



Broad Agency Announcement
Ice Control for cold Environments (ICE)
BIOLOGICAL TECHNOLOGIES OFFICE
HR001122S0047
August 15, 2022

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PART I: OVERVIEW INFORMATION

- **Federal Agency Name** – Defense Advanced Research Projects Agency (DARPA), Biological Technologies Office (BTO)
- **Funding Opportunity Title** – Ice Control for Cold Environments (ICE)
- **Announcement Type** – Initial Announcement
- **Funding Opportunity Number** – HR001122S0047
- **North American Industry Classification System (NAICS)** – 541714
- **Catalog of Federal Domestic Assistance Numbers (CFDA)** – 12.910 Research and Technology Development
- **Dates**
 - Posting Date: **August 15, 2022**
 - Proposal Abstract Due Date and Time: **September 22, 2022, 4:00 PM ET**
 - Full Proposal Due Date and Time: **November 8, 2022, 4:00 PM ET**
 - BAA Closing Date: **November 8, 2022**
 - Proposers' Day: **August 22, 2022**

<https://sam.gov/opp/d460f1a8f8d2484ba013831fe743b9f6/view>
- **Concise description of the funding opportunity:** The Ice Control for cold Environments (ICE) program seeks to develop solutions for Department of Defense (DoD) operational challenges in extreme cold weather by discovering and optimizing biologically sourced or inspired molecules to enable tuned inhibition or nucleation of ice crystallization, propagation, and adhesion. The best-performing molecules identified during the discovery phase will subsequently be formulated to develop novel materials with enhanced operational performance, tailored to mitigate extreme cold weather challenges for specific DoD applications, and tested against stakeholder needs and priorities.
- **Anticipated individual awards** – Multiple awards are anticipated.
- **Types of instruments that may be awarded** – Procurement contract, cooperative agreement, or other transaction.
- **Agency contact**

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PART II: FULL TEXT OF ANNOUNCEMENT

1. Funding Opportunity Description

This publication constitutes a Broad Agency Announcement (BAA) as contemplated in Federal Acquisition Regulation (FAR) 6.102(d)(2) and 35.016 and 2 C.F.R. § 200.203. Any resultant award negotiations will follow all pertinent law and regulation, and any negotiations and/or awards for procurement contracts will use procedures under FAR 15.4, Contract Pricing, as specified in the BAA.

Program Overview

The Defense Advanced Research Projects Agency (DARPA) is soliciting innovative research proposals to investigate the physical properties of ice crystals for the development of new solutions to protect warfighters and infrastructure and enhance operational capabilities in extreme cold weather (ECW) environments. The Ice Control for Cold Environments (ICE) program aims to leverage biological adaptations to cold environments for novel biologically sourced and inspired materials to facilitate Department of Defense (DoD) operations in ECW. The ICE program structure is organized into two phases with a potential third phase. Phases I and II are the focus of this BAA, and Phase III may be solicited under a separate BAA.

The goal of the ICE program is to deliver novel biologically sourced or inspired molecules that can control or exploit ice crystallization. In Phases I and II, the program seeks to discover and/or improve known molecules with enhanced activity corresponding to three broad functional classes of ice control: inhibition of crystallization/re-crystallization, ice nucleation, and molecular adhesion to ice. In support of these objectives, ICE performers will design robust assays to identify and test candidates for ice control activity that should be specific to each of the three activity classes; execute iterative design, build, and test cycles to improve activity; optimize candidate molecule performance; and explore methods and approaches to functionalize these molecules to enable incorporation into different materials and form factors for future prototyping efforts in a Phase III effort, which may be solicited under a separate BAA.

1.1. BACKGROUND INFORMATION

The warming of the arctic has opened access to new trade routes and necessitated an expanded operational area where the U.S. military must counter peer adversaries seeking to exploit emerging theaters in ECW areas. Significant physiological and material barriers exist to establishing and maintaining a force capable of sustained operations in ice-prone environments. Many of these challenges are a consequence of the physical properties of ice such as ice crystal formation, recrystallization, and propagation, as well as the impact these phenomena have on the surrounding operational environment and force readiness. Ice control capabilities could include, but are not limited to, the prevention of frostbite injuries, reduction of ice accretion on vehicles, vessels, and aircraft, decreased damage to infrastructure, maintaining aqueous solutions (potable water, medicines), solving transportation and logistics challenges (ice bridges, roads, runways), and enabling field operations.

The dynamic formation and dissolution of ice is a ubiquitous process with wide-ranging effects on both natural and built environments, including creating structural challenges to both living and non-living systems and materials due to the growth and expansion of ice crystals. To cope with these challenges, organisms that inhabit environments prone to ice formation have evolved unique biological adaptations to mitigate, and in some instances exploit, the physical properties of ice in order to survive and flourish in harsh conditions. The ICE program seeks to utilize diverse and ingenious biological solutions to operating in extreme environmental conditions.

Proposers may seek to leverage a series of technological advances across disparate fields that have produced a confluence of biotechnology capabilities enabling the identification, engineering, optimization, and scaling of new biologically sourced or inspired molecules displaying ice control properties, including:

- ice-binding proteins (fish, insects, fungi, bacteria, and plants), capable of modulating the physical and kinetic properties of ice formation in a dynamic fashion at the molecular level;
- pigments capable of absorption of defined wavelengths of light and radiative heat transfer to selectively melt snow versus ice (algae and bacteria);
- cryoprotective polysaccharides (bacteria, algae, insects, and plants); and
- small molecule cryoprotectants and eutectic mixtures (animals, insects, and plants).

Although only a limited number of these compounds have been identified and experimentally validated to date, these molecules hail from a diverse set of organisms and have demonstrated unique functionalities by divergent mechanisms such as instigating ice formation at elevated temperatures, decreasing ice formation at lower temperatures (with no effect on the melting point), selectively adhering to ice at ice/water interfaces, enabling cryoprotection and anti-desiccation activities.

ICE performers will characterize candidates based on their method of ice control, broadly grouped under inhibition, induction, and adhesion, regardless of the type of molecule (e.g., proteins, small molecules, polysaccharides). Some of the challenges to be addressed for each class of ice control molecule include, but are not limited to:

- 1) Discovering and characterizing new ice control molecules.
- 2) Measuring key physical properties of ice crystal formation and maturation and corresponding modulation by exogenous agents in standardized, quantitative, high throughput, and reproducible assays.
- 3) Optimizing function of ice control molecules at varied temperature ranges, improving stability, and enabling identification, isolation, validation, and optimization of novel molecules.
- 4) Improving the dynamic functional range of molecules to expand suitability for diverse DoD applications.

The field lacks standardized, quantitative, and reproducible assays to measure key physical properties of ice crystal formation and maturation, as well as their corresponding modulation by

exogenous agents. Current approaches are time consuming, require expert execution for reliable results, can be dependent on qualitative observation/scoring, are low throughput, and can be prone to either false positive or negative results depending on method and protocol.^{1,2}

Standardized testing methodologies capable of robust, reproducible quantification of molecule performance related to ice induction, adhesion and inhibition classes respectively, would be advantageous to identifying and developing novel materials capable of inhibiting or accelerating ice crystal formation/propagation or binding to ice for DoD ECW applications.

1.2. TECHNICAL APPROACH AND STRUCTURE

The ability to modulate specific properties of ice such as the type, size, shape, texture, freezing point, melting point, kinetics, strength, and thickness would be advantageous for a wide variety of DoD applications. Studies by a diverse cadre of investigators focused on elucidating the biochemical, and physiological adaptations that microbes, plants, and animals display to survive extreme cold have identified a number of biological molecules (proteins, polysaccharides, and small molecules) that exhibit the ability to modulate or exploit the properties of ice. These activities include antifreeze, ice nucleation, ice recrystallization inhibition, ice structuring, and ice adhesion.

While some ice-modulating molecules and their associated properties have been previously characterized and reported in literature, significant foundational research and development efforts are required to screen for activity in a robust, standardized, reproducible manner and to optimize molecules for performance. To systematically address these capability gaps, ICE program performers must sequentially develop solutions to expand discovery and standardize performance screening of molecules capable of inhibiting ice crystallization/re-crystallization, nucleation, and molecular adhesion to ice.

ICE is anticipated to be a three-phase program. Phase I will be 18 months, and Phase II will be a 12-month option, for a total of 30 months of discovery, screening, and optimization. Phase III (not solicited under this BAA) may include application-specific testing to enable transition to DoD stakeholders.

In Phase I, performers design or discover new biologically sourced or inspired methods of controlling ice and develop new assays and test beds to monitor crystallization and performance to determine ice control properties. By the end of Phase I, successful performer teams should establish a high-throughput and quantitative testbed for screening performance of ice control candidates; identify at least 25 molecules in each class of ice crystallization: 1) inhibition 2) induction, and 3) adhesion; and optimize a subset of at least 10 molecules in each class to broaden the operational range of ice modulation.

Phase II will focus on screening the candidates based on performance for potential DoD-relevant applications, including the generation of safety data. Intermediate and end-of-phase milestones, outlined in [Section 1.3](#), will be required in each phase to evaluate progress throughout the program. Proposals should contain, subject to DARPA agreement, quantitative- and application-relevant metrics to assess technical performance toward milestones (see [Section 1.3](#) for details). By the end of Phase II, performers will be asked to demonstrate $\geq 75\%$ improvement of ice modulation based on application (ice inhibition, induction, or adhesion), and demonstrate approaches and methods

to incorporate and/or formulate Phase II molecules into an appropriate material and form factor for testing in a Phase III. To assist with the development of a framework compatible for a potential Phase III (not solicited under this BAA), DARPA will highly recommend that proposers integrate at least one of the DoD ECW application areas outlined in [Section 1.2.3](#) into their proposed research and development efforts. Proposals that could enable multiple future applications and materials formulations are highly encouraged.

Phase III may include application-specific testing to enable transition to DoD stakeholders. DARPA anticipates potentially releasing the Phase III solicitation during the Phase II period of performance. The timeline for Phase III work is tentatively scheduled to be 12-18 months in duration, dependent upon application and associated testing requirements. Candidates for testing in Phase III are not limited to those discovered and screened in Phases I and II. However, data from these phases may inform the application(s), scope, testing parameters, and metrics for a Phase III BAA.

Beginning in Phase I and throughout all screening and optimization, DARPA anticipates consistency in the evaluation of all candidate molecules through collaboration and concurrent testing with a U.S. Government Independent Verification and Validation (IV&V) partner. DARPA's IV&V partner will complement performer testing and independently evaluate candidate molecules to inform DARPA program decisions. All performers are expected to work with and provide samples to the IV&V partner on schedule in the format required.

1.2.1 Phase I: Quantitative Test Bed Infrastructure, Candidate Discovery, and Characterization (18 months)

Phase I comprises two parallel research and development tracks in the first 12 months: 1) quantitative testbed infrastructure and 2) candidate discovery and library generation. Proposers must address both tracks. These tracks will converge at month 12 wherein libraries of candidate molecules will be screened for ice crystal modulation capabilities. By the end of Phase I, the best performing candidates will be down selected in consultation with DARPA and subjected to iterative rounds of focused discovery, design, and performance improvement. At least 10 molecules per class (inhibition, induction, and adhesion) will be down selected by each performer team in consultation with DARPA for transition to Phase II.

Track 1 Quantitative Testbed Infrastructure (0-12 months)

A key challenge to discovering, developing, and optimizing new molecules and materials with the ability to modulate ice crystal size, shape, and growth kinetics are the bespoke, variable, semi-quantitative assays currently employed to measure key physical properties of ice crystal formation and maturation, as well as their corresponding modulation by exogenous agents. ICE encourages the development of robust standardized, quantitative, and reproducible assays that can be multiplexed or used in high throughput approaches to enable the rapid identification and prototyping of molecules and materials capable of inhibiting or accelerating ice crystal formation/propagation or binding. Proposers are encouraged to design assays that screen for multiple classes of ice modulation, increasing the generalizability of the assay. Assay performance across performer teams will be validated at month 9 using blinded samples provided by IV&V partners.

Proposed assays must be capable of meeting the following specifications:

- Molecular diversity - performers are required to demonstrate that their assay is functional, reproducible, and equivalent across at least 1) proteins/peptides, 2) polysaccharides, and 3) small molecules.
- Temperature range - assays need to be operational and produce equivalent results over a temperature range of +5°C to -30°C.
- Dynamic range - assays must be capable of screening candidate molecules over at least two orders of magnitude in concentration.
- Robustness - assays must be capable of performing at least 3 replicates per sample in parallel, achieving results that vary by no more than 5% between replicates, and must include appropriate positive and negative controls.
- Reproducibility - assay platforms must utilize quantitative data collection NOT dependent on subjective interpretations by a human (i.e., microscopy-based approaches dependent on human scoring of activity and performance).
- Throughput - final assays must be capable of screening a large number of molecules in order to achieve the molecular diversity required to identify candidates with ice modulating properties. It is expected that assays demonstrate the capability to screen up to 500 samples (in triplicate) over a continuous 24-hour period (pooling of samples and multiplexed approaches are acceptable).
- Quality Control – variation between assay runs regarding the accuracy and precision of the testbed must be quantified, mitigated, and minimized with a standard deviation of no less than 5%.

DARPA is agnostic to testing regimes or assay platforms. Potential approaches include but are not limited to:

- Microscopy approaches that utilize automated image analysis or AI
- Differential Scanning Calorimetry
- Fourier Transformed Infrared spectroscopy
- Raman Spectroscopy
- Osmometry
- Combinatorial approaches

In Phase I, IV&V partners will work with DARPA ICE program teams to develop a common framework for measurements and results within each laboratory and support the goals and objectives of the ICE program by measuring ice properties and adhesion across length scales on (multi-functional) technologies provided to IV&V partners by DARPA and ICE performers. IV&V partners will facilitate selection and distribution of a panel of unknown materials for all performers to test under identical conditions for each team's proposed assay. Each team will receive materials for testing within 6 months (up to 5 molecules x 5 replicates). All performers must complete studies to return data for comparison and compilation by the end of month nine.

The IV&V partner will aggregate and compare results between performers as well as from equivalent studies, returning reports to DARPA and performers. Possible metrics for testing include:

- By the end of Phase I, IV&V partners will work with DARPA and ICE performers to develop the test matrix, including substrate materials, temperature(s), testing mode, and aspect ratio of substrates for small-scale ice adhesion tests. Target sizes include 70 x 150 mm (~3x6 inches).
- As Phases I and II are focused on candidate discovery and performance screening, DARPA plans to implement ice adhesion studies on a small scale (cm scale) utilizing freshwater columnar ice.

Track 2 Candidate Discovery and Library Generation (0-12 months)

While a wide variety of different biologically sourced molecules with ice modulating properties have been reported in the literature over the last several decades (i.e., proteins, polysaccharides, and small molecules), the relative number of examples are quite small. However, published data (genomic sequences, amino acid motifs, macromolecule crystal/NMR structures, polysaccharide composition, small molecule substituents/ratios, and physiological data), coupled with state-of-the-art high throughput biotechnology capabilities have created an opportunity space to discover, engineer, and optimize biologically sourced/inspired molecules with enhanced ice modulation properties. Track 2 aims to leverage existing data and next-generation technologies to develop at least two different libraries of diverse molecules to screen and identify candidates with ice modulating activity.

Potential approaches to library generation include but are not limited to:

- Metagenomics approaches to identify new sequences with potential ice modulating activity
- High throughput mass spectrometry
- In vitro selection, directed evolution, phage display
- Synthetic chemistry and/or biochemical approaches
- Bioinformatics and/or computationally assisted protein discovery and design
- Combinatorial approaches

Proposals must address the following information related to Track 2:

- Rationale for approach and selection of molecular targets, including estimated formulations for potential DoD applications
- Estimation and justification for library size
- Justification and risk mitigation for library generation approach:

- For metagenomics-based approaches and sampling sites, estimated number of sequences, and projected throughput/capacity of sequencing required to generate sufficient data to mine
- High throughput mass spectrometry should detail the estimated number of biological samples or mixtures to be screened and how sufficient chemical diversity can be achieved to enable candidate identification
- In vitro selection, directed evolution, and phage display based techniques must justify selection approaches and describe how significant molecular diversity can be achieved to mitigate risk
- Synthetic chemistry and biochemical approaches must describe the breadth and depth of chemical diversity achievable using the proposed approach(s)
- Bioinformatics/computational methodologies must articulate/justify how the proposed approaches identify significant candidate diversity to screen for functionality and mitigate risk
- Combinatorial approaches should detail the advantages over stand-alone methods
- Biological or synthetic production approaches to produce molecules in quantities sufficient to screen and begin optimization within the 18-month Phase I timeframe
- Plans for assay protocol coordination with other ICE teams (secure infrastructure and servers)
- Plans for data sharing with IV&V partner and DARPA

Integration of Tracks (12-18 months)

By the end of month 12, performers will have completed screening for up to 1000 candidate molecules and have received a report from the IV&V partner with feedback on testbed performance and specifications. DARPA anticipates integration of the two tracks to demonstrate the robustness of the quantitative test bed infrastructure and use this infrastructure to test and characterize the ice modulating candidates. The best performing candidates will be down selected in consultation with DARPA to obtain ≥ 10 molecules for each of the three ice modulation classes for transition to Phase II.

Proposers must provide the following details for each class of molecules:

- Performance for each class
- Initial demonstration of the performance of the test bed and plans to expand its capabilities
- Approach to optimization of ice modulation capabilities of the top candidates
- A coordination and data sharing plan with IV&V partner
- Delivery of sufficient quantities of the material to enable multiple tests that can produce statistically significant data

1.2.2 Phase II: Accelerated Molecule Engineering for Performance and Formulation (12 months)

Molecules selected for transition into the Phase II pipeline will be subjected to additional rounds of library design, build, and test to further optimize function and performance to meet Phase II benchmark metrics. In parallel, performers must develop methods and approaches to functionalize molecules for potential incorporation into prototype materials for a potential Phase III solicitation. DARPA highly recommends that proposals integrate/address at least one of the DoD ECW application areas outlined in section 1.2.3 in order to fully assess the impact and applicability of Phases I and II efforts into a potential prototyping work in the future. In addition, proposals must provide details and articulate methods/approaches to increase the scale of molecule production to sufficient quantities to support Phase II research and development efforts. Phase II will conclude with evaluation of materials performance and benchmarking by the IV&V partners, the results of which will inform potential transition to the Phase III testing focused on advanced development (not solicited under this BAA).

Proposals must address the following information related to Phase II:

- Detailed rationale on approach and timelines for iterative molecule design, build, and test to improve activity and enhance performance on molecules transitioned to Phase II.
- A comprehensive justification and rationale for how the selected class of molecules can be functionalized, modified, or incorporated into different formulations/materials such as gels, aqueous solutions, powders, textiles, resins, composites, and coatings, among others that are suitable for use in selected DoD ECW application areas.
- Methods and approaches to determining stability, half-life, activity, toxicity, durability, and efficiency of performance and formulation/incorporation into different material form factors and alternative approaches to mitigate risk.
- Details on approaches to scale-up and a preliminary technoeconomic analysis of costs associated with production of active molecules and incorporation into proposed materials.
- A comprehensive testing plan to assess materials performance relative to selected formulation/ECW application.
- Details on alternative approaches and risk mitigation strategies for molecule optimization, materials development, and scale up.

Phase II engages Design, Build, Test, and Optimize (DBTO) cycles to demonstrate continuous, improved performance of ice control candidates in three classes of molecules or materials with ice modulation ability: inhibition, induction, and adhesion.

Proposals must address the following:

- Anticipated timeline for DBTO cycles and process
- Capacity to produce molecules or materials for testing
- Approach to scale up quantities of molecules and/or materials
- Plans for data sharing with IV&V partner and DARPA (secure infrastructure and servers)

In Phase II, the IV&V partner will focus on small-scale testing of materials using freshwater columnar ice in application relevant testing regimes (i.e., coated substrates, liquid mixtures, skin and tissue surrogates, etc.). In addition, IV&V will perform small-scale ice testing with reference materials/substrates (to be determined) and will collaborate with performers to establish methods to fabricate appropriate substrates and/or mixtures for testing, evaluation, and independent verification. Performers are expected to supply at least 5 candidates per molecule class at quantities sufficient for multiple experiments/replicates dependent on testing regime. Approaches to assess the performance of candidate molecules may include scratch and adhesion tests, microscopy/spectroscopy-based analysis, shear force, freezing/melting points, glass transition temperatures, stability and durability analysis, and wettability measurements, among others, by month 28.

To address the different ice types encountered in real field applications, all studies will utilize freshwater columnar ice and, potentially, saline spray ice. Safety, environmental, and toxicity data should be gathered in anticipation of EPA, FDA, or other regulatory requirements. Large scale studies should be carried out on different geometry substrates: such as flat or curved panels or a cable. Animal studies should be included as needed depending on application (i.e., frostbite).

1.2.3 Phase III: Materials formulation, testing, and scale-up (12-18 months)

Phase III is NOT solicited in this BAA. Phase III may optimize molecules and materials for testing of applications with transition partners.

Successful demonstration of improved performance and control of ice crystals will inform potential DoD relevant applications to pursue future testing. In preparation for a potential Phase III, proposals should strive to articulate how data for molecule candidates achieving Phase II metrics for each of the three molecule classes can inform and enable prototyping efforts for one or more of the ECW application areas listed below. However, Phase III may not be limited to candidate molecules/materials discovered and screened during Phases I and II of ICE. Innovative approaches including novel functionalization or modifications of selected molecules to incorporate into deployable compounds may be pursued. Scale up predictions of molecules for specific applications must be considered. Applications may be selected for further testing and development based on performance and relevance to DoD requirements. Testing should be designed to enable transition to a DoD stakeholder, but access to candidate molecules/materials by local and vulnerable populations will be considered.

ECW EXAMPLE APPLICATION AREAS

1. **Frostbite Prevention:** Injuries to service members resulting from exposure to extreme cold weather is a persistent problem. There are currently limited technologies for the prevention of frostbite, which results from formation and expansion of ice crystals on and in skin and peripheral tissues. Biological molecules that prevent the formation or growth of ice crystals could potentially be leveraged as an anti-frostbite countermeasure. Incorporation of these molecules into topical formulations such as a gel, hydrogel, cream, dermal polymer, or other appropriate medium may provide a solution.
2. **Critical Aqueous Solutions:** Freezing of critical aqueous solutions such as potable water, IV fluids, and sterile injectable medications is a challenge to sustained operations in ECW.

The addition of biological molecules that could lower the freezing and/or melting points of these critical solutions in a non-toxic manner would be highly desirable.

3. **Anti-icing Coatings:** Ice accretion on maritime vessels is a persistent operational and safety challenge. Current mitigation procedures for ice accretion employed at sea consist primarily of manual removal with blunt objects. This approach is time consuming, physically intensive, and not suitable for sensitive equipment and devices. The incorporation of anti-icing molecules into coatings and adhesive formulations that could be easily applied over large surface areas represents a potential solution to this ubiquitous problem.
4. **Green De-icing Solutions:** Current de-icing fluids are comprised of different mixtures of salts or polyethylene glycol. These fluids are corrosive and toxic to the environment. Biologically sourced and/or inspired molecules could provide a non-toxic, environmentally friendly, and low-cost de-icing alternative for runways and aircraft.
5. **Ice Inducers:** Ice nucleators can promote freezing and ice strengthening at elevated temperatures. Overland vehicles in extreme cold often utilize frozen rivers and “ice bridges” to traverse the rugged terrain of the Arctic. In addition, the Army Corp of Engineers utilizes cleared snow to construct protective barriers/berms to defend against kinetic weapons. The materials will be evaluated in operational conditions to determine performance and utility.

1.3. PROGRAM METRICS

In order for the Government to evaluate the effectiveness of a proposed solution in achieving the stated program objectives, proposers should note that the Government hereby promulgates the following program metrics that may serve as the minimum basis for determining whether satisfactory progress is being made to warrant continued funding of the program. Although the following program metrics are specified, proposers should note that the Government has identified these goals with the intention of affording the maximum flexibility, creativity, and innovation in proposing solutions to the stated problem.

Quantitative performance metrics are designed to improve understanding of the candidate molecules by class (e.g., inhibition, induction, adhesion) and optimize performance. Phase II will down select the candidates screened based on performance. Proposers to the ICE program are required to define ambitious, specific, and quantitative metrics in support of program goals, including intermediate metrics (e.g., every 3 months, or sooner) to help further evaluate progress. Some exemplary milestones are included below for proposers to consider but are not meant to be prescriptive. Final metrics are to be determined at time of award negotiation and are subject to DARPA approval. Proposers should note that program metrics may serve as the basis for determining whether satisfactory progress is being made to warrant continuation of the program.

1.3.1 Phase I

Phase I is an 18-month phase that contains two tracks that will be pursued simultaneously by each performer. The two tracks should be integrated by month 12. Track 1 focuses on developing quantitative test bed infrastructure and Track 2 focuses on discovering novel ice-modulating

candidate molecules. The goal of Phase I is to demonstrate the robustness of the quantitative test bed infrastructure and use this infrastructure to test and characterize the novel ice modulating candidates. The metrics listed below are the minimum acceptable criteria, proposers are expected to provide additional rigorous metrics specific to their proposed strategies as needed to effectively ensure that sufficient progress is being made toward the minimum program metrics.

Table 1: Phase I Milestones and Metrics.

Track	Month	Milestone Description	Quantitative Metric
Track 1: Quantitative Test Bed Development	4	Basic test bed performance: Demonstrate performance of the test bed using commercially available molecules and materials.	The test bed must be capable of assaying: 1) Proteins/peptides. 2) Polysaccharides. 3) Small molecules. Within a temperature range of +5°C to -10°C.
	9	Test bed challenge: Using blinded samples provided by the ICE IV&V partner, evaluate the accuracy of the test bed.	Using the test bed, successfully identify the performance characteristics of all of the supplied substrates within 10% accuracy of the known parameter (provided by the IV&V partner).
	12	Advanced test bed performance: Optimize the performance of the test bed and expand its capabilities.	The test bed must be capable of: 1) Assaying a temperature range of +5°C to -30°C. 2) Assaying over two orders of magnitude of concentration. 3) Assaying 3 technical replicates per molecule with less than 5% variation in relevant assay metric. 4) Producing automated and quantitative data collection that is NOT dependent on subjective interpretations by a human. 5) Screening of ice modulation activity for at least 500 samples, in triplicate, over a continuous 24-hour period. 6) Achieving a run to run variability of less than 5% for the same sample assessed on different days.

Track	Month	Milestone Description	Quantitative Metric
Track 2: Candidate Discovery and Characterization	6	Candidate Discovery Method 1	Prepare a minimum of 250 candidates for testing by a single method of synthesis, production, collection, etc.
	12	Candidate Discovery Method 2	Prepare a minimum of 750 additional candidates by either: <ol style="list-style-type: none"> 1) A second method of synthesis, production, collection, etc. (unique from the month 6 milestone). OR <ol style="list-style-type: none"> 2) A combination of the first and second methods (250 new candidates from the first method and 500 from a second method).
Integration of Tracks	15	Candidate Screening	Screen at least 1000 candidate molecules to obtain ≥ 25 molecules per class with ice modulation abilities.
	18	Candidate Characterization	Demonstrate advanced ice modulation capabilities from the top 10 candidates from each class by methods such as: <ol style="list-style-type: none"> 1) Inhibition of ice crystallization measured by size and shear force for surface removal $<100\text{kPa}$ 2) Induction of ice crystallization measured by time to crystal formation, size, and shear force for surface removal 3) Adhesion to ice measured temporally and shear force strength (shear force and peel test)
	18	Validation of high performing candidates by IV&V partner.	Verification of 5 high performing candidates <ul style="list-style-type: none"> • Delivery of sufficient quantities of the material to enable testing

1.3.2 Phase II

The overall phase goals are listed in Table 2. The metrics listed below are the minimum acceptable criteria. Proposers are expected to provide additional rigorous metrics specific to their proposed strategies as needed to effectively ensure that sufficient progress is being made toward the minimum program metrics.

Table 2: Phase II Milestones and Metrics

Month	Milestones	Metrics
28	Performance Optimization	<p>Screen ≥ 5 candidates per class for form and function with application relevant metrics. For example:</p> <ol style="list-style-type: none"> 1) Ice crystal modulation: -20C/-60C 2) Ice adhesion: <100kPA 3) Demonstrate $\geq 75\%$ reduction in tissue necrosis 4) Demonstrate $\geq 75\%$ reduction in ice accumulation on a surface 5) Safety/environmental data based on surfaces selected for testing 6) Minimal tissue reactivity to formulation 7) Toxicity assays to produce data for regulatory engagement
30	Validation of candidates by IV&V partner	<p>Metrics for the three classes of ice modulation molecules will be determined based on the analytical testing regime employed. These will be determined in collaboration between the DARPA PM, IV&V partner, and any relevant government stakeholders.</p>

1.3.3 Phase III

Phase III is NOT solicited in this BAA. Potential phase III goals are listed in Table 3 to inform the schedule and milestones proposed to this solicitation for Phases I and II. The metrics listed below are notional and intended to provide intellectual inspiration to proposers to develop well-rounded, focused proposals. A potential Phase III may be informed by results of Phases I and II regarding the selection of DoD relevant application and testing requirements (See section 1.2.3).

Table 3: Phase III Milestones and Metrics

Month	Milestone	Metrics
42	Operationally relevant testing with IV&V and/or DoD partners.	<p>Test at least 5 candidates scaled up formulations for application specific conditions with IV&V and/or DoD partner.</p> <ol style="list-style-type: none"> 1) Demonstrate at least 75% modulation based on DoD ECW application.

		2) Provide all safety, toxicity, and environmental impact data, based on the surfaces and operation environments for testing.
48-54	Final demonstration with IV&V and/or DoD partners.	<p>Test at least 2 candidate formulations for application specific conditions with IV&V and/or DoD partner.</p> <ol style="list-style-type: none"> 1) Demonstrate at least 90% modulation. 2) Operationally persistent (time or ruggedness to be determined by what would be necessary for stakeholder adoption). 3) Determine the operationally relevant scale up and production plan. 4) Provide all safety, toxicity, and environmental impact data to stakeholders for necessary FDA engagement.

1.4. GENERAL REQUIREMENTS

Regardless of the specific approach, application, and Technical Area(s) pursued, proposers to the ICE program must address each of the following:

Teaming

Proposers are responsible for assembling a complete team that has technical expertise, capabilities, and facilities to address all requirements of the program. Describe any formal teaming agreements that are required to execute this program. All teams are encouraged to identify a Project Manager to serve as the primary point of contact to communicate with the DARPA Program Manager and Contracting Officer Representative, coordinate effort across performer teams, organize regular performer meetings or discussions, facilitate data sharing, and ensure timely completion of milestones and deliverables. For teams that are not physically co-located, proposers must articulate how logistical challenges will be overcome to ensure smooth collaboration and an integrated work product.

Data Sharing and Associate Contractor Agreements (ACA)

DARPA anticipates that a large amount of data will be generated under this program by each performer and that data analysis will be strengthened by compiling and integrating information across all performers, specifically to improve the testbeds and assay development to standardize the evaluation of ice formation, modulation, and control. DARPA encourages library sharing of environmental samples, sequences, or molecules to search the broadest field for candidate discovery. Proposers are encouraged to include a description of a plan to share data with teams internally to the ICE performer group to ensure consistency in assay evaluation across teams and improve testing capabilities for the field. As needed, data sharing plans to facilitate exchange will then be formalized in an ACA (See Section 8.2) to be included in the contract or agreement awarded. Performers will be encouraged to share data externally with the broader research community, and may include plans for external data sharing and stakeholder engagement in the

interim milestones, metrics, and deliverables. For more information on external data sharing and stakeholder engagement, see Ethical, Legal, and Societal Implications (ELSI) section.

Controlled Unclassified Information (CUI)

To prevent the release of sensitive technical information, certain aspects of the proposed research may be considered CUI if they reveal DoD-specific applications or requirements and may require safeguarding or dissemination controls, pursuant to and consistent with applicable law, regulations, and government-wide policies. Proposals must deliver a detailed risk mitigation plan to DARPA (see [Section 4.2.2](#)). Performers must partition potentially sensitive tasks from non-sensitive research efforts. All performers (prime contractor and subcontractor) desiring public release of project information that may contain CUI as defined above must submit a request for public release from DARPA in accordance with their contractual requirements.

Ethical, Legal, and Societal Implications (ELSI)

The changing climate of the Arctic and other cold weather regions poses unique ethical, legal, and social concerns, in addition to security and environmental issues. DARPA anticipates that leveraging biological adaptations to extreme cold weather can inform the development to solutions to control the crystallization of ice and protect the warfighter. This investigation will need guidance to inform technology development as researchers seek to identify novel biological solutions and produce materials that demonstrate safety for individuals and ecosystems while improving ice control. Issues to be considered may initially include, but are not limited to:

1. access to environmental samples and data sovereignty,
2. demonstrating safety or degradation/digestion of formulations,
3. incorporating temporal or spatial controls for reactivity with substrates,
4. minimizing environmental impacts of increasing operations in the Arctic,
5. availability and dissemination of best candidates to locally affected and vulnerable populations, and
6. protection of companion and working animals as well as warfighters.

Program development will be discussed with a group of external advisors with expertise in ethical issues, emerging technologies, and community engagement. DARPA will engage experts to address potential ethical, legal, and societal implications of the proposed technology throughout the program to share data. Proposers are encouraged to integrate experts on the team to collaborate on ELSI and stakeholder engagement and dedicate resources for activities with DARPA and the external ELSI group.

DARPA maintains its commitment to ensuring that efforts funded under this BAA adhere to ethical and legal regulations currently in place for federally and DoD-funded research (see Section 4.2.3), as well as respecting the relevant guidelines and rules set forth by state, local, and tribal authorities. Proposers should expect regular communications with DARPA and its external advisors regarding data analytics and ELSI; incorporate this input into project plans and technology development; and allocate resources to engage on these topics.

Biodiversity and Environmental Safety

DARPA anticipates that proposals may include field work impacting the environment, such as the collection of samples in the discovery of new biological inspiration. Examples of field activities that could affect the environment include, but are not limited to, those involving: the invasive taking of samples (biological, sediment, water, soil, marine, and air); collection of protected flora and fauna; gathering of anthropological or sociological data through interviews and observations; release of chemicals; release or use of tracers (radioactive or stable isotopes) or dyes; generation of significant noise; use of explosives or vibration-generating equipment; activities that could disturb species in their native habitat (including fencing or other habitat segmentation); installation of equipment that could have visual impacts or displace habitat; archaeological and paleontological research involving significant earth-disturbing activities; or construction of infrastructure or roads needed to support the field work. DARPA maintains its commitment to ensuring that efforts funded under this BAA adhere to regulations in place for Federally and DoD-funded research, as well as respecting the relevant guidelines and rules set forth by state, local, and tribal authorities. Proposals are encouraged to identify potential impacts and address them in the proposal by noting the guidelines that will dictate the terms of the field work if available or propose a mitigation strategy within the scope of the program.

Transition Strategy

The goal of the ICE program is to control the physical properties of ice crystals to protect warfighters and infrastructure for enhanced operational capabilities in extreme cold environments. **Phase III is NOT solicited in this BAA.** Phase III will not enable all prospective candidates to be tested for all applications. It is anticipated that ice control candidates and assays identified in Phases I and II may be suitable for advanced development and licensing for many high-impact applications in ECW for DoD and non-DoD populations and operations. Proposers are encouraged to present a plan for testing and transition of the technologies developed under the program for advanced development, to include the capacity to scale up production for testing relevant quantities, to enable both DoD and non-DoD use cases.

Based on the data from candidates in Phases I and II, DARPA will determine if performance is suitable for one or more DoD relevant applications in coordination with stakeholders. DARPA may select candidates from Phases I and II to continue testing in Phase III if technical progress warrants and DoD stakeholders support further development for relevant applications. If additional testing is needed to identify candidates for applications, proposals may be solicited.

Deliverables

All products, material, and otherwise that will be provided to the Government as outcomes from conducted research should be defined as part of the proposal. Performers need to reserve time and budget to fulfill obligations for travel to review meetings and the transmission of report documentation. Performers will be expected to provide at a minimum the following deliverables:

- Monthly financial status reports: Performers are required to provide financial status updates. These reports should be in the form of an editable MS Excel file and should provide financial data including, but not limited to, the following: program spend plan by phase and task, incurred program expenditures to date by phase and task, and invoiced program expenditures to date by phase and task. The prime Performer is to include information for itself and all subawardees/subcontractors.

- Technical progress reports: Every six weeks (or as close to as scheduling permits), performers are required to provide research updates. These reports should be in the form of a standardized slide presentation given to DARPA and discussed with the program management team via teleconference. Length and detail level should be at the discretion of the Program Manager.
- Quarterly technical status reports: The reports shall be prepared and submitted in accordance with the procedures contained in the award document. Quarterly reports due at the end of Phases I and II will constitute a phase completion report, summarizing the research done and progress made on the specific milestones and metrics as laid out in the SOW.
- Semi-Annual Reviews: Leadership from each performer team (with additional key personnel at the discretion of the Principal Investigator (PI)) will be required to present research progress in person, twice annually. The purpose of these reviews is to ensure adequate engagement with the DARPA team to discuss details that might otherwise fall outside the scope of a routine technical brief and provide opportunities to discuss progress towards milestones and scientific goals, any ongoing technical or programmatic challenges that must be overcome to achieve the overarching goals of the program.
- Final Program Report: When the final funding phase closes out, performer teams will provide a final report that summarizes all research activities, outcomes, and molecular mechanisms discovered during the program.
- Any publications, research presentations, or patent applications that result from the research pursued as part of the ICE program.

2. Award Information

2.1. GENERAL AWARD INFORMATION

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

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

The Government reserves the right to request any additional, necessary documentation once it makes the award instrument determination. Such additional information may include but is not limited to Representations and Certifications (see Section VI.B.2., “Representations and Certifications”). The Government reserves the right to remove proposers from award consideration should the parties fail to reach agreement on award terms, conditions, and/or

cost/price within a reasonable time, and the proposer fails to timely provide requested additional information. Proposals identified for negotiation may result in a procurement contract, cooperative agreement, or other transaction, depending upon the nature of the work proposed, the required degree of interaction between parties, whether or not the research is classified as Fundamental Research, and other factors.

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

In accordance with 10 U.S.C. § 4022(f), the Government may award a follow-on production contract or Other Transaction (OT) for any OT awarded under this solicitation if: (1) that participant in the OT, or a recognized successor in interest to the OT, successfully completed the entire prototype project provided for in the OT, as modified; and (2) the OT provides for the award of a follow-on production contract or OT to the participant, or a recognized successor in interest to the OT.

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

2.2. FUNDAMENTAL RESEARCH

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

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

As of the date of publication of this solicitation, the Government expects that program goals as described herein may be met by proposers intending to perform fundamental research and does not anticipate applying publication restrictions of any kind to individual awards for fundamental research that may result from this solicitation. Notwithstanding this statement of expectation, the Government is not prohibited from considering and selecting research proposals that, while perhaps not qualifying as fundamental research under the foregoing definition, still meet the solicitation criteria for submissions. If proposals are selected for award that offer other than a fundamental research solution, the Government will either work with the proposer to modify the

proposed statement of work to bring the research back into line with fundamental research or else the proposer will agree to restrictions in order to receive an award.

University or non-profit research institution performance under this solicitation will include effort categorized as fundamental research. In addition to Government support for free and open scientific exchanges and dissemination of research results in a broad and unrestricted manner, the academic or non-profit research performer or recipient, regardless of tier, acknowledges that such research may have implications that are important to U.S. national interests and must be protected against foreign influence and exploitation. As such, the academic or non-profit research performer or recipient agrees to comply with the following requirements:

- (a) The University or non-profit research institution performer or recipient must establish and maintain an internal process or procedure to address foreign talent programs, conflicts of commitment, conflicts of interest, and research integrity. The academic or non-profit research performer or recipient must also utilize due diligence to identify Foreign Components or participation by Senior/Key Personnel in Foreign Government Talent Recruitment Programs and agree to share such information with the Government upon request.
 - i. The above described information will be provided to the Government as part of the proposal response to the solicitation and will be reviewed and assessed prior to award. Generally, this information will be included in the Research and Related Senior/Key Personnel Profile (Expanded) form (SF-424) required as part the proposer's submission through Grants.gov.
 - 1. Instructions regarding how to fill out the SF-424 and its biographical sketch can be found through Grants.gov.
 - ii. In accordance with USD(R&E) direction to mitigate undue foreign influence in DoD-funded science and technology, DARPA will assess all Senior/Key Personnel proposed to support DARPA grants and cooperative agreements for potential undue foreign influence risk factors relating to professional and financial activities. This will be done by evaluating information provided via the SF-424, and any accompanying or referenced documents, in order to identify and assess any associations or affiliations the Senior/Key Personnel may have with foreign strategic competitors or countries that have a history of intellectual property theft, research misconduct, or history of targeting U.S. technology for unauthorized transfer. DARPA's evaluation takes into consideration the entirety of the Senior/Key Personnel's SF-424, current and pending support, and biographical sketch, placing the most weight on the Senior/Key Person's professional and financial activities over the last 4 years. The majority of foreign entities lists used to make these determinations are publicly available. The DARPA Countering Foreign Influence Program (CFIP) "Senior/Key Personnel Foreign Influence Risk Rubric" details the various risk ratings and factors. The rubric can be seen at the following link:
<https://www.darpa.mil/attachments/092021DARPA CFIP Rubric.pdf>
 - iii. Examples of lists that DARPA leverages to assess potential undue foreign influence factors include, but are not limited to:

1. Executive Order 13959 “Addressing the Threat From Securities Investments That Finance Communist Chinese Military Companies”: <https://www.govinfo.gov/content/pkg/FR-2020-11-17/pdf/2020-25459.pdf>
2. The U.S. Department of Education’s College Foreign Gift and Contract Report: [College Foreign Gift Reporting \(ed.gov\)](https://www.ed.gov/college-foreign-gift-reporting)
3. The U.S. Department of Commerce, Bureau of Industry and Security, List of Parties of Concern: <https://www.bis.doc.gov/index.php/policy-guidance/lists-of-parties-of-concern>
4. Georgetown University’s Center for Security and Emerging Technology (CSET) Chinese Talent Program Tracker: <https://chinatalenttracker.cset.tech>
5. Director of National Intelligence (DNI) “World Wide Threat Assessment of the US Intelligence Community”: [2021 Annual Threat Assessment of the U.S. Intelligence Community \(dni.gov\)](https://www.dni.gov/2021-annual-threat-assessment)
6. Various Defense Counterintelligence and Security Agency (DCSA) products regarding targeting of US technologies, adversary targeting of academia, and the exploitation of academic experts: <https://www.dcsa.mil/>

DARPA’s analysis and assessment of affiliations and associations of Senior/Key Personnel is compliant with Title VI of the Civil Rights Act of 1964. Information regarding race, color, or national origin is not collected and does not have bearing in DARPA’s assessment.

University or non-profit research institutions with proposals selected for negotiation that have been assessed as having high or very high undue foreign influence risk, will be given an opportunity during the negotiation process to mitigate the risk. DARPA reserves the right to request any follow-up information needed to assess risk or mitigation strategies.

- iv. Upon conclusion of the negotiations, if DARPA determines, despite any proposed mitigation terms (e.g. mitigation plan, alternative research personnel), the participation of any Senior/Key Research Personnel still represents high risk to the program, or proposed mitigation affects the Government’s confidence in proposer’s capability to successfully complete the research (e.g., less qualified Senior/Key Research Personnel) the Government may determine not to award the proposed effort. Any decision not to award will be predicated upon reasonable disclosure of the pertinent facts and reasonable discussion of any possible alternatives while balancing program award timeline requirements.
- (b) Failure of the academic or non-profit research performer or recipient to reasonably exercise due diligence to discover or ensure that neither it nor any of its Senior/Key Research Personnel involved in the subject award are participating in a Foreign Government Talent Program or have a Foreign Component with an a strategic competitor or country with a history of targeting U.S. technology for unauthorized transfer may result in the Government exercising remedies in accordance with federal law and regulation.

- i. If, at any time, during performance of this research award, the academic or non-profit research performer or recipient should learn that it, its Senior/Key Research Personnel, or applicable team members or subtier performers on this award are or are believed to be participants in a Foreign Government Talent Program or have Foreign Components with a strategic competitor or country with a history of targeting U.S. technology for unauthorized transfer, the performer or recipient will notify the Government Contracting Officer or Agreements Officer within 5 business days.
 1. This disclosure must include specific information as to the personnel involved and the nature of the situation and relationship. The Government will have 30 business days to review this information and conduct any necessary fact-finding or discussion with the performer or recipient.
 2. The Government's timely determination and response to this disclosure may range anywhere from acceptance, to mitigation, to termination of this award at the Government's discretion.
 3. If the University receives no response from the Government to its disclosure within 30 business days, it may presume that the Government has determined the disclosure does not represent a threat.
- ii. The performer or recipient must flow down this provision to any subtier contracts or agreements involving direct participation in the performance of the research.

(c) Definitions

- i. Senior/Key Research Personnel
 1. This definition would include the Principal Investigator or Program/Project Director and other individuals who contribute to the scientific development or execution of a project in a substantive, measurable way, whether or not they receive salaries or compensation under the award. These include individuals whose absence from the project would be expected to impact the approved scope of the project.
 2. Most often, these individuals will have a doctorate or other professional degrees, although other individuals may be included within this definition on occasion.
- ii. Foreign Associations/Affiliations
 1. Association is defined as collaboration, coordination or interrelation, professionally or personally, with a foreign government-connected entity where no direct monetary or non-monetary reward is involved.
 2. Affiliation is defined as collaboration, coordination, or interrelation, professionally or personally, with a foreign government-connected entity where direct monetary or non-monetary reward is involved.
- iii. Foreign Government Talent Recruitment Programs
 1. In general, these programs will include any foreign-state-sponsored attempt to acquire U.S. scientific-funded research or technology through

foreign government-run or funded recruitment programs that target scientists, engineers, academics, researchers, and entrepreneurs of all nationalities working and educated in the U.S.

2. Distinguishing features of a Foreign Government Talent Recruitment Program may include:
 - a. Compensation, either monetary or in-kind, provided by the foreign state to the targeted individual in exchange for the individual transferring their knowledge and expertise to the foreign country.
 - b. In-kind compensation may include honorific titles, career advancement opportunities, promised future compensation or other types of remuneration or compensation.
 - c. Recruitment, in this context, refers to the foreign-state-sponsor's active engagement in attracting the targeted individual to join the foreign-sponsored program and transfer their knowledge and expertise to the foreign state. The targeted individual may be employed and located in the U.S. or in the foreign state.
 - d. Contracts for participation in some programs that create conflicts of commitment and/or conflicts of interest for researchers. These contracts include, but are not limited to, requirements to attribute awards, patents, and projects to the foreign institution, even if conducted under U.S. funding, to recruit or train other talent recruitment plan members, circumventing merit-based processes, and to replicate or transfer U.S.-funded work in another country.
 - e. Many, but not all, of these programs aim to incentivize the targeted individual to physically relocate to the foreign state. Of particular concern are those programs that allow for continued employment at U.S. research facilities or receipt of U.S. Government research funding while concurrently receiving compensation from the foreign state.
3. Foreign Government Talent Recruitment Programs DO NOT include:
 - a. Research agreements between the University and a foreign entity, unless that agreement includes provisions that create situations of concern addressed elsewhere in this section,
 - b. Agreements for the provision of goods or services by commercial vendors, or
 - c. Invitations to attend or present at conferences.

iv. Conflict of Interest

1. A situation in which an individual, or the individual's spouse or dependent children, has a financial interest or financial relationship that could directly and significantly affect the design, conduct, reporting, or funding of research.

v. Conflict of Commitment

1. A situation in which an individual accepts or incurs conflicting obligations between or among multiple employers or other entities.
2. Common conflicts of commitment involve conflicting commitments of time and effort, including obligations to dedicate time in excess of institutional or funding agency policies or commitments. Other types of conflicting obligations, including obligations to improperly share information with, or withhold information from, an employer or funding agency, can also threaten research security and integrity and are an element of a broader concept of conflicts of commitment.

vi. Foreign Component

1. Performance of any significant scientific element or segment of a program or project outside of the U.S., either by the University or by a researcher employed by a foreign organization, whether or not U.S. government funds are expended.
2. Activities that would meet this definition include, but are not limited to:
 - a. Involvement of human subjects or animals;
 - b. Extensive foreign travel by University research program or project staff for the purpose of data collection, surveying, sampling, and similar activities;
 - c. Collaborations with investigators at a foreign site anticipated to result in co-authorship;
 - d. Use of facilities or instrumentation at a foreign site;
 - e. Receipt of financial support or resources from a foreign entity; or
 - f. Any activity of the University that may have an impact on U.S. foreign policy through involvement in the affairs or environment of a foreign country.
3. Foreign travel is not considered a Foreign Component.

vii. Strategic Competitor

1. A nation, or nation-state, that engages in diplomatic, economic or technological rivalry with the United States where the fundamental strategic interests of the U.S are under threat.

Proposers should indicate in their proposal whether they believe the scope of the research included in their proposal is fundamental or not. While proposers should clearly explain the intended results of their research, the Government shall have sole discretion to determine whether the proposed research shall be considered fundamental and to select the award instrument type. Appropriate language will be included in resultant awards for non-fundamental research to prescribe publication requirements and other restrictions, as appropriate. This language can be found at <http://www.darpa.mil/work-with-us/additional-baa>.

For certain research projects, it may be possible that although the research to be performed by a potential awardee is non-fundamental research, its proposed subawardee's effort may be fundamental research. It is also possible that the research performed by a potential awardee is fundamental research while its proposed subawardee's effort may be non-fundamental research. In all cases, it is the potential awardee's responsibility to explain in its proposal which proposed efforts are fundamental research and why the proposed efforts should be considered fundamental research.

3. Eligibility Information

3.1. ELIGIBLE APPLICANTS

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

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

FFRDCs

FFRDCs are subject to applicable direct competition limitations and cannot propose to this solicitation in any capacity unless they meet the following conditions. (1) FFRDCs must clearly demonstrate that the proposed work is not otherwise available from the private sector. (2) FFRDCs must provide a letter, on official letterhead from their sponsoring organization, that (a) cites the specific authority establishing their eligibility to propose to Government solicitations and compete with industry, and (b) certifies the FFRDC's compliance with the associated FFRDC sponsor agreement's terms and conditions. These conditions are a requirement for FFRDCs proposing to be awardees or subawardees.

Government Entities

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

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. § 4892 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.

3.1.2. Non-U.S. Organizations

Non-U.S. organizations and/or individuals may participate to the extent that such participants comply with any necessary non-disclosure agreements, security regulations, export control laws, and other governing statutes applicable under the circumstances.

3.2. ORGANIZATIONAL CONFLICTS OF INTEREST

FAR 9.5 Requirements

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

Agency Supplemental OCI Policy

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

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

Government Procedures

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

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

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

3.3. COST SHARING/MATCHING

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

3.4. OTHER ELIGIBILITY CRITERIA – COLLABORATIVE EFFORTS

It is anticipated that successful proposals will be comprised of multi-disciplinary teams, and that successful implementation may require academic and industrial collaborations. Teams may be led by industrial, academic, or non-profit entities, among others. It is expected that the proposed leadership team will include individuals with significant experience and expertise in directing operations and technology development, leading large and diverse teams with both academic and industrial partners, and have significant experience in the research and development of engineered organisms, spaceflight and spaceflight analogs, and microbial in-situ resource utilization and waste stream utilization.

DARPA will facilitate a Proposers Day (see [Section 8.1](#) below) to encourage the formation of teams with the expertise necessary to meet the goals of the program and enable sharing of information among interested proposers through fbo.gov and the Proposers Day registration website.

DARPA requires that all teaming arrangements be resolved before proposal submission. Specific content, communications, networking, and team formation are the sole responsibility of the proposers. Teams/collaborative efforts must submit a single, integrated proposal led by a single Principal Investigator (PI) or prime contractor. Proposers may join any number of teams as a subcontractor and still submit a separate proposal as the PI (with or without subcontractors). In all cases, collaborating team members must submit a unified proposal.

4. Application and Submission Information

4.1. ADDRESS TO REQUEST APPLICATION PACKAGE

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

4.2. CONTACT AND FORM OF APPLICATION SUBMISSION

All submissions, including abstracts and proposals, must be written in English with type no smaller than 12-point font. Smaller font may be used for figures, tables, and charts. The page limitation includes all figures, tables, and charts. All pages shall be formatted for printing on 8-1/2 by 11-inch paper. Margins must be 1-inch on all sides. Copies of all documents submitted must be clearly labeled with the DARPA BAA number, proposer organization, and proposal title/proposal short title.

4.2.1. Proposal Abstract Format

Proposers are strongly 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. DARPA will respond to abstracts providing feedback and indicating whether, after preliminary review, there is interest within BTO for the proposed work. DARPA will attempt to reply within **14** calendar days of receipt. Proposals may be submitted irrespective of comments or feedback received in response to the abstract. Proposals are reviewed without regard to feedback given as a result of abstract review. The time and date for submission of proposal abstracts are specified in Part I above.

The abstract is a concise version of the proposal comprising a maximum of **eight (8)** pages, including all figures, tables, and charts. All submissions must be written in English with type no smaller than 12-point font. Smaller font may be used for figures, tables, and charts. All pages shall be formatted for printing on 8-1/2 by 11-inch paper. Margins must be 1-inch on all sides. Copies of all documents submitted must be clearly labeled with the DARPA BAA number, proposer organization, and proposal abstract title.

NOTE: Non-conforming submissions that do not address both Program Tracks in Phase I and/or follow the instructions herein may be rejected without further review.

The page limit does NOT include:

- Official transmittal letter (optional);
- Cover sheet;
- Executive summary slide;
- Resumes; and
- Bibliography (optional).

Abstracts must include the following components:

A. Cover Sheet (does not count towards page limit): Include the administrative and technical points of contact (name, address, phone, fax, e-mail, lead organization). Also include the BAA number, title of the proposed project, primary subcontractors, estimated cost, duration of the project, and the label “ABSTRACT.”

B. Goals and Impact: Clearly describe what is being proposed and what difference it will make (qualitatively and quantitatively), including brief answers to the following questions:

1. What is the proposed work attempting to accomplish or do?
2. How is it done today? And what are the limitations?
3. What is innovative in your approach, and how does it compare to the current state-of-the-art (SOA)?
4. What are the key technical challenges in your approach, and how do you plan to overcome these?
5. Who will care, and what will the impact be if you are successful?
6. How much will it cost, and how long will it take?

C. Executive Summary Slides: The slide template is provided as **Attachment 1** to the BAA posted at <https://SAM.gov>. Use of this template is required.

D. Technical Plan: Outline and address all technical areas and challenges inherent in the approach and possible solutions for overcoming potential problems. This section should provide specific objectives, metrics, and milestones at intermediate stages of the project to demonstrate a plan for accomplishment of the program goals. Propose additional appropriate qualitative and quantitative metrics specific to the approach, as needed. Outline of intermediary milestones should occur at no greater than 6-month increments.

E. Management and Capabilities: Provide a brief summary of expertise of the team, including subcontractors and key personnel.

A principal investigator for the project must be identified, and a description of the team's organization including a breakdown by Technical Area (TA). All teams are strongly encouraged to identify a Project Manager/Integrator to serve as the primary point of contact to communicate with the DARPA Program Manager, IV&V partner, and Contracting Officer's Representative, coordinate the effort across co-performer, vendor, and subcontractor teams, organize regular performer meetings or discussions, facilitate data sharing, and ensure timely completion of milestones and deliverables.

Include a description of the team's organization, including roles and responsibilities. Team member descriptions should address the Technical Plan, describe the time and percent effort divisions for members participating across multiple TAs, and delineate individuals to avoid duplication of efforts.

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 materials or data assumed to be available. Describe any specialized facilities to be used as part of the project, the extent of access to these facilities, and any biological containment, biosafety, and certification requirements.

F. Cost and Schedule: Provide a cost estimate for resources over the proposed timeline of the project, broken down by phase and major cost items (e.g., labor, materials, etc.). Include cost estimates for each potential subcontractor (may be a rough order of magnitude).

G. Resumes (do not count towards page limit): Include resumes of key team members.

H. Bibliography (Optional, does not count towards page limit): If desired, include a brief bibliography with links to relevant papers and reports. The bibliography should not exceed two (2) pages.

4.2.2. Proposal Format

All full proposals must be in the format given below. Proposals shall consist of two volumes: 1) **Volume I, Technical and Management Proposal**, and 2) **Volume II, Cost Proposal**. All submissions must be written in English with type no smaller than 12-point font. A smaller font may be used for figures, tables, and charts. The page limitation includes all figures, tables, and charts. All pages shall be formatted for printing on 8-1/2 by 11- inch paper. Margins must be 1- inch on all sides. Copies of all documents submitted must be clearly labeled with the DARPA BAA number, proposer organization, and proposal title/proposal short title. Volume I, Technical and Management Proposal, may include an attached bibliography of relevant technical papers or research notes (published and unpublished) which document the technical ideas and approach upon which the proposal is based. Copies of not more than three (3) relevant papers may be included with the submission. The bibliography and attached papers are not included in the page counts given below. The submission of other supporting materials along with the proposals is strongly discouraged and will not be considered for review. **The maximum page count for Volume 1 is twenty (20) pages.** The official transmittal letter is not included in the page count. Volume I should include the following components:

NOTE: Non-conforming submissions that do not address both Program Tracks in Phase I and/or follow the instructions herein may be rejected without further review.

a. Volume I, Technical and Management Proposal

Section I. Administrative (does not count towards page limit)

A. Cover Sheet (Labeled “PROPOSAL: VOLUME I”):

1. BAA number (HR001122S0047);
2. Lead organization submitting proposal (prime contractor);
3. Type of organization, selected from among the following categories: “LARGE BUSINESS,” “SMALL DISADVANTAGED BUSINESS,” “OTHER SMALL BUSINESS,” “HBCU,” “MI,” “OTHER EDUCATIONAL,” OR “OTHER NONPROFIT”;
4. Proposer’s reference number (if any);
5. Other team members (if applicable) and type of business for each;
6. Proposal title;
7. Technical point of contact (Program Manager or Principle Investigator) to include: salutation, last name, first name, street address, city, state, zip code, telephone, fax, e-mail;
8. Administrative point of contact (Contracting Officer or Award Officer) to include: salutation, last name, first name, street address, city, state, zip code, telephone, fax, e-mail;
9. Award instrument requested: cost-plus-fixed-fee (CPFF), cost-contract—no fee, cost sharing contract – no fee, or other type of procurement contract (*specify*), cooperative agreement, or other transaction;

10. Place(s) of performance, including all subcontractors and consultants;
11. Period of performance;
12. Total funds requested from DARPA, total funds requested per phase and the amount of any cost share (if any);
13. Proposal validity period; AND
14. Date proposal was submitted.

Information on award instruments is available at <http://www.darpa.mil/work-with-us/contract-management>.

B. Official Transmittal Letter.

C. Executive Summary Slides: The slide template is provided as **Attachment 1** to the BAA posted at <https://SAM.gov>. Use of this template is required.

D. Specific Program Plan: Provide a summary list of technical information as requested in Attachment 2 to the BAA posted at <https://SAM.gov>. Use of this Excel template is required.

Section II. Detailed Proposal Information

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

- What is the proposed work attempting to accomplish or do?
- How is it done today, and what are the limitations?
- What is innovative in your approach?
- What are the key technical challenges in your approach, and how do you plan to overcome these?
- Who or what will be affected, and what will be the impact if the work is successful?
- How much will it cost, and how long will it take?

B. Goals and Impact: Clearly describe what the team is trying to achieve and the 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 uniqueness and benefits of this project in the context of the state of the art, alternative approaches, and other projects from the past and present. Describe how the proposed project is revolutionary and how it significantly rises above the current state-of-the-art. Describe the deliverables associated with the proposed project and any plans to commercialize the technology, transition it to a customer, or further the work.

- C. Technical Plan:** Outline and address technical challenges inherent in the approach and possible solutions for overcoming potential problems. This section should provide appropriate measurable milestones (quantitative if possible) at intermediate stages of the program to demonstrate progress, plan for achieving the milestones, and must include a simple process flow diagram of their final system concept. The technical plan should demonstrate a deep understanding of the technical challenges and present a credible (even if risky) plan to achieve the program goal. Discuss mitigation of technical risk.
- D. Management Plan:** Provide a summary of expertise of the team, including any subcontractors, and key personnel who will be doing the work. A Principal Investigator (PI) for the project must be identified, along with a description of the team's organization, including the breakdown by Technical Area. All teams are strongly encouraged to identify a Project Manager/Integrator to serve as the primary point of contact to communicate with the DARPA Program Manager, IV&V partner, and Contracting Officer's Representative, coordinate the effort across co-performer, vendor, and subcontractor teams, organize regular performer meetings or discussions, facilitate data sharing, and ensure timely completion of milestones and deliverables.

Provide a clear description of the team's organization, including an organization chart that includes, as applicable: the programmatic relationship of team members; the unique capabilities of team members; the task responsibilities of team members, the teaming strategy among the team members; and key personnel with the amount of effort to be expended by each person during each year. Provide a detailed plan for coordination including explicit guidelines for interaction among collaborators/subcontractors of the proposed effort. Include risk management approaches. Describe any formal teaming agreements that are required to execute this program.

- E. Capabilities:** Describe organizational experience in relevant subject area(s), existing intellectual property, specialized facilities, and any Government-furnished materials or information. Describe any specialized facilities to be used as part of the project, the extent of access to these facilities, and any biological containment, biosafety, and certification requirements. Discuss any work in closely related research areas and previous accomplishments.
- F. Statement of Work (SOW) NOT INCLUDED IN PAGE COUNT:** The SOW should provide a detailed task breakdown, citing specific tasks for each Technical Area, and their connection to the milestones and program metrics. Each phase of the program should be separately defined. The SOW must not include proprietary information. It is encouraged, though not required, to use the SOW template provided as **Attachment 3**. SOW is not included in the Volume 1 page count.

For each task/subtask, provide:

- 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, i.e., a deliverable, demonstration, or other event/activity that marks task completion. Include completion dates for all milestones. Include quantitative metrics.
- A definition of all deliverables (e.g., data, reports, software) to be provided to the Government in support of the proposed tasks/subtasks.

It is recommended that the SOW be developed so that each Technical Area and Phase of the program is separately defined.

G. CUI Risk Mitigation Plan: (Required for proposers who anticipate generating work that may be considered CUI in accordance with “Controlled Unclassified Information” in [Section 1.5](#)): Provide a detailed plan for how the organization and its subcontractors will meet CUI safeguarding requirements. The plan should provide a detailed strategy to protect CUI without unnecessarily compartmentalizing information flow within or among performer teams. This plan must describe safeguard procedures for generating sensitive program deliverables.

H. 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.

I. Technology Transfer Plan: Provide information regarding the types of partners (e.g., government, private industry) that will be pursued and submit a timeline with incremental milestones toward successful engagement. The plan should include a description of how DARPA will be included in the development of potential technology transfer relationships. If the Technology Transfer Plan includes the formation of a start-up company, a business development strategy must also be provided.

a. Volume II, Cost Management Proposal

Cover Sheet (LABELED “PROPOSAL: VOLUME II”):

1. BAA Number (HR001122S0047);
2. Lead Organization Submitting proposal;

3. Type of organization, selected among the following categories: “LARGE BUSINESS”, “SMALL DISADVANTAGED BUSINESS”, “OTHER SMALL BUSINESS”, “HBCU”, “MI”, “OTHER EDUCATIONAL”, OR “OTHER NONPROFIT”;
4. Proposer’s reference number (if any);
5. Other team members (if applicable) and type of business for each;
6. Proposal title;
7. Technical point of contact (Program Manager or Principal Investigator) to include: salutation, last name, first name, street address, city, state, zip code, telephone, fax (if available), electronic mail (if available);
8. Administrative point of contact (Contracting Officer or Award Officer) to include: salutation, last name, first name, street address, city, state, zip code, telephone, fax (if available), and electronic mail (if available);
9. Award instrument requested: cost-plus-fixed-fee (CPFF), cost-contract—no fee, cost sharing contract—no fee, or other type of procurement contract (*specify*), cooperative agreement, or other transaction;
10. Place(s) of performance, including all subcontractors and consultants;
11. Period of performance;
12. Total funds requested from DARPA, total funds requested per phase (as defined in Table 1), and the amount of any cost share (if any);
13. Name, address, and telephone number of the proposer’s cognizant Defense Contract Management Agency (DCMA) administration office (*if known*);
14. Name, address, and telephone number of the proposer’s cognizant Defense Contract Audit Agency (DCAA) audit office (*if known*);
15. Date proposal was prepared;
16. Data Universal Numbering System (DUNS) number (<http://www.dnb.com/get-a-duns-number.html>);
17. Taxpayer ID number (<https://www.irs.gov/Individuals/International-Taxpayers/Taxpayer-Identification-Numbers-TIN>);
18. Commercial and Government Entity (CAGE) code (<https://cage.dla.mil/Home/UsageAgree>);
19. Proposal validity period

NOTE: Non-conforming submissions that do not address both Program Tracks in Phase I and/or follow the instructions herein may be rejected without further review.

The Government requires that proposers use the provided MS Excel™ DARPA Standard Cost Proposal Spreadsheet in the development of their cost proposals. A customized cost proposal spreadsheet may be an attachment to this solicitation. If not, the spreadsheet can be found on the DARPA website at <http://www.darpa.mil/work-with-us/contract-management> (under “Resources” on the right-hand side of the webpage). All tabs and tables in the cost proposal spreadsheet should be developed in an editable format with calculation formulas intact to allow traceability of the cost proposal. This cost proposal spreadsheet should be used by the prime

organization and all subcontractors. In addition to using the cost proposal spreadsheet, the cost proposal still must include all other items required in this announcement that are not covered by the editable spreadsheet. Subcontractor cost proposal spreadsheets may be submitted directly to the Government by the proposed subcontractor via e-mail to the address in Part I of this solicitation. **Using the provided cost proposal spreadsheet will assist the Government in a rapid analysis of your proposed costs and, if your proposal is selected for a potential award, speed up the negotiation and award execution process.**

- (1) Total program, per phase (Phase I (Base); Phase II (Option); and per task cost broken down by major cost items to include:
 - i. **Direct labor** – provide an itemized breakout of all personnel, listed by name or TBD, with labor rate (or salary), labor hours (or percent effort), and labor category. All senior personnel must be identified by name.
 - ii. **Materials and Supplies** – itemized list which includes description of material, quantity, unit price, and total price. If a material factor is used based on historical purchases, provide data to justify the rate.
 - iii. **Equipment** – itemized list which includes description of equipment, unit price, quantity, and total price. Any equipment item with a unit price over \$5,000 must include a vendor quote.
 - iv. **Animal Use Costs** – itemized list of all materials, animal purchases, and per diem costs, associated with proposed animal use; include documentation supporting daily rates.
 - v. **Travel** – provide an itemized list of travel costs to include purpose of trips, departure and arrival destinations, projected airfare, rental car and per GSA approved diem, number of travelers, number of days); provide screenshots from travel website for proposed airfare and rental car, as applicable; provide screenshot or web link for conference registration fee and note if the fee includes hotel cost. Conference attendance must be justified and explain how it is in the best interest of the project. **Plan for two (2) DARPA program review meetings per year.**
 - vi. **Other Direct Costs (e.g., computer support, clean room fees)** – Should be itemized with costs or estimated costs. Backup documentation and/or a supporting cost breakdown is required to support proposed costs with a unit price over \$5,000. An explanation of any estimating factors, including their derivation and application, must be provided. Please include a brief description of the proposers' procurement method to be used.
 - vii. **Other Direct Costs** – Consultants: provide executed Consultant Agreement that describes work scope, rate and hours.
 - viii. **Indirect costs** including, as applicable, fringe benefits, overhead, General and Administrative (G&A) expense, and cost of money (see university vs. company specific requirements below).
 - ix. **Indirect costs specific to a University performer:** (1) **Fringe Benefit Rate** (provide current Department of Health and Human Services (DHHS) or Office of Naval Research (ONR) negotiated rate package; if calculated by other than a rate, provide University documentation identifying fringe costs by position or HR documentation if unique to each person); (2) **F&A**

Indirect Overhead Rate (provide current DHHS or ONR negotiated rate package); (3) **Tuition Remission** (provide current University documentation justifying per-student amount); and (4) **Health Insurance/Fee** (provide current University documentation justifying per student amount, if priced separately from fringe benefits with calculations included in the EXCEL cost file).

Indirect costs specific to a Company performer: (1) **Fee/Profit** (provide rationale for proposed fee/profit percentage using criteria found in DFARS 215.404-70); and (2) **Fringe Benefit/Labor OH/Material OH/G&A Rates** (provide current Forwarding Pricing Rate Proposal (FPRP) or DCMA/DCAA Forward Pricing Rate Recommendation or Agreement (FPRR or FPRA). If these documents are not available, provide company historical data, preferably two years, minimum of one, to include both pool and expense costs used to generate the rates).

- (2) A summary of total program costs by Phase (I and II)
- (3) An itemization of Subcontracts. All subcontractor cost proposal documentation must be prepared at the same level of detail as that required of the prime. Subcontractor proposals should include Interdivisional Work Transfer Agreements (IWTA) or evidence of similar arrangements (an IWTA is an agreement between multiple divisions of the same organization). The prime proposer is responsible for compiling and providing all subcontractor proposals for the Procuring Contracting Officer (PCO). The proposal must show how subcontractor costs are applied to each phase and task. If consultants are to be used, proposer must provide consultant agreement or other document that verifies the proposed loaded daily/hourly rate.
- (4) An itemization of any information technology (IT) purchase (including a letter stating why the proposer cannot provide the requested resources from its own funding), as defined in FAR Part 2.101.
- (5) A summary of projected funding requirements by month for all phases of the project.
- (6) A summary of tasks that have animal or human use funding.
- (7) The source, nature, and amount of any industry cost-sharing. Where the effort consists of multiple portions that could reasonably be partitioned for purposes of funding, these should be identified as options with separate cost estimates for each.
- (8) Identification of pricing assumptions of which may require incorporation into the resulting award instrument (e.g., use of Government Furnished Property/Facilities/Information, access to Government Subject Matter Expert/s, etc.).
- (9) Any Forward Pricing Rate Agreement, DHHS rate agreement, other such approved rate information, or such documentation that may assist in expediting negotiations (if available).
- (10) Proposers with a Government acceptable accounting system who are proposing a cost-type contract must submit the DCAA document approving the cost accounting system.

Per FAR 15.403-4, certified cost or pricing data shall be required if the proposer is seeking a procurement contract award per the referenced threshold, unless the proposer requests and is granted an exception from the requirement to submit cost or pricing data. Certified cost or pricing data” are not required if the proposer proposes an award instrument other than a procurement contract (e.g., a cooperative agreement, or other transaction.)

Subawardee Proposals

The awardee is responsible for compiling and providing all subawardee proposals for the Procuring Contracting Officer (PCO)/Grants Officer (GO)/Agreements Officer (AO), as applicable. Subawardee proposals should include Interdivisional Work Transfer Agreements (ITWA) or similar arrangements. Where the effort consists of multiple portions which could reasonably be partitioned for purposes of funding, these should be identified as options with separate cost estimates for each.

All proprietary subawardee proposal documentation, prepared at the same level of detail as that required of the awardee’s proposal and which cannot be uploaded with the proposed awardee’s proposal, shall be provided to the Government either by the awardee or by the subawardee organization when the proposal is submitted. Subawardee proposals submitted to the Government by the proposed subawardee should be submitted via e-mail to the address in Section I.

Other Transaction (OT) Requests

All proposers requesting an OT must include a detailed list of milestones for each phase of the program (I and II). Each milestone must include the following:

- milestone description,
- completion criteria,
- due date, and
- payment/funding schedule (to include, if cost share is proposed, awardee and Government share amounts).

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

4.2.3. Additional Proposal Information

Proprietary Markings

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

Unclassified Submissions

DARPA anticipates that submissions received under this BAA will be unclassified. However, should a proposer wish to submit classified information, an *unclassified* e-mail must be sent to the BAA mailbox requesting submission instructions from the Technical Office Program Security Officer (PSO). If a determination is made that the award instrument may result in access to classified information, a Security Classification Guide (SCG) and/or DD Form 254 will be issued by DARPA and attached as part of the award.

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://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.800-171r2.pdf>) and DoDI

8582.01 that are in effect at the time the solicitation is issued.

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

Human Subjects Research (HSR)/Animal Use

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

Approved Cost Accounting System Documentation

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

Small Business Subcontracting Plan

Pursuant to Section 8(d) of the Small Business Act (15 U.S.C. § 637(d)) and FAR 19.702(a)(1), each proposer who submits a contract proposal and includes subcontractors might be required to submit a subcontracting plan with their proposal. The plan format is outlined in FAR 19.704.

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

All electronic and information technology acquired or created through this BAA must satisfy the accessibility requirements of Section 508 of the Rehabilitation Act (29 U.S.C. § 749d)/FAR 39.2.

Intellectual Property

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

For Procurement Contracts

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

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

For All Non-Procurement Contracts

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

System for Award Management (SAM) and Universal Identifier Requirements

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

International entities can register in SAM by following the instructions in this link: https://www.fsd.gov/sys_attachment.do?sys_id=c08b64ab1b4434109ac5ddb6bc4bcbb8.

4.2.4. Submission Information

DARPA will acknowledge receipt of all submissions and assign an identifying control number that should be used in all further correspondence regarding the submission. DARPA intends to use electronic mail correspondence regarding HR001122S0047. Submissions may not be sent by fax or e-mail; any so sent will be disregarded.

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

For abstract and proposal submission dates, see Part I., Overview Information. Submissions received after these dates and times may not be reviewed.

For all Proposal Abstracts and Full Proposals requesting Procurement Contracts:

Abstracts and Full Proposals sent in response to HR001122S0047 may be submitted via DARPA's BAA Website (<https://baa.darpa.mil>). Visit the website to complete the two-step registration process. Submitters will need to register for an Extranet account (via the form at the URL listed above) and wait for two separate e-mails containing a username and temporary password. After accessing the Extranet, submitters may then create an account for the DARPA BAA website (via the "Register your Organization" link along the left side of the homepage), view submission instructions, and upload/finalize the abstract. Proposers using the DARPA BAA Website may encounter heavy traffic on the submission deadline date; it is highly advised that the submission process be started as early as possible.

All unclassified concepts submitted electronically through DARPA's BAA Website must be uploaded as zip files (.zip or .zipx extension). The final zip file should be no greater than 50 MB in size. Only one zip file will be accepted per submission. Classified submissions and proposals requesting or cooperative agreements should NOT be submitted through DARPA's BAA Website (<https://baa.darpa.mil>), though proposers will likely still need to visit <https://baa.darpa.mil> to register their organization (or verify an existing registration) to ensure the BAA office can verify and finalize their submission.

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

Proposers using the DARPA BAA Website may encounter heavy traffic on the submission deadline date; it is highly advised that the submission process be started as early as possible.

For Full Proposals requesting Cooperative Agreements only:

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

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

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

To evaluate compliance with Title IX of the Education Amendments of 1972 (20 U.S.C. § 1681 et.seq.), the Department of Defense (DoD) is collecting certain demographic and career information to be able to assess the success rates of women who are proposed for key roles in applications in science, technology, engineering or mathematics disciplines. In addition, the National Defense Authorization Act (NDAA) for FY 2019, Section 1286, directs the Secretary of Defense to protect intellectual property, controlled information, key personnel, and information about critical technologies relevant to national security and limit undue influence, including foreign talent programs by countries that desire to exploit United States' technology within the DoD research, science and technology, and innovation enterprise. This requirement is necessary for all research and research-related educational activities. The DoD is using the two forms below to collect the necessary information to satisfy these requirements. Detailed instructions for each form are available on Grants.gov.

Form 2: The Research and Related Senior/Key Person Profile (Expanded) form, available on the Grants.gov website at https://apply07.grants.gov/apply/forms/sample/RR_KeyPersonExpanded_3_0-V3.0.pdf, will be used to collect the following information for all senior/key personnel, including Project Director/Principal Investigator and Co-Project Director/Co-Principal Investigator, whether or not

the individuals' efforts under the project are funded by the DoD. The form includes 3 parts: the main form administrative information, including the Project Role, Degree Type and Degree Year; the biographical sketch; and the current and pending support. The biographical sketch and current and pending support are to be provided as attachments:

- Biographical Sketch: Mandatory for Project Directors (PD) and Principal Investigators (PI), optional, but desired, for all other Senior/Key Personnel. The biographical sketch should include information pertaining to the researchers:
 - Education and Training.
 - Research and Professional Experience.
 - Collaborations and Affiliations (for conflict of interest).
 - Publications and Synergistic Activities.
- Current and Pending Support: Mandatory for all Senior/Key Personnel including the PD/PI. This attachment should include the following information:
 - A list of all current projects the individual is working on, in addition to any future support the individual has applied to receive, regardless of the source.
 - Title and objectives of the other research projects.
 - The percentage per year to be devoted to the other projects.
 - The total amount of support the individual is receiving in connection to each of the other research projects or will receive if other proposals are awarded.
 - Name and address of the agencies and/or other parties supporting the other research projects
 - Period of performance for the other research projects.

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

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

For Full Proposals requesting Technology Investment Agreements only:

Proposers requesting Technology Investment Agreements (TIA) awarded under 10 U.S.C. § 4021 must include the completed form indicated below. This requirement only applies only to those who expect to receive a TIA as their ultimate award instrument.

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

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

- Biographical Sketch: Mandatory for Project Directors (PD) and Principal Investigators (PI), optional, but desired, for all other Senior/Key Personnel. The biographical sketch should include information pertaining to the researchers:
 - Education and Training.
 - Research and Professional Experience.
 - Collaborations and Affiliations (for conflict of interest).
 - Publications and Synergistic Activities.
- Current and Pending Support: Mandatory for all Senior/Key Personnel including the PD/PI. This attachment should include the following information:
 - A list of all current projects the individual is working on, in addition to any future support the individual has applied to receive, regardless of the source.
 - Title and objectives of the other research projects.
 - The percentage per year to be devoted to the other projects.
 - The total amount of support the individual is receiving in connection to each of the other research projects or will receive if other proposals are awarded.
 - Name and address of the agencies and/or other parties supporting the other research projects
 - Period of performance for the other research projects.

Additional senior/key persons can be added by selecting the “Next Person” button at the bottom of the form. Note that, although applications without this information completed may pass Grants.gov edit checks, if DARPA receives an application without the required information, DARPA may determine that the application is incomplete and may cause your submission to be rejected and eliminated from further review and consideration under the solicitation. DARPA

reserves the right to request further details from the applicant before making a final determination on funding the effort.

Grants.gov requires proposers to complete a one-time registration process before a proposal can be electronically submitted. First-time registration can take between three business days and four weeks. For more information about registering for Grants.gov, see <http://www.darpa.mil/work-with-us/additional-baa>.

Hard copy Submissions: Proposers electing to submit cooperative agreement proposals as hard copies must complete the SF 424 R&R form (Application for Federal Assistance), available on the Grants.gov website (https://apply07.grants.gov/apply/forms/sample/SF424_2_1-V2.1.pdf).

Proposal abstracts will not be accepted if submitted via Grants.gov.

Failure to comply with the submission procedures may result in the submission not being evaluated. DARPA will acknowledge receipt of complete submissions via e-mail and assign control numbers that should be used in all further correspondence regarding proposals.

4.3. FUNDING RESTRICTIONS

Not applicable.

4.4. OTHER SUBMISSION INFORMATION

DARPA will post a consolidated Frequently Asked Questions (FAQ) document. To access the posting go to <http://www.darpa.mil/work-with-us/opportunities>. A link to the FAQ will appear under the HR001120S0047 summary. Submit your question(s) via e-mail to ICE@darpa.mil.

5. Application Review Information

5.1. EVALUATION CRITERIA

Proposals will be evaluated using the following criteria, listed in descending order of importance: 5.1.1 Overall Scientific and Technical Merit; 5.1.2 Potential Contribution and Relevance to the DARPA Mission; and 5.1.3 Cost Realism.

5.1.1. Overall Scientific and Technical Merit

The proposed technical approach is innovative, feasible, achievable, and complete.

The proposed technical team has the expertise and experience to accomplish the proposed tasks.

Task descriptions and associated technical elements provided are complete and in a logical sequence with all proposed deliverables clearly defined such that a final outcome that achieves the goal can be expected as a result of award. The proposal identifies major technical risks, and planned mitigation efforts are clearly defined and feasible. The timeline for achieving major milestones is aggressive but rationally supported with a clear description of the requirements and risks. The proposer's prior experience in similar efforts must clearly demonstrate an ability to deliver products that meet the proposed technical performance within the proposed budget and schedule. The proposed team has the expertise to manage the cost and schedule.

5.1.2. Potential Contribution and Relevance to the DARPA Mission

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

5.1.3. Cost Realism

The proposed costs are realistic for the technical and management approach and accurately reflect the technical goals and objectives of the solicitation. The proposed costs are consistent with the proposer's Statement of Work and reflect a sufficient understanding of the costs and level of effort needed to successfully accomplish the proposed technical approach. The costs for the prime proposer and proposed subawardees are substantiated by the details provided in the proposal (e.g., the type and number of labor hours proposed per task, the types and quantities of materials, equipment and fabrication costs, travel and any other applicable costs and the basis for the estimates).

It is expected that the effort will leverage all available relevant prior research in order to obtain the maximum benefit from the available funding. For efforts with a likelihood of commercial application, appropriate direct cost sharing may be a positive factor in the evaluation. DARPA recognizes that undue emphasis on cost may motivate proposers to offer low-risk ideas with minimum uncertainty and to staff the effort with junior personnel in order to be in a more competitive posture. DARPA discourages such cost strategies.

5.2. REVIEW OF PROPOSALS

Review Process

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

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

Award(s) will be made to proposers whose proposals are determined to be the most advantageous to the Government, consistent with instructions and evaluation criteria specified in the BAA herein, and availability of funding.

Handling of Source Selection Information

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

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

Federal Awardee Performance and Integrity Information (FAPIIS)

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

Countering Foreign Influence Program (CFIP)

DARPA's CFIP is an adaptive risk management security program designed to help protect the critical technology and performer intellectual property associated with DARPA's research projects by identifying the possible vectors of undue foreign influence. The CFIP team will create risk assessments of all proposed Senior/Key Personnel selected for negotiation of a fundamental research grant or cooperative agreement award. The CFIP risk assessment process will be conducted separately from the DARPA scientific review process and adjudicated prior to final award.

6. Award Administration Information

6.1. SUBMISSION STATUS NOTIFICATIONS

Proposal Abstracts and Full Proposals submitted in response to HR001122S0047 will be evaluated following the submission deadlines listed in Part 1. DARPA will respond as described below. These official notifications will be sent via e-mail to the Technical Point of Contact (POC) and/or Administrative POC identified on the submission coversheet.

6.1.1. Proposal Abstracts

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

6.1.2. Full Proposals

As soon as the evaluation of all proposals is complete, the proposer will be notified that (1) the proposal has been selected for funding pending award negotiations, in whole or in part, or (2) the proposal has not been selected.

6.2. ADMINISTRATIVE AND NATIONAL POLICY REQUIREMENTS

6.2.1. Meeting and Travel Requirements

There will be a program kickoff meeting in the Arlington, VA vicinity and all key participants are required to attend. Performers should also anticipate annual program-wide PI meetings and periodic site visits at the Program Manager's discretion. Proposers shall include within the content of their proposal details and costs of any travel or meetings they deem to be necessary throughout the course of the effort, to include periodic status reviews by the government.

6.2.1. Solicitation Provisions and Award Clauses, Terms and Conditions

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

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

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

6.2.3. Representations and Certifications

In accordance with FAR 4.1102 and 4.1201, proposers requesting a procurement contract must complete electronic annual representations and certifications at <https://www.sam.gov/>.

In addition, all proposers are required to submit for all award instrument types supplementary DARPA-specific representations and certifications at the time of proposal submission. See <http://www.darpa.mil/work-with-us/rep-cert> for further information on required representation and certification depending on your requested award instrument.

6.2.4. Terms and Conditions

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

6.3. REPORTING

The number and types of reports will be specified in the award document, but will include as a minimum monthly financial status reports, 6-week technical status reports, and quarterly technical status reports. The reports shall be prepared and submitted in accordance with the procedures contained in the award document and mutually agreed on before award. Reports and briefing material will also be required as appropriate to document progress in accomplishing program metrics. A Final Report that summarizes the project and tasks will be required at the

conclusion of the performance period for the award, notwithstanding the fact that the research may be continued under a follow-on vehicle.

6.4. ELECTRONIC SYSTEMS

6.4.1. Wide Area Work Flow (WAWF)

Performers will be required to submit invoices for payment directly to <https://wawf.eb.mil>, unless an exception applies. Performers must register in WAWF prior to any award under this BAA.

6.4.2. I-EDISON

The award document for each proposal selected for funding will contain a mandatory requirement for patent reports and notifications to be submitted electronically through i-Edison (<http://public.era.nih.gov/iedison>).

7. Agency Contacts

Administrative, technical or contractual questions should be sent via e-mail to the mailbox listed below.

Points of Contact

The BAA Coordinator for this effort may be reached at:

ICE@darpa.mil

DARPA/BTO

ATTN: HR001122S0047

675 North Randolph Street

Arlington, VA 22203-2114

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

8. Other Information

8.1. PROPOSERS DAY

DARPA will host a virtual Proposers Day in support of the ICE program on **August 22, 2022**. The purpose is to provide potential proposers with information on the ICE program, promote additional discussion on this topic, address questions, provide a forum to present their capabilities, and encourage team formation.

Interested proposers are not required to attend to respond to the ICE BAA, and relevant information and materials discussed at Proposers Day will be made available to all potential proposers in the form of a FAQ posted on the DARPA Opportunities Page.

DARPA will not provide cost reimbursement for interested proposers in attendance. An online registration form and various other meeting details can be found at the registration website, <https://events.sa-meetings.com/ICEProposersDay>.

Participants are required to register no later than **August 17, 2022**. This event is not open to the Press. The Proposers Day will be open to members of the public who have registered in advance for the event; there will be no onsite registration.

Proposers Day Point of Contact:
BAA Coordinator
ICE@darpa.mil

8.2. ASSOCIATE CONTRACTOR AGREEMENTS

This same or similar language will be included in procurement contract awards against HR001122S0047. Awards other than FAR based contracts will contain similar agreement language:

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

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

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

- (1) maintenance of a close liaison and working relationship;
- (2) maintenance of a free and open information network with all Government-identified associate Contractors;
- (3) delineation of detailed interface responsibilities;
- (4) entering into a written agreement with the other Associate Contractors setting forth the substance and procedures relating to the foregoing, and promptly providing the Agreements Officer/Procuring Contracting Officer with a copy of same; and,

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

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

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

9. APPENDIX 1 – Volume II checklist

Volume II, Cost Proposal Checklist and Sample Templates

The following checklist and sample templates are provided to assist the proposer in developing a complete and responsive cost volume. Full instructions appear in Section 4.2.2 of HR001122S0047. This worksheet must be included with the coversheet of the Cost Proposal.

1. Are all items from Section 4.2.2 (Volume II, Cost Proposal) of **HR001122S0047** included on your Cost Proposal cover sheet?

☐ YES ☐ NO **Appears on Page(s)** [Type text]

If reply is “No”, please explain:

2. Does your Cost Proposal include (1) a summary cost buildup by Phase, (2) a summary cost buildup by Year, and (3) a detailed cost buildup of for each Phase that breaks out each task and shows the cost per month?

☐ YES ☐ NO **Appears on Page(s)** [Type text]

If reply is “No”, please explain:

3. Does your cost proposal (detailed cost buildup #3 above in item 2) show a breakdown of the major cost items listed below:

Direct Labor (Labor Categories, Hours, Rates)

☐ YES ☐ NO **Appears on Page(s)** [Type text]

Indirect Costs/Rates (i.e., overhead charges, fringe benefits, G&A)

☐ YES ☐ NO **Appears on Page(s)** [Type text]

Materials and/or Equipment

☐ YES ☐ NO **Appears on Page(s)** [Type text]

Subcontracts/Consultants

☐ YES ☐ NO **Appears on Page(s)** [Type text]

Other Direct Costs

☐ YES ☐ NO **Appears on Page(s)** [Type text]

Travel

☐ YES ☐ NO **Appears on Page(s)** [Type text]

If reply is “No”, please explain:

4. Have you provided documentation for proposed costs related to travel, to include purpose of trips, departure and arrival destinations and sample airfare?
- ☐ YES ☐ NO **Appears on Page(s)** [Type text]

If reply is "No", please explain:

5. Does your cost proposal include a complete itemized list of all material and equipment items to be purchased (a priced bill-of-materials (BOM))?
- ☐ YES ☐ NO **Appears on Page(s)** [Type text]

If reply is "No", please explain:

6. Does your cost proposal include vendor quotes or written engineering estimates (basis of estimate) for all material and equipment with a unit price exceeding \$5000?
- ☐ YES ☐ NO **Appears on Page(s)** [Type text]

If reply is "No", please explain:

7. Does your cost proposal include a clear justification for the cost of labor (written labor basis-of-estimate (BOE)) providing rationale for the labor categories and hours proposed for each task?
- ☐ YES ☐ NO **Appears on Page(s)** [Type text]

If reply is "No", please explain:

8. Do you have subcontractors/consultants? If YES, continue to question 9. If NO, skip to question 13.
- ☐ YES ☐ NO **Appears on Page(s)** [Type text]

9. Does your cost proposal include copies of all subcontractor/consultant technical (to include Statement of Work) and cost proposals?
- ☐ YES ☐ NO **Appears on Page(s)** [Type text]

If reply is "No", please explain:

10. Do all subcontract proposals include the required summary buildup, detailed cost buildup, and supporting documentation (SOW, Bill-of-Materials, Basis-of-Estimate, Vendor Quotes, etc.)?
- ☐ YES ☐ NO **Appears on Page(s)** [Type text]

If reply is "No", please explain:

11. Does your cost proposal include copies of consultant agreements, if available?

☐ YES ☐ NO **Appears on Page(s)** [Type text]

If reply is “No”, please explain:

12. If requesting a FAR-based contract, does your cost proposal include a tech/cost analysis for all proposed subcontractors?

☐ YES ☐ NO **Appears on Page(s)** [Type text]

If reply is “No”, please explain:

13. Have all team members (prime and subcontractors) who are considered a Federally Funded Research & Development Center (FFRDC), included documentation that clearly demonstrates work is not otherwise available from the private sector AND provided a letter on letterhead from the sponsoring organization citing the specific authority establishing their eligibility to propose to government solicitations and compete with industry, and compliance with the associated FFRDC sponsor agreement and terms and conditions.

☐ YES ☐ NO **Appears on Page(s)** [Type text]

If reply is “No”, please explain:

14. Does your proposal include a response regarding Organizational Conflicts of Interest?

☐ YES ☐ NO **Appears on Page(s)** [Type text]

If reply is “No”, please explain:

15. Does your proposal include a completed Data Rights Assertions table/certification?

☐ YES ☐ NO **Appears on Page(s)** [Type text]

If reply is “No”, please explain:

10. References

- (1) Wolkers, W.F.; Oldenhof, H. Cryopreservation and Freeze-Drying Protocols. *Methods Mol Biol.* 2021; 2180.
- (2) Bleszynski, M.; Clark, E. Current Ice Adhesion Testing Methods and the Need for a Standard: A Concise Review. *Standards.* 2021; 1, 117–133.