ARMY RESEARCH OFFICE

FUNDING OPPORTUNITY

ANNOUNCEMENT (FOA) FOR

DEVCOM ARL HBCU/MI Research Partnerships

W911NF-24-S-0002

ISSUED BY:

U.S. Army Contracting Command
Aberdeen Proving Ground
Research Triangle Park Division
P. O. Box 12211
Research Triangle Park, NC 27709-2211

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I. OVERVIEW OF THE FUNDING OPPORTUNITY

A. Required Overview Content

1. Agency Name
Army Research Office, a directorate of the U.S. Combat Capabilities Development Command Army Research Laboratory (DEVCOM ARL)

Issuing Acquisition Office
U.S. Army Contracting Command-Aberdeen Proving Ground, Research Triangle Park (ACC-APG-RTP) Division

2. Research Opportunity Title
DEVCOM ARL HBCU/MI Research Partnerships

3. Announcement Type
Initial Announcement

4. Research Opportunity Number
W911NF-24-S-0002

5. Catalog of Federal Domestic Assistance (CFDA) Number and Title
12.431 – Basic Scientific Research

6. Response Dates

a. Questions
Questions regarding this FOA must be submitted via email (usarmy.rtp.devcom-arl.mbx.hbcu-mi-programs@army.mil) by December 22, 2023 at 11:59 PM Eastern Time.

b. Whitepapers
January 19, 2024 no later than 4:00 PM Eastern Time

c. Selection of whitepapers for full proposal by February 26, 2024

d. Applications (also referred to as "Proposals" in this FOA)
March 29, 2024 no later than 4:00 PM Eastern Time

B. Additional Overview Information

The DoD agencies involved in this program reserve the right to select for award all, some, or none of the proposals submitted in response to this announcement. The participating DoD agencies will provide no funding for direct reimbursement of whitepaper or proposal development costs.

Whitepapers and proposals submitted in response to this FOA will not be returned to the applicant. It is the policy of participating DoD agencies to treat all proposals as sensitive, competitive information and to disclose their contents only for the purposes of evaluation.

An applicant may withdraw a proposal at any time before award by written notice or by email sent to one of the Agency Contacts listed in this FOA.

Proposals submitted to this FOA must address elements of one of the Technical Program areas listed in Section II.B of this document. Additional information on the scope of the funding areas is listed below.

This will be a two-step application process:

The application process under this FOA consists of a Whitepaper stage and a Proposal stage. The purpose of requesting Whitepapers is to minimize the effort associated with the production of detailed proposals for those applicants that have little chance of being selected for funding. The Government's decision to invite a Proposal will be based upon the evaluation results of a timely and compliant Whitepaper submission. Only Whitepapers of the highest merit will receive an invitation from the Government to submit a Proposal. **An Applicant that does NOT submit a timely and compliant whitepaper, is NOT eligible to submit a Proposal for consideration for funding. An Applicant that does NOT receive an invitation from the Government to submit a Proposal is NOT eligible to submit a Proposal.** An Applicant invited to submit a Proposal will receive feedback on their Whitepaper.

(End of Section)

II. DETAILED INFORMATION ABOUT THE FUNDING OPPORTUNITY

A. PROGRAM DESCRIPTION

1. Overview

U.S. Army Combat Capabilities Development Command (DEVCOM) Army Research Laboratory (ARL) Historically Black College and University (HBCU)/Minority-Serving Institution (MI) Research Partnership.

Under the DEVCOM ARL HBCU/MI Research Partnership, funding will be provided for HBCU/MIs to support basic research focused on partnerships with major DEVCOM ARL research programs. The focus of this effort is to advance innovative basic research in areas of strategic importance to the Army by bringing competitively selected HBCU/MI research teams into existing Army Futures Command (AFC) Collaborative Research Alliances (CRAs), Collaborative Technology Alliances (CTAs), and research centers. The Army CRAs, CTAs, and centers work with Army, industry, and other academic partners to conduct and transition research to technology demonstration.

This is a call for HBCUs/MIs to submit whitepapers expressing their interest in participating in new research partnerships with opportunities and to recruit, educate, and train outstanding students and post-doctoral researchers through participation in collaborative research in science and technology areas relevant to the Army. This opportunity will establish three to five new HBCU/MI research partnerships, each selected to enhance existing research under an individual Army CRA, CTA, and/or center.

Whitepapers are to be submitted addressing one of the seven ARL research program opportunities described in Section II.B. The format and content of the Whitepapers, and for invited proposals, as well as submission information, are described below and in the following sections. Whitepapers may be submitted to more than one of the seven ARL Programs; however, each Program requires a separate submission. Further, while there is no limit on the number of Whitepapers submitted by each institution, each named Principal Investigator from an institution can submit only one Whitepaper to each of the seven ARL Programs.

2. <u>Army Center for Synthetic Biology</u>

a. Background

The Army Center for Synthetic Biology is a basic research program initiated by the Combat Capabilities Development Command (DEVCOM)/Army Research Laboratory (ARL)/Army Research Office (ARO). It focuses on areas of strategic importance to U.S. national security. It seeks to increase the Army's intellectual capital in synthetic biology and improve its ability to address future challenges. The Army Center for Synthetic Biology brings together universities, research institutions, companies, and individual scholars and supports multidisciplinary and cross-institutional projects addressing specific topic areas determined by the Department of the Army (DA). The Army Center for Synthetic Biology aims to promote research in specific areas of synthetic biology and to promote a candid and constructive relationship between the Army Science and Technology (S&T) enterprise and the synthetic biology research community.

Proposed efforts under this opportunity will collaborate and cooperate with performers executing awards issued previously under prior funding opportunities for the Army Center for Synthetic Biology and with DEVCOM ARL and other organizations within the Army S&T Enterprise. Proposals must include collaboration plan that describes how collaboration, cooperation, and communication will be accomplished among proposing team members, other awardees under the Army Center for Synthetic Biology, and researchers within DEVCOM ARL and other organizations within the Army S&T Enterprise. All awardees are expected to collaborate and cooperate with and among each other as well as researchers within DEVCOM ARL and other organizations within the Army S&T Enterprise in order to achieve unity of effort toward the goals of the Army Center for Synthetic Biology.

b. Research Thrusts for the Army Center for Synthetic Biology

The technical scope of the Center is defined along the following thrust areas: 1) Predictive Design of Engineered Biological Materials, 2) Predictive Design of Engineered Cellular Systems in Defined Environments.

i. Predictive Design of Engineered Biological Materials

The objective of this thrust is to develop experimental and computational tools enabling the scalable synthesis, assembly and characterization of rationally designed biological materials with control over final material properties. Proposers are encouraged to focus efforts in this thrust on materials exhibiting more than one material property (multifunctional materials) for which a biological solution is anticipated to exceed material properties currently attainable via traditional chemical and/or materials science approaches. Properties of interest include, but are not limited to: optical, mechanical, structural, computational/logic functions. Proposers must provide rationale for the materials and properties selected. A major goal of this thrust is the development of generalizable predictive tools that will support the rational design of multifunctional biological materials beyond those selected for experimental investigation under the Army Center for Synthetic Biology.

Sub-areas within in this thrust could include: comprehensive sampling of the biological material property landscape; material analytical characterization tools; predictive design tools. Additional detail, challenges, and knowledge gaps related to these sub-areas are indicated below:

(1) *Comprehensive sampling of the biological material property landscape*
The development of predictive tools enabling the rational design of multifunctional materials with targeted properties will depend upon robust experimental data sets that comprehensively correlate resultant material properties to specific biological features. Challenges include, but are not limited to: development of approaches to experimentally generate and comprehensively characterize large libraries of variants of the selected material(s); determination of the relevant biological features impacting the material properties of interest (e.g., genetic sequence, molecular structure, epigenetic modification, post-translational modification, molecular interactions, biotic-abiotic interfaces, etc.); delineation of the boundaries of the biological feature-material property landscape.

(2) *Material analytical characterization tools*

Robust characterization tools will be required to analyze the large material variant libraries and provide high-quality pedigreed data for the development of predictive tools. Challenges include, but are not limited to: development of high-throughput analytical methods for characterization, screening and selection of variants with targeted multifunctional material properties; development of sensitive, non-destructive characterization tools that enable analysis of buried interfaces.

(3) *Predictive design tools*
A major goal of this thrust is the development of generalizable predictive tools that will support the rational design of multifunctional biological materials. Challenges include, but are not limited to: development of a comprehensive informatics pipeline; development of robust predictive tools that enable informed design using synthetic biology to produce biological materials with targeted multifunctional properties; creation of algorithms that extract the critical biological features underlying material properties; development of strategies and techniques supporting extrapolation of property prediction to the macroscale; testing and validation of the computational tools/pipelines via prediction of variants required to realize a given set of multifunctional properties, experimental production of the engineered biological material specimens, and characterization of the structure and properties of the resulting materials.

This is not an all-inclusive list, but is provided to help potential Applicants target their proposals appropriately.

ii. Predictive Design of Engineered Cellular Systems in Defined Environments

The objective of this thrust is to develop experimental and computational tools that support the predictive design of engineered cellular consortia in a defined environment. Proposers must provide rationale for the consortia composition, environment and engineered function(s) selected for study. Environments of interest include, but are not limited to: geological systems (e.g., soil, rock), interfaces in the built environment, and corrosive systems. Specifically excluded are the human/animal environments. Engineered functions of interest include, but are not limited to: extraction of valuable elements/materials, waste decomposition, sense and respond, and corrosion prevention. All experimental efforts under this thrust must be conducted in a controlled laboratory setting (e.g., surrogate environment) that accurately reflects the relevant natural environmental conditions anticipated for future operational performance (e.g., aqueous and non-aqueous composition, temperature, humidity, etc.).

Sub-areas within this thrust could include: genetic modification of consortia; stability of engineered biological modifications; control of engineered function. Additional detail, challenges, and knowledge gaps on these sub-areas are indicated below:

(1) *Genetic modification of consortia*
Within the environments of interest, any engineered organisms will exist within consortia that also contain non-engineered organisms. A goal of this thrust is to develop approaches to selectively modify specific organisms within a naturally occurring consortia. Challenges include, but are not limited to: development of relevant surrogate environment(s); development of tools to genetically manipulate environmentally robust chassis organisms (e.g., fungi, extremophiles); development of methods to effectively target specific organisms within a consortium for genetic

modification; development of approaches to genetically modify specific members of a consortium while the consortium is located within a defined environment.

(2) *Stability of engineered genetic modifications*
Detailed analysis of the stability of engineered genetic modifications within the context of a consortium is critical not only to ensure the reliable function of the engineered organisms, but also to prevent unintended impacts on the non-engineered organisms within the consortium. Challenges include, but are not limited to: analysis of the fate of engineered DNA within the consortium, including gene transfer, persistence, mutation, etc.; determination of the impact of environmental variation (e.g. temperature, humidity, surface material, etc.) on the function and stability of engineered genetic modifications within the context of a consortium.

(3) *Control of engineered function*
A major goal of this thrust is to gain fundamental understanding of the interactions between engineered microorganisms and the biological, chemical and physical parameters of their environment to inform the predictive design of engineered approaches to support robust controlled performance in a defined environment. Challenges include, but are not limited to: development of approaches to experimentally measure the impact of the biological, chemical and physical parameters of the environment on the function of engineered microorganisms in the context of a consortium; design of engineered biological programs that support tightly regulated activation and inactivation of engineered function; generation of computational models that describe the environmental interactions impacting the function of engineered microorganisms with and without the addition of engineered biological control schemes; development and validation of predictive tools that identify optimal control schemes to support prolonged regulated function of engineered organisms within a given environment and consortium composition.

c. Technical Point of Contact: Dr. Stepanie McElhinny, stephanie.a.mcelhinny.civ@army.mil, 919-549-4240

3. Ultra-Wide Bandgap (UWBG) RF Center

a. Background

The Army ultra-wide bandgap (UWBG) RF Electronics Center is a multidisciplinary basic research center for extreme-radio-frequency electronics (x-RF electronics) based on ultra-wide bandgap (UWBG) semiconductors and related emerging materials. It will facilitate collaboration between extramural academic researchers and the Army in pursuit of a mutual goal: generating the foundational knowledge in solid-state physics, device structures, integrated circuit design, materials discovery and development, and physics-based machine learning needed to enable the next generation of RF electronics with unprecedented power, bandwidth, frequency agility, and size-weight-and-power (SWaP) requirements. The Center will provide the Army with a new ability to create advanced RF technologies across its modernization priorities for robust multi-domain operations in highly contested electromagnetic (EM) environments. In particular, the Center aims to create RF electronic device structures that break the power

density limit of WBG materials, maintain at least 10 dB of gain, and demonstrate at least an order of magnitude improvement in power density (W/mm) over current SoA WBG RF devices, especially in the upper millimeter-wave/submillimeter-wave regions of the EM spectrum.

The Center will develop methodologies to design, integrate, and fabricate UWBG semiconductors and related materials into RF electronic devices, and characterize these devices in terms of RF performance, carrier physics, thermal metrology, reliability, etc. Significant fundamental advances in the physics and materials science of UWBG semiconductors, with band gaps exceeding 4 eV, will be critical to realizing this goal. ARO seeks approaches that integrate strong theory, modelling, and experimental efforts. ARO also anticipates that the scale of this effort, the amount of data generated, and the desire to search and optimize over wide design parameter spaces for novel materials and device concepts, will be impossible to manage without complementary basic research in artificial intelligence (AI) and, in particular, in physics-informed machine learning (ML) and uncertainty quantification (UQ).

b. Topic Areas

The topic areas for the UWBG RFE Center consists of three main topics: UWBG Semiconductor Physics and Devices, UWBG Materials, and Physics-Driven Machine Learning for UWBG Materials and RF Device Development. Proposals are encouraged to address one, several, or all these areas.

i. UWBG Semiconductor Physics and Devices

Electric fields oscillating at high frequency and intensity in a semiconductor present an extreme environment for charged carriers, and the physics of these carriers under such extreme conditions is poorly understood. For example, researchers lack a complete understanding about how holes and electrons interact with photons, phonons, polarons, other electrons/holes, and other quasiparticles, both in the bulk of the materials and at interfaces. Deeper insight into heat generation and transport within a device and across interfaces, and methods to characterize this at extreme power/frequency, is also needed. To date this has required scientists and engineers to rely on extrapolation and Edisonian approaches to develop new device concepts that are poorly optimized or faulty. The Center will establish principled understanding of governing physical phenomena from models capable of coupling nonlinear active dynamics with full-wave electromagnetic calculations, and capture interactions at frequencies where the size of active structures is comparable to the wavelength. The goal of this topic is to create RF electronic device structures that break the power density limit of GaN, maintain at least 10 dB of gain, and demonstrate at least an order of magnitude improvement in power density (W/mm) over current SoA WBG RF devices. These metrics should be pursued particularly in the upper millimeter-wave/submillimeter-wave regions of the EM spectrum: 90 - 1000 GHz. Subtopics under this thrust include the following:

a) UWBG Semiconductor Physics
b) UWBG Semiconductor Devices
c) Novel approaches to integration of WBG/UWBG semiconductors

ii. UWBG Materials

The goal of this topic is to realize electronic-grade UWBG semiconductor materials, with material properties that surpass GaN, the current state-of-the-art semiconductor for RF electronics. The

Center will explore UWBG materials synthesis and characterization, both experimentally and theoretically, and the use of AI/ML techniques for discovering new UWBG materials, and for optimizing their properties for device structures. Example UWBG materials of interest include, but are not limited to, aluminum gallium nitride (AlGaN), aluminum nitride (AlN), cubic boron nitride (c-BN), and diamond. A complete set of synthesis and processing tools will be critical for the success of the Center. Critical materials-related issues include, but are not limited to, large area substrate and film growth, device homoepitaxy and heteroepitaxy, device contact and surface passivation, modeling and characterization of defect behavior, modeling and characterization of dopant incorporation and activation, and discovery of new compound UWBG materials. Complementary efforts examining novel approaches to RF materials are also expected to be useful; these may include examining unusual growth methods, examining new integration approaches that may allow existing materials (e.g., GaN, Ga2O3) to overcome shortcomings that would otherwise limit their utility for high-power RF electronics, or even considering exotic materials concepts, like 2D materials, twistronics, or topological materials, as potential platforms for next generation RF electronics. Subtopics under this thrust include the following:

a) Novel approaches to large area, uniform growth of UWBG semiconductors
b) Fundamental studies of growth processes, defects, and doping in UWBG semiconductors
c) Discovery of new UWBG semiconductors and alternative materials for RF electronics

iii. Physics-Driven AI/ML for UWBG Materials and Device Discovery

The goal of this topic is to develop AI/ML methodologies that allow for a more efficient sampling of materials phase space, thermodynamic energy landscapes, and RF electronic device design, with quantified uncertainty, in order to reduce the reliance on empirical and Edisonian approaches to discovery and design. The sheer breadth and depth of available parameter space in UWBG materials design and RF electronic device design necessitates the use of data-driven techniques, like AI and ML, to guide and inform efficient theory development, simulation, and experimentation. Because available data for UWBG materials and devices are limited, diverse, and expensive to generate, an alternative, physics-based machine learning (ML) approach is warranted. While ML techniques can and have been proven to help in finding patterns in large datasets, their use with smaller datasets with the incorporation of physical laws and constraints in lieu of large datasets is still in its nascent stage of development. A physics-aware ML approach, wherein ML learned and corrected for the discrepancy between the simulations and real-world observations, could potentially outperform a pure trial-and-error ML training strategy. Similarly, ML could enable us to derive more value from existing physics-based simulations. This type of approach will be one of the thrusts in the work carried out under this Center.

c. Technical Point of Contact: Dr. Tom Oder, tom.n.oder.civ@army.mil, 919-549-4297

4. Energetics Basic Research Center (EBRC)

a. Background

The EBRC is a basic research program initiated by DEVCOM-ARL. It focuses on areas of strategic importance to U.S. national security; it seeks to increase the Army's intellectual capital in energetic

materials (EM) and improve its ability to address future challenges. EBRC brings together universities, research institutions, companies, and individual scholars and supports multidisciplinary and cross-institutional projects addressing specific topic areas determined by the Department of the Army (DA). The EBRC aims to promote research in specific areas of EMs and to promote a candid and constructive relationship between DA and the energetics research community.

The future Army is projected to be unable to achieve dominance in range and lethality due to inadequate energetic formulations and form factor limitations associated with current weapon systems. Basic research generates new knowledge that may be exploited to develop and deliver new materials and technologies that contribute to enhanced lethal effects at the system level as well as increased range and a smaller payload. These, in turn, enable space for larger, mission-critical systems, and shorter time-to-target ensuring Army battlefield dominance in Multi-Domain Operations. Army research must encompass new ways to expedite the discovery, design, and scale-up of new materials and concepts which when integrated into newly designed weapons components (e.g. additively manufactured high strength steels with pre-formed fragmentation patterns, and structural reactive materials) developed at ARL and across the Army and DoD communities, will deliver decisive weapons overmatch.

To achieve the desired future technological overmatch, advances must be made in new synthetic methodologies targeting novel energetic materials to increase performance for both explosive and propulsion applications. Physics-based synthesis (e.g., processes that use pressure, mechanical action, electromagnetic fields and/or high-energy plasmas) can potentially access materials outside those available via classical chemical synthesis, allowing exploitation of novel, non-traditional materials capable of explosive energy release (e.g., dense metastable extended solids such as doped poly-nitrogen, structural-bond-energy release materials, composite reactive materials).

Further, fundamental understanding leading to control of energy storage and release for explosive and propellant applications is required. Current knowledge gaps are extensive relying largely based on empirical rules of thumb used to identify targets. We still do not know the answers to basic questions such as “what makes a good explosive?” To address these gaps, validated multiscale models and advanced experimentation capable of capturing the relevant physics and chemistries of violent, rapid reacting events are needed to identify and understand controlling mechanisms and rates of energy release under the full range of conditions for a variety of energetic materials. This information should be able to inform the design, synthesis, and formulation of novel, stable, high-energy density materials for advanced explosive and propellant concepts. This fundamental understanding will lead to breakthrough materials and concepts.

Strong collaborations between DoD and academia are necessary to overcome challenges associated with achieving the desired goals. Some of these challenges include: developing methods and materials allowing for the manipulation of energy release rates; exploitation of structures and features across length scales, fundamental understanding of the initiation, break-up, and fragmentation during and after detonative energy release; and advanced models and experimental methodologies to capture the relevant chemistry and physics. Tackling these will require a large comprehensive cooperative effort (while also allowing for single effort exploratory efforts for high-risk concepts) with a strong emphasis on new material synthesis (that targets advanced performance) with related experimental and theoretical characterization, performance evaluation, and concept development to fully exploit the totality of available energy. Listed below are knowledge gaps and basic research opportunities which are to be addressed by the EBRC. These are discussed in further detail in the topic area sub-section below.

i. Novel materials and synthesis methods
ii. Microstructure and geometry influence on energetic release
iii. Advanced diagnostics and modeling

Seven efforts are currently underway in the EBRC, one large, team-oriented center (Center) which addresses all three of the topic areas above and six single investigator-type awards (Seedlings) which each address at least one of the topic areas above. The Center and Seedling awards collaborate and cooperate among themselves and with DEVCOM-ARL. It is expected that awards under this FOA will collaborate and cooperate similarly. Whitepapers and subsequent invited proposals under this topic must address at least one of the three thrust areas above.

b. Topic Areas

The purpose of this topic is to solicit ideas across a wide range of disciplines, including chemistry, physics, materials science, and engineering. Discovery and innovation that enable the rapid and effective exploration and validation of novel energetic materials is the main objective. These ideas should lead to and demonstrate significant advancements in the energy density, sensitivity, structural properties, synthesis, and prediction of properties and characteristics of energetic materials and energetic material systems. This topic focuses on basic research as defined at 32 CFR 22.105.

The technical scope of the initiative is defined along the following thrust areas: 1) novel materials and synthesis methods, 2) microstructure and geometry influence on energetic release, 3) advanced diagnostics and modeling.

i. Novel Materials and Synthesis Methods

For the purposes of this topic, novel methods is meant to be a comprehensive term for concepts that can be clearly distinguished from traditional materials or approaches. Materials developed under this area will require advanced diagnostics to accurately and rapidly assess performance and survivability metrics, as well as requiring novel theoretical tools to guide synthesis chemists and aid in optimizing final materials. Sub-areas within in this thrust could include: inorganic chemistry, organic chemistry, structural energetics, next generation synthesis techniques, and radiation interactions for driving chemistry. Additional detail, challenges, and knowledge gaps, on these sub-areas are indicated below:

(1) *Inorganic chemistry* includes the architecture and/or formulation of aluminum or other high energy metal or organometallic articles (including alloys, composites, coatings) to increase energy release rates. These materials also include non-traditional "non-CHNO" energetic materials. These materials will target higher detonation velocities, blast effects, thermal outputs, as well as enhancing rocket propellants through the reduction of two-phase flow losses. Challenges include but are not limited to: control of ignition times, temperatures, and burn times; independent control of initiation and combustion conditions; material stabilization (heat, moisture, etc.); energy density; understanding multi-phase reactions; interfacial physics and chemistry; breakup and fragmentation influence on ignition and initiation.

(2) *Organic chemistry* includes the architecture and/or formulation of energetic binders/plasticizers, and energetic materials for explosive and propellant applications. These materials will target higher detonation velocities, blast effects, thermal outputs, as well as enhancing rocket propellants through increased performance and mechanical properties.

Challenges include lack of fundamental understanding of polymers in formulations as pertains to stress/strain properties; aging; impact of high temperatures; interfacial chemistry between polymers and energetic material crystals; and generation of new energetic polymer binders.
(3) *Structural energetics* includes exploring and synthesizing energetic materials targeting enhanced mechanical properties that can support significant loads with little deformation while maintaining high energy content and energy release rates. Challenges include the discovery and development of novel materials and understanding the effect of microstructure on ignition, reaction rates, and strength.
(4) *Next generation synthesis techniques* will consider the ability to scale up new and known compounds in new chemical spaces coupled with minimization of synthesis steps through the advancement of synthesis techniques. This will also enable the synthesis of previously notional compounds. Challenges include developing sufficient understanding of the intermediate synthesis chemistry to reduce steps. Predicting the contribution of individual molecules in formulations as well as the contribution of intermediate species and compounds during steps towards target species is also a significant challenge. Development of fast synthesis reactions that could enable flow instead of traditional batch processing is a possible research target in this sub-area.
(5) *Radiation interactions for driving chemistry* include exploring the driving reaction chemistry towards specific pathways through radiation (microwave, visible, infrared, ultraviolet, etc.) or plasmas. Exploration of these novel synthesis techniques will enable the synthesis of previously notional compounds as well as possibly reducing or speeding up the intermediate synthetic steps. Challenges include identifying controlling mechanisms and species/radiation interactions. The ability to control and stabilize non-equilibrium chemistry and chemical kinetics is critical.

This is not an all-inclusive list, but is provided to help potential authors to target their proposals appropriately.

ii. Microstructure and Geometry Influence on Energetic Release

Research into the role microstructure and geometry play in the performance, response, and survivability of materials and formulations is crucial in maximizing gains in energetic material performance. Models and processing techniques developed under this line of effort will require advanced diagnostics to accurately and rapidly evaluate material characteristics, as well as requiring novel theoretical tools to gain fundamental understanding of the relevant physics and chemistry occurring across time and length scales. Sub-areas within in this thrust could include: exploiting microstructure in EM response; and energy focusing, geometry, and sequencing. Additional detail, challenges, and knowledge gaps, on these sub-areas are indicated below:
(1) *Exploiting microstructure in EM response* includes understanding the role of microstructure on performance and the physical / mechanical properties required to enable engineering solutions to formulations and system level response. Advances in this area will allow for the design and control of mechanical response and performance increases through control over physical microstructure and not solely through stored chemical energy. Challenges and gaps include the ability to image, in real-time, the evolution of microstructure during reactive and non-reactive events. Understanding how the microstructure evolves under extreme conditions (temperature, vibration) is necessary. Development of understanding of the connectivity across scales (from molecular to meso/grain scale) is critical. Another challenge is developing understanding of how shockwaves interact with material grain boundaries, material interfaces, and material defects.

(2) *Focusing, geometry, and sequencing* involves the exploration of novel geometries to exploit advanced materials geometries (possibly via advanced manufacturing techniques) and form-factors to maximize energy density and other performance gains through manipulation of large-scale interactions between different munition materials and material boundaries and interfaces. Advances in this area will allow for the design and control of mechanical response and performance increases through control over large scale physical structure and not solely through stored chemical energy. Challenges include understanding the directing and focusing of shockwave and phonon energy to achieve desired energetic performance. Challenges also include phonon and acoustic coupling to chemistry especially involving interfaces and defects and where the material under question may be undergoing extreme strain at extreme pressures with significant temperature gradients.

This is not an all-inclusive list, but is provided to help potential authors to target their proposals appropriately.

iii. Advanced Diagnostics and Modeling

Research into advanced diagnostics and modeling is essential for characterization and understanding of the effects of novel chemistries, formulations, structures, and non-linear effects controlling performance and material response. Research will be driven to identification and fundamental understanding of factors controlling EM processes occurring through chemistries at extreme states, providing exploitable information leading to control the output of EM. Advances in diagnostics and modeling and simulation (M&S) are also needed for understanding of burning rate dependence on pressure to enable design of propellants with extended plateau burning behavior. Techniques developed under this thrust could be employed in a "fail early, fail fast" optimization approach to enable the rapid development of novel materials and concepts. Sub-areas within in this thrust could include: next generation diagnostics and advanced M&S. Additional detail, challenges, and knowledge gaps, on these sub-areas are indicated below
(1) *Next generation diagnostics* are needed to advance small-scale tests designed to correctly reflect large-scale performance and mechanical metrics (all performance metrics, stability, etc.). These advanced diagnostics should enable experimental stepping up in scale, ensuring translation between the small (milligram to gram scale) to system (kilogram and higher) level performance, and will be tied closely with modeling at each step, culminating in models capable of a priori prediction of system performance. Challenges in this area include obtaining a fundamental understanding of what is "lost" in scaling (particle interaction, additional heat and radiative losses, levels of turbulence in surrounding atmosphere, loss of "run-up" time/distance). Additional challenges include imaging and optical diagnostics into/through dense clouds and opaque materials, and quickly obtaining equations of state with small sample sizes.
(2) *Advanced modeling and simulation* are needed to fully understand and subsequently enable tailoring of target materials, formulations, processing conditions, initiation, micro- and macro-structures, overall performance, and mechanical properties. Challenges include capturing relevant chemistry and physics with computational efficiency to enable design and characterization *in silico*. Modeling challenges would include determining suitable performance, mechanical, and multi-species/component metrics for target molecules, developing reduced order models (including machine-learned surrogate models) that depict full chemical mechanisms obtained from quantum mechanical models, overcoming difficulties associated with limited data for verification and validation, uncertainty quantification, and determination of appropriate use of machine learning and artificial intelligence methods and methodologies.

This is not an all-inclusive list, but is provided to help potential authors to target their proposals appropriately.

c. Technical Point of Contact: Dr. Ralph Anthenien, ralph.a.anthenien2.civ@army.mil, 919-549-4317

5. Scalable, Adaptive, and Resilient Autonomy (SARA)

a. Background

The Scalable, Adaptive, and Resilient Autonomy (SARA) program is focused on developing and experimentally accelerating emerging research in autonomous mobility and maneuverability, scalable heterogeneous and collaborative behaviors, and human agent teaming. Component-level autonomy technologies developed in SARA are expected to enable adaptive and resilient Intelligent Systems that can reason about the environment, work in distributed and collaborative heterogeneous teams, and make decisions at a relevant operational tempo to enable Autonomous Maneuver in complex and contested environments. The SARA program consists of a series of technology sprint efforts executed in annual program cycles. Each topic is focused on addressing a different scientific area within the scope of the broad research aims of SARA. Each topic is carefully chosen based on program achievements from the previous year, on scientific and technological advancements by the broader research community, and in a way that systematically converges on the specific long-term SARA program goals.

b. Topic Areas

In order to achieve this vision, advancements are needed in the following areas:

- Novel methods for all-terrain ground and aerial maneuver to interact with and move through complex environments.
- Methods for scalable and heterogeneous collaborative behaviors in support of collaborative air and ground manned-unmanned teaming operations.
- Techniques for improved perception, decision-making, and adaptive behaviors for fully autonomous maneuver in contested environments.
- Methods, metrics, and tools to facilitate, simulate, and enable testing and evaluation of emerging approaches for intelligent and autonomous systems under Army relevant constraints and environments.
- Experimental testbeds to develop and refine knowledge products to inform and transition technology to Army stakeholders.

c. Point of Contact: Mr. Eric Spero, eric.spero.civ@army.mil, 240-687-7334

6. Strengthening Teamwork for Robust Operations in Novel Groups (STRONG)

a. Background

Rapid advancements in computational capabilities, machine learning and AI, have led to the capabilities of machines to dramatically outperform humans across several dimensions critical to task performance and decision making. However, humans maintain a deep, intuitive, and immediate understanding of the world that is critical, and is, as yet, unmatched by machine intelligence. The STRONG program re-envisions human-machine partnerships and seeks to develop to novel concepts and methods that effectively partner Soldiers with machines in collaborative systems in order to create capabilities that surpass either humans or machines along on a wide variety of decision making, intelligence and creative reasoning tasks. Successful approaches will directly challenge the notion of humans as operators of technology in order to allow partnerships which can adapt to extreme complexity, time constraints, and informational uncertainty. In order to enable these adaptive systems, humans and machines will need to be able to work together in a seamless way across individual human and machine capabilities, changes in team composition, and adaptation to changing conditions.

b. Topic Area

Capitalize on the potential of these newly developing adaptive technologies the STRONG program focuses on developing anti-disciplinary approaches which combine insights from neuroscience, machine learning, mathematics and teaming sciences. Research should focus on combining human and machine intelligences in novel ways to create new forms of hybrid intelligences going beyond the possible in todays state of the art. Example research areas of interest may: 1, Explore novel methodologies to understand and enhance the performance of integrated teams of humans and computational agents, particularly in tasks necessitating hybrid intelligence and adaptation.; 2, Cultivate groundbreaking, task-agnostic human-guided ML capabilities. These should bolster team efficacy, facilitating seamless co-adaptation between human and machine teammates. Crucially, this should demand minimal preliminary knowledge of agent competencies from the human participants, while still ensuring superior team performance.; 3, Design human-machine teaming frameworks powered by neuro-inspired algorithms. These intelligent agents should capitalize on the latest discoveries in neuroscience to interface with humans ergonomically; 4, Develop hybrid intelligence models tailored to expedite decision-making processes. Additionally, these paradigms should address creative ideation challenges that neither machines nor humans can tackle in isolation. Possible approaches might encompass, but are not restricted to, machine-enabled crowdsourcing, neuromodulation, and unique large scale human-AI partnerships. Including combinations of the above areas.

c. Point of Contact: Dr .David Boothe, david.l.boothe7.civ@army.mil, 301-996-2329

7. Army AI Innovations Institute (A2I2)

a. Background

The Army AI Innovation Institute (A2I2) is the Army's premier basic science research and technology transition program focused on Artificial Intelligence and Machine Learning (AI/ML). A2I2's research program aims to advance and enhance AI/ML algorithms and software to aid Soldiers' ability to

achieve operational overmatch in future multi-domain operations battlefield. In particular, A2I2 seeks to improve AI/ML and autonomous agents' ability to improve air/ground reconnaissance and expeditionary maneuver capabilities. By developing AI/ML algorithms and software, A2I2 strives to establish fundamental capabilities that Soldier can use to compete in an increasingly fast-pace and chaotic battlefield that will exceed what human cognitive capacity can handle alone. Toward these goals, A2I2 research is currently focused in three primary areas: (1) Scene understanding for adversarial threats, degraded visual environments, and tracking of moving objects; (2) Robotics movement over rugged terrain requiring limited human engagement and correction; and (3) Secure and informative data sharing among multiple autonomous systems and human collaborators.

b. Topic Area

A2I2 is seeking to expand the state of the art in AI/ML to achieve overmatch over near-peer adversaries in a dynamic battlefield that will only increase in complexity over time, especially with the rise of artificial intelligence and machine learning (AI/ML). Mixed-entity battlefields will involve the strengths and weaknesses of human and autonomous actors as well as human and artificial intelligence applied to information-processing and decision-making objectives. Two mission types take on greater significance for Army research in AI/ML: expeditionary maneuver and ai/ground reconnaissance. Expeditionary maneuver refers to missions that require strategic placement and movement of Warfighters and their assets in a battlefield to gain overmatch versus adversaries. Air/ground reconnaissance refers to missions to obtain information about environmental threats and adversary activity from sensor or autonomous assets operating on the ground or in the air. These and other types of missions require capabilities that may be developed via AI/ML in autonomous agents, sensors, or edge computing resources. A2I2 also aims to provide unique data processing algorithms to provide information to human decision-makers in ways that support the human's cognitive processing needs and expansion of a repository of proven AI/ML algorithms, data, and software. Examples of results of AI/ML research of interest to the Army include new robotic movement capabilities, cognitive modeling integration with AI processes, advances in cyber-security for autonomous agents, new AI simulation processes, advanced sensing in Degraded Visual Environments (DVEs), improved object recognition, and advanced machine learning techniques.

c. Point of Contact: Dr. Dan Cossenti, daniel.n.cassenti.civ@army.mil, 301-394-2138

8. Tactical Behaviors for Autonomous Maneuver (TBAM)

a. Background

Future Army forces will be called upon to operate and maneuver in multi-domain operations (MDO), against a modern and capable peer adversary. The battlefield of the future may impose additional constraints on maneuver forces such as disruption in communication as well as positioning services. To field a highly capable fighting force in this future battlefield, novel tactics and doctrines leveraging nascent technologies in robotics and autonomous systems (RAS) will need to be developed. Teams of RAS will serve an increasingly critical role in the future force to deliver situational awareness, defend key locations or positions, or take point in dynamic and hazardous situations. Resilience to disruptions, failures, or unexpected scenarios, is a key quality for teams of RAS to operate alongside other future Army forces. The US Army Combat Capabilities Development Command (DEVCOM) Army Research

Laboratory (ARL) is focused on developing fundamental understanding and informing the art-of-the-possible for warfighter concepts through research to greatly improve the scope of mission capabilities of teams of RAS, develop robust and resilient approaches to plan under extreme conditions of uncertainty, to learn coordinated strategies for groups of agents to achieve a common objective, all within a complex maneuver environment including adversaries. The Tactical Behaviors for Autonomous Maneuver Collaborative Research Program (TBAM-CRP) is focused on developing and experimentally evaluating coordinated and individual behaviors for small groups of autonomous agents to learn doctrinal as well as novel tactics for maneuvering in military relevant environments. The TBAM-CRP will leverage developments in other internal and extramural programs as well as identify new research directions to find novel solutions to these maneuver problems in analogical simulations representing complex realistic terrain.

b. Topic Area

Army Robotics and Autonomous Systems (RAS) will need to operate in environments which are not addressed by the commercial research and development sector. These RAS systems will have the ability to maneuver through complex terrains including urban scenarios incorporating prepared surfaces as well as off-road traversal, in unstructured scenarios with natural obstacles such as forests, jungles, deserts, and undulating terrain with watershed features such as wet gaps, as well as in rural settings with boundary fences, walls, and sparse structures. In each of these scenarios, contact with potential adversarial positions is a constant concern – in some situations this contact should be avoided through use of terrain features and cover; in other missions the adversary positions should be met with a posture of tactical overmatch through coordinated maneuver - the synchronized actions of a distributed system.

The operational scenario for Cycle 1 is entitled “Movement to Contact”. In this scenario, the team is maneuvering to a defined position within large-scale simulated environments with complex terrain of the types described above (forest/jungle, undulating desert / grassland with watershed features, rural settings with boundary fences). The team should choose routes which maximize cover and concealment and maneuver as if adversary contact were imminent. Autonomous agents should provide cover for their advancing teammates.

In order to demonstrate these capabilities, research is needed to advance algorithms for navigation in cover, multi-agent learning, reasoning and decision making under uncertainty, and distributed algorithms which are robust to attrition. Key components which differentiate this topic from existing internal and external research programs include a specific focus on:

- Exploiting terrain and cover as opposed to operations in sparse or permissive environments.
- Scenarios involving capable adversaries which are counter-maneuvering rather than operating without opposition
- The need to synchronize motion and other effects across a team instead of a focus on individual platforms
- Recognition of evolving and dynamic phases of operation and the need for transition between tactical behaviors across a team instead of static and simple scenarios

- Changing roles within team based on phase of operation, terrain or other semantics, as well as scenario changes such as due to attrition or resource / power availability rather than well-defined and fixed relationships or capabilities

c. **Point of Contact**: Dr. John G. Rogers III, john.g.rogers59.civ@army.mil, 301-394-1811

(End of section)

B. FEDERAL AWARD INFORMATION

It is anticipated the awards will be made in the form of cooperative agreements to allow for maximum interaction, cooperation, and collaboration between the Government and the awardee. The awards will be made at funding levels commensurate with the proposed research, investigator/team type, as well as availability of funding. We realize the preparation of a research proposal often represents a substantial investment of time and effort by the applicant. Therefore, in an attempt to minimize this burden, we are requiring applicants interested in funding under this FOA to submit whitepapers describing the type of research effort to be proposed. Whitepapers received will be reviewed by a Government panel. A detailed description of the whitepaper submissions can be found in Section D.

Applications of the highest merit will be invited to submit full proposals. The determination that a proposal should be invited will be made by the Government and communicated to the applicants. An Applicant that does NOT receive an invitation from the Government to submit a Proposal is NOT eligible to submit a Proposal. Only those applicants invited by the Government will be eligible to submit a proposal.

Under this funding opportunity, the awards for full proposals will contain a base period for 48 months with up to one option period for twelve months. The base and option periods may be incrementally funded. Selection of proposals for awards will be contingent on the availability of funds.

DEVCOM ARL plans to award up to five (5) cooperative agreements at a total cost of $2,020,000 each over a duration of 5 years, with funding profile of $350,000 in year one, $350,000 in year two, $440,000 in year three, $530,000 in year four, and $350,000 in year five. Awards will be made only to extremely meritorious proposals. Proposals submitted in excess of this amount will not be considered. Exercise of the year five option will be subject to the availability of funds.

VERY IMPORTANT: There is no guarantee that any of the proposals submitted will be recommended for funding. More than one proposal may be recommended for funding associated with a single collaborative research program. On the other hand, it is possible that a particular collaborative research program may have no full proposals invited or have no proposals be recommended for funding.

Whitepapers and proposals must clearly state which ARL Collaborative Research Program (Section II.B) it is being submitted under for consideration.

The ACC-APG RTP Division has the authority to award a variety of instruments on behalf of ARO. Anticipated awards will be made in the form of cooperative agreements. to allow for maximum interaction, cooperation, and collaboration between the Government and the Recipient. The following is a brief description of cooperative agreements:

Cooperative Agreement. A legal instrument which, consistent with 31 U.S.C. 6305, is used to enter into a relationship as follows:

a. The principal purpose of which is to transfer a thing of value to the recipient to carry out a public purpose of support or stimulation authorized by a law or the United States, rather than to acquire property or services for the Federal Government's direct benefit or use.

b. In which substantial involvement is expected between the Federal Government and the recipient when carrying out the activity contemplated by the cooperative agreement.

c. No fee or profit is allowed.

Cooperative agreements for institutions of higher education, nonprofit organizations, foreign organizations, and foreign public entities are primarily governed by the following:

a. Federal statutes
b. Federal regulations
c. 2 CFR Part 200
d. 2 CFR 1104
e. 32 CFR Parts 21, 22, 26, and 28
f. DoD Research and Development General Terms and Conditions
g. Agency-specific Research Terms and Conditions

(End of section)

C. ELIGIBILITY INFORMATION

1. Eligible Applicants

This opportunity is only open to HBCU/MIs as provided in 10 U.S.C. § 4144, eligibility for this competition is open only to "covered educational institutions," which are defined as:

a. institutions of higher education eligible for assistance under Title III or V of the Higher Education Act of 1965 (20 U.S.C. 1051 et seq.); or

b. accredited post-secondary minority institutions.

Enrollments, accreditation, and other factors may affect an institution's eligibility in any given year. With the exception of HBCUs and Tribal Colleges and Universities (TCUs), for which eligibility can be readily validated with the U.S. Department of Education (DoEd), in order to meet the eligibility criterion noted above, an institution must apply to the DoEd each year for Title III or Title V eligibility. **A copy of the DoEd letter dated November 2022 or later certifying eligibility** for Title III or Title V assistance must be included with each Whitepaper submitted under this program. The eligibility letter will not be count toward the page limit. If the DoEd eligibility letter is not submitted, DEVCOM ARL will utilize the current DoEd eligibility lists (Fiscal Year 2023) to validate the eligibility of a proposing institution. If DEVCOM ARL cannot verify the eligibility of a submitting institution, the whitepaper will be considered ineligible and will not be reviewed or considered for proposal invitation and funding.

Whitepapers and proposals will be evaluated only if they are for fundamental scientific study and experimentation directed toward advancing the scientific state of the art or increasing basic knowledge and understanding. Whitepapers and proposals focused on specific devices or components are beyond the scope of this FOA.

2. Cost Sharing or Matching

Generally, there is no requirement for cost sharing, matching, or cost participation to be eligible for award under this FOA. Cost sharing and matching is not an evaluation factor used under this FOA.

In addition, if cost sharing is proposed on a cooperative agreement proposal submitted by a nonprofit or institution of higher education, the award will be subject to the restrictions at 2 CFR 200.306.

(End of section)

D. Application and Submission Information

1. Address to View FOA

This FOA may be accessed via the following websites:

a. Grants.gov (www.grants.gov)
b. ARL website https://www.arl.army.mil/collaborate-with-us/opportunity/arl-baa/

Amendments to this FOA, if any, will be posted to these websites when they occur. Interested parties are encouraged to periodically check these websites for updates and amendments.

Digital copies of submission forms can be downloaded from https://www.arl.army.mil/resources/baa-forms/. Paper copies of submission forms are available upon request from the point of contact identified for a given topic.

The following information is for those wishing to respond to this FOA:

2. Whitepaper Preparation and Submission

a. WHITEPAPER CONTENT

(1) COVER PAGE (not to exceed one page):

The whitepaper cover page shall include at a minimum: Title of the whitepaper, name and contact information of the individual and organization submitting the whitepaper, which of the seven ARL Programs is being proposed under and the FOA number.

(2) TECHNICAL CONTENT (not to exceed four pages):

i. Scientific (max. 3 pages) - Address the following questions: What is your basic idea? Why is it innovative? What are the technical challenges to this idea you will be focused on with your research? What are the scientific and technical approaches to overcome the challenges? In general terms, how do you plan to interact/coordinate with other research partners in the Center/CRA?

ii. Impact (max. 0.5 page) - If successful, how will this work improve the capabilities of future systems?

iii. Programmatic (max. 0.5 page) – To the extent known at this point, provide details on the research team (if more than one PI), timeline, deliverables, and estimated cost of the research. Brief per year descriptions are an acceptable level of granularity.

(3) ADDENDUM (not to exceed one page):

Include biographical sketches of the key personnel who will perform the research, highlighting their qualifications and experience.

b. PROPRIETARY INFORMATION: Any proprietary data must be clearly marked. The applicant must also identify any technical data or computer software contained in the whitepaper that is to be managed by the Government with restrictions, limited rights in technical data and restricted rights in computer software. In the absence of such identification, the Government will conclude there are no limitations or restrictions on technical data or computer software included in the whitepaper. Records or data bearing a restrictive legend may be included in the whitepaper. It is the intent of the Army to treat all whitepapers as procurement sensitive and to disclose their contents to Government employees or designated support contractors only for the purpose of evaluation.

c. WHITEPAPER SUBMISSION: Whitepaper submissions are due (with DoEd eligibility letter as described above) to usarmy.rtp.devcom-arl.mbx.hbcu-mi-programs@army.mil by the date and time in Section I, page 1 of this FOA. Please email a copy of your submission before the deadline. VERY IMPORTANT: Applicants are responsible for submitting their whitepaper in sufficient time to avoid the possibility of late receipt (for any reason, including technical difficulties). Submissions received after the deadline will be deemed ineligible and no further consideration will be given to them.

d. WHITEPAPER EVALUATION: The Government will acknowledge receipt of each whitepaper submission via a return email to the submitter. The whitepaper will be evaluated for the concept's scientific merit, technical and resource plausibility, collaboration plan, and potential contributions of the effort to the Army and DoD mission. Applicants whose whitepapers are evaluated as having significant scientific merit may be invited to submit a full proposal. An applicant may not submit a proposal without submitting a whitepaper and receiving a proposal invitation from the government. Once the decision has been made as to which whitepapers will be invited for a full proposal submission, the submitter will be informed that either: 1) the whitepaper has been selected for a full proposal submission; or 2) the whitepaper submission is not being considered further in connection with the ARL HBCU/MI Research Partnership Program FOA. Further feedback concerning Whitepaper submissions for which a full proposal is *not* invited may be provided to submitters, but is not guaranteed.

3. Proposal Preparation and Submission

a. ELIGIBILITY. An Applicant that does NOT submit a timely and compliant whitepaper is NOT eligible to submit a proposal for consideration for funding. Only applications of the highest merit will receive an invitation from the Government to submit a proposal. An Applicant that does NOT receive an invitation from the Government to submit a proposal is NOT eligible to submit a proposal.

b. RESEARCH SOUGHT AND DURATION. Proposals for up to $350,000 for years one and two, $440,000 in year 3, $530,000 in year 4, and $350,000 in year five, are sought for research in the areas identified in the research topic area sections under the ARL Program Descriptions in this FOA (Section II.B). The awards will contain a forty-eight month base award and one twelve month option period.

Faculty and/or post-doctoral associates as well as graduate research assistants at the applicant and partner institutions may participate in the project and assist the PI as co-PI or in another capacity. HBCUs/MIs applying under this FOA may propose collaboration with one or more degree-granting Institutions of Higher Education (IHEs). Collaborations with entities other than degree-granting IHEs are not permitted. Any proposed collaborations with IHEs should be explained in the narrative as well as the budget justification. Collaborating IHEs are not required to be covered educational institutions, as defined in Section II.C.1 of this FOA. Collaborators together may not account for more than 50% of the total budget. An HBCU/MI applying under this FOA must account for at least 50% of the total budget.

c. PROPOSAL CONTENT.

i. COVER PAGE:

(1) A Cover Page, using the SF 424 (R&R) Form is required. Proposals will not be processed a SF 424 (R&R) Form.

(2) Should the project be carried out at a branch campus or other component of the applicant, that branch campus or component should be identified in the space provided (Block 12 on the SF 424 (R&R) Form).

(3) The title of the proposed project should be brief, scientifically representative, intelligible to a scientifically-literate reader, and suitable for use in the public domain.

(4) Funding and Duration - Proposals can be for up to $350,000 for years one and two, $440,000 in year 3, $530,000 in year 4, and $350,000 in year five. The duration will be a forty-eight month base award and one twelve month option period.

(5) Pursuant to 31 U.S.C. 7701, as amended by the Debt Collection Improvement Act of 1996 [Section 31001(I)(1), Public Law 104-134] and implemented by 32 CFR 22.420(d), federal agencies shall obtain each awardees' Taxpayer Identification Number (TIN). The TIN is being obtained for purposes of collecting and reporting on any delinquent amounts that may arise out

of an awardees' relationship with the Government.

(6) Applicants must provide their organization's Unique Entity Identifier (UIE) (formerly Data Universal Number System (DUNS)).

(7) Applicants must provide their assigned Commercial and Government Entity (CAGE) Code. The CAGE Code is a 5-character code assigned and maintained by the Defense Logistics Service Center (DLSC) to identify a commercial plant or establishment.

ii. TABLE OF CONTENTS:

Use the following format for the Table of Contents. Forms are available at https://www.arl.army.mil/resources/baa-forms/

SECTION	PAGE NUMBER
Table of Contents	A-1
Statement of Disclosure Preference (Form 52 or 52A)	B-1
Research and Related Other Project Information	B-2
Project Abstract	C-1
Project Description (Technical Proposal)	D-1 - D-□
Biographical Sketch	E-1 - E-□
Bibliography	F-1 - F-□
Current and Pending Support	G-1 - G-□
Facilities, Equipment, and Other Resources	H-1 - H-□
Proposal Budget	I-1 - I-□
Contract Facilities Capital Cost of Money (DD Form 1861)	J-1
Appendices List Appendix Items: _____	K-□

This format applies to all proposals. Applicants should show the location of each section of the proposal, as well as major subdivisions of the project description.

iii. STATEMENT OF DISCLOSURE PREFERENCE (FORM 52 OR 52A): Complete and sign ARO Form 52A (Educational and Nonprofit Organizations).

iv. RESEARCH AND RELATED OTHER PROJECT INFORMATION: Must be completed and signed by all applicants.

v. PROJECT ABSTRACT:

(1) The project abstract shall be completed on the form entitled "Publicly Releasable Project Abstract" found at the following website: https://www.arl.army.mil/resources/baa-forms/

(2) Unless otherwise instructed in this FOA, the project abstract shall include a concise statement of work and basic approaches to be used in the proposed effort. The abstract should include a statement of scientific objectives, methods to be employed, and the significance of the proposed effort to the advancement of scientific knowledge. This abstract should also identify under which of the 7 ARL Programs this proposal is being submitted.

(3) The abstract should be no longer than one (1) page (maximum 4,000 characters).

(4) The project abstract shall be marked by the applicant as publicly releasable. By submission of the project abstract, the applicant confirms that the abstract is releasable to the public. For a proposal that results in a grant award, the project abstract will be posted to a searchable website available to the general public to meet the requirements of Section 8123 of the DoD Appropriations Act, 2015. The website address is https://dodgrantawards.dtic.mil/grants.

vi. PROJECT DESCRIPTION (TECHNICAL PROPOSAL): The technical portion of the proposal is limited to 15 pages and shall contain the following: (NOTE: Pages in excess of the 15-page limitation will not be considered.)

(1) A complete discussion stating the background and objectives of the proposed work, the scientific approaches to be considered, the relationship to competing or related research, and the level of effort to be employed. Include also the nature and extent of the anticipated results and how they will significantly advance the scientific state-of-the-art. Also, if known, include the manner in which the work will contribute to the accomplishment of the Army's mission. Ensure the proposal identifies any scientific uncertainties and describes specific approaches for the resolution or mitigation of the uncertainties.

(2) A brief description of your organization.

(3) The names of other federal, state, local agencies, or other parties receiving the proposal and/or funding the proposed effort. If none, state so. Concurrent or later submission of the proposal to other organizations will not prejudice its review by ARL if ARL is kept informed of the situation.

(4) A statement regarding possible impact, if any, of the proposed effort on the environment, considering as a minimum its effect upon water, atmosphere, natural resources, human resources, and any other values.

(5) A statement regarding the use of Class I and Class II ozone- depleting substances. Ozone-

depleting substances are any substance designated as Class I by the Environmental Protection Agency (EPA), including but not limited to chlorofluorocarbons, halons, carbon tetrachloride, and methyl chloroform, and any substance designated as Class II by EPA, including but not limited to hydrochlorofluorocarbons. See 40 CFR Part 82 for detailed information. If Class I or II substances are to be utilized, a list shall be provided as part of the applicant's proposal. If none, state so.

(6) The type of support, if any, requested by the applicant (e.g., facilities, equipment, and materials).

(7) A teaming and collaboration plan for interaction, collaboration, cooperation, and communication with existing Center Awardees and researchers within DEVCOM ARL and other organizations within the Army S&T Enterprise.

vii. BIOGRAPHICAL SKETCH:

(1) This section shall contain the biographical sketches for key personnel only, i.e. research personnel who are specifically named in the proposal.

(a) Primary PI: The Primary PI provides a single or initial point of communication between ARL and the awardee organization(s) about scientific matters. If not otherwise designated, the first PI listed will serve as the Primary PI. This individual can be changed with notification to ARL. ARL does not infer any additional scientific stature to this role among collaborating investigators.

(b) Co-PIs: The individual(s) a research organization designates as having an appropriate level of authority and responsibility for the proper conduct of the research and submission of required reports to ARL. When an organization designates more than one PI, it identifies them as individuals who share the authority and responsibility for leading and directing the research, intellectually and logistically. ARL does not infer any distinction among multiple PIs.

(2) The following information is required:

(a) Relevant experience and employment history including a description of any prior Federal employment within one year preceding the date of proposal submission.

(b) List of up to five publications most closely related to the proposed project and up to five other significant publications, including those being printed. Patents, copyrights, or software systems developed may be substituted for publications.

(c) List of persons, other than those cited in the publications list, who have collaborated on a project or a book, article, report or paper within the last four years. Include pending publications and submissions. Otherwise, state "None."

(d) Names of each investigator's own graduate or post-graduate advisors and advisees.

NOTE: The information provided in (c) and (d) is used to help identify potential

conflicts or bias in the selection of reviewers.

(3) For the personnel categories of postdoctoral associates, other professionals, and students (research assistants), the proposal may include information on exceptional qualifications of these individuals that merit consideration in the evaluation of the proposal.

viii. BIBLIOGRAPHY: A bibliography of pertinent literature is required. Citations must be complete (including full name of author(s), title, and location in the literature).

ix. CURRENT AND PENDING SUPPORT:

This announcement requires all current and pending research support, as defined by Section 223 of the Fiscal Year (FY) 2021 National Defense Authorization Act, must be disclosed at the time of proposal submission, for all covered individuals.

(1) All project support from whatever source must be listed. The list must include all projects requiring a portion of the PI's and other key personnel's time, even if they receive no salary support from the project(s).

(2) The information should include, as a minimum: (i) the project/proposal title and brief description, (ii) the name and location of the organization or agency presently funding the work or requested to fund such work, (iii) the award amount or annual dollar volume of the effort, (iv) the period of performance, and (v) a breakdown of the time required of the PI and/or other key personnel.

x. FACILITIES, EQUIPMENT, AND OTHER RESOURCES: The applicant should include in the proposal a listing of facilities, equipment, and other resources already available to perform the research proposed.

xi. PROPOSAL BUDGET (including DD Form 1861):

(1) Each proposal must contain a budget for each year of support requested and a cumulative budget for the full term of requested support. Each budget year and the cumulative budget for the full term must be documented on ARO Form 99. ARO Form 99 may be reproduced, but you may not make substitutions in prescribed budget categories nor alter or rearrange the cost categories as they appear on the form. The proposal may request funds under any of the categories listed so long as the item is considered necessary to perform the proposed work and is not precluded by applicable cost principles. In addition to the forms, the budget proposal should include budget justification for each year.

(2) A signed summary budget page must be included. The documentation pages should be titled "Budget Explanation Page" and numbered chronologically starting with the budget form. The need for each item should be explained clearly.

(3) All cost data must be current and complete. Costs proposed must conform to the principles and procedures of 2 CFR 200.

(4) Sample itemized budgets and the information they must include for a contract and for

grants and cooperative agreements can be found at Section II.H of this FOA (Other Information). Before award of a cooperative agreement, it must be established that an approved accounting system and financial management system exist.

xii. APPENDICES: Some situations require that special information and supporting documents be included in the proposal before funding can be approved. Such information and documentation should be included by appendix to the proposal.

(1) To evaluate compliance with Title IX of the Education Amendments of 1972 (20 U.S.C. A Section 1681 Et. Seq.), the Department of Defense 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 STEM disciplines. To enable this assessment, each application must include the following forms completed as indicated.

(A) Research and Related Senior/Key Person Profile (Expanded) form:

The Degree Type and Degree Year fields on the Research and Related Senior/Key Person Profile (Expanded) form will be used by DoD as the source for career information. In addition to the required fields on the form, applicants must complete these two fields for all individuals that are identified as having the project role of PD/PI or Co-PD/PI on the form. Additional senior/key persons can be added by selecting the "Next Person" button. Failure to provide this information may result in delays in proposal evaluation or the proposal not be considered further under this FOA.

(B) Research and Related Personal Data form:

This form will be used by DoD as the source of demographic information, such as gender, race, ethnicity, and disability information for the Project Director/Principal Investigator and all other persons identified as Co-Project Director(s)/Co-Principal Investigator(s). Each application must include this form with the name fields of the Project Director/Principal Investigator or any Co-Project Director(s)/Co-Principal Investigator(s) completed; however, provision of the demographic information in the form is voluntary. If completing the form for multiple individuals, each Co-Project Director/Co-Principal Investigator can be added by selecting the "Next Person" button. The demographic information, if provided, will be used for statistical purposed only and will not be made available to merit reviewers. Applicants who do not wish to provide some or all of the information should check or select the "Do not wish to provide" option.

(2) Data Management Plan: A data management plan is a document that describes which data generated through the course of the proposed research will be shared and preserved, how it will be done, or explains why data sharing or preservation is not possible or

scientifically appropriate, or why the costs of sharing or preservation are incommensurate with the value of doing so. See also: DoD Instruction 3200.12. In no more than 2 pages set forth as a separate PDF document, discuss the following:

- The types of data, software, and other materials to be produced.
- How the data will be acquired.
- Time and location of data acquisition, if scientifically pertinent.
- How the data will be processed.
- The file formats and the naming conventions that will be used.
- A description of the quality assurance and quality control measures during collection, analysis, and processing.
- A description of dataset origin when existing data resources are used.
- A description of the standards to be used for data and metadata format and content.
- Appropriate timeframe for preservation.
- The plan may consider the balance between the relative value of data preservation and other factors such as the associated cost and administrative burden. The plan will provide a justification for such decisions.
- A statement that the data cannot be made available to the public when there are national security or controlled unclassified information concerns (e.g., "This data cannot be cleared for public release in accordance with the requirements in DoD Directive 5230.09.")

(3) With the application, the Applicant must provide the following "Privacy Act Statement" consent form for each Covered Individual in the proposal. This form must also signed by the Applicant as that Individual's Sponsor. Failure to provide the completed Privacy Act Statement for each Covered Individual may result in the proposal not being considered further under this FOA.

Privacy Act Statement

Army Futures Command or Department of the Army

Application for Federal Assistance

Authority: Government Paperwork Elimination Act (Pub. L. 105-277, 44 U.S.C. 3504); Executive Order 12372, Intergovernmental review of Federal Programs (47 FR 30959); 42 U.S. Code § 6605 – Disclosure of funding sources in applications for Federal research and development awards; Public Law 117-167, CHIPS and Science Act; Public Law 116-92, National Defense Authorization Act for Fiscal Year 2020; 5 U.S.C. 9101, Access to Criminal History for National Security and Other Purposes 5 CFR §1320.8, Agency collection of information Responsibility; 18 U.S.C. § 1001, False Statements, Concealment; E.O. 13478, Amendments to Executive Order 9397 Related to Federal Use of social Security Numbers; NSPM-33, National Security Presidential Memorandum 33 on National Security for United States Research and Development; DoD-D 5240.01, DoD Intelligence Activities; DoD-I 5200.02, Department of Defense Personnel Security Program; Army Regulation 381-10, U.S. Army Intelligence Activities

Purpose: The information collected may be used in processing, investigating, and maintaining records relevant to Federal Assistance awarded by the Department of the Army. Records in these systems will be used to ensure Army sponsored and/or awarded federal grants, assistance, contracts, and/or benefits are awarded to responsible parties, entities, and individuals.

Routine Uses: To contractors, grantees, experts, consultants, students, and others performing or working on a contract, service, grant, cooperative agreement, or other assignment for the Federal Government when necessary to accomplish an agency function.

To the appropriate Federal, State, local, territorial, tribal, foreign, or international law enforcement authority or other appropriate entity where a record, either alone or in conjunction with other information, indicates a violation or potential violation of law, whether criminal, civil, or regulatory in nature.

DoD Blanket Routine Use (http://dpcld.defense.gov/privacy)

Effect of not providing information: Providing information to the Department of the Army is voluntary. However, 42 U.S. Code § 6605, which imposes certain disclosure requirements in connection with Federal research and development awards, provides various enforcement mechanisms for non-compliance. One such mechanism, which the Department of the Army intends to pursue here, is rejection of such applications.

Proposal Title (or grants.gov number): _____

Acknowledgment of consent:

Covered individual (Signature): _____ Date: _____

Covered individual (Name print): _____

Institution's Authorized Representative (Signature): _____ Date: _____

Institution's Authorized Representative (Name print): _____

Institution Name: _____

d. GENERAL INFORMATION

i. Classified Submissions: Proposals containing classified information are not accepted under this FOA.

ii. Post-Employment Conflict of Interest: There are certain post-employment restrictions on former federal employees, including special government employees (18 U.S.C. 207). If a prospective applicant believes a conflict of interest may exist, the situation should be discussed with the TPOC listed in the FOA for their topic of scientific research who will then coordinate with appropriate ARL legal counsel prior to the applicant expending time and effort in preparing a proposal.

iii. Statement of Disclosure Preference: In accordance with Section II.D.2.e.iii of this FOA, Form 52 or 52A shall be completed stating your preference for release of information contained in your proposal. Copies of these forms may be downloaded from the ARL web site at https://www.arl.army.mil/resources/baa-forms/.

NOTE: Submissions may be handled for administrative purposes by support contractors. These support contractors are prohibited from submitting proposals under this FOA and are bound by non-disclosure and/or conflict of interest requirements as deemed appropriate. Applicants are cautioned, however, that portions of a submission may be subject to release under terms of the Freedom of Information Act, 5 U.S.C. 552, as amended.

iv. Equipment: Normally, in accordance with 31 USC 6306, title to equipment or other tangible property purchased with Government funds vests with nonprofit institutions of higher education or with nonprofit organizations whose primary purpose is conducting scientific research if vesting will facilitate scientific research performed for the Government.

e. SUBMISSION OF PROPOSALS

All required forms for proposals may be downloaded from the ARL website at https://www.arl.army.mil/resources/baa-forms/.

All proposals must be submitted electronically through Grants.gov using the Workspace system. Proposals must be submitted through the applicant's organizational office having responsibility for Government business relations. All signatures must be that of an official authorized to commit the organization in business and financial affairs.

i. GRANTS.GOV SUBMISSION: Grants.gov Registration must be accomplished prior to application submission in Grants.gov.

Each organization that desires to submit applications via Grants.Gov must complete a one-time registration. There are several one-time actions your organization must complete in order to submit applications through Grants.gov (e.g., obtain a Unique Entity Identifier, register with the SAM, register with the credential provider, register with Grants.gov and obtain approval for an authorized organization representative (AOR) to submit applications on behalf of the organization). To register please see http://www.grants.gov/web/grants/applicants/organization-registration.html

Please note the registration process for an Organization or an Individual can take between three to five business days or as long as four weeks if all steps are not completed in a timely manner.

Questions relating to the registration process, system requirements, how an application form works, or the submittal process should be directed to Grants.gov at 1-800-518-4726 or support@grants.gov.

NOTE: All web links referenced in this section are subject to change by Grants.gov and may not be updated here.

(1) Specific forms are required for submission of a proposal. The forms are contained in the Application Package available at http://www.grants.gov **under the specific opportunity you are submitting under**. When viewing an opportunity, select the "Package" tab and then select "View." A Grant Application Package and Application Instructions are available for this FOA through the Grants.gov Apply portal under CFDA Number 12.431/Funding Opportunity Number W911NF-24-S-0001. To apply, select "Apply" and then "Apply Now Using Workspace."

*NOTE: Effective 31 December 2017, applicants must apply online at Grants.gov using the application Workspace. For access to complete instructions on how to apply for opportunities using Workspace refer to https://www.grants.gov/web/grants/applicants/workspace-overview.html.

The following documents are mandatory: (1) Application for Federal Assistance (R&R) (SF 424 (R&R)), and (4) Attachments form.

(2) The SF 424 (R&R) form is to be used as the cover page for all proposals submitted via Grants.gov. The SF 424 (R&R) must be fully completed. AOR usernames and passwords serve as "electronic signatures" when your organization submits applications through Grants.gov. By using the SF 424 (R&R), proposers are providing the certification required by 32 CFR Part 28 regarding lobbying (see Section II.F.2.a.ii of this FOA). Block 11, "Descriptive Title of Applicant's Project," must reference the research topic area being addressed in the effort by identifying the specific paragraph from Section II.A of this FOA.

(3) The Attachments form must contain the documents outlined in Section II.D.2.e.ii entitled "Table of Contents". All documents must be combined into separate and single PDF formatted files using the Table of Contents names. Include "W911NF-24-S-0001" in the title so the proposal will be distinguished from other FOA submissions and upload each document to the mandatory Attachments form.

(4) The applicant must include with its proposal submission the representations required by Section II.F.2.a.ii of this FOA. The representations must include applicant POC information and be signed by an authorized representative. Attach the representations document to an available field within the Attachments form. Note: If the applicant's online SAM Representations and Certifications include its response to the representations, a hard copy representation is not required with proposal submission.

(5) The Grants.gov User Guide at: https://www.grants.gov/help/html/help/index.htm#t=GetStarted%2FGetStarted.htm will assist AORs in the application process. Remember that you must open and complete the Application for Federal Assistance (R&R) (SF 424 (R&R)) first, as this form will automatically populate data fields in other forms. If you encounter any problems, contact customer support at 1-800-518-4726 or at support@grants.gov. If you forget your user name or password, follow the instructions provided in the Credential Provider tutorial. Tutorials may be printed by right-clicking on the tutorial and selecting "Print".

(6) As it is possible for Grants.gov to reject the proposal during this process, it is strongly recommended that proposals be uploaded at least two days before any established deadline in the FOA so that they will not be received late and be ineligible for award consideration. It is also recommended to start uploading proposals at least two days before the deadline to plan ahead for any potential technical and/or input problems involving the applicant's own equipment.

4. Unique Entity Identifier and System for Award Management (SAM)

a. Each applicant (unless the applicant is an individual or Federal awarding agency that is exempt from those requirements under 2 CFR 25.110(b) or (c), or has an exemption approved by the Federal awarding agency under 2 CFR 25.110(d)) is required to:

i. Provide a valid unique entity identifier (formerly DUNS) in its application. Please verify the accuracy of your Unique Entity Identifier (formerly DUNS) at the Dun and Bradstreet (D&B) website http://fedgov.dnb.com/webform before registering with the System for Award Management System (SAM).

ii. Be registered in SAM at https://www.sam.gov prior to submitting its application; and

iii. Maintain an active SAM registration with current information at all times during which it has an active Federal award or an application or plan under consideration by a Federal awarding agency.

b. The SAM obtains Legal Business Name, Doing Business Name (DBA), Physical Address, and Postal Code/ Zip+4 data fields from D&B. If corrections are required, registrants will not be able to enter/modify these fields in SAM; they will be pre-populated using D&B Unique Entity Identifier record data. When D&B confirms the correction has been made, the registrant must then re-visit sam.gov and click a "yes"' to D&B's changes. Only at this point will the D&B data be accepted into the SAM record. Allow a minimum of two (2) business days for D&B to send the modified data to SAM.

c. The Federal awarding agency may not make a Federal award to an applicant until the applicant has complied with all applicable unique entity identifier and SAM requirements. If an applicant has not fully complied with the requirements by the time the Federal awarding agency is ready to make a Federal award, the Federal awarding agency may determine that the applicant is not qualified to receive a Federal award and use that determination as a basis for making a Federal award to another applicant.

5. Submission Dates and Times

a. Proposals

Proposals will be considered until and including the closing date of this announcement. Proposals submitted after the closing date will not be considered by the Government under this announcement.

b. Proposal Receipt Notices

i. Grants.gov: After a proposal is submitted to Grants.gov, the AOR will receive a series of three emails from Grants.gov. The first two emails will be received within 24 to 48 hours after submission. The first email will confirm time of receipt of the proposal by the Grants.gov system and the second will indicate that the proposal has either been successfully validated by the system prior to transmission to the grantor agency or has been rejected due to errors. A third email will be received once the grantor agency has confirmed receipt of the proposal. Reference the Grants.gov User Guide at https://www.grants.gov/help/html/help/index.htm#t=GetStarted%2FGetStarted.htm for information on how to track your application package.

For the purposes of this FOA, an applicant's proposal is not considered received by ARL until the AOR receives email #3.

6. Intergovernmental Review

Not Applicable

7. Funding Restrictions

See Section D.3.b above.

8. Other Submission Requirements

Information to Be Requested from Successful Applicants: Applicants whose proposals are accepted for funding will be contacted before award to provide additional information required for award. The required information may include requests to clarify budget explanations, representations, certifications, and some technical aspects.

(End of Section)

E. Application Review Information

1. Evaluation Criteria. Proposals submitted in response to this FOA will be evaluated using the following criteria:

a. Scientific merit, soundness, and programmatic strategy of the proposed research.

b. Relevance and potential contributions of the proposed research to one or more of the topic areas.

c. Qualifications and availability of the Principal Investigators and key co-investigators.

d. Realism and reasonableness of costs.

2. Review and Selection Process

a. All proposals are treated as procurement sensitive and are disclosed only for the purpose of evaluation. Proposals will be subject to a peer review by highly qualified subject matter experts that are Government employees.

b. Each proposal will be evaluated based on the evaluation criteria in Section II.E.1 of this FOA rather than against other proposals received under this FOA. Each evaluated proposal will receive a recommendation of "select" or "do not select" as supported by the evaluation. To receive a recommendation of "select," the overall strengths of a proposal must outweigh weaknesses. If the overall strengths of a proposal do not outweigh weaknesses, it will receive a recommendation of "do not select."

c. Upon completion of an evaluation against the criteria in Section II.E.1, a proposal selected for possible award will be analyzed for the realism and reasonableness of costs and funds availability. Proposal costs must be determined reasonable and realistic before the Government can make an award. Proposal costs must be determined reasonable and realistic before the Government can make an award.

d. Each proposal with a recommendation to "select" in accordance with II.E.2.c above, whose costs have been determined to be reasonable and realistic in accordance with II.E.2.d above, for which funds are available, will be subject to an Army Research Risk Assessment prior to award.

i. The Army Research Risk Assessment Program. The Army Research Risk Assessment Program (ARRP) is an adaptive risk management security program applied to Army-funded research designed to help protect Army Science and Technology (S&T) by identifying possible vectors of undue foreign influence.

In order to identify and mitigate undue foreign influence as required by federal law and policy, the Army will perform a research risk assessment of each proposal selected based on the criteria above for consideration of a fundamental research grant or cooperative agreement award. ARRP risk assessments for these subject proposals will be developed

for all proposed Senior/Key personnel, (also referred to as "Covered Individuals"). These risk assessments will be based on information disclosed in the Standard Form (SF) 424, "Senior/Key Person Profile (Expanded)," any of its accompanying or referenced documents, publicly available information, and information contained in internal Army databases. Nationality or citizenship is not a factor in the risk assessment.
ARRP has a risk matrix which identifies risk factors and resulting risk ratings. The matrix generally looks at four factors, or risk areas: participation in foreign talent programs; denied entity list affiliation or association (see https://www.bis.doc.gov/index.php/the-denied-persons-list and https://www.bis.doc.gov/index.php/policy-guidance/lists-of-parties-of-concern/entity-list); funding sources to include conflict of interest or conflict of commitment, or funding from a strategic competitor; and foreign influence showing a pattern or history of affiliation, association, or collaboration with a foreign institution, person or entity from a U.S. strategic competitor. The matrix is set forth below:

Rating	**Identified Specific Actions of the Senior/Key Personnel**			
	Foreign Talent Program	**Denied Entities**	**Funding**	**Foreign Institutions**
HIGH	Indicators of active (ongoing) participation or sponsorship in a strategic competitor Foreign Talent Program	Indicators of an active (ongoing) affiliation or past affiliation or present association with an entity on the U.S. Gov't denied entity or person list or EO 13959 or subsequent similar issuances	Indicators of active (ongoing) conflict of interest, conflict of commitment, or pattern of direct funding from a strategic competitor or country with history of targeting U.S. research or technology	Indicators of active (ongoing) direct affiliation, association or collaboration with a foreign institution, person, or entity from a strategic competitor
MODERATE	Indicators of past participation in a Foreign Talent Program with a U.S. strategic competitor, or country with a	Indicators of past association with an entity identified in the U.S. Gov't denied entity or person list or EO 13959 or	Indicators of any history or nonconsecutive pattern of, conflict of interest, conflict of commitment, or funding from a strategic competitor or	Indicators of a history or pattern of association or collaboration with foreign institution, person, or entity from a strategic

	history of targeting U.S. research or technology	subsequent similar issuances	country with history of targeting U.S. research or technology	competitor or country with history of targeting U.S. research or technology
LOW	No participation in a Foreign Talent Program	No indicators of past or current association or affiliation with an entity on the U.S. Gov't denied entity or person list or EO 13959 or subsequent similar issuances	No indicators of past funding from a strategic competitor or country with history of targeting U.S. research or technology	No indicators of an association or collaboration with a foreign institution, person, or entity from a strategic competitor or country with history of targeting U.S. research or technology

- **Affiliation** is academic, professional, or institutional appointments or positions with a foreign government-connected entity, whether full-time, part-time, or voluntary (including adjunct, visiting, honorary, or lectures/visits) where direct monetary or non-monetary reward is involved.

- **Association** is academic, professional, or institutional appointments or positions with a foreign government-connected entity, whether full-time, part-time, or voluntary (including adjunct, visiting, honorary, or lectures/visits) where no direct monetary or non-monetary reward is involved.

- **Collaboration** is academic, professional, or institutional agreement to jointly work together with a foreign government- connected entity, whether full-time, part-time, or voluntarily, in an official or unofficial capacity. Co-authorship in research endeavors is an example of collaboration.

- **Strategic competitors** are those adversaries identified in the current year Annual Threat Assessment report from Director of National Intelligence. The 2021 assessment was published on April 9, 2021 and can be found at https://www.dni.gov.

- **Conflict of Interest and Conflict of Commitment** are defined in NSPM-33 and in the CONOP as well as the ARRP Policy memorandum.

- **Senior/Key Personnel** are those who (a) contribute in a substantive, meaningful way to the scientific development or execution of a research and development project proposed to be carried out with a research and development award from a Federal research agency; and (b) are designated as a covered individual by the Federal research agency concerned.

ARRP risk ratings range from LOW to HIGH depending on the amount, type, and timing of foreign associations or affiliations that could constitute a foreign-influenced "Conflict of Interest" or "Conflict of Commitment," as defined by National Security Presidential Memorandum 33 (NSPM-33).

Once the research risk assessments are performed, the Army risk acceptance authority has several courses of action available for consideration. These courses of action are as follows:

Course of Action 1 - The Army risk acceptance authority may accept the risk rating that results from the risk assessment process and proceed with the award. This typically happens with proposals with risk ratings of "LOW" but could also happen with the other risk ratings. In Course of Action 1, the applicant will not be required to do anything related to the risk assessment process or the assigned risk rating.

Course of Action 2 - The Army risk acceptance authority may accept the risk rating with some research protection requirements added to the grant or cooperative agreement award. This typically happens with proposals with risk ratings of "MODERATE" but

could also happen with the other risk ratings. Also, typically, these added research protection requirements could include, but be limited to the following in the grant or cooperative agreement award:

- The University's Security Office shall provide the Principal Investigator and key personnel related to this award training on foreign talent recruitment programs and threat awareness and reporting requirements.

- The University shall disclose to the Army Research Laboratory Security Office and Grants Officer all international travel, i.e., all international travel completed as part of any university business, by the Principal Investigator and key personnel related to this award instrument prior to travel.

- The University shall report to the Army Research Laboratory Security Office and Grants Officer all inquiries by foreign operatives or suspected foreign operatives into research associated with the award.

- The University is encouraged to utilize students without potential conflicts of interest or conflicts of commitment as identified in U.S. National Security Presidential Memorandum (NSPM-33).

Under Course of Action 2, the applicant will be asked to sign the grant or cooperative agreement prior to award, confirming agreement to these added requirements. Should the applicant not agree to these added research protection requirements, the Army risk assessment authority may decide not to award.

Course of Action 3 - The Army risk acceptance authority is not willing to accept the risk assigned as a result of the assessment process. In this case, the applicant will be provided an opportunity to provide a risk mitigation plan. This typically happens with proposals with risk ratings of "HIGH" but could also happen with the other risk ratings. In Course of Action 3, the applicant will be informed of the risk rating assigned during the risk assessment process as well as the block(s) on the matrix where the review resulted in some type of finding that contributed to the assigned risk rating. Should the applicant choose to not submit a risk mitigation plan, the Army risk assessment authority may decide not to award. Should the applicant choose to submit a risk mitigation plan, the Army will review such plan. As a result of this review, the Army risk acceptance authority may then be willing to accept the risk assigned with the mitigation plan and proceed with the award or the Army risk acceptance authority may not be willing to accept the risk and may decide not to award. Further, should the risk mitigation plan include proposal revisions that affect those aspects of the proposal included in the review or selection process under SECTION II.E.2.c, the original proposal evaluation will be reviewed and revised as appropriate based on the proposal revisions.

ii. Actions Required by Applicants.

(1) By submission of this application and authorized signature on the SF 424 (R&R) Form, the Applicant agrees to comply with the following

requirements:

- To certify that each covered individual who is listed on the application has been made aware: (1) of all relevant disclosure requirements, including the requirements of 42 U.S.C. § 6605; and (2) that false representations may be subject to prosecution and liability pursuant to, but not limited to, 18 U.S.C. §§287, 1001, 1031 and 31 U.S.C. §§ 3729-3733 and 3802. See National Science and Technology Council Guidance for Implementing National Security Presidential Memorandum 33 (NSPM-33) on National Security Strategy for United States Government-Supported Research and Development (January 2022), at p. 7 (available at https://www.whitehouse.gov/wp-content/uploads/2022/01/010422-NSPM-33-Implementation-Guidance.pdf).

- To establish and maintain an internal process or procedure to address foreign talent programs, conflicts of commitment, conflicts of interest, and research integrity.

- To exercise 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.

(2) With the application, the Applicant must provide a completed "Privacy Act Statement" consent form for each Covered Individual that is also signed by the Applicant as that Individual's Sponsor. The "Privacy Act Statement" form is included at SECTION II.D.2.d.xii (3) of this FOA.

(3) During the award period of performance:

- If, at any time, during performance of this award, the Recipient learns that its Senior/Key Research Personnel (including any subawardee personnel who receive this designation) 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 recipient will notify the Government or Grants Officer within 5 business days of awareness.

- This disclosure must include specific information as to the personnel involved and the nature of the situation and relationship. The Government will review this information and conduct any necessary fact-finding or discussion with the Recipient. The Government's determination on disclosure may include acceptance, mitigation, or termination of the award.

- Failure of the 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 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.

- The provisions concerning this disclosure will be included in each award.

- The Recipient will be required to flow down this provision to all sub awardees who have personnel designated as Senior/Key Research Personnel as a result of their involvement in the performance of the research.

iii. Actions Required by Covered Individuals.

Federal law requires that all current and pending research support, as defined by 42 U.S.C. §6605, must be disclosed at the time of proposal submission, for all covered individuals. The Government may require an updated disclosure during the performance of any research project selected for funding. The Government will require an updated disclosure whenever covered individuals are added or identified as performing under the funded project. See definition of "Covered Individuals" below.

Covered Individuals are also required to sign the "Privacy Act Statement" and provide such signed statement to the applicant for submission with the proposal.

Any decision to accept a proposal for funding under this announcement will include full reliance on the individual's statements. Failure to report fully and completely all sources of project support and outside positions and affiliations may be considered a material statement within the meaning of the False Claims Act, 31 U.S.C. 3729, and constitute a violation of Federal law.

iv. Privacy Act Compliance. All information collected and developed for the purpose of conducting ARRP risk assessments will be maintained in accordance with the following authorities:

- Office of Personnel Management (OPM) System of Records Notice (SORN) GOVT-1. This SORN governs information collected from federal grantees for the purpose of conducting a national security investigation or carrying out other lawful statutory, administrative, or investigative purposes of the agency, to the extent the information is relevant and necessary to the requesting agency's decision.

- Department of the Army (DA) SORN A0381-20b-DAMI (Feb. 10, 2009, 74 F.R. 6596). This SORN applies to information contained in systems used by the Department of the Army to develop ARRP risk assessments.

- 32 C.F.R. Appendix A to Part 310, Paragraph N: DoD Blanket Routine Uses. Pursuant to this provision, a record from a system of records maintained by a Component may be disclosed as a routine use outside the DoD or the U.S. Government for the purpose

of counterintelligence activities authorized by U.S. law or Executive order or for the purpose of enforcing laws that protect the national security of the United States.

v.Definitions

- Covered Individual. An individual who contributes in a substantive, meaningful way to the scientific development or execution of a research and development project proposed to be carried out with a research and development award from a Federal research agency; and is designated as a covered individual by the Federal research agency concerned. See 42 U.S.C. § 6605, Definitions. (For purposes of this FOA, "covered individuals" are all Senior/Key Personnel.)

- Senior/Key Research Personnel. This term includes the Principal Investigator (PI) 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. (For purposes of this FOA, "Senior/Key Personnel" are all considered "covered individuals."

- Foreign Associations and Affiliations. 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. 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.

- Foreign Government Talent Recruitment Programs. In general, these programs 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. Distinguishing features of a Foreign Government Talent Recruitment Program may include:

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

    - 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.

    - 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.

- 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.

- Foreign Government Talent Recruitment Programs do **not** include research agreements between the University and a foreign entity, unless that agreement includes provisions that create situations of concern addressed elsewhere in this section; agreements for the provision of goods or services by commercial vendors; or invitations to attend or present at conferences.

- Conflict of Interest. 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.

- Conflict of Commitment. A situation in which an individual accepts or incurs conflicting obligations between or among multiple employers or other entities. 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.

- Foreign Component. 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. Activities that would meet this definition include, but are not limited to: involvement of human subjects or animals; extensive foreign travel by University research program or project staff for the purpose of data collection, surveying, sampling, and similar activities; collaborations with investigators at a foreign site anticipated to result in co-authorship; use of facilities or instrumentation at a foreign site; receipt of financial support or resources from a foreign entity; or 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.

- Strategic Competitor. 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.

3. Recipient Qualification

The Grants Officer is responsible for determining a recipient's qualification prior to award. In general, a Grants Officer will award cooperative agreements only to qualified recipients that meet the standards at 32 CFR 22.415. To be qualified, a potential recipient must:

- Have the management capability and adequate financial and technical resources, given those that would be made available through the grant or cooperative agreement, to execute the program of activities envisioned under the grant or cooperative agreement;

- Have a satisfactory record of executing such programs or activities (if a prior recipient of an award);

- Have a satisfactory record of integrity and business ethics; and

- Be otherwise qualified and eligible to receive a grant or cooperative agreement under applicable laws and regulations.

Applicants are requested to provide information with proposal submissions to assist the Grants Officer's evaluation of recipient qualification.

ii. In accordance with Office of Management and Budget (OMB) guidance in parts 180 and 200 of Title 2, CFR, it is DoD policy that DoD Components must report and use integrity and performance information in the Federal Awardee Performance and Integrity Information System (FAPIIS), or any successor system designated by OMB, concerning grants, cooperative agreements, and OTs for research as follows:

If the total Federal share will be greater than the simplified acquisition threshold on any Federal award under a notice of funding opportunity (see 2 CFR 200.88 Simplified Acquisition Threshold):

- The Federal awarding agency, prior to making a Federal award with a total amount of Federal share greater than the simplified acquisition threshold, will review and consider any information about the applicant that is in the designated integrity and performance system accessible through SAM (currently FAPIIS) (see 41 U.S.C. 2313);

- An applicant, at its option, may review information in the designated integrity and performance systems accessible through SAM and comment on any information about itself that a Federal awarding agency previously entered and is currently in the designated integrity and performance system accessible through SAM;

- The Federal awarding agency will consider any comments by the applicant, in addition to the other information in the designated integrity and performance system, in making a judgment about the applicant's integrity, business ethics, and record of performance under Federal awards when completing the review of risk posed by applicants as described in 2 CFR 200.205 Federal awarding agency review of risk posed by applicants.

(End of Section)

F. Award Administration Information

1. Award Notices

Applicants whose proposals are recommended for award may be contacted by a Grants Specialist to discuss additional information required for award. This may include representations and certifications, revised budgets or budget explanations, and/or other information as applicable to the proposed award. The anticipated start date will be determined at that time.

The notification email is not an authorization to commit or expend funds. The Government is not obligated to provide any funding until a Government Grants Officer signs the award document.

The award document signed by the Government Grants Officer is the official and authorizing award instrument. The authorizing award instrument, signed by the Contracting/ Grants Officer, will be emailed to the PI and AOR.

2. Administrative and National Policy Requirements

a. Required Representations and Certifications

(1) Cooperative agreement awards greater than $100,000 require a certification of compliance with a national policy mandate concerning lobbying. Statutes and Government-wide regulations require the certification to be submitted prior to award. When submitting your application through Grants.gov, by completing blocks 18 and 19 of the SF 424 (R&R) Form, the grant applicant is providing the certification on lobbying required by 32 CFR Part 28; otherwise, a copy signed by the AOR must be provided. Below is the required certification:

> CERTIFICATION AT APPENDIX A TO 32 CFR PART 28 REGARDING LOBBYING: Certification for Contracts, Grants, Loans, and Cooperative Agreements the undersigned certifies, to the best of his or her knowledge and belief, that:
>
> > (1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit SF-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. 1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

(2) In accordance with Section 743 of P.L. 113-235 , none of the funds appropriated or otherwise made available by that or any other Act may be made available for a grant or cooperative agreement with an entity that requires its employees or contractors seeking to report fraud, waste, or abuse to sign internal confidentiality agreements or statements prohibiting or otherwise restricting those employees or contractors from lawfully reporting that waste, fraud, or abuse to a designated investigative or law enforcement representative of a Federal department or agency authorized to receive the information.

PROHIBITION ON CONTRACTING WITH ENTITIES THAT REQUIRED CERTAIN INTERNAL CONFIDENTIALITY AGREEMENTS – REPRESENTATION

Agreement with the representation below will be affirmed by checking the "I agree" box in block 17 of the SF424 (R&R) as part of the electronic proposal submitted via Grants.gov. The representation reads as follows:

By submission of its proposal or application, the applicant represents that it does not require any of its employees, contractors, or subrecipients seeking to report fraud, waste, or abuse to sign or comply with internal confidentiality agreements or statements prohibiting or otherwise restricting those employees, contractors, subrecipients from lawfully reporting that waste, fraud, or abuse to a designated investigative or law enforcement representative of a Federal department or agency authorized to receive such information.

*Note that: Section 743 states that it does not contravene requirements applicable to SF 312, Form 4414, or any other form issued by a Federal department or agency governing the nondisclosure of classified information.

(3) Recipients are required to submit the following representation with the application package:

REPRESENTATIONS UNDER DOD ASSISTANCE AGREEMENTS:

APPROPRIATIONS PROVISIONS ON TAX DELINQUENCY AND FELONY CONVICTIONS

The applicant is [ ] is not [ ] a "Corporation" meaning any entity, including any institution of higher education, other nonprofit organization, or for-profit entity that has filed articles of incorporation.

If the applicant is a "Corporation" please complete the following representations:

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

(b) The applicant represents that it is [ ] is not [ ] a corporation that was convicted of a criminal violation under any Federal law within the preceding 24 months.

NOTE: If an applicant responds in the affirmative to either of the above representations, the applicant is ineligible to receive an award unless the agency suspension and debarment official (SDO) has considered suspension or debarment and determined that further action is not required to protect the Government's interests. The applicant therefore should provide information about its tax liability or conviction to the agency's SDO as soon as it can do so, to facilitate completion of the required considerations before award decisions are made.

PROHIBITION ON CONTRACTING WITH ENTITIES USING CERTAIN TELECOMMUNICATIONS AND VIDEO SURVEILLANCE SERVICES OR EQUIPMENT

Section 889 of the National Defense Authorization Act (NDAA) for Fiscal Year (FY) 2019 (Public Law 115-232) prohibits the head of an executive agency from obligating or expending loan or grant funds to procure or obtain, extend, or renew a contract to procure or obtain, or enter into a contract (or extend or 105 renew a contract) to procure or obtain the equipment, services, or systems prohibited systems as identified in section 889 of the NDAA for FY 2019. For more information on how this applies to all grant recipients and sub-recipients after August 13, 2020, please see DoD Research General Terms and Conditions (SEP 2021) NP Article IV. Other national policy requirements, paragraph 18.

b. Policy Requirements

The following list provides notable national policy requirements that may be applicable to an award. NOTE: The following is not an all-inclusive list of policy requirements. For assistance

awards, refer to the DoD Research and Development General Terms and Conditions at https://www.onr.navy.mil/en/work-with-us/manage-your-award/manage-grant-award/grants-terms-conditions for additional national policy requirements that may apply. For contract awards, appropriate clauses will be added to award documents.

i. PROTECTION OF HUMAN SUBJECTS

(1) For Assistance Instruments:

(a) The recipient must protect the rights and welfare of individuals who participate as human subjects in research under this award and comply fully with the requirements at 32 CFR part 219, Department of Defense Instruction (DoDI) 3216.02, 10 U.S.C. 980, the National Policy Requirements Concerning Live Organisms Terms and Conditions (Section A.1., Human Subjects, at 81 Federal Register 78380, Appendix C to Part 1122), and when applicable, Food and Drug Administration (FDA) policies and regulations.

(b) The recipient must not begin performance of research involving human subjects, also known as human subjects research (HSR), that is covered under 32 CFR part 219, or that meets exemption criteria under 32 CFR 219.101(b), or expends funding on such effort, until you receive a formal notification of approval from the cognizant DoD Human Research Protection Official (HRPO). Approval to perform HSR under this award is received after the HRPO has performed a review of the recipient's documentation of planned HSR activities and has officially furnished a concurrence with the recipient's determination as presented in the documentation.

(c) In order for the HRPO to accomplish this concurrence review, the recipient must provide sufficient documentation to enable his or her assessment as follows:

(i) If the HSR meets an exemption criteria under 32 CFR 219.101(b), the documentation must include a citation of the exemption category under 32 CFR 219.101(b) and a rationale statement.

(ii) If the recipient's activity is determined as "non-exempt research involving human subjects", the documentation must include:

- Assurance of Compliance (a written assurance that an institution will comply with requirements of 32 CFR Part 219, as well as the terms of the assurance) appropriate for the scope of work or program plan; and

- Institutional Review Board (IRB) approval, as well as all documentation reviewed by the IRB to make their determination.

(d) The HRPO retains final judgment on what activities constitute HSR, whether an exempt category applies, whether the risk determination is appropriate, and whether the planned HSR activities comply with the requirements in paragraph (a) of this section.

(e) The recipient must notify the Grants Officer/Agreements Officer immediately of any suspensions or terminations of the Assurance of Compliance.

(f) DoD staff, consultants, and advisory groups may independently review and inspect the recipient's research and research procedures involving human subjects and, based on such findings, DoD may prohibit research that presents unacceptable hazards or otherwise fails to comply with DoD requirements.

(g) Definitions for terms used in this section are found in DoDI 3216.02.

ii. ANIMAL USE:

(1) Assistance Instruments:

(a) Prior to initiating any animal work under the award, the recipient must:

(i) Register the recipient's research, development, test, and evaluation or training facility with the Secretary of Agriculture in accordance with 7 U.S.C. 2136 and 9 CFR section 2.30, unless otherwise exempt from this requirement by meeting the conditions in 7 U.S.C. 2136 and 9 CFR parts 1-4 for the duration of the activity.

(ii) Have the recipient's proposed animal use approved in accordance with DoDI 3216.01, Use of Animals in DoD Programs by a DoD Component Headquarters Oversight Office.

(iii) Furnish evidence of such registration and approval to the grants officer.

(b) The recipient must make the animals on which the research is being conducted, and all premises, facilities, vehicles, equipment, and records that support animal care and use available during business hours and at other times mutually agreeable to the recipient, the United States Department of Agriculture Office of Animal and Plant Health Inspection Service (USDA/APHIS) representative, personnel representing the DoD component oversight offices, as well as the grants officer, to ascertain that the recipient is compliant with 7 U.S.C. 2131 et seq., 9 CFR parts 1-4, and DoDI 3216.01.

(c) The recipient's care and use of animals must conform with the pertinent laws of the United States, regulations of the Department of Agriculture, and regulations, policies, and procedures of the DoD (see 7 U.S.C. 2131 et seq., 9 CFR parts 1-4, and DoDI 3216.01).

(d) The recipient must acquire animals in accordance with DoDI 3216.01.

iii. BIOLOGICAL SAFETY PROGRAM REQUIREMENTS:

(1) Assistance Instruments: Awards may be subject to biological safety

program requirements IAW:

(a) Army Regulation (AR) 385-10, Chapter 20
https://armypubs.army.mil/epubs/DR_pubs/DR_a/pdf/web/ARN16777_ARN16343_AR385_10_FINAL.pdf

(b) Department of Army (DA) Pamphlet (PAM) 385-69 on safety standards for microbiological and biomedical laboratories. This pamphlet requires the mandatory use of the latest edition of the U.S. Department of Health and Human Services, Centers for Disease Control and Prevention (CDC) and National Institutes of Health's (NIH) Biosafety in Microbiological and Biomedical Laboratories (BMBL) https://armypubs.army.mil/epubs/DR_pubs/DR_a/pdf/web/p385_69.pdf

(c) DoD Manual 6055.18-M, Enclosure 4, Section 13 https://www.hsdl.org/?view&did=24365

iv. MILITARY RECRUITING:

(1) Assistance Instruments: This is to notify potential applicants that each grant or cooperative agreement awarded under this announcement to an institution of higher education must include the following term and condition:

(a) As a condition for receiving funds available to the DoD under this award, you agree that you are not an institution of higher education (as defined in 32 CFR part 216) that has a policy or practice that either prohibits, or in effect prevents:

> (i) The Secretary of a Military Department from maintaining, establishing, or operating a unit of the Senior Reserve Officers Training Corps (ROTC)—-in accordance with 10 U.S.C. 654 and other applicable Federal laws—-at that institution (or any sub-element of that institution);
>
> (ii) Any student at that institution (or any sub-element of that institution) from enrolling in a unit of the Senior ROTC at another institution of higher education.
>
> (iii) The Secretary of a Military Department or Secretary of Homeland Security from gaining access to campuses, or access to students (who are 17 years of age or older) on campuses, for purposes of military recruiting in a manner that is at least equal in quality and scope to the access to campuses and to students that is provided to any other employer; or
>
> (iv) Access by military recruiters for purposes of military recruiting to the names of students (who are 17 years of age or older and enrolled at that institution or any sub-element of that institution); their addresses, telephone listings, dates and places of birth, levels of education, academic majors, and degrees received; and the most recent educational institutions in which they were enrolled.

(b) If you are determined, using the procedures in 32 CFR part 216, to be such an institution of higher education during the period of performance of this award, we:

(i) Will cease all payments to you of DoD funds under this award and all other DoD grants and cooperative agreements; and

(ii) May suspend or terminate those awards unilaterally for material failure to comply with the award terms and conditions.

v. DRUG-FREE WORKPLACE:

(1) Assistance Instruments: The recipient must comply with drug-free workplace requirements in 32 CFR Part 26, which is the DoD implementation of 41 U.S.C. 701, "Drug-free workplace requirements for Federal contractors."

vi. DEBARMENT AND SUSPENSION:

(1) Assistance Instruments: The recipient must comply with requirements regarding debarment and suspension in Subpart C of 2 CFR part 180, as adopted by DoD at 2 CFR part 1125. This includes requirements concerning the recipient's principals under an award, as well as requirements concerning the recipient's procurement transactions and subawards that are implemented in DoD Research and Development General Terms and Conditions.

vii. REPORTING SUBAWARDS AND EXECUTIVE COMPENSATION:

(1) Assistance Instruments: The recipient must report information about subawards and executive compensation as specified in the award term in Appendix A to 2 CFR Part 170, "Reporting subaward and executive compensation information," modified as follows:

(a) To accommodate any future designation of a different Government wide Web site for reporting subaward information, the Web site "http://www.fsrs.gov" cited in paragraphs a.2.i. and a.3 of the award provision is replaced by the phrase "http://www.fsrs.gov or successor OMB-designated Web site for reporting subaward information";

(b) To accommodate any future designation of a different Government wide Web site for reporting executive compensation information, the Web site "http://www.sam.gov" cited in paragraph b.2.i. of the award provision is replaced by the phrase "https://www.sam.gov or successor OMB-designated Web site for reporting information on total compensation"; and

viii. CONFLICT OF INTEREST/CONFLICT OF COMMITMENT REVIEW:

This announcement requires all current and pending research support, as defined by Section 223 of the FY21 National Defense Authorization Act, must be disclosed at the time of proposal submission, for all covered individuals. Such disclosure will be updated annually during the performance of any research project selected for funding, and whenever covered individuals are

added or identified as performing under the funded project. Covered Individuals are those who are listed as key personnel on proposals, including but not restricted to, the principal investigator or co-principal investigator.

Any decision to accept a proposal for funding under this announcement will include full reliance on the applicant's statements. Failure to report fully and completely all sources of project support and outside positions and affiliations may be considered a materials statement within the meaning of the False Claims Act, 31 U.S.C. 3729, and constitute a violation of Federal law.

ARL may conduct a pre-award conflict of interest/conflict of commitment review, as defined in the National Security Presidential Memorandum- 33, of any proposal selected for funding. Applicants are advised that any significant conflict of interest/conflict of commitment identified may be a basis for the rejection of an otherwise awardable proposal.

3. Reporting

a. Additional reports including number and types will be specified in the award document but will include as a minimum monthly financial status reports. The reports shall be prepared and submitted in accordance with the procedures contained in the award document and mutually agreed upon before award. Reports and briefing material will also be required as appropriate to document progress in accomplishing program metrics. A final report that summarizes the project and tasks will be required at the conclusion of the performance period for the award.

b. If the total Federal share exceeds $500,000 on any Federal award under a notice of funding opportunity, the post-award reporting requirements reflected in Appendix XII to 2 CFR 200 will be included in the award document. This requirement also applies to modifications of awards that: 1) increase the scope of the award, 2) are issued on or after January 1, 2016, and 3) increase the federal share of the award’s total value to an amount that exceeds $500,000.

(End of Section)

G. Agency Contacts

1. Questions of a technical or programmatic nature shall be directed to the Program Manager: Ja-Neen Owens, ja.n.owens.civ@army.mil, 919-549-4283

2. Questions of a business or administrative nature are to be directed to the following email: william.a.creech3.civ@army.mil.

3. Comments or questions submitted should be concise and to the point, eliminating any unnecessary verbiage. In addition, the relevant part and paragraph of the announcement should be referenced.

4. Requests to withdraw a proposal shall be directed to ja.n.owens.civ@army.mil.

(End of Section)

H. Other Information

1. Cooperative Agreement Proposals

Before award it must be established that an approved accounting system and financial management system exist. The following guidelines are offered concerning cost proposals:

Direct Labor: Show the current and projected salary amounts in terms of man-hours, man-months, or annual salary to be charged by the PI(s), faculty, research associates, postdoctoral associates, graduate and undergraduate students, secretarial, clerical, and other technical personnel either by personnel or position. State the number of man-hours used to calculate a man-month or man-year. For proposals from universities, research during the academic term is deemed part of regular academic duties, not an extra function for which additional compensation or compensation at a higher rate is warranted. Consequently, academic term salaries shall not be augmented either in rate or in total amount for research performed during the academic term. Rates of compensation for research conducted during non-academic (summer) terms shall not exceed the rate for the academic terms. When part or all of a person's services are to be charged as project costs, it is expected that the person will be relieved of an equal part or all of his or her regular teaching or other obligations. For each person or position, provide the following information:

i. The basis for the direct labor hours or percentage of effort (e.g., historical hours or estimates);

ii. The basis for the direct labor rates or salaries. Labor costs should be predicted upon current labor rates or salaries. These rates may be adjusted upward for forecast salary or wage cost-of-living increases that will occur during the agreement period. The cost proposal should separately identify the rationale applied to base salary/wage for cost-of-living adjustments and merit increases. Each must be fully explained;

iii. The portion of time to be devoted to the proposed research, divided between academic and non-academic (summer) terms, when applicable;

iv. The total annual salary charged to the research project; and

v. Any details that may affect the salary during the project, such as plans for leave and/or remuneration while on leave.

Note: There is no page limitation for budget proposals or budget justifications.

b. *Fringe Benefits and Indirect Costs (Overhead, G&A, and Other)*: The most recent rates, dates of negotiation, the base(s) and periods to which the rates apply must be disclosed and a statement included identifying whether the proposed rates are provisional or fixed. If the rates have been negotiated by a Government agency, state when and by which agency. A copy of the negotiation memorandum should be provided. If negotiated forecast rates do not exist, applicants must provide sufficient detail to enable a determination to be made that the costs included in the forecast rate are allocable according to applicable cost provisions. Applicants' disclosure should

be sufficient to permit a full understanding of the content of the rate(s) and how it was established. As a minimum, the submission should identify:

i. All individual cost elements included in the forecast rate(s);

ii. Basis used to prorate indirect expenses to cost pools, if any;

iii. How the rate(s) was calculated;

iv. Distribution basis of the developed rate(s);

v. Basis on which the overhead rate is calculated, such as "salaries and wages" or "total costs;" and

vi. The period of the applicant's fiscal year.

c. *Permanent Equipment*: If facilities or equipment are required, a justification why this property should be furnished by the Government must be submitted. State the organization's inability or unwillingness to furnish the facilities or equipment. Applicants must provide an itemized list of permanent equipment showing the cost for each item. Permanent equipment is any article or tangible nonexpendable property having a useful life of more than one year and an acquisition cost of $5,000 or more per unit. The basis for the cost of each item of permanent equipment included in the budget must be disclosed, such as:

i. Vendor Quote: Show name of vendor, number of quotes received and justification, if intended award is to other than lowest bidder.

ii. Historical Cost: Identify vendor, date of purchase, and whether or not cost represents lowest bid. Include reason(s) for not soliciting current quotes.

iii. Engineering Estimate: Include rationale for quote and reason for not soliciting current quotes.

If applicable, the following additional information shall be disclosed in the applicant's cost proposal:

iv. Special test equipment to be fabricated by the awardee for specific research purposes and its cost.

v. Standard equipment to be acquired and modified to meet specific requirements, including acquisition and modification costs, listed separately.

vi. Existing equipment to be modified to meet specific research requirements, including modification costs. Do not include equipment the organization will purchase with its funds if the equipment will be capitalized for Federal income tax purposes. Proposed permanent equipment purchases during the final year of an award shall be limited and fully justified.

vii. Grants and cooperative agreements may convey title to an institution for equipment purchased with project funds. At the discretion of the Contracting/Grants Officer, the agreement may provide for retention of the title by the Government or may impose conditions governing the equipment conveyed to the organization per the governing laws and regulations.

d. *Travel*: Forecasts of travel expenditures (domestic and foreign) that identify the destination

and the various cost elements (airfare, mileage, per diem rates, etc.) must be submitted. The costs should be in sufficient detail to determine the reasonableness of such costs. Allowance for air travel normally will not exceed the cost of round-trip, economy air accommodations. Specify the type of travel and its relationship to the research project. Separate, prior approval by the ARL is required for all foreign travel (i.e., travel outside the continental U.S., its possessions and Canada). Travel may be requested to visit Army laboratories and facilities to enhance agreement objectives and to achieve technology transfer.

e. *Participant Support Costs*: This budget category refers to costs of transportation, per diem, stipends, and other related costs for participants or trainees (but not employees) in connection with ARL-sponsored conferences, meetings, symposia, training activities, apprenticeships and workshops. Generally, indirect costs are not allowed on participant support costs. The number of participants to be supported should be entered in the parentheses on the budget form. These costs should also be justified in the budget justification page(s) attached to the cost proposal.

f. *Materials, Supplies, and Consumables*: A general description and total estimated cost of expendable equipment and supplies are required. The basis for developing the cost estimate (vendor quotes, invoice prices, engineering estimate, purchase order history, etc.) must be included. If possible, provide a material list.

g. *Publication, Documentation, and Dissemination*: The budget may request funds for the costs of preparing, publishing, or otherwise making available to others the findings and products of the work conducted under an agreement, including costs of reports, reprints, page charges, or other journal costs (except costs for prior or early publication); necessary illustrations, cleanup, documentation, storage, and indexing of data and databases; and development, documentation, and debugging of software.

h. *Consultant Costs*: Applicants normally are expected to utilize the services of their own staff to the maximum extent possible in managing and performing the project's effort. If the need for consultant services is anticipated, the nature of proposed consultant services should be justified and included in the technical proposal narrative. The cost proposal should include the names of consultant(s), primary organizational affiliation, each individual's expertise, daily compensation rate, number of days of expected service, and estimated travel and per diem costs.

i. *Computer Services*: The cost of computer services, including computer-based retrieval of scientific, technical, and educational information, may be requested. A justification/explanation based on the established computer service rates at the proposing organization should be included. The budget also may request costs, which must be shown to be reasonable, for leasing automatic data processing equipment. The purchase of computers or associated hardware and software should be requested as items of equipment.

j. *Subawards (Subcontracts or Subgrants)*: A precise description of services or materials that are to be awarded by a subaward must be provided. For subawards totaling $10,000 or more, provide the following specific information:

- A clear description of the work to be performed;
- If known, the identification of the proposed subawardee and an explanation of why and how the subawardee was selected or will be selected;
- The identification of the type of award to be used (cost reimbursement, fixed price, etc.);
- Whether or not the award will be competitive and, if noncompetitive, rationale to justify the absence of competition; and
- A detailed cost summary.

k. *ODCs*: Itemize and provide the basis for proposed costs for other anticipated direct costs such as communications, transportation, insurance, and rental of equipment other than computer related items. Unusual or expensive items must be fully explained and justified.

l. *Profit/ Fee*: Profit/fee is not allowed for the recipient of or subaward to an assistance instrument, where the principal purpose of the activity to be carried out is to stimulate or support a public purpose (i.e., to provide assistance), rather than acquisition (i.e., to acquire goods and services for the direct benefit of the Government). A subaward is an award of financial assistance in the form of money, or property in lieu of money, made under a DoD grant or cooperative agreement by a recipient to an eligible subrecipient. The term includes financial assistance for substantive program performance by the subrecipient of a portion of the program for which the DoD grant or cooperative agreement was made. It does not include the recipient's procurement of goods and services needed to carry out the program.

m. *Subcontracting Plan*: Subcontracting plans do not apply to assistance instruments.

n. *FCCM*: If cost of money is proposed, a completed FCCM (DD Form 1861) is required.

(End of Section)