



Broad Agency Announcement
Enhancing Design for Graceful Extensibility (EDGE)
Defense Sciences Office
HR001121S0030
May 26, 2021

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PART I: OVERVIEW INFORMATION

- **Federal Agency Name:** Defense Advanced Research Projects Agency (DARPA), Defense Sciences Office (DSO)
- **Funding Opportunity Title:** Enhancing Design for Graceful Extensibility (EDGE)
- **Announcement Type:** Initial Announcement
- **Funding Opportunity Number:** HR001121S0030
- **Catalog of Federal Domestic Assistance (CFDA) Number(s):** 12.910 Research and Technology Development
- **Dates** (All times listed herein are Eastern Time.)
 - Posting Date: May 26, 2021
 - Proposers Day: June 1, 2021. See Section VIII.A.
 - Abstract Due Date: June 9, 2021, 4:00 p.m.
 - FAQ Submission Deadline: July 9, 2021, 4:00 p.m. See Section VIII.B.
 - Full Proposal Due Date: July 22, 2021, 4:00 p.m.
- **Anticipated Individual Awards:** DARPA anticipates multiple awards for Technical Areas 1, 2, and 3 and a single award for Testing and Evaluation Simulation Engine.
- **Types of Instruments that May be Awarded:** Procurement contracts, cooperative agreements or Other Transactions. Award instruments will be limited to procurement contracts and Other Transactions for proposers whose proposed solution includes Controlled Unclassified Information (CUI)
- **Agency contacts**
 - **Technical POC:** Bartlett Russell, Program Manager, DARPA/DSO
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 - **DARPA/DSO Opportunities Website:** <http://www.darpa.mil/work-with-us/opportunities>
- **Teaming Information:** See Section VIII.C for information on teaming opportunities.
- **Frequently Asked Questions (FAQ):** FAQs for this solicitation may be viewed on the DARPA/DSO Opportunities Website. See Section VIII.B for further information.
- **Security:** EDGE is an UNCLASSIFIED program. If proposers would like to work with Controlled Unclassified Information (CUI) or classified information please specify so in the abstract and proposal and refer to section IV.B.4.

PART II: FULL TEXT OF ANNOUNCEMENT

I. Funding Opportunity Description

This Broad Agency Announcement (BAA) constitutes a public notice of a competitive funding opportunity as described in Federal Acquisition Regulation (FAR) 6.102(d)(2) and 35.016 as well as 2 C.F.R. § 200.203. Any resultant negotiations and/or awards will follow all laws and regulations applicable to the specific award instrument(s) available under this BAA, e.g., FAR 15.4 for procurement contracts.

A. Introduction

The Defense Sciences Office (DSO) at the Defense Advanced Research Projects Agency (DARPA) is soliciting innovative research proposals for developing the tools necessary to create, measure, and test Human Machine Interfaces (HMI) that provide enough situational awareness (SA) of a system's¹ processes and status and of the operational environment so the operator can adapt the system in unexpected situations. The Enhancing Design for Graceful Extensibility (EDGE) program seeks design capabilities that will be fast, quantifiable, repeatable, and manageable enough for HMI concept design, development, and testing to be integrated into the larger system's design processes. Proposed research should investigate innovative approaches that enable revolutionary advances in science, devices, or capabilities that enable HMI development. Specifically excluded is research that primarily results in evolutionary improvements to the existing state of practice.

B. Background

HMI design has not matured at the same pace as automated and autonomous machines and, as a result, most current interfaces do a poor job supporting the operator's SA of the machine's processes, status, and/or operational context. An operator with reduced SA may not adapt to unexpected circumstances, risking catastrophic failure.

Traditionally, designers have assumed that by freeing cognitive resources, operators will be able to adapt to unanticipated and off-nominal situations when necessary. Unfortunately, the drive to limit cognitive workload has too often been at the expense of the operator's SA of the machine's processes, status, and operational environment. The result has been that as systems become more automated and autonomous, mission effectiveness increases in *expected* conditions; yet, in *unexpected* situations, the failures are proportionally catastrophic to the system's level of automation, despite the overall reductions in operator workload.²

It was this lack of pilot SA of the aircraft processes and status that contributed to the PT Lion Mentari Airlines (Lion Air) Boeing 737-8 (MAX) accident. "During the accident flight, multiple

¹ "System" refers to the combination of machine(s)/platform(s) and the human operator. In the case of EDGE, the machines and platforms include those that are highly automated, autonomous, and/or AI-enabled. An EDGE system comprises a single human operator managing a multi-asset system of the operator's own ship plus up to four autonomous vehicles.

² This is known as the Lumberjack effect and has been observed over individual studies and meta analyses. Onnasch, L., Wickens, C. D., Li, H., & Manzey, D. (2014). Human performance consequences of stages and levels of automation: An integrated meta-analysis. *Human factors*, 56(3), 476-488.

alerts and indications occurred which increased flight crew's workload. This obscured the problem and the flight crew could not arrive at a solution during the initial or subsequent automatic aircraft nose down stabilizer trim inputs, such as performing the runaway stabilizer procedure or continuing to use electric trim to reduce column forces and maintain level flight.”³ A subsequent National Transportation Safety Board (NTSB) report indicated that multiple simultaneous alerts prevented the crew from efficiently diagnosing the root issue of the Maneuvering Characteristic Augmentation System (MCAS), and current methods for evaluating system function in failure modes are insufficient.⁴ Managing operator workload is critical when it supports SA, but alone is insufficient for enabling effective operator adaptation to such off-nominal situations.

Likewise, preventing overload by simply limiting information neutralizes years and millions of dollars of operator training by limiting the operator's span of control. Consider a pilot vehicle interface (PVI) that simplifies enemy entities to red icons on a screen. Without any indication of classification uncertainty or of contributing sensors' reliability, the simplified HMI diminishes the operator's role – from a mission commander entrusted to make tactical decisions with strategic-level significance to that of a slow, uninformed actuator.

When an operator has sufficient SA of a system's process, status, and operational context, they remain our most adaptive asset. It was this kind of adaptive capability that Neil Armstrong demonstrated on Gemini VIII, considered NASA's first emergency in space. His extensive knowledge of the flight systems and his ability to execute under extreme circumstances resolved a potentially deadly spin, saving the mission and the astronauts' lives.

Human management of autonomous and AI-enabled systems is, thus, not only a constraint of a moral and ethical mandate of autonomous weapons systems (DoDD 3000.09), but remains the technically and operationally most advantageous path for all AI-enabled systems, as they remain brittle to unexpected situations and contexts. Designs that harden the system against user error fail to take advantage of the fact that humans are the most adaptive asset any system has at its disposal, currently and for the foreseeable future. As we develop autonomous capabilities that allow a single human operator the ability to manage more assets and mission tasks (e.g., planning, control, and maneuver; ISR; targeting; coordinating fires), providing the operator with enough of the right information to establish and support SA becomes a much more complex challenge.

³ *Final KNKT.18.10.35.04 Aircraft Accident Investigation Report*. PT. Lion Airlines Boeing 737 (MAX); PK-LQP Tanjung Karawang, West Java, Republic of Indonesia 29 October 2018.

⁴ Sumwalt, R. L., Landsberg, B., & Homendy, J. (2019). Assumptions used in the safety assessment process and the effects of multiple alerts and indications on pilot performance. *District of Columbia: National Transportation Safety Board*.

While there has been a considerable amount of progress in developing good principles and guidelines for human-centered design,^{5,6,7,8} the process remains slow, separate from, and lagging behind greater systems design and development processes. As systems become more automated and autonomous and the role of the operator shifts from operating a platform (e.g., flying, driving, navigating) to managing a mission, operator demands shift away from physical tasks and lean more heavily on complex decision making and managing risk across a number of interrelated factors and variables, many of which are abstract. Traditional design tools have not accommodated this shift and struggle to keep pace with automated and autonomous system development due to three major challenges:

1. System-level SA demands are not quantified. It is currently not clear when a given HMI design is “good enough” to meet a system’s requirements. Most modeling capabilities are either too low-level in the cognitive processes they model⁹ or are task, rather than SA, oriented.¹⁰ These methods require lengthy bottom-up construction and offer limited opportunities for reuse. They also rarely account explicitly for SA requirements. Alternatively, approaches like the Human Autonomous Systems Oversight (HASO) model provide the right categorical elements that must be considered for HMI design but do not generate the quantitative operator performance estimates necessary to integrate HMI design into a larger systems design and development process.

2. There is no way to assemble and deconflict SA-supporting component strategies into system-level compositions. Since human sensory, attentional, and executive bandwidth are limited, HMI designers are faced with the challenge of trying to balance information transmission needs against the need to support operator SA, which includes creating and updating accurate mental models of the system’s processes and status against its service envelope and operational environment. Although there are strategies for transmitting more information per unit data, there is currently no ability to quickly compose these strategies into a unified system-level HMI design. Inserting a single strategy can disrupt or conflict with other design elements; for instance, a spatial auditory display that supports the operator’s awareness of entities in the operational environment may conflict with alerts from the pilot’s platform or be distorted by engine noise. The potential permutations of determining when and how to present information across sensory space and time are more than development budgets and schedules can explore. Moreover, while there have been advances in understanding how to support SA (e.g., studies in decision sciences and demonstrations that show information that is *situated* and *forward* better prepares an operator to adapt to changing situations), there is no way currently to inject these strategies into a design process that weighs multiple, sometimes competing, demands.

⁵ Endsley, M. R. (2016). *Designing for situation awareness: An approach to user-centered design*. CRC press.

⁶ Wickens, C. D. (2008). Multiple resources and mental workload. *Human factors*, 50(3), 449-455.

⁷ Woods, D. D. (2018). The theory of graceful extensibility: basic rules that govern adaptive systems. *Environment Systems and Decisions*, 38(4), 433-457.

⁸ Oury, J. D., & Ritter, F. E. (2021). *Building Better Interfaces for Remote Autonomous Systems: An Introduction for Systems Engineers*.

⁹ Such as Soar and ACT-R cognitive architectures, among others.

¹⁰ Examples of task-oriented models are Improved Performance Research Integration Tool (IMPRINT) and, Goals, Operators, Methods, Selection Rules or GOMS) models.

3. Meaningful testing requires operational realism. It is almost impossible to discover design flaws without user testing. Current practice is good at examining “surface” level issues with HMI, but less capability exists to explore how well the HMI supports the operator’s handling of challenges from emergent properties of complex systems. Often, the machines must be built before the HMI can be evaluated. Moreover, human perception and cognition are affected by environmental pressures such as motion, noise, and stress. Realistic test simulation environments are too costly and rigid for early concept evaluation, design prototyping, and exploration. As a result, there are currently limited opportunities for early HMI concept testing and exploration against system complexity and environmental stressors.

In response to these limitations, and in order to manage the gap between increasing system complexity and subsequent lack of operator SA, engineers have defaulted to hardening the system against user error. Yet, this strategy exacerbates the problem, making systems, even with their human operators, more brittle and incapable of adaptation.

EDGE will create HMI design tools capable of integrating with a larger systems design and development process. By prioritizing and orienting these tools towards quantifying, supporting, and testing SA, rather than on reducing cognitive load at the expense of SA, EDGE will help designers build HMI systems that allow operators to not just monitor autonomous systems but also adapt their use to meet the needs of unanticipated situations.

C. Program Description/Scope

EDGE’s vision is to develop a new class of HMI design tools that integrate into larger systems design and development processes by:

- Developing models that quantify the SA demand of a given system to accurately predict operator performance when using a system before the system has been developed
- Creating composable design methods to incorporate and deconflict multiple SA and cognition supporting techniques into a unified HMI for generating more mature designs, more quickly
- Building a reconfigurable HMI “breadboard” for rapidly testing design prototypes in ecologically realistic environments

While HMI development includes many elements from new display technologies to actuators and ergonomics, EDGE focuses on the elements that most affect the operator’s ability to adapt to unexpected conditions. Considering John Boyd’s OODA Loop, EDGE is predominantly focused on methods that support Observation, Orientation, and Decision-making, and less on how the HMI supports Action. This means new methods of operator control (e.g., gesture and voice commands) are out of scope.

Domains of interest include land, surface, undersea, air, and/or space. Missions in the cyber domain and information operations are out of scope.

D. Program Structure

EDGE is a four-year research and development (R&D) effort comprising three Phases, as illustrated in Figure 1.

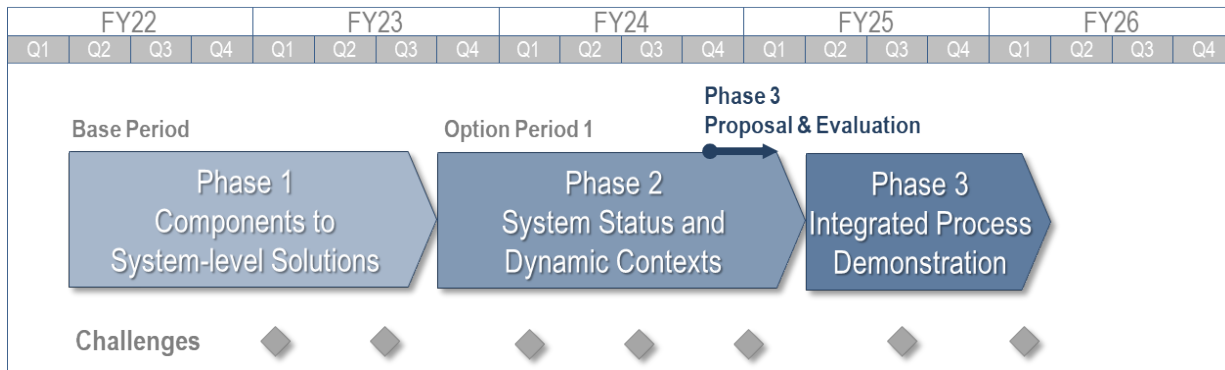


Figure 1 – High-Level Program Schedule

EDGE will use a phased-acquisition approach. Proposers are asked to provide detailed pricing and a Statement of Work (SOW) for the Phase 1 base effort, a detailed SOW and separately priced option for Phase 2, and Rough Order of Magnitude (ROM) cost estimate and draft SOW for Phase 3. Proposals that do not include a separately priced option for Phase 2 and ROM cost estimate and draft SOW for Phase 3 may be deemed non-conforming and removed from consideration. Near the end of Phase 2, the Government may issue Proposal Instructions to Phase 2 performers requesting final SOWs and revised cost proposals for Phase 3. Competition for Phase 3 will be limited to only Phase 2 performers.

Evaluation of Phase 3 proposals will be based on criteria to be specified in the Phase 3 proposal requests. The Phase 3 evaluation criteria will be consistent with the evaluation criteria in this solicitation, but may be tailored to the Phase 3 requests for updated proposals. Phase 3 proposal evaluations will be conducted through a scientific and technical review process in accordance with Section V.A and V.B. The Government reserves the right to issue a new solicitation for Phase 3 with a new award instrument if programmatic circumstances dictate.

Participation in Phase 2 does not guarantee funding in Phase 3; progression to the next phase will be contingent on evaluation of Phase 3 proposals and availability of funds.

Additional details are outlined in the sections below.

- Phase 1 (Base) is an 18-month effort to develop tools that turn component-level capabilities into system-level designs.
- Phase 2 (Option 1) is an 18-month effort that builds on work in Phase 1 by refining Phase 1 tools to adapt them to operational contexts.
- Phase 3 (ROM cost estimate and draft SOW) is a 12-month effort to refine the Phase 2 tools and demonstrate an optimized, integrated HMI design process.

The Government may elect to exercise the option(s) on the award(s) of the selected performer(s) based on progress made meeting the phases' goals and metrics and the candidate technologies' potential to meet the subsequent phase's program goals and metrics. The Government retains the right to award all, some, one, none, or portions of the proposed options to support promising further technology developments. Participation in any given phase does not guarantee funding in a subsequent phase; progression to the next phase will be contingent on performance and

availability of funds. Additional details on the objectives of each phase are included in the Technical Area (TA) (below and in Section I.E.) and Metrics (Section I.F.) descriptions.

EDGE comprises three TAs:

- TA1: Quantify the Situational Awareness Demand: Develop models that quantify before a given system has been developed the SA demand of that system to accurately predict operator performance when using the system.
- TA2: Composable Design: Create composable design methods to incorporate and deconflict multiple SA and cognition supporting techniques into a unified HMI for rapid prototyping.
- TA3: HMI Breadboard: Build a live and virtual reconfigurable HMI “breadboard” for rapidly testing design prototypes in ecologically realistic environments.

Section I.E describes the TAs in more detail.

Since TA1 capabilities will be important for meeting TA2 outcomes, proposers must propose to both TA1 and TA2 with combined technical and cost proposals. Proposals that cover only TA1 or only TA2 may be considered non-conforming. Proposers who submit combined TA1/TA2 proposals may also submit separate technical and cost proposals for TA3. A proposer can be selected for both a combined TA1/TA2 and a separate TA3. TA1/TA2 proposers should separate tasks and costs by TA, and Phase 2 Options should be separated by TA (i.e., Option 1 is Phase 2 TA1, Option 2 is Phase 2 TA2).

The EDGE program seeks to create general-purpose tools that will support HMI development for all operational domains. As such, all TAs will have to demonstrate their capabilities in more than one domain. TA2 will choose two of the following five possible domains in which to develop and demonstrate the generalizability of their capabilities: land, surface, undersea, air, and/or space. For each domain, the Government will define mission requirements and architectures for systems that will include multiple mission tasks the operator must manage. These may include planning and re-planning, ISR, sensor tasking and management, target identification and tracking, target allocation, vehicle control and maneuver, battle damage assessment, and/or others. TA1 performers will have to demonstrate their ability to predict operator performance for each Government defined system, including those in domains in which other TA1/TA2 teams are working (maximum 5 systems per challenge event). TA3 will demonstrate the agility and reconfigurability of their Breadboard by integrating and testing the designs of all TA2 performer teams (1 design per domain for all TA2 selected domains).

DARPA is committed to reproducibility of studies and methods developed under its programs. In support of this ideal, TA1/TA2 teams will be required to pre-register their studies, methods, and hypotheses¹¹ and should clearly delineate within the proposal which proposed studies and methods will be exploratory and which will be confirmatory.

¹¹ See pre-registration sites for instructions on how to pre-register a study. For example: <https://help.osf.io/hc/en-us/articles/360019738834-Create-a-Preregistration>. For more information about the purpose of pre-registration see <https://www.sciencemag.org/news/2018/09/more-and-more-scientists-are-preregistering-their-studies-should-you>

To facilitate these evaluations, DARPA is also soliciting proposals for a Test and Evaluation (T&E) Simulation Engine in this BAA. The role of the T&E Simulation Engine is to create off-nominal virtual test scenarios (“challenge scenarios”) to evaluate performer performance against program metrics. As such, proposers to the T&E Simulation Engine are not permitted to perform on any other TA either as a prime or as a subcontractor. Should a proposer submit proposals for the T&E Simulation Engine *and* for one or more TAs (as a prime or subcontractor to either team), they may only be selected for, at most, *either* the T&E Simulation Engine role *or* the TA role(s).

To evaluate each TA’s progress, the program will pose a series of Government-designed challenge events approximately every six months (see Section I.F). DARPA, along with EDGE’s Government Independent Validation and Verification (IV&V) team will generate challenges specific to each TA2 domain, including a Concept of Operations (CONOPS), set of requirements, and system architecture for TA1/TA2 and TA3 and mission objectives for the T&E Simulation Engine’s challenge scenarios. The challenges are designed to build on each other to enhance overall capabilities over the course of the program.

Proposers should strive to provide a clear understanding of the cost, risk, and organizational expertise to be used within each proposed effort.

E. Technical Area Descriptions

TA1: Quantify the Situational Awareness Demand.

This technical area will develop models that quantify the SA demands imposed on an operator by a given system before it has been built. DARPA will supply three inputs: (1) a CONOPS, (2) a set of system requirements and mission tasks, and (3) a draft system architecture, including system sub-components and details such as expected accuracy, reliability, and service envelopes. TA1 performers will generate a quantified estimate of the system’s SA demands on the operator and a list of design priorities (e.g., which of the SA requirements are most critical for predicting the types and magnitude of performance failures) for HMI designers.

In order to achieve this goal, performers should determine the appropriate level of detail needed to model operational understanding and consider methods that are faster to develop and more predictive than overly-detailed, bottom-up modeling approaches. TA1 performers should pay particular attention to the cognitive processes and demands necessary to create and update accurate mental models of the system and its components.

The output of TA1 is expected to be a model that quantifies the SA demands imposed by system design choices, using only the CONOPS, system requirements, and draft system architecture. TA1 can assume these systems, regardless of domain, will include a forward human operator managing a multi-asset system. The operator’s role will be mission commander managing up to four vehicles in addition to the operator’s own ship. Rather than create a bespoke model for one type of system, TA1 performers should extract, through experimentation, a set of underlying common axes that drive SA demands that would help a designer identify when the demands of an architecture become impossible to manage. Candidate axes may include decision timelines, system or environmental

uncertainty, system or environmental complexity, points of interaction with the world (e.g., sources of stochasticity), and system recursion. By approximating a notional system along these axes, designers should be able to approximate the SA demands of systems that do not yet exist, set performance goals for a system's functional subcomponents (e.g., sensor accuracies, re-planning speed), and update those estimates as the system is refined.

TA1 technical proposals should include the following:

- A description of the kind of model the team will use, including level of description, representation, and the strengths and weaknesses of the proposed modeling approach
- A candidate list of common axes that drive SA demand and their theoretical basis
- A clear description of how the work on the program will derive or refine these axes empirically, including data, methods, and ways the team will assess the model's accuracy (confirmatory and disconfirmatory methods)
- Expected sources of error, how error should be aggregated, and how the proposer will determine what is an acceptable margin of error by domain
- A description for how a designer would use the envisioned end-product to approximate the SA demands of a new system in a new domain

DARPA will evaluate TA1 performers on how well their models accurately predict SA demands when tested in the live TA3 Breadboard against the baseline HMI provided by the T&E Simulation Engine. Results of the evaluation will be used to help determine funding for subsequent phases.

TA2: Composable Design.

The possible combinations of information transmission schemas and strategies (e.g., cross-modal cueing, attention management and boost, decision aiding, re-orientation support) far outstrip the available time and resources for HMI development, leaving designers to guess which SA support mechanisms would be most useful. Methods are required that aid the HMI designer in choosing the best combination of interface strategies and components for the system at hand and quickly generating those designs.

TA2 proposers should describe how their approaches will speed HMI composition and incorporate display strategies and components that support operator SA. Both visual and non-visual (e.g., audio, tactile, proprioceptive) display technologies are encouraged.

Approaches should be able to do the following to speed HMI composition:

- Negotiate quickly across multiple, oftentimes competing design elements to rapidly identify and begin testing with more mature design concepts
- Integrate interface components and SA support strategies into a unified design (or set of initial candidate designs)
- Speed the development of HMI components from concepts to reduce the time it takes to generate (code, layout) and revise functional design prototypes for early evaluation

Approaches should address the following to describe how they will incorporate display strategies and components that support operator SA:

- **System processes.** Since system operators need to have a robust understanding of how the system works but are not experts in modern complex systems, DARPA is seeking techniques that make hierarchical complex systems comprehensible despite their complexity. Effective abstractions would help the operator anticipate how the system's components work as a unified system. These strategies should provide the foundation for future work, including helping the operator manage contextual challenges in Phase 2.
- **System status.** To manage the system, the operators need to maintain awareness of the **system status across operational states/phases** and the **status of the system's component interactions** (e.g., how the status of one system module may affect that of another). To help the operator maintain awareness, DARPA is seeking techniques that provide the operator with more information per unit data transmitted. These techniques should address issues such as determining how to present information across sensory space and time, managing orientation and re-orientation while multitasking, and facilitating memory recall, among others.
- **System processes and status against environmental and adversarial conditions.** The system's processes and status will change against different environments and when competing against adversary tactics (e.g., jamming, military deception). DARPA is interested in HMI design methods that will help the operator manage the system against these changing dynamics.

TA2 proposers are expected to develop designs for systems in at least two of the five following DoD relevant domains: land, air, ground, surface, and/or undersea. Proposers are encouraged to choose domains that demonstrate the generalizability of their approaches and describe in their proposals how their design tools will account for the particular challenges of each domain.

TA2 performers will develop implementations of unified interface design concepts as software components that interact with TA3 (starting at the end of Phase 1), using an application programming interface (API) developed by TA3 (below). TA2 performers are expected to have a local HMI testing and demonstration environment or capability other than what TA3 provides to facilitate their own testing and demonstrations throughout Phase 1 and between challenge events. These can be separate environments for each domain proposed.

To determine which team(s) will continue to subsequent phases, the TA2 design tools will be evaluated based on the speed by which they develop new designs and on the efficacy of the designs they generate. Efficacy will be evaluated in terms of (1) how well the designs support operator SA (system processes, status, and operational environment) and (2) how well the operator adapts to unanticipated situations.

TA3: HMI Breadboard

The stressors of operational environments affect cognitive processes, yet realistic simulation environments that approximate those stressors are often limited to bespoke, rigid training platforms. Advances over the last decade in immersive technologies have decreased the cost and increased the accessibility and sophistication of immersive experiences, making simulations more realistic without costly, high-maintenance, mechanical hardware systems, as an example. Additionally, trends towards open and modular architectures allow reconfigurability and enable capabilities such as context-sensitive interfaces. DARPA is interested in ways to make realistic HMI testing and exploration environments that reconfigure quickly enough to fit within an Agile software development sprint (2-4 weeks). The goal for TA3 is to create a low-cost, rapidly reconfigurable, immersive, open source HMI kit with an API that connects interface hardware, an immersive environment, and multimodal presentation schemas to test simulations (vehicles, environments, and scenarios). This “HMI Breadboard” should comprise an online, virtual version that enables rapid throughput testing of early design concepts to reach deployed end-users and a live version that boosts realism and operator performance at low cost.

Developments in instrumentation provide the ability to link behavioral and cognitive events such as observation and orientation to system events to identify problem areas and guide design revisions. Diagnostic strategies are important to TA3; such methods should—in the spirit of a robust, quickly reconfigurable platform that enables quick assessments—avoid equipment that imposes lengthy set up, calibration, or heavy post-test data processing and analysis. Diagnostic methods should link scenario and system events and HMI features to very specific behaviors or cognitive events/states. Neuroimaging equipment like electroencephalography (EEG) and functional near-infrared spectroscopy (fNIRS) of workload are too non-specific, are difficult to set up, and require lengthy post processing with any breadboard reconfiguration. Proposers wishing to use psychophysiological measures should make a convincing argument for how those measures will be employed to detect specific features of cognition and/or performance and why those features would provide diagnostic information above behavioral measures, like button presses and eye-tracking, for instance.

TA3 proposers should describe how they plan to do the following:

- **Approximate any specified EDGE domain.** In the spirit of being a “breadboard” kit rather than a high-fidelity gaming environment, the priority should be to quickly approximate general layouts and constraints of the HMI experience, rather than try to create replicas of the environments. EDGE’s domains of interest include land, surface, undersea, air, and space.
- **Create a capability for rapidly reconfiguring testing environments.** Both live and virtual versions should implement a common open architecture backbone for HMI developers and an API for TA2 integration by the end of Phase 1. The API should include:
 - Ways for TA2 performers to quickly integrate and iterate designs for testing. This API should include configuration specifications necessary for HMI developers (TA2) to control the spatial and temporal layout of audio,

visual, and other forms of data presentation within the breadboard. TA3 will delimit configuration and control options for its reconfigurable environment (e.g., hardware for visual and other sensory displays) and dynamically inform TA2 of T&E Simulation events.

- A way for TA2 to inform TA3 of relevant events and operator actions taken, for the purpose of assessing operator performance and cognitive processes.
 - Mechanisms for connecting and tracking operator-system interactions, such as means for collecting operator actions and system events and linking simulation events to operator behavior.
 - Methods to send T&E Simulation events and scenario information to TA2 (e.g., sensor information TA2 software can use to manage audio/visual timing and presentation).
- **Develop a live breadboard to approximate the immersive experience of conducting the mission.** The live breadboard should include:
 - Reconfigurable hardware for visual displays, auditory displays, and other sensory displays (e.g., location, size, timing).
 - Estimated specifications of the test environment (e.g., physical footprint, CPU requirements).
 - Mechanisms for the operator to control the simulated systems. While the focus of the program is not on actuators (input mechanisms, etc.), some methods for controlling the systems is required. Proposers should consider existing capabilities that approximate different operational domains, offer a variety of actuator capabilities, and/or include ways to integrate new actuators to support TA2 needs.
 - **Develop a virtual breadboard to increase the speed of early HMI testing.** Increasing the accessibility of test environments for early HMI concept testing will increase the speed of evaluations and, in some cases, enable testing with remote operator/end-user populations. To support this end, proposers should:
 - Provide a means by which test participants can be consented and personally identifiable information (PII) protected in compliance with Human Subjects Research (HSR) protocols.
 - Explain how their virtual breadboard can provide HMI approximations in terms of equipment required and processing requirements, with a focus on capabilities commonly available at virtual research subjects' home stations.
 - Specify what meaningful behavioral and event-marked metrics can be generated from an online environment.

TA3 will be responsible for providing the test participant populations throughout the program. For costing purposes, TA3 should assume at least 30 live and 90 virtual participants per challenge and provide detail in the Cost Volume to allow a decrease or increase in participant testing (recruitment, incentives, etc.) based on program needs. Live and virtual populations should be different samples. Populations should be representative of current and future operators and assume a junior officer as the operator.

TA3 proposers should assume testing will be considered HSR and plan for the Independent Review Board (IRB) and secondary Human Research Protection Office (HRPO) reviews necessary for government sponsored HSR in their cost and schedule. Performers will be required to submit IRB approved protocols to HRPO for secondary review no later than 1 month after award. No data collection can begin prior to HRPO approval. To meet this deadline, proposers should submit protocols to their local IRB for initial approval prior to proposal submission.

Test & Evaluation (T&E) Simulation Engine.

The T&E Simulation Engine will provide simulated environments and extensible systems (machines) needed to create challenge scenarios. Proposers should already have robust existing capability in simulating the behavior of military-relevant platforms in outdoor operational environments from which multi-vehicle control systems and challenge scenarios may be constructed. DARPA requests a completely open-source simulation environment and simulated entities that are Robot Operating System (ROS) based to maximize compatibility and integration with other program performers and beyond. DARPA has a strong preference for solutions that do not impose intellectual property (IP) restrictions.

Competitive proposers will have large existing libraries of environments, vehicles, sensors, and vehicle control, so that new development tasks can focus on constructing scenarios from that existing material. The T&E Simulation Engine team should be able to provide graphical representations of the vehicles in environments but should use methods that do not impose high computational demands on TA3 solutions, whether virtual or live.

Vehicle simulations. Vehicles should include those that operate in land, surface, undersea, air, and space domains and should have the ability to simulate complex autonomous behaviors (Endsley & Kaber's Levels of Automation 3-6¹²). Proposers should have the ability to construct new hypothetical vehicles and teams of vehicles on a schedule that coincides with the pace of the program.

Environment simulations: Competitive proposals will have existing capability for simulating land, surface, undersea, air, and space domains. The simulated environments should be expansive and complex enough to support 30-45 minute challenge scenarios.

¹² Endsley, M.R., & Kaber, D.B., (1999) Level of automation effects on performance, situation awareness, and workload in a dynamic control task. *Ergonomics*, 42(3), 462-492.

Challenge scenarios: All simulated systems, regardless of domain, will include a common unit of reference: a single, forward human operator managing a multi-asset system. The operator's role will be mission commander managing up to four vehicles in addition to the operator's own ship. The operator will not be teleoperating the other vehicles; the operator's role will be to manage highly automated behaviors across the team at various levels of autonomy. These vehicles may be homogeneous or heterogeneous in terms of form, capabilities, automated or autonomous control systems, and payload. The overall system may include various kinds of sensors, data processing, data fusion, and inference capabilities intended to aid the operator, distributed evenly or unevenly across the managed vehicles, as well as control, planning, communications management, and other system-management functions.

To measure how well the HMI solutions developed by TA2 support operator SA, the simulated scenarios must provide a way for the DARPA team to inject system failures and unexpected contextual changes. DARPA has a strong preference for physics-accurate simulators that can explore complexity and emergent behaviors from platforms interacting with each other and the environment as opposed to simulators emphasizing high-fidelity graphics. T&E Simulation Engine proposers should describe their ability to inject system failures and unexpected contexts or environmental features into scenarios. For example, the challenge scenario may need to simulate a sensor on one platform returning a high number of false positive readings or perception elements detecting the presence of civilian populations where there were none expected. A single challenge event may include various versions of the same scenario; therefore, the environments should include modular elements that can change easily (e.g., buildings and targets can be moved easily), so the scenario can be iterated but present the same basic task.

The T&E Simulation Engine performer will be responsible for providing a baseline HMI (interfaces for operator control of simulated systems) for TA1 predictions and for comparing the improvement of TA2 designs. Ideally, these baselines would be existing HMIs that are minimally modified to accommodate a system developed for each challenge event. Additional visualization of the simulation will be required for managing the scenarios and for evaluators to observe mission effectiveness.

The T&E Simulation Engine performer will work with DARPA and the IV&V team to draw challenge scenarios for each domain from major programs of record or from autonomous system initiatives across the Services and research and development (R&D) laboratories. For example, if a TA2 team proposes to work in the air and surface domains, the T&E Simulation Engine team might pull SA challenge scenarios from Next Generation Air Dominance and Project Overmatch, respectively. In all cases, challenge scenarios will be tied to a single common unit of study: a single forward operator managing a multi-entity control system. Challenge scenarios may include various forms of perception and sensing (e.g., automated target recognition) and control autonomy (e.g., route planners, obstacle avoidance). The purpose of the challenge scenarios is to (1) connect the testing to real needs that the Services and other R&D programs are facing rather than toy problems, (2) facilitate transition, and (3) demonstrate that the resulting tools will be general purpose and not just able to support one type of system or domain.

T&E Simulation Engine will be required to pass the following information types to TA2

and TA3 performers:

- Environmental information such as terrain, structures, and weather
- Vehicle position, speed, trajectory
- Sensor “readings” at a component level
- Event metadata such as object identifiers and entity ground truth
- And other metadata as necessary

For costing purposes, T&E Simulation Engine should assume challenges every six months, across as many as all five simulation domains in Phase 1. It is likely that TA1/TA2 teams may propose to work in the same domains, so it may be fewer than five; cost proposals should allow for adjustments after TA1/TA2 team(s) are selected, depending on the domains proposed by selected TA2 teams. T&E Simulation Engine will follow the same phased program structure as TAs 1-3.

F. Schedule/Milestones

The EDGE performers will be evaluated using a number of milestones and metrics enumerated below. Attaining the milestones and metrics for a given phase does not guarantee transition into the next phase of the program. DARPA will also assess efforts on their expected ability to attain subsequent milestones. The program’s phases will challenge the performers to demonstrate maturity of their methods and tools consistent with engineering standards by producing consistent results from a **generalizable, manageable, and repeatable** process.

Challenge Events

In order to judge the progress of the technologies developed in TA1, TA2, and TA3, there will be challenge events approximately every six months. For costing purposes, proposers should reference the TA3 metrics for integration timelines for each event and assume three days of testing per challenge. TA3 proposers should estimate costs for three TA2 teams at the end of Phase 1, two TA2 teams for Phase 2, and one TA2 team for Phase 3. These costs should be itemized such that costs may be adjusted if more or fewer TA2 teams are selected. These challenge events consist of a challenge system, against which the TAs will build capability, and a challenge scenario run by the T&E Simulation Engine team against which the TAs will demonstrate efficacy. The challenge systems and scenarios will be developed by DARPA, the Government IV&V team, and the T&E Simulation Engine team. For each event DARPA will specify a challenge system: the CONOPS, the system requirements, and a draft machine architecture design for all performers. The T&E Simulation Engine team will provide the baseline (existing) HMI for each challenge system. For each challenge event:

- TA1 will predict operator performance in terms of the types and magnitude of operator errors
- TA2 will compose a set of HMI designs to support the system
- TA3 will reconfigure both the live and virtual breadboards to generate an approximate experience of the operator environment

More specific outcomes for each challenge and TA can be found in Tables 2 and 3 below.

Each challenge event will focus on a particular aspect of SA, with each performer being expected to build upon their advances from the previous challenge. The focus of each of the challenges in Phase 1 and Phase 2 are listed in Tables 2 and 3, respectively. All challenge events will include an event, failure, or condition considered “off-nominal” to test operator responses to unexpected events. The nature of these off-nominal events will differ in accordance with the focus of the challenge event.

Phase 1 development is focused on moving from component level solutions to whole-system solutions; as such, the challenges will focus on elements related to understanding the system’s processes and status as a whole. Since Phase 2 development is focused on understanding how the system changes against context, Phase 2 challenge events will focus on off-nominal conditions related to the environment or opponents. In Phase 3, both types of events will occur.

Phase 3 is focused on maturing tools developed in Phases 1 and 2. As such, Phase 3 challenge events will ask remaining performer(s) to demonstrate that an engineer of the Government’s choosing is able to use the tools developed on the program to predict, develop, and test candidate HMIs. The designs generated by the Government engineer should enable comparable operator performance to those developed by the performer team as demonstrated in the final challenge event and Capstone Demonstration (see Table 1 schedule).

Table 1. Program meetings and challenge event schedule

Phase	Month	Event	Location
Phase 1 From components to systems	1	Program Kickoff & Technical Exchange meeting	Virtual
	6	PI meeting	Virtual
	10	Challenge Event: System Processes	Performer site
	14	PI meeting	Arlington, VA
	16	End of Phase Challenge Event: System status and component interactions	TBD
Phase 2 System status and context	20	Phase 2 Kickoff & PI meeting	Arlington VA
	22	Challenge Event: System processes and status against environmental factors	TBD
	26	PI meeting	Arlington VA
	28	Challenge Event: System processes and status against adversary factors	TBD
	32	PI meeting	Arlington VA
	34	End of Phase Challenge Event: IV&V-defined challenge	TBD
Phase 3 HMI design tool maturity	38	Phase 3 Kickoff & PI meeting	Arlington VA
	40	Challenge Event: Demonstrate tool manageability	TBD
	44	PI meeting	Arlington VA

	46	End of Phase: Capstone Demonstration	TBD
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TA1 will submit performance predictions to the Government IV&V team prior to all test events. All TA1 performers will predict performance against T&E Simulation Engine provided baseline HMI designs and against experimental designs for all TA2 performers. TA2 performers' designs will be tested at the end of each Phase in the TA3 Breadboard.

TA2 performers will demonstrate their solutions on their own simulation environments through Phase 1 and will test their solution in the TA3 breadboard starting at the end of Phase 1.

To control for learning effects, all participants will be provided the same amount of training (minutes to hours, 1 or 2 sessions, max) prior to testing each TA2 design.

At the end of each phase, there will be timed test-integration events; the speed goals for each phase are detailed in Table 2 below.

Table 2. EDGE Metrics

	Phase 1 From components to systems (18 months)	Phase 2 System status & contexts (18 months)	Phase 3 HMI design tool maturity (12 months)
TA1: Quantify the SA Demand			
Time to model performance of each new system	• 1 month/system	• 2 weeks/system	• 3 days/system
Operator performance prediction accuracy	• 75% prediction accuracy across all domains*	• 85% fit or better	• 95% fit or better
TA2: Composable Designs			
Accuracy of operator SA	• Operator demonstrates SA of system (90% accuracy**, and ability to adapt)	• Operator demonstrates SA of system and context (> 90% accuracy**, and ability to adapt)	• Demonstrate manageable composition process by maintaining quality of new designs with Government engineer
Operator's ability to adapt to circumstances (judged by IV&V panel)	• Quality of adaptation	• Quality of adaptation	
Manageability/maturity of composable design tools			
TA3: Breadboard			
Time to reconfigure virtual and live environments	• 3 weeks virtual • TA1 assessment of data output utility	• 1 week virtual • 3 weeks live (for each challenge)	• 1 day virtual • 3 days live (for each challenge)

* IV&V will re-assess fit threshold needs by domain for each domain

**IV&V will re-assess error tolerance

In order to have a smooth interface between TA1/TA2 and TA3, teams will conduct a technical exchange to discuss and specify what specific types and format of data TA2 and TA3 will expect

and need to exchange with the T&E Simulation Engine and what type and format of data they will require from each other. This technical exchange will occur as part of the Program Kickoff (See Table 1).

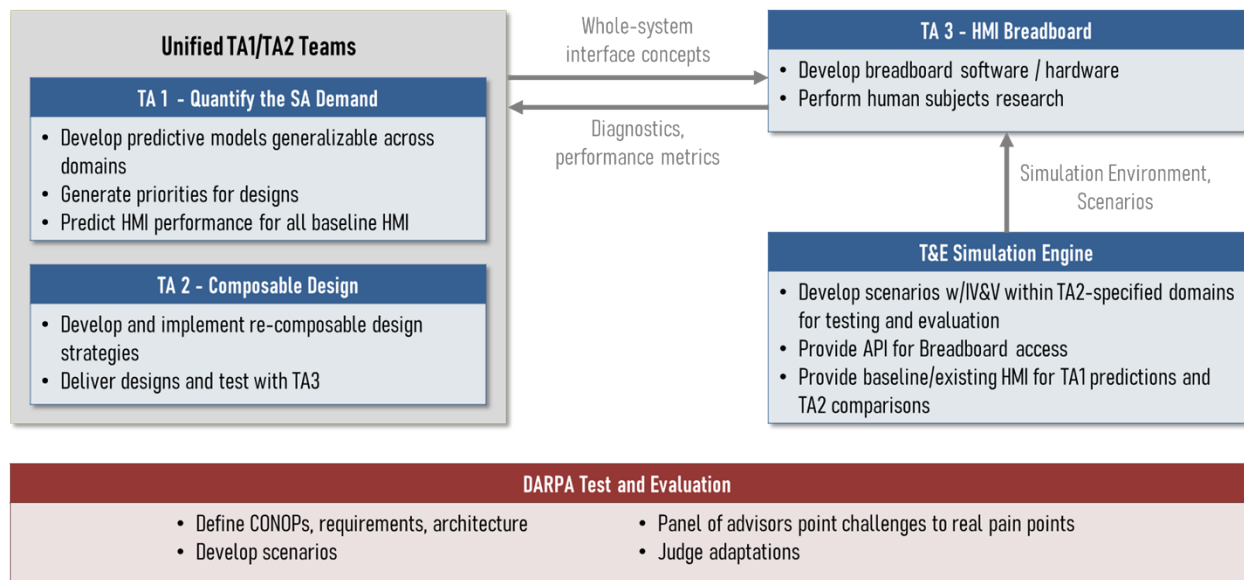


Figure 2 – Technical Area Interaction

Other proposal properties

- Proposers should provide a technical and programmatic strategy that conforms to the entire program schedule and presents an aggressive plan to fully address all program goals, metrics, milestones, and deliverables.
- The task structure must be consistent across the proposed schedule, Statement of Work, and cost volume.
- A target start date of December 1, 2021 may be assumed for planning purposes.
- Schedules will be synchronized across performers, as required, and monitored/ revised, as necessary, throughout the program.
- All proposals must include the following meetings and travel in the proposed schedule and costs:
 - To continue integration and development between TAs, foster collaboration between teams, and disseminate program developments, a two-day Principal Investigator (PI) meeting will be held approximately every six months with locations split between the East and West Coasts of the United States. For budgeting purposes, plan for seven two-day meetings over the course of 48 months: four meetings in the Washington, D.C. area and three meetings in the San Francisco, CA area.

- Regular teleconference meetings will be scheduled with the Government team for progress reporting as well as problem identification and mitigation. Proposers should anticipate at least one site visit per phase by the DARPA Program Manager during which they will have the opportunity to demonstrate progress towards agreed-upon milestones.

G. Deliverables

Performers will be expected to provide, at a minimum, the following deliverables:

TA1/TA2

- IRB approved protocol submitted to HRPO for any proposed testing (initial protocol submitted month 1 for Phase 1 testing; modifications must be submitted month 17 for Phase 2 testing and month 37 for Phase 3 testing)
- TA1 operator performance predictions for each challenge event 1 week before testing begins
- Demonstration of TA2 composability method and tool prior to each challenge event starting at month 10
- Description and documentation for HMI designs for evaluation in TA3 environment prior to each challenge event; revisions made during TA3 integration will be documented and provided within 10 days after the challenge event

TA3

- IRB approved protocol submitted to HRPO for review (initial protocol submitted month 1 for Phase 1 testing; modifications must be submitted month 17 for Phase 2 testing and month 37 for Phase 3 testing)
- Initial HRPO approval protocol (month 5)
- Initial software architecture and hardware descriptions (month 6); major revisions due 2 months prior to challenge events
- Internal demonstration of prototype reconfigurability (month 10)
- API for TA2 design integration prior to initial challenge event (month 14); quarterly revisions thereafter
- Data and code necessary for DARPA and the IV&V team to evaluate TA1 performer prediction accuracy and the efficacy of TA2 designs at least 60 days before the end of Phases 1 and 2

T&E Simulation Engine

- Baseline HMI for all TA2-proposed domains (month 6)
- Challenge scenarios prior to each challenge event (see Table 1)
- “Ground truth” event logs no later than 10 days after each test event

All teams:

- Comprehensive quarterly technical reports due within ten days of the end of the given quarter, describing progress made on the specific milestones as laid out in the SOW
- A phase completion report submitted within 30 days of the end of each phase,

- summarizing the research done
- Other negotiated deliverables specific to the objectives of the individual efforts. These may include registered reports; experimental protocols; publications; data management plan; intermediate and final versions of software libraries, code, and APIs, including documentation and user manuals and/or a comprehensive assemblage of design documents, models, modeling data and results; and model validation data.
- Reporting as outlined in Section VI.C.

H. Government-furnished Property/Equipment/Information

There will be no Government-furnished Property/Equipment/Information.

I. Other Program Objectives and Considerations

1. Collaboration

All awardees will be required to work collaboratively with awardees from the other areas (TA1/TA2, TA3, T&E Simulation Engine) to demonstrate efficacy of the proposed solutions. However, TA3 awardees will not need to collaborate with other TA3 awardees (if any such multiple awards are made) nor will TA1/TA2 awardees need to interface with other TA1/TA2 awardees. All proposals must clearly describe plans for interfacing and integrating proposed technologies/approaches with those of the performers in the other TAs and T&E Simulation Engine as appropriate. To facilitate collaboration, all awards will include an Associate Contractor Agreement (ACA) clause for portions of the awards requiring joint participation between the TAs in the accomplishment of the program requirements. This provision will become a material requirement for any contracts awarded as a result of this BAA. The ACA clause will include the basis for sharing information, data, technical knowledge, expertise and/or resources essential to the integration of the program technical areas and components. This clause will ensure appropriate coordination and integration of work by program contractors; ensure complete compatibility between data, tools, and services; and prevent unnecessary duplication of efforts and maximize commonality. Without exception, all ACAs must be in place within three months of award. See Section VIII.D for a sample ACA clause.

2. Intellectual Property

A key goal of the program is to establish an open, standards-based, multi-source, plug-and-play architecture that allows for interoperability and integration. This includes the ability to easily add, remove, substitute, and modify software and hardware components. This will facilitate rapid innovation by providing a base for future users or developers of program technologies and deliverables. Therefore, intellectual property rights asserted by proposers are strongly encouraged to be aligned with open source regimes. See Section VI.B.4 for more information related to intellectual property. All TA1 and TA3 noncommercial software (including source code), software documentation, hardware designs and documentation as applicable, and technical data generated by the program must be provided as to the Government as open source deliverables. It is desired that all TA2 noncommercial software (including source code), software documentation, hardware designs and documentation, and technical data generated by the program be provided as deliverables to the Government as open source, but at a minimum of Government Purpose Rights (GPR), as lesser rights may adversely impact the lifecycle costs of affected items, components, or processes.

II. Award Information

A. General Award Information

DARPA anticipates multiple awards for the TA1/TA2 and TA3 efforts. DARPA anticipates a single award for T&E Simulation Engine.

As part of the cost volume, HSR and non-HSR tasking needs to be priced separately for Phase 1 and Phase 2. This will result in a price for Phase 1 HSR tasking, a price for Phase 1 non-HSR tasking, a price for Phase 2 HSR tasking, and a price for Phase 2 non-HSR tasking. For Phase 3, the ROM should include separate estimates for HSR and non-HSR tasking.

The level of funding for individual awards made under this BAA will depend on the quality of the proposals received and the availability of funds. Awards will be made to proposers¹³ whose proposals are determined to be the most advantageous to the Government, all evaluation factors considered. See Section V for further information.

The Government reserves the right to:

- select for negotiation all, some, one, or none of the proposals received in response to this solicitation;
- make awards without discussions with proposers;
- conduct discussions with proposers if it is later determined to be necessary;
- segregate portions of resulting awards into pre-priced options;
- accept proposals in their entirety or select only portions of proposals for award;
- fund awards in increments with options for continued work at the end of one or more phases;
- request additional documentation once the award instrument has been determined (e.g., representations and certifications); and
- remove proposers from award consideration should the parties fail to reach agreement on award terms within a reasonable time or the proposer fails to provide requested additional information in a timely manner.

Proposals identified for negotiation may result in a procurement contract, cooperative agreement, or Other Transaction (OT), depending upon the nature of the work proposed, the required degree of interaction between parties, and other factors.

¹³ As used throughout this BAA, “proposer” refers to the lead organization on a submission to this BAA. The proposer is responsible for ensuring that all information required by a BAA--from all team members--is submitted in accordance with the BAA. “Awardee” refers to anyone who might receive a prime award from the Government, including recipients of procurement contracts, cooperative agreements, or Other Transactions. “Subawardee” refers to anyone who might receive a subaward from a prime awardee (e.g., subawardee, consultant, etc.).

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 may be met by proposed efforts for fundamental research and non-fundamental research. Some proposed research may present a high likelihood of disclosing performance characteristics of military systems or manufacturing technologies that are unique and critical to defense. Based on the anticipated type of proposer (e.g., university or industry) and the nature of the solicited work, the Government expects that some awards will include restrictions on the resultant research that will require the awardee to seek DARPA permission before publishing any information or results relative to the program.

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 DARPA's consideration.

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.

Include any OCIs affirmations and disclosures in Attachment G: PROPOSAL TEMPLATE VOLUME 3: ADMINISTRATIVE & NATIONAL POLICY REQUIREMENTS.

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 (e.g., OTs under the authority of 10 U.S.C. § 2371). 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#OtherTransactions>.

D. Ability to Receive Awards in Multiple Technical Areas - Conflicts of Interest

While proposers may submit proposals for TA1/TA2 and TA3 and T&E Simulation Engine, TA3 and T&E Simulation Engine must be stand-alone performers. A proposer selected for T&E Simulation Engine cannot be selected for any portion of any other TA, whether as a prime proposer, subawardee, or in any other capacity from an organizational to individual level. This is to avoid OCI situations, as defined at FAR 9.5, between the Technical Areas and to ensure objective test and evaluation results. The decision as to which proposal to consider for award is at the discretion of the Government.

IV. Application and Submission Information

Prior to submitting a full proposal, proposers are *strongly encouraged* to first submit an abstract as described below. This process allows a proposer to ascertain whether the proposed concept is (1) applicable to the EDGE BAA and (2) currently of interest. For the purposes of this BAA, applicability is defined as follows:

- The proposed concept is applicable to the technical areas described herein.
- The proposed concept investigates an innovative approach that enables revolutionary advances, i.e., will not primarily result in evolutionary improvements to the existing state of practice.
- The proposed work has not already been completed (i.e., the research element is complete but manufacturing/fabrication funds are required).
- The proposer has not already received funding or a positive funding decision for the proposed concept (whether from DARPA or another Government agency).

Abstracts and full proposals that are not found to be applicable to the EDGE BAA as defined above may be deemed non-responsive and removed from consideration. All abstracts and full proposals must provide sufficient information to assess the validity/feasibility of their claims as well as comply with the requirements outlined herein for submission formatting, content and transmission to DARPA. Abstracts and full proposals that fail to do so may be deemed non-conforming and removed from consideration. Proposers will be notified of non-conforming determinations via letter.

A. Address to Request Application Package

This document contains all information required to submit a response to this solicitation. No additional forms, kits, or other materials are needed except as referenced herein. No request for proposal or additional solicitation regarding this opportunity will be issued, nor is additional information available except as provided at the SAM.gov website (<https://sam.gov/>), the Grants.gov website (<http://www.grants.gov/>), or referenced herein.

B. Content and Form of Application Submission

1. Abstract Information and Formatting

As stated above, proposers are strongly encouraged to submit an abstract in advance of a full proposal to minimize effort and reduce the potential expense of preparing an out of scope proposal. All proposers are required to use Attachment A: ABSTRACT SUMMARY SLIDE TEMPLATE and Attachment B: ABSTRACT TEMPLATE provided with this solicitation on <https://sam.gov/> and <http://www.grants.gov>. Attachment A: ABSTRACT SUMMARY SLIDE TEMPLATE described herein must be in .ppt or .pptx format and should be attached as a separate file to this document.

The abstract provides a synopsis of the proposed project by briefly answering the following questions:

- What is the proposed work attempting to accomplish or do?
- How is it done today, and what are the limitations?
- Who will care, and what will the impact be if the work is successful?
- How much will it cost, and how long will it take?

Proposers who are proposing work with CUI or classified information must provide an unclassified description in the abstract of the relevant technology, application, and classification and its relevance to the program and refer to Section IV.B.4.

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.

Proposers should note that a favorable response to an abstract is not a guarantee that a proposal based on the abstract will ultimately be selected for award negotiation.

While it is DARPA policy to attempt to reply to abstracts within thirty calendar days, proposers to this solicitation may anticipate a response within approximately three weeks. These official notifications will be sent via email to the Technical POC and/or Administrative POC identified on the abstract coversheet.

2. Full Proposal Information and Formatting

a. Proposal Volumes

Full proposals must consist of all 3 volumes described below. To assist in proposal development, templates for these volumes are posted as attachments to this solicitation on <https://sam.gov/>. The templates are specific to each volume, as outlined below.

Full proposals requesting a procurement contract or Other Transaction (OT) must use the following attachments in each volume:

- **Volume 1**
 - Attachment C: PROPOSAL SUMMARY SLIDE TEMPLATE

- Attachment D: PROPOSAL TEMPLATE VOLUME 1: TECHNICAL & MANAGEMENT
- **Volume 2**
 - Attachment E: PROPOSAL TEMPLATE VOLUME 2: COST
 - Attachment F: MS Excel™ DARPA COST PROPOSAL SPREADSHEET
- **Volume 3**
 - Attachment G: PROPOSAL TEMPLATE VOLUME 3: ADMINISTRATIVE & NATIONAL POLICY REQUIREMENTS

Full proposals requesting a cooperative agreement must use the following attachments in addition to the Grants.gov application package:

- **Volume 1**
 - Attachment C: PROPOSAL SUMMARY SLIDE TEMPLATE
 - Attachment D: PROPOSAL TEMPALTE VOLUME 1: TECHNICAL & MANAGEMENT
- **Volume 2***
 - Attachment F: MS Excel™ DARPA COST PROPOSAL SPREADSHEET
- **Volume 3**
 - Attachment G: PROPOSAL TEMPLATE VOLUME 3: ADMINISTRATIVE & NATIONAL POLICY REQUIREMENTS

* Full proposals requesting a cooperative agreement do not need to include Attachment E. Instead, Budget Justification should be provided as Section L of the SF 424 Research & Related Budget form provided via <http://www.grants.gov> (see section IV.E.1.c for additional details). The Budget Justification should include the following information for the recipient and all subawardees:

- **Direct Labor (sections A and B)** - Detail the total number of persons and their level of commitment for each position listed (as well as which specific tasks (as described in the SOW) they will support. HSR and non-HSR tasking needs to be priced separately for Phase 1 and Phase 2. For Phase 3, the ROM should include separate estimates for HSR and non-HSR tasking.
- **Equipment (section C)** - Provide an explanation for listed requested equipment exceeding \$5,000, properly justifying why it is required to meet the objectives of the program.
- **Travel (section D)** - Provide the purpose of the trip, number of trips, number of days per trip, departure and arrival destinations, number of people, etc.
- **Other Direct Costs (section F)** - Provide a justification for the items requested and an explanation of how the estimates were obtained.
- **Participant/Trainee Support Costs section E** - Provide details on Tuition/ Fees/ Health

Insurance, Stipends, Travel and Subsistence costs.

The Government requires 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.**

All proposers are required to use the appropriate templates based on the type of award requested. Templates are provided as attachments to this solicitation on <https://sam.gov/> and <http://www.grants.gov>. Full Proposals that do not include the appropriate attachments as detailed here may be deemed non-conforming and may not be evaluated.

b. 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_2_0-V2.0.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:

- Degree Type and Degree Year.
- Current and Pending Support, including:
 - 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.

c. 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.

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

There is no requirement to use or handle classified information on the EDGE program. DARPA anticipates that submissions received under this BAA will be unclassified. However, should a proposer wish to work with classified data, applications, or materials on the program such that they would need to submit classified information relevant to the proposal, an *unclassified* email must be sent to the BAA mailbox requesting submission instructions from the DARPA/DSO Program Security Officer (PSO).

For proposers choosing to submit classified proposals, unclassified abstracts shall identify the proposer's organizational Commercial and Government Entity (CAGE) Code and Facility Clearance (FCL) level, storage and processing capabilities, and commitment of personnel with appropriate clearances. Abstracts will identify relevant Security Classification Guides (SCG), and those SCGs will be made available to DARPA upon request.

Proposers choosing to pursue classified applications are expected to have appropriate facilities, personnel, and information systems in place to support proposal efforts. DARPA will not sponsor new clearances for facilities or personnel or provide classified processing capabilities to support classified proposals.

a. Program Security Information

i. Program Security

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 will be detailed in a DARPA CUI Guide if necessary and provided at a later date.

ii. CUI Submission Requirements

Unclassified submissions containing CUI may be submitted via DARPA's BAA Website (<https://baa.darpa.mil>) in accordance with Part II Section VIII of this BAA.

iii. CUI Authorized Systems

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. Classified Submission Requirements and Procedures

Classified submissions shall be marked and transmitted in accordance with the guidance outlined herein. Submissions containing Classified National Security Information (as defined by Executive Order 13526) must be conspicuously marked with the appropriate classification level and declassification date of both the submitted materials and that of the anticipated award.

i. Undetermined Classification Level

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)

Such submissions shall be transmitted in accordance with the appropriate instructions below applicable to the proposed classification level.

ii. 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 - 3), 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 Classified Document Registry (CDR). Prior to traveling, the courier shall contact the DARPA 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: DARPA/DSO BAA Office
Reference: HR001121S0030
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

iii. Top Secret Information

Use classification, handling, and marking guidance provided by previously issued SCGs, the DoD Information Security Manual (DoDM 5200.01, Volumes 1 - 3), 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.

iv. 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/DSO 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 Program Security Officer at 703-526-2836.

v. 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 DARPA/DSO PSO.

Proposers choosing to submit SAP information from an agency other than DARPA are required to provide the DARPA/DSO 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/DSO PSO via the BAA mailbox or at 703-526-2836.

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.

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

Proposers and awardees are subject to the DoD requirements related to protection of CUI and CTI IAW Executive Order 13556, *Controlled Unclassified Information*, DFARS 252.204-7000, *Disclosure of Information*, DFARS 252.204-7012, *Safeguarding Covered Defense Information and Cyber Incident Reporting*, DoD Instruction 5200.48, *Controlled Unclassified Information*, DoD Instruction 8582.01, *Security of Non-DoD Information Systems Processing Unclassified Nonpublic DoD Information*. See <http://www.darpa.mil/work-with-us/additional-baa> for additional guidance on protecting CUI on Non-DoD Information Systems.

CUI is defined as unclassified information that requires safeguarding or dissemination controls, pursuant to and consistent with applicable law, regulations, and Government-wide policies.

Controlled Technical Information (CTI) is defined as technical information with military or space application that is subject to controls on its access, use, reproduction, modification,

performance, display, release, disclosure, or dissemination. The term CTI does not include information that is lawfully publicly available without restrictions.

DoD considers “technical information” to be technical data or computer software, as those terms are defined in Defense Federal Acquisition Regulation Supplement clause 252.227-7013, "Rights in Technical Data - Noncommercial Items" (48 CFR 252.227-7013). Examples of technical information include research and engineering data; engineering drawings and associated lists, specifications, standards, process sheets, manuals, technical reports, technical orders, catalog-item identifications, data sets, studies and analyses and related information; and computer software code. Note that such technical information may or may not be controlled (i.e., CTI), depending on whether it has military or space application.

All proposals indicating CUI requirements must include a draft CUI protection plan in Attachment G: PROPOSAL TEMPLATE VOLUME 3: ADMINISTRATIVE & NATIONAL POLICY REQUIREMENTS detailing how CUI will be protected at performance sites as well as sub-contractor locations. The draft CUI protection plan is not a source selection criterion, and there is no page limit. During selection and negotiation, DARPA will determine additional requirements and clarification required of the CUI protection plan. DARPA will generate an Unclassified CUI Guide after award and prior to Program Kickoff to include proposed CUI, if and as appropriate. Potential award instruments for proposals containing CUI will be limited to contracts or Other Transactions.

As part of Attachment D: PROPOSAL TEMPLATE VOLUME 1: TECHNICAL & MANAGEMENT, the proposer should include a Statement of Work with a breakdown of all research tasks and subtasks and indicate the proposed classification for each. For all tasks and subtasks proposed to be unclassified, proposers should distinguish between work proposed to be Fundamental Research versus work proposed to be CUI. Proposers will provide a short explanation for why each subtask should be categorized as Fundamental Research or CUI.

HSR and non-HSR tasking needs to be priced separately for Phase 1 and Phase 2. For Phase 3, the ROM should include separate estimates for HSR and non-HSR tasking.

If CUI tasks are proposed in the Statement of Work, proposers must provide a plan for protecting Controlled Unclassified Information as part of Attachment G: PROPOSAL TEMPLATE VOLUME 3: ADMINISTRATIVE & NATIONAL POLICY REQUIREMENTS.

CTI is to be marked “DISTRIBUTION C. Distribution authorized to U.S. Government agencies and their contractors; Critical Technology; [current date]. Other requests for this document shall be referred to DARPA, DSO” in accordance with Department of Defense Instruction 5203.24, “Distribution of Statements on Technical Documents.”

C. Submission Dates and Times

Proposers are warned that submission deadlines as outlined herein are in Eastern Time and will be strictly enforced. When planning a response to this solicitation, proposers should take into account that some parts of the submission process may take from one business day to one month to complete (e.g., registering for a Data Universal Numbering System (DUNS) number or Taxpayer Identification Number (TIN)).

DARPA will acknowledge receipt of *complete* submissions via email and assign identifying numbers that should be used in all further correspondence regarding those submissions. If no confirmation is received within two business days, please contact the BAA Administrator at EDGE@darpa.mil to verify receipt.

1. Abstracts

Abstracts must be submitted per the instructions outlined herein *and received by DARPA* no later than the due date and time listed in Part One: Overview Information. Abstracts received after this time and date may not be reviewed.

2. Full Proposals

Full proposal packages as detailed in Section IV.B.2 above, and, as applicable, proprietary subawardee cost proposals and classified appendices to unclassified proposals, must be submitted per the instructions outlined herein *and received by DARPA* no later than the due date and time listed in Part One: Overview Information. Proposals received after this time and date may not be reviewed.

D. Funding Restrictions

Not applicable.

E. Other Submission Requirements

1. Unclassified Submission Instructions

Proposers must submit all parts of their submission package using the same method; submissions cannot be sent in part by one method and in part by another method nor should duplicate submissions be sent by multiple methods. Email submissions will not be accepted. Failure to comply with the submission procedures outlined herein may result in the submission being deemed non-conforming and withdrawn from consideration.

a. Abstracts

DARPA/DSO will employ an electronic upload submission system (<https://baa.darpa.mil/>) for all UNCLASSIFIED abstracts sent in response to this solicitation. *Abstracts must not be submitted via Grants.gov.*

First time users of the DARPA BAA Submission website must complete a two-step account creation process. The first step consists of registering for an extranet account by going to the URL listed above and selecting the “Account Request” link. Upon completion of the online form, proposers will receive two separate emails; one will contain a user name and the second will provide a temporary password. Once both emails have been received, the second step requires proposers to go back to the submission website and log in using that user name and password. After accessing the extranet, proposers may then create a user account for the DARPA BAA Submission website by selecting the “Register your Organization” link at the top of the page. Once the user account is created, proposers will be able to see a list of solicitations open for submissions, view submission instructions, and upload/finalize their abstract.

Proposers who already have an account on the DARPA BAA Submission website may simply log in at <https://baa.darpa.mil/>, select this solicitation from the list of open DARPA solicitations and proceed with their abstract submission. NOTE: Proposers who have created a DARPA BAA Submission website account to submit to another DARPA Technical Office's solicitations do not need to create a new account to submit to this solicitation.

All abstracts submitted electronically through the DARPA BAA Submission website must meet the following requirements: (1) uploaded as a zip file (.zip or .zipx extension); (2) only contain the document(s) requested herein; (3) only contain unclassified information; and (4) must not exceed 100 MB in size. Only one zip file will be accepted per abstract and abstracts not uploaded as zip files will be rejected by DARPA.

Technical support for the DARPA BAA Submission website is available during regular business hours, Monday – Friday, 9:00 a.m. – 5:00 p.m. Requests for technical support must be emailed to BAAT_Support@darpa.mil with a copy to EDGE@darpa.mil. Questions regarding submission contents, format, deadlines, etc. should be emailed to EDGE@darpa.mil. Questions/requests for support sent to any other email address may result in delayed/no response.

Since proposers may encounter heavy traffic on the web server, DARPA discourages waiting until the day abstracts are due to request an account and/or upload the submission.

NOTE: Proposers submitting an abstract via the DARPA BAA Submission site MUST (1) click the “Finalize” button in order for the submission to upload AND (2) do so with sufficient time for the upload to complete prior to the deadline. Failure to do so will result in a late submission.

b. Proposals Requesting a Procurement Contract or Other Transaction

Proposers requesting procurement contracts or Other Transactions may submit full proposals through ONE of the following methods: (1) electronic upload (DARPA-preferred); or (2) direct mail/hand-carry.

i. Electronic Upload

DARPA/DSO encourages proposers to submit UNCLASSIFIED proposals via the DARPA BAA Submission website at <https://baa.darpa.mil/>.

First time users of the DARPA BAA Submission website must complete a two-step account creation process. The first step consists of registering for an extranet account by going to the URL listed above and selecting the “Account Request” link. Upon completion of the online form, proposers will receive two separate emails; one will contain a user name and the second will provide a temporary password. Once both emails have been received, the second step requires proposers to go back to the submission website and log in using that user name and password. After accessing the extranet, proposers may then create a user account for the DARPA BAA Submission website by selecting the “Register your Organization” link at the top of the page. Once the user account is created, proposers will be able to see a list of solicitations open for submissions, view submission instructions, and upload/finalize their proposal.

Proposers who already have an account on the DARPA BAA Submission website may simply log in at <https://baa.darpa.mil/>, select this solicitation from the list of open DARPA solicitations

and proceed with their proposal submission. *NOTE: Proposers who have created a DARPA BAA Submission website account to submit to another DARPA Technical Office's solicitations do not need to create a new account to submit to this solicitation.*

All full proposals submitted electronically through the DARPA BAA Submission website must meet the following requirements: (1) uploaded as a zip file (.zip or .zipx extension), (2) only contain the document(s) requested herein, (3) only contain unclassified information, and (4) must not exceed 100 MB in size. Only one zip file will be accepted per full proposal and full proposals not uploaded as zip files will be rejected by DARPA.

Technical support for the DARPA BAA Submission website is available during regular business hours, Monday – Friday, 9:00 a.m. – 5:00 p.m. Requests for technical support must be emailed to BAAT_Support@darpa.mil with a copy to EDGE@darpa.mil. Questions regarding submission contents, format, deadlines, etc. should be emailed to EDGE@darpa.mil. Questions/requests for support sent to any other email address may result in delayed/no response.

Since proposers may encounter heavy traffic on the web server, DARPA discourages waiting until the day proposals are due to request an account and/or upload the submission. NOTE: Proposers submitting a proposal via the DARPA BAA Submission site MUST (1) click the "Finalize" button in order for the submission to upload AND (2) do so with sufficient time for the upload to complete prior to the deadline. Failure to do so will result in a late submission.

ii. Direct Mail/Hand-carry

Proposers electing to submit procurement contract or Other Transaction proposals via direct mail or hand-carried must provide one paper copy and one electronic copy on CD or DVD of the full proposal package. All parts of the proposal package must be mailed or hand-carried in a single delivery to the address noted in Section VII below.

c. Proposals Requesting a Cooperative Agreement

Proposers requesting cooperative agreements must submit proposals through one of the following methods: (1) electronic upload per the instructions at <https://www.grants.gov/applicants/apply-for-grants.html> (DARPA-preferred); or (2) hard-copy mailed directly to DARPA. If proposers intend to use Grants.gov as their means of submission, then they must submit their entire proposal through Grants.gov; applications cannot be submitted in part to Grants.gov and in part as a hard-copy. Proposers using Grants.gov do not submit hard-copy proposals in addition to the Grants.gov electronic submission.

Submissions: In addition to the volumes and corresponding attachments requested elsewhere in this solicitation, proposers must also submit the three forms listed below.

Form 1: SF 424 Research and Related (R&R) Application for Federal Assistance, available on the Grants.gov website at https://apply07.grants.gov/apply/forms/sample/RR_SF424_2_0-V2.0.pdf. *This form must be completed and submitted.*

To evaluate compliance with Title IX of the Education Amendments of 1972 (20 U.S.C. § 1681 et.seq.), the Department of Defense (DoD) is collecting certain demographic and career information to be able to assess the success rates of women who are proposed for key roles in applications in science, technology, engineering or mathematics disciplines. In addition, 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 two forms below to collect the necessary information to satisfy these requirements. Detailed instructions for each form are available on Grants.gov.

Form 2: Research and Related Senior/Key Person Profile (Expanded), available on the Grants.gov website at https://apply07.grants.gov/apply/forms/sample/RR_KeyPersonExpanded_2_0-V2.0.pdf. *This form must be completed and submitted.*

The Research and Related Senior/Key Person Profile (Expanded) form 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:

- Degree Type and Degree Year.
- Current and Pending Support, including:
 - 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.

Form 3: Research and Related Personal Data, available on the Grants.gov website at https://apply07.grants.gov/apply/forms/sample/RR_PersonalData_1_2-V1.2.pdf. *Each applicant must complete the name field of this form, however, provision of the demographic information is voluntary. Regardless of whether the demographic fields are completed or not, this form must be submitted with at least the applicant's name completed.*

i. Electronic Upload

DARPA encourages cooperative agreement proposers to submit their proposals via electronic upload at <http://www.grants.gov/web/grants/applicants/apply-for-grants.html>. Proposers electing to use this method must complete a one-time registration process on Grants.gov before a proposal can be electronically submitted. *If proposers have not previously registered, this process can take up to four weeks* so registration should be done in sufficient time to ensure it does not impact a proposer's ability to meet required submission deadlines. Registration requirements and instructions are outlined at <http://www.grants.gov/web/grants/register.html>.

Carefully follow the DARPA submission instructions provided with the solicitation application package on Grants.gov. Only the required forms listed therein (e.g., SF-424 and Attachments form) should be included in the submission. *NOTE: Grants.gov does not accept zipped or encrypted proposals.*

Once Grants.gov has received an uploaded proposal submission, Grants.gov will send two email messages to notify proposers that: (1) the proposal has been received by Grants.gov; and (2) the proposal has been either validated or rejected by the system. *It may take up to two business days to receive these emails.* If the proposal is validated, then the proposer has successfully submitted their proposal. If the proposal is rejected, the submission must be corrected, resubmitted and revalidated before DARPA can retrieve it. If the solicitation is no longer open, the rejected proposal cannot be resubmitted. Once the proposal is retrieved by DARPA, Grants.gov will send a third email to notify the proposer. DARPA will send a final confirmation email as described in Section IV.C.

To avoid missing deadlines, Grants.gov recommends that proposers submit their proposals to Grants.gov 24-48 hours in advance of the proposal due date to provide sufficient time to complete the registration and submission process, receive email notifications and correct errors, as applicable.

Technical support for Grants.gov submissions may be reached at 1-800-518-4726 or support@grants.gov.

ii. Direct Mail/Hand-carry

Proposers electing to submit grant or cooperative agreement proposals via direct mail or hand-carried must provide one paper copy and one electronic copy on CD or DVD of the full proposal package. Proposers must complete the SF 424 R&R form (Application for Federal Assistance, Research and Related) provided at Grants.gov as part of the opportunity application package for this BAA and include it in the proposal submission. All parts of the proposal package must be mailed or hand-carried to the address noted in Section VII below.

V. Application Review Information

A. Evaluation Criteria

Proposals will be evaluated using the following criteria listed in descending order of importance: Overall Scientific and Technical Merit; Potential Contribution and Relevance to the DARPA Mission; Cost Realism; and Plans and Capability to Accomplish Technology Transition.

- **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. The proposed schedule aggressively

pursues performance metrics in an efficient time frame that accurately accounts for the anticipated workload.

- **Potential Contribution and Relevance to the DARPA Mission**

The potential contributions of the proposed effort bolster the national security technology base and support DARPA's mission to make pivotal early technology investments that create or prevent technological surprise.

- **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).

- **Plans and Capability to Accomplish Technology Transition**

The proposer has the capability and a feasible plan to transition the technology to the research, industrial, and/or operational military communities in such a way as to enhance U.S. defense capabilities. The proposed intellectual property restrictions (if any) will not significantly impact the Government's ability to transition the technology.

B. Review and Selection Process

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.

The review process identifies proposals that meet the evaluation criteria described above and are, therefore, selectable for negotiation of awards by the Government. DARPA policy is to ensure impartial, equitable, comprehensive proposal evaluations and to select proposals that meet DARPA technical, policy, and programmatic goals. Proposals that are determined selectable will not necessarily receive awards (see Section II). Selections may be made at any time during the period of solicitation. For evaluation purposes, a proposal is defined to be the document and supporting materials as described in Section IV.

1. Handling of Source Selection Information

DARPA policy is to treat all submissions as source selection information (FAR 2.101 and 3.104), and to only disclose their contents to authorized personnel. Restrictive notices notwithstanding, 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), DARPA may also request input on technical aspects of the proposals from other non-Government consultants/experts who are strictly bound by the appropriate non-disclosure requirements.

Submissions will not be returned. The original of each submission received will be retained at DARPA and all other non-required copies destroyed. A certification of destruction may be requested via email to the BAA mailbox, provided the formal request is received within 5 days after being notified of submission status.

C. Federal Awardee Performance and Integrity Information (FAPIS)

Following the review and selection process described above, but prior to making an award above the simplified acquisition threshold (FAR 2.101), DARPA is required¹⁴ to review and consider any information available through the designated integrity and performance system (currently FAPIS). Selectees have the opportunity to comment on any information about themselves entered in the database. DARPA will consider any comments and other information in FAPIS or other systems prior to making an award.

VI. Award Administration Information

A. Selection Notices

After proposal evaluations are complete, proposers will be notified as to whether their proposal was selected for award negotiation as a result of the review process. Notification will be sent by email to the Technical and Administrative POCs identified on the proposal cover sheet. If a proposal has been selected for award negotiation, the Government will initiate those negotiations following the notification.

B. Administrative and National Policy Requirements

1. Solicitation Provisions and Award Clauses, Terms and Conditions

Solicitation provisions relevant to DARPA BAAs are listed on the Additional BAA Content page on DARPA's website at www.darpa.mil/work-with-us/additional-baa. This page also lists award clauses that, depending on their applicability, may be included in the terms and conditions of awards resultant from DARPA solicitations. This list is not exhaustive and the clauses, terms and conditions included in a resultant award will depend on the nature of the research effort, the specific award instrument, the type of awardee, and any applicable security or publication restrictions.

For terms and conditions specific to grants and/or cooperative agreements, see the DoD General Research Terms and Conditions (latest version) at <http://www.onr.navy.mil/Contracts-Grants/submit-proposal/grants-proposal/grants-terms-conditions> and the supplemental DARPA-specific terms and conditions at <http://www.darpa.mil/work-with-us/contract-management#GrantsCooperativeAgreements>.

The above information serves to put potential proposers and awardees on notice of proposal

¹⁴ Per 41 U.S.C. 2313, as implemented by FAR 9.103 and 2 CFR § 200.205.

requirements and award terms and conditions to which they may have to adhere.

2. 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/bsd-gov/answer.do?sysparm_kbid=dbf8053adb119344d71272131f961946&sysparm_search=KB0013221.

NOTE: New registrations can take an average of 7-10 business days to process in SAM. SAM registration requires the following information:

- DUNS number
- TIN
- Commercial and Government Entity (CAGE) Code. If a proposer does not already have a CAGE code, one will be assigned during SAM registration.
- Electronic Funds Transfer information (e.g., proposer’s bank account number, routing number, and bank phone or fax number).

3. 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/reprs-certs> for further information on required representation and certification depending on your requested award instrument.

4. Intellectual Property

Proposers should note that the Government does not own the intellectual property or technical data/computer software developed under Government contracts. The Government acquires the right to use the technical data/computer software. Regardless of the scope of the Government’s rights, awardees may freely use their same data/software for their own commercial purposes (unless restricted by U.S. export control laws or security classification). Therefore, technical data and computer software developed under this solicitation will remain the property of the awardees, though DARPA will have, at a minimum, Government Purpose Rights (GPR) to technical data and computer software developed through DARPA sponsorship.

If proposers desire to use proprietary computer software or technical data or both as the basis of their proposed approach, in whole or in part, they should: (1) clearly identify such software/data and its proposed particular use(s); (2) explain how the Government will be able to reach its program goals (including transition) within the proprietary model offered; and (3) provide possible nonproprietary alternatives in any area that might present transition difficulties or

increased risk or cost to the Government under the proposed proprietary solution. Proposers expecting to use, but not to deliver, commercial open source tools or other materials in implementing their approach may be required to indemnify the Government against legal liability arising from such use.

All references to "Unlimited Rights" or "Government Purpose Rights" are intended to refer to the definitions of those terms as set forth in the Defense Federal Acquisition Regulation Supplement (DFARS) 227.

a. Intellectual Property Representations

All proposers must provide a good faith representation of either ownership or possession of appropriate licensing rights to all other intellectual property to be used for the proposed project. Proposers must provide a short summary for each item asserted with less than unlimited rights that describes the nature of the restriction and the intended use of the intellectual property in the conduct of the proposed research. See Attachment G: PROPOSAL TEMPLATE VOLUME 3: ADMINISTRATIVE & NATIONAL POLICY REQUIREMENTS, Section 4.

b. Patents

All proposers must include documentation proving ownership or possession of appropriate licensing rights to all patented inventions to be used for the proposed project. If a patent application has been filed for an invention, but it includes proprietary information and is not publicly available, a proposer must provide documentation that includes: the patent number, inventor name(s), assignee names (if any), filing date, filing date of any related provisional application, and summary of the patent title, with either: (1) a representation of invention ownership; or (2) proof of possession of appropriate licensing rights in the invention (i.e., an agreement from the owner of the patent granting license to the proposer).

c. Procurement Contracts

i. Noncommercial Items (Technical Data and Computer Software)

Proposers requesting a procurement contract must list all noncommercial technical data and computer software that it plans to generate, develop, and/or deliver, in which the Government will acquire less than unlimited rights and to assert specific restrictions on those deliverables. In the event a proposer does not submit the list, the Government will assume that it has unlimited rights to all noncommercial technical data and computer software generated, developed, and/or delivered, unless it is substantiated that development of the noncommercial technical data and computer software occurred with mixed funding. If mixed funding is anticipated in the development of noncommercial technical data and computer software generated, developed, and/or delivered, proposers should identify the data and software in question as subject to GPR. In accordance with DFARS 252.227-7013, "Rights in Technical Data - Noncommercial Items," and DFARS 252.227-7014, "Rights in Noncommercial Computer Software and Noncommercial Computer Software Documentation," the Government will automatically assume that any such GPR restriction is limited to a period of 5 years, at which time the Government will acquire unlimited rights unless the parties agree otherwise. The Government may use the list during the evaluation process to evaluate the impact of any identified restrictions and may request additional information from the proposer, as may be necessary, to evaluate the proposer's

assertions. Failure to provide full information may result in a determination that the proposal is non-conforming. A template for complying with this request is provided in Attachment G: PROPOSAL TEMPLATE VOLUME 3: ADMINISTRATIVE & NATIONAL POLICY REQUIREMENTS, Section 4.

ii. Commercial Items (Technical Data and Computer Software)

Proposers requesting a procurement contract must list all commercial technical data and commercial computer software that may be included in any noncommercial deliverables contemplated under the research project and assert any applicable restrictions on the Government's use of such commercial technical data and/or computer software. In the event a proposer does not submit the list, the Government will assume there are no restrictions on the Government's use of such commercial items. The Government may use the list during the evaluation process to evaluate the impact of any identified restrictions and may request additional information from the proposer to evaluate the proposer's assertions. Failure to provide full information may result in a determination that the proposal is non-conforming. A template for complying with this request is provided in Attachment G: PROPOSAL TEMPLATE VOLUME 3: ADMINISTRATIVE & NATIONAL POLICY REQUIREMENTS, Section 4.

d. Other Types of Awards

Proposers requesting an award instrument other than a procurement contract shall follow the applicable rules and regulations governing those award instruments, but in all cases should appropriately identify any potential restrictions on the Government's use of any intellectual property contemplated under those award instruments. This includes both noncommercial items and commercial items. The Government may use the list as part of the evaluation process to assess the impact of any identified restrictions and may request additional information from the proposer, to evaluate the proposer's assertions. Failure to provide full information may result in a determination that the proposal is non-conforming. A template for complying with this request is provided in Attachment G: PROPOSAL TEMPLATE VOLUME 3: ADMINISTRATIVE & NATIONAL POLICY REQUIREMENTS, Section 4.

5. Program-generated Data

Data are increasingly the key product of research and engineering endeavors. To ensure the reproducibility of results and access to source data for future research, awardees will be required to maintain and deliver any data generated during award performance ("program-generated data") that is needed to accomplish these goals. Awardees shall be expected to document both the proprietary and non-proprietary products of their research to ensure the retention and potential reusability of this information. This may include:

- Raw unprocessed data, software source code and executables, build scripts, process sequence, programmatic communication and other collaboration activities
- Data sets: rarified, experimental, test and measurement data
- Design of experiments and simulations
- Models or simulations (computational or mathematical)
- Recordings of various physical phenomena (including images, videos, sensor data, etc.)

- Access to and use of institutional, organizational or scientific community repositories and archives

When possible, DARPA may share some or all of the program-generated data with the broader research community as open data (with permission to access, reuse, and redistribute under appropriate licensing terms where required) to the extent permitted by applicable law and regulations (e.g., privacy, security, rights in data, and export control). DARPA plans to enable reproducibility of results through data sharing and to establish (or contribute to) digital collections that can advance this and other scientific fields.

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.

HSR and non-HSR tasking needs to be priced separately for Phase 1 and Phase 2. For Phase 3, the ROM should include separate estimates for HSR and non-HSR tasking.

7. Electronic Invoicing and Payments

Awardees will be required to submit invoices for payment electronically via Wide Area Work Flow (WAWF), accessed through the Procurement Integrated Enterprise Environment at <https://piee.eb.mil/>, unless an exception applies. Registration in WAWF is required prior to any award under this BAA.

8. Electronic and Information Technology

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. § 749d) and FAR 39.2.

9. 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.

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://doi.org/10.6028/NIST.SP.800-171r1>) 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.

C. Reporting

1. Technical and Financial Reports

The number and types of technical and financial reports required under the award will be specified in the award document and may include monthly financial reports, monthly technical reports and/or a yearly status summary. A final report that summarizes the project and tasks will be required at the conclusion of the performance period for the award. The reports shall be prepared and submitted in accordance with the procedures contained in the award document.

2. Patent Reports and Notifications

All resultant awards will contain a mandatory requirement for patent reports and notifications to be submitted electronically through i-Edison (<https://public.era.nih.gov/iedison>).

VII. Agency Contacts

DARPA will use email for all technical and administrative correspondence regarding this solicitation.

- **Technical POC:** Dr. Bartlett Russell, Program Manager, DARPA/DSO
- **BAA Email:** EDGE@darpa.mil
- **BAA Mailing Address:**
DARPA/DSO
ATTN: HR001121S0030
675 North Randolph Street
Arlington, VA 22203-2114
- **DARPA/DSO Opportunities Website:** <http://www.darpa.mil/work-with-us/opportunities>

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

VIII. Other Information

A. Proposers Day

The EDGE Proposers Day will be held on June 1, 2021 via webcast for remote participation. Advance registration is required. See DARPA-SN-21-29 posted at <https://sam.gov/> for all details. Participation in the EDGE Proposers Day is voluntary and is not required to propose to this solicitation.

B. Frequently Asked Questions (FAQs)

Administrative, technical, and contractual questions should be emailed to EDGE@darpa.mil.

All questions must be in English and must include the name, email address, and the telephone number of a point of contact.

DARPA will attempt to answer questions in a timely manner; however, questions submitted within 10 days of the proposal due date may not be answered. DARPA will post an FAQ list at: <http://www.darpa.mil/work-with-us/opportunities>. The list will be updated on an ongoing basis until the BAA expiration date as stated in Part I.

C. Collaborative Efforts/Teaming

DARPA highly encourages teaming before proposal submission and will facilitate the formation of teams with the necessary expertise. Interested parties should submit a profile, no longer than 1 page, including the following information:

- Contact information to include name, organization, email, telephone number, organization website (if applicable)
- A brief description of the proposer's technical competencies
- Desired expertise from other teams, if applicable.

All profiles must be emailed to EDGE@darpa.mil no later than 4:00 p.m. June 9, 2021. Following the deadline, the consolidated teaming profiles will be sent via email to the proposers who submitted a valid profile. Specific content, communications, networking, and team formation are the sole responsibility of the participants. Neither DARPA nor the DoD endorses the information and organizations contained in the consolidated teaming profile document, nor does DARPA or the DoD exercise any responsibility for improper dissemination of the teaming profiles. Teams need not be finalized at the time of abstract submission.

D. Sample ACA Clause

(a) It is recognized that success of the *[List brief description of research effort]* research effort depends in part upon the open exchange of information between the various Associate Contractors involved in the effort. This requirement is intended to ensure that there will be appropriate coordination and integration of work by the Associate Contractors to achieve complete compatibility and to prevent unnecessary duplication of effort. By executing this contract, the Contractor assumes the responsibilities of an Associate Contractor. For the purpose of this requirement, the term Contractor includes subsidiaries, affiliates, and organizations under the control of the contractor (e.g. subcontractors).

(b) Work under this contract may involve access to proprietary or confidential data from an Associate Contractor. To the extent that such data is received by the Contractor from any Associate Contractor for the performance of this contract, the Contractor hereby agrees that any proprietary information received shall remain the property of the Associate Contractor and shall be used solely for the purpose of the *[List brief description of research effort]* research effort. Only that information which is received from another contractor in writing and which is clearly identified as proprietary or confidential shall be protected in accordance with this requirement. The obligation to retain such information in confidence will be satisfied if the Contractor receiving such information utilizes the same controls as it employs to avoid disclosure, publication, or dissemination of its own proprietary information. The receiving Contractor

agrees to hold such information in confidence as provided herein so long as such information is of a proprietary/confidential or limited rights nature.

(c) The Contractor hereby agrees to closely cooperate as an Associate Contractor with the other Associate Contractors on this research effort. This involves as a minimum:

(1) maintenance of a close liaison and working relationship;

(2) maintenance of a free and open information network with all Government-identified associate Contractors;

(3) delineation of detailed interface responsibilities;

(4) entering into a written agreement with the other Associate Contractors setting forth the substance and procedures relating to the foregoing, and promptly providing the Contracting Officer with a copy of same; and,

(5) receipt of proprietary information from the Associate Contractor and transmittal of Contractor proprietary information to the Associate Contractors subject to any applicable proprietary information exchange agreements between associate contractors when, in either case, those actions are necessary for the performance of either.

(d) In the event that the Contractor and the Associate Contractor are unable to agree upon any such interface matter of substance, or if the technical data identified is not provided as scheduled, the Contractor shall promptly notify the DARPA DSO Program Manager. The Government will determine the appropriate corrective action and will issue guidance to the affected Contractor.

(e) The Contractor agrees to insert in all subcontracts which require access to proprietary information belonging to the Associate Contractor, a requirement which shall conform substantially to the language of this requirement, including this paragraph (e).

(f) Associate Contractors for this research effort include:

Contractor

Technical Area

[List Name of Contractor]

[List Technical Area]