

Broad Agency Announcement

Explainable Artificial Intelligence (XAI)

DARPA-BAA-16-53

August 10, 2016



Defense Advanced Research Projects Agency

Information Innovation Office

675 North Randolph Street

Arlington, VA 22203-2114

Table of Contents

| | |
|---|----------|
| PART I: OVERVIEW INFORMATION | 4 |
| I. Funding Opportunity Description | 5 |
| A. Introduction | 5 |
| B. Program Scope | 6 |
| C. Challenge Problems and Evaluation | 10 |
| D. Technical Areas | 14 |
| E. Schedule/Milestones | 16 |
| F. Deliverables | 17 |
| G. Government-furnished Property/Equipment/Information | 17 |
| H. Intellectual Property | 17 |
| I. References | 18 |
| II. Award Information | 20 |
| A. Awards | 20 |
| III. Eligibility Information | 23 |
| A. Eligible Applicants | 23 |
| B. Procurement Integrity, Standards of Conduct, Ethical Considerations, and Organizational Conflicts of Interest | 23 |
| C. Cost Sharing/Matching | 24 |
| IV. Application and Submission Information | 25 |
| A. Address to Request Application Package | 25 |
| B. Content and Form of Application Submission | 25 |
| C. Submission Dates and Times | 35 |
| D. Funding Restrictions | 36 |
| E. Other Submission Requirements | 36 |
| V. Application Review Information | 40 |
| A. Evaluation Criteria | 40 |
| B. Review and Selection Process | 40 |
| VI. Award Administration Information | 42 |
| A. Selection Notices | 42 |
| B. Administrative and National Policy Requirements | 42 |
| C. Reporting | 49 |
| VII. Agency Contacts | 50 |

VIII. Other Information51

- A. Frequently Asked Questions (FAQs)51
- B. Proposers Day51
- C. Submission Checklist.....51

PART I: OVERVIEW INFORMATION

- **Federal Agency Name:** Defense Advanced Research Projects Agency (DARPA), Information Innovation Office (I2O)
- **Funding Opportunity Title:** Explainable Artificial Intelligence (XAI)
- **Announcement Type:** Initial Announcement
- **Funding Opportunity Number:** DARPA-BAA-16-53
- **Catalog of Federal Domestic Assistance Numbers (CFDA):** 12.910 Research and Technology Development
- **Dates**
 - Posting Date: August 10, 2016
 - Proposers Day: August 11, 2016
 - Abstract Due Date: September 1, 2016, 12:00 noon (ET)
 - Proposal Due Date: November 1, 2016, 12:00 noon (ET)
 - BAA Closing Date: November 1, 2016, 12:00 noon (ET)
- **Anticipated Individual Awards:** Multiple awards are anticipated.
- **Types of Instruments that May be Awarded:** Procurement Contracts, Cooperative Agreements, or Other Transactions (OTs). No grants will be awarded under this solicitation.
- **Agency Contacts**
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 - **I2O Solicitation Website:** <http://www.darpa.mil/work-with-us/opportunities>

PART II: FULL TEXT OF ANNOUNCEMENT

I. Funding Opportunity Description

DARPA is soliciting innovative research proposals in the areas of machine learning and human-computer interaction. The goal of Explainable Artificial Intelligence (XAI) is to create a suite of new or modified machine learning techniques that produce explainable models that, when combined with effective explanation techniques, enable end users to understand, appropriately trust, and effectively manage the emerging generation of Artificial Intelligence (AI) systems. Proposed research should investigate innovative approaches that enable revolutionary advances in science, or systems. Specifically excluded is research that primarily results in evolutionary improvements to the existing state of practice.

This Broad Agency Announcement (BAA) is being issued, and any resultant selection will be made, using procedures under Federal Acquisition Regulation (FAR) 35.016. Any negotiations and/or awards will use procedures under FAR 15.4 or 32 CFR 22 for grants and cooperative agreements. Proposals received as a result of this BAA shall be evaluated in accordance with evaluation criteria specified herein through a scientific review process.

DARPA BAAs are posted on the Federal Business Opportunities (FBO) website (<https://www.fbo.gov/>) and, as applicable, the Grants.gov website (<http://www.grants.gov/>).

The following information is for those wishing to respond to this BAA.

A. Introduction

Dramatic success in machine learning has led to an explosion of new AI capabilities. Continued advances promise to produce autonomous systems that perceive, learn, decide, and act on their own. These systems offer tremendous benefits, but their effectiveness will be limited by the machine's inability to explain its decisions and actions to human users. This issue is especially important for the Department of Defense (DoD), which is facing challenges that demand the development of more intelligent, autonomous, and symbiotic systems. Explainable AI will be essential if users are to understand, appropriately trust, and effectively manage this incoming generation of artificially intelligent partners.

The problem of explainability is, to some extent, the result of AI's success. In the early days of AI, the predominant reasoning methods were logical and symbolic. These early systems reasoned by performing some form of logical inference on (somewhat) human readable symbols. Early systems could generate a trace of their inference steps, which then became the basis for explanation. As a result, there was significant work on how to make these systems explainable (Shortliffe & Buchanan, 1975; Swartout, Paris, & Moore, 1991; Johnson, 1994; Lacave & Díez, 2002; Van Lent, Fisher, & Mancuso, 2004).

Yet these early systems were much less effective; they proved too expensive to build and were too brittle against the complexities of the real world. Success came as researchers developed new techniques that employed machine learning to construct models of the world in their own internal representations. These new techniques include support vector machines, random forests, probabilistic graphical models, reinforcement learning, and deep learning neural networks. Although these more opaque models are more effective, they are less explainable.

DARPA is interested in creating technology to make this new generation of AI systems explainable. Because the most critical and most opaque components are based on machine learning, XAI is focusing on the development of explainable machine learning techniques. By creating new machine learning methods to produce more explainable models and combining them with explanation techniques, XAI aims to help users understand, appropriately trust, and effectively manage the emerging generation of AI systems.

B. Program Scope

The target of XAI is an end user who depends on decisions, recommendations, or actions produced by an AI system, and therefore needs to understand the rationale for the system’s decisions. For example, an intelligence analyst who receives recommendations from a big data analytics algorithm needs to understand why the algorithm has recommended certain activity for further investigation. Similarly, a test operator of a newly developed autonomous system will need to understand why the system makes its decisions so that he/she can decide how to use it in future missions. Figure 1 illustrates the XAI concept—to provide end users with an explanation of individual decisions, enable users to understand the system’s overall strengths and weaknesses, convey an understanding of how the system will behave in the future, and perhaps how to correct the system’s mistakes.

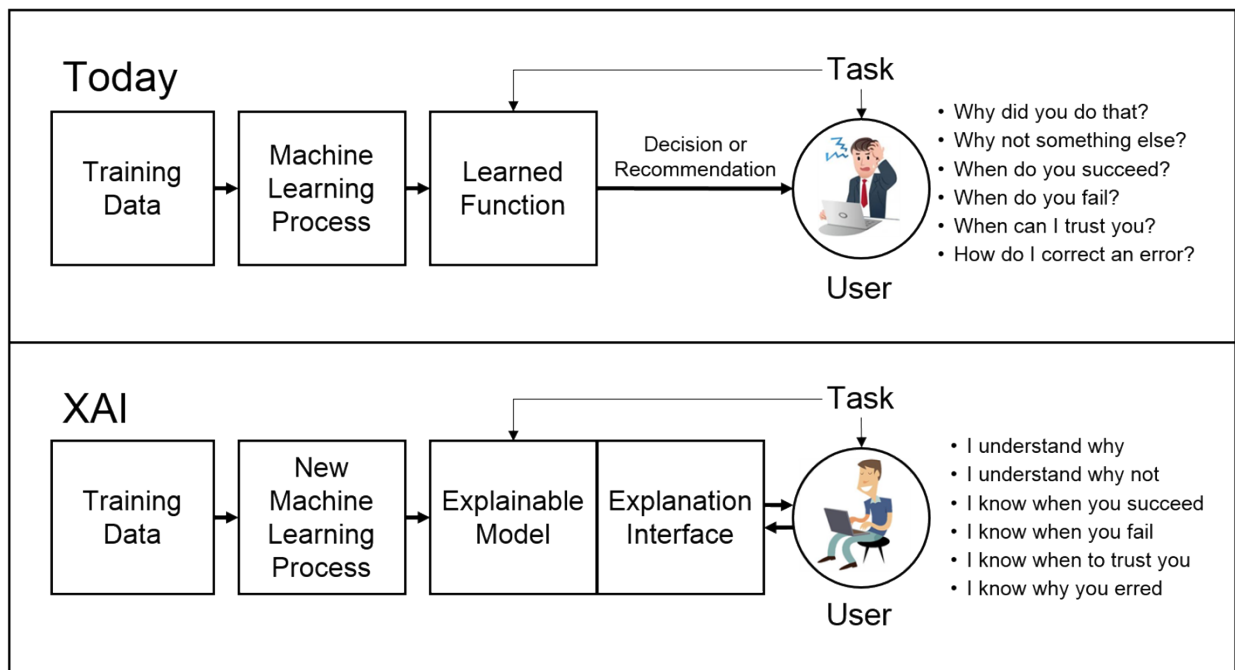


Figure 1: XAI Concept

This concept presents three related research and development challenges: (1) how to produce more explainable models; (2) how to design the explanation interface; and (3) how to understand the psychological requirements for effective explanations. For the first development challenge, the XAI program envisions developing a range of new or modified machine learning techniques to produce more explainable models. For the second development challenge, the program anticipates integrating state-of-the-art human-computer interaction (HCI) techniques (e.g., visualization, language understanding, language generation, and dialog management) with new

principles, strategies, and techniques to generate effective explanations. For the third development challenge, XAI plans to summarize, extend, and apply current psychological theories of explanation to assist both the XAI developers and evaluator. The program will be structured to ask for multiple development teams (under Technical Area 1) to address the first and second challenges by developing an explainable learning system that contains both an explainable model and an explanation interface, and one team (under Technical Area 2) to address the third challenge.

B.1. Explainable Models

The XAI program would like to improve explainability while maintaining a high level of learning performance for a range of machine learning techniques. There is an inherent tension between machine learning performance (predictive accuracy) and explainability; often the highest performing methods (e.g., deep learning) are the least explainable, and the most explainable (e.g., decision trees) are less accurate. The program plans to fund a variety of machine learning techniques to provide future developers with a range of design options covering the performance versus explainability trade space.

Explainable models might be created by learning to associate explanatory semantic information with features of the model, by learning simpler models that are easier to explain, by learning richer models that contain more explanatory content, or by inferring approximate models solely for the purpose of explanation. Recent research offers examples of promising directions, even though none of these examples provides a complete solution, nor are these considered the only possible solutions. Here are three possible strategies to illustrate the range, but not the entire space, of approaches that may be pursued:

- **Deep Explanation**: Develop modified or hybrid deep learning techniques that learn more explainable features, explainable representations, or explanation generation facilities. There are a number of design choices that affect deep learning: the selection of training data, initial conditions, architectural layers, loss functions, regularization, optimization techniques, and training sequences. These design choices might be engineered to produce more explainable representations. Recent work has made several small steps towards explainability. Researchers have used deconvolutional networks to visualize the layers of convolutional networks (Zeiler & Fergus, 2014). There are a variety of techniques for associating semantic concepts with nodes of a deep network, such as those used to identify items in a visual scene and recount multimedia events (Yu, Liu, Cheng, Divakaran, & Sawhney, 2012; Gan, Wang, Yang, Yeung, & Hauptmann, 2015). Moreover, it might be possible to extend the approaches used to generate image captions (LeCun, Bengio, & Hinton, 2015) to train a second deep network to generate explanations without explicitly identifying the semantic features of the original network (Hendricks et al., 2016). Because deep learning is so prominent, it is important for the XAI program to pursue several approaches to make these systems more explainable.
- **Interpretable Models**: Develop alternative machine learning techniques that learn more structured, interpretable, or causal models. There is a wide variety of techniques that may be pursued: learning simpler, more compact models, such as Bayesian Rule Lists (Letham, Rudin, McCormick, & Madigan, 2015); learning richer, more conceptual, generative models, such as Bayesian Program Learning (Lake, Salakhutdinov, & Tenenbaum, 2015); learning models of causal relationships (Maier, Taylor, Oktay, & Jensen, 2010); using stochastic grammars to learn more interpretable structure (Brendel

& Todorovic, 2011; Park, Nie, & Zhu 2016); or many others. Because these techniques are inherently more explainable (even if their performance is less than optimal), it is important for the XAI program to also pursue promising techniques for learning interpretable models.

- **Model Induction:** Develop techniques that would experiment with any given machine learning model—as a black box—to infer an approximate, explainable model. Ribeiro, Singh, & Guestrin (2016) demonstrate an example of such a model-agnostic explanation system that infers explanations by observing and analyzing the input-output behavior of the original black-box model. Moreover, it may be possible to develop richer model-agnostic techniques by using abduction, reasoning, and story generation to “rationalize” plausible explanations of the system’s reasoning. Because these techniques could apply to almost any machine learning application, it is important for the XAI program to also pursue promising techniques for model induction.

B.2. Explanation Interface

DARPA anticipates the design and development of effective interfaces by integrating state-of-the-art HCI techniques with new strategies for presenting understandable explanations. Kulesza, Burnett, Wong, & Stumpf (2015) provide an example of the development and evaluation of a basic explanation interface. The work followed a complete development strategy that included identifying principles of explainability, developing a prototype interface from those principles, and evaluating the effectiveness of the explanations provided by the prototype. It was basic in the sense that the system explained a very simple machine learning model, a naïve Bayesian text classifier. The XAI program is seeking developments that go beyond this work by explaining more complex learning systems, by devising additional explanation strategies, and by applying more sophisticated HCI techniques where appropriate.

The design of an effective explanation interface should consider a range of HCI and cognitive science techniques. This would certainly include basic user interface design, but XAI is interested in user interaction in the broadest sense. The design of the interface should consider the user’s cognitive tasks and mental model of the system being explained. It should consider possible principles, such as the ones mentioned in Kulesza, Burnett, Wong, & Stumpf (2015), and possible strategies, such as explanation by example or analogy. It should consider the appropriate use of visualization and natural language understanding. Furthermore, it should include an explanation dialog to allow the user to interact with and drill down into the explanation. XAI is interested in a broad range of HCI and cognitive science techniques that will produce the most effective explanations.

Moreover, DARPA believes it is important to develop the explanation interface in conjunction with explainable models as a part of an integrated system. Breakthroughs are more likely to come from the right combination of machine learning and HCI. The XAI program encourages a dialog between these two research communities and believes that effective XAI systems will depend on significant interaction and contribution from both research groups. The program will be asking for proposals that jointly develop explainable models and explanation interfaces in an integrated explainable learning system.

XAI emphasizes the development of new/modified machine learning techniques to produce explainable models. However, it is also possible for a well-designed explanation interface to work with existing machine learning techniques to make those models more explainable.

Developers are encouraged to design and implement explanation interfaces that cover as wide a range of machine learning techniques as possible, old and new.

B.3. Psychology of Explanation

In addition to the application of psychology to the design of the explanation interface, the program is interested in work focused primarily on psychological theories of explanation. For example, there is relevant psychological research on the structure and function of explanation (Lombrozo, 2006) and its role in learning and reasoning (Lombrozo, 2012). XAI is interested in having this work summarized and consolidated to inform both the development of the explainable learning systems by the developers and the definition of explanation effectiveness measures by the evaluator. XAI is particularly interested in the development of computational models of these theories that could be used to understand, model, and predict explanation effectiveness.

B.4. Emphasis and Scope of XAI Research

The XAI program is interested in new technology at the intersection of machine learning, HCI, and the psychology of explanation (Figure 2). XAI is not interested in research unrelated to the specific problem of explainable AI. For example, designing an effective explanation dialog may involve aspects of user modeling, personalization, and theory of mind, but XAI is not interested in research on these topics for the sake of that research alone. Similarly, there are many interesting research problems related to interactive machine learning and visual analytics, but XAI is most interested in research directly related to the problem of explaining machine learning models to end users.

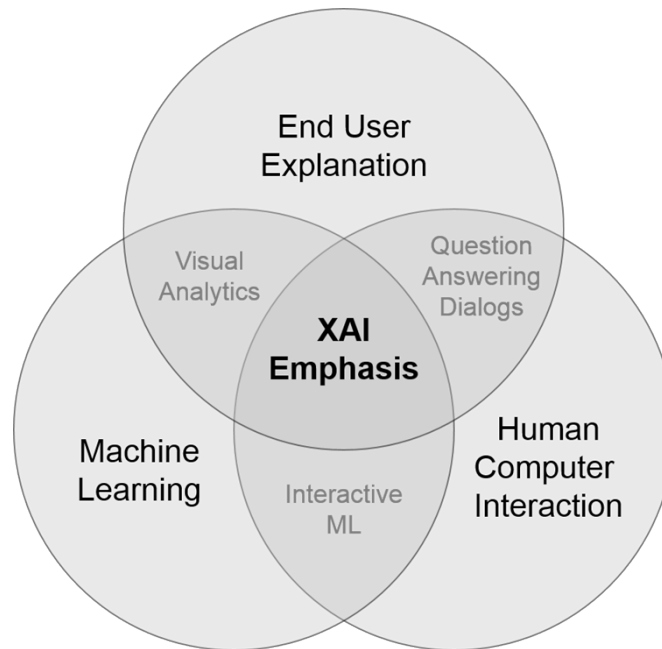


Figure 2: XAI Emphasis

C. Challenge Problems and Evaluation

C.1. Overview

The XAI program will focus the development of explainable learning systems on addressing challenge problems in two areas: (1) machine learning problems to classify events of interest in heterogeneous, multimedia data, and (2) machine learning problems to construct decision policies for a simulated autonomous system. These two challenge problem areas, illustrated in Figure 3, were chosen to represent the intersection of two important machine learning approaches (classification and reinforcement learning) and two important operational problem areas for DoD (intelligence analysis and autonomous systems).

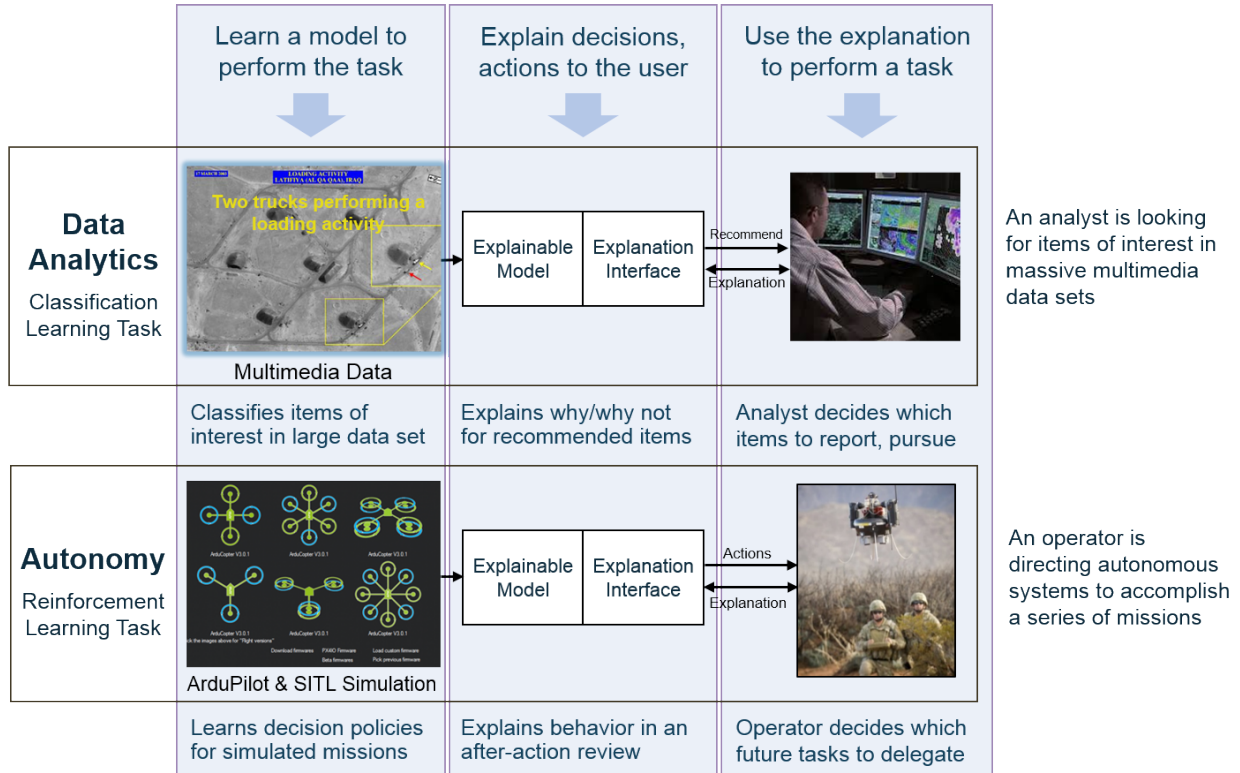


Figure 3: XAI Challenge Problem Areas

The government will provide an evaluator and is not soliciting proposals for the evaluation role. The program is structured in two phases: Phase 1, Technology Demonstrations (18 months); and Phase 2, Comparative Evaluations (30 months). During Phase 1, developers will demonstrate their technology against their own test problems. During Phase 2, developers will test their technology against common problems defined by the government evaluator.

Proposals for TA1 and TA2 should reflect a four-year base program effort and a nominal start date of May 1, 2017. Each proposal may address either TA1 or TA2, but not both. Organizations may submit separate proposals to TA1 and TA2 and could possibly receive awards under both.

Developers should propose their own test problems, within one or both of two general areas listed above, to work on during Phase 1 of the program. During Phase 2 of the program, developers will be asked to demonstrate their XAI systems against a set of common test

problems defined by the XAI government evaluator. During Phase 1, the XAI government evaluator will work with XAI developers to define a set of common test problems, in each of these challenge problem areas, to be used in Phase 2. The exact number and nature of the Phase 2 problems will depend on the technical approaches and test problems proposed by the selected XAI performers.

Proposers should suggest creative and compelling test problems that would be the most productive drivers of XAI research and development. The program seeks test problems that are sufficiently general and compelling to be useful for multiple XAI approaches in order to avoid having a unique, tailored problem for each research project.

Below, we describe the motivation and desired characteristics of these problems to inform proposer's selection of test problems for Phase 1.

C.2. Data Analysis

The choice of a data analytics challenge is motivated by a common problem in intelligence analysis—analysts are presented with decisions and recommendations from big data analytics algorithms and must decide which items to pursue with more resources or which items to report as supporting evidence in their analysis. These algorithms often produce false alarms that the analyst must prune, and are subject to model drift that the analyst must detect. Furthermore, these algorithms often recommend items that the analyst must spend time assessing to determine if the evidence supports or contradicts hypotheses they are evaluating. Effective explanations would greatly help with all of these tasks.

Ideally, test problems in this area will emphasize machine learning to classify items, events, or patterns of interest in heterogeneous, multimedia data, which would include structured or semi-structured data, in addition to images and video. XAI is interested in problems that involve both video as well as other types of data, and that require meaningful explanations that are not obvious in the video alone. Although the main problem would involve supervised classification, unsupervised techniques might be very useful to organize the data into meaningful categories for explanation.

A variety of candidate data sets and open test problems exist, including those provided by the National Institute of Standards and Technology (NIST), the Knowledge Discovery and Data Mining (KDD) conference, Kaggle, and other published data sets and test problems. Proposers interested in this problem area should describe their version of the challenge problem to include the data sets, training data, classification function to be learned, types of explanation to be provided, and user decisions to be supported.

C.3. Autonomy

The choice of an autonomy challenge is motivated by the question of how to effectively manage the incoming generation of artificially intelligent partners. For example, in the future DoD is likely to develop, test, and use a variety of autonomous systems. There will be test pilots or operators who will conduct operational tests and evaluations to determine how and when to use these systems in future missions. Operational conditions often vary from the original design specifications. There will be opportunities to use these systems for unanticipated mission scenarios. Test operators will need explanations to effectively make those determinations.

Ideally, test problems in this area will emphasize the use of reinforcement learning to learn sequential decision policies for the autonomous agent. However, because the decision machinery is likely to include additional planning, decision, or control modules, DARPA anticipates that these explanations may cover those reasoning modules, as well as decision policies learned through reinforcement learning. Moreover, the program is interested in explaining decisions that would be meaningful to the end user (e.g., the test operator). Reinforcement learning might also be used to learn low-level motor control, as well as higher-level decisions. XAI is most interested in explanations of higher-level decisions that would be relevant to the end user and the missions he/she needs to manage.

DARPA is considering simulation environments such as the ArduPilot/Software in the Loop (SITL) environment, Research Environment for Supervising Control of Heterogeneous Unmanned Vehicles (RESCHU), and those available from the OpenAI Gym for reinforcement learning. Proposers interested in this problem area should describe their version of the challenge problem to include the simulation environment, the types of missions to be covered, the decision policies and mission tasks to be learned, the type of explanations to be provided, and the user decisions to be supported.

C.4. Expected Evaluation Sequence

The general evaluation sequence to be administered by the government evaluator for the Phase 2 problems, in both challenge problem areas should be as follows. Proposals for Phase 1 test problems should use this sequence as a model, but may vary to provide a more effective development progression.

1. XAI developers are presented with a problem domain that includes training data or a simulated training environment and a description of the tasks that might be included in the final user test. The specific problems presented should vary to avoid over-engineering and to provide a progression of increasing difficulty.
2. XAI developers are asked to apply their machine learning technique to learn an explainable model to accomplish those tasks. The evaluator may require some light instrumentation of this process to estimate the person hours and other resources required to learn the model. The program understands that some human involvement may be needed during the learning process, but encourages developers to avoid depending on a human-intensive knowledge engineering effort.
3. The resulting explainable model is combined with the XAI developer's explanation interface to construct an explainable system.
4. The explainable system delivers and explains decisions or actions from the learned model while the user is performing related domain tasks.
5. The system's decisions and explanations contribute (positively or negatively) to the user's performance of the domain related tasks.
6. The evaluator measures the learning performance (e.g., predictive accuracy) of the model to accomplish the target tasks and the effectiveness of the explanations in helping the user understand and manage the AI system.
7. The evaluator also conducts evaluations of existing machine learning techniques, with a basic user interface, to establish baseline measurements for learning performance and explanation effectiveness against the target challenge problem.

Measuring explanation effectiveness is a research challenge in its own right. XAI developers should propose their own measurement scheme to use in conjunction with their proposed test

problems for Phase 1. During that first phase, the XAI government evaluator will work with the XAI developers to define more detailed test problems and evaluation metrics to be used in the second phase of the program. Figure 4 shows the framework and initial ideas for measuring explanation effectiveness. The list of measures roughly represents increasing difficulty and sophistication. The most basic capability would explain a model’s individual decisions. A more advanced capability would explain the strengths and weaknesses of the overall model. The most sophisticated capability would enable the user to identify and correct mistakes. It may not be possible to achieve all of these desired capabilities, especially the capability to correct mistakes, which would be beyond the reach of most current machine learning techniques. This list represents the ideal capabilities of an explanation system.

In addition, the evaluator will define a range of evaluation techniques from fully automated to human-intensive. XAI envisions three levels of evaluation: (1) fully automated techniques that developers can use immediately and often to evaluate the system’s explanations; (2) Amazon Mechanical Turk (AMT) techniques that developers can use less frequently (perhaps monthly) to obtain some human evaluation of their system’s explanations; and (3) human-in-the-loop techniques that developers can use annually for more intensive human evaluations while performing more complex tasks.

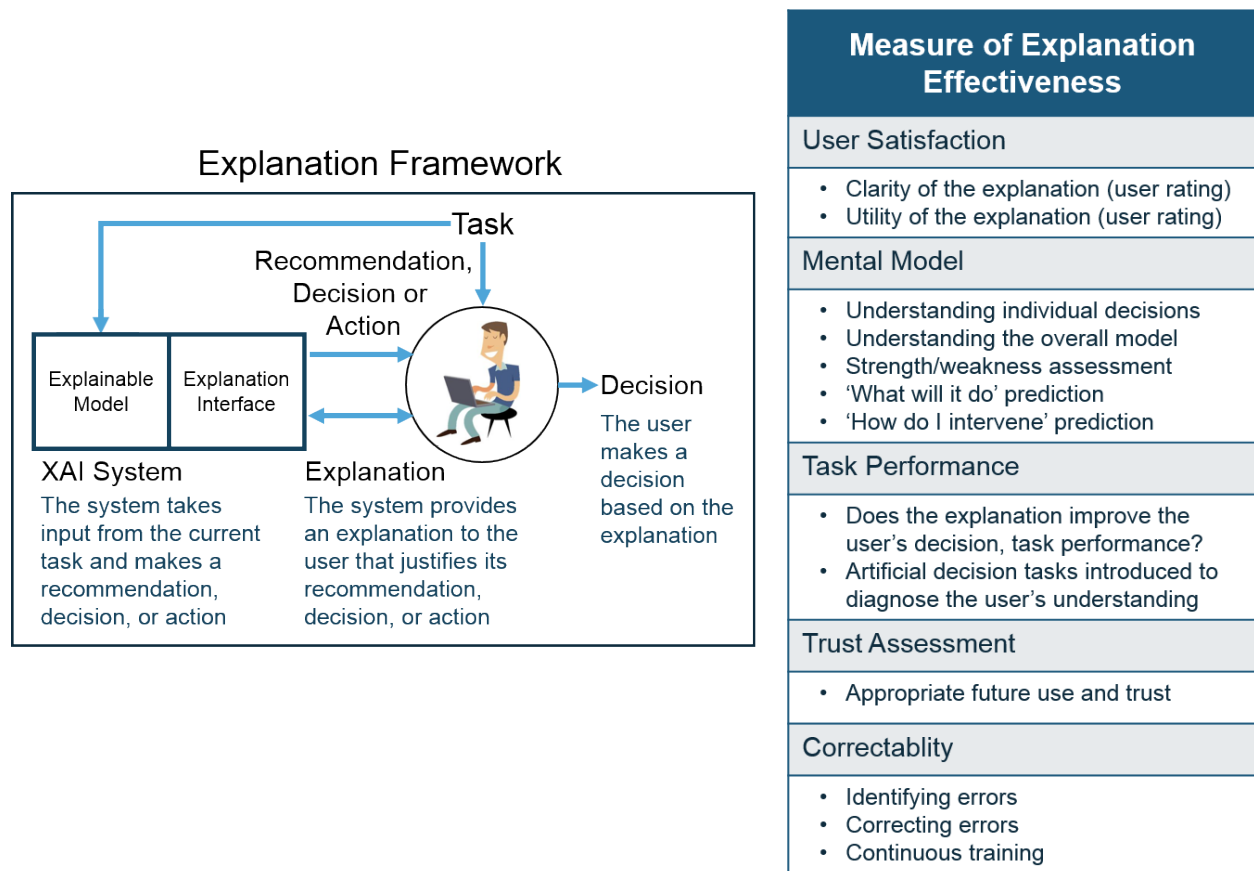


Figure 4: Evaluation Framework for Measuring Explanation Effectiveness

D. Technical Areas

Figure 5 shows the overall structure of the program. XAI shall be organized into two technical areas (TAs): Explainable Learners and Psychological Models of Explanation. As mentioned in Section C.1. Overview, DARPA is not soliciting proposals for the evaluator role. Proposers may propose to either or both of the technical areas

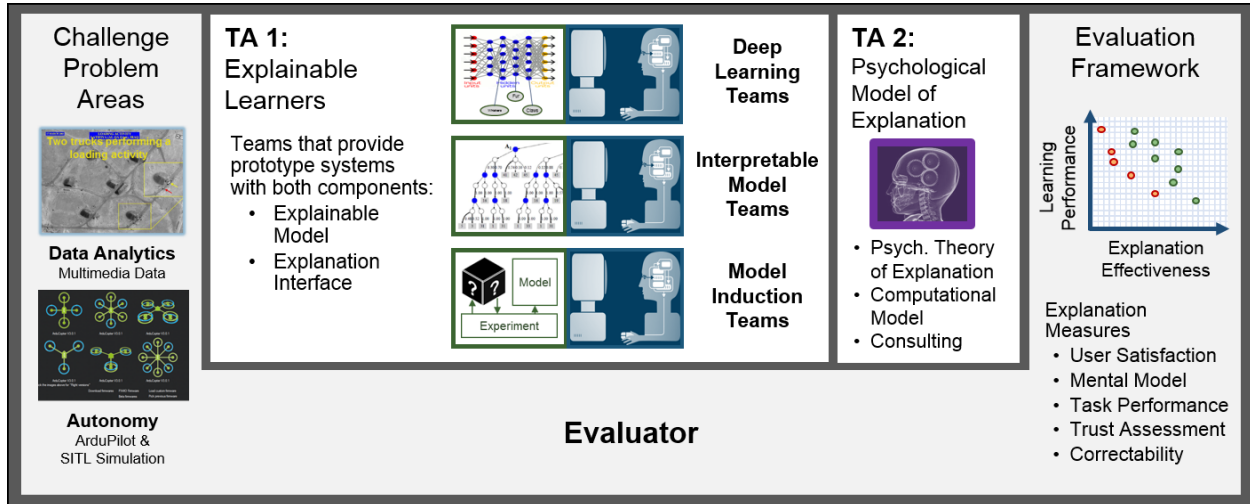


Figure 5: XAI Program Structure

Technical Area 1 (TA1) (Explainable Learners):

Multiple TA1 teams will develop prototype explainable learning systems. Each prototype should include both a machine learning technique that produces an explainable model and an explanation interface that will deliver useful explanations to an end user.

TA1 proposers should include the following topics among those discussed in their proposal. This list will be evaluated as part of the Overall Science and Technical Merit of TA1 proposals:

- **Challenge Problem Area:** Select one or both of the challenge problems areas, data analytics or autonomy, to work on in both Phase 1 and Phase 2. Describe the proposed test problem(s) to work on in Phase 1, including the data sets or simulation environment, training data, functions to be learned, types of explanation to be provided, and user decisions to be supported.
- **Explainable Model:** Describe the proposed machine learning approach for learning more explainable models. Describe the scope of the learning problems that would be handled by this approach. Describe the learning process. What training data is required? What human involvement is required? Propose how to measure learning performance and explainability of the learned models? The proposed machine learning techniques may follow any of the three strategies described earlier (deep explanation, interpretable models, or model induction), any combination of the three, or something completely different. It is acceptable to propose a range of machine learning techniques, especially if this widens the scope of machine learning problems covered by the proposer's approach.
- **Explanation Interface:** Describe the approach for building the explanation interface. What are the initial design ideas for this interface? What principles or design

strategies will be employed? Describe examples of the explanations the system will generate. Describe the range of the machine learning models that could be explained by this approach. It is understood that the explanation interface may be developed through iterative prototyping with users. Nevertheless, proposers should describe their initial ideas for designing the first iteration of the explanation interface.

- Development Progression: Describe the development sequence proposers intend to follow. What capabilities would proposers expect to develop during each phase of the program? It is understood that this progression is likely to change, but proposers should describe the capabilities of the final system they hope to produce by the end of the program and the interim capabilities they expect to develop along the way.
- Test and Evaluation Plan: How will proposers test and evaluate their work in the first phase of the program? How will proposers measure learning performance and explanation effectiveness? If the test problem requires some government provided data or infrastructure, specify that in the proposal.

Technical Area 2 (TA2) (Psychological Model of Explanation):

DARPA plans to fund at least one TA2 performer to provide expertise in the psychology of explanation. This performer will summarize current psychological theories of explanation, relevant to a XAI system, in an information package to assist the TA1 developers and the government evaluator. This summary may include recommendations on theories the performer believes are most useful for XAI. The TA2 performer will then develop a computational model of explanation from those theories that could be used to predict explanation effectiveness of XAI systems. The TA2 performer would also provide advice and consultation to the TA1 developers on the requirements for an effective explanation and to the XAI government evaluator regarding the development of metrics to measure explanation effectiveness.

TA2 proposers should include the following topics among those discussed in their proposal. This list will be evaluated as part of the Overall Science and Technical Merit of TA2 proposals:

- Theories of Explanation: Summarize the current psychological theories of explanation and describe how to further develop and refine this summary. Describe how this work will inform the development of the TA1 XAI systems. Describe how this work will inform the definition of the evaluation framework for measuring explanation effectiveness by the XAI evaluator.
- Computational Model: Describe how to develop and implement a computational model of explanation from the available theories. Describe how to model elements of the theory. Identify predictions that might be tested with the computational model. Explain how to test and refine the model.
- Model Validation: Describe how to validate the computational model of the theory and how to test the model against the TA1 evaluation results in Phase 2 of the XAI program.

F. Deliverables

Performers are responsible for providing, at a minimum, the following deliverables, as applicable:

- Slide Presentations – Annotated slide presentations will be submitted within two weeks after program kick-off meeting and after each review.
- XAI Web Page – DARPA intends to have a teaming website for performers, maintained by the XAI evaluator. Periodic updates for the XAI program web page (maintained by the XAI evaluator) with links to information describing the proposer’s work on the program (presentations, papers, video demos, and evaluation results).
- Monthly Coordination Reports – A monthly technical coordination report describing progress made, resources expended, and any issues requiring the attention of the Government team will be provided within 10 days after the end of each month.
- Monthly expenditure reports (for cost reimbursable awards) and uploading of required deliverables to the DARPA Technology Financial Information Management System (TFIMS), or its replacement system, are required by all program performers.
- Software – All computer software developed or delivered under the program must be delivered as source and as object code (as consistent with the Intellectual Property rights asserted in the proposal). Include the source listings and source code for the target computer systems. DARPA encourages delivered software under this effort to be completely maintainable and modifiable with no reliance on any non-delivered computer programs or documentation.
- Software Documentation – It should document source code, hardware description language specifications, system diagrams, part numbers and other data necessary to maintain and to produce copies of the software (as consistent with the Intellectual Property rights asserted in the proposal).
- Final Technical Report – Due at project completion, this will concisely summarize the effort conducted and provide any lessons learned during the development of the technology.

Proposals are not limited to these and may contain additional deliverables.

G. Government-furnished Property/Equipment/Information

DARPA and the evaluation team will manage a demonstration/evaluation infrastructure described in Section C. Challenge Problems and Evaluation. During Phase 2 of the program, the XAI government evaluator will provide test data, problem definitions, evaluation infrastructure (including AMT, other human subjects, and IRB approvals), and data analysis of the evaluation results. During Phase 1 of the program, the XAI government evaluator may provide assistance as needed. Proposers should describe any assistance they expect to be provided by the XAI government evaluator during Phase 1.

H. Intellectual Property

The program will emphasize creating and leveraging open source technology and architecture. 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, it is desired that all 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, with a minimum of Government Purpose Rights (GPR), as lesser rights may adversely impact the lifecycle costs of affected items, components, or processes. Intellectual property rights asserted by proposers are strongly encouraged to be aligned with open source regimes. See Section VI.B.1 for more details on intellectual property.

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II. Award Information

A. Awards

Multiple awards are anticipated. The level of funding for individual awards made under this solicitation has not been predetermined and will depend on the quality of the proposals received and the availability of funds. Awards will be made to proposers whose proposals are determined to be the most advantageous to the Government, all factors considered, including the potential contributions of the proposed work, overall funding strategy, and availability of funding. 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 to select only portions of proposals for award;
- fund proposals in increments and/or 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 selected for award 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.

In all cases, the Government contracting officer shall have sole discretion to select award instrument type and to negotiate all instrument terms and conditions with selectees. Proposers are advised that regardless of the instrument type proposed, DARPA personnel, in consultation with the Government contracting officer, may select other award instruments, as they deem appropriate. 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 established the national policy for controlling the flow of scientific, technical, and engineering information produced in federally funded fundamental research at colleges, universities, and laboratories. The Directive 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 BAA, the Government expects that program goals as described herein may be met by proposers intending to perform fundamental research. The Government does not anticipate applying publication restrictions of any kind to individual awards for fundamental research that may result from this BAA. Notwithstanding this statement of expectation, the Government is not prohibited from considering and selecting research proposals that, while perhaps not qualifying as fundamental research under the foregoing definition, still meet the BAA criteria for submissions. If proposals are selected for award that offer other than a fundamental research solution, the Government will either work with the proposer to modify the proposed statement of work to bring the research back into line with fundamental research or else the proposer will agree to restrictions in order to receive an award.

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 select award instrument type and to negotiate all instrument terms and conditions with selectees. Appropriate clauses will be included in resultant awards for non-fundamental research to prescribe publication requirements and other restrictions, as appropriate.

For certain research projects, it may be possible that although the research being performed by the prime contractor is restricted research, a subawardee may be conducting fundamental research. In those cases, it is the prime contractor's responsibility to explain in its proposal why its subawardee's effort is fundamental research.

The following statement or similar provision will be incorporated into any resultant non-fundamental research procurement contract or other transaction:

There shall be no dissemination or publication, except within and between the contractor and any subawardees, of information developed under this contract or contained in the reports to be furnished pursuant to this contract without prior written approval of DARPA's Public Release Center (DARPA/PRC). All technical reports will be given proper review by appropriate authority to determine which Distribution Statement is to be applied prior to the initial distribution of these reports by the contractor. With regard to subawardee proposals for Fundamental Research, papers resulting from unclassified fundamental research are exempt from prepublication controls and this review requirement, pursuant to DoD Instruction 5230.27 dated October 6, 1987.

When submitting material for written approval for open publication, the contractor/awardee must submit a request for public release to the DARPA/PRC and include the following information: (1) Document Information: document title, document author, short plain-language description of technology discussed in the material (approx. 30 words), number of pages (or minutes of video) and document type (e.g., briefing, report, abstract, article, or paper); (2) Event Information: event type (conference,

principal investigator meeting, article or paper), event date, desired date for DARPA's approval; (3) DARPA Sponsor: DARPA Program Manager, DARPA office, and contract number; and (4) Contractor/Awardee's Information: POC name, email and phone. Allow four weeks for processing; due dates under four weeks require a justification. Unusual electronic file formats may require additional processing time. Requests may be sent either via email to public_release_center@darpa.mil or by mail at 675 North Randolph Street, Arlington VA 22203-2114, telephone (571) 218-4235. Refer to the following for link for information about DARPA's public release process: <http://www.darpa.mil/work-with-us/contract-management/public-release>.”

III. Eligibility Information

A. Eligible Applicants

All responsible sources capable of satisfying the Government's needs may submit a proposal that shall be considered by DARPA. Please note that FFRDC, government entity, and foreign participation is welcomed, however, some limitations may apply. Please see below.

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

Federally Funded Research and Development Centers (FFRDCs) and Government entities (e.g., Government/National laboratories, military educational institutions, etc.) are subject to applicable direct competition limitations and cannot propose to this BAA 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; and (2) FFRDCs must provide a letter on official letterhead from their sponsoring organization citing the specific authority establishing their eligibility to propose to Government solicitations and compete with industry, and their compliance with the associated FFRDC sponsor agreement's terms and conditions. This information is required for FFRDCs proposing to be prime contractors or subawardees. 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. 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. Foreign Participation

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. Procurement Integrity, Standards of Conduct, Ethical Considerations, and Organizational Conflicts of Interest

Current federal employees are prohibited from participating in particular matters involving conflicting financial, employment, and representational interests (18 U.S.C. §§ 203, 205, and 208). Once the proposals have been received, and prior to the start of proposal evaluations, the Government will assess potential conflicts of interest and will promptly notify the proposer if any appear to exist. The Government assessment does NOT affect, offset, or mitigate the proposer's responsibility to give full notice and planned mitigation for all potential organizational conflicts, as discussed below.

Without prior approval or a waiver from the DARPA Director, in accordance with FAR 9.503, a contractor cannot simultaneously provide scientific, engineering, technical assistance (SETA) or similar support and also be a technical performer. As part of the proposal submission, all members of the proposed team (prime proposers, proposed subawardees, and consultants) must affirm whether they (their organizations and individual team members) are providing SETA or similar support to any DARPA technical office(s) through an active contract or subcontract. All affirmations must state which office(s) the proposer, subawardees, consultant, or individual supports and identify the prime contract number(s). All facts relevant to the existence or potential existence of organizational conflicts of interest (FAR 9.5) must be disclosed. The disclosure must include a description of the action the proposer has taken or proposes to take to avoid, neutralize, or mitigate such conflict. If in the sole opinion of the Government after full consideration of the circumstances, a proposal fails to fully disclose potential conflicts of interest and/or any identified conflict situation cannot be effectively mitigated, the proposal will be rejected without technical evaluation and withdrawn from further consideration for award.

If a prospective proposer believes a conflict of interest exists or may exist (whether organizational or otherwise) or has questions on what constitutes a conflict of interest, the proposer should send his/her contact information and a summary of the potential conflict via email to the BAA email address before time and effort are expended in preparing a proposal and mitigation plan.

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).

IV. Application and Submission Information

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 (RFP) or additional solicitation regarding this opportunity will be issued, nor is additional information available except as provided at the Federal Business Opportunities website (<https://www.fbo.gov>), the Grants.gov website (<http://www.grants.gov/>), or referenced herein.

B. Content and Form of Application Submission

1. Abstracts

Proposers are highly encouraged to submit an abstract in advance of a proposal to minimize effort and reduce the potential expense of preparing an out of scope proposal. The abstract provides a synopsis of the proposed project.

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 full proposals submitted using the published evaluation criteria and without regard to any comments resulting from the review of an abstract.

Abstract Format: Abstracts shall not exceed a maximum of 7 pages including the cover sheet and all figures, tables, and charts, 5 pages for technical approach, 1 for capabilities and management plan. The page limit does not include a submission letter (optional).

All pages shall be formatted for printing on 8-1/2 by 11 inch paper with 1-inch margins and font size not smaller than 12 point. Font sizes of 8 or 10 point may be used for figures, tables, and charts. Document files must be in .pdf, .odx, .doc, .docx, .xls, or .xlsx formats. Submissions must be written in English.

Abstracts must include the following components:

- **Cover Sheet (1 page):** Provide the administrative and technical points of contact (name, address, phone, email, lead organization). Include the BAA number, title of the proposed project, primary subcontractors, estimated cost, duration of the project, and the label “Abstract.”
- **Technical Approach (5 pages):** Outline and address all technical challenges inherent in the approach and possible solutions for overcoming potential problems. Provide appropriate specific milestones (quantitative, if possible) at intermediate stages of the project to demonstrate progress.
- **Capabilities/Management Plan (1 page):** Provide a brief summary of expertise of the organization or team, including subcontractors (if any) and key personnel. Identify a

principal investigator for the project and include a description of the team's organization including roles and responsibilities. Describe the organizational experience in this area, existing intellectual property required to complete the project, and any specialized facilities to be used as part of the project.

2. Proposals

Proposals consist of Volume 1: Technical and Management Proposal (including mandatory Appendix A and optional Appendix B) and Volume 2: Cost Proposal.

All pages shall be formatted for printing on 8-1/2 by 11-inch paper with 1-inch margins, single-line spacing, and a font size not smaller than 12 point. Font sizes of 8 or 10 point may be used for figures, tables, and charts. Document files must be in .pdf, .odx, .doc, .docx, .xls, or .xlsx formats. Submissions must be written in English.

Proposals not meeting the format prescribed herein may not be reviewed.

a. Volume 1: Technical and Management Proposal

The maximum page count for Volume 1 is 31 pages, including all figures, tables and charts but not including the cover sheet, table of contents or appendices. A submission letter is optional and is not included in the page count. Appendix A does not count against the page limit and is mandatory. Appendix B does not count against the page limit and is optional. Additional information not explicitly called for here must not be submitted with the proposal, but may be included in the bibliography in Appendix B. Such materials will be considered for the reviewers' convenience only and not evaluated as part of the proposal.

Volume 1 must include the following components:

i. Cover Sheet: Include the following information.

- Label: "Proposal: Volume 1"
- BAA number (DARPA-BAA-16-53)
- Technical Area
- Proposal title
- Lead organization (prime contractor) name
- Type of organization, selected from the following categories: Large Business, Small Disadvantaged Business, Other Small Business, HBCU, MI, Other Educational, or Other Nonprofit
- Technical point of contact (POC) including name, mailing address, telephone, and email
- Administrative POC including name, mailing address, telephone number, and email address
- Award instrument requested: procurement contract (specify type), cooperative agreement or OT.¹
- Total amount of the proposed effort.
- Place(s) and period(s) of performance
- Other team member (subcontractors and consultants) information (for each,

¹ Information on award instruments can be found at <http://www.darpa.mil/work-with-us/contract-management>.

- include Technical POC name, organization, type of organization, mailing address, telephone number, and email address)
- Proposal validity period (minimum 120 days)
- Data Universal Numbering System (DUNS) number²
- Taxpayer identification number³
- Commercial and Government Entity (CAGE) code⁴
- Proposer's reference number (if any)

ii. Table of Contents

iii. Executive Summary: Provide a synopsis of the proposed project, including answers to the following questions:

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

The executive summary should include a description of the key technical challenges, a concise review of the technologies proposed to overcome these challenges and achieve the project's goal, and a clear statement of the novelty and uniqueness of the proposed work.

iv. Innovative Claims and Deliverables: Describe the innovative aspects of the project in the context of existing capabilities and approaches, clearly delineating the uniqueness and benefits of this project in the context of the state of the art, alternative approaches, and other projects from the past and present. Describe how the proposed project is revolutionary and how it significantly rises above the current state of the art.

Describe the deliverables associated with the proposed project and any plans to commercialize the technology, transition it to a customer, or further the work. Discuss the mitigation of any issues related to sustainment of the technology over its entire lifecycle, assuming the technology transition plan is successful.

v. Technical Plan: Outline and address technical challenges inherent in the approach and possible solutions for overcoming potential problems. Demonstrate a deep understanding of the technical challenges and present a credible (even if risky) plan to achieve the project's goal. Discuss mitigation of technical risk. Provide appropriate measurable milestones (quantitative if possible) at intermediate stages of the project to demonstrate progress, and a plan for achieving the milestones.

² The DUNS number is used as the Government's contractor identification code for all procurement-related activities. Go to <http://fedgov.dnb.com/webform/index.jsp> to request a DUNS number (may take at least one business day). See Section VI.B.8 for further information.

³ See <http://www.irs.gov/businesses/small/international/article/0,,id=96696,00.html> for information on requesting a TIN. Note, requests may take from 1 business day to 1 month depending on the method (online, fax, mail).

⁴ A CAGE Code identifies companies doing or wishing to do business with the Federal Government. See Section VI.B.8 for further information.

vi. Management Plan: Provide a summary of expertise of the proposed team, including any subcontractors/consultants and key personnel who will be executing the work. Resumes count against the proposal page limit so proposers may wish to include them in Appendix B below. Identify a principal investigator (PI) for the project. Provide a clear description of the team’s organization including an organization chart that includes, as applicable, the relationship of team members; unique capabilities of team members; task responsibilities of team members; teaming strategy among the team members; and key personnel with the amount of effort to be expended by each person during the project. Provide a detailed plan for coordination including explicit guidelines for interaction among collaborators/subcontractors of the proposed project. Include risk management approaches. Describe any formal teaming agreements that are required to execute this project. List Government-furnished materials or data assumed to be available.

vii. Personnel, Qualifications, and Commitments: List key personnel (no more than one page per person), showing a concise summary of their qualifications, discussion of previous accomplishments, and work in this or closely related research areas. Indicate the level of effort in terms of hours to be expended by each person during each contract year and other (current and proposed) major sources of support for them and/or commitments of their efforts. DARPA expects all key personnel associated with a proposal to make substantial time commitment to the proposed activity and the proposal will be evaluated accordingly. It is DARPA’s intention to put key personnel conditions into the awards, so proposers should not propose personnel that are not anticipated to execute the award.

Include a table of key individual time commitments as follows:

| Key Individual | Project | Status (Current, Pending, Proposed) | Hours on Project (by FY) | | | | |
|-------------------|-----------|-------------------------------------|--------------------------|------|------|------|------|
| | | | 2017 | 2018 | 2019 | 2020 | 2021 |
| Individual Name 1 | XAI | Proposed | | | | | |
| | Project 1 | Current | | | | | |
| | Project 2 | Pending | | | | | |
| Individual Name 2 | XAI | Proposed | | | | | |
| | Project 3 | Current | | | | | |

viii. Capabilities: Describe organizational experience in relevant subject area(s), existing intellectual property, or specialized facilities. Discuss any work in closely related research areas and previous accomplishments.

ix. Statement of Work (SOW): The SOW must provide a detailed task breakdown, citing specific tasks and their connection to the interim milestones and metrics, as applicable. Each year of the project should be separately defined. The SOW must not include proprietary information. For each defined task/subtask, provide:

- A general description of the objective.
- A detailed description of the approach to be taken to accomplish each defined task/subtask.
- Identification of the primary organization responsible for task execution (prime contractor, subcontractor(s), consultant(s)), by name.
- A measurable milestone, (e.g., a deliverable, demonstration, or other event/activity that marks task completion).
- A definition of all deliverables (e.g., data, reports, software) to be provided to the Government in support of the proposed tasks/subtasks.
- Identify any tasks/subtasks (by the prime or subcontractor) that will be accomplished at a university.

x. Schedule and Milestones: Provide a detailed schedule showing tasks (task name, duration, work breakdown structure element as applicable, performing organization), milestones, and the interrelationships among tasks. The task structure must be consistent with that in the SOW. Measurable milestones should be clearly articulated and defined in time relative to the start of the project.

xi. Level of Effort Summary by Task: Provide a one-page table summarizing estimated level of effort per task (in hours) broken out by senior, mid-level and junior personnel, in the format shown below in Figure 2. Also include dollar-denominated estimates of travel, materials and equipment. For this table, consider materials to include the cost of any data sets or software licenses proposed. For convenience, an Excel template is available for download along with the BAA.

| SOW Task | Duration (months) | Intensity (hrs/mo) | Labor Hours | | | | | | |
|---|-------------------|--------------------|----------------------------------|--------------|--------------|------------------|------------------|-----------------|-------------------|
| | | | Sr | Mid | Jr | Total | SubC | Conslt | Total |
| 1.1.0 <Phase 1 Task 1 name> | 7 | 135 | 240 | 680 | 24 | 944 | - | 200 | 1,144 |
| 1.1.1 <Subtask 1.1.1 name> | 4 | 90 | 80 | 280 | - | 360 | - | 200 | 560 |
| 1.1.2 <Subtask 1.1.2 name> | 3 | 195 | 160 | 400 | 24 | 584 | - | - | 584 |
| 1.2.0 <Phase 1 Task 2 name> | 6 | 385 | 108 | 400 | 1,800 | 2,308 | 1,400 | - | 3,708 |
| 1.2.1 <Subtask 1.2.1 name> | 3 | 656 | 48 | 320 | 1,600 | 1,968 | 600 | - | 2,568 |
| 1.2.2 <Subtask 1.2.2 name> | 3 | 113 | 60 | 80 | 200 | 340 | 800 | - | 1,140 |
| : | : | : | : | : | : | : | : | : | : |
| Phase 1 Total Hours | | | 348 | 1,080 | 1,824 | 3,252 | 1,400 | 200 | 4,652 |
| Phase 1 Costs First column is prime, second is total subcontractor, third is total consultant, fourth is total | | | Travel | | | \$ 44,000 | \$ 12,000 | \$ 2,000 | \$ 58,000 |
| | | | Materials & Equipment | | | \$ 8,000 | \$ - | \$ - | \$ 8,000 |
| 2.1.0 <Phase 2 Task 1 name> | 8 | 100 | 176 | 560 | 64 | 800 | 100 | 100 | 1,000 |
| 2.1.1 <Subtask 2.1.1 name> | 7 | 51 | 96 | 240 | 24 | 360 | 100 | 100 | 560 |
| 2.1.2 <Subtask 2.1.2 name> | 4 | 110 | 80 | 320 | 40 | 440 | - | - | 440 |
| 2.2.0 <Phase 2 Task 2 name> | 6 | 417 | 180 | 520 | 1,800 | 2,500 | 1,240 | - | 3,740 |
| 2.2.1 <Subtask 2.2.1 name> | 4 | 435 | 140 | 400 | 1,200 | 1,740 | 400 | - | 2,140 |
| 2.2.2 <Subtask 2.2.2 name> | 4 | 190 | 40 | 120 | 600 | 760 | 840 | - | 1,600 |
| : | : | : | : | : | : | : | : | : | : |
| Phase 2 Total Hours | | | 356 | 1,080 | 1,864 | 3,300 | 1,340 | 100 | 4,640 |
| Phase 2 Costs First column is prime, second is total subcontractor, third is total consultant, fourth is total | | | Travel | | | \$ 47,000 | \$ 12,000 | \$ 2,000 | \$ 61,000 |
| | | | Materials & Equipment | | | \$ 4,000 | \$ - | \$ - | \$ 4,000 |
| Project Total Hours | | | 704 | 2,160 | 3,688 | 6,552 | 2,740 | 300 | 9,292 |
| Total Project Costs First column is prime, second is total subcontractor, third is total consultant, fourth is total | | | Travel | | | \$ 91,000 | \$ 24,000 | \$ 4,000 | \$ 119,000 |
| | | | Materials & Equipment | | | \$ 12,000 | \$ - | \$ - | \$ 12,000 |

Figure 7: Example level-of-effort summary table. Numbers illustrate roll-ups and subtotals. The SubC column captures all subcontractor hours and the Conslt column captures all consultant hours.

xii. Appendix A: This section is mandatory and must include all of the following components. If a particular subsection is not applicable, state “NONE”.

- (1). Team Member Identification:** Provide a list of all team members including the prime, subcontractor(s), and consultant(s), as applicable. Identify specifically whether any are a non-US organization or individual, FFRDC and/or Government entity. Use the following format for this list:

| <i>Individual Name</i> | <i>Role (Prime, Subcontractor or Consultant)</i> | <i>Organization</i> | <i>Non-US?</i> | | <i>FFRDC or Govt?</i> |
|------------------------|--|---------------------|----------------|-------------|-------------------------------|
| | | | Org. | Ind. | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

- (2). Government or FFRDC Team Member Proof of Eligibility to Propose:** If none of the team member organizations (prime or subcontractor) are a Government entity or FFRDC, state “NONE”.

If any of the team member organizations are a Government entity or FFRDC, provide documentation (per Section III.A.1) citing the specific authority that establishes the applicable team member’s eligibility to propose to Government solicitations to include: 1) statutory authority; 2) contractual authority; 3) supporting regulatory guidance; and 4) evidence of agency approval for applicable team member participation.

- (3). Government or FFRDC Team Member Statement of Unique Capability:** If none of the team member organizations (prime or subcontractor) are a Government entity or FFRDC, state “NONE”.

If any of the team member organizations are a Government entity or FFRDC, provide a statement (per Section III.A.1) that demonstrates the work to be performed by the Government entity or FFRDC team member is not otherwise available from the private sector.

- (4). Organizational Conflict of Interest Affirmations and Disclosure:** If none of the proposed team members is currently providing SETA or similar support as described in Section III.B, state “NONE”.

If any of the proposed team members (individual or organization) is currently performing SETA or similar support, furnish the following information:

| Prime Contract Number | DARPA Technical Office supported | A description of the action the proposer has taken or proposes to take to avoid, neutralize, or mitigate the conflict |
|-----------------------|----------------------------------|---|
| | | |
| | | |

- (5). Intellectual Property (IP):** If no IP restrictions are intended, state “NONE”. The Government will assume unlimited rights to all IP not explicitly identified as having less than unlimited rights in the proposal.

For all technical data or computer software that will be furnished to the Government with other than unlimited rights, provide (per Section VI.B.1) a list describing all proprietary claims to results, prototypes, deliverables or systems supporting and/or necessary for the use of the research, results, prototypes and/or deliverables. Provide documentation proving ownership or possession of appropriate licensing rights to all patented inventions (or inventions for which a patent application has been filed) to be used for the proposed project. Use the following format for these lists:

| NONCOMMERCIAL | | | | |
|---|--|---------------------|--------------------------|---------------------------------------|
| Technical Data and/or Computer Software To be Furnished With Restrictions | Summary of Intended Use in the Conduct of the Research | Basis for Assertion | Asserted Rights Category | Name of Person Asserting Restrictions |
| (List) | (Narrative) | (List) | (List) | (List) |
| (List) | (Narrative) | (List) | (List) | (List) |

| COMMERCIAL | | | | |
|---|--|---------------------|--------------------------|---------------------------------------|
| Technical Data and/or Computer Software To be Furnished With Restrictions | Summary of Intended Use in the Conduct of the Research | Basis for Assertion | Asserted Rights Category | Name of Person Asserting Restrictions |
| (List) | (Narrative) | (List) | (List) | (List) |
| (List) | (Narrative) | (List) | (List) | (List) |

- (6). Human Subjects Research (HSR):** If HSR is not a factor in the proposal, state “NONE”.

If the proposed work will involve human subjects, provide evidence of or a plan for review by an institutional review board (IRB). For further information on this subject, see Section VI.B.2.

- (7). Animal Use:** If animal use is not a factor in the proposal, state “NONE”.

If the proposed research will involve animal use, provide a brief description of the plan for Institutional Animal Care and Use Committee (IACUC) review and approval. For further information on this subject, see Section VI.B.3.

(8). Representations Regarding Unpaid Delinquent Tax Liability or a Felony Conviction under Any Federal Law: Per Section VI.B.10, complete the following statements.

(1) The proposer is [] is not [] a corporation that has any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability,

(2) The proposer is [] is not [] a corporation that was convicted of a felony criminal violation under a Federal law within the preceding 24 months.

(9). Cost Accounting Standards (CAS) Notices and Certification: Per Section VI.B.11, any proposer who submits a proposal which, if accepted, will result in a CAS-compliant contract, must include a Disclosure Statement as required by 48 CFR 9903.202. The disclosure forms may be found at http://www.whitehouse.gov/omb/procurement_casb.

If this section is not applicable, state “NONE”.

xiii. Appendix B: If desired, include a brief bibliography to relevant papers, reports, or resumes. Do not include technical papers. This section is optional, and the materials will not be evaluated as part of the proposal review.

b. Volume 2 - Cost Proposal

This volume is mandatory and must include all the listed components. No page limit is specified for this volume.

The cost proposal should include a working spreadsheet file (.xls or equivalent format) that provides formula traceability among all components of the cost proposal. The spreadsheet file should be included as a separate component of the full proposal package. Costs must be traceable between the prime and subcontractors/consultants, as well as between the cost proposal and the SOW.

Pre-award costs will not be reimbursed unless a pre-award cost agreement is negotiated prior to award.

i. Cover Sheet: Include the same information as the cover sheet for Volume 1, but with the label “Proposal: Volume 2.”

ii. Cost Summary Tables: Provide a single-page summary table broken down by fiscal year listing cost totals for labor, materials, other direct charges (ODCs), indirect costs (overhead, fringe, general and administrative (G&A)), and any proposed fee for the project. Include costs for each task in each fiscal year of the project by prime and major subcontractors, total cost and proposed cost share, if applicable. Provide a second table containing the same information broken down by project phase.

iii. Cost Details: For each task, provide the following cost details by month. Include supporting documentation describing the method used to estimate costs. Identify any cost sharing.

(1) Direct Labor: Provide labor categories, rates and hours. Justify rates by providing examples of equivalent rates for equivalent talent, past commercial or Government rates or Defense Contract Audit Agency (DCAA) approved rates.

(2) Indirect Costs: Identify all indirect cost rates (such as fringe benefits, labor overhead, material overhead, G&A, etc.) and the basis for each.

(3) Materials: Provide an itemized list of all proposed materials, equipment, and supplies for each year including quantities, unit prices, proposed vendors (if known), and the basis of estimate (e.g., quotes, prior purchases, catalog price lists, etc.). For proposed equipment/information technology (as defined in FAR 2.101) purchases equal to or greater than \$50,000, include a letter justifying the purchase. Include any requests for Government-furnished equipment or information with cost estimates (if applicable) and delivery dates.

(4) Travel: Provide a breakout of travel costs including the purpose and number of trips, origin and destination(s), duration, and travelers per trip.

(5) Subcontractor/Consultant Costs: Provide above info for each proposed subcontractor/consultant. Subcontractor cost proposals must include interdivisional work transfer agreements or similar arrangements. If the proposer has conducted a cost or price analysis to determine reasonableness, submit a copy of this along with the subcontractor proposal.

The proposer is responsible for the compilation and submission of all subcontractor/consultant cost proposals. At a minimum, the submitted cost volume must contain a copy of each subcontractor or consultant non-proprietary cost proposal (i.e. cost proposals that do not contain proprietary pricing information such as rates, factors, etc.) Proprietary subcontractor/consultant cost proposals may be included as part of Volume 2. Proposal submissions will not be considered complete unless the Government has received all subcontractor/consultant cost proposals.

If proprietary subcontractor/consultant cost proposals are not included as part of Volume 2, they may be emailed separately to XAI@darpa.mil. Email messages must include “Subcontractor Cost Proposal” in the subject line and identify the principal investigator, prime proposer organization and proposal title in the body of the message. Any proprietary subcontractor or consultant proposal documentation which is not uploaded to BAAT as part of the proposer’s submission or provided by separate email by the closing timeframe shall be made immediately available to the Government, upon request, under separate cover (i.e., mail, electronic/email, etc.), either by the proposer or by the subcontractor/consultant organization.

Please note that a Rough Order of Magnitude (ROM), or similar budgetary

estimate, is not considered a fully qualified subcontract cost proposal submission. Inclusion of a ROM, or similar budgetary estimate, or failure to provide a subcontract proposal, will result in the full proposal being deemed non-compliant.

(6) ODCs: Provide an itemized breakout and explanation of all other anticipated direct costs.

iv. Proposals Requesting a Procurement Contract: Provide the following information where applicable.

(1) Proposals for \$750,000 or more: Provide “certified cost or pricing data” (as defined in FAR 2.101) or a request for exception in accordance with FAR 15.403.

(2) Proposals for \$700,000 or more: Pursuant to Section 8(d) of the Small Business Act (15 U.S.C. § 637(d)), it is Government policy to enable small business and small disadvantaged business concerns to be considered fairly as subcontractors to organizations performing work as prime contractors or subcontractors under Government contracts, and to ensure that prime contractors and subcontractors carry out this policy. In accordance with FAR 19.702(a)(1) and 19.702(b), prepare a subcontractor plan, if applicable. The plan format is outlined in FAR 19.704.

(3) Proposers without an adequate cost accounting system: If requesting a cost-type contract, provide the DCAA Pre-award Accounting System Adequacy Checklist to facilitate DCAA’s completion of an SF 1408. Proposers without an accounting system considered adequate for determining accurate costs must complete an SF 1408 if a cost type contract is to be negotiated. To facilitate this process, proposers should complete the SF 1408 found at <http://www.gsa.gov/portal/forms/download/115778> and submit the completed form with the proposal. To complete the form, check the boxes on the second page, then provide a narrative explanation of your accounting system to supplement the checklist on page one.

v. Proposals Requesting an Other Transaction for Prototypes Agreement: Proposers must indicate whether they qualify as a nontraditional Defense contractor⁵, have teamed with a nontraditional Defense contractor, or are providing a one-third cost share for this effort. Provide information to support the claims. See 10 U.S.C. § 2371b.

Provide a detailed list of milestones including: milestone description, completion criteria, due date, and payment/funding schedule (to include, if cost share is proposed, contractor and Government share amounts). Milestones must relate directly to accomplishment of technical metrics as defined in the solicitation and/or the proposal. While agreement type (fixed price or expenditure based) will be subject to negotiation, the use of fixed price milestones with a payment/funding schedule is preferred. Proprietary information must

⁵ For definitions and information on OT for prototype agreements see <http://www.darpa.mil/work-with-us/contract-management>.

not be included as part of the milestones.

3. Proprietary and Classified Information

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

a. 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.

b. Classified Information

Classified submissions (classified technical proposals or classified appendices to unclassified proposals) WILL NOT be accepted under this solicitation.

If a determination is made that the award instrument may result in access to classified information, a DD Form 254, “DoD Contract Security Classification Specification,” will be issued by DARPA and attached as part of the award. A DD Form 254 will not be provided to proposers at the time of submission. For reference, the DD Form 254 template is available at <http://www.dtic.mil/whs/directives/forms/eforms/dd0254.pdf>.

C. Submission Dates and Times

Proposers are warned that submission deadlines as outlined herein are strictly enforced. Note: some proposal requirements may take from 1 business day to 1 month to complete. See the proposal checklist in Section VIII.C for further information.

When utilizing the DARPA BAA Submission Website, as described below in Section IV.E.1 below, a control number will be provided at the conclusion of the submission process. This control number should be used in all further correspondence regarding your abstract/proposal submission.

For proposal submissions requesting cooperative agreements, Section IV.E.1.c, you must request your control number via email at XAI@darpa.mil. Please note that the control number will not be issued until after the proposal due date and time.

Failure to comply with the submission procedures outlined herein may result in the submission not being evaluated.

1. Abstracts

Abstracts must be submitted per the instructions outlined herein and received by DARPA no later than September 1, 2016 at 12:00 noon (ET). Abstracts received after this date and time may not be reviewed.

2. Proposals

The proposal package -- full proposal (Volume 1 and 2) and, as applicable, proprietary subcontractor cost proposals, classified appendices to unclassified proposals -- must be submitted per the instructions outlined herein and received by DARPA no later than November 1, 2016, at 12:00 noon (ET). Proposal submissions received after this date and time will not be reviewed.

Proposers are warned that submission deadlines as outlined herein are strictly enforced. DO NOT WAIT UNTIL THE LAST MINUTE TO FINALIZE AND COMPLETE YOUR SUBMISSION.

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.

a. Abstracts

DARPA/I2O will employ an electronic upload submission system (<https://baa.darpa.mil/>) for all UNCLASSIFIED abstract responses under this solicitation. *Abstracts should not be emailed and should not be submitted via Grants.gov. If the submission instructions are not followed, your abstract will not be reviewed.*

First time users of the DARPA BAA Submission Website must complete a two-step account creation process at <https://baa.darpa.mil/>. The first step consists of registering for an Extranet account by going to the above URL 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, proposers must go back to the submission website and log in using that user name and password. After accessing the Extranet, proposers must create a user account for the DARPA BAA Submission Website by selecting the "Register Your Organization" link at the top of the page. The DARPA BAA Submission Website will display a list of solicitations open for submissions. Once a proposer's user account is created, they may view instructions on uploading 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 submissions submitted electronically through DARPA's BAA website must be uploaded

as zip files (.zip or .zipx extension). The final zip file should contain only the files requested herein and must not exceed 50 MB in size. Only one zip file will be accepted per submission. Note: Submissions not uploaded as zip files will be rejected by DARPA.

Please note that all submissions MUST be finalized, meaning that no further editing will be possible, when submitting through the DARPA BAA Submission Website in order for DARPA to be able to review your submission. If a submission is not finalized, the submission will not be deemed acceptable and will not be reviewed.

Website technical support may be reached at Action@darpa.mil and is typically available during regular business hours (9:00 AM – 5:00 PM ET, Monday-Friday). Questions regarding submission contents, format, deadlines, etc. should be emailed to XAI@darpa.mil.

Since abstract submitters may encounter heavy traffic on the web server, they should not wait until the day abstracts are due to request an account and/or upload the submission.

b. Proposals Requesting a Procurement Contract or Other Transaction

DARPA/I2O will employ an electronic upload submission system (<https://baa.darpa.mil/>) for UNCLASSIFIED proposals requesting award of a procurement contract or Other Transaction under this solicitation.

First time users of the DARPA BAA Submission Website must complete a two-step account creation process at <https://baa.darpa.mil/>. The first step consists of registering for an Extranet account by going to the above URL 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, proposers must go back to the submission website and log in using that user name and password. After accessing the Extranet, proposers must create a user account for the DARPA BAA Submission Website by selecting the “Register Your Organization” link at the top of the page. The DARPA BAA Submission Website will display a list of solicitations open for submissions. Once a proposer’s user account is created, they may view instructions on uploading 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 submissions submitted electronically through DARPA's BAA website must be uploaded as zip files (.zip or .zipx extension). The final zip file should contain only the files requested herein and must not exceed 50 MB in size. Only one zip file will be accepted per submission. Note: Submissions not uploaded as zip files will be rejected by DARPA.

Please note that all submissions MUST be finalized, meaning that no further editing will be possible, when submitting through the DARPA BAA Submission Website in order for

DARPA to be able to review your submission. If a submission is not finalized, the submission will not be deemed acceptable and will not be reviewed.

Website technical support may be reached at Action@darpa.mil and is typically available during regular business hours (9:00 AM – 5:00 PM ET, Monday-Friday). Questions regarding submission contents, format, deadlines, etc. should be emailed to XAI@darpa.mil.

Since proposers may encounter heavy traffic on the web server, they should not wait until the day proposals are due to request an account and/or upload the submission.

c. Proposals Requesting a Cooperative Agreement

Proposers requesting cooperative agreements may submit proposals through one of the following methods: (1) hard copy mailed directly to DARPA; or (2) electronic upload per the instructions at <http://www.grants.gov/applicants/apply-for-grants.html>. Cooperative agreement proposals may not be submitted through any other means. 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 the Grants.gov do not submit paper proposals in addition to the Grants.gov electronic submission.

Proposers choosing to mail hard copy proposals to DARPA must include one paper copy and one electronic copy (e.g., CD/DVD) of the full proposal package.

Grants.gov requires proposers to complete a one-time registration process before a proposal can be electronically submitted. If proposers have not previously registered, this process can take between three business days and four weeks if all steps are not completed in a timely manner. See the Grants.gov user guides and checklists at <http://www.grants.gov/web/grants/applicants.html> for further information.

Once Grants.gov has received an uploaded proposal submission, Grants.gov will send two email messages to notify proposers that: (1) their submission has been received by Grants.gov; and (2) the submission 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 rejected by Grants.gov, it must be corrected and re-submitted before DARPA can retrieve it (assuming the solicitation has not expired). If the proposal is validated, then the proposer has successfully submitted their proposal and Grants.gov will notify DARPA. Once the proposal is retrieved by DARPA, Grants.gov will send a third email to notify the proposer. The proposer will then receive an email from DARPA acknowledging receipt and providing a control number. For more information on submitting proposals to Grants.gov, visit the Grants.gov submissions page at: <http://www.grants.gov/web/grants/applicants/apply-for-grants.html>.

To avoid missing deadlines, proposers should submit their proposals to Grants.gov in advance of the proposal due date, with sufficient time to complete the registration and submission processes, receive email notifications and correct errors, as applicable.

Technical support for the Grants.gov website may be reached at 1-800-518-4726 and

support@grants.gov. Questions regarding submission contents, format, deadlines, etc. should be emailed to XAI@darpa.mil.

2. Classified Submission Instructions

As a reminder, classified submissions (classified technical proposals or classified appendices to unclassified proposals) WILL NOT be accepted under this solicitation.

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; and Cost Realism.

- *Overall Scientific and Technical Merit:*
The proposed technical approach is feasible, achievable, complete and supported by a proposed technical team that has the expertise and experience to accomplish the proposed tasks.

The task descriptions and associated technical elements are complete and in a logical sequence, with all proposed deliverables clearly defined such that a viable attempt to achieve project goals is likely as a result of award. The proposal identifies major technical risks and clearly defines feasible mitigation efforts.
- *Potential Contribution and Relevance to the DARPA Mission:*
The potential contributions of the proposed effort are relevant to the national technology base. Specifically, DARPA's mission is to maintain the technological superiority of the U.S. military and prevent technological surprise from harming our national security by sponsoring revolutionary, high-payoff research that bridges the gap between fundamental discoveries and their application.

This includes considering the extent to which any proposed intellectual property restrictions will potentially impact the Government's ability to transition the technology.
- *Cost Realism:*
The proposed costs are realistic for the technical and management approach and accurately reflect the technical goals and objectives of the 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).

B. Review and Selection Process

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. If necessary, panels of experts in the appropriate areas will be convened. As described in Section IV, proposals must be deemed conforming to the solicitation to receive a full technical review against the evaluation criteria; proposals deemed non-conforming will be removed from consideration.

DARPA will conduct a scientific/technical review of each conforming proposal. 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.

Selections may be made at any time during the period of solicitation. Pursuant to FAR 35.016, the primary basis for selecting proposals for award negotiation shall be technical, importance to agency programs, and fund availability. Conforming proposals based on a previously submitted abstract will be reviewed without regard to feedback resulting from review of that abstract. Furthermore, a favorable response to an abstract is not a guarantee that a proposal based on the abstract will ultimately be selected for award negotiation. Proposals that are determined selectable will not necessarily receive awards.

For evaluation purposes, a proposal is defined to be the document and supporting materials as described in Section IV.B. Subject to the restrictions set forth in FAR 37.203(d), input on technical aspects of the proposals may be solicited by DARPA from non-Government consultants/experts who are strictly bound by the appropriate non-disclosure requirements. No submissions, classified or unclassified, will be returned.

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. Intellectual Property

Proposers should note that the Government does not own the intellectual property of technical data/computer software developed under Government contracts; it acquires the right to use the technical data/computer software. Regardless of the scope of the Government's rights, performers 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 performers, though DARPA desires to have a minimum of Government Purpose Rights (GPR) to software developed through DARPA sponsorship.

If proposers desire to use proprietary 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) Part 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.

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

- **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 not compliant with the solicitation. A template for complying with this request is provided in Section IV.B.1.a.xii.(5).

- **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 not compliant with the solicitation. A template for complying with this request is provided in Section IV.B.1.a.xii.(5).

d. Other Types of Awards

Proposers responding to this solicitation 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 in question. 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 not compliant with the solicitation. A template for complying with this request is provided in Section IV.B.1.a.xii.(5).

2. Human Subjects Research

All research selected for funding involving human subjects, to include use of human biological specimens and human data, must comply with the federal regulations for human subjects protection. Further, research involving human subjects that is conducted or supported by the DoD must comply with 32 CFR 219, Protection of Human Subjects (and DoD Instruction 3216.02, Protection of Human Subjects and Adherence to Ethical Standards in DoD-Supported Research (<http://www.dtic.mil/whs/directives/corres/pdf/321602p.pdf>)).

Institutions awarded funding for research involving human subjects must provide documentation of a current Assurance of Compliance with Federal regulations for human subjects protection, such as a Department of Health and Human Services, Office of Human Research Protection Federal Wide Assurance (<http://www.hhs.gov/ohrp>). All institutions engaged in human subjects research, to include subawardees, must also hold a valid Assurance. In addition, all personnel involved in human subjects research must provide documentation of completion of human subjects research training.

For all proposed research that will involve human subjects in the first year or phase of the project, the institution must provide evidence of or a plan for review by an Institutional Review Board (IRB) upon final proposal submission to DARPA as part of their proposal, prior to being selected for funding. The IRB conducting the review must be the IRB identified on the institution's Assurance of Compliance with human subjects protection regulations. The protocol, separate from the proposal, must include a detailed description of the research plan, study population, risks and benefits of study participation, recruitment and consent process, data collection, and data analysis. It is recommended that you consult the designated IRB for guidance on writing the protocol. The informed consent document must comply with federal regulations (32 CFR 219.116). A valid Assurance of Compliance with human subjects protection regulations along with evidence of completion of appropriate human subjects research training by all investigators and personnel involved with human subjects research should accompany the protocol for review by the IRB.

In addition to a local IRB approval, a headquarters-level human subjects administrative review and approval is required for all research conducted or supported by the DoD. The Army, Navy, or Air Force office responsible for managing the award can provide guidance and information about their component's headquarters-level review process. Note that confirmation of a current Assurance of Compliance with human subjects protection regulations and appropriate human subjects research training is required before headquarters-level approval can be issued.

The time required to complete the IRB review/approval process varies depending on the complexity of the research and the level of risk involved with the study. The IRB approval process can last between one and three months, followed by a DoD review that could last between three and six months. Ample time should be allotted to complete the approval process. DoD/DARPA funding cannot be used towards human subjects research until ALL approvals are granted.

3. Animal Use

Award recipients performing research, experimentation, or testing involving the use of animals shall comply with the rules on animal acquisition, transport, care, handling, and use as outlined in: (i) 9 CFR parts 1-4, Department of Agriculture rules that implement the Animal Welfare Act of 1966, as amended, (7 U.S.C. § 2131-2159); (ii) National Institutes of Health Publication No. 86-23, "Guide for the Care and Use of Laboratory Animals" (8th Edition); and (iii) DoD Instruction 3216.01, "Use of Animals in DoD Programs."

For projects anticipating animal use, proposals should briefly describe plans for Institutional Animal Care and Use Committee (IACUC) review and approval. Animal studies in the program will be expected to comply with the Public Health Service (PHS) Policy on Humane Care and Use of Laboratory Animals, available at <http://grants.nih.gov/grants/olaw/olaw.htm>.

All award recipients must receive approval by a DoD-certified veterinarian, in addition to an IACUC approval. No animal studies may be conducted using DoD/DARPA funding until the United States Army Medical Research and Materiel Command (USAMRMC) Animal Care and Use Review Office (ACURO) or other appropriate DoD veterinary office(s) grant approval. As a part of this secondary review process, the award recipient will be required to complete and submit an ACURO Animal Use Appendix, which may be found at https://mrmc-www.army.mil/index.cfm?pageid=Research_Protections.acuro&rn=1.

4. Export Control

Per DFARS 225.7901-4, all procurement contracts, other transactions and other awards, as deemed appropriate, resultant from this solicitation will include the DFARS Export Control clause (252.225-7048).

5. Electronic and Information Technology

All electronic and information technology acquired through this solicitation must satisfy the accessibility requirements of Section 508 of the Rehabilitation Act (29 U.S.C. § 794d) and FAR 39.2. Each project involving the creation or inclusion of electronic and information technology must ensure that: (1) Federal employees with disabilities will have access to and use of information that is comparable to the access and use by Federal employees who are not individuals with disabilities; and (2) members of the public with disabilities seeking information or services from DARPA will have access to and use of information and data that is comparable to the access and use of information and data by members of the public who are not individuals with disabilities.

6. Employment Eligibility Verification

As per FAR 22.1802, recipients of FAR-based procurement contracts must enroll as federal contractors in E-verify and use the system to verify employment eligibility of all employees

assigned to the award. All resultant contracts from this solicitation will include FAR 52.222-54, "Employment Eligibility Verification." This clause will not be included in grants, cooperative agreements, or Other Transactions.

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

Unless the proposer is exempt from this requirement, as per FAR 4.1102 or 2 CFR 25.110 as applicable, all proposers must be registered in the System for Award Management (SAM) and have a valid Data Universal Numbering System (DUNS) number prior to submitting a proposal. All proposers must maintain an active registration in SAM with current information at all times during which they have an active Federal award or proposal under consideration by DARPA. All proposers must provide the DUNS number in each proposal they submit.

Information on SAM registration is available at www.sam.gov.

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

- DUNS number
- TIN
- 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).

8. Reporting Executive Compensation and First-Tier Subcontract Awards

FAR clause 52.204-10, "Reporting Executive Compensation and First-Tier Subcontract Awards," will be used in all procurement contracts valued at \$25,000 or more. A similar award term will be used in all grants and cooperative agreements.

9. Updates of Information Regarding Responsibility Matters

Per FAR 9.104-7(c), FAR clause 52.209-9, Updates of Publicly Available Information Regarding Responsibility Matters, will be included in all contracts valued at \$500,000 or more where the contractor has current active Federal contracts and grants with total value greater than \$10,000,000.

10. Representations by Corporations Regarding an Unpaid Delinquent Tax Liability or a Felony Conviction under any Federal Law

The following representation will be included in all awards:

(a) In accordance with section 101(a) of the Continuing Appropriations Act, 2016 (Pub. L. 114-53) and any subsequent FY 2016 appropriations act that extends to FY 2016 funds the same restrictions as are contained in sections 744 and 745 of division E, title VII, of the Consolidated and Further Continuing Appropriations Act, 2015 (Pub. L. 113-235), none of the funds made available by this or any other Act may be used to enter into a contract with any corporation that —

(1) Has any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability, where the awarding agency is aware of the unpaid tax liability, unless the agency has considered suspension or debarment of the corporation and made a determination that this further action is not necessary to protect the interests of the Government; or

(2) Was convicted of a felony criminal violation under any Federal law within the preceding 24 months, where the awarding agency is aware of the conviction, unless the agency has considered suspension or debarment of the corporation and made a determination that this action is not necessary to protect the interests of the Government.

(b) The Offeror represents that –

(1) It is [] is not [] a corporation that has any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability,

(2) It is [] is not [] a corporation that was convicted of a felony criminal violation under a Federal law within the preceding 24 months.

Each proposer must complete and return the representations outlined in IV.B.1.a.xii.(8) with their proposal submission.

11. Cost Accounting Standards (CAS) Notices and Certification

As per FAR 52.230-2, any procurement contract in excess of the referenced threshold resulting from this solicitation will be subject to the requirements of the Cost Accounting Standards Board (48 CFR 99), except those contracts which are exempt as specified in 48 CFR 9903.201-1. Any proposer submitting a proposal which, if accepted, will result in a CAS compliant contract, must submit representations and a Disclosure Statement as required by 48 CFR 9903.202 detailed in FAR 52.230-2. The disclosure forms may be found at http://www.whitehouse.gov/omb/procurement_casb.

12. Controlled Unclassified Information (CUI) on Non-DoD Information Systems

Controlled Unclassified Information (CUI) refers to unclassified information that does not meet the standards for National Security Classification but is pertinent to the national interests of the United States or to the important interests of entities outside the Federal Government and under law or policy requires protection from unauthorized disclosure, special handling safeguards, or prescribed limits on exchange or dissemination. All non-DoD entities doing business with DARPA are expected to adhere to the following procedural safeguards, in addition to any other relevant Federal or DoD specific procedures, for submission of any proposals to DARPA and any potential business with DARPA:

- Do not process DARPA CUI on publicly available computers or post DARPA CUI to publicly available webpages or websites that have access limited only by domain or Internet protocol restriction.
- Ensure that all DARPA CUI is protected by a physical or electronic barrier when not under direct individual control of an authorized user and limit the transfer of DARPA CUI to subawardees or teaming partners with a need to know and commitment to this level of protection.
- Ensure that DARPA CUI on mobile computing devices is identified and encrypted and all communications on mobile devices or through wireless connections are protected and encrypted.
- Overwrite media that has been used to process DARPA CUI before external release or disposal.

13. Safeguarding of Covered Defense Information and Cyber Incident Reporting

Per DFARS 204.7304, DFARS 252.204-7012, “Safeguarding of Covered Defense Information and Cyber Incident Reporting,” applies to this solicitation and all FAR-based awards resulting from this solicitation.

14. Prohibition on Contracting with Entities that Require Certain Internal Confidentiality Agreements

(a) In accordance with section 101(a) of the Continuing Appropriations Act, 2016 (Pub. L. 114-53) and any subsequent FY 2016 appropriations act that extends to FY 2016 funds the same restrictions as are contained in section 743 of division E, title VII, of the Consolidated and Further Continuing Appropriations Act, 2015 (Pub. L. 113-235), none of the funds appropriated (or otherwise made available) by this or any other Act may be used for a contract with an entity that requires employees or subcontractors of such entity seeking to report fraud, waste, or abuse to sign internal confidentiality agreements or statements prohibiting or otherwise restricting such employees or contractors from lawfully reporting such waste, fraud, or abuse to a designated investigative or law enforcement representative of a Federal department or agency authorized to receive such information.

(b) The prohibition in paragraph (a) of this provision does not contravene requirements applicable to Standard Form 312, Form 4414, or any other form issued by a Federal department or agency governing the nondisclosure of classified information.

(c) *Representation.* By submission of its offer, the Offeror represents that it does not require employees or subcontractors of such entity seeking to report fraud, waste, or abuse to sign or comply with internal confidentiality agreements or statements prohibiting or otherwise restricting such employees or contractors from lawfully reporting such waste, fraud, or abuse to a designated investigative or law enforcement representative of a Federal department or agency authorized to receive such information.

C. Reporting

1. Technical and Financial Reports

The number and types of technical and financial reports required under the contracted project will be specified in the award document, and will include, as a minimum, monthly financial status reports and 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. Representations and Certifications

In accordance with FAR 4.1201, prospective proposers shall complete electronic annual representations and certifications at <http://www.sam.gov>.

3. Wide Area Work Flow (WAWF)

Unless using another means of invoicing, performers will be required to submit invoices for payment directly at <https://wawf.eb.mil>. If applicable, WAWF registration is required prior to any award under this solicitation.

4. i-Edison

Award documents will contain a requirement for patent reports and notifications to be submitted electronically through the i-Edison Federal patent reporting system at <https://s-edison.info.nih.gov/iEdison>.

VII. Agency Contacts

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

- **Technical POC:** David Gunning, Program Manager, DARPA/I2O
- **Email:** XAI@darpa.mil
- **Mailing address:**
DARPA/I2O
ATTN: DARPA-BAA-16-53
675 North Randolph Street
Arlington, VA 22203-2114
- **I2O Solicitation Website:** <http://www.darpa.mil/work-with-us/opportunities>

VIII. Other Information

A. Frequently Asked Questions (FAQs)

Administrative, technical, and contractual questions should be sent via email to XAI@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 7 days of closing may not be answered. If applicable, DARPA will post FAQs to http://www.darpa.mil/Opportunities/Solicitations/I2O_Solicitations.aspx.

B. Proposers Day

The Proposers Day will be held on August 11, 2016, in Arlington, VA.

For further information regarding the Dispersed Computing Proposers Day, please see DARPA-SN-16-53, which is the Special Notice announcing the event, https://www.fbo.gov/index?s=opportunity&mode=form&id=de513fd656437e8124430922e66f5841&tab=core&_cvview=1

C. Submission Checklist

The following items apply prior to proposal submission. Note: some items may take up to 1 month to complete.

| ✓ | Item | BAA Section | Applicability | Comment |
|---|---|-------------|-----------------------------------|---|
| | Abstract | IV.B.1 | Optional, but recommended | Conform to stated page limit. |
| | Obtain DUNS number | IV.B.2.a.i | Required of all proposers | The DUNS Number is the Federal Government's contractor identification code for all procurement-related activities. See http://fedgov.dnb.com/webform/index.jsp to request a DUNS number. Note: requests may take at least one business day. |
| | Obtain Taxpayer Identification Number (TIN) | IV.B.2.a.i | Required of all proposers | A TIN is used by the Internal Revenue Service in the administration of tax laws. See http://www.irs.gov/businesses/small/international/article/0,,id=96696.00.html for information on requesting a TIN. Note: requests may take from 1 business day to 1 month depending on the method (online, fax, mail). |
| | Register in the System for Award Management (SAM) | VI.B.7 | Required of all proposers | The SAM combines Federal procurement systems and the Catalog of Federal Domestic Assistance into one system. See www.sam.gov for information and registration. Note: new registrations can take an average of 7-10 business days. SAM registration requires the following information: -DUNS number -TIN -CAGE Code. A CAGE Code identifies companies doing or wishing to do business with the Federal Government. 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). |
| | Register in E-Verify | VI.B.6 | Required for proposers requesting | E-Verify is a web-based system that allows businesses to determine the eligibility of their employees to work in the United States. See http://www.uscis.gov/e-verify for |

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|--|--|----------|--|---|
| | | | procurement contracts | information and registration. |
| | Ensure representations and certifications are up to date | VI.C.2 | Required of all proposers | Federal provisions require entities to represent/certify to a variety of statements ranging from environmental rules compliance to entity size representation. See http://www.sam.gov for information. |
| | Ensure eligibility of all team members | III | Required of all proposers | Verify eligibility, as applicable, for in accordance with requirements outlined in Section 3. |
| | Register at Grants.gov | IV.E.1.c | Required for proposers requesting grants or cooperative agreements | Grants.gov requires proposers to complete a one-time registration process before a proposal can be electronically submitted. If proposers have not previously registered, this process can take between three business days and four weeks if all steps are not completed in a timely manner. See the Grants.gov user guides and checklists at http://www.grants.gov/help/html/help/index.htm#t=Get_Started%2FGet_Started.htm for further information. |

The following items apply as part of the submission package:

| ✓ | Item | BAA Section | Applicability | Comment |
|---|--|--------------|---------------------------|---|
| | Volume 1 (Technical and Management Proposal) | IV.B.2.a | Required of all proposers | Conform to stated page limits and formatting requirements. Include all requested information. |
| | Appendix A | IV.B.2.a.xii | Required of all proposers | <ul style="list-style-type: none"> - Team member identification - Government/FFRDC team member proof of eligibility - Organizational conflict of interest affirmations - Intellectual property assertions - Human subjects research - Animal use - Unpaid delinquent tax liability/felony conviction representations - CASB disclosure, if applicable |
| | Volume 2 (Cost Proposal) | IV.B.2.b | Required of all proposers | <ul style="list-style-type: none"> - Cover Sheet - Cost summary - Detailed cost information including justifications for direct labor, indirect costs/rates, materials/equipment, subcontractors/consultants, travel, ODCs - Cost spreadsheet file (.xls or equivalent format) - If applicable, list of milestones for OTs - Subcontractor plan, if applicable - Subcontractor cost proposals - Itemized list of material and equipment items to be purchased with vendor quotes or engineering estimates for material and equipment more than \$50,000 - Travel purpose, departure/arrival destinations, and sample airfare |