports
Months 27, 33, 36, 39, 42, 45	Quarterly program review presentations
Month 46	Laser tile demonstration, test plan, and test results
Month 47	End of phase program review report
Month 47	End of phase program review presentation
Months 25, 26, 28, 29, 30, 31, 32, 34, 35, 37, 38, 40, 41, 43, 44, 46	Monthly technical reports
Months 25, 26, 28, 29, 30, 31, 32, 34, 35, 37, 38, 40, 41, 43, 44, 46	Monthly technical status update overview slides
Months 25-48	Monthly financial reports
Month 48	Phase 2 Final Report
Month 48	Laser tile(s) and associated firmware, software, and critical design package delivery
Phase 3	
Month 49	Kick-off meeting package and presentation
Month 50	Science and Technology Protection Implementation Plan
Months 51, 54, 57	Quarterly program review reports
Months 51, 54, 57	Quarterly program review presentations
Month 58	3x3 panelized HEL demonstration, test plan, and test results

Table 2. MELT Program Deliverables - continued

Date*	Deliverable
Month 59	End of phase program review report
Month 59	End of phase program review presentation
Months 49, 50, 52, 53, 55, 56, 58	Monthly technical reports
Months 49, 50, 52, 53, 55, 56, 58	Monthly technical status update overview slides
Months 49-60	Monthly financial reports
Month 60	Phase 3 Final Report
Month 60	3x3 panelized HEL(s) and associated firmware, software, and critical design package delivery

* Dates are after contract award

1. Program Kickoff Meetings

Program kickoff meetings will be held at the beginning of each phase in the form of conferences (reference Table 1. Program Event Schedule). These meetings will typically be 1-2 days each at DARPA. Performers will provide their technical approach in the form of a presentation, technical and programmatic items of concern (risk registers), detailed spend plan, and master schedule.

2. Science and Technology Protection Implementation Plan

Performers will prepare and submit a Science and Technology Protection Implementation Plan detailing how the performer will protect program data at the appropriate level at the beginning of each program phase.

3. Program Review Meetings

Program review meetings will be held quarterly in the form of conferences. These meetings will typically be 1-2 days each at the performer's site. Performers will provide their technical and programmatic briefs in the form of presentations and will present program progress and financial summaries in individual program review sessions with the MELT Program Manager and the Government team. Prior to each program review meeting, performers will provide to the Government a written report covering technical results, how well the component(s) met, exceeded, or fell short of specified program metrics (as detailed in the CUI and classified addendums), discuss any problems/failures encountered and describe mitigation efforts, and risk registers.

4. Design Reviews

Performers are expected to deliver design review packages for each of the three design reviews, as listed in Table 1 and Table 2, to include details of design, modeling, and simulation. Performers shall prepare and submit design review packages two weeks prior to the scheduled design review. Design Reviews will be held in the form of conferences. These meetings will typically be two days each at the performer's site. Performers will provide their technical design briefs in the form of presentations for the MELT Program Manager and the Government team.

Laser tile manufacturability is critical to enabling follow-on development and demonstration of panelized array HEL sources. Performers are expected to develop a detailed manufacturing plan

which describes the path to production and delivery, within one year, of an adequate numbers of laser tiles to build and maintain a conceptual 50 kW panelized array HEL source. The manufacturing plan shall be delivered with the design review package for the Panelized Array Design Review in Phase 2.

5. Demonstrations

The performers shall work with the Government team to demonstrate – at the performer site – the planar array of emitters in Phase 1, the fully integrated laser tile in Phase 2, and the 3x3 panelized array of laser tiles in Phase 3, with the associated test plans and test results to show compliance with the program metrics in accordance with the schedule above. The performers should anticipate the need to provide assistance and supplementary information specific to the individual laser tile and panelized HEL to enable independent evaluation and validation by the Government team.

6. End of Phase Program Reviews

End-of-phase program review meetings with individual performers will be held approximately six weeks before the end of each program phase. Prior to individual end-of-phase meetings, performers will provide the Government a high-level written report covering:

a. Technical results for the current phase
b. Charts of the current phase technical results as measured by the program metrics and compared to the current phase milestones (detailed in the CUI and classified addendums), with explanations of why the results did or did not meet the milestones, and possible remediation strategies.

7. Monthly Technical Reports and Status Updates

Performers will provide technical status updates (with overview slides) during monthly technical interchange meetings (via teleconference) with the Government team, and comprehensive technical reports and master schedule shall be submitted on a monthly basis. Additional technical presentations are due prior to each subsequently scheduled program event, such as program manager site visits.

8. Monthly Financial Reports

For each calendar month of the program, the performer will submit a financial report. The financial report shall describe resources expended, resources available, any deviation from planned expenditures, and any potential financial issues requiring the attention of the Government team. This report shall be provided no later than ten (10) days after the end of the month covered by the report.

9. Final Reports

At the end of each phase, the performer will submit a detailed final report for the phase. The report shall cover the performer's effort in a comprehensive text document. The document shall cover the details of the following:

a. Technical results for the current phase
b. Charts of the current phase technical results as measured by the program metrics and compared to the current phase milestones (specified in this BAA), with explanations of why the results did or did not meet the milestones, and possible remediation strategies.
c. List of publications, copyrights, and patent applications

10. Prototype Delivery

At the conclusion of Phase 2, delivery of three (3) laser tiles and the associated firmware, software, and critical design package shall be delivered to the Government. The delivery of the three (3) laser tiles shall include the associated supporting equipment needed to enable turnkey operation of the laser tile.

At the conclusion of Phase 3, delivery of two (2) 3x3 panelized array of laser tiles and the associated critical design package shall be delivered to the Government. The delivery of the two (2) 3x3 panelized array of laser tiles shall include the associated supporting equipment needed to enable turnkey operation of the 3x3 array.

11. Other Deliverables

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, firmware and software source code, mask layouts and other physical design data, and APIs, including documentation and user manuals, and/or a comprehensive assemblage of design documents, models, modeling data and results, and model validation data. Performers also are expected to provide out-of-cycle technical reports and briefing materials at the request of the DARPA Program Manager.

G. Government Furnished Equipment/Property/Information

The MELT program does not anticipate providing Government Furnished Equipment, Property, or Information to the performers, but will consider the proposed use if clearly identified and justified in the proposal.

H. Intellectual Property

It is expected that the technology developed under MELT will have the following minimum data rights:

- It is desired that all noncommercial software (including source code), software documentation, and technical data generated by the program be provided as deliverables to the Government with no less than Government Purpose Rights (GPR) unless Unlimited Rights are otherwise appropriate, and all hardware designs and documentation with a minimum of GPR.

Any proposed use of prior intellectual property (patents, proprietary information, etc.) must be clearly identified in the proposal. If there are any intellectual property claims to future results, prototypes, or deliverables, proposer must explain how these claims may limit Government use of the technology developed under the MELT program or development of derivative technologies.

See Section IV.B.10, "Intellectual Property", and Section IV.B.2, "Section III. Other Transaction Request", if applicable. If there are no intellectual property claims, this should be stated.

II. Award Information

A. General Award Information

Multiple awards are anticipated. The amount of resources made available under this BAA will depend on the quality of the proposals received and the availability of funds.

The Government reserves the right to select for negotiation all, some, one, or none of the proposals received in response to this solicitation, and to make awards without discussions with proposers. The Government also reserves the right to conduct discussions if it is later determined to be necessary. If warranted, portions of resulting awards may be segregated into pre-priced options. Additionally, DARPA reserves the right to accept proposals in their entirety or to select only portions of proposals for award. In the event that DARPA desires to award only portions of a proposal, negotiations may be opened with that proposer. The Government reserves the right to fund proposals in phases with options for continued work at the end of one or more of the phases, as applicable.

Awards under this BAA will be made to proposers on the basis of the evaluation criteria listed below (see section labeled "Application Review Information," Sec. V.), and program balance to provide overall value to the Government. The Government reserves the right to request any additional, necessary documentation once it makes the award instrument determination. Such additional information may include but is not limited to Representations and Certifications (see Section VI.B.4., "Representations and Certifications"). The Government reserves the right to remove proposers from award consideration should the parties fail to reach agreement on award terms, conditions and cost/price within a reasonable time or the proposer fails to timely provide requested additional information. Proposals identified for negotiation may result in a procurement contract or other transaction, depending upon the nature of the work proposed, the required degree of interaction between parties, whether or not the research is classified as Fundamental Research, and other factors.

Proposers looking for innovative, commercial-like contractual arrangements are encouraged to consider requesting Other Transactions. To understand the flexibility and options associated with Other Transactions, consult http://www.darpa.mil/work-with-us/contract-management#OtherTransactions.
In accordance with 10 U.S.C. § 2371b(f), the Government may award a follow-on production contract or Other Transaction (OT) for any OT awarded under this solicitation if: (1) that participant in the OT, or a recognized successor in interest to the OT, successfully completed the entire prototype project provided for in the OT, as modified; and (2) the OT provides for the award of a follow-on production contract or OT to the participant, or a recognized successor in interest to the OT.

In all cases, the Government contracting officer shall have sole discretion to select award instrument type, regardless of instrument type proposed, and to negotiate all instrument terms and conditions with selectees. DARPA will apply publication or other restrictions, as necessary, if it determines that the research resulting from the proposed effort will present a high likelihood of disclosing performance characteristics of military systems or manufacturing technologies that are unique and critical to defense. Any award resulting from such a determination will include a requirement for DARPA permission before publishing any information or results on the program. For more information on publication restrictions, see the section below on Fundamental Research.

B. Fundamental Research

It is DoD policy that the publication of products of fundamental research will remain unrestricted to the maximum extent possible. National Security Decision Directive (NSDD) 189 defines fundamental research as follows:

> 'Fundamental research' means basic and applied research in science and engineering, the results of which ordinarily are published and shared broadly within the scientific community, as distinguished from proprietary research and from industrial development, design, production, and product utilization, the results of which ordinarily are restricted for proprietary or national security reasons.

As of the date of publication of this solicitation, the Government expects that program goals as described herein either cannot be met by proposers intending to perform fundamental research or the proposed research is anticipated to present a high likelihood of disclosing performance characteristics of military systems or manufacturing technologies that are unique and critical to defense. Therefore, the Government anticipates restrictions on the resultant research that will require the awardee to seek DARPA permission before publishing any information or results relative to the program.

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 http://www.darpa.mil/work-with-us/additional-baa.

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 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.

III. Eligibility Information

A. Eligible Applicants

All responsible sources capable of satisfying the Government's needs may submit a proposal that shall be considered by DARPA.

1. Federally Funded Research and Development Centers (FFRDCs) and Government Entities

a) FFRDCs

FFRDCs are subject to applicable direct competition limitations and cannot propose to this solicitation in any capacity unless they meet the following conditions. (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. These conditions are a requirement for FFRDCs proposing to be awardees or subawardees.

b) Government Entities

Government Entities (e.g., Government/National laboratories, military educational institutions, etc.) are subject to applicable direct competition limitations. Government Entities must clearly demonstrate that the work is not otherwise available from the private sector and provide written documentation citing the specific statutory authority and contractual authority, if relevant, establishing their ability to propose to Government solicitations and compete with industry. This information is required for Government Entities proposing to be awardees or subawardees.

c) Authority and Eligibility

At the present time, DARPA does not consider 15 U.S.C. § 3710a to be sufficient legal authority to show eligibility. While 10 U.S.C.§ 2539b may be the appropriate statutory starting point for some entities, specific supporting regulatory guidance, together with evidence of agency approval, will still be required to fully establish eligibility. DARPA will consider FFRDC and Government Entity eligibility submissions on a case-by-case basis; however, the burden to prove eligibility for all team members rests solely with the proposer.

2. Other Applicants

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.

B. Organizational Conflicts of Interest

FAR 9.5 Requirements

In accordance with FAR 9.5, proposers are required to identify and disclose all facts relevant to potential OCIs involving the proposer's organization and *any* proposed team member (subawardee, consultant). Under this Section, the proposer is responsible for providing this disclosure with each proposal submitted to the solicitation. The disclosure must include the proposer's, and as applicable, proposed team member's OCI mitigation plan. The OCI mitigation plan must include a description of the actions the proposer has taken, or intends to take, to prevent the existence of conflicting roles that might bias the proposer's judgment and to prevent the proposer from having unfair competitive advantage. The OCI mitigation plan will specifically discuss the disclosed OCI in the context of each of the OCI limitations outlined in FAR 9.505-1 through FAR 9.505-4.

Agency Supplemental OCI Policy

In addition, DARPA has a supplemental OCI policy that prohibits contractors/performers from concurrently providing Scientific Engineering Technical Assistance (SETA), Advisory and Assistance Services (A&AS) or similar support services and being a technical performer. Therefore, as part of the FAR 9.5 disclosure requirement above, a proposer must affirm whether the proposer or *any* proposed team member (subawardee, consultant) is providing SETA, A&AS, or similar support to any DARPA office(s) under: (a) a current award or subaward; or (b) a past award or subaward that ended within one calendar year prior to the proposal's submission date.

If SETA, A&AS, or similar support is being or was provided to any DARPA office(s), the proposal must include:

- The name of the DARPA office receiving the support;
- The prime contract number;
- Identification of proposed team member (subawardee, consultant) providing the support; and
- An OCI mitigation plan in accordance with FAR 9.5.

Government Procedures

In accordance with FAR 9.503, 9.504 and 9.506, the Government will evaluate OCI mitigation plans to avoid, neutralize or mitigate potential OCI issues before award and to determine whether it is in the Government's interest to grant a waiver. The Government will only evaluate OCI mitigation plans for proposals that are determined selectable under the solicitation evaluation criteria and funding availability.

The Government may require proposers to provide additional information to assist the Government in evaluating the proposer's OCI mitigation plan.

If the Government determines that a proposer failed to fully disclose an OCI; or failed to provide the affirmation of DARPA support as described above; or failed to reasonably provide additional information requested by the Government to assist in evaluating the proposer's OCI mitigation plan, the Government may reject the proposal and withdraw it from consideration for award.

C. Cost Sharing/Matching

Cost sharing is not required; however, it will be carefully considered where there is an applicable statutory condition relating to the selected funding instrument. Cost sharing is encouraged where there is a reasonable probability of a potential commercial application related to the proposed research and development effort.

For more information on potential cost sharing requirements for Other Transactions for Prototype, see http://www.darpa.mil/work-with-us/contract-management and https://acquisitioninnovation.darpa.mil.

D. Other Eligibility Criteria

1. Ability to Support Classified Development

Performers will require collateral SECRET clearances and access to both an accredited facility and secure communications in order to support classified development OR proposers must team with an organization that has personnel with collateral SECRET clearances and access to both an accredited facility and secure communications in order to support classified development. Please reference BAA Attachment 4 "Controlled Unclassified Information (CUI) Addendum Request Form" and Attachment 5 "Security Classification Guide and Classified Addendum Request Form" for additional information.

Proposers must also be able to handle Controlled Unclassified Information. All award instruments will include a CUI clause or article. See BAA Part II. Section IV.C.5. "Disclosure of Information and Compliance with Safeguarding Covered Defense Information Controls".

2. Collaborative Efforts

Collaborative efforts/teaming are strongly encouraged.

IV. Application and Submission Information

PROPOSERS ARE CAUTIONED THAT EVALUATION RATINGS MAY BE LOWERED AND/OR PROPOSALS REJECTED IF PROPOSAL PREPARATION (PROPOSAL FORMAT, CONTENT, ETC.) AND/OR SUBMITTAL INSTRUCTIONS ARE NOT FOLLOWED.

A. Address to Request Application Package

This announcement, any attachments, and any references to external websites herein constitute the total solicitation. If proposers cannot access the referenced material posted in the announcement found at www.darpa.mil, contact the administrative contact listed herein.

B. Content and Form of Application Submission

All submissions, including abstracts and proposals must be written in English with type not smaller than 12 point font. Smaller font may be used for figures, tables, and charts. Copies of all documents submitted must be clearly labeled with the DARPA BAA number, proposer organization, and proposal title/proposal short title.

1. Abstract Format

Proposers are strongly encouraged to submit an abstract in advance of a full proposal. Abstracts should follow the format described below in this section. The cover sheet should be clearly marked "ABSTRACT" and the total length of Section II should not exceed 8 pages. **Abstracts are expected to be submitted as two separate submissions; an unclassified abstract and a classified addendum.**

Section I. Administrative

A. Cover sheet to include:

(1) BAA number (HR001122S0017);
(2) Lead Organization submitting abstract;
(3) Type of organization, selected among the following categories:
Large Organization, Small Disadvantaged Organization, Other Small Organization, HBCU, MI, Other Educational, Other Nonprofit;
(4) Proposer's internal reference number (if any);
(5) Other team members (if applicable) and type of organization for each;
(6) Proposal title;
(7) Technical point of contact to include:
Salutation, last name, first name, street address, city, state, zip code (+4), telephone, fax (if available), electronic mail;
(8) Administrative point of contact to include:
Salutation, last name, first name, street address, city, state, zip code (+4), telephone, fax (if available), electronic mail;
(9) Total funds requested from DARPA, and the amount of cost share (if any); AND
(10) Date proposal abstract was submitted.

(Note: An official transmittal letter is not required when submitting a Proposal Abstract.)

Section II. Abstract Details

A. Innovative Claims

Summary of innovative claims for the proposed research. This section is the centerpiece of the abstract and should succinctly describe the uniqueness and benefits of the proposed approach relative to the current state-of-art alternate approaches.

B. Technical Approach
Technical rationale, technical approach, and constructive plan for accomplishment of technical goals in support of innovative claims and deliverable production.

C. Deliverables
Deliverables associated with the proposed research and the plans and capability to accomplish technology transition and commercialization.

D. Cost and Schedule
Provide a cost estimate for resources (e.g. labor, materials) and any subcontractors over the proposed timeline of the project, broken down by Government fiscal year.

2. Full Proposal Format

All full proposals must be in the format given below. Proposals shall consist of two volumes: Volume I – Technical and Management Proposal (3 sections), and Volume II – Cost Proposal (4 sections). The submission of other supporting materials along with the proposals is strongly discouraged and will not be considered for review. Section II of Volume I, Technical and Management Proposal, shall not exceed 25 pages. The page limitation for full proposals includes all figures, tables, and charts. There is no page limit for Volume II, Cost Proposal. **Proposals are expected to be submitted as two separate submissions; an unclassified proposal and a classified addendum.**

A summary slide of the proposed effort, in PowerPoint format, should be submitted with the proposal. A template slide is provided as Attachment 2 to the BAA. Submit this PowerPoint file in addition to Volumes I and II of your full proposal. This summary slide does not count towards the total page count.

a. Volume I, Technical and Management Proposal

Section I. Administrative

A. Cover sheet to include:
(1) BAA number (HR001122S0017);
(2) Lead Organization submitting proposal;
(3) Type of organization, selected among the following categories:
Large Organization, Small Disadvantaged Organization, Other Small Organization, HBCU, MI, Other Educational, Other Nonprofit;
(4) Proposer's internal reference number (if any);
(5) Other team members (if applicable) and type of organization for each;
(6) Proposal title;
(7) Technical point of contact to include:
Salutation, last name, first name, street address, city, state, zip code (+4), telephone, fax (if available), electronic mail;
(8) Administrative point of contact to include:

Salutation, last name, first name, street address, city, state, zip code (+4), telephone, fax (if available), electronic mail;

(9) Total funds requested from DARPA, and the amount of cost share (if any); AND

(10) Date proposal was submitted.

B. Official transmittal letter.

The transmittal letter should identify the BAA number, the proposal by name, and the proposal reference number (if any), and should be signed by an individual who is authorized to submit proposals to the Government.

Section II. Detailed Proposal Information

A. Executive Summary

Summarize the technical approach, anticipated performance, and expected outcomes of the proposed effort. The executive summary should be concise and to the point. Tables, graphs, and diagrams can be used as supplemental material along with narrative to convey the information.

B. Technical Approach

This section is the centerpiece of the proposal and should succinctly summarize the innovative claims for the proposed research and clearly describe the proposed approach without using any jargon. This section should demonstrate that the proposer has a clear understanding of the state-of-the-art and should provide sufficient justification for the feasibility of the proposed approach(es). This section should include a detailed technical rationale, technical approach, and constructive plan for accomplishment of technical goals in support of innovative claims and deliverable creation. The proposal must provide a detailed analysis of how the proposed approach will meet the MELT metrics and goals, with particular emphasis on describing the approach to meeting the program key metrics as listed in the CUI and classified addendums.

The Technical Approach should:

- Clearly state how the technical approach will address all of the technical challenges stated in the Program Description including the assumptions and rationale of the proposed emitter, phase sensing and control, and thermal dissipation technology.
- Provide a detailed description of the proposed approach for a dense planar amplifier array to include uniform emitter spacing, minimizing seams between tiles, management of manufacturing tolerances, and optics required for beam collimation.
- Provide a detailed description of the proposed strategy for sensing phase to include meeting volume metrics, inter-tile sensing solution, and compatibility with proposed phase control algorithm.
- Provide a detailed description of the proposed method for controlling phase to include assumed phase noise, physical method for manipulating phase and associated accuracy, bandwidth requirements, and scalability of algorithm.

- Provide a detailed description of the proposed method for cooling the laser tile to include heat transfer away from emitting surface, and ability to meet runtime requirements.
- Provide a detailed description of the proposed strategy for 3D integration of the laser tile to include functions incorporated within the tile footprint, and the four-side-abuttable design solution.
- Include a detailed description of the modeling, simulation, and/or test plans to show traceability during each phase to the next phase program metrics.

C. Statement of Work (SOW)

In plain English, clearly define the technical tasks/subtasks to be performed, their durations, and dependencies among them. The page length for the SOW will be dependent on the amount of the effort. The SOW must not include proprietary information. For each task/subtask, provide:

1. A general description of the objective (for each defined task/activity);
2. A detailed description of the approach to be taken to accomplish each defined task/activity;
3. Identification of the primary organization responsible for task execution (prime, sub, team member, by name, etc.);
4. The completion criteria for each task/activity - a product, event or milestone that defines its completion.
5. Define all deliverables, including laser tile and panelized HEL prototypes, supporting software and hardware, as well as reports, data, additional software, etc. to be provided to the Government in support of the proposed research tasks/activities; AND
6. Clearly identify the locations in which all tasks/subtasks (prime or subcontracted) will be performed (e.g., government lab, industrial lab, on-campus at a university, etc.)

*Note: Each phase of the program must be separately defined in the SOW. Include a SOW for each subcontractor and/or consultant in the **Cost Proposal Volume**. Do not include any proprietary information in the SOW(s).*

D. Schedules and measurable milestones

Schedules and measurable milestones for the proposed research. (Note: Measurable milestones should capture key development points in tasks and should be clearly articulated and defined in time relative to start of effort.) Where the effort consists of multiple portions which could reasonably be partitioned for purposes of funding, these should be identified as options. Additionally, proposals should clearly explain the technical approach(es) that will be employed to meet or exceed each program metric and provide ample justification as to why the approach(es) is/are feasible. The milestones must not include proprietary information.

E. Results and Technology Transfer

Description of the results, products, transferable technology, and expected technology transfer. This should also address mitigation of life-cycle and sustainment risks associated with transitioning intellectual property for U.S. military applications, if applicable. See also Section IV.B.10, "Intellectual Property." If there are no proprietary claims, this should be stated.

F. Risk Analysis and Mitigation Plan

Identify the major technical and programmatic risks in the program. Include a risk matrix. For each risk, assign a probability of occurrence on a scale of 1-10, where 10 indicates a high likelihood that the risk will impact program success, as well as an assessment of impact, also on a scale of 1-10, where 10 indicates that this risk would maximally limit the program from delivering prototypes on schedule or meeting performance objectives. For each item with total risk (likelihood × impact) exceeding 40, include a plan for mitigating the risk and assessing risk reduction.

G. Ongoing Research

Comparison with other ongoing research indicating advantages and disadvantages of the proposed effort.

H. Proposer Accomplishments

Discussion of proposer's previous accomplishments and work in closely related research areas.

I. National Security Impact Statement

To reduce the potential for unintended foreign access to critical U.S. national security technologies developed under this effort, proposals shall describe:

- How the proposed work contributes to U.S. national security and U.S. technological capabilities. The proposer may also summarize previous work that contributed to U.S. national security and U.S. technological capabilities.
- Plans and capabilities to transition technologies developed under this effort to U.S. national security applications and/or to U.S. industry. The proposer may also discuss previous technology transitions to the benefit of U.S. interests.
- Any plans to transition technologies developed under this effort to foreign governments or to companies that are foreign owned, controlled or influenced. The proposer may also discuss previous technology transition to these groups.
- How the proposer will assist its employees and agents performing work under this effort to be eligible to participate in the U.S. national security environment.

J. Facilities and Equipment

Description of the facilities and equipment that would be used for the proposed effort and how they will support meeting program metrics.

K. Teaming

Describe the formal teaming arrangements which will be used to execute this effort. Describe the programmatic relationship between investigators and the rationale for choosing this teaming strategy. Present a coherent organization chart and integrated management strategy

for the program team. For each person, indicate: (1) name, (2) affiliation, (3) abbreviated listing of all technical area tasks they will work on with roles, responsibilities, and percent time indicated, (4) discussion of the proposers' previous accomplishments, relevant expertise and/or unique capabilities.

L. Security Management

Describe security management architecture and/or approach for the proposed effort. Detail unique additional security requirements information system certification expertise for controlled unclassified information (CUI) or classified processing, OPSEC, program protection planning, test planning, transportation plans, work being performed at different classification levels, and/or utilizing test equipment not approved at appropriate classification level.

Section III. Additional Information

Information in this section may include a brief bibliography of relevant technical papers and research notes (published and unpublished) which document the technical ideas upon which the proposal is based. Copies of not more than three (3) relevant prior papers may be included in the submission.

b. Volume II, Cost Proposal – {No Page Limit}

All proposers, including FFRDCs, must submit the following:

Section I. Administrative

Cover sheet to include:

(1) BAA number (HR001122S0017);
(2) Lead Organization submitting proposal;
(3) Type of organization, selected among the following categories:
    Large Organization, Small Disadvantaged Organization, Other Small Organization, HBCU, MI, Other Educational, Other Nonprofit;
(4) Proposer's internal reference number (if any);
(5) Other team members (if applicable) and type of organization for each;
(6) Proposal title;
(7) Technical point of contact to include:
    Salutation, last name, first name, street address, city, state, zip code (+4), telephone, fax (if available), electronic mail (if available);
(8) Administrative point of contact to include:
    Salutation, last name, first name, street address, city, state, zip code (+4), telephone, fax (if available), and electronic mail (if available);
(9) Award instrument requested:
    Cost-Plus-Fixed Fee (CPFF), Cost-contract—no fee, cost sharing contract—no fee, or other type of procurement contract (*specify*), or Other Transaction;
(10) Place(s) and period(s) of performance;

(11) Total proposed cost separated by basic award and option(s), if any, by calendar year and by government fiscal year;
(12) Name, address, and telephone number of the proposer's cognizant Defense Contract Management Agency (DCMA) administration office (*if known)*;
(13) Name, address, and telephone number of the proposer's cognizant Defense Contract Audit Agency (DCAA) audit office (*if known*);
(14) Date proposal was prepared;
(15) DUNS number;
(16) TIN number;
(17) CAGE Code;
(18) Subcontractor Information;
(19) Proposal validity period (120 days is recommended); AND
(20) Any Forward Pricing Rate Agreement, other such approved rate information, or such documentation that may assist in expediting negotiations (if available).

Attachment 1, the Cost Volume Proposer Checklist, must be included with the coversheet of the Cost Proposal.

Section II. Detailed Cost Information (Prime and Subcontractors)

The proposers', to include eligible FFRDCs', cost volume shall provide cost and pricing information (See Note 1), or other than cost or pricing information if the total price is under the referenced threshold, in sufficient detail to substantiate the program price proposed (e.g., realism and reasonableness). In doing so, the proposer shall provide, for **both the prime and each subcontractor**, a "Summary Cost Breakdown" by phase and performer fiscal year, and a "Detailed Cost Breakdown" by phase, technical task/sub-task, and month. The breakdown/s shall include, at a minimum, the following major cost items along with associated backup documentation:

Total program cost broken down by major cost items:

A. Direct Labor
A breakout clearly identifying the individual labor categories with associated labor hours and direct labor rates, as well as a detailed Basis-of-Estimate (BOE) narrative description of the methods used to estimate labor costs;

B. Indirect Costs
Including Fringe Benefits, Overhead, General and Administrative Expense, Cost of Money, Fee, etc. (must show base amount and rate);

C. Travel
Provide the purpose of the trip, number of trips, number of days per trip, departure and arrival destinations, number of people, etc.;

D. Other Direct Costs
Itemized with costs; back-up documentation is to be submitted to support proposed costs;

E. Material/Equipment

(i) An itemization of any information technology (IT) purchase, as defined by FAR 2.101 – Documentation supporting the reasonableness of the proposed equipment costs (vendor quotes, past purchase orders/purchase history, detailed engineering estimates, etc.) shall be provided, including a letter stating why the proposer cannot provide the requested resources from its own funding for prime and all sub-awardees.

(ii) A priced Bill-of-Material (BOM) clearly identifying, for each item proposed, the quantity, unit price, the source of the unit price (i.e., vendor quote, engineering estimate, etc.), the type of property (i.e., material, equipment, special test equipment, information technology, etc.), and a cross-reference to the Statement of Work (SOW) task/s that require the item/s. At time of proposal submission, any item that exceeds $2,000 must be supported with basis-of-estimate (BOE) documentation such as a copy of catalog price lists, vendor quotes or a written engineering estimate (additional documentation may be required during negotiations, if selected).

(iii) If seeking a procurement contract and items of Contractor Acquired Property are proposed, exclusive of material, the proposer shall clearly demonstrate that the inclusion of such items as Government Property is in keeping with the requirements of FAR Part 45.102. In accordance with FAR 35.014, "Government property and title," it is the Government's intent that title to all equipment purchased with funds available for research under any resulting contract will vest in the acquiring nonprofit institution (e.g., Nonprofit Institutions of Higher Education and Nonprofit Organizations whose primary purpose is the conduct of scientific research) upon acquisition without further obligation to the Government. Any such equipment shall be used for the conduct of basic and applied scientific research. The above transfer of title to all equipment purchased with funds available for research under any resulting contract is not allowable when the acquiring entity is a for-profit organization; however, such organizations can, in accordance with FAR 52.245-1(j), be given priority to acquire such property at its full acquisition cost.

F. Consultants

If consultants are to be used, proposer must provide a copy of the consultant's proposed SOW as well as a signed consultant agreement or other document which verifies the proposed loaded daily / hourly rate and any other proposed consultant costs (e.g. travel);

G. Subcontracts

Itemization of all subcontracts. Additionally, the prime contractor is responsible for compiling and providing, as part of its proposal submission to the Government, subcontractor proposals prepared at the same level of detail as that required by the prime. Subcontractor proposals include Interdivisional Work Transfer Agreements (ITWA) or similar arrangements. If seeking a procurement contract, the prime contractor shall provide a cost reasonableness analysis of all proposed subcontractor costs/prices. Such analysis shall indicate the extent to which the prime contractor has negotiated subcontract costs/prices and whether any such subcontracts are to be placed on a sole-source basis.

All proprietary subcontractor proposal documentation, prepared at the same level of detail as that required of the prime, which cannot be uploaded to the DARPA BAA website (https://baa.darpa.mil, BAAT) as part of the proposer's submission, shall be made immediately

available to the Government, upon request, under separate cover (i.e., mail, electronic/email, etc.), either by the proposer or by the subcontractor organization. This does not relieve the proposer from the requirement to include, as part of their submission (via BAAT), subcontract proposals that do not include proprietary pricing information (rates, factors, etc.).

A Rough Order of Magnitude (ROM), or similar budgetary estimate, is not considered a fully qualified subcontract cost proposal submission. Inclusion of a ROM, or similar budgetary estimate, may result in the full proposal being deemed non-conforming or evaluation ratings may be lowered;

H. Cost-Sharing

The amount of any industry cost-sharing (the source and nature of any proposed cost-sharing should be discussed in the narrative portion of the cost volume).

Note 1:
(a) "Cost or Pricing Data" as defined in FAR 15.403-4 shall be required if the proposer is seeking a procurement contract per the referenced threshold, unless the proposer requests and is granted an exception from the requirement to submit cost or pricing data.
(b) Per DFARS 215.408(5), DFARS 252.215-7009, Proposal Adequacy Checklist, applies to all proposers/proposals seeking a FAR-based award (contract).
(c) In accordance with DFARS 215.403-1(4)(D), DoD has waived cost or pricing data requirements for nonprofit organizations (including educational institutions) on cost-reimbursement-no-fee contracts. In such instances where the waiver stipulated at DFARs 215.403-1(4)(D) applies, proposers shall submit information other than cost or pricing data to the extent necessary for the Government to determine price reasonableness and cost realism; and cost or pricing data from subcontractors that are not nonprofit organizations when the subcontractor's proposal exceeds the cost and pricing data threshold at FAR 15.403-4(a)(1).
(d) Per Section 873 of the FY2016 National Defense Authorization Act (Pub L. 114-92), "Pilot Program For Streamlining Awards For Innovative Technology Projects," as modified by Sections 896 of the NDAA for FY 2017 (Pub. L. 114-328) and 832 of the NDAA for FY 2021 (Pub. L. 116-283), small businesses and nontraditional defense contractors (as defined therein) are alleviated from submission of certified cost and pricing data for new contract awards valued at less than $7,500,000. In such instances where this "waiver" applies, proposers seeking a FAR-based contract shall submit information other than certified cost or pricing data to the extent necessary for the Government to determine price reasonableness and cost realism; and certified cost or pricing data from subcontractors that are not small businesses or nontraditional defense contractors when such subcontract proposals exceed the cost and pricing data threshold at FAR 15.403-4(a)(1).

Note 2:
Proposers requesting an Other Transaction who meet the definition of "nontraditional defense contractor," as defined at 10 U.S. Code § 2302(9), should submit information similar to "data other than certified cost or pricing data," as defined at FAR 2.101, to the maximum extent possible to allow for the Government to evaluate cost realism. Proposers (to include subcontractors) who do not meet the definition of a nontraditional defense contractor (who are, therefore, considered a traditional defense contractor) shall submit "data other than certified cost or pricing data." It is

incumbent on a proposer requesting an Other Transaction to provide an adequate amount of cost information needed in order for the Government to be able to evaluate cost realism. Failure to provide an adequate amount of cost information will result in the proposal being deemed non-conforming.

Note 3:
Proposers are required to provide the aforementioned cost breakdown as an editable MS Excel spreadsheet, inclusive of calculations formulae, with tabs (material, travel, ODC's) provided as necessary. The Government also requests and recommends that the Cost Proposal include MS Excel file(s) that provide traceability between the Bases of Estimate (BOEs) and the proposed costs across all elements and phases. This includes the calculations and adjustments that are utilized to generate the Summary Costs from the source labor hours, labor costs, material costs, etc. input data. It is requested that the costs and Subcontractor proposals be readily traceable to the Prime Cost Proposal in the provided MS Excel file(s) – although this is not a requirement, providing information in this manner will assist the Government in understanding what is being proposed both technically and in terms of cost realism. NOTE: If the PDF submission differs from the Excel submission, the PDF will take precedence.

Note 4:
The Government strongly encourages that proposers use the provided MS Excel™ DARPA Standard Cost Proposal Spreadsheet in the development of their cost proposals. A customized cost proposal spreadsheet may be an attachment to this solicitation. If not, the spreadsheet can be found on the DARPA website at http://www.darpa.mil/work-with-us/contract-management (under "Resources" on the right-hand side of the webpage). All tabs and tables in the cost proposal spreadsheet should be developed in an editable format with calculation formulas intact to allow traceability of the cost proposal. This cost proposal spreadsheet should be used by the prime organization and all subcontractors. In addition to using the cost proposal spreadsheet, the cost proposal still must include all other items required in this announcement that are not covered by the editable spreadsheet. Subcontractor cost proposal spreadsheets may be submitted directly to the Government by the proposed subcontractor via e-mail to the address in Part I of this solicitation. **Using the provided cost proposal spreadsheet will assist the Government in a rapid analysis of your proposed costs and, if your proposal is selected for a potential award, speed up the negotiation and award execution process**.

Any questions pertaining to use of the DARPA Standard Cost Proposal Spreadsheet, to include permitted changes and prohibited changes thereto, should be directed to costproposal@darpa.mil. Please read the instructions provided within the DARPA Standard Cost Proposal Spreadsheet, "General" tab, to include the General Spreadsheet Instruction document embedded therein. It is very important that proposers not make changes to the format of the spreadsheet where specifically instructed not to do so (to include embedding documents or supporting cost information otherwise to be included in the Volume 2 written document). Submission of the spreadsheet alone does not make for a complete Volume 2 submission. Please see proposal preparation instructions above.

Section III. Other Transaction Request, if applicable

All proposers requesting an Other Transaction (OT) must include a detailed list of payment milestones (Milestone Plan). Each milestone must include the following:

- Milestone description
- Completion/Exit criteria (to include identifying all associated data deliverables excluding those specifically providing project status)
- Due date
- Payment/funding schedule (to include, if cost share is proposed, awardee and Government share amounts)
- For each data deliverable, identify the proposed Government data rights (keeping in mind how each data deliverable will need to be used by the Government given the goals and objectives of the proposed project)

It is noted that, at a minimum, milestones should relate directly to accomplishment of program technical metrics as defined in the BAA and/or the proposer's proposal. Agreement type, expenditure or fixed-price based, will be subject to negotiation by the Agreements Officer. Do not include proprietary data.

Section IV. Other Cost Information

Where the effort consists of multiple portions which could reasonably be partitioned for purposes of funding, these should be identified as options with separate cost estimates.

The cost proposal should include identification of pricing assumptions of which may require incorporation into the resulting award instrument (i.e., use of Government Furnished Property/Facilities/Information, access to Government Subject Matter Experts, etc.).

The proposer should include supporting cost and pricing information in sufficient detail to substantiate the summary cost estimates and should include a description of the method used to estimate costs and supporting documentation.

Cost proposals submitted by FFRDC's (prime or subcontractor) will be forwarded, if selected for negotiation, to their sponsoring organization contracting officer for review to confirm that all required forward pricing rates and factors have been used.

3. Proprietary Information

Proposers are responsible for clearly identifying proprietary information. Submissions containing proprietary information must have the cover page and each page containing such information clearly marked with a label such as "Proprietary" or "Company Proprietary." Note, "Confidential" is a classification marking used to control the dissemination of U.S. Government National Security Information as dictated in Executive Order 13526 and should not be used to identify proprietary business information.

4. Security Information

a. Program Security Information

Proposers should include with their proposal any proposed solution(s) to program security requirements unique to this program. Common program security requirements include but are not limited to: operational security (OPSEC) contracting/sub-contracting plans; foreign participation or materials utilization plans; program protection plans (which may entail the following) manufacturing and integration plans; range utilization and support plans (air, sea, land, space, and cyber); data dissemination plans; asset transportation plans; classified test activity plans; disaster recovery plans; classified material / asset disposition plans and public affairs / communications plans.

b. 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.

i. CUI Proposal Markings

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 is detailed in BAA Attachment 3 "MELT Controlled Unclassified Information (CUI) Guide".

ii. CUI Submission Requirements

Unclassified submissions containing CUI may be submitted via DARPA's BAA Website (https://baa.darpa.mil) in accordance with Section IV.C.2. 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.

c. Both Classified and Unclassified Submissions

For an abstract or proposal that includes both classified and unclassified information, the document must be separated into an unclassified abstract or proposal and a classified addendum. The unclassified abstract or proposal should include as much information as possible (technical and non-technical), and use the classified addendum ONLY for classified technical information. The unclassified abstract or proposal can be submitted through the DARPA BAA Website, per the instructions in Section IV.C.2, below. The classified addendum must be provided separately, according to the instructions outlined in the 'Classified Submissions' section below.

Classified submissions shall be transmitted in accordance with the following guidance. Additional information on the subjects discussed in this section may be found at http://www.dcsa.mil/.

If a submission contains Classified National Security Information as defined by Executive Order 13526, the information must be appropriately and conspicuously marked with the proposed classification level and declassification date. Similarly, when the classification of a submission is in question, the submission must be appropriately and conspicuously marked with the proposed classification level and declassification date. Submissions requiring DARPA to make a final classification determination shall be marked as follows:

> "CLASSIFICATION DETERMINATION PENDING. Protect as though classified _____ *(insert the recommended classification level, e.g., Top Secret, Secret or Confidential).*"

NOTE: Classified submissions must indicate the classification level of not only the submitted materials, but also the classification level of the anticipated award.

Submissions containing both classified information and CUI must be appropriately and conspicuously marked with the proposed classification level as well as ensuring CUI is marked in accordance with DoDI 5200.48.

Proposers submitting classified information must have, or be able to obtain prior to contract award, cognizant security agency approved facilities, information systems, and appropriately cleared/eligible personnel to perform at the classification level proposed. All proposer personnel performing Information Assurance (IA)/Cybersecurity related duties on classified Information Systems shall meet the requirements set forth in DoD Manual 8570.01-M (Information Assurance Workforce Improvement Program).

Proposers choosing to submit classified information from other collateral classified sources (i.e., sources other than DARPA) must ensure (1) they have permission from an authorized individual at the cognizant Government agency (e.g., Contracting Officer, Program Manager); (2) the proposal is marked in accordance with the source Security Classification Guide (SCG) from which the material is derived; and (3) the source SCG is submitted along with the proposal.

When a proposal includes a classified portion, and when able according to security guidelines, we ask that proposers send an e-mail to HR001122S0017@darpa.mil as notification that there is a classified portion to the proposal. When sending the classified portion via mail according to the instructions, proposers should submit six (6) hard copies of the classified portion of their proposal and two (2) CD-ROMs containing the classified portion of the proposal as a single searchable Adobe PDF file. Please ensure that all CDs are well-marked. Each copy of the classified portion must be clearly labeled with HR001122S0017, proposer organization, proposal title (short title recommended), and "Copy X of Y".

Confidential and Secret Information
Use transmission, classification, handling, and marking guidance provided by previously issued SCGs, the DoD Information Security Manual (DoDM 5200.01, Volumes 1 - 4), and the National Industrial Security Program Operating Manual, including the Supplement Revision 1, (DoD 5220.22-M and DoD 5200.22-M Sup. 1) when submitting Confidential and/or Secret classified information.

Confidential and Secret classified information may be submitted via ONE of the two following methods:

- Hand-carried by an appropriately cleared and authorized courier to the DARPA CDR. Prior to traveling, the courier shall contact the DARPA Classified Document Registry (CDR) at 703-526-4052 to coordinate arrival and delivery.

  OR

- Mailed via U.S. Postal Service (USPS) Registered Mail or USPS Express Mail. All classified information will be enclosed in opaque inner and outer covers and double-wrapped. The inner envelope shall be sealed and plainly marked with the assigned classification and addresses of both sender and addressee.

  The inner envelope shall be addressed to:

  Defense Advanced Research Projects Agency
  ATTN: Program Security Officer, MTO
  Reference: HR001122S0017
  675 North Randolph Street
  Arlington, VA 22203-2114

  The outer envelope shall be sealed with no identification as to the classification of its contents and addressed to:

  Defense Advanced Research Projects Agency
  Security & Intelligence Directorate, Attn: CDR
  675 North Randolph Street
  Arlington, VA 22203-2114

Top Secret Information
Use classification, handling, and marking guidance provided by previously issued SCGs, the DoD Information Security Manual (DoDM 5200.01, Volumes 1 - 4), and the National Industrial Security Program Operating Manual, including the Supplement Revision 1, (DoD 5220.22-M and DoD 5200.22-M Sup. 1). Top Secret information must be hand-carried by an appropriately cleared and authorized courier to the DARPA CDR. Prior to traveling, the courier shall contact the DARPA CDR at 703-526-4052 to coordinate arrival and delivery.

Sensitive Compartmented Information (SCI)
SCI must be marked, managed and transmitted in accordance with DoDM 5105.21 Volumes 1 - 3. Questions regarding the transmission of SCI may be sent to the DARPA Technical Office PSO via the BAA mailbox or by contacting the DARPA Special Security Officer (SSO) at 703-812-1970.

Successful proposers may be sponsored by DARPA for access to SCI. Sponsorship must be aligned to an existing DD Form 254 where SCI has been authorized. Questions regarding SCI sponsorship should be directed to the DARPA Personnel Security Office at 703-526-4543.

Special Access Program (SAP) Information
SAP information must be marked in accordance with DoDM 5205.07 Volume 4 and transmitted by specifically approved methods which will be provided by the Technical Office PSO or their staff.

Proposers choosing to submit SAP information from an agency other than DARPA are required to provide the DARPA Technical Office Program Security Officer (PSO) written permission from the source material's cognizant Special Access Program Control Officer (SAPCO) or designated representative. For clarification regarding this process, contact the DARPA Technical Office PSO via the BAA mailbox or the DARPA SAPCO at 703-526-4102.

Additional SAP security requirements regarding facility accreditations, information security, personnel security, physical security, operations security, test security, classified transportation plans, and program protection planning may be specified in the DD Form 254.

> *NOTE: All proposals containing Special Access Program (SAP) information must be processed on a SAP information technology (SAP IT) system that has received an Approval-to-Operate (ATO) from the DARPA Technology Office PSO, or other applicable DARPA SAP IT Authorizing Official. The SAP IT system ATO will be based upon the Risk Management Framework (RMF) process outlined in the Joint Special Access Program Implementation Guide (JSIG), current version, (or successor document). (Note: A SAP IT system is any SAP IT system that requires an ATO. It can range from a single laptop/tablet up to a local and wide area networks.)*
>
> *The Department of Defense mandates the use of a component's SAP enterprise system unless a compelling reason exists to use a non-enterprise system. The DARPA Chief Information Officer (CIO) must approve any performer proposal to acquire, build, and operate a non-enterprise SAP IT system during the awarded period of performance. Use of the DARPA SAP enterprise system, SAVANNAH, does not require CIO approval.*
>
> *SAP IT disposition procedures must be approved in accordance with the DoD CIO Memorandum of April 20, 2020*[8].

5. Disclosure of Information and Compliance with Safeguarding Covered Defense Information Controls

The following provisions and clause apply to all solicitations and contracts; however, the definition of "controlled technical information" clearly exempts work considered fundamental research and therefore, even though included in the contract, will not apply if the work is fundamental research.

[8] The title of this memorandum is CUI and the memo is classified SECRET//HANDLE VIA SPECIAL ACCESS CHANNELS ONLY. This memorandum may be provided under separate cover.

DFARS 252.204-7000, "Disclosure of Information"
DFARS 252.204-7008, "Compliance with Safeguarding Covered Defense Information Controls"
DFARS 252.204-7012, "Safeguarding Covered Defense Information and Cyber Incident Reporting"
The full text of the above solicitation provision and contract clauses can be found at http://www.darpa.mil/work-with-us/additional-baa#NPRPAC.
Compliance with the above requirements includes the mandate for proposers to implement the security requirements specified by National Institute of Standards and Technology (NIST) Special Publication (SP) 800-171, "Protecting Controlled Unclassified Information in Nonfederal Information Systems and Organizations" (see https://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.800-171r2.pdf) and DoDI 8582.01 that are in effect at the time the solicitation is issued.
For awards where the work is considered fundamental research, the contractor will not have to implement the aforementioned requirements and safeguards. However, should the nature of the work change during performance of the award, work not considered fundamental research will be subject to these requirements.

6. Human Subjects Research (HSR)/Animal Use

Proposers that anticipate involving human subjects or animals in the proposed research must comply with the approval procedures detailed at http://www.darpa.mil/work-with-us/additional-baa, to include providing the information specified therein as required for proposal submission.

7. Approved Cost Accounting System Documentation

Proposers that do not have a Cost Accounting Standards (CAS) compliant accounting system considered adequate for determining accurate costs that are negotiating a cost- type procurement contract must complete an SF 1408. For more information on CAS compliance, see http://www.dcaa.mil/cas.html. To facilitate this process, proposers should complete the SF 1408 found at http://www.gsa.gov/portal/forms/download/115778 and submit the completed form with the proposal. To complete the form, check the boxes on the second page, then provide a narrative explanation of your accounting system to supplement the checklist on page one. For more information, see (http://www.dcaa.mil/preaward_accounting_system_adequacy_checklist.html).

8. Section 508 of the Rehabilitation Act (29 U.S.C. § 749d)/FAR 39.2

All electronic and information technology acquired or created through this BAA must satisfy the accessibility requirements of Section 508 of the Rehabilitation Act (29 U.S.C § 794d)/FAR 39.2.

9. Small Business Subcontracting Plan

Pursuant to Section 8(d) of the Small Business Act (15 U.S.C. § 637(d)) and FAR 19.702(a)(1), each proposer who is a large business concern and seeking a procurement contract that has subcontracting possibilities is required to submit a subcontracting plan with their proposal. The

plan format is outlined in FAR 19.704. As of the date of publication of this BAA, per FAR 19.702, the threshold for submission of a small business subcontracting plan is $700,000 (total contract amount including options).

10. Intellectual Property

All proposers must provide a good faith representation that the proposer either owns or possesses the appropriate licensing rights to all intellectual property that will be utilized under the proposed effort.

a. For Procurement Contracts

Proposers responding to this BAA requesting procurement contracts will need to complete the certifications at DFARS 252.227-7017. See www.darpa.mil/work-with-us/additional-baa for further information. If no restrictions are intended, the proposer should state "none." The table below captures the requested information:

Technical Data Computer Software To be Furnished With Restrictions	Summary of Intended Use in the Conduct of the Research	Basis for Assertion	Asserted Rights Category	Name of Person Asserting Restrictions
(LIST)	(NARRATIVE)	(LIST)	(LIST)	(LIST)

b. For All Non-Procurement Contracts

Proposers responding to this BAA requesting a Technology Investment Agreement or Other Transaction for Prototypes shall follow the applicable rules and regulations governing these various award instruments, but, in all cases, should appropriately identify any potential restrictions on the Government's use of any Intellectual Property contemplated under the award instrument in question. This includes both Noncommercial Items and Commercial Items. Proposers are encouraged use a format similar to that described in Paragraph a. above. If no restrictions are intended, then the proposer should state "NONE."

11. Patents

Include documentation proving your ownership of or possession of appropriate licensing rights to all patented inventions (or inventions for which a patent application has been filed) that will be utilized under your proposal for the DARPA program. If a patent application has been filed for an invention that your proposal utilizes, but the application has not yet been made publicly available and contains proprietary information, you may provide only the patent number, inventor name(s), assignee names (if any), filing date, filing date of any related provisional application, and a summary of the patent title, together with either: (1) a representation that you own the invention, or (2) proof of possession of appropriate licensing rights in the invention.

12. System for Award Management (SAM) and Universal Identifier Requirements

All proposers must be registered in SAM unless exempt per FAR 4.1102. FAR 52.204-7, "System for Award Management" and FAR 52.204-13, "System for Award Management Maintenance" are incorporated into this solicitation. See http://www.darpa.mil/work-with-us/additional-baa for further information.
International entities can register in SAM by following the instructions in this link: https://www.fsd.gov/sys_attachment.do?sys_id=c08b64ab1b4434109ac5ddb6bc4bcbb8.

13. Funding Restrictions

Not applicable.

C. Submission Information

DARPA will acknowledge receipt of all submissions and assign an identifying control number that should be used in all further correspondence regarding the submission. DARPA intends to use electronic mail correspondence regarding HR001122S0017. Submissions may not be submitted by fax or e-mail; any so sent will be disregarded.

Submissions will not be returned. An electronic copy of each submission received will be retained at DARPA and all other non-required copies destroyed. A certification of destruction may be requested, provided the formal request is received by DARPA within 5 days after notification that a proposal was not selected.

All administrative correspondence and questions on this solicitation, including requests for clarifying information on how to submit an abstract or full proposal to this BAA should be directed to HR001122S0017@darpa.mil. DARPA intends to use electronic mail for correspondence regarding HR001122S0017. Proposals and abstracts may not be submitted by fax or e-mail; any so sent will be disregarded. DARPA encourages use of the Internet for retrieving the BAA and any other related information that may subsequently be provided.

1. Submission Dates and Times

a. Abstract Due Date

Abstracts must be submitted to DARPA/MTO on or before 4:00 PM, Eastern Time, March 7, 2022. Abstracts received after this time and date may not be reviewed.

b. Full Proposal Date

Full proposals must be submitted to DARPA/MTO on or before 4:00 PM, Eastern Time, May 2, 2022, in order to be considered during the single round of selections. Proposals received after this deadline will not be reviewed.

c. Frequently Asked Questions (FAQ)

DARPA will post a consolidated Question and Answer (FAQ) document on a regular basis. To access the posting go to: http://www.darpa.mil/work-with-us/opportunities. Under the HR001122S0017 summary will be a link to the FAQ. Submit your question/s by e-mail to HR001122S0017@darpa.mil. In order to receive a response sufficiently in advance of the proposal due date, send your question/s on or before 4:00 PM, Eastern Time, April 18, 2022.

2. Abstract Submission Information

Proposers are strongly encouraged to submit an abstract in advance of a full proposal in order to provide potential proposers with a rapid response and to minimize unnecessary effort in proposal preparation and review. DARPA will acknowledge receipt of the submission and assign a control number that should be used in all further correspondence regarding the abstract.

All unclassified abstracts sent in response to HR001122S0017 shall be submitted via DARPA's BAA Website (https://baa.darpa.mil). All abstract classified addendums must be provided separately, according to the instructions outlined in the 'Both Classified and Unclassified Submissions' Section IV.B.4.c. Visit the website to complete the two-step registration process. Submitters will need to register for an Extranet account (via the form at the URL listed above) and wait for two separate e-mails containing a username and temporary password. After accessing the Extranet, submitters may then create an account for the DARPA BAA website (via the "Register your Organization" link along the left side of the homepage), view submission instructions, and upload/finalize the abstract. Proposers using the DARPA BAA Website may encounter heavy traffic on the submission deadline date; it is highly advised that submission process be started as early as possible.

All abstracts submitted electronically through the DARPA BAA Submission website must be uploaded as zip files (.zip or .zipx extension). The final zip file should only contain the document(s) requested herein and must not exceed 50 MB in size. Only one zip file will be accepted per abstract; abstracts not uploaded as zip files will be rejected by DARPA.

NOTE: YOU MUST CLICK THE 'FINALIZE PROPOSAL ABSTRACT' BUTTON AT THE BOTTOM OF THE CREATE PROPOSAL ABSTRACT PAGE. FAILURE TO DO SO WILL RESULT IN YOUR ABSTRACT NOT BEING OFFICIALLY SUBMITTED TO THIS BAA AND THEREFORE NOT BEING REVIEWED.

Please note that the DoD-issued certificate associated with the BAA website is not recognized by all commercial certificate authorities, resulting in untrusted connection errors/messages. You can either bypass the warning (possibly by adding https://baa.darpa.mil to your listed of trusted sites, or darpa.mil as a trusted domain), or visit DISA's site to download the Root Certificate Authority (CA): https://public.cyber.mil/from-iase/.

Technical support for DARPA's BAA Website may be reached at BAAT_Support@darpa.mil, and is typically available during regular business hours, (9:00 AM - 5:00 PM EST Monday - Friday).

3. Proposal Submission Information

The typical proposal should express a consolidated effort in support of one or more related technical concepts or ideas. Disjointed efforts should not be included into a single proposal. Proposals not meeting the format described in the BAA may not be reviewed. Proposals must be submitted according to the instructions outlined in the 'Both Classified and Unclassified Submissions' Section IV.B.4.c

a. For Proposers Requesting Technology Investment Agreements

Proposers requesting Technology Investment Agreements (TIA) awarded under 10 U.S.C. 2371 must include the completed form indicated below. This requirement only applies only to those who expect to receive a TIA as their ultimate award instrument.

The National Defense Authorization Act (NDAA) for FY 2019, Section 1286, directs the Secretary of Defense to protect intellectual property, controlled information, key personnel, and information about critical technologies relevant to national security and limit undue influence, including foreign talent programs by countries that desire to exploit United States' technology within the DoD research, science and technology, and innovation enterprise. This requirement is necessary for all research and research-related educational activities. The DoD is using the form below to collect the necessary information to satisfy these requirements.

The Research and Related Senior/Key Person Profile (Expanded) form, available on the Grants.gov website at https://apply07.grants.gov/apply/forms/sample/RR_KeyPersonExpanded_3_0-V3.0.pdf, will be used to collect the following information for all senior/key personnel, including Project Director/Principal Investigator and Co-Project Director/Co-Principal Investigator, whether or not the individuals' efforts under the project are funded by the DoD. The form includes 3 parts: the main form administrative information, including the Project Role, Degree Type and Degree Year; the biographical sketch; and the current and pending support. The biographical sketch and current and pending support are to be provided as attachments:

- Biographical Sketch: Mandatory for Project Directors (PD) and Principal Investigators (PI), optional, but desired, for all other Senior/Key Personnel. The biographical sketch should include information pertaining to the researchers:
    - Education and Training.
    - Research and Professional Experience.
    - Collaborations and Affiliations (for conflict of interest).
    - Publications and Synergistic Activities.
- Current and Pending Support: Mandatory for all Senior/Key Personnel including the PD/PI. This attachment should include the following information:
    - A list of all current projects the individual is working on, in addition to any future support the individual has applied to receive, regardless of the source.

- Title and objectives of the other research projects.
- The percentage per year to be devoted to the other projects.
- The total amount of support the individual is receiving in connection to each of the other research projects or will receive if other proposals are awarded.
- Name and address of the agencies and/or other parties supporting the other research projects
- Period of performance for the other research projects.

Additional senior/key persons can be added by selecting the "Next Person" button at the bottom of the form. Note that, although applications without this information completed may pass Grants.gov edit checks, if DARPA receives an application without the required information, DARPA may determine that the application is incomplete and may cause your submission to be rejected and eliminated from further review and consideration under the solicitation. DARPA reserves the right to request further details from the applicant before making a final determination on funding the effort.

b. For Proposers Requesting Contracts or Other Transaction Agreements

Proposers requesting contracts or other transaction agreements must submit unclassified proposals via DARPA's BAA Website (https://baa.darpa.mil). Note: If an account has recently been created for the DARPA BAA Website, this account may be reused. Accounts are typically disabled and eventually deleted following 75-90 days of inactivity – if you are unsure when the account was last used, it is recommended that you create a new account. If no account currently exists for the DARPA BAA Website, visit the website to complete the two-step registration process. Submitters will need to register for an Extranet account (via the form at the URL listed above) and wait for two separate e-mails containing a username and temporary password. The "Password Reset" option at the URL listed above can be used if the password is not received in a timely fashion. After accessing the Extranet, submitters may then create an account for the DARPA BAA website (via the "Register your Organization" link along the left side of the homepage), view submission instructions, and upload/finalize the proposal. Note: Even if a submitter's organization has an existing registration, each user submitting a proposal must create their own Organization Registration.

All unclassified full proposals submitted electronically through the DARPA BAA website must be uploaded as zip archives (i.e., files with a .zip or .zipx extension). The final zip archive should not exceed 100 MB in size. Only one zip archive will be accepted per submission – subsequent uploads for the same submission will overwrite previous uploads, and submissions not uploaded as zip files will be rejected by DARPA.

NOTE: YOU MUST CLICK THE 'FINALIZE FULL PROPOSAL' BUTTON AT THE BOTTOM OF THE CREATE FULL PROPOSAL PAGE. FAILURE TO DO SO WILL RESULT IN YOUR PROPOSAL NOT BEING OFFICIALLY SUBMITTED TO THIS BAA AND THEREFORE NOT BEING REVIEWED.

Classified submissions should NOT be submitted through DARPA's BAA Website (https://baa.darpa.mil), though proposers will likely still need to visit https://baa.darpa.mil to register their organization (or verify an existing registration) to ensure the BAA office can verify and finalize their submission. Proposal abstracts will not be accepted if submitted via Grants.gov.

Please note that the DoD-issued certificate associated with the BAA website is not recognized by all commercial certificate authorities, resulting in untrusted connection errors/messages. You can either bypass the warning (possibly by adding https://baa.darpa.mil to your listed of trusted sites, or darpa.mil as a trusted domain), or visit DISA's site to download the Root Certificate Authority (CA): https://public.cyber.mil/from-iase/.

Proposers using the DARPA BAA Website may encounter heavy traffic on the submission deadline date; it is highly advised that submission process be started as early as possible. Technical support for DARPA's BAA Website may be reached at BAAT_Support@darpa.mil, and is typically available during regular business hours (9:00 AM - 5:00 PM Eastern Time).

c. Classified Submission Information

See Section IV.B.4, “Security Information,” for guidance on submitting classified abstracts and proposals.

4. Other Submission

Not applicable.

V. Application Review Information

A. Evaluation Criteria

Proposals will be evaluated using the following criteria, listed in descending order of importance:

1. 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.

2. Potential Contribution and Relevance to the DARPA Mission

The potential contributions of the proposed effort are relevant to the national technology base. Specifically, DARPA’s mission is to make pivotal early technology investments that create or prevent strategic surprise for U.S. National Security.

The proposer clearly demonstrates its plans and capabilities to contribute to U.S. national security and U.S. technological capabilities. The evaluation will consider the proposer's plans and capabilities to transition proposed technologies to U.S. national security applications and to U.S. industry. The evaluation may consider the proposer's history of transitioning or plans to transition technologies to foreign governments or to companies that are foreign owned, controlled, or influenced. The evaluation will also consider the proposer's plans and capabilities to assist its employees and agents to be eligible to participate in the U.S. national security environment. In addition, the evaluation will take into consideration the extent to which the proposed intellectual property (IP) rights structure will potentially impact the Government's ability to transition the technology.

3. Cost Realism

The proposed costs are realistic for the technical and management approach and accurately reflect the technical goals and objectives of the solicitation. The proposed costs are consistent with the proposer's Statement of Work 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 in order to obtain the maximum benefit from the available funding. For efforts with a likelihood of commercial application, appropriate direct cost sharing may be a positive factor in the evaluation. DARPA recognizes that undue emphasis on cost may motivate proposers to offer low-risk ideas with minimum uncertainty and to staff the effort with junior personnel in order to be in a more competitive posture. DARPA discourages such cost strategies.

B. Review and Selection Process

1. Review Process

It is the policy of DARPA to ensure impartial, equitable, comprehensive proposal evaluations based on the evaluation criteria listed in Section V.A, and to select the source (or sources) whose offer meets the Government's technical, policy, and programmatic goals.

DARPA will conduct a scientific/technical review of each conforming proposal. Conforming proposals comply with all requirements detailed in this solicitation; proposals that fail to do so may be deemed non-conforming and may be removed from consideration. Proposals will not be evaluated against each other since they are not submitted in accordance with a common work statement. DARPA's intent is to review proposals as soon as possible after they arrive; however, proposals may be reviewed periodically for administrative reasons.

Award(s) will be made to proposers whose proposals are determined to be the most advantageous to the Government, all factors considered, including the potential contributions of the proposed work to the overall research program and the availability of funding for the effort.

It is the policy of DARPA to ensure impartial, equitable, comprehensive proposal evaluations based on the evaluation criteria listed above and to select the source (or sources) whose offer meets the Government's technical, policy, and programmatic goals. Pursuant to FAR 35.016, the primary basis for selecting proposals for acceptance shall be technical, importance to agency programs, and fund availability. In order to provide the desired evaluation, qualified Government personnel will conduct reviews and (if necessary) convene panels of experts in the appropriate areas.

2. Handling of Source Selection Information

DARPA policy is to treat all submissions as source selection information (see FAR 2.101 and 3.104), and to disclose their contents only for the purpose of evaluation. Restrictive notices notwithstanding, during the evaluation process, submissions may be handled by support contractors for administrative purposes and/or to assist with technical evaluation. All DARPA support contractors performing this role are expressly prohibited from performing DARPA-sponsored technical research and are bound by appropriate nondisclosure agreements.

Subject to the restrictions set forth in FAR 37.203(d), input on technical aspects of the proposals may be solicited by DARPA from non-Government consultants/experts who are strictly bound by the appropriate non-disclosure requirements.

3. Federal Awardee Performance and Integrity Information (FAPIIS)

Per 41 U.S.C. 2313, as implemented by FAR 9.103 and 2 CFR § 200.205, prior to making an award above the simplified acquisition threshold, DARPA is required to review and consider any information available through the designated integrity and performance system (currently FAPIIS). Awardees have the opportunity to comment on any information about themselves entered in the database, and DARPA will consider any comments, along with other information in FAPIIS or other systems prior to making an award.

VI. Award Administration Information

A. Selection Notices

1. Abstracts

DARPA will respond to abstracts with a statement as to whether DARPA is interested in the idea. If DARPA does not recommend the proposer submit a full proposal, DARPA will provide feedback to the proposer regarding the rationale for this decision. Regardless of DARPA’s response to an abstract, proposers may submit a full proposal. DARPA will review all conforming full proposals using the published evaluation criteria and without regard to any comments resulting from the review of an abstract.

2. Proposals

As soon as the evaluation of a proposal is complete, the proposer will be notified that (1) the proposal has been selected for funding pending contract negotiations, in whole or in part, or (2) the proposal has not been selected. These official notifications will be sent via email to the Technical POC identified on the proposal coversheet.

B. Administrative and National Policy Requirements

1. Meeting and Travel Requirements

All key participants are required to attend (either in-person or virtually) the program kickoff meeting. Performers should also anticipate regular program-wide PI Meetings and periodic site visits at the Program Manager's discretion.

2. Solicitation Provisions and Award Clauses, Terms and Conditions

Solicitation clauses in the FAR and DFARS relevant to procurement contracts and FAR and DFARS clauses that may be included in any resultant procurement contracts are incorporated herein and can be found at www.darpa.mil/work-with-us/additional-baa.

3. Controlled Unclassified Information (CUI) and Controlled Technical Information (CTI) on Non-DoD Information Systems

Further information on Controlled Unclassified Information identification, marking, protecting and control, to include processing on Non-DoD Information Systems, is incorporated herein and can be found at www.darpa.mil/work-with-us/additional-baa.

4. Representations and Certifications

In accordance with FAR 4.1102 and 4.1201, proposers requesting a procurement contract must complete electronic annual representations and certifications at https://www.sam.gov/.
In addition, all proposers are required to submit for all award instrument types supplementary DARPA-specific representations and certifications at the time of proposal submission. See http://www.darpa.mil/work-with-us/reps-certs for further information on required representation and certification depending on your requested award instrument.

C. Reporting

The number and types of reports will be specified in the award document, but will include as a minimum monthly technical and financial status reports. The reports shall be prepared and submitted in accordance with the procedures contained in the award document and mutually agreed on before award. Reports and briefing material will also be required as appropriate to document progress in accomplishing program metrics. A Final Report that provides detailed documentation

of the project, tasks, and results will be required at the conclusion of the performance period for the award, notwithstanding the fact that the research may be continued under a follow-on vehicle.

D. Electronic Systems

1. Wide Area Work Flow (WAWF)

Unless using another means of invoicing, performers will be required to submit invoices for payment directly via to https://wawf.eb.mil. Registration in WAWF will be required prior to any award under this BAA.

2. i-Edison

The award document for each proposal selected for funding will contain a mandatory requirement for invention disclosures (and associated elections, confirmatory instruments, etc.) and patent reports to be submitted electronically through i-Edison (https://public.era.nih.gov/iedison).

3. Vault

The award document for each proposal selected for funding will contain a mandatory requirement for technical and status reports to be submitted electronically through DARPA's
Vault (or similar) web-based tool.

4. DARPA Embedded Entrepreneur Initiative (EEI)

Awardees pursuant to this solicitation may be eligible to participate in the DARPA Embedded Entrepreneur Initiative (EEI) during the award's period of performance. EEI is a limited scope program offered by DARPA, at DARPA's discretion, to a small subset of awardees. The goal of DARPA's EEI is to increase the likelihood that DARPA-funded technologies take root in the U.S. and provide new capabilities for national defense. EEI supports DARPA's mission "to make pivotal investments in breakthrough technologies and capabilities for national security" by accelerating the transition of innovations out of the lab and into new capabilities for the Department of Defense (DoD). EEI investment supports development of a robust and deliberate Go-to-Market strategy for selling technology to government and commercial markets and positions DARPA awardees to attract U.S. investment. The following is for informational and planning purposes only and does not constitute solicitation of proposals to the EEI.

There are three elements to DARPA's EEI: (1) A Senior Commercialization Advisor (SCA) from DARPA who works with the Program Manager (PM) to examine the business case for the awardee's technology and uses commercial methodologies to identify steps toward achieving a successful transition of technology to the government and commercial markets; (2) Connections to potential industry and investor partners via EEI's Transition Working Groups; and (3) Additional funding for awardees to hire an embedded entrepreneur to achieve specific commercialization milestones and work towards the delivery of a robust transition plan for both defense and commercial markets. This embedded entrepreneur's qualifications should include business experience within the target industries of interest, experience in commercializing early

stage technology, and the ability to communicate and interact with technical and non-technical stakeholders. Funding for EEI is typically no more than $250,000 per awardee over the duration of the award. An awardee may apportion EEI funding to hire more than one embedded entrepreneur, if achieving the milestones requires different expertise that can be obtained without exceeding the awardee's total EEI funding. The EEI effort is intended to be conducted concurrent with the research program without extending the period of performance.

EEI Application Process:

After receiving an award under the solicitation, awardees interested in being considered for EEI should notify their DARPA Program Manager (PM) during the period of performance. Timing of such notification should ideally allow sufficient time for DARPA and the awardee to review the awardee's initial transition plan, identify commercial milestones to deliver under EEI, modify the award, and conduct the work required to achieve such milestones within the original award period of performance. These steps may take 18-24 months to complete, depending on the technology. If the DARPA PM determines that EEI could be of benefit to transition the technology to product(s) the Government needs, the PM will refer the performer to DARPA's Commercial Strategy team.

DARPA's Commercial Strategy team will then contact the performer, assess fitness for EEI, and in consultation with the DARPA technical office, determine whether to invite the performer to participate in the EEI. Factors that are considered in determining fitness for EEI include DoD/Government need for the technology; competitive approaches to enable a similar capability or product; risks and impact of the Government's being unable to access the technology from a sustainable source; Government and commercial markets for the technology; cost and affordability; manufacturability and scalability; supply chain requirements and barriers; regulatory requirements and timelines; Intellectual Property and Government Use Rights, and available funding.

Invitation to participate in EEI is at the sole discretion of DARPA and subject to program balance and the availability of funding. EEI participants' awards may be subsequently modified bilaterally to amend the Statement of Work to add negotiated EEI tasks, provide funding, and specify a milestone schedule which will include measurable steps necessary to build, refine, and execute a Go-to-Market strategy aimed at delivering new capabilities for national defense. Milestone examples are available at: https://www.darpa.mil/work-with-us/contract-management

Awardees under this solicitation are eligible to be considered for participation in EEI, but selection for award under this solicitation does not imply or guarantee participation in EEI.

VII. Agency Contacts

Administrative, technical or contractual questions should be sent via e-mail to HR001122S0017@darpa.mil. All requests must include the name, email address, and phone number of a point of contact.

The technical POC for this effort is:

Dr. Thomas Ehrenreich
DARPA/MTO
ATTN: HR001122S0017
675 North Randolph Street
Arlington, VA 22203-2114
Email: HR001122S0017@darpa.mil

VIII. Other Information

A. Proposers Day

The MELT Proposers Day will be held virtually on February 18, 2022. Advance registration is required for the virtual event. See DARPA-SN-22-24 posted at https://sam.gov for all details. Virtual attendance at the MELT Proposers Day is not required to propose to this solicitation.

B. Protesting

For information concerning agency level protests see http://www.darpa.mil/work-with-us/additional-baa#NPRPAC.