Research Announcement

Young Faculty Award (YFA)

Defense Sciences Office

DARPARA2401

November 7, 2023

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PART I: OVERVIEW INFORMATION

- **Federal Agency Name:** Defense Advanced Research Projects Agency (DARPA), Defense Sciences Office (DSO)
- **Funding Opportunity Title:** Young Faculty Award (YFA)
- **Announcement Type:** Initial Announcement
- **Funding Opportunity Number:** DARPARA2401
- **Catalog of Federal Domestic Assistance (CFDA) Number(s):** 12.910 Research and Technology Development
- **Dates** (All times listed herein are Eastern Time.)
  - Posting Date**:** November 7, 2023
  - Executive Summary Due Date: December 13, 2023, 4:00 p.m.
  - FAQ Submission Deadline: February 15, 2024, 4:00 p.m. See Section VIII.B.
  - Full Proposal Due Date: February 22, 2024, 4:00 p.m.
- **Anticipated Individual Awards:** DARPA anticipates multiple awards.
- **Anticipated Funding Available for Award:** Each award will include a 24-month base period (a maximum of $500,000) and a 12-month option period (a maximum of $500,000).
- **Types of Instruments that May be Awarded:** Grants
- **Agency Contacts**
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  - **DARPA/DSO Opportunities Website:** http://www.darpa.mil/work-with-us/opportunities
- **Teaming Information:** See Section VIII.C for information on teaming opportunities.
- **Frequently Asked Questions (FAQ):** FAQs for this solicitation may be viewed on the DARPA/DSO Opportunities Website. See Section VIII.B for further information.

PART II: FULL TEXT OF ANNOUNCEMENT

I. Funding Opportunity Description

This Research Announcement (RA) constitutes a public notice of a competitive funding opportunity as described in 2 CFR § 200.203. Any resultant negotiations and/or awards will follow all laws and regulations applicable to the specific award instrument(s) available under this RA.

A. Introduction

The Defense Advanced Research Projects Agency (DARPA) Young Faculty Award (YFA) program aims to identify and engage rising stars in junior research positions in academia and equivalent positions at non-profit research institutions, particularly those without prior DARPA funding, to expose them to Department of Defense (DoD) needs and DARPA's mission to create and prevent technological surprise. The YFA program will provide high-impact funding to elite researchers early in their careers to develop innovative new research that enables transformative DoD capabilities. Ultimately, the YFA program is developing the next generations of researchers focused on national security issues.

Before preparing an executive summary or proposal submission, proposers are encouraged to review the DARPA mission statement and current program descriptions at the DARPA website https://www.darpa.mil to familiarize themselves with examples of current DARPA investments. This is not meant as instruction to duplicate those efforts, but rather to illustrate that current programs are aimed at research that will substantially advance our capabilities in these areas. Once awards are made, each YFA program performer will be assigned a DARPA Program Manager with interests closely related to their research topic. The Program Manager will act as project manager and mentor to the YFA award recipients.

Proposers should also familiarize themselves with the "Heilmeier Catechism." Details about the catechism and questions it seeks to answer can be found at https://www.darpa.mil/work-with-us/heilmeier-catechism.

B. Program Description/Scope

DARPA is soliciting innovative research proposals in the areas of interest to DARPA's six technical offices: Biological Technologies Office (BTO), Defense Sciences Office (DSO), Information Innovation Office (I2O), Microsystems Technology Office (MTO), Strategic Technology Office (STO), and Tactical Technology Office (TTO). Further detail regarding the specific technical areas of interest can be found under Section I.D "Topic Areas (TAs)." Proposed research should investigate innovative approaches that enable revolutionary advances in science, devices, or systems. Specifically excluded is research that primarily results in evolutionary improvements to the existing state of practice.

Submissions responding to a TA under this RA should clearly describe the relevance and impact of the proposed concept(s) for addressing the national security challenges identified in the TA description (Section I.D); the current state-of-the-art technology; new insights to address the TA challenges; a credible research plan and schedule; and critical, quantitative milestones to be pursued over the research period.

This RA seeks grant proposals only. Submissions for any other award instrument type may be considered non-conforming with the RA and may not be reviewed.

C. Program Structure

This RA seeks grant proposals for a research activity consisting of a 24-month base period. No award type other than grants will be issued under this RA. Each 12-month interval of the base period shall not exceed $250,000. Proposals should also include a 12-month option period with a maximum funding level of $500,000. The 12-month option period, referred to as the "Director's Fellowship," will be reserved for a limited number of awardees who demonstrate exceptional YFA project performance over the 24-month base period. YFA recipients may request one No-Cost Extension (NCE) to the base period of performance (PoP) not to exceed 12 months. NCEs beyond 12 months for the base period require justification be submitted to the Agreements Officer for consideration. In order to be eligible for the Director's Fellowship option period, the effort's reporting must show they have expended a significant portion of received funding. Director's Fellowship nominations by the PM Mentor may be deferred until required reasonable expenditure levels have been reached, provided that deferment not surpass the Grant PoP, to include any requested extensions. Director's Fellowship recipients may request one NCE for the Director's Fellowship option PoP, not to exceed 12 months.

A target start date of August 2024 may be assumed for planning purposes.

As part of the program, a number of visits/exercises at a variety of DoD sites and facilities will be scheduled. These briefings and visits will provide YFA recipients unique, first-hand exposure to DoD personnel and technologies in the field; issues faced by the Military Services in execution of their missions; and current National Security challenges. It is expected that YFA recipients will participate in a subset of the visits/exercises made available to them. Participation in all such opportunities is not a requirement; however, lack of participation may impact the award of the Director's Fellowship. Proposers are expected to include the necessary travel funds within the total budget of their proposal. For budgeting purposes, please plan for a minimum of 6 two-day meetings (three meetings in the Washington, D.C. area and three meetings in the San Francisco, CA area). Of the six meetings, four should occur over the course of the 24-month base period and two over the course of the 12-month option period. Travel proposed for non-DoD sponsored activities and events is highly discouraged, please see FAQ for more information.

D. Topic Areas (TAs)

This RA solicits single principal investigator (PI) proposals for research and development in the specific TAs of interest articulated below. Prior to submitting a full proposal, proposers are *strongly encouraged* to first submit an executive summary as described in Section IV. At the executive summary phase, proposing PIs are limited to one executive summary per TA; at the full proposal phase, proposing PIs are limited to submitting only one full proposal to only one topic under this RA. Submitting more than one full proposal may result in all of the PI's proposal submissions being determined non-conforming and being removed from award consideration.

Potential applicants are encouraged to carefully consider the descriptions of the TAs before submission. Each submission (executive summary or full proposal) must specify ONE and only one TA for the submission and identify this TA on the submission's cover sheet. Executive Summaries and Full Proposals (limit of one proposal per proposer) that do not clearly address a specific topic may be deemed non-conforming and may not be reviewed. DARPA reserves the right to assign a proposal or an executive summary to a different topic area than indicated by the proposer.

Technical inquiries should be emailed to YFA2024@darpa.mil with the TA stated in the subject line. Your question will be distributed to the appropriate contact. Please see Section VIII.B for more details regarding the question and answer process.

1. 3D Microphysiologic Systems

DARPA is interested in advancing microphysiologic systems (MPS) to understand patient specific risks to environmental exposures or pharmaceutical interventions. Such systems, which can be composed of patient-specific cells, have the potential to model an individual's physiologic risks to a large variety of threats. Many current MPS systems rely upon 2D models – layered sheets of cells. With advances in micropatterning and microfluidics of 2D substrates, MPS designers are able to tightly control the microenvironment of cultures – allowing more physiologic differentiation and "realistic" architectures. But, many tissues of interest have inherent 3D architectures – lungs, brain, liver, etc. Current 3D MPSs do allow induced pluripotent stem cells to self-develop into improved "realistic" microarchitectures – improving the ability to model tissues which are inherently 3D. However, in 3D MPSs, media, nutrients, growth factors and waste products passively diffuse – limiting the size of 3D cultures can grow as well as any spatial control of growth factor delivery necessary to promote a desired architecture. Thus, in order to improve 3D MPS to model in vivo tissues, two key challenges need to be addressed: 1) perfusion of nutrients and eliminating cellular waste evenly throughout the entire volume of MPS and 2) controlling the spatial perfusion of growth factors and physiologic active substances to 3D MPS. Strong proposals should address the challenges of fabricating biologically compatible systems which can distribute nutrients and waste removal throughout a 3D cell culture by year 1. By year 2, proposals should demonstrate spatial control of delivery of nutrient and incorporate living cell cultures into perfusion system.

2. Spatially Precise Microenvironments for Localized Therapeutic Intervention

Developing new therapeutic approaches to neuropathologies, such as traumatic brain injury (TBI), is of great interest to the Department of Defense (DoD) due to a heightened prevalence and severity in Service Members and Veterans. Pharmacologic therapies for TBI play important roles in acute treatment and post-acute care. However, many TBIs involve very specific brain regions and/or structures, making it difficult to target pharmacological/biologic therapeutic strategies to specific foci. For example, small molecules are designed to interact with specific brain receptors, yet these receptor targets are often more broadly expressed and not limited solely to the damaged region. This "off-target" effect often leads to significant and undesirable side effects. DARPA is seeking proposals on novel approaches for targeted, spatially precise therapeutic interventions in the brain. DARPA is not looking at the development of new drugs or implants per se, but to drive discovery of extremely localized therapeutics. Of particular interest is fundamental research that explores the underlying mechanisms of spatially constrained microenvironments by which alteration or tuning of brain cell/tissue function can be achieved. Focusing on precision targeting after any type of brain injury or diagnosis of dysfunction, this effort differentiates itself from other current or previous DARPA programs involved in brain health and new therapeutic development within specific contexts. An increased understanding of these microenvironments will enable the development of advanced strategies and interventions for neurological disorders and dysfunctions (e.g., TBI, anxiety, depression) that can provide increased efficacy and mitigate off-target effects of traditional treatment.

3. Rapid characterization and understanding of mechanisms of cell binding and entry by novel viral pathogens

The DoD has a need to develop effective medical countermeasures (MCMs) for the warfighter in a timely manner. The current COVID-19 pandemic has showcased the results of previous DoD investment in mRNA vaccine technology and rapid antibody discovery technologies from the ADEPT and Pandemic Prevention Platform (P3) programs, respectively. However, technological advances alone did not contribute to the swift development of vaccines and therapeutics against SARS-CoV-2 – the research and development community leveraged years of prior research establishing viral cell tropism and mechanism of viral entry by related coronaviruses (i.e. SARS-CoV-1, MERS-CoV). Previous research established that SARS-CoV-1 enters human epithelial cells via the ACE-2 receptor, and that the Spike protein generates the most robust immune response. Antibody discovery and manufacturing teams knew to screen for Spike-binding monoclonal antibodies, and test for the ability of their antibody candidates to block SARS-CoV-2 binding to the ACE-2 receptor protein in vitro. If SARS-CoV-2 targeted different human cell types, or used a different receptor mechanism for cell entry, the MCM discovery and development process would have been significantly delayed by months to years. DARPA seeks to develop new, rapid techniques to screen viruses for both cell tropism and entry receptors. It is envisioned that the virus agnostic technologies will assess which human cells/tissues the virus enters and the receptor(s) to which it binds to gain entry. Additionally, approaches should achieve interpretable, actionable results in short timelines (days rather than months). Proposals should address:

1. Cell and/or tissue types (indicate source)
2. Assay(s) for assessing virus binding to cells and methods for determining the receptors
3. In vitro and/or in vivo validation of results
4. Virus agnostic nature of the methods – i.e. tested on different virus families

4. Outcome Selection Through Nontraditional Receptor Modulation

Understanding the mechanisms of action of toxicants is paramount to the chemical and biological defense programs of the DoD for both threat assessment and countermeasure development. Mixtures of fentanyl derivatives have been used as weapons, most notably in the 2002 Moscow Theater Siege, and drugs such as medetomidine have been researched by state actors for use as potential weapons. Current medical countermeasure (MCM) options for the treatment of opioid poisoning are limited to naloxone and its derivatives, which have several drawbacks. MCM options for the reversal of medetomidine effects are limited to veterinary use only and there are no options for humans. G-protein coupled receptors (GPCRs) are proteins that are the targets of many drugs including threat agents such as fentanyl and its derivatives, as well as other classes of toxins. GPCRs are membrane proteins that are essentially environmental sensors, communicating signals from the extracellular environment across the cell membrane to elicit a response inside the cell. A growing body of evidence suggests that GPCRs do not accomplish this cellular communication in a single way; receptor conformations or shapes can be modulated via ligand interactions at multiple sites that are unappreciated. Myriad possibilities for altering GPCR function exist that elicit both desired and adverse responses, be they based on interactions of the GPCR with auxiliary proteins, signaling pathway selectivity downstream of

the receptor, or binding at nontraditional sites by molecules of interest. DARPA is seeking proposals on work to develop molecules that act at GPCRs in nonclassical ways; namely those that leverage allostery, differential protein-protein interactions, and/or signaling pathway bias for utility against toxicant exposure relevant for national security. Proposals must provide rationale for how such development moves beyond state-of-the-art drugs that interact at classical sites to activate or inhibit GPCRs.

5. Biohybrid Additive Manufacturing of Strong, Flexible Optical Elements

This research topic aims to explore and build upon the advanced additive manufacturing landscape to develop the techniques to design, print, and test organic-hybrid tough and flexible optical elements, enabling future hardened and self-healing optical sensors for DoD applications. Given the rapid development of additive manufacturing, it is now possible to create multiscale, multi-material, and multi-functional devices with varying dimensional scales spanning from the sub-micrometer to the millimeter. Recent research has demonstrated the printing of optically transparent fused silica nanostructures at low temperatures, which paves the way for incorporating biological and organic molecules into fabrication processes. Other recent work has shown that the multiscale lattice frameworks, inspired by the skeletal systems of deep-sea glass sponges, e.g., Euplectella aspergillum, can be printed, and the specific lattice design dictates the structure's mechanical properties. However, these efforts did not take advantage of the unique mechanical properties of E. aspergillum that result from the multiscale organization of inorganic silica with protein molecules. DARPA seeks to replicate the flexibility and self-healing properties of E. aspergillum fibers through improvements in additive manufacturing – integrating organic/biological and inorganic components, to improve fabrication speed and precision, and enhance multiscale 3D printing of flexible fiber optics by 1) successfully demonstrating the capability to use additive manufacturing to create bio-hybrid silica-based materials, and 2) demonstrating the ability to use additive manufacturing to mimic the multiscale architecture and mechanical and optical properties of E. aspergillum spicules.

6. Multiscale Modeling of Microbial Communities

This effort seeks to develop innovative computational approaches to model the complex dynamics of microbial communities. Specifically, this research aims to discover and apply novel multi-scale modeling approaches to inform and predict the dynamic behavior of bacteria in heterogeneous populations. Generalizable in silico models will help demystify complex and highly non-linear behavior of bacteria operating in microbial communities. Proposals should describe innovative approaches to model and predict quorum sensing in bacteria by considering heterogeneous phenotypes and variable environmental conditions. Computational models developed under this program should incorporate relevant biological processes including (but not limited to) the following: intra- and inter-cellular chemical communication; noise; gene expression and genomic (in)stability; gene regulatory networks (GSN); spatial-temporal heterogeneity; genetic and phenotypic heterogeneity. Performers under this topic will design and validate novel and generalizable computational multiscale models that will fundamentally improve our understanding regarding the complex dynamic behavior of microbial communities.

7. Decentralized Foundation Models from Small Data

Self-supervised pre-trained foundation models have recently found tremendous successes in a wide range of applications in natural language and computer vision problems (e.g., BERT, GPT, MoCo, and CLIP). These pre-trained foundation models rely on a variety of masking patterns to

construct “next-word-prediction-type” self-supervised training, thus enabling the training on massive-scale unlabeled datasets. Interestingly, the “next-word-prediction-type” self-supervised training bears striking similarity with sequential decision-making tasks typically seen in reinforcement learning (RL). Motivated by this connection, there have been some recent attempts on using self-supervised pre-trained foundation models for RL. However, the use of self-supervised pretrained foundation models has remained limited to conventional centralized single-agent RL. On the other hand, in complex tactical environments, many of the sequential decision-making problems are by nature multi-agent reinforcement learning (MARL) problems and fundamentally data-limited. So far, it remains unclear how to achieve the tremendous performance gains in MARL with self-supervised pre-trained foundation models, particularly in the data-limited regime. There are many significant and under-explored technical challenges in MARL when applying self-supervised pretrained transformer-based foundation models, including the designs of model architectures and self-supervised pre-training objectives, fundamental trade-offs between the choices of RL training paradigms, fully decentralized parameter-efficient finetuning and continual learning, etc. DARPA is seeking proposals on decentralized data-limited MARL with self-supervised pre-trained foundation models. Successful proposals will enable applications of autonomy on large-scale networks (e.g., low-data swarm autonomy, ISR from multiple robots using vision-language models) and sample-efficient approaches for solving NP-hard combinatorial problems over networks. Proposals must include the development of theory and algorithms that address the fundamental challenges arising from limited data, computing, and networking constraints in MARL.

8. Compilation for Integrated Heterogeneous Systems

We are facing a “diversity crisis.” Moore’s law is no longer providing rapid improvements in performance, leading to an era in which specialization is king. Large DoD systems, such as F-35 avionic systems, increasingly comprise a heterogeneous ensemble of systems-on-chip (SoC) with specialized components, GPUs and accelerators, each with their own unique features, performance characteristics and instruction sets.

Ideally, these systems would be programmed in high level, domain-specific languages (DSLs) that abstract away these differences, leaving it to compilation tools to handle the details. However, it is very time consuming and error prone to develop new compiler components that handle the diversity of hardware targets and source languages.

The goal of this research is to develop and integrate novel compiler components that address this diversity crisis by 1) Mapping elements of the source program to specific hardware targets; 2) Providing mechanisms, such as a variety of intermediate representations, to handle the diversity; and 3) Performing optimizations at a variety of levels of abstraction. While recent research using machine learning (ML) techniques has begun to address compiler optimization challenges, proposers should address the technologies they will develop to address the above compiler challenges, what classes of diverse hardware they intend to address, and how they will verify that the compiled code is a faithful implementation of the source DSL.

9. FR (For Real) LLMs

Given the explosion in AI-generated content, especially through the use of large language models (LLMs), it is becoming increasingly critical to ground the models on scientific principles. Though exceptionally powerful, current LLMs ‘learn’ from massive data, extracting purely statistical patterns without inherent consideration of known physical laws. This pure statistical

representation provides no guarantee that the model's predictions are physically feasible or that they can appropriately generalize to unseen situations. The goal of this research program is to design new AI algorithmic approaches that incorporate scientific facts and physical principles into AI reasoning mechanisms. Examples of such principles can include laws of conservation, logical constraints, or statistical facts derived from relevant literature. This research should result in advancements and demonstrations of deep learning to ensure trustworthiness, especially in operational conditions that require generalization outside of previously observed conditions.

10. Causal and Mechanistic Explanations of Large Language Models

Much of the current state of the art in generative AI is based on large pre-trained models (LPTMs). Traditionally, neural networks of this type have been referred to as "black boxes," and have been assumed to lack interpretable internal structure of the type that enables causal explanations and interventions regarding model behavior. Treating LLMs as inscrutable black boxes poses challenges for the safety and trustworthiness of such systems in that it fundamentally limits the types of approaches that can be pursued in order to audit or control systems in the wild, often favoring "guess and check" or "whack-a-mole" approaches to model development and refinement. Work in this topic area seeks to illuminate the basic representational and algorithmic building blocks in play within LPTMs, in order to facilitate finer-grained understanding and control of model behavior once deployed. Ideal outcomes will result in coherent human-understandable theories that explain how LPTMs work, why they behave the way they do, and how they will behave in new situations. Principled, theory-based approaches for controlling LPTMs in real world deployment will improve safety and trust in the black box nature of LPTMs.

11. Deployable Radiators for Small, High Power, Low Earth Orbit Spacecraft

Low earth orbit (LEO) spacecraft are of growing interest in various commercial and defense applications. These spacecrafts are exposed to multiple unique thermal control challenges, including a rapid rotation period (as low as ~90 minutes), increased aerodynamic drag due to proximity to earth, and material degradation due to interaction with atomic oxygen. They are subject to widely-varying internal and external thermal loads during orbit, requiring careful thermal control to insure proper operation of the deployed microsystems. Enhancing the capabilities of spacecraft-deployed microsystems results in larger heat dissipations, which must be effectively transmitted out of the spacecraft and rejected by the radiators. Small spacecraft such as CubeSat, a cube of 10 cm side (or 1U) or its multiples, are increasingly attractive, but are limited in spacecraft surface area for heat rejection. Deployable radiators allow for significant increase in heat removal capabilities, provided low thermal resistance links from the spacecraft also can be enabled. This topic seeks proposals on innovative deployable radiator concepts that allow >200 W of heat rejection capability for 6U LEO spacecraft. The targeted operating temperature range is -40 oC to 75 oC, mass per unit surface area < 6 kg/m2, thickness < 0.6 cm, specific stiffness >100 and specific thermal conductivity >5. Proposed approaches must be supported via underlying modeling and experimental validation.

12. Optical Coupler Arrays

Foundry processes for photonic integrated circuits (PICs) have enabled larger and more complex photonic circuits for a variety of applications including sensing, signal processing and interconnects. This scaling also has increased the quantity of off-chip optical couplers. Current approaches to coupling take up valuable chip real estate, have limited optical bandwidth, and are

high-loss which negatively impacts the PIC performance. The development of coupling technology similar to the ball grid array technology for electronics would allow for the simplification of PIC chips and enable the 3D integration of PICs with other microelectronic chips. This topic is soliciting proposals for the development of small-area, low-loss (<0.5 dB) optical coupling technology for high-density coupling arrays between foundry fabricated PICs. Proposed technology should be compatible with current PIC foundry platforms, enable scaling to large number of connections, and have >1 μm misalignment tolerance.

13. Photonic Integrated Generators of Multiphoton Entanglement

The ability to create complex entangled states of light is central to the quantum technologies promising to transform computing, communication, and sensing. While laboratory experiments have demonstrated exotic forms of quantum light such as NOON states, cat states, and Greenberger–Horne–Zeilinger (GHZ) states, obtaining quantum technology advantages requires overcoming key challenges in scalability, quality, and generation rate. The rise of nonlinear integrated photonics in recent years presents opportunities to not only miniaturize the discrete-optical hardware required to generate entanglement, but also exceed multiple performance attributes owing to enhanced nonlinear efficiency in chip-scale optical devices and the capacity to multiplex large numbers of modes in complex photonic circuits. This topic seeks to develop foundational capabilities in multiphoton entangled state generation using integrated photonics. Proposals should identify the innovations in photonic devices and circuits necessary to prepare and verify multiphoton entanglement, and include a constructive plan to experimentally demonstrate quantum light states at baseline rate > 1 MHz and fidelity > 75%. Concepts that generate large photon number states (>> 2), significantly exceed baseline rate and fidelity goals, and/or support emerging architectures in quantum information and measurement are of particular interest.

14. Hardware/Software Fault Injection

Fault injection, also known as glitching, is a cyber threat that controls hardware by introducing faults into the system. For example, researchers in 2015 were able to bypass game console security protections by resetting the chip at a specific time, thereby preventing specific instructions from executing. Today, finding and patching fault injection vulnerabilities require exquisite knowledge of the system under test which does not scale to the diversity of modern systems. While researchers have proposed software-only mitigations for a subset of glitching attacks, DARPA is interested in understanding the full breadth of fault injection attack threats and potential strategies for mitigating against them in future systems beyond general purpose processors and the associated software. This topic seeks proposals for research that can distill the problem space into fundamental properties, such as timing as mentioned above, as well fundamental requirements, such as the specific instructions mentioned above, so as to understand the research space. Techniques that focus only on elucidating the fundamental properties or only on elucidating the fundamental requirements are out of scope. Finding, preventing, and patching fault injection vulnerabilities requires knowledge of both the fundamental properties and requirements. Proposals that only focus on finding new vulnerabilities without the fundamental theories or requirements are also out of scope. Proposals must include an approach for ensuring the verifiability of discovered theories as well as repeatability and reproducibility of research results.

15. Advanced Structural Energetics

Developing advanced structural energetics for rocket propellants is of great national interest for both military and rapidly growing commercial launch services. Composite energetics have shown little improvement in mechanical properties or processability in the preceding decades, limiting grain geometries and rate of production. Conversely, the analogous structural polymer matrix composites have found critical uses in everything from consumer goods to military hardware. This ubiquity is built on decades of materials research to enable higher strength and durability while simultaneously decreasing cost and increase rate of production. DARPA is seeking proposals to bridge the material science of structural polymer chemistry and processing with energetics to enable future advances in energetics formulation and fabrication. New approaches to analysis and testing of cross-linking, interfacial bonding, and load transfer are encouraged. Proposals must include both modeling of energetic performance and experimental validation of mechanical properties. Where appropriate, surrogate non-energetic materials may be used for experimental testing when properly validated.

16. Beyond line-of-sight Power Beaming

Laser-enabled Optical power beaming is a potentially transformative technology for lunar or space-based power distribution and communication. However, this technology is fundamentally limited by line of sight. In the lunar environment, the horizon is <2 km away, limiting the area of regard of an optical power distribution node and requiring widely-distributed, mass-intensive relay systems to share power or communications "over the horizon".

Recent work may change this emerging paradigm. Atomic and molecular polarization give rise to optical forces that trap particles (optical tweezers) and affect the refractive index of light propagation. Engineered mutual interactions between an expanding particle beam and a diffracting light beam can produce a self-channeling effect,[1] enhancing the propagation distance beyond that determined by the Rayleigh criterion for a diffracting beam in vacuum. It is possible that this enables the optimization of self-guided particle and light beams such that they remain collimated over the horizon, enabling a revolutionary change to the art of the possible with power beaming to remote receivers beyond line of sight.

DARPA seeks highly innovative proposals that will form the foundational knowledge to model scale-appropriate vacuum particle-light coupled beam propagation over multiple kilometers of distance. In particular, proposers must describe how their research could demonstrably contribute to enabling an over-the-horizon power beaming capability specific to the lunar environment, to include: schemes for optimal mutual guiding in the presence of locally varying gravitational accelerations on the Moon; other relevant loss, scattering or detrapping mechanisms; and preliminary estimates for efficiency and maximum propagation distances of proposed laser designs.

17. Gas Surface Interactions in Very Low Earth Orbit (VLEO)

Drag prediction and material survivability of spacecraft in VLEO are two key areas of research needed to support DoD operations in this relatively unexplored region of space. VLEO spacecraft may be designed with a variety of features including, but not limited to, solar panels, air-breathing inlets, antennas and multi-layer insulation. The drag and material survivability are areas linked by a common phenomenon: gas surface interactions. DARPA is seeking proposals focused on understanding the kinetic and chemical energy exchange between neutral diatomic

[1] Castillo et al., 2022, Nature, DOI 10.1038/s41598-022-08802-z.

(N2 and O2) and atomic species (O) in addition to charged species (O2+, O+, NO+) given that a large portion of the ionosphere is coincident with VLEO. Research has investigated interactions with a fixed surface condition. For this YFA, energy exchange dependence on surface conditions, wall temperature and electric potential, are of particular interest with materials expected for VLEO spacecraft. Proposals ideally include a combination of modeling and experimental research results to address this topic. The resulting research is expected to enable improvements to orbital aerodynamic performance in VLEO.

18. Novel Underwater Propulsion

Traditionally, ships and submersibles use propellers, impellers, or waterjets as their main forms of propulsion to generate thrust. DARPA is interested in understanding the fundamental physics and engineering of novel propulsion to be able to develop future novel ship propulsion technologies. Specifically important are mechanisms to maximize efficiency of the propulsion system.

One possible avenue is bio-inspired propulsion. Fish and other undersea creatures use a combination of fins/appendages and kinematic motions to achieve high-speed and highly efficient locomotion as well as unique maneuvering capabilities. Examples of potential areas of research are advances in the fluid-structure interactions to minimize losses from the traveling wave along the structure, novel actuation mechanisms with large numbers of actuators to allow the structure to interact with the fluid to maximize efficiency, and novel control systems for large networks of sensors and actuators.

Possible avenues for investigation could include, but is not limited to, one of the following areas: modeling and simulation (M&S) of the fluid dynamics and fluid-structure interactions of bio-inspired propulsion, development of biomechanics for propulsion, development of novel distributed sensing and actuation for soft bodies, M&S for the prediction of trades (performance, efficiency, size, weight, and power) compared to conventional propulsion, and development and extracting principles of sensorimotor control to simulate biological systems for propulsion.

19. Light-Matter hybrids in the Large Cooperativity Regime

The quantum coherent interplay between light and matter is a fundamental building block of a wide range of quantum phenomena of relevance to Quantum Information Science (QIS). At sufficiently strong interaction strengths, this interplay can give rise to entirely new phenomenology due to the hybridization between the optical and atomistic degrees of freedom. Once the exclusive province of cold atom-based cavity quantum electrodynamic (QED) systems, this regime of strong light-matter interaction and large cooperativity is being attained in an increasingly disparate set of solid-state nanophotonic platforms due to the ability to confine optical excitations to spatial dimensions far below the wavelength of light and couple optical excitations to a wide range of atomic, molecular, electronic and phononic excitations. With suitably low optical losses and requisite levels of addressability, tunability, and quantum control, such solid-state light-matter hybrids can enable applications including new regimes of nanoscale quantum sensing, quantum transduction between disparate regions of the electromagnetic spectrum, quantum emulation of non-equilibrium quantum phenomena such as light-induced superconductivity, and nanoscale control of light-mediated chemical processes.

This research effort seeks to develop and validate solid-state and nanophotonic platforms capable of attaining the regime of large atom-light cooperativity, with potential applications to quantum

sensing, transduction and quantum emulation of non-equilibrium many-body quantum phenomena. Proposers should justify the proposed experimental platform and describe a research plan to develop and characterize their light-matter hybrid quantum system in order to demonstrate the regime of large cooperativity. The Year 3 option period may be used for the demonstration of QIS applications such as quantum-enhanced sensing, transduction or quantum emulation with the proposed hybrid quantum system.

20. Poetics of authenticity in human - AI generated content

This program seeks to develop quantitative metrics of authenticity and authentication in human and AI generated texts, expressions and interactions. A poetics of authenticity will explore content patterns that are grounded in human experiences at the individual, group and cross-cultural levels. AI systems can generate content and the authenticity and intents associated with this content can be opaque. Human expression changes over time based on stimuli and experiences, informing changes of expression of and receptivity to narratives and art. This now includes interaction with AI and human/AI generated expressions and art. This program seeks to develop quantitative metrics that support assessment and detection of authentic expression. This includes concepts of poetic resonances in groups and individuals, and metrics for assessment of the dynamics and co-evolution of poetic resonances and narratives in response to AI, AI/human and human generated content and stimuli. Proposers are expected to explore quantitative metrics for assessment and detection of authenticity in human, AI and human/AI generated content, including language based and bio-metric signatures. Successful proposals will articulate one or several approaches to quantitative authentication methodologies in Year 1 and will focus on the development of potential implementation paths in Year 2.

21. 3-Domain Integration

Modern fabrication technologies including 3-Dimension integration, bulk and surface micro machining and wafer bonding have enabled precise integration of 2 disparate domains on a single wafer platform. Examples of this include piezoelectric micro-electro-mechanical systems (piezoMEMS) and photonic integrated circuits, vapor cells and laser sources, etc. While engineering breakthroughs and yield in these highly desirable integration platforms remain outstanding challenges, this YFA focuses on "3-Domain" integration. DARPA is interested in revolutionary micro-fabrication technologies that bring three disparate domains {CMOS, Mechanical, photonics, spin wave, quantum, fluidic} on a wafer-manufacturable platform with the potential to disrupt the current integration bottlenecks. Successful proposals will identify approaches to achieving 3-Domain solutions with 3 or less critical, low-yield batch fabrication steps in Year 1, followed by successful fabrication of 3-Domain devices in Year 2. A potential Year 3 effort would be focused on demonstration of proposed 3-Domain devices towards applications that challenge traditional fabrication methods.

22. Electromagnetic Interference Safeguards Secured by Ionics (EMISSIons)

Electromagnetic interference, whether natural (e.g., solar storms, lightning) or manmade (e.g., power line surges, nuclear electromagnetic pulses) can damage or significantly degrade the performance of traditional electronics. Ion-based systems, however, are far more resilient to rapid changes in ambient electromagnetic fields. The primary reason for this resilience is that ionic motion is much more difficult to disrupt than electronic motion, since ions are several orders of magnitude more massive than electrons. The development of ionic and protonic devices—in analogy with electronic devices—has seen rapid expansion recently in a number of

applications, but the resilience of these systems to electromagnetic interference and radiation remains underexamined. DARPA is seeking proposals to develop new ionic and/or protonic circuits and devices. In particular, proposals should seek to understand the response of these devices to a range of electromagnetic interfering signals as well as their resilience in high-radiation environments. Proposals should include specific measures to evaluate the robustness of these circuits and their integration with traditional electronics in hybrid systems, with an eye toward potential deployment in mission critical systems.

23. Exploring the Limits of Reinforcement Learning Explainability

Reinforcement Learning has, in several ways, revolutionized the discovery of protocols for solving many scientific modeling and control tasks – in effect, discovering algorithms for performing these tasks. Yet the algorithms discovered, even when very effective, remain "hidden" in the platform (e.g. deep neural networks, kernels) that was employed in their RL discovery. We seek to unlock this description of what was found, and interpret/rationalize the successful algorithm discovered. We seek to understand whether we have rediscovered one of the ``traditional" theoretical/computational algorithms we always knew, something close to them, or something with fundamentally, qualitatively different capabilities. The path towards doing this envisaged by this call, is the attempt to construct – in a data driven way, and exploiting the suite of modern tools developed for ML tasks/architectures- transformations between the algorithm found and known algorithms. In the process of this construction, we want to discover whether (a) there exist "perfect", global equivalencies between RL-discovered and known algorithms, suggesting we discovered something we already knew; or whether (b) the equivalence is only local/partial, and the transformation eventually ceases to exist/becomes singular. Studying the nature of this breakdown and the behavior in its neighborhood we can then acquire insight in the fundamental novelty -or in the fundamental shortcomings- of the RL-discovered algorithm. Ideally, it will help us rationally improve our traditional algorithmic toolkit.

This effort seeks to develop the beginnings of a framework of Interpretable Reinforcement Learning, leveraging current RL computational technologies, knowledge of established scientific computation algorithms, and data-driven tools for comparing them as outlined above. The investigator should demonstrate proofs of concept for algorithms arising in more than one domain (e.g. control, solution of differential equations, classification problems, data compression). Proposals should indicate a set of proposed test cases and a description of the data that will be collected/used for the effort, as well as benchmarks against which the work will be evaluated. Human subject research is outside the scope of this effort.

24. DSO Open YFA Topic

DSO invites proposers to submit innovative fundamental research concepts that address one or more of the following technical thrust areas: (1) Novel Materials & Structures, (2) Sensing & Measurement, (3) Computation & Processing, (4) Enabling Operations, (5) Collective Intelligence, and (6) Emerging Threats. A description of each of these thrust areas is described below and includes a list of example research topics that highlight several (but not all) potential areas of interest. Proposals must investigate innovative approaches that enable revolutionary advances. DSO is explicitly interested in nascent high-risk, high-reward research relevant to the Department of Defense.

Novel Materials & Structures: This thrust includes, but is not limited to, science and

technology in quantum devices, atomic scale systems, and functional and structural materials.

Sensing & Measurement: This thrust includes, but is not limited to, science and technology in quantum sensing and metrology, seeing (sensing) the unseen, and novel light sources.

Computation & Processing: This thrust includes, but is not limited to, science and technology of quantum computing, cryptography, and modeling of complex systems.

Enabling Operations: This thrust includes, but is not limited to, technologies to support space-based operations, tactically remote environments, and resource assurance.

Collective Intelligence: This thrust includes, but is not limited to, exploration of complex social systems, adaptable Artificial Intelligence (AI), and AI-accelerated learning.

Emerging Threats: This thrust includes, but is not limited to, national security concerns related to global issues associated with raw material availability, environmental catastrophes, and digital societies.

II. Award Information

A. General Award Information

DARPA anticipates multiple awards. The level of funding for individual awards made under this RA will depend on the quality of the proposals received and the availability of funds. Awards will be made to proposers[2] whose proposals are determined to be the most advantageous to the Government, all evaluation factors considered. See Section V for further information.

The Government reserves the right to:

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

All awards resulting from proposals identified for negotiation will be grants.

[2] As used throughout this RA, "proposer" refers to the lead organization on a submission to this RA. The proposer is responsible for ensuring that all information required by a RA—from all team members—is submitted in accordance with the RA. "Awardee" refers to anyone who might receive a prime award from the Government. "Subawardee" refers to anyone who might receive a subaward from a prime awardee (e.g., subawardee, consultant, etc.).

B. Fundamental Research

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

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

As of the date of publication of this solicitation, the Government expects that program goals as described herein may be met by proposers intending to perform fundamental research and does not anticipate applying publication restrictions of any kind to individual awards for fundamental research that may result from this solicitation. DARPA will not select proposals for negotiation of an award if the proposal is deemed to be Applied Research, or otherwise requires Controlled Unclassified Information (CUI) restrictions. Inclusion of publication costs is highly discouraged, proposed costs should focus on program goals and objectives. Please see FAQ for additional information.

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

(a) The University or non-profit research institution performer or recipient must establish and maintain an internal process or procedure to address foreign talent programs, conflicts of commitment, conflicts of interest, and research integrity. The academic or non-profit research performer or recipient must also utilize due diligence to identify Foreign Components or participation by Senior/Key Personnel in Foreign Government Talent Recruitment Programs and agree to share such information with the Government upon request.

   i. The above described information will be provided to the Government as part of the proposal response to the solicitation and will be reviewed and assessed prior to award. Generally, this information will be included in the Research and Related Senior/Key Personnel Profile (Expanded) form (SF-424) required as part the proposer's submission through Grants.gov.

      1. Instructions regarding how to fill out the SF-424 and its biographical sketch can be found through Grants.gov.

   ii. In accordance with USD(R&E) direction to mitigate undue foreign influence in DoD-funded science and technology, DARPA will assess all Senior/Key Personnel proposed to support DARPA grants and cooperative agreements for potential undue foreign influence risk factors relating to professional and financial activities. This will be done by evaluating information provided via the SF-424,

and any accompanying or referenced documents, in order to identify and assess any associations or affiliations the Senior/Key Personnel may have with foreign strategic competitors or countries that have a history of intellectual property theft, research misconduct, or history of targeting U.S. technology for unauthorized transfer. DARPA's evaluation takes into consideration the entirety of the Senior/Key Personnel's SF-424, current and pending support, and biographical sketch, placing the most weight on the Senior/Key Person's professional and financial activities over the last 4 years. The majority of foreign entities lists used to make these determinations are publicly available. The DARPA Countering Foreign Influence Program (CFIP) "Senior/Key Personnel Foreign Influence Risk Rubric" details the various risk ratings and factors. The rubric can be seen at the following link:
https://www.darpa.mil/attachments/092021DARPACFIPRubric.pdf

iii. Examples of lists that DARPA leverages to assess potential undue foreign influence factors include, but are not limited to:

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

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

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

i. Upon conclusion of the negotiations, if DARPA determines, despite any proposed mitigation terms (e.g. mitigation plan, alternative research personnel), the participation of any Senior/Key Research Personnel still represents high risk to the program, or proposed mitigation affects the Government's confidence in proposer's capability to successfully complete the research (e.g., less qualified Senior/Key Research Personnel) the Government may determine not to award the proposed effort. Any decision not to award will be predicated upon reasonable disclosure of the pertinent facts and reasonable discussion of any possible alternatives while balancing program award timeline requirements.

(d) Failure of the academic or non-profit research performer or recipient to reasonably exercise due diligence to discover or ensure that neither it nor any of its Senior/Key Research Personnel involved in the subject award are participating in a Foreign Government Talent Program or have a Foreign Component with an a strategic competitor or country with a history of targeting U.S. technology for unauthorized transfer may result in the Government exercising remedies in accordance with federal law and regulation.

i. If, at any time, during performance of this research award, the academic or non-profit research performer or recipient should learn that it, its Senior/Key Research Personnel, or applicable team members or subtier performers on this award are or are believed to be participants in a Foreign Government Talent Program or have Foreign Components with a strategic competitor or country with a history of targeting U.S. technology for unauthorized transfer , the performer or recipient will notify the Government Contracting Officer or Agreements Officer within 5 business days.

1. This disclosure must include specific information as to the personnel involved and the nature of the situation and relationship. The Government will have 30 business days to review this information and conduct any necessary fact-finding or discussion with the performer or recipient.

2. The Government's timely determination and response to this disclosure may range anywhere from acceptance, to mitigation, to termination of this award at the Government's discretion.

3. If the University receives no response from the Government to its disclosure within 30 business days, it may presume that the Government has determined the disclosure does not represent a threat.

ii. The performer or recipient must flow down this provision to any subtier contracts or agreements involving direct participation in the performance of the research.

(e) Definitions

i. Senior/Key Research Personnel

1. This definition would include the Principal Investigator or Program/Project Director and other individuals who contribute to the scientific development or execution of a project in a substantive, measurable way, whether or not they receive salaries or compensation

under the award. These include individuals whose absence from the project would be expected to impact the approved scope of the project.

2. Most often, these individuals will have a doctorate or other professional degrees, although other individuals may be included within this definition on occasion.

ii. Foreign Associations/Affiliations

1. Association is defined as collaboration, coordination or interrelation, professionally or personally, with a foreign government-connected entity where no direct monetary or non-monetary reward is involved.

2. Affiliation is defined as collaboration, coordination, or interrelation, professionally or personally, with a foreign government-connected entity where direct monetary or non-monetary reward is involved.

iii. Foreign Government Talent Recruitment Programs

1. In general, these programs will include any foreign-state-sponsored attempt to acquire U.S. scientific-funded research or technology through foreign government-run or funded recruitment programs that target scientists, engineers, academics, researchers, and entrepreneurs of all nationalities working and educated in the U.S.

2. Distinguishing features of a Foreign Government Talent Recruitment Program may include:

    a. Compensation, either monetary or in-kind, provided by the foreign state to the targeted individual in exchange for the individual transferring their knowledge and expertise to the foreign country.

    b. In-kind compensation may include honorific titles, career advancement opportunities, promised future compensation or other types of remuneration or compensation.

    c. Recruitment, in this context, refers to the foreign-state-sponsor's active engagement in attracting the targeted individual to join the foreign-sponsored program and transfer their knowledge and expertise to the foreign state. The targeted individual may be employed and located in the U.S. or in the foreign state.

    d. Contracts for participation in some programs that create conflicts of commitment and/or conflicts of interest for researchers. These contracts include, but are not limited to, requirements to attribute awards, patents, and projects to the foreign institution, even if conducted under U.S. funding, to recruit or train other talent recruitment plan members, circumventing merit-based processes, and to replicate or transfer U.S.-funded work in another country.

    e. Many, but not all, of these programs aim to incentivize the targeted individual to physically relocate to the foreign state. Of particular concern are those programs that allow for continued employment

at U.S. research facilities or receipt of U.S. Government research funding while concurrently receiving compensation from the foreign state.

3. Foreign Government Talent Recruitment Programs DO NOT include:
    a. Research agreements between the University and a foreign entity, unless that agreement includes provisions that create situations of concern addressed elsewhere in this section,
    b. Agreements for the provision of goods or services by commercial vendors, or
    c. Invitations to attend or present at conferences.

iv. Conflict of Interest

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

v. Conflict of Commitment

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

vi. Foreign Component

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

f. Any activity of the University that may have an impact on U.S. foreign policy through involvement in the affairs or environment of a foreign country.

3. Foreign travel is not considered a Foreign Component.

vii. Strategic Competitor

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

III. Eligibility Information

All responsible sources capable of satisfying the Government's needs may submit a proposal that shall be considered by DARPA. Historically Black Colleges and Universities, Small Businesses, Small Disadvantaged Businesses and Minority Institutions are encouraged to submit proposals and join others in submitting proposals; however, no portion of this announcement will be set aside for these organizations' participation due to the impracticality of reserving discrete or severable areas of this research for exclusive competition among these entities.

A. Eligible Applicants

Participation is open to individuals who are U.S. Citizens, U.S. Permanent Residents, and Foreign Nationals who meet the eligibility criteria listed below:

- Proposers must be one of the following (excluding any personal leaves of absence) by the full proposal deadline listed in Part One: Overview Information:
    - current Tenure-Track Assistant/Associate Professors;
    - current Tenured faculty within 3 years of their Tenure date; or
    - an equivalent at a non-profit research institution within 12 years of the receipt of their Ph.D.
- All proposers must be employed at a U.S. institution, which includes those in U.S. states and territories. Proposals from outside these regions will not be accepted.
- Individuals who have previously received a YFA Award are not eligible for this or any future YFA program.
- Former DARPA Program Managers are not eligible to apply for funding under this program.
- Researchers working at Federally Funded Research and Development Centers and Government Entities are not eligible to apply as PIs for funding under this program; however, they may be proposed as subawardees provided they meet the requirements in Section III.A.1.a. Please see Section VIII.C for teaming.
- Non-U.S. individuals employed by U.S. institutions 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.

- At the executive summary phase, proposing PIs are limited to one executive summary per TA. At the full proposal phase, proposing PIs are limited to submitting only one full proposal to only one topic under this RA. Submitting more than one full proposal may result in all of the PI's proposal submissions being determined non-conforming and being removed from award consideration. A proposer is strongly encouraged to submit an executive summary in advance of a full proposal to determine DARPA's interest and minimize the effort and expense of preparing an out of scope proposal.
- Recipients of non-YFA DARPA awards are eligible to propose. Proposers must provide a listing of federal support (past, current, and pending). This list must include the sponsor, amount, and performance dates of all federally-funded research efforts and should be present on the submission cover sheet as indicated in Section IV.

There is no limit to the number of applications that can be submitted by an institution; however, each submission must have a single PI. Submissions to young investigator programs sponsored by other agencies are not restricted.

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

FFRDCs may be proposed as subawardees under YFA, but are subject to applicable direct competition limitations and cannot propose to this solicitation in any capacity unless they meet the following conditions: (1) FFRDCs must clearly demonstrate, with specific details, that the proposed work, expertise, and facilities are not otherwise available from the private sector, and (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 subawardees. FFRDC proposals that do not include these elements may be deemed non-conforming and removed from consideration.

3. **Government Entities**

Government Entities (e.g., Government/National laboratories, military educational institutions, etc.) may be proposed as subawardees under YFA, and 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.

4. **Authority and Eligibility**

At the present time, DARPA does not consider 15 U.S.C. § 3710a to be sufficient legal authority to show eligibility. While 10 U.S.C.§ 4892 may be the appropriate statutory starting point for some entities, specific supporting regulatory guidance, together with evidence of agency approval, will still be required to fully establish eligibility. DARPA will consider FFRDC and Government Entity eligibility submissions on a case-by-case basis; however, the burden to prove eligibility for all team members rests solely with the proposer.

5. **Foreign Entity Participation**

Non-U.S. organizations may not propose to this RA in any capacity.

B. Organizational Conflicts of Interest

2 CFR §200.112 Conflict of Interest and 2 CFR §200.318 General procurement standards

In accordance with 2 CFR §200.112 and 2 CFR §200.318, proposers are required to identify and disclose all facts relevant to potential organizational conflicts of interest (OCI) involving the proposer's organization and *any* proposed team member (subawardee, consultant). Under this Section, the proposer is responsible for providing this disclosure with each proposal submitted to the solicitation. The disclosure must include the proposer's, and as applicable, proposed team member's OCI mitigation plan. The OCI mitigation plan must include a description of the actions the proposer has taken, or intends to take, to prevent the existence of conflicting roles that might bias the proposer's judgment and to prevent the proposer from having unfair competitive advantage. The OCI mitigation plan will specifically discuss the disclosed OCI in the context of each of the OCI limitations.

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 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.

Government Procedures

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

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

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

Include any OCI affirmations and disclosures in Attachment D: PROPOSAL TEMPLATE VOLUME 2: ADMINISTRATIVE & NATIONAL POLICY REQUIREMENTS, Section 3.

C. Cost Sharing/Matching

Cost sharing is not required.

IV. Application and Submission Information

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

- The proposed concept is applicable to the technical and topic areas described herein;
- The proposed concept is important to DARPA's current investment portfolio;
- The proposed concept investigates an innovative approach that enables revolutionary advances, i.e., will not primarily result in evolutionary improvements to the existing state of practice;
- The proposed work has not already been completed (i.e., the research element is complete but manufacturing/fabrication funds are required);
- The proposer has not already received funding or a positive funding decision for the proposed concept (whether from DARPA or another Government agency);
- The proposer must meet the eligibility requirements outlined in Section III; and
- Only requests for grants may be considered.

Executive summaries and full proposals that are not found to be applicable to the YFA RA as defined above may be deemed non-conforming[3] and removed from consideration. All executive summaries and full proposals must provide sufficient information to assess the validity/feasibility of their claims as well as comply with the requirements outlined herein for submission formatting, content and transmission to DARPA. Executive summaries and full proposals that fail to do so may be deemed non-conforming and removed from consideration. Proposers will be notified of non-conforming determinations via letter.

A. Address to Request Application Package

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

B. Content and Form of Application Submission

1. Executive Summary Information and Formatting

As stated above, proposers are strongly encouraged to submit an executive summary in advance of a full proposal to minimize effort and reduce the potential expense of preparing an out-of-

[3] "Conforming" is defined as having been submitted in accordance with the requirements outlined herein.

scope proposal. DARPA intends to conduct a blind review of submitted executive summaries. Institution and Key Personnel identifying information must be present on only the Executive Summary Cover Sheet, which will be separated from the remaining text prior to DARPA conducting its review. If Institution or Key Personnel identifying information is found after the Executive Summary Cover Page, the executive summary may be deemed non-conforming, and may not be reviewed. DARPA will respond to executive summaries with a statement as to whether DARPA is interested in the idea. Regardless of DARPA's response to an executive summary, proposers may submit a full proposal. DARPA will review all conforming full proposals using the published evaluation criteria (See Section V.A) and without regard to any comments resulting from the review of an executive summary. Proposers should note that a favorable response to an executive summary is not a guarantee that a proposal based on the executive summary will ultimately be selected for award negotiation.

Executive summaries submitted in response to this solicitation may anticipate a response within approximately 30 calendar days. These notifications will be sent via email to the Technical POC and/or Administrative POC identified on the Executive Summary Cover Sheet.

Proposing PIs are limited to one executive summary per TA. Proposers are encouraged to carefully consider the descriptions of the TAs before submission. Each executive summary submission must specify *only one* of these TAs for their submission and identify this TA on the submission cover sheet. Executive summaries that do not clearly address a specific topic may be deemed non-conforming and may not be reviewed. DARPA reserves the right to assign executive summaries to a different topic area than indicated by the proposer.

All proposers are required to use the template provided as Attachment A: EXECUTIVE SUMMARY TEMPLATE to this solicitation on https://sam.gov/ and http://www.grants.gov. Executive summaries must not be submitted to DARPA via email. See Section IV.E.1 for executive summary submission instructions.

2. Full Proposal Information and Formatting

Full proposals must consist of both volumes described below in addition to the Grants.gov application package. To assist in proposal development, templates for these volumes are posted as attachments to this solicitation on https://sam.gov/ and on http://www.grants.gov. The templates are specific to each volume, as outlined below.

- **Volume 1**
    - Attachment B: PROPOSAL SUMMARY SLIDE TEMPLATE
    - Attachment C: PROPOSAL TEMPLATE VOLUME 1: TECHNICAL & MANAGEMENT
- **Volume 2**
    - Attachment D: PROPOSAL TEMPLATE VOLUME 2: ADMINISTRATIVE & NATIONAL POLICY REQUIREMENTS

Full Proposals that do not include the appropriate attachments as detailed here may be deemed non-conforming and may not be evaluated.

Budget Justification should be provided as Section L of the SF 424 Research & Related Budget form provided via http://www.grants.gov. The Budget Justification should include the following

information for the recipient and all subawardees:

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

Proposing PIs are limited to one full proposal submission to only one TA under this RA. Submitting more than one full proposal may result in all of the PI's proposal submissions being determined non-conforming and being removed from award consideration.

Potential applicants are encouraged to carefully consider the descriptions of the TAs before submission. A full proposal must specify ONE and only one of these TAs for the submission and identify this TA on the submission cover sheet. Full proposals that do not clearly address a specific topic may be deemed non-conforming and may not be reviewed. DARPA reserves the right to assign proposals to a different TA than indicated by the proposer.

Full proposals must not be submitted to DARPA via email. See Section IV.E.1.b for proposal submission instructions.

3. Proprietary Information

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

4. Security Information

All proposals and supporting documentation must be unclassified, and all awards made under this RA will be unclassified. Only proposals determined to be proposing Fundamental Research can be deemed selectable. DARPA will not select proposals for negotiation of an award if the proposal is deemed to be Applied Research, or otherwise requires Controlled Unclassified Information (CUI) restrictions.

C. Submission Dates and Times

Proposers are warned that submission deadlines as outlined herein are in Eastern Time and will be strictly enforced. When planning a response to this solicitation, proposers should take into account that some parts of the submission process may take from one business day to one month

to complete (e.g., registering for a SAM.gov Unique Entity Identifier (UEI) number or Taxpayer Identification Number (TIN)).

DARPA will acknowledge receipt of *complete* submissions via email and assign identifying numbers that should be used in all further correspondence regarding those submissions. If no confirmation is received within two business days, please contact the RA Administrator at YFA2024@darpa.mil to verify receipt.

1. Executive Summaries

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

2. Full Proposals

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

D. Funding Restrictions

Not applicable.

E. Other Submission Requirements

1. Submission Instructions

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

a. Executive Summaries

DARPA/DSO will employ an electronic upload submission system (https://baa.darpa.mil/) for all executive summaries sent in response to this solicitation. Executive summaries must not be submitted via Grants.gov, via hard copy, or email. Note: If an account has recently been created for the DARPA BAA Website, this account may be reused. Accounts are typically disabled and eventually deleted following 75-90 days of inactivity – if you are unsure when the account was last used, it is recommended that you create a new account. If no account currently exists for the DARPA BAA Website, visit the website to complete the two-step registration process. Submitters will need to register for an Extranet account (by clicking "Create New Account" 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 proposal. Note: Even if a submitter's organization has an existing registration, each user submitting a proposal must create their own Organization Registration.

All executive summaries must be uploaded as zip archives (i.e., files with a .zip or .zipx

extension). The final zip archive should be no greater than 100 MB in size. Only one zip archive will be accepted per submission - subsequent uploads for the same submission will overwrite previous uploads, and submissions not uploaded as zip archives will be rejected by DARPA.

Proposers may encounter heavy traffic on the submission deadline date; proposers should start this process as early as possible. Technical support for the DARPA BAA Submission website is available during regular business hours, Monday – Friday, 9:00 a.m. – 5:00 p.m. Requests for technical support must be emailed to BAAT_Support@darpa.mil with a copy to YFA2024@darpa.mil. Questions regarding submission contents, format, deadlines, etc. should be emailed to YFA2024@darpa.mil. Questions/requests for support sent to any other email address may result in delayed/no response.

b. Proposals

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

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

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

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

Form 2: The Research and Related Senior/Key Person Profile (Expanded) form, available on the Grants.gov website at https://apply07.grants.gov/apply/forms/sample/RR_KeyPersonExpanded_3_0-V3.0.pdf, will be used to collect the following information for all senior/key personnel, including Project Director/Principal Investigator and Co-Project Director/Co-Principal Investigator, whether or not the individuals' efforts under the project are funded by the DoD. The form includes 3 parts: the main form administrative information, including the Project Role, Degree Type and Degree

Year; the biographical sketch; and the current and pending support. The biographical sketch and current and pending support are to be provided as attachments:

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

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

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

i. Electronic Upload

DARPA encourages grant proposers to submit their proposals via electronic upload at http://www.grants.gov/web/grants/applicants/apply-for-grants.html. Proposers electing to use this method must complete a one-time registration process on Grants.gov before a proposal can be electronically submitted. *If proposers have not previously registered, this process can take up to four weeks so* registration should be done in sufficient time to ensure it does not impact a

proposer's ability to meet required submission deadlines. Registration requirements and instructions are outlined at http://www.grants.gov/web/grants/register.html.

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

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

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

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

ii. Direct Mail/Hand-carry

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

V. Application Review Information

A. Evaluation Criteria

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

- **Overall Scientific and Technical Merit**

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

The proposed technical team has the expertise and experience to accomplish the proposed tasks. Task descriptions and associated technical elements provided are complete and in a logical sequence with all proposed deliverables clearly defined such that a final outcome that achieves the goal can be expected as a result of award. The proposal identifies major technical risks, and planned mitigation efforts are clearly defined and feasible. The proposed schedule aggressively pursues performance metrics in an efficient time frame that accurately accounts for the

anticipated workload.

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

The potential contributions of the proposed effort bolster the national security technology base and support DARPA's mission to make pivotal early technology investments that create or prevent technological surprise. The proposed intellectual property restrictions (if any) will not significantly impact the Government's ability to transition the technology.

- **Cost Realism**

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

B. Review and Selection Process

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

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

1. Handling of Source Selection Information

DARPA policy is to treat all submissions as source selection information and to only disclose their contents to authorized personnel. Restrictive notices notwithstanding, submissions may be handled by support contractors for administrative purposes and/or to assist with technical evaluation. All DARPA support contractors performing this role are expressly prohibited from performing DARPA-sponsored technical research and are bound by appropriate nondisclosure agreements. DARPA may also request input on technical aspects of the proposals from other non-Government consultants/experts who are strictly bound by the appropriate non-disclosure requirements.

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

C. Countering Foreign Influence Program (CFIP)

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

D. Federal Awardee Performance and Integrity Information (FAPIIS)

Following the review and selection process described above, DARPA is required[4] to review and consider any information available through the designated integrity and performance system (currently FAPIIS). Selectees have the opportunity to comment on any information about themselves entered in the database. DARPA will consider any comments and other information in FAPIIS or other systems prior to making an award.

VI. Award Administration Information

A. Selection Notices

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

B. Administrative and National Policy Requirements

1. Solicitation Provisions and Award Clauses, Terms and Conditions

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

For terms and conditions specific to grants, see the DoD General Research Terms and Conditions (latest version) at https://www.nre.navy.mil/work-with-us/manage-your-award/manage-grant-award/grants-terms-conditions and the supplemental DARPA-specific terms and conditions at http://www.darpa.mil/work-with-us/contract-management#GrantsCooperativeAgreements.

The above information serves to put potential proposers and awardees on notice of proposal requirements and award terms and conditions to which they may have to adhere.

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

All proposers must be registered in SAM unless exempt per 2 CFR §25.110. See https://www.darpa.mil/work-with-us/grantsagreements for further information.

[4] Per 41 U.S.C. 2313, as implemented by 2 CFR § 200.205.

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

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

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

3. Representations and Certifications

All proposers are required to submit supplementary DARPA-specific representations and certifications at the time of proposal submission. See http://www.darpa.mil/work-with-us/reps-certs for further information on required representation and certification.

4. Intellectual Property

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

If proposers desire to use proprietary computer software or technical data or both as the basis of their proposed approach, in whole or in part, they should: (1) clearly identify such software/data and its proposed particular use(s); (2) explain how the Government will be able to reach its program goals (including transition) within the proprietary model offered; and (3) provide possible nonproprietary alternatives in any area that might present transition difficulties or increased risk or cost to the Government under the proposed proprietary solution. Proposers expecting to use, but not to deliver, commercial open source tools or other materials in implementing their approach may be required to indemnify the Government against legal liability arising from such use.

a. Intellectual Property Representations

All proposers must provide a good faith representation of either ownership or possession of appropriate licensing rights to all other intellectual property to be used for the proposed project. Proposers must provide a short summary for each item asserted with less than unlimited rights that describes the nature of the restriction and the intended use of the intellectual property in the conduct of the proposed research. See ATTACHMENT D: PROPOSAL TEMPLATE VOLUME 2: ADMINISTRATIVE & NATIONAL POLICY REQUIREMENTS, Section 4.

b. Patents

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

c. Grant Awards

Proposers shall follow the applicable rules and regulations governing grants and should appropriately identify any potential restrictions on the Government's use of any intellectual property contemplated under these awards. This includes both noncommercial items and commercial items. The Government may use the list as part of the evaluation process to assess the impact of any identified restrictions and may request additional information from the proposer to evaluate the proposer's assertions. Failure to provide full information may result in a determination that the proposal is non-conforming. A template for complying with this request is provided in ATTACHMENT D: PROPOSAL TEMPLATE VOLUME 2: ADMINISTRATIVE & NATIONAL POLICY REQUIREMENTS, Section 4.

5. 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.

6. Electronic Invoicing and Payments

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

7. Electronic and Information Technology

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

8. Publication of Grant Awards

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.

C. Reporting

1. Technical and Financial Reports

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

2. Patent Reports and Notifications

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

VII. Agency Contacts

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

- **Technical POC**: Rohith Chandrasekar, Program Manager, DARPA/DSO
- **RA Email:** YFA2024@darpa.mil
- **RA Mailing Address:**

  DARPA/DSO
  ATTN: DARPARA2401
  675 North Randolph Street
  Arlington, VA 22203-2114

- **DARPA/DSO Opportunities Website:** http://www.darpa.mil/work-with-us/opportunities

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

VIII. Other Information

In order to ensure that U.S. scientific and engineering students will be able to continue to make strategic technological advances, DARPA is committed to supporting the work and study of Ph.D. students and post-doctoral researchers that began work under a DARPA-funded program awarded through an assistance instrument. Stable and predictable federal funding enables these students to continue their scientific and engineering careers.

To that end, should a DARPA funded program awarded through a grant or cooperative agreement with a university or a Research Other Transaction pursuant to 10 U.S.C. § 4021 where the university is a participant end (due to termination or down-select) before the planned program completion, DARPA may continue to fund, for no more than two semesters (or equivalent), the documented costs to employ or sponsor Ph.D. students and/or post-doctoral researchers. Should such a circumstance arise, the following will take place:

1) The Government will provide appropriate notification to the University participant by the Agreements Office or through the prime performer.
2) The University must make reasonable efforts to find alternative research or employment opportunities for these students and researchers.

3) Before any costs will be paid, the University must submit documentation describing their due diligence efforts in finding alternative arrangements that is certified by a University official.

4) In addition to this documentation, the affected students and researchers must submit statements of work describing what research activities they will pursue during the period of funding and the final deliverable they will submit when the funding is complete.

5) In determining these costs, DARPA will rely on information from the University's original proposal unless specific circumstances warrant requesting updated proposals. In no circumstances will this funding be provided when the program is ended because of suspected or actual fraud or negligence.

DARPA Down-Select Definition:

DARPA often structures programs in phases or options that include specific objectives and a designated period of performance. This may result in potentially issuing multiple awards to maximize the number of innovative approaches. This approach allows the Government to monitor progress and enables programmatic decision points based, at a minimum, against stated evaluation criteria, metrics, funding availability, and program goals and objectives. As a result, select performers may advance via award of a subsequent phase or through exercise of a planned option period.

A. Program Overview Slides

The YFA Program Overview slide presentation will be posted at: http://www.darpa.mil/work-with-us/opportunities.

B. Frequently Asked Questions (FAQs)

Administrative, technical, and contractual questions should be emailed to YFA2024@darpa.mil. All questions must be in English and must include the name, email address, and the telephone number of a point of contact.

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

C. Collaborative Efforts/Teaming

This RA solicits single Principal Investigator (PI) proposals; no co-PIs are allowed. However, investigators will be given the opportunity to propose teaming if the nature of the proposal requires it. The total, combined value of teaming and subcontract awards will be limited to no more than 30% of the total grant value. Non-U.S. organizations may not be proposed as subawardees. Please see guidance for FFRDCs and Government Entities in Section III.A.1.a and III.A.1.b. Specific content, communications, networking, and team formation will be the sole responsibility of the participants.