Broad Agency Announcement ReSource BIOLOGICAL TECHNOLOGIES OFFICE HR001119S0084

August 20, 2019

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PART I: OVERVIEW INFORMATION

- **Federal Agency Name –** Defense Advanced Research Projects Agency (DARPA), Biological Technologies Office (BTO)
- **Funding Opportunity Title –** ReSource
- **Announcement Type –** Initial Announcement
- **Funding Opportunity Number –** HR001119S0084
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- **Dates**
    - Posting Date: **August 20, 2019**
    - Proposal Abstract Due Date and Time: **September 26, 2019, 4:00 PM ET**
    - Full Proposal Due Date and Time: **November 5, 2019, 4:00 PM ET**
    - BAA Closing Date: **November 5, 2019**
    - Proposers' Day: **August 29, 2019**

  https://fbo.gov/spg/ODA/DARPA/CMO/DARPA-SN-19-73/listing.html
- **Concise description of the funding opportunity –** The goal of the ReSource program is to provide the military with an integrated system to convert plastics, and other energy-dense waste, into food and strategic chemicals. Developed technologies should function in austere environments to extend long-term missions by engaging single-use wastes and scavenged materials as feedstock, consequently decreasing the logistic burdens and risks associated with delivery of supplies.
- **Anticipated individual awards –** Multiple awards are anticipated.
- **Types of instruments that may be awarded –** Procurement contract, grant, cooperative agreement, or Other Transaction.
- **Agency contact**

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PART II: FULL TEXT OF ANNOUNCEMENT

1. Funding Opportunity Description

The Defense Advanced Research Projects Agency (DARPA) often selects its research efforts through the Broad Agency Announcement (BAA) process. The BAA will appear first on the FedBizOpps website, http://www.fedbizopps.gov/, and the Grants.gov website http://www.grants.gov/. The following information is for those wishing to respond to the BAA.

The Defense Advanced Research Projects Agency (DARPA) is soliciting innovative proposals to address the following areas: (1) preparation of complex waste mixtures to enable their accelerated biological and bio-inspired conversion; (2) liberation of simple functional products and organic upgradeable molecules from pre-treated waste mixes; and (3) generation of strategic materials and chemicals through upgrading processes. Proposed research should investigate innovative approaches that enable revolutionary advances in the development of novel polymer-degrading enzymes, optimized biological chassis systems, formulation of techniques to use mixed waste as inputs to biochemical reactions and feed engineered biological organisms, and invention of processes that generate high-value materials on-demand. Enhanced robustness to chemical and physical conditions atypical of natural biological systems will be critical, with final integrated systems anticipated to employ novel hybrids of mechanical, biological, and chemical catalytic approaches. While biological organisms are capable of degrading the components of military waste (e.g., food, plastic, paper, and metal) there are currently no biological technologies capable of reforming waste polymers to valuable materials. Key innovations are necessary to build a platform for rapidly transforming energy-dense waste into food/macronutrients, lubricants, or other strategically relevant products. Specifically excluded is research that primarily results in incremental improvements to the existing state of practice.

1.1. PROGRAM OVERVIEW

The goal of the ReSource program is to provide the military with the ability to rapidly and efficiently up-convert military waste into valuable resources onsite and on-demand. This is significant because delivery of critical supplies and removal or disposal of waste present logistical burdens and endangerment of human lives during transport in contested environments. Current industrial utilities are capable of incinerating or gasifying municipal wastes to generate electricity, but the footprints/power requirements of these large-scale systems are not compatible with military expedition or stabilization efforts. These different military scenarios also demand a variety of products and functional materials that could be derived from polymer-rich wastes generated during operations, or scavenged from the local environment, but at this time military operators use neither biological nor biochemical processes to re-form waste into value-added materials. The ReSource program is directed at providing a cross-scale approach to support the warfighter in the following scenarios:

- Stabilization scenarios where humanitarian assistance and disaster relief (HADR) would be provided to major urban centers rendered inhospitable by conflict or natural disaster, through the conversion of waste to food/macronutrients, tactical materials, and water, for hundreds to thousands of people;

- Expeditionary/Special Operations scenarios that may require a lower product quantity, but would demand scavenged wastes to be processed within a minimal logistical footprint.

From the outset, proposed approaches and developed technologies should identify desired product outputs that align to either two scenarios: Stabilization efforts or Marine expeditionary units/Army special operations (or the equivalent). Each proposal must be directed to either the Stabilization or the Expeditionary /Special Operations track. Proposing teams may offer solutions to both tracks but should submit a separate proposal for each. Unique waste available in each scenario and associated waste management protocols should be considered. By program completion, developed platforms should be capable of resourcing on-demand products that could include the following: edible macronutrients; traditionally petroleum-derived products such as lubricants, adhesives, and tactical fibers; potable water, and other value-add molecules to an emergency ration (e.g., caffeine). Fuels and fuel additives (e.g., ethanol) will not be allowable final products but will be acceptable process intermediates. Developed technologies must function simply, reliably, and continuously in austere and/or isolated environments (e.g., far-forward positions with limited infrastructure). Revolutionary approaches directed at the breakdown of recalcitrant polymers residing in complex waste mixture environments – plastics and other carbon-rich materials – will be necessary to accomplish the program goal. Interdisciplinary methods will also be required to produce and purify emergency rations adequate for consumption, or produce strategically relevant chemicals of suitable quality for immediate use.

1.2. TECHNICAL APPROACH AND STRUCTURE

1.2.1. Technical Areas

The ReSource program will develop a suite of tools and processes that blend biochemistry, biotechnology, and bio-inspired systems for the conversion of waste to food/macronutrients, Petroleum, Oils and Lubricants (POLs) used by the Armed Forces – including lubricants or oil and grease used in engines, machinery, and weapons systems – and other valuable materials on-demand. Emerging chemical and engineering technologies should integrate into the designed bio-based processes to ensure production within the time, scale, and dependability necessary to support the diverse aforementioned military operations. There are three interconnected Technical Areas (TAs) which must be developed concurrently over the duration of the effort (Figure 1). Proposals that do not address all three TAs as characterized within this section will be considered non-responsive and not considered for review.

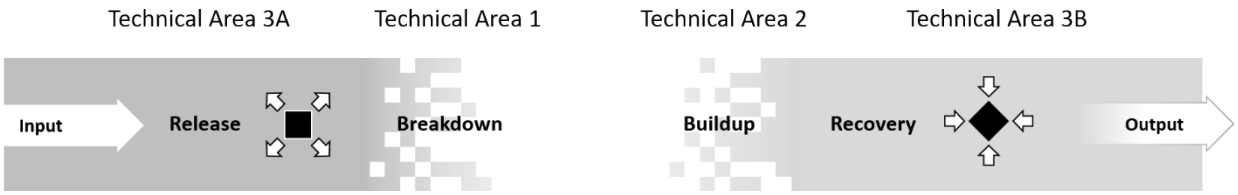

Figure 1: Workflow illustration of the three, non-consecutively numbered Technical Areas.

Technical Area 1: "Breakdown"

The objective of TA1 is to use prepared, pre-treated (see TA3A) waste as a feedstock. Proposals should offer novel solutions to the challenges associated with the recalcitrance of waste to decomposition, including both physical and chemical conditions that adversely impact the deconstruction of carbon-rich polymers in a complex, mixed waste environment. Proposed solutions must consider the rapidity, simplicity, and efficiency necessary for military operations; as such, technological solutions that are robust against breakage, easily serviceable, and built from common components for replacement and repairs are preferred. The continuous integrated function of platforms will be essential, since the masses of waste input and required periods of operation increase drastically in later phases. Proposals must contextualize these constraints to align with their selected military setting. TA1 can be directed at fully deconstructing polymers to single-carbon monomers (e.g., carbon monoxide) to serve as substrates for TA2 pathways, but breakdown technologies that are incapable of producing intermediates (e.g., gasification) should meet the increasingly strict size, weight, and power (i.e., "SWaP") goals defined for subsequent phases (Table 1). In addition to producing organic intermediate molecules suitable for upgrading, proposers will be required to generate breakdown molecules that could be used (nearly) immediately as a useful product (e.g., rifle lubricant) following a simple recovery step.

Technical Area 2: "Buildup"

The objective of TA2 is to utilize organic upgradeable intermediates to generate strategic materials and chemicals in unpurified forms at high efficiency and scale. The platform for producing materials should be fast, robust, easily operable, serviceable, and capable of prolonged periods of uninterrupted operation. Proposals should engineer the platform for production (e.g., consortia of microorganisms) to be resilient to increasingly non-optimal waste environments and reaction conditions.

Technical Area 3: TA3A"Release" and TA3B "Recovery"

The objective of TA3 is to devise up- and down-stream processes that will enable the maximized functions of TA1 and TA2 technologies. Specifically, TA3A is pre-treatment of complex waste mixtures to increase reactive surface area and optimize the conditions required for maximal release and conversion of recalcitrant polymers; TA3B is directed at separating desired intermediates throughout and recovering outputs of the engineered conversion process to provide purified, usable materials. Proposals to TA3 should address the challenges associated with pre-processing waste for conversion and addressing challenges associated with variable compositions of outputs produced at each step in the process. Proposers are expected to design a work plan to develop and employ novel tools that make waste amenable for conversion to upgradeable organic intermediates and end-products ready for direct use. Approaches should incorporate the design of novel extraction techniques, macro- and micro-compartmentalization within the system, and physical surface area characteristics necessary for biological and non-biological reactions to proceed sufficiently. Proposals should consist of multiple pilot tests at smaller scales to validate the path forward and inform down-selections between multiple variations in pre-treatment and purification approaches. In order to achieve the goals of the ReSource program, performers must demonstrate sufficient pre-treatment for the envisioned military waste to undergo satisfactory conversion steps and achieve satisfactory product purity for a proposed use-case.

1.2.2. Program Structure

The ReSource program will be accomplished over three sequential phases of increasing technical complexity. The durations are 15, 15, and 18 months, respectively. The successful completion of each phase will be determined by an End-of-Phase demonstration showing advancement and integration of the three TAs (Table 1). Independent Verification and Validation (IV & V) will occur throughout the program as described in Section 1.5.1.

Phase 1 (Base - 15 months): Proof of Concept

During Phase 1 performers will develop technologies for the Release (TA3A) and Breakdown (TA1) of waste mixtures, Buildup (TA2) of organic precursors, and product Recovery (TA3B), or a combination of these areas that satisfy the requirements of the selected military scenario. Performers must establish a proof-of-concept toward the invention of an integrated novel waste conversion process.

Phase 2 (Option – 15 months): Technology Advancement

Proposers should formulate their Phase 2 work plans to accomplish technological advancement of their selected TAs. Possible approaches could include performing pilot tests with simple waste mixtures to prepare for an End-of-Phase demonstration at scale. Results should give a good indication that multiple waste-stream types in a mixture can be converted to an upgradable organic intermediate.

The statement of work (SOW) should contain tasks to isolate and collect upgradable, organic intermediate molecules and use these molecules to demonstrate sufficient purity by generating at least one product – food and/or POLs by the end of Phase 2. This will validate the quality of the purified organic upgradable molecules and feasibility toward successful product generation in Phase 3.

Phase 3 (Option – 18 months): Operationalize

The aim of Phase 3 is to operationalize the biological technologies and tools to function in simulated theatre conditions with actual Department of Defense (DoD) waste. As a proof-of-principle toward this end, the program will conclude with the conversion of a sample of military waste into at least one usable product, including food, POLs, or tactical material, depending on the chosen operational scenario. To ensure the necessary robustness toward potential real-world scenarios, this final demonstration will be accomplished under a pressure test (to be determined) inclusive of an exacerbating factor (e.g., contaminating the starting material with fouling microorganisms).

Table 1: Program structure and general overview.

		Phase 1 (Months 1-15)	Phase 2 (Months 16-30)	Phase 3 (Months 31-48)
Stabilization	**Plastic:**	50 g	20 kg	3,000 kg
	Platform *(maximum energy consumption)*:	Uncoupled systems for breakdown and buildup *(2,000 kWh/day)*	Integrated system leveraging innovative engineering *(700 kWh/day)*	Streamlined footprint for operational setting *(300 kWh/day)*
	Output:	10 g	4 kg	900 kg of food
Expeditionary /Special Operations	**Waste mixture:**	50 g	1 kg	10 kg
	Platform *(maximum energy consumption)*:	Multiple containers composed of innovative materials *(10 kWh/day)*	Single container with multiple micro/macro compartments *(3 kWh/day)*	Simple, dependable engineering *(1.8 kWh/day)*
	Output:	2.5 g	100 g	2.5 kg of food and/or POLs

1.3. PROGRAM SPECIFICATIONS

1.3.1. Military Waste

The components of military waste that are in scope for this program are non-hazardous items that include general refuse and food waste (Table 2). The main constituents are plastic bottles, other plastic types from food containers (e.g., wrappers or kitchen wastes), metal (e.g., discarded aluminum containers), cardboard (e.g., shipping wastes), paper (e.g., office waste), and glass. Waste materials foraged from the environment such as these and vegetative debris (e.g., leaf matter and grasses) could also be incorporated into the waste pool, but proposers should anticipate the environmental fouling and degradation of scavenged items. In addition, food wastes are highly variable and could consist of uneaten portions of "meals ready-to-eat" (MREs) or cooking oil residues. Consideration of the complex nature of military waste compositions will be necessary to design a stepwise conversion process that is amenable to the unpredictability of mixture contents, and prototyping reaction chambers with the appropriate sieve and micro/macro compartments for preparation, decontamination, and purification. Each component of military waste can have a wide range of abundance at any point of collection, and the final integrated process should reliably convert mixed waste regardless of potential contaminating inputs. The increased difficulty of developing innovative methods to deconstruct additional aliphatic compounds is desired, while leveraging existing organisms and enzymes for deconstructing plastics prevalent in mixed waste is also within scope, so long as it is one part within an overall novel process. Examples of other waste types that are in scope for the program are foraged hydrocarbon- and carbohydrate-based materials (e.g., leaves/bark/branches and clothing), wood

pallets, cardboard, and paper. Specific metrics for the deconstruction of waste mixture are given in Section 1.4.

Table 2: Distribution of military waste.

	Food	Paper	Plastic	Metal	Glass	Total
Range (kg/person/day)	0.5 – 1.7	0.4 – 2.3	0.004 – 1.43	0.059 – 0.66	0.02 – 0.06	~1-10

1.3.2. Products

The desired products of the program are food, POLs, and materials that would serve otherwise strategic and/or tactical purposes, and should be in line with the proposer's chosen concept of operation (i.e., either Stabilization or Expeditionary/Special Operations).

For the goal of on-demand food production from waste, the generation of macronutrients by performers is not constrained to a pre-defined collection of outputs, and products will not require additional post-purification processing beyond what could be a foodstuff material, though directly edible single or combined materials may be preferred. On-demand nutrients are highly valued in both Stabilization and Expeditionary/Special Operations scenarios. Proposals must clearly describe their rationale for the choice of macronutrient product(s), as well their described relevance and nutritional benefit. While glucose will be a useful intermediate for conversion, it should comprise <10% of the final product mass; platform outputs that include more complex digestible carbohydrates (e.g., starch) and inclusion of higher-value fats/fatty acids and/or amino acids/protein may be preferred. Platform technologies directed at macronutrient production may include biological chassis (i.e., prokaryotic or eukaryotic organisms) as viable outputs, but edibility, total nutritional content, and dietary impact must be clearly outlined for each, and constraints to system use (i.e., SWaP) and robustness (i.e., ease of operation and serviceability) will be considered. Inclusion of electrolytes and vitamins, though not required, may also be preferred, and capture and/or production of these and other beneficial micronutrients via biologic or non-biologic means would be considered valuable, but not essential.

Like nutrients, POLs are necessary, day-to-day chemicals that are exclusive of fuels and fuel additives that are commonly used and vital to the warfighter. All POLs are in scope for this program, as long as proposers present a reasonable technical path and a substantiated concept-of-operation scenario. Some examples are adhesives, general and specialized lubricants – the latter including rifle cleaner, lubricant, and protectant (CLP), which is particularly valuable – and other functional oils. Tactical materials (e.g., polymer-based fabric for bandages) are also highly valued in both Stabilization and Expeditionary/Special Operations scenarios. Like proposal requirements described for macronutrients above, proposers should clearly delineate use cases for POLs and other strategic products and their pathway feasibility in their proposals. Though not required, platforms capable of generating diversified outputs (food, POLs, and/or other tactical materials) may be preferred. The purity requirements of final products should meet military specifications consistent with existing DoD standards for use, or in unique cases, *ad hoc* specifications will be provided, if deemed permissible. The DoD Qualified Products Database (https://qpldocs.dla.mil/search/default.aspx) may be a useful tool to determine specifications of proposers' products of interest.

1.3.3. Size, weight, and power (SWaP)

The SWaP objectives for the program are designed to deliver an efficient and dependable integrated system for either Stabilization or Expeditionary/Special Operations and are defined in Table 3. Intermediary milestones may be executed under alternative SWaP parameters, but the ultimate goal must be for the system to perform under program SWaP as each milestone is reached. To achieve success during Phase 2, systems will be required to function under less optimal conditions with increased masses of waste to process and a reduced energy allowance. Energy requirements must logically align with the concept of operations and be clearly delineated to substantiate they remain within SWaP.

In Phase 3, the permitted size and weight allotments reach a maximum, whereas the power is most limited, but the developed prototype platform should be simple to use and dependable, robust against breakage, easily serviceable, and built from common components for replacement and repairs. Energy requirements should be aligned to the envisioned operation and defined clearly to ensure SWaP has been met or exceeded.

Proposers should include a simple process flow diagram of their final system concept to describe its anticipated components and operating ranges. A rationale for the energy requirements of the systems should be provided and will depend on the implemented technologies and their integration. These will differ according to the proposed mechanical, chemical, and/or biological approaches, and the energy requirements for each. Technology advancements that relax reaction conditions, reduce energy demand, and lessen platform vulnerabilities to stress-strain factors and corrosion by enabling process operations closer to ambient conditions are preferred.

Table 3: SWaP objectives for integrated systems by Phase and scenario.

		Phase 1 (Months 1-15)	**Phase 2 (Months 16-30)**	**Phase 3 (Months 31-48)**
Stabilization	**Size:**	≤10 m^3	≤33 m^3	≤500 m^3
	Weight:	2,000kg	10,000 kg	50,000 kg
	Power:	2000 kWh/day	700 kWh/day	300 kWh/day
Expeditionary /Special Operations	**Size:**	≤1 m^3	≤2 m^3	≤3 m^3
	Weight:	200 kg	200 kg	200 kg
	Power:	10 kWh/day	3 kWh/day	1.8 kWh/day

1.4. PROGRAM METRICS

Although the following program metrics are specified, proposers should note that the Government has identified these goals with the intention of bounding the scope of effort, while

affording the maximum flexibility, creativity, and innovation in proposing solutions to the stated problem. Proposals should cite the quantitative and qualitative success criteria that the proposed effort will achieve by the time of each Phase's program milestone and intermediary metric measurement.

Phase 1 Metrics – Proof-of-Concept, Months 1-15

The Phase 1 objectives, metrics, and milestones are designed to generate data and information which establishes proof-of-concept toward the invention of a novel step-wise conversion process (Table 4). Proposers should submit work plans to develop technologies for conversion of at least two waste materials. Those proposing to meet the Stabilization scenario program goals will be required to work with plastic mixtures comprising at least two types (Section 1.3.1). The ratio of plastic types must be consistent with amounts found in actual military waste. Proposals directed at the Expeditionary/Special Operations scenario will be required to work with mixed waste comprising at least two distinct waste types (Section 1.3.1), and one of the two must be plastic. The ratio of plastic to the other chosen waste type must be consistent with amounts found in actual military waste. In either scenario, food waste may be included in the process, but would not fulfill waste metrics for Phase 1.

Proposals should work toward the development of innovative methods to pre-treat and maximize the reactivity of individual waste types (TA3A) to enable downstream breakdown processes (TA1), upgradable organic intermediate molecule buildup (TA2), and the design and testing of extraction and purification techniques conducive to both novel breakdown and upgrading processes (TA3B). Proposed approaches can begin the buildup process from the outputs derived from TA1, or by demonstrating that the input could be a plausible breakdown product from waste by directly generating monomeric, carbon-containing molecules (e.g., carbon monoxide produced by gasification). During Phase 1, the Buildup (TA2) processes can also be uncoupled from the Breakdown (TA1) pathway, and chemically-equivalent surrogates to the anticipated TA1 outputs used as inputs; however, proposers should note that the End-of-Phase 2 demonstration will require the use of organic outputs generated from processed wastes via TA1 as feedstock for TA2.

The metrics associated with Phase 1 TA1 are designed to explore novel approaches for the deconstruction of waste and advance the state-of-the-art in the rational design of novel enzymes, identify and collect enzyme candidates from the field, and re-engineer known enzymes (or microorganisms), with the ultimate goal of enhancing the speed and efficiency of deconstructing pre-treated, breakdown-reactive materials generated from TA3A. Other chemical, thermal, or combined approaches are within scope, as long as the increasing amounts of waste and given SWaP objectives for each successive Phase are taken into account. While the deconstruction metric for TA1 stipulates ≥ 50% waste breakdown, proposers should be aware that the metric for later phases is no less than 95% deconstruction of the input; hence, it is strongly recommended that both types of plastic be addressed at the outset.

The metrics associated with Phase 1 TA2 are to establish proof-of-concept by establishing the buildup process required to upgrade outputs that will be derived from TA1. Using purified, chemically-equivalent surrogate input(s) at this stage will be acceptable, but proposers must

describe: 1) how their surrogate is a plausible breakdown product from military waste, and 2) how it would serve as a feedstock for the synthesis of desired product(s) via the proposed conversion platform. Phase 2 will require performers to use waste breakdown products as TA2 inputs, so they will be strongly encouraged to shift from using purified organic surrogate inputs as quickly as possible, so shake-downs of fully integrated systems can be accomplished. Performers must also delineate and account for carbon flux from input polymers to intermediates and output products.

The metrics associated with TA3 are designed to enhance the reactivity of recalcitrant waste inputs and demonstrate a plausible path of purification for the envisioned downstream use case. Proposals should identify and test effective pre-treatment strategies to make waste increasingly amenable to downstream biological conversion processes (TA3A). These strategies may include: identifying the biological or mechanical action procedures for pre-treatment; determining the requisite characteristics of the waste reaction chamber; and elucidating the physical surface area changes that must occur so microorganisms, enzymes, and processed waste material can interact sufficiently throughout all stages of the process. The necessary purity of collected upgradeable molecule mixtures and products will be based on the isolation of these molecules at 95% homogeneity.

Table 4: Phase 1 metrics by TA and military scenario (Sc).

Sc	TA	Objective	Metric	Milestone
Stabilization	**3A**	Pre-treat and process waste input	≥ 50 g	Demonstration of waste processing and feeding
		Design implements for plastic waste mixtures	≥ 2 plastic types	Baseline uninhibited reaction efficiencies
		Increase reactivity of waste	> 20%	Improvement of reactive surface area
	1	Validate breakdown of mixed plastic waste into feedstock	> 50% deconstruction	Generation of substrate for buildup and unpurified products
		Produce an upgradeable substrate	≥ 25 g (≤ 10% glucose)	Generation of monomers and oligomers from polymeric wastes
		Increase rapidity of deconstruction	> 25 g/day	Demonstration of sufficient deconstruction in a single day
	2	Engineer platform for production	> 20% conversion	Production sufficient to meet DoD need
		Produce sufficient upgradeable organic molecules	≥ 10 g	Generation of unpurified product precursors
		Optimize rapidity of conversion	> 10 g/day	Production platform fits operational scenario

Sc	TA	Objective	Metric	Milestone
	3B	Route intermediates and products for purification	≥ 10 g	Generation of purified product precursors
		Show plausible path forward for downstream use case	> 95% purity	Isolation of homogenous, organic molecule mixture
Expeditionary /Special Operations	**3A**	Establish novel, substantial pre-processing techniques	≥ 50 g (≤ 25% of cellulosic waste material)	Commencement of process at proof of concept scale
		Pretreat and process a mixture of waste	≥ 2 waste types	Commencement of process with two distinct waste types
		Increase reactivity of waste	> 10%	Validation of pretreatment techniques
	1	Validate breakdown of mixed waste	> 50% deconstruction (≥ 25% of each waste type)	Generation of substrate for buildup and unpurified products
		Generate deconstruction output	≥ 25 g (≤ 25% glucose)	Production of upgradeable molecules and unpurified product
		Deconstruct mixed waste effectively	> 25 g/day	Demonstration of deconstruction in a single day
	2	Engineer a platform for production	> 5% conversion	Production of upgradeable organic molecules
		Generate upgradeable organic molecules	≥ 2.5 g	Yields sufficient product
		Demonstrate sufficient rapidity for production	> 2.5 g/day	Production rate fits operational scenario
	3B	Show recovery and extraction	≥ 2.5 g	Recovery of upgradeable molecules
		Purify aqueous, organic, and inorganic components	> 95%	Capture of homogenous mixture

Phase 2 Metrics – Technology Advancement, 16-30 months

The Phase 2 objectives, metrics, and milestones increase in difficulty by moving to larger masses of waste (Table 5). The metrics under TA1 are designed to advance research toward mitigating the challenges of working with unpredictable mixtures of waste components and to overcome processing by-products that inhibit desired reactions. Intermediary molecules and final outputs generated during the build-up (TA2) process must be identified and quantified to facilitate down-selection between all characterized build-up conversions and ensure that anticipated products best align to DoD need. All performing teams will isolate and collect upgradable organic

intermediate molecules, then assess the quality of these molecules in a functional demonstration by generating one (1) DoD-valued product. This will contribute to validating the application of purified organic upgradable molecules for product generation, a vital advancement toward achieving the ReSource program goal. Under TA3A, performers are expected to interrogate surface area and micro/macro interactions of waste, enzymes, chemicals, and microorganisms, and to produce and test prototype procedures, pre-treatments, and chambers for the preparation of mixed waste for breakdown. Under TA3B, performers will produce and test various prototype mechanisms and materials for partitioning organic upgradable molecules from contaminants. These approaches will likely include engineering novel structures within chambers for the purification (e.g., sieves), and new methods to scale the compartmentalization of impurities. It is anticipated that the performers will explore biochemical, chemical, physical, and engineering advancements to ensure process fidelity and robustness, including sustained operation under variable pH and alterations in other chemical attributes that will likely occur during the integrated process.

Table 5: Phase 2 metrics by TA and military scenario (Sc).

Sc	TA	Objective	Metric	Milestone
Stabilization	**3A**	Increase capacity of system	≥ 20 kg	Increased scale of waste input
		Begin process with plastic mixture	≥ 2 plastic types	Optimization for mixture challenges at scale
		Increase reactivity of waste	> 30%	Improvement of reactivity
	1	Deconstruct plastic for discharge or downstream conversion	> 95% deconstruction	Breakdown starting material by weight
		Generate upgradeable and/or biodegradable molecules	≥ 19 kg	TA2 precursor and/or product
		Increase rapidity of deconstruction	> 2.8 kg/day	Maintained rate of deconstruction
	2	Convert from TA1 or otherwise deconstructed waste input	> 20% conversion	Maintained conversion sufficient for DoD need
		Increased yield of buildup platform	≥ 4 kg	Produced sufficient amount for DoD need
		Increase rapidity for production at scale	> 570 g/day	Maintained daily production rate
		Upgrade organic molecules to product(s)	≥ 1 product	Generated macronutrients and water at sufficient purity
	3B	Purify organic upgradable molecules	Capable of TA2 conversion into ≥ 1 product	Isolation of output from inhibitors

Sc	TA	Objective	Metric	Milestone
Expeditionary/ Special Operations	**3A**	Increase capacity of system	≥ 1 kg	Increase scale of waste input
		Begin process with waste mixture	≥ 3 waste types	Optimization for heterogeneous mixture at scale
		Increase reactivity of waste	> 15%	Improvement of reactivity
	1	Deconstruct mixed waste for discharge or downstream conversion	> 95% deconstruction	Breakdown starting material by weight
		Generate biodegradable and/or upgradeable molecules	≥ 950 g	TA2 precursor and/or product
		Increase rapidity of deconstruction	> 135 g/day	Maintained rate of deconstruction
	2	Convert from TA1 or waste input	> 10% conversion	Maintained conversion sufficient for DoD need
		Increased yield of buildup platform	≥ 100 g	Produced sufficient amount for DoD need
		Increase rapidity for production at scale	> 14 g/day	Maintained daily production rate
		Upgrade organic molecules	≥ 1 product	Sufficient purity to generate macronutrients or POLs
	3B	Purify organic upgradable molecules	Capable of TA2 conversion into ≥ 1 product	Isolation of output from inhibitors

Phase 3 Metrics – Operationalize, 31-48 months

During Phase 3, performers will work with relevant, military-specified waste mixtures that have pre-defined characteristics. Military waste generally consists of food residues, plastic, paper, and cardboard, plus less abundant variable components (e.g., metal and glass) that could potentially contaminate or inhibit the processes. The objectives, metrics, and milestones of Phase 3 are established to ensure these processes are capable of converting complex mixtures of waste to upgradeable organic intermediates and products in a timely manner, and potentially convert or dispose of those contaminants as they arise. Proposers will be expected to assemble the military waste mixture they will implement during Phase 3 according to pre-defined distribution specifications and will describe the alignment between their engineered system and the envisioned DoD use.

The overall objective is to produce and purify food/macronutrients, POLs, and/or tactical materials. Any residual outputs of the engineered system that are not usable products should be

non-toxic, biodegradable, environmentally compatible, and/or upgradeable. The environmental amelioration of processed, non-usable byproduct should be able to occur in a reasonably rapid, safe, and non-descript fashion, so emphasis should be placed on the traceability of residual waste amounts for the Expeditionary/Special Operations scenario.

Product purity will be a performer-defined and effort-specific metric and must be consistent with existing standards for use of final product. For example, if the performer has chosen to generate a macronutrient, then it must be purified to the standard defined for safe consumption. In line with this, if the performer has chosen to produce rifle lubricant, then it must meet specifications necessary for its immediate application and use. The proposed purification techniques for use will be closely evaluated during Phase 3 to ensure the proposed products are made rapidly and safely.

Table 6: Phase 3 metrics by TA and military scenario.

Sc	TA	Objectives	Metrics	Milestones
Stabilization	**3A**	Input at scale	≥ 3000 kg	Engineered for mixed plastics
		Input plastic mixture	≥ 2 plastic types	Engineered for mixed plastics
		Increase reactivity of waste	> 40%	Engineered for mixed plastics
		Mitigate one exacerbating factor	TBD	Demonstrated platform resilience
	1	Deconstruct for discharge or downstream conversion	> 95% deconstruction	Met breakdown metric with actual military waste
		Deconstruct for high output yield	≥ 2,850 kg	Production of non-plastic deconstructed output
		Deconstruct rapidly at scale	> 100 kg/day	Met rate metric at scale
	2	Produce sufficient amount for use	> 30% conversion	Optimized process for generation of products
		Generate high yield of product(s)	≥ 900 kg	Produced sufficient amount for DoD need
		Produce rapidly at scale	> 30 kg/ day	Produced at time scale for DoD need
	3B	Purify food/macronutrient(s) and water	≥ 900 kg food/macronutrients	Purified sufficient quantity for DoD use

Sc	TA	Objectives	Metrics	Milestones
		Purify food/macronutrient(s) and water	Metric consistent with existing standards for use	Provided necessary homogeneity for use case
	3A	Input at scale	≥ 10 kg	Engineered for realistic military waste
		Input military waste mixture	≥ 3 waste types (2 must be plastic)	Engineered for diverse military waste
		Increase reactivity of waste	>20%	Pre-defined military waste stream
		Mitigate one exacerbating factor	TBD	Demonstrated platform resilience
Expeditionary/Special Operations	**1**	Deconstruct to be untraceable and/or upgradeable	> 95% deconstruction	Demonstrated complete deconstruction at scale
		Deconstruct for high output yield	≥ 9.5 kg	Production of untraceable and/or upgradeable molecules
		Deconstruct rapidly at scale	> 340 g/day	Maintained rapid deconstruction at scale
	2	Convert sufficient amount for use	> 25% conversion	Optimized process for generation of products
		Yield sufficient products for use	≥ 2.5 kg	Produced sufficient amount for DoD need
		Produce at timescale necessary for use	> 89 g/day	Produced at time scale for DoD need
	3B	Purify food, POLs, or tactical materials	≥ 2.5 kg	Purified sufficient quantity for DoD use
		Purify food, POLs, or tactical materials	Metric consistent with existing standards for use	Provided necessary homogeneity for use case

1.5. PROGRAM DEMONSTRATIONS

The successful completion of each phase will be determined through an End-of-Phase demonstration showing technical advancement and potential for functional integration of the proposed TAs. From the outset, performers will be working under one of two selected scenarios—Stabilization or Expeditionary/Special Operations—which will define the respective program SWaP objectives and specific demonstration metrics. In Phase 1, performers will deliver a key demonstration showing the conversion of waste to non-toxic, upgradeable organic molecules. In Phase 2, performers will be expected to demonstrate the conversion of larger masses of waste with increased heterogeneity (i.e., mixture of plastics and cellulosic materials).

Phase 3 will require a system demonstration on a pre-defined military waste stream at scale. Efficient conversion, energy return on investment, and minimal footprint will be emphasized.

1.5.1. Independent Validation and Verification (IV & V)

Independent verification and validation (IV & V) testing will be conducted by a third-party organization, to be identified and retained by DARPA. This third-party IV & V organization will be responsible for testing the engineered system and its corresponding protocols and procedures in accordance with the metrics outlined in Sections 1.5.2 and 1.5.3, with supervision by DARPA.

The IV & V team will be responsible for conducting a mid-phase 1 Trial Run at the performer's site, Month 9. The IV & V-managed system testing of the Trial Run will include:

- Prototype systems are tested by IV&V team.
- Tests performed following performer protocol under performer guidance.
- Performer teams allowed to troubleshoot and analyze results.
- Results of IV&V testing provided to performers, Month 10.

The IV & V team mid-phase 1 Trial Run report is due Month 11.

The IV & V team will be responsible for conducting an end of phase 1 demonstration at the performer site, Month 12. The IV & V-managed system testing of the end of phase 1 demonstration will include:

- Prototype systems are tested by IV & V team.
- Tests performed following performer protocol under performer guidance.
- Performer teams allowed to troubleshoot and analyze results.

IV & V-managed system test of end of phase demo report is due Month 13.

1.5.2. Mid-Phase 1 Trial Run (Month 9)

A mid-phase 1 Trial Run will be conducted by the performers in conjunction with the IV & V team. During the mid-phase 1 Trial Run, performers will demonstrate that they have launched functional individual (non-integrated) system components. The Trial Run should show that the non-integrated process is functioning to convert minimal amounts of waste under reduced constraints. Performer teams will be required to allow the IV & V team to re-perform their Trial Run under the reported protocols and specifications; Trial Run objectives and their respective metrics will be specified to selected performers. Performers that do not pass the review of the Trial Run may not continue to Phase 2. The Trial Run report will be due no later than 30 calendar days after Trial Run is performed, Month 10.

1.5.3. End-of-Phase 1 Demonstration (Month 12)

The objective of Phase 1 is to establish proof-of-concept using a basic system consisting of either mixed plastic waste types as an input (Stabilization) or a mixture of plastic and cellulosic material (Expeditionary/Special Operations). This phase will conclude by demonstrating that a designed step-wise process can convert waste to upgradeable organic molecules and, potentially, unpolished products. The minimum objectives are that performers will convert at least 50 grams

of mixed plastic waste (Stabilization) or mixed waste (Expeditionary/Special Operations) to upgradeable organic precursor molecules over the course of a single day (Table 7). Performer teams will be required to allow the IV & V team to test their system for reproducibility and reliability of capabilities. Continued funding will be contingent upon the system's ability to meet the metrics (Section 1.5.3), under defined objectives (Table 3), presentation of a solid development plan for the remainder of the program, due Month 13, and funding availability.

Table 7: Phase 1 demonstration metrics should be accomplished by running a non-integrated system over the course of a single day.

Sc	Objective	Metric
Stabilization	Pretreat mixed plastic input	≥ 50 g
	Process compatible with mixture input	≥ 2 plastic types
	Deconstruct half of the waste input	> 50%
	Convert mass input to mass output (upgradeable molecules)	> 20%
	Generate upgradeable organic molecules output	≥ 10 g
Expeditionary /Special Operations	Pretreat mixed waste input	≥ 50 g
	Process compatible with input waste mixture input	≥ 2 waste types
	Deconstruct half of the waste input	> 50%
	Convert mass input to mass output (upgradeable molecules)	> 5%
	Generate upgradeable organic molecules output	≥ 2.5 g

1.5.4. End-of-Phase 2 Demonstration (Month 29)

The objective of the End-of-Phase 2 demonstration is to convert larger masses of waste with increased heterogeneity (i.e., mixture of plastics and cellulosic materials) using a fully integrated system over the course of seven (7) days (Table 8). Continued funding will be contingent upon the system's ability to meet the metrics (Section 1.5.4), under defined objectives (Table 3), presentation of a solid development plan for the remainder of the program (due Month 29), and funding availability.

Table 8: Phase 2 demonstration metrics should be accomplished by running a fully integrated system over the course of seven (7) days.

Sc	Objective	Metric
Stabilization	Pretreat mixed plastic input	≥ 20 kg
	Process compatible with mixture input	≥ 2 plastic types
	Deconstruct the majority of waste input	> 95%
	Convert mass input to mass output (upgradeable molecules)	> 20%
	Generate food/macronutrient precursors	≥ 4 kg
Expeditionary /Special Operations	Pretreat mixed plastic input	≥ 1 kg
	Process compatible with mixture input	≥ 3 waste types (2 must be plastic and 1 cellulosic)
	Deconstruct the majority of waste input	> 95%
	Convert mass input to mass output (upgradeable molecules)	> 10%
	Generate food/macronutrient, POL, or tactical material precursors	≥ 100 g

1.5.5. End-of-Phase 3 Demonstration (Month 47)

The third phase will conclude with a system demonstration on a sample of military waste over the course of twenty-eight (28) days (Table 9). Efficient conversion, serviceability of the machinery used, energy return on investment, and minimal footprint should be considered.

Table 9: Phase 3 demonstration metrics should be accomplished by running a fully integrated system over the course of twenty-eight (28) days.

Sc	Objective	Metric
Stabilizati	Pretreat mixed plastic input	≥ 3,000 kg

Sc	Objective	Metric
on	Process compatible with mixture input	≥ 2 plastic types
	Deconstruct the majority of waste input	> 95%
	Convert mass input to food/macronutrients and water, or tactical materials	> 30%
	Generate desired product	Food and water (or tactical materials) for 300 people
Expeditionary /Special Operations	Pretreat mixed plastic input	10 kg
	Process compatible with mixture input	≥ 3 waste types (2 must be plastic)
	Deconstruct the majority of waste input	> 95%
	Convert mass input to POLs or food/macronutrients	> 25%
	Generate desired product	POLs for 100 weapons or food/macronutrients for 10s of people

1.6. GENERAL REQUIREMENTS

1.6.1. Proposing Teams

It is expected that proposals will involve multidisciplinary teams that include expertise from multiple complementary disciplines (e.g., biology, chemistry, and engineering). Specific content, communications, networking, and team formation are the sole responsibility of the proposer teams. Proposer teams should submit a single, integrated proposal led by a single Principal Investigator, Program Integrator/Manager, under a single prime contractor that addresses all program phases, as applicable.

DARPA will hold a Proposers Day (see Section 8, Other Information) to facilitate the formation of proposer teams with the expertise necessary to meet the goals of the program and enable sharing of information among interested proposers through the DARPA Opportunities Page and the Proposers Day registration website.

1.6.2. Data Sharing

DARPA anticipates that a large amount of data will be generated under this program by each team. Data analyses and validation results will be strengthened by compiling and integrating information across all performers. Therefore, the ReSource program will require that performer

data, analysis, and software executables (or source code) be shared with DARPA, the IV & V team, and US Government stakeholders. Performers are strongly encouraged to establish the appropriate agreements to enable collaboration and data sharing beyond these organizations. DARPA encourages sharing of pre-existing data and capabilities, including those generated through funding from other sources.

1.6.3. Biocontainment/Biosafety (Engineered Organisms)

This program will support engineered biological research conducted in containment and will not support proposals that include uncontained environmental release of engineered organisms. The inclusion of biocontainment strategies and/or assessment to all TAs is very strongly encouraged.

1.6.4. Permits and Compliance

It is the proposing team's responsibility to obtain all necessary federal, state, and local government permits and approvals, and abide by all applicable laws where necessary for the proposed work to be conducted. Proposals should include sufficient documentation to allow the Government team to determine whether the proposed work is in compliance. Failure to apply for and/or obtain federal, state, and local permits, approvals, letters of agreement, or failure to provide environmental analysis where necessary will delay the award of funds if a project is otherwise selected for funding.

1.6.5. Ethical, Legal, and Societal Implications (ELSI)

DARPA maintains its commitment to ensuring that efforts funded under this BAA adhere to ethical and legal regulations currently in place for Federal and DoD-funded research. Program plans will be reviewed and discussed by a panel of expert external advisors with expertise in bioethical issues that may emerge as a consequence of advances in ReSource technologies. Proposers to this BAA should address potential ethical, legal, and societal implications of the proposed technology, as deemed appropriate.

1.6.6. Regulatory Strategy

Proposers must present a detailed plan for early and continued engagement with regulators (e.g., Food and Drug Administration, Environmental Protection Agency) throughout the program to discuss developing technologies and challenges in order to inform and facilitate technological advancement and the eventual translation of the technology to field deployment. Ideally, proposers will identify the regulatory framework at the time of proposal submission.

1.6.7. Transition Strategy

Proposers must present a detailed Technology Transition Plan to transition the technologies developed under the program for testing and product formulation. It is anticipated that the ReSource engineering platform will be suitable for advanced development and licensing for many high impact applications. It is critical that the ReSource platform be developed in a manner that positions it for further development and deployment by the end of the program.

1.6.8. 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.

Mid-phase Trial Run report:

The mid-Phase 1 Trial Run report due will be due no later than 30 days after the system demonstration (Month 10).

End of Phase reports: Two months prior to the end of Phase 1 (Month 13) and one month prior to the end of Phase 2 (Month 29), performers must draft and present to DARPA a written report of all research activities and metrics satisfied. This report should contain as much supporting data as can be reasonably conveyed.

Monthly financial reports: Performers are required to provide financial status updates. The prime Performer is to include information for itself and all subawardees/subcontractors. These reports should be in the form of an editable MS Excel file, and should provide financial data including, but not limited to:

- Program spend plan by phase and task.
- Incurred program expenditures to date by phase and task.
- Invoiced program expenditures to date by phase and task.

Monthly technical progress reports: Each month (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.

Mid-phase and end of phase 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. 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 mechanisms discovered during the program, publications, research presentations, patent applications that result from the research pursued, any additional deliverables requested by the contracting agent for this 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. § 2371b(f), the Government may award a follow-on production contract or Other Transaction (OT) for any OT awarded under this BAA if: (1) that participant in the OT, or a recognized successor in interest to the OT, successfully completed the entire prototype project provided for in the OT, as modified; and (2) the OT provides for the award of a follow-on production contract or OT to the participant, or a recognized successor in interest to the OT.

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

program. For more information on publication restrictions, see the section below on Fundamental Research.

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

Proposers should indicate in their proposal whether they believe the scope of the research included in their proposal is fundamental or not. While proposers should clearly explain the intended results of their research, the Government shall have sole discretion to 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 BAA in any capacity unless they meet the following conditions. (1) FFRDCs must clearly demonstrate that the proposed work is not otherwise available from the private sector. (2) FFRDCs must provide a letter, on official letterhead from their sponsoring organization, 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.§ 2539b may be the appropriate statutory starting point for some entities, specific supporting regulatory guidance, together with evidence of agency approval, will still be required to fully establish eligibility. DARPA will consider FFRDC and Government Entity eligibility submissions on a case-by-case basis; however, the burden to prove eligibility for all team members rests solely with the proposer.

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 nondisclosure 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 BAA. The disclosure must include the proposer's, and as applicable, proposed team member's OCI mitigation plan. The OCI mitigation plan must include a description of the actions the proposer has taken, or intends to take, to prevent the existence of conflicting roles that might bias the proposer's judgment and to prevent the proposer from having unfair competitive advantage. The OCI mitigation plan will specifically discuss the disclosed OCI in the context of each of the OCI limitations outlined in FAR 9.505-1 through FAR 9.505-4.

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

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

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

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

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

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

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.

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 30 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.

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, email, 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 http://www.fbo.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).

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 40 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 Technical Areas and/or follow the instructions herein may be rejected without further review.

a. Volume I, Technical and Management Proposal

Section I. Administrative

A. Cover Sheet (LABELED "PROPOSAL: VOLUME I"):

1. BAA number (HR001119S0084);
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-free (CPFF), cost-contract—no fee, cost sharing contract – no fee, or other type of procurement contract (*specify*), GRANT, 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 2** to the BAA posted at http://www.fbo.gov. Use of this 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 (See Section 1 of the BAA for information on program goals, objectives, metrics and milestones). 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 (See Section 1 of the BAA for information on program goals, objectives, metrics and milestones). 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. The technical plan should also address the regulatory strategy for early and continued engagement with regulators (e.g., Food and Drug Administration, Environmental Protection Agency) throughout the program.

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 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 (Phase 1 (Base); Phase 2 (Option One); and Phase 3 (Option Two)) 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. 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.

H. 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 (HR001119S0084);
2. Lead organization submitting the 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-free (CPFF), cost-contract—no fee, cost sharing contract – no fee, or other type of procurement contract (*specify*), GRANT, 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 Technical Areas and/or follow the instructions herein may be rejected without further review.

The Government encourages proposers to complete an editable MS excel budget template that covers (1)i. – x., (2), (3), (4), (5), and (6) discussed below. This template document is provided as **Attachment 4** to this BAA. If proposers choose to use **Attachment 4**, submit the MS Excel template in addition to Volume I and II of their proposal. The template is not a Volume II alternative. Volume II must include all other items discussed below that are not covered by the editable MS excel budget template. Proposers are welcome to utilize an alternative format, provided the information requested below is clearly and effectively communicated.

(1) Total program, per phase (Phase I (Base); Phase II (Option); and Phase III (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, 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).

x. **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, II, and III and task.
(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 another 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 grant, 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

reasonable 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 Requests

All proposers requesting an OT must include a detailed list of milestones for each phase of the program (I, II, and III). 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* email 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://doi.org/10.6028/NIST.SP.800-171r1) that are in effect at the time the BAA is issued.

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

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) complaint 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.

Grant Abstract

Per Section 8123 of the Department of Defense Appropriations Act, 2015 (Pub. L. 113-235), all grant awards must be posted on a public website in a searchable format. To comply with this requirement, proposers requesting grant awards must submit a maximum one (1) page abstract that may be publicly posted and explains the program or project to the public. The proposer should sign the bottom of the abstract confirming the information in the abstract is approved for public release. Proposers are advised to provide both a signed PDF copy, as well as an editable (e.g., Microsoft word) copy. Abstracts contained in grant proposals that are not selected for award will not be publicly posted.

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 BAA. See http://www.darpa.mil/work-with-us/additional-baa for further information.

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

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 HR001119S0084. 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 five (5) calendar 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.

Abstracts and Full Proposals sent in response to HR001119S0084 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 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 Grants or Cooperative Agreements only:

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

Submissions: Proposers must submit the three forms listed below.

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

Grants.gov Submissions: 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 (3) business days and four weeks. For more information about registering for Grants.gov, see http://www.darpa.mil/work-with-us/additional-baa.

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

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).

Failure to comply with the submission procedures may result in the submission not being evaluated. DARPA will acknowledge receipt of complete submissions via email 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 HR001119S0084 summary. Submit your question(s) via e-mail to ReSource@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; 5.1.3. Cost Realism; 5.1.4. Realism of Proposed Schedule; and 5.1.5. Plans and Capabilities to Accomplish Technology Transition.

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.

5.1.4. Realism of Proposed Schedule

The proposed schedule aggressively pursues performance metrics in the shortest timeframe and accurately accounts for that timeframe. The proposed schedule identifies and mitigates any potential schedule risk.

5.1.5. Plans and Capability to Accomplish Technology Transition

The proposer clearly demonstrates its capability to transition the technology to the research, industrial, and/or operational military communities in such a way as to enhance U.S. defense. In addition, the evaluation will take into consideration the extent to which the proposed intellectual property (IP) rights will potentially impact the Government's ability to transition the technology.

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 BAA; proposals that fail to do so may be deemed non-conforming and may be removed from consideration. Proposals will not be evaluated against each other since they are not submitted in accordance with a common work statement. DARPA's intent is to review proposals as soon as possible after they arrive; however, proposals may be reviewed periodically for administrative reasons.

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 nondisclosure agreements.

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

Federal Awardee Performance and Integrity Information (FAPIIS)

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

6. Award Administration Information

6.1. SELECTION NOTICES

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. These official notifications will be sent via e-mail to the Technical POC and Administrative POC identified on the proposal coversheet.

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 regular program-wide PI meetings and periodic site visits at the Program Manager's discretion to the Arlington, VA vicinity. 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. FAR and DFARS Clauses

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

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

Further information on Controlled Unclassified Information on Non-DoD Information Systems is incorporated herein can be found at 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, resultant procurement contracts will require supplementary DARPA-specific representations and certifications. See http://www.darpa.mil/work-with-us/additional-baa for further information.

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:
ReSource@darpa.mil
DARPA/BTO
ATTN: HR001119S0084
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

DARPA will host a Proposers Day in support of the ReSource program on August 29, 2019, at the Embassy Suites by Hilton Phoenix Downtown North, Phoenix, AZ. The purpose is to provide potential proposers with information on the ReSource 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 ReSource 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, http://events.sa-meetings.com/ReSourceProposersDay.

Participants are required to register no later than **August 23, 2019, 12:00 PM ET**. 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:
DARPA-SN-19-73@darpa.mil
ATTN: DARPA-SN-19-73

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 beginning on Page 36 of HR001119S0084. 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 **HR001119S0084** 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)
   f○ **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: