Broad Agency Announcement

Machine Common Sense (MCS)

HR001119S0005

October 19, 2018

Defense Advanced Research Projects Agency
Information Innovation Office
675 North Randolph Street
Arlington, VA 22203-2114

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PART I: OVERVIEW INFORMATION

- **Federal Agency Name:** Defense Advanced Research Projects Agency (DARPA), Information Innovation Office (I2O)

- **Funding Opportunity Title:** Machine Common Sense (MCS)

- **Announcement Type:** Initial Announcement

- **Funding Opportunity Number:** HR001119S0005

- **Catalog of Federal Domestic Assistance Numbers (CFDA):**
  12.910 Research and Technology Development

- **Dates**
  - Proposers Day: October 18, 2018
  - Posting Date: October 19, 2018
  - Abstract Due Date: November 6, 2018, 12:00 noon (ET)
  - Proposal Due Date: December 18, 2018, 12:00 noon (ET)
  - BAA Closing Date: December 18, 2018, 12:00 noon (ET)

- **Anticipated Individual Awards:** DARPA anticipates multiple awards for technical areas (TAs) 1 and 3, and a single award for TA2

- **Types of Instruments that May be Awarded:** Procurement contracts, cooperative agreements, or Other Transactions

- **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 area of machine common sense to enable Artificial Intelligence (AI) applications to understand new situations, monitor the reasonableness of their actions, communicate more effectively with people, and transfer learning to new domains. Proposed research should investigate innovative approaches that enable revolutionary advances in science, devices, or systems. Specifically excluded is research that primarily results in evolutionary improvements to the existing state of practice.

This Broad Agency Announcement (BAA) is being issued, and any resultant selection will be made, using procedures under Federal Acquisition Regulation (FAR) 6.102(d)(2) and 35.016. Any negotiations and/or awards will use procedures under FAR 15.4 (or 32 CFR § 200.203 for 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 the Grants.gov website (http://www.grants.gov/).

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

A. Introduction/Background

Machine common sense has long been a critical—but missing—component of AI. Recent advances in machine learning have resulted in exciting new capabilities, but machine reasoning remains narrow and highly specialized. Developers must carefully train or program systems for every situation. General machine common sense remains elusive.

Wikipedia defines common sense as, the basic ability to perceive, understand, and judge things that are shared by ("common to") nearly all people and can reasonably be expected of nearly all people without need for debate. It is common sense that helps us quickly answer the question, "can an elephant fit through the doorway?"; or understand the statement, "I saw the Grand Canyon flying to New York." The vast majority of common sense is typically not expressed by humans because there is no need to state the obvious. We are usually not conscious of the vast sea of commonsense assumptions that underlie every statement and every action. This unstated background knowledge includes: a general understanding of how the physical world works (i.e., intuitive physics); a basic understanding of human motives and behaviors (i.e., intuitive psychology); and knowledge of the common facts that an average adult possesses. Machines lack this basic background knowledge that all humans share. The obscure-but-pervasive nature of common sense makes it difficult to articulate and encode in machines.

The absence of common sense prevents intelligent systems from understanding their world, behaving reasonably in unforeseen situations, communicating naturally with people, and learning from new experiences. Its absence is perhaps the most significant barrier between the narrowly focused AI applications we have today and the more general, human-like AI systems we would like to build in the future. If successful, the MCS program could accelerate the development of

AI for both defense and commercial applications. Here are four use cases that apply to single AI applications, symbiotic human-machine partnerships, and autonomous systems:

- *Sensemaking* – any AI system that needs to analyze and interpret sensor or data input could benefit from a machine commonsense service to help it understand real-world scenes and situations.
- *Monitoring the reasonableness of machine actions* – a machine commonsense service would provide the ability to monitor and check the reasonableness of any AI system's actions and decisions, especially in novel situations.
- *Human-machine collaboration* – all human communication and understanding assumes a background of common sense. Machines need to have a basic level of human-like common sense to effectively communicate and collaborate with humans.
- *Transfer learning (adapting to new situations)* – reusable commonsense knowledge would provide a foundation for AI systems to learn new domains and adapt to new situations without voluminous specialized training or programming.

Since the earliest days of AI, researchers have admired the need for, and struggled to achieve, machine common sense. This began with a variety of efforts to develop logic-based approaches to commonsense knowledge and reasoning (e.g., situation calculus, frames, scripts, naïve physics, default reasoning, non-monotonic logics, description logics, qualitative reasoning) and a number of efforts to create logic-based ontologies (e.g., Cyc, WordNet, VerbNet, SUMO, YAGO, DOLCE, and hundreds of smaller ontologies on the Semantic Web). These efforts have produced useful results, but suffer from the brittleness of symbolic logic. Concepts are defined in black or white symbols, which never quite match the subtleties of the human concepts they are intended to represent. Similarly, natural language queries never quite match the precise symbolic concepts. More recently, as machine learning and crowdsourcing have come to dominate AI, those techniques have also been used to extract and collect commonsense knowledge from the Web. While these approaches continue to make significant progress, they generally lack sufficient semantic understanding to enable reasoning beyond simple answer lookup. Overall, all of these approaches have fallen short of producing a widely useful commonsense capability. Machine common sense has remained a difficult and unbounded problem.

However, there has been significant progress in recent years along a number of dimensions that make it possible to address this difficult problem now. Rapid progress in machine learning, especially deep learning, is producing fresh representations and innovative techniques for semi-supervised, self-supervised, and unsupervised learning. This progress has created a resurgence of new researchers who are attempting to take on the common sense problem by learning grounded, semantic representations, such as embeddings; developing commonsense knowledge from the language, vision, and robotic interactions; learning predictive models from experience, by training systems to predict the next event in video sequences; moving beyond supervised classification to create more complete learning systems capable of memory, 'mental' simulation, and multi-step reasoning; as well as understanding and modeling the foundations of human cognition from developmental psychology.

B. Program Description/Scope

To focus this new effort, the MCS program will target two diverse strategies for developing and evaluating two different machine commonsense services:

- Foundations of Human Common Sense: a service that learns from experience, like a child, to construct computational models that mimic the core domains of cognition for objects (intuitive physics), places (spatial navigation), and agents (intentional actors). These models will be evaluated against the cognitive development milestones as evidenced in developmental psychology experiments with human children from 0-18 months old.
- Broad Common Knowledge: a service that learns from reading the Web, like a research librarian, to construct a commonsense knowledge repository capable of answering natural language and image-based questions about commonsense phenomena. This service will mimic the general knowledge of an average American adult in 2018, and be evaluated against the Allen Institute for Artificial Intelligence (AI2) Common Sense Benchmarks.

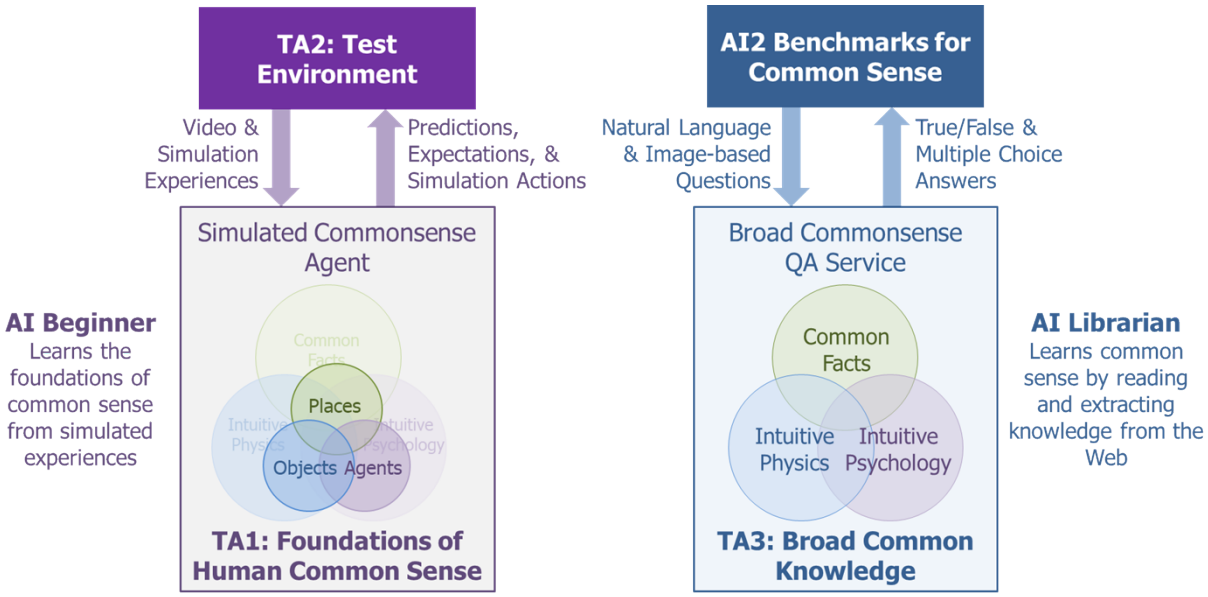

Figure 1: Machine Commonsense Services

C. Technical Areas (TAs)

TA1: Foundations of Human Common Sense

The goal of TA1 is to develop computational models that mimic the core cognitive capabilities of children, 0-18 months old. Researchers who study childhood cognition now have years of experimental results that allow them to map out the cognitive capacities of children. The field of cognitive development is at a point where it can provide empirical and theoretical guidance for building intelligent machines that think and learn like children. In particular, developmental psychologists have intensively studied children's knowledge in six domains (Table 1). Some believe that each of these domains constitutes a distinct and relatively autonomous system of knowledge, an idea that has been codified in the Theory of Core Knowledge. Others believe that these domains interact from the beginning of life. Developmental psychologists agree, however, that abilities to reason about objects, agents, places, number, geometry, and the social world, as described in the Theory of Core Knowledge, emerge early and serve as crucial foundations for later learning. See references [1][2][3][4].

Domain	Description
Objects	supports reasoning about objects and the laws of physics
Agents	supports reasoning about agents that act autonomously to pursue goals
Places	supports navigation and spatial reasoning around an environment
Number	supports reasoning about quantity and how many things are present
Geometry	supports representation of shapes and their affordances
Social World	supports reasoning about Theory of Mind and social interactions

Table 1: Theory of Core Knowledge

These core domains likely form the fundamental building blocks of human intelligence and common sense, especially the core domains of objects (intuitive physics), agents (intentional actors), and places (spatial navigation). For example, the core domain of objects not only provides the fundamental concepts for understanding the physical world but also provides the foundation for understanding causality. The core domain of agents not only provides the fundamental concepts for understanding intentional actors and Theory of Mind (TOM) but also provides the foundation for dealing with the "frame problem" in AI (i.e., knowing that objects in a scene only change if acted on by an agent). The core domain of places not only provides the fundamental concepts for navigation but also provides the foundation for spatial memory and spatial reasoning.

As a result of years of research and new experimental techniques and tools, developmental psychologists are now able to map the cognitive capacities of children. Figure 2 illustrates key stages in the current understanding of the developmental sequence for three core domains of objects, agents, and places for children from 0 to 18 months. This sequence provides an excellent set of target milestones for AI researchers to mimic as a strategy for developing a new foundation for machine common sense. While these milestones are particularly useful, these are just a selection of those the literature suggests. Also, research in development is ongoing and it is helpful to consider Figure 2 as including "error bars" on both the columns (time of acquisition) and rows (the conceptual split and grouping of the abilities and understandings of children). Note that TA1 computational models are not expected to duplicate the exact developmental sequence of these milestones in children, but they are expected to duplicate the cognitive capabilities of an 18-month old by the end of the program.

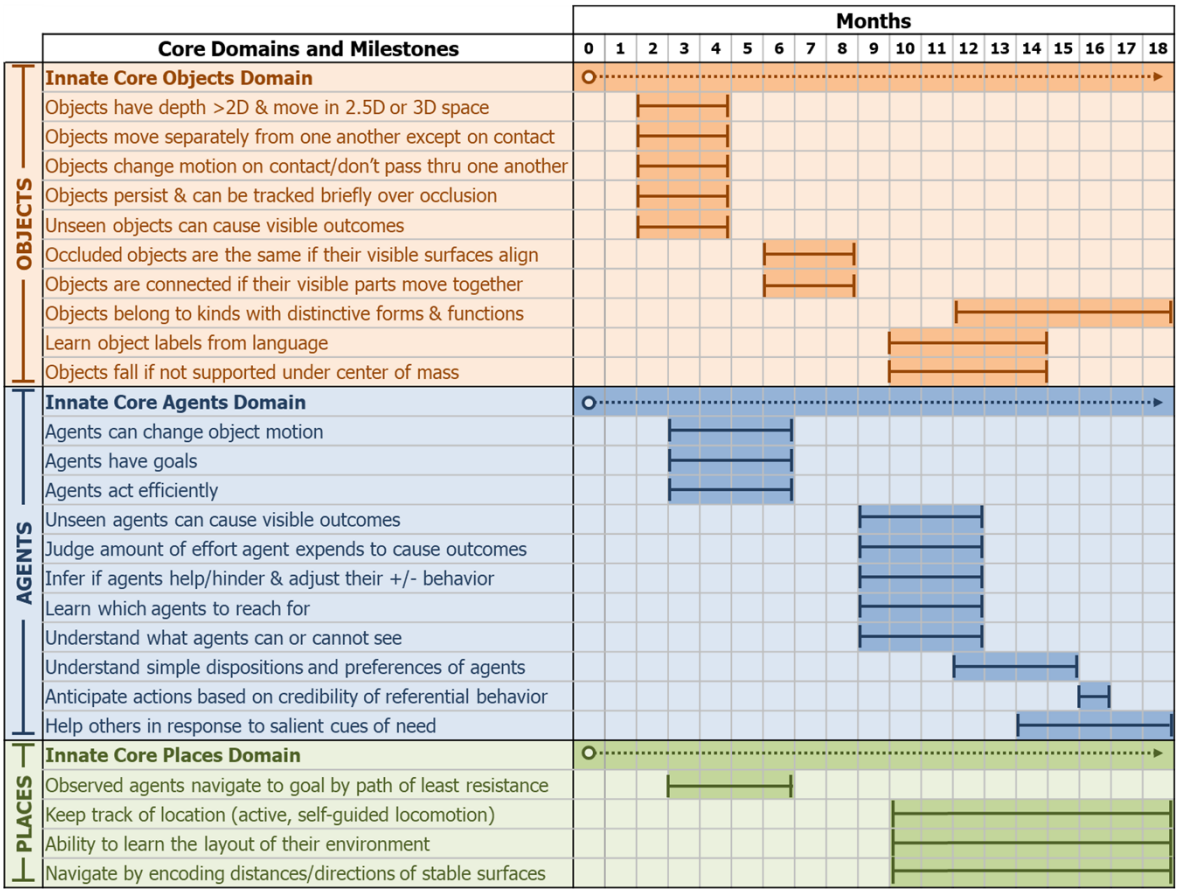

Figure 2: Cognitive Development Milestones (0-18 months)

Multiple development teams will be selected to construct these TA1 computational models. The TA1 teams may propose a variety of development strategies, ranging from pre-building initial models to learning everything from scratch using any combination of symbolic, probabilistic, or deep learning techniques. The TA1 development teams are expected to include both AI and developmental psychology expertise to produce both computational models and refined psychological theories of cognition. Although the primary goal of TA1 is to develop computational models, a secondary goal is to consolidate, refine, and extend the psychological theories of child cognition needed to guide model development, and to test through research key predictions made by the computational models. The TA1 teams may also propose optional companion research experiments in developmental psychology to refine their theories of cognition, where needed, to answer critical design questions relevant to their computational models.

TA1 proposals should include a detailed discussion of the technical plan to:

1) Design and develop computational models that mimic the foundations of human common sense for the core domains of objects, agents, and places;
2) Consolidate, refine, and extend the psychological theories of child cognition needed to guide model development; and test key predictions made by the computational models;
3) Sequence the development and evaluation of the computational models over the four-year program, including any optional companion research experiments in developmental psychology to refine relevant theories of cognition;

4) Perform the evaluation tasks described under TA2 below, including the three levels of performance: prediction/expectation, experience learning, and problem solving;
5) Achieve the target milestones and metrics identified in the Schedule/Milestone section below; and
6) Publish, share, and disseminate the results of research and development to the broader AI and Developmental Psychology communities.

Note that, although TA2 will provide sample test problems, each TA1 team is responsible for designing and providing its development strategy, training regimen, and any necessary datasets.

TA2: Test Environment for the Foundations of Human Common Sense

The goal of TA2 is to provide the test and evaluation environment for evaluating the TA1 models against cognitive development milestones as evidenced in developmental psychology research with children from 0 to 18-months old (Figure 3).

	Core Domains and Milestones	Months 0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
OBJECTS	**Innate Core Objects Domain**	○																		▸
	Objects have depth >2D & move in 2.5D or 3D space			Termine et al. , 1987 [5] Spelke et al., 1989 [6]																
	Objects move separately from one another except on contact	Kellman & Spelke, 1983 [7]; Ball, 1973 [8]; Johnson & Aslin, 1995 [9]																		
	Objects change motion on contact/don't pass thru one another			Baillargeon et al., 1985 [10]																
	Objects persist & can be tracked briefly over occlusion	Feigenson & Carey, 2003 [11]; Aguiar & Baillargeon, 1999 [12]																		
	Unseen objects can cause visible outcomes										Saxe et al., 2005 [13]									
	Occluded objects are the same if their visible surfaces align							Needham [14]												
	Objects are connected if their visible parts move together							Kellman et al., 1987 [15]												
	Objects belong to kinds with distinctive forms & functions													Xu [16]						
	Learn object labels from language											Xu [16]								
	Objects fall if not supported under center of mass											Baillargeon [17]								
AGENTS	**Innate Core Agents Domain**	○																		▸
	Agents can change object motion				Baillargeon & Luo [17][18]															
	Agents have goals				Woodward, 1999 [19]; Csibra, 2003 [20]															
	Agents act efficiently				Gergely & Csibra, 2013 [21]; Liu & Spelke, 2017 [22]															
	Unseen agents can cause visible outcomes										Saxe et al., 2005 [13]									
	Judge amount of effort agent expends to cause outcomes						Liu et al., 2017 [23]; Leonard et al., 2017 [24]													
	Infer if agents help/hinder & adjust their +/- behavior										Hamlin [25]									
	Learn which agents to reach for										Hamlin [25]									
	Understand what agents can or cannot see										Hamlin et al., 2013 [26]									
	Understand simple dispositions and preferences of agents			Song et al., 2005 [27]; Sootsman & Woodward, 2007 [28]																
	Anticipate actions based on credibility of referential behavior											Poulin-Dubois & Chow, 2009 [29]								
	Help others in response to salient cues of need															Warneken [30]				
PLACES	**Innate Core Places Domain**	○																		▸
	Observed agents navigate to goal by path of least resistance	Gergely & Csibra [31][32]; Skerry [33]																		
	Keep track of location (active, self-guided locomotion)						O'Keefe & Nadel [34]; Spelke & Lee, 2012 [35]													
	Ability to learn the layout of their environment						O'Keefe & Nadel [34]; Spelke & Lee, 2012 [35]													
	Navigate by encoding distances/directions of stable surfaces							Hermer [36]; Doeller & Burgess, 2008 [37]												

Figure 3: Examples of Developmental Psychology Research (0-18 months)

This existing body of research will be used as an initial starting point for the TA2 team to construct the test environment and develop specific test problems for each milestone in order to evaluate the TA1 computational models at three levels of performance:

1) Prediction/expectation: the test environment will present the TA1 models with videos and simulation experiences of the type used to test child cognition for each cognitive milestone. The models will produce a prediction or expectation output that will be used to determine if the model matches human cognitive performance. The models will

provide a measurable Violation of Expectation (VOE) signal when shown a possible next event, for direct comparison to the VOE results observed in children.

2) Experience learning: the test environment will present TA1 models with videos and simulation experiences in which a new object, agent, or place is introduced. The models will be tested to determine that they are able to learn the properties of the newly introduced item in a way that matches human cognitive performance.
3) Problem solving: the test environment will present the TA1 models with videos and simulation experiences in which a problem solving task is introduced. The models will be tested to determine they solve the problem in a way that matches human cognitive performance.

TA2 proposals should include a detailed discussion of the technical plan to:

1. Refine and expand the cognitive milestones shown above for the core domains of objects, agents, and places (including combinations of the three domains);
2. Devise a set of specific test problems for each cognitive milestone to assess computational models at the required three levels of performance (prediction/expectation, experience learning, problem solving);
3. Select, modify, or construct the video and 3D simulation infrastructure needed to conduct the TA1 evaluations;
4. Provide the training and testing infrastructure, with sample test problems, to support TA1 computational model development. TA2 is not expected to provide all of the training data that may be needed by the TA1 teams. TA1 teams are responsible for designing and providing their own development strategy and training regimen.
5. Develop and provide all of the documentation (e.g., user guides, test environment specifications, etc.) and application programming interfaces (APIs) for testing TA1 computational models;
6. Conduct formal evaluations of TA1 computational models every six months; and
7. Provide written test reports that document the performance of the TA1 models for each 6-month evaluation.

TA3: Broad Common Knowledge

The goal of TA3 is to learn/extract/construct a commonsense knowledge repository capable of answering natural language and image-based questions about commonsense phenomena from the AI2 Benchmarks for Common Sense. The AI2 benchmarks are constructed through an extensive crowdsourcing process to represent and measure the broad commonsense knowledge of a typical adult (https://allenai.org/commonsense/).

The AI2 benchmarks consist of a set of commonsense datasets and a leaderboard with an interface for researchers to submit their models for testing. The leaderboard utilizes technologies such as Docker and Kubernetes and operates on top of the highly scalable AI2 Beaker platform. The leaderboard is designed to streamline the submission workflow and prevent overfitting and leaking ("cheating"). To maximize flexibility, researchers build and train their models on their computational infrastructure. Once researchers wish to create a submission, they encapsulate their model as a Docker container, allowing code in any language or technology. The containers are submitted to the underlying system through a single command and archived for future validation. The simple user interface allows researchers to specify parameters, datasets, etc.

Once submitted to the platform, the models can be run on public datasets so researchers can understand their model's behavior and debug any issues. Once they are satisfied with the performance of their model on the public datasets, they can run it, or any of their previous submissions, on a "blind" evaluation dataset, which is hidden from the public. The underlying system prevents leakage of the blind evaluation dataset by only allowing researchers to view their model's final score (note that the blind evaluation dataset and logs from the run are kept private). Submissions run on blind evaluation datasets are automatically evaluated by the AI2 system, and the score is then posted to the leaderboard. The underlying system prevents overfitting by limiting the number of runs submitted by each team against the blind evaluation dataset. All submissions are tagged with metadata and a URL, which facilitates seamless sharing and replication by the community.

Initially, five commonsense question datasets will be developed and available for testing of TA3-developed services:

(1) Commonsense Natural Language Inference (NLI): multiple choice, natural language-based questions about commonsense events derived from captions in the ActivityNet Captions and Large Scale Movie Description Challenge (LSMDC) datasets, see reference [38].
(2) Commonsense NLI with Vision: multiple choice, image-based questions about commonsense events selected from the same ActivityNet and LSMDC datasets.
(3) Abductive NLI: questions about inferring the most likely hypothesis for a given set of observations.
(4) Physical Interaction Question Answering (QA): natural language questions (initially) and image-based questions (in later years) about everyday objects and actions.
(5) Social Interaction QA: questions about human social behavior and the causal effects of everyday events.

The development of the first dataset, Commonsense NLI, is completed and is described further in reference [38]. The remaining four datasets are currently in development and will be completed by the start of the program. More information about the AI2 commonsense question datasets and leaderboard will be available at https://leaderboard.allenai.org/ (which requires Chrome).

Multiple development teams will be selected to develop the TA3 commonsense repositories/question answering services. TA3 teams may propose any combination of manual construction, information extraction, machine learning, and crowdsourcing techniques to construct a repository of broad commonsense knowledge. TA3 teams are not required to include personnel with expertise in psychology and are free to use whatever techniques they prefer, whether artificial or biologically inspired. The TA3 teams are expected to submit their system for testing on the blind evaluation datasets (i.e., all five commonsense question datasets identified above, if completed/available) every six months. Additional datasets may be developed over the course of the program, as needed, to align with the evolution of the TA3-developed capabilities. After the first year, TA3 teams may propose their own question datasets for inclusion in the AI2 benchmarks, or propose suggestions for the development of additional datasets by AI2, for testing by all of the TA3 teams.

TA3 proposals should include a detailed discussion of the technical approach to:

(1) Design and develop the broad commonsense knowledge service;
(2) Sequence the development and evaluation of the broad commonsense knowledge service

over the four-year program;
(3) Perform the evaluation tasks described above for the AI2 Benchmarks for Common Sense;
(4) Achieve the target milestones and metrics identified in Schedule/Milestone section below; and
(5) Publish, share, and disseminate the results of research and development to the broader AI community.

D. Schedule/Milestones

DARPA anticipates a June 2019 start date for the MCS program that will run for a duration of 48 months. The following Principal Investigator (PI) Meetings will take place:

- An in-person Kickoff Meeting at program start. For planning purposes, assume a 3-day meeting in Arlington, VA;
- Four (4) web-based PI meetings held at six (6) months into each year of the program to review technical progress. For planning purposes, assume the government as host for these 2-day virtual meetings; and
- Four (4) in-person PI meetings held at the end of each year of the program to review technical progress, conduct demonstrations, and provide opportunities for face-to-face collaboration. For planning purposes, assume 3-day meetings, alternating between a west coast and east coast location.

In addition to the PI Meetings above, each team should expect to:

- Host an onsite visit from the Program Manager (and potentially other government personnel) at least once a year; and
- Make two additional trips to the Washington, D.C. area in the last two years of the program for possible demonstrations and technology transition meetings.

The target milestones and metrics identified below have been established to assess technical progress over the course of the program. These targets represent the expected pace of technology development. The targets are not "go/no-go" criteria and it is not DARPA's intention to use these targets as the basis for down-selects or as the primary reason for other funding decisions.

TA1-developed computational models will be assessed for performance against cognitive development milestone capabilities (for the core domains of objects, agents, and places) at increasing levels of performance: prediction/expectation, experience learning, and problem solving. The target milestones and metrics are shown below, where each target metric represents the percentage of cognitive development milestones for which the model has been judged to match human cognitive performance at the designated level.

- Year 1: 30% of prediction/expectation milestones
- Year 2: 50% of prediction/expectation and 30% of experience learning milestones
- Year 3: 60% of prediction/expectation; 50% of experience learning; 30% of problem solving milestones
- Year 4: 80% of prediction/expectation milestones; 80% of experience learning milestones for objects and 50% for agents and places milestones; 50% of problem solving milestones.

TA3-developed services will be assessed for performance on the AI2 Common Sense Benchmark datasets (Commonsense NLI, Commonsense NLI with Vision, Abductive NLI, Physical Interaction QA, and Social Interaction QA). The target metrics are as follows:

- Year 1: 50% correct for all blind evaluation datasets
- Year 2: 60% correct for all blind evaluation datasets
- Year 3: 70% correct for all blind evaluation datasets
- Year 4: 80% correct for all blind evaluation data sets

Assessments of TA1-developed computational models and TA3-developed QA services will be conducted every six (6) months, preceding each PI meeting, in order for results/analyses to be available for review and discussion at the meetings.

E. TA-specific Deliverables

TA1:

- Computational model source code and APIs; and
- Any associated data and documentation (including, at a minimum, user manuals and a detailed software design document).

TA2:

- Test environment source code and APIs;
- Any associated data and documentation (including, at a minimum, user manuals and a detailed software design document);
- Test Environment Readiness Assessment Reports; and
- Any Test Environment documentation necessary to support TA1 team model assessments (e.g., standard operating procedures, user guide, etc.).

TA3:

- Repositories, libraries, source code, and APIs; and
- Any associated data and documentation (including, at a minimum, user manuals and a detailed software design document).

All TAs (TA1, TA2, and TA3) require the following deliverables:

- Quarterly progress and final reports;
- Presentations (in PowerPoint) for each PI Meeting (total of nine [9]);
- Copies of published papers and presentations at conferences, provided each month; and
- Monthly financial status reports, provided within 10 calendar days of the end of each calendar month.

F. Government-furnished Property/Equipment/Information

No Government-furnished equipment is expected to be provided. The test and evaluation infrastructures and environments will be provided by TA2 for TA1, and by AI2 for TA3. The TA3 evaluation datasets will be provided by AI2.

G. Intellectual Property

The program will emphasize creating and leveraging open source technology and architecture. 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.

A key goal of the program is to facilitate rapid innovation and advancements in AI by providing foundational capabilities for future users or developers of MCS 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 progress towards the realization of AI systems with machine commonsense knowledge and reasoning capabilities.

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II. Award Information

A. Awards

DARPA anticipates multiple awards for TA1 and TA3, and a single award for TA2. 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 and provide the best value 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 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. Grants will NOT be awarded under this program.

Proposers looking for innovative, commercial-like contractual arrangements are encouraged to consider requesting Other Transactions. To understand the flexibility and options associated with Other Transactions, consult http://www.darpa.mil/work-with-us/contract-management#OtherTransactions.

In accordance with 10 U.S.C. § 2371b(f), the Government may award a follow-on production contract or Other Transaction (OT) for any OT awarded under this BAA if: (1) that participant in the OT, or a recognized successor in interest to the OT, successfully completed the entire prototype project provided for in the OT, as modified; and (2) the OT provides for the award of a follow-on production contract or OT to the participant, or a recognized successor in interest to the OT.

In all cases, the Government contracting officer shall have sole discretion to select award instrument type, regardless of instrument type proposed, and to negotiate all instrument terms and conditions with selectees. DARPA will apply publication or other restrictions, as necessary, if it determines that the research resulting from the proposed effort will present a high likelihood

of disclosing performance characteristics of military systems or manufacturing technologies that are unique and critical to defense. Any award resulting from such a determination will include a requirement for DARPA permission before publishing any information or results on the program. For more information on publication restrictions, see the section below on Fundamental Research.

B. Fundamental Research

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

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

As of the date of publication of this BAA, the Government expects that program goals as described herein may be met by proposers intending to perform fundamental research and does not anticipate applying publication restrictions of any kind to individual awards for fundamental research that may result from this 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. This clause can be found at http://www.darpa.mil/work-with-us/additional-baa.

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

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

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

DFARS 252.204-7000, “Disclosure of Information”
DFARS 252.204-7008, “Compliance with Safeguarding Covered Defense Information Controls”
DFARS 252.204-7012, “Safeguarding Covered Defense Information and Cyber Incident Reporting”

The full text of the above solicitation provision and contract clauses can be found at http://www.darpa.mil/work-with-us/additional-baa#NPRPAC.

Compliance with the above requirements includes the mandate for proposers to implement the security requirements specified by National Institute of Standards and Technology (NIST) Special Publication (SP) 800-171, “Protecting Controlled Unclassified Information in Nonfederal Information Systems and Organizations” (see https://doi.org/10.6028/NIST.SP.800-171r1) that are in effect at the time the BAA is issued.

For awards where the work is considered fundamental research, the contractor will not have to implement the aforementioned requirements and safeguards; however, should the nature of the work change during performance of the award, work not considered fundamental research will be subject to these requirements.

III. Eligibility Information

A. Eligible Applicants

DARPA welcomes engagement from all responsible sources capable of satisfying the Government's needs, including academia (colleges and universities); businesses (large, small, small disadvantaged, etc.); other organizations (including non-profit); other entities (foreign, domestic, and government); FFRDCs; minority institutions; and others.

DARPA welcomes engagement from non-traditional sources in addition to current DARPA performers.

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

a. FFRDCs

FFRDCs are subject to applicable direct competition limitations and cannot propose to this 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. (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 awardees or subawardees.

b. Government Entities

Government Entities (e.g., Government/National laboratories, military educational institutions, etc.) are subject to applicable direct competition limitations. Government entities must clearly demonstrate that the work is not otherwise available from the private sector and provide written documentation citing the specific statutory authority and contractual authority, if relevant, establishing their ability to propose to Government solicitations.

c. Authority and Eligibility

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

2. 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. Organizational Conflicts of Interest

FAR 9.5 Requirements

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

Agency Supplemental OCI Policy

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

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

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

Government Procedures

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

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

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

C. Cost Sharing/Matching

Cost sharing is not required; however, it will be carefully considered where there is an applicable statutory condition relating to the selected funding instrument (e.g., OTs under the authority of 10 U.S.C. § 2371).

D. Other Eligibility Requirements

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

Proposers may submit proposals for all three TAs; however, to avoid Organizational Conflicts of Interest (OCI) situations between the TAs and ensure objective test and evaluation results, the following caveats apply:

- Proposers selected for TA1 cannot also be selected for TA2, whether as a prime, subcontractor, or in any other capacity, from an organizational to an individual level. Similarly, proposers selected for TA2 cannot also be selected for TA1. Exceptions (i.e., selection for both TA1 and TA2) will be considered for proposals that include an OCI Mitigation Strategy as described in Section III.B that sufficiently describes the plans to avoid, neutralize or mitigate the real or potential OCI between TA1 and TA2.
- Proposers selected for TA3, who have any OCI (or appearance of OCI) with AI2 must include in their proposal an OCI Mitigation Strategy as described in Section III.B that sufficiently describes the plans to avoid, neutralize or mitigate the real or potential OCI with AI2.

Proposers selected for TA1 or TA2 have no restrictions and may also be selected for TA3. Similarly, proposers selected for TA3 have no restrictions and may also be selected for TA1 or TA2.

The decision as to which proposal(s) to consider for award is at the discretion of the Government.

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, including a brief coverage of the topics listed under the particular TA in Section I. Submission of an abstract is not a prerequisite to the submission of a proposal.

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 five (5) pages including the cover sheet and all figures, tables, and charts. The page limit does not include a submission letter or bibliography references (optional).

Reminder – Each abstract submitted in response to this BAA shall address only one TA. Organizations may submit multiple abstracts to any one TA, and/or they may submit abstracts to multiple TAs.

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. All pages should be numbered.

Abstracts must include the following components:

- **Cover Sheet**: 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."

- **Goals and Impact:** Describe what is being proposed and what difference it will make (qualitatively and quantitatively) if successful. Describe the innovative aspects of the

project in the context of existing capabilities and approaches, clearly delineating the relationship of this work to any other projects from the past and present.

- **Technical Plan:** 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:** Provide a brief summary of the expertise of the team, including subcontractors 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. List Government-furnished property, facilities, or data assumed to be available. If desired, include a brief bibliography with links to relevant papers, reports, or resumes of key performers. Do not include more than two resumes as part of the abstract. Resumes count against the abstract page limit.

- **Statement of Work, Cost, and Schedule:** Provide a cost estimate for resources over the proposed timeline of the project, broken down by year. Include labor, materials, a list of deliverables and delivery schedule. Provide cost estimates for each subcontractor (may be a rough order of magnitude).

2. Proposals

Proposals consist of Volume 1: Technical and Management Proposal (including mandatory Appendix A and optional Appendix B); Volume 2: Cost Proposal; the Level of Effort Summary by Task Excel spreadsheet; and the PowerPoint summary slide.

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. All pages of Volume 1 should be numbered.

A summary slide of the proposed effort, in PowerPoint format, should be submitted with the proposal. A template slide is provided as an attachment to the BAA. Submit this PowerPoint file in addition to Volumes 1 and 2 of your full proposal, and the Level of Effort Summary by Task Excel spreadsheet. This summary slide does not count towards the total page count.

Reminder – Each proposal submitted in response to this BAA shall address only one TA. Organizations may submit multiple proposals to any one TA, and/or they may propose to multiple TAs.

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 30 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 (HR001119S0005)
- 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 number, and email address
- 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, include Technical POC name, organization, type of organization, mailing address, telephone number, and email address)
- Proposal validity period (minimum 120 calendar days)
- Data Universal Numbering System (DUNS) number[2]
- Taxpayer Identification Number (TIN)[3]
- Commercial and Government Entity (CAGE) code[4]
- Proposer's reference number (if any)

ii. Table of Contents

[1] Information on award instruments can be found at http://www.darpa.mil/work-with-us/contract-management.
[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). For further information regarding this subject, please see www.darpa.mil/work-with-us/additional-baa.
[3] See https://www.irs.gov/individuals/international-taxpayers/taxpayer-identification-numbers-tin 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. For further information regarding this subject, please see www.darpa.mil/work-with-us/additional-baa.

iii. Executive Summary: Provide a synopsis of the proposed project.
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.

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.

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 a 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			
			Year 1	Year 2	Year 3	Year 4
Name 1	**MCS**	Proposed	x	x	x	x
	Project Name 1	Current	x	n/a	x	n/a
	Project Name 2	Pending	n/a	n/a	x	x
Name 2	**MCS**	Proposed	x	x	x	x
	Project Name 3	Proposed	x	n/a	x	x

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.

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. 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:

Individual Name	*Role (Prime, Subcontractor or Consultant)*	*Organization*	*Non-US?*		*FFRDC or Govt?*
			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 proposed team member (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 noncommercial 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. For commercial technical data or software, provide a copy of the commercial user license. 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.2.

(8). Representations Regarding Unpaid Delinquent Tax Liability or a Felony Conviction under Any Federal Law: For further information regarding this subject, please see www.darpa.mil/work-with-us/additional-baa.

Please also 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: 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 https://www.whitehouse.gov/wp-content/uploads/2017/11/CASB_DS-1.pdf.

If this section is not applicable, state "NONE." For further information regarding this subject, please see www.darpa.mil/work-with-us/additional-baa.

xii. 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, unprotected spreadsheet file (.xls, .xlsx 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 Government 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 from a Government audit agency such as the Defense Contract Audit Agency (DCAA), the Office of Naval Research (ONR), the Department of Health and Human Services (DHHS), etc.

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

(3) Materials: Provide an itemized list of all proposed materials, equipment, and supplies for each Government fiscal 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 information 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 mcs@darpa.mil. Email messages must include "Subcontractor Cost Proposal" in the subject line and identify the PI, prime proposer organization and proposal title in the body of the message. Any proprietary subcontractor or consultant proposal documentation which is not uploaded to the DARPA BAA Submission Website as part of the proposer's submission or provided by separate email 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 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 anticipated ODCs.

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

(1) Proposals exceeding the Certification of Cost or Pricing Threshold: 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.

(2) 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 Agreement: Proposers must indicate whether they qualify as a nontraditional Defense contractor[5], have teamed with a nontraditional Defense contractor, or are providing a one-third cost share for this effort. Provide information to support the claims.

Provide a detailed list of milestones including the 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 not be included as part of the milestones.

c. Level of Effort Summary by Task Spreadsheet

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 4. Also include dollar-denominated estimates of travel, materials, and equipment. For this table,

[5] For definitions and information on an OT agreement see http://www.darpa.mil/work-with-us/contract-management.

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. Submit the Level of Effort Summary Excel file (do not convert the Excel file to pdf format) in addition to Volumes 1 and 2 of your full proposal. This Excel file does not count towards the total page count.

				Labor Hours for Prime							Labor Hours for Subcontractor/Consultants							
	SOW Task	Duration (months)	Intensity (hrs/mo)	Sr	Skill set(s)	Mid	Skill set(s)	Jr	Skill set(s)	Total	SubC-Sr	Skill set(s)	SubC-Mid	Skill set(s)	SubC-Jr	Skill set(s)	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*							Travel		$ 44,000	$ 12,000						$ 2,000	$ 58,000
	total subcontractor, third is total consultant, fourth is total							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*							Travel		$ 47,000	$ 12,000						$ 2,000	$ 61,000
	total subcontractor, third is total consultant, fourth is total							Materials & Equipment		$ 4,000	$ -						$ -	$ 4,000
3.1.0	<Phase 3 Task 1 name>	9	71	120		400		120		640	100						100	840
3.1.1	<Subtask 3.1.1 name>	3	93	40		200		40		280	100						100	480
3.1.2	<Subtask 3.1.2 name>	6	60	80		200		80		360	-						-	360
3.2.0	<Phase 3 Task 2 name>	6	460	160		800		1,800		2,760	1,200						-	3,960
3.2.1	<Subtask 3.2.1 name>	4	370	80		400		1,000		1,480	600						-	2,080
3.2.2	<Subtask 3.2.2 name>	3	427	80		400		800		1,280	600						-	1,880
:	:	:	:	:		:		:		:	:						:	:
		Phase 3 Total Hours		280		1,200		1,920		3,400	1,300						100	4,800
	Phase 3 Costs *First column is prime, second is*							Travel		$ 48,000	$ 12,000						$ 2,000	$ 62,000
	total subcontractor, third is total consultant, fourth is total							Materials & Equipment		$ -	$ -						$ -	$ -
		Project Total Hours		984		3,360		5,608		9,952	4,040						400	14,092
	Total Project Costs *First column is prime, second is*							Travel		$ 139,000	$ 36,000						$ 6,000	$ 181,000
	total subcontractor, third is total consultant, fourth is total							Materials & Equipment		$ 12,000	$ -						$ -	$ 12,000

Figure 4: 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. The Skill set(s) columns should indicate an area of expertise (e.g., engineer, software developer, data scientist, subject matter expert).

d. Summary Slide

The submission of a PowerPoint slide summarizing the proposed effort is mandatory. A template PowerPoint slide will be provided on the Federal Business Opportunities (FedBizOpps) website as an attachment. Submit the PowerPoint file (do not convert PowerPoint file to pdf format) in addition to Volumes 1 and 2 of your full proposal. This summary slide does not count towards the total page count.

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) addressing any of the three technical areas will not be accepted under this solicitation.

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.D 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 mcs@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 **November 6, 2018, at 12:00 noon (ET)**. Abstracts received after this date and time will not be reviewed.

2. Proposals

The proposal package -- full proposal (Volume 1 and 2) and, as applicable, proprietary subcontractor cost proposals, must be submitted per the instructions outlined herein and received by DARPA no later than **December 18, 1018, at 12:00 noon (ET)**. Submissions received after this date and time will not be reviewed.

D. Funding Restrictions

Not applicable.

E. Other Submission Requirements

1. 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. Emailed submissions of abstracts or full proposals will not be accepted.

a. Abstracts

DARPA/I2O will employ an electronic submission system (https://baa.darpa.mil/) for all abstract responses under this solicitation. *Abstracts should not be submitted via Email or Grants.gov.*

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 on the right side of the page, using the Chrome browser. 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). 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 mcs@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. Abstracts should not be submitted via Email or Grants.gov. Any abstracts submitted by Email or Grants.gov will not be accepted or reviewed.

b. Proposals Requesting a Procurement Contract or Other Transaction

DARPA/I2O will employ an electronic submission system (https://baa.darpa.mil/) for proposals requesting a procurement contract or OT 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 on the right side of the page, using the Chrome browser. 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). 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 mcs@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. Full proposals should not be submitted via Email. Any full proposals submitted by Email will not be accepted or evaluated.

c. Proposals Requesting a Cooperative Agreement

Proposers requesting cooperative agreements must submit proposals through one of the following methods: (1) electronic upload per the instructions at https://www.grants.gov/applicants/apply-for-grants.html; or (2) hard-copy mailed directly to DARPA. If proposers intend to use Grants.gov as their means of submission, then they

must submit their entire proposal through Grants.gov; applications cannot be submitted in part to Grants.gov and in part as a hard-copy. Proposers using Grants.gov do not submit hard-copy proposals in addition to the Grants.gov electronic submission.

Submissions: Proposers must submit the three forms listed below.

> SF 424 Research and Related (R&R) Application for Federal Assistance, available on the Grants.gov website at https://apply07.grants.gov/apply/forms/sample/RR_SF424_2_0-V2.0.pdf. *This form must be completed and submitted.*
>
> To evaluate compliance with Title IX of the Education Amendments of 1972 (20 U.S.C. A§ 1681 Et. Seq.), the Department of Defense is using the two forms below to collect certain demographic and career information to be able to assess the success rates of women who are proposed for key roles in applications in science, technology, engineering, or mathematics disciplines. Detailed instructions for each form are available on Grants.gov.
>
> Research and Related Senior/Key Person Profile (Expanded), available on the Grants.gov website at https://apply07.grants.gov/apply/forms/sample/RR_KeyPersonExpanded_2_0-V2.0.pdf. *This form must be completed and submitted.*
>
> Research and Related Personal Data, available on the Grants.gov website at https://apply07.grants.gov/apply/forms/sample/RR_PersonalData_1_2-V1.2.pdf. *Each applicant must complete the name field of this form, however, provision of the demographic information is voluntary. Regardless of whether the demographic fields are completed or not, this form must be submitted with at least the applicant's name completed.*

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 https://www.grants.gov/web/grants/applicants.html for further information.

Once Grants.gov has received a 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. For proposers requesting cooperative agreements, and wishing to have a DARPA control number associated with your submission, you must request your control number via email at mcs@darpa.mil after your submission has been retrieved by DARPA from Grants.gov.

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.

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.

Proposers electing to submit cooperative agreement proposals as hard copies must complete the SF 424 R&R form (Application for Federal Assistance, Research and Related) available on the Grants.gov website http://apply07.grants.gov/apply/forms/sample/RR_SF424_2_0-V2.0.pdf.

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

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 mcs@darpa.mil.

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 innovative, feasible, achievable, and complete.

  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.

  Proposer should also take note to the information provided in Section I, as DARPA will also look at how a proposer addresses the technical challenges relevant to each TA, as well as view how key personnel will work on those challenges.

- *Potential Contribution and Relevance to the DARPA Mission:*
  The potential contributions of the proposed effort are relevant to the national technology base. Specifically, DARPA's mission is to make pivotal early technology investments that create or prevent strategic surprise for U.S. National Security.

  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 and the basis for the estimates).

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.

DARPA will conduct a scientific/technical review of each conforming proposal. Conforming proposals comply with all requirements detailed in this BAA; proposals that fail to do so may be deemed non-conforming and may be removed from consideration. Proposals will not be evaluated against each other since they are not submitted in accordance with a common work

statement. DARPA's intent is to review proposals as soon as possible after they arrive; however, proposals may be reviewed periodically for administrative reasons.

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 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. 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 technical data/computer software developed through DARPA sponsorship.

The program will emphasize creating and leveraging open source technology and architecture. Intellectual property rights asserted by proposers are strongly encouraged to be aligned with open source/open architecture regimes.

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 IP 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 IP in the conduct of the proposed research. 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.

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.2.a.xi.(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 deliverables contemplated under the research project, assert any applicable restrictions on the Government's use of such commercial technical data and/or computer software, and provide a copy of the existing commercial license. 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.2.a.xi.(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.2.a.xi.(5).

2. Human Research Subjects/Animal Use

Proposers that anticipate involving Human Research Subjects or Animal Use must comply with the approval procedures detailed at http://www.darpa.mil/work-with-us/additional-baa.

3. 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.

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

All proposers must be registered in SAM unless exempt per FAR 4.1102. FAR 52.204-7, "System for Award Management" and FAR 52.204-13, "System for Award Management Maintenance" are incorporated into this BAA. See http://www.darpa.mil/work-with-us/additional-baa for further information.

International entities can register in SAM by following the instructions in this link: https://www.fsd.gov/fsd-gov/answer.do?sysparm_kbid=dbf8053adb119344d71272131f961946&sysparm_search=KB0013221.

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).

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, at a minimum, monthly financial status reports and quarterly technical status summaries. 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

If a procurement contract is contemplated, prospective awardees will need to be registered in the SAM database prior to award and complete electronic annual representations and certifications consistent with FAR guidance at 4.1102 and 4.1201; the representations and certifications can be found at www.sam.gov. Supplementary representations and certifications can be found at http://www.darpa.mil/work-with-us/additional-baa.

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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. Terms and Conditions

A link to the DoD General Research Terms and Conditions for Grants and Cooperative Agreements and supplemental agency terms and conditions can be found at http://www.darpa.mil/work-with-us/contract-management#GrantsCooperativeAgreements.

5. FAR and DFARS Clauses

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

See also Section II.C regarding the disclosure of information and compliance with safeguarding covered defense information controls (for FAR-based procurement contracts only).

6. 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 http://s-edison.info.nih.gov/iEdison.

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

Further information on Controlled Unclassified Information on Non-DoD Information Systems is incorporated herein can be found at www. darpa.mil/work-with-us/additional-baa.

VII. Agency Contacts

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

- **Technical POC:** Dave Gunning, Program Manager, DARPA/I2O

- **Email:** mcs@darpa.mil

- **Mailing address**:
  DARPA/I2O
  ATTN: HR001119S0005
  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 mcs@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 calendar days of closing may not be answered. If applicable, DARPA will post FAQs to http://www.darpa.mil/work-with-us/opportunities.

B. 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 https://www.irs.gov/individuals/international-taxpayers/taxpayer-identification-numbers-tin 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.4	Required of all proposers	The SAM combines Federal procurement systems and the Catalog of Federal Domestic Assistance into one system. See https://sam.gov/portal/SAM/##11#1 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).
	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 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 https://www.grants.gov/web/grants/applicants.html 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	Required of all proposers	Conform to stated page limits and formatting requirements. Include all requested information.
	Appendix A	IV.B.2.a.xi	Required of all proposers	-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
	Appendix B	IV.B.2.a.xii	Optional of all proposers	- Appendix B does not count against the page limit - A brief bibliography to relevant papers, reports, or resumes - Do not include technical papers - The materials in Appendix B will not be evaluated as part of the proposal review
	Volume 2 (Cost Proposal)	IV.B.2.b	Required of all proposers	- 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
	Level of Effort Summary by Task Excel spreadsheet	IV.B.2.c	Required of all proposers	A template LoE Excel file will be provided on the FBO website as an attachment. Submit the LoE Excel file (do not convert Excel file to .pdf format).
	PowerPoint Summary Slide	IV.B.2.d	Required of all proposers	A template PowerPoint slide will be provided on the FBO website as an attachment. Submit the PowerPoint file (do not convert PowerPoint file to .pdf format).

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