BROAD AGENCY ANNOUNCEMENT (BAA)
FA8651-22-S-0001

FEDERAL AGENCY NAME:
Air Force Research Laboratory, Munitions Directorate
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Eglin AFB, FL 32542-6810

BROAD AGENCY ANNOUNCEMENT (BAA) TITLE: Air Delivered Effects

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BAA TYPE: Initial Announcement

CATALOG OF FEDERAL DOMESTIC ASSISTANCE (CFDA) NUMBER(S): 12.800 Air Force Defense Research Sciences Program

WHITE PAPER DUE DATE AND TIME: This BAA will remain open 5 years from the BAA posting date or until amended or superseded. It may be reissued and/or amended periodically, as needed. This BAA is set up in two parts: (1) Basic Open BAA, in which white papers may be submitted at any time during the open period, and (2) Call BAA, in which white paper/proposal Call announcements may be issued by the Government in beta.sam.gov and grants.gov under FA8651-22-S-0001. This BAA is intended to cover Basic Research (6.1), Applied Research (6.2), and Advanced Technology Development (6.3). For these white papers, it is recommended prior to submission, each submitter consult with the technical Point of Contract (POC) to discuss the topic of interest. The two parts of this BAA are explained in greater detail in separate sections below. White papers may be submitted at any time during the open period to afrl.rwk.baaworkflow@us.af.mil in accordance with the instructions described further below.

TWO-STEP OPEN BAA: OTHER THAN WHITE PAPERS, NO PROPOSALS SHALL BE SUBMITTED AGAINST THIS OPEN BAA. A request for proposal (RFP) will be issued by the Contracting Officer (CO) if white paper is favorably evaluated against the criteria. Due dates and times will be specified in each RFP issued by the CO in accordance with the instructions for proposals in response to white papers provided in this document. There will be no other announcement issued for this requirement. Offerors should monitor the Contract Opportunities websites https://sam.gov/content/home and https://www.grants.gov/ in the event this announcement is amended. Oral proposals may be requested on a case by case basis. It is anticipated that the cumulative amount for awards issued under this BAA will not exceed $750,000,000.

TWO-STEP BAA WITH CALLS: Periodically over the period of this BAA, proposal Call announcements (Calls) may be issued in sam.gov under FA8651-22-S-0001 to request white paper/proposals for specific research areas. Proposals in response to the Calls will be accepted as specified in the individual Calls and evaluated in accordance with the instructions further below. Offerors should monitor the Contract Opportunities website at https://sam.gov/content/home and https://www.grants.gov/ in the event this announcement is amended or Calls are issued.

I. PROGRAM DESCRIPTION

1. STATEMENT OF OBJECTIVES

a. This is a BAA of the Air Force Research Laboratory, Munitions Directorate (AFRL/RW) under the provisions of Federal Acquisition Regulation (FAR) paragraph 6.102(d)(2), which provides for competitive selection of research proposals. Proposals submitted in response to the BAA that are selected for award are considered to be the results of full and open competition and in full compliance with the provisions of PL 98-369, the Competition in Contracting Act of 1984. This acquisition is unrestricted. Small businesses are encouraged to propose on all or any part of this solicitation. The NAICS Code for this acquisition is 541715, Research and Development in the Physical, Engineering, and Life Sciences (except Nanotechnology and Biotechnology), and the small business size standard is 1,000 employees. For purposes of this announcement, research is defined to be scientific study and experimentation directed at increasing knowledge and understanding in relation to long term national security needs. It is an enhancement to related exploratory and advanced development programs. A program should be designed to demonstrate well-defined and substantive research results, should not be overly ambitious or open-ended, and should not be a paper study that inherently requires a substantial testing effort. Any significant testing is unlikely; however, there is a possibility of experimental testing to support battle lab experiments proposed under this BAA. Programs to support Team Eglin Technology Demonstration Programs may also be considered under this BAA.

b. AFRL/RW awards to educational institutions, non-profit organizations, and private industry for research in Air Delivered Effects. This BAA is intended to cover, in general nature, all research areas of interest under this Directorate. Offerors contemplating a submission to AFRL/RW are strongly encouraged to contact the AFRL/RW technical POC for the research area to ascertain the extent of interest AFRL/RW may have in a specific research project.

c. AFRL/RW is the primary Department of the Air Force (DAF) organization concerned with conventional munitions technology development. AFRL/RW plans and executes research, development, and test of conventional munitions, and supports conventional munitions Weapons Program Offices. There are three product divisions within the Munitions Directorate that conduct research and development (R&D). They are the Technology Integration Division (RWI), Strategy Division (RWS), and Science and Technology Division (RWT).

2. DELIVERABLE ITEMS:

a. Data Items are to be determined for each individual award. However, at a minimum the following reports are anticipated to be required:

1) Final Report

2) Funds and Man-hour Reports (Cost contracts only)

3) Status Reports: Reports are anticipated to be required monthly for Contracts and quarterly for Assistance Instruments

4) Hardware: Deliverables to be determined based on each award

5) Other: Interim Reports and Presentation Materials

3. OTHER REQUIREMENTS:

a. The announcement incorporates FAR and supplemental provisions and clauses by references. For Contracts, the full text of provisional and clauses can be found at https://www.acquisition.gov/. For Grants and Agreements, the full text articles can be found at dod-research-and-development-rd-general-terms-and-conditions-september-2023 (navy.mil).

b. This effort may require a SECRET facility clearance and SECRET safeguarding capability. Offerors must verify their Cognizant Security Office information is current with Defense Security Service (DSS) at https://www.dcsa.mil/.

c. Export Control: Information involved in this research effort may be subject to Export Control (International Traffic in Arms Regulation (ITAR) 22 CFR 120-131, or Export Administration Regulations (EAR) 15 CFR 710-774). If an effort is subject to export control, then certified DD Form 2345, Militarily Critical Technical Data Agreement, will be required to be submitted with the proposal.

d. Export Controlled Items: As prescribed by DFARS 225-7901-4, DFARS 252.225-7048, Export-Controlled Item (JUNE 2013) shall be contained in all resulting contracts.

4. OTHER INFORMATION:.

a. Base Support/Network Access: If a contractor determines use of available base support to be in their best interest, it must be included as such in the proposal. Use of available base support will not be assumed during technical evaluation unless proposed.

b. In accordance with AFRL/CC Policy on Employment of Non-US Citizen Contractors dated 4 October 2016, Contractor employees requiring access to USAF bases, AFRL facilities, and/or access to U.S. Government Information Technology networks in connection with the work on this BAA must be U.S. Citizens. Possession of a permanent resident card ("Green Card") does not equate to U.S. Citizenship. This requirement does not apply to foreign nationals approved by the U.S. Department of

Defense or U.S. State Department under international personnel exchange agreements with foreign governments. Any waivers to this requirement will be granted in writing by the CO prior to providing access. The above requirements are in addition to any other contract requirements related to obtaining a Common Access Card (CAC).

c. Multiple awards subject to Fair Opportunity are not anticipated.

d. Human subjects may be used in the research studies under this effort. DFARS 252.235-7004, Protection of Human Subjects (Jul 2009), will be included in all contracts awarded under this BAA.

e. Data Rights Desired:

1) Technical Data: Unlimited Rights

2) Non-Commercial Software (NCS): Unlimited Rights

3) NCS Documentation: Unlimited Rights

4) Commercial Computer Software Rights: Customary License

f. The Air Force Research Laboratory is engaged in the discovery, development, and integration of warfighting technologies for our air, space, and cyberspace forces. As such, rights in technical data and NCS developed or delivered under this contract are of significant concern to the Government. The Government will therefore carefully consider any restrictions on the use of technical data, NCS, and NCS documentation which could result in transition difficulty or less-than full and open competition for subsequent development of this technology. In exchange for paying for development of the data, the Government expects technical data, NCS, and NCS documentation developed entirely at Government expense to be delivered with Unlimited Rights.

g. Technical data, NCS, and NCS documentation developed with mixed funding are expected to be delivered with at least Government Purpose Rights. Offers that propose delivery of technical data, NCS, or NCS documentation subject to Government Purpose Rights should fully explain how the data were developed at private expense. Specifically, offers must explain what technical data, NCS, or NCS documentation developed with costs charged to indirect cost pools and/or costs not allocated to a Government contract will be incorporated, how the incorporation will benefit the program, and whether those portions or processes are segregable.

h. Offers that propose delivery of technical data, NCS, or NCS documentation subject to Limited Rights, Restricted Rights, or Specifically Negotiated License Rights will be considered. Proposals should fully explain what technical data, NCS, or NCS documentation developed with costs charged to indirect cost pools and/or costs not allocated to a Government contract will be incorporated and how the incorporation will benefit the program and whether those portions or processes are segregable.

i. Offerors SHALL provide data rights/software assertions, as part of their proposal submittal, as required by DFARS 252.227-7017, Identification and Assertion of Use, Release, or Disclosure Restrictions (Jan 2011). Assertions must be completed with specificity. Each assertion must identify both the data/software and each such item, component, or process listed. Nonconforming assertions will be rejected and will require resubmittal.

j. Terms used in this section are defined in the clauses at DFARS 252.227-7013, Rights in Technical Data–Noncommercial Items (Feb 2014) and 252.227-7014, Rights in Noncommercial Computer Software and Noncommercial Computer Software Documentation (Feb 2014).

5. THIRD PARTY SOFTWARE (COMMERCIAL AND NONCOMMERICAL):

a. DFARS 252.227-7014(d) describes requirements for incorporation of third party computer software. Any third party software (commercial or noncommercial) to be incorporated into a deliverable must be clearly identified in the proposal. Prior to delivery of any third party software, the contractor will obtain an appropriate license for the Government, and the written approval of the CO.

b. Any third party software to be delivered to the Government that is not reasonably identifiable at proposal submission, must still be approved by the CO prior to incorporation into a system deliverable. This obligation to obtain pre-approval by the CO, as described above, continues throughout contract administration.

c. The Government will neither accept nor execute a DD Form 250 for the software deliverables until the Contractor obtains from all third party software suppliers and/or vendors (Licensor) licenses that comply with the following terms and conditions for the Government (Licensee):

1) The license shall not subject the Government to liability that is indefinite, such as an indemnification clause, as it would constitute an obligation in advance or in excess of an appropriation and violate the Anti-Deficiency Act.

2) The license shall not create a contingent liability for the Government. This includes, but is not limited to: unilateral price increases, automatic assessment of charges, and automatic renewal of the license.

3) The license shall be governed by Federal Statutes, Case Law, and Federal Regulations, and shall not be subject to the laws or jurisdiction of any municipality, state, or foreign country.

4) The license shall not include non-substitution language that would preclude or limit the Government from using another vendor/reseller and/or product to fulfill Government requirements.

5) The license shall not comment an entitlement to attorney fees.

6) The Licensor shall not have the authority to unilaterally terminate the license. All remedies available shall be consistent with the Disputes Clause in the contract.

7) The Licensor shall not have the right to enter the premise or monitor the networks of Licensee for the purpose of auditing the use of the license.

8) The Licensor shall not use any injunctive relief clauses as the Licensor cannot prevent the Licensee from performing mission operations.

9) The Licensor shall not have the authority to control any litigation between a third party and Licensee.

10) The Licensor shall not use the fact that the Licensee is using the Licensor's products in any notification to the public (e.g., no publicity rights permitted).

d. The Contractor may be required to obtain licenses that comply with the following terms and conditions, based on the Government's needs:

1) The license shall not disclaim all warranties through use of an "as is" provision.

2) The license shall neither restrict the Government from using the product at various sites nor limit use of the product by various Government agencies or third parties performing work on behalf of the Department of the Air Force under this Air Delivered Effects BAA. In performance of contracts resulting from this Air Delivered Effects BAA, Government personnel as well as Government contractors may use the software.

3) The license shall not limit the Government's use of the software at other Government and Government contractor sites.

4) The license shall not require automatic updates or give Licensor the authority to unilaterally replace the software.

5) The Licensee shall not be restricted from copying or embedding elements of accessible code into other applications (e.g., nesting code, derivative works).

6) The Contractor may obtain agreement from the Licensor to insert the clause below to its respective software licenses intended to be transferred to the Government:

"In the event that any of the provisions of the [Software License] are determined to be inconsistent with Federal law and/or do not otherwise

satisfy the Government's needs, the parties to the [Software License] hereby agree that such provisions shall be null and void as they pertain to the Government. Specifically, the following sections are hereby deleted from the [Software License] [and/or amended as indicated below]:

If the Licensor will not agree to the terms and conditions cited herein and/or as contained in DFARS 227.72, the Contractor shall retain the current license on behalf of and for the benefit of the US Government if permissible under its license and such use will not subject the Government to the terms of the license."

7) The Contractor shall provide documentation to clearly correlate or map software license(s) to:

   i. Contract Line Item Numbers (CLINs);

   ii. Contract Deliverables per the Contract Data Requirements List (CDRL);

   iii. Paragraphs in the Statement of Work (SOW) and Statement of Objectives (SOO)

   iv. Portions of any functional block diagrams and/or system architecture diagrams, so that it can be readily determined where certain commercial software corresponding to certain software license agreement(s) are physically located on the system to be delivered under the contract.

II. MUNITIONS DIRECTORATE DIVISIONS

TECHNOLOGY INTEGRATION DIVISION (RWI)

The Technology Integration Division (RWI) leads the Munitions Directorate's (RW) advanced technology development (6.3) and digital transformation activities. RWI integrates advanced components from applied research initiatives and executes high-visibility ground and flight test demonstrations to rapidly transition next-generation technologies to programs of record and fielded warfighter capabilities. RWI has three branches. The Air Dominance Branch (RWIA) develops, integrates, demonstrates, and transitions air dominance weapons technologies across the counter-air, networked, collaborative, autonomous, and electromagnetic domains. The Digital Materiel Management Branch (RWID) develops, integrates, demonstrates, and transitions software tools and advanced architectures to drive model-based systems engineering, automate agile business processes, and institutionalize open standards. The Global Strike Branch (RWIG) develops, integrates, demonstrates, and transitions global strike weapons technologies across the counter-land and counter-maritime domains.

STRATEGY DIVISION (RWS)

The Strategy Division (RWS) is responsible for obtaining information and developing strategic methodologies to guide RW in near, mid, and long-term activities to meet mission needs. This includes: 1) Strategic Planning which develops capability and investment plans to meet warfighter needs, 2) Partnerships to collaborate with customers and partners to develop sound business practices and opportunities, & 3) Modeling, Simulation, & Analysis of weapon concepts to build military utility for future investments.

SCIENCE AND TECHNOLOGY DIVISION (RWT)

The Science and Technology Division (RWT) directs and conducts basic, exploratory and advanced research and development of fuzes, warheads, energetic materials, guidance/navigation/controls (GNC), autonomy, seeker sciences, weapon cyber defense, AI & decision making, and weapon algorithm development. In addition, RWT conducts Computational assessment for air-launched munitions for use with a full array of launch platforms including fighter, bomber, and remotely-piloted aircraft. RWT consist of the Computation Engineering Sciences Branch (RWTC), Autonomy, Navigation & Control Branch (RWTA), Seekers Branch (RWTS), Energetic Materials Branch (RWTE) and Ordnance Branch (RWTO). RWTC creates, develops and optimizes computational models and simulations, weapon algorithms, cyber defense approaches and nature inspired systems. RWTA Leads the development and integration of advanced aerodynamics modeling & simulation, artificial intelligence and decision-making, multi-agent teaming, and navigation technology across the Munitions Directorate. RWTS researches, develops, demonstrates, and transitions weapon seeker science and technology for precision guided munitions. RWTE discovers, develops, integrates, and transitions energetic materials technology that maximizes weapon lethality, survivability, and safety for air-delivered munitions. In addition, RWTE operates the High Explosives Research & Development (HERD) facility which is responsible for the development of energetic materials from concept formulation through pilot plant production for transition into existing or future inventory weapon systems. RWTO is responsible for research and

development of technologies to enable revolutionary fuzing and warhead capabilities for current and future weapon systems. RWTO discovers, develops, demonstrates, and transitions ordnance science and technology that maximizes air-delivered munitions effectiveness.

III. RESEARCH AREAS

1. RESEARCH AREA 1 - WEAPON AIRFRAME SYSTEMS TECHNOLOGY RESEARCH (RWTAA)

Advances in weapon airframe system technologies are required to take advantage of emerging developments in weapon guidance and navigation systems, networked communication systems, and precision effect ordnance and fuzing systems. The goal of this work is to perform research on technologies for development of agile weapon airframes that are capable of being deployed or dispensed from unmanned and manned platforms (e.g., 5th/6th-generation) and which can deliver precision-controlled effects against fixed and mobile ground targets and air targets in highly contested engagement scenarios (i.e., Anti-Access/Area Denial). Enabling technologies in the following research areas are of interest: agile weapon airframes for high-speed flight regimes (e.g., air-launched unitary subsonic to supersonic guided weapons, air-launched supersonic to low hypersonic air-intercept, and long-range hypersonic strike weapons); high-agility airframes capable of aggressive flight maneuvers for terminal target intercept; compressed carriage munitions and release mechanisms; robust, low-cost, compact control and actuation systems (aero and propulsive) for small weapons; compact power for small weapons; and small weapon design, carriage, and dispensing technology. Proposed research should have a sound basis in credible theories, principles, and methodologies of dynamical systems, aerodynamics, structural dynamics, machine learning, material sciences, propulsion, thermodynamics, aeroelasticity, aerothermoelasticity, and aeromechanics. Efforts should also exploit advances in other weapon subsystem technologies (e.g., advanced sensors and seekers, guidance and control algorithms, networked enabled weapons and information architectures, controlled effects ordnance, divert and attitude control systems, flexible or morphing bodies), be amenable to further development through sound principles of systems engineering, and offer the potential for significantly improving affordable weapon aerial systems capabilities, effectiveness and manufacturability. In the context of this research area, innovative and novel concepts based upon emerging science and technology are encouraged; incremental evolutionary capability of existing technologies are of low interest.

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2. RESEARCH AREA 2 - BIOPRINCIPIC SENSORS, INFORMATION PROCESSING, AND CONTROL (RWTCA)

Flying insects and smart munitions often need to perform similar tasks that require sensing, processing, and control. However, biological systems tend to be much more robust and have significantly lower size, weight, and power (SWaP) than their engineered counterparts. In fact, flying insects are existence proofs of goal-oriented, autonomous agents that can detect, identify, and intercept targets while avoiding threats in uncertain and highly dynamic environments. Researchers at the Munitions Directorate are determined to understand the principles underlying the abilities of relevant biological organisms (not just flying insects) and apply those principles to future engineered systems to improve performance, lower SWaP, and achieve trusted autonomy in man-made systems. We refer to such systems as bioprincipic and we

believe this approach may lead to revolutionary concepts and capabilities for future Air Force systems. The Government wants to use what is understood about the natural sensors to build small and affordable autonomous munitions sensors. Sensors of interest include multi-spectral and polarimetric electro-optical / infrared (EO/IR) imaging sensors, mechanosensors of various types and applications (including acoustic sensors), magnetosensors, and chemosensors. Often biological systems use multiple sensing modalities and efficiently combine the sensor outputs to achieve robust behavior in dynamic environments. Furthermore, an integrated sensor design includes not only the hardware component, but the "software" or "algorithm" that does the information processing. The Department of Defense is interested in sparse/compressive sensing, neuromorphic/spiking architectures, and analog and hybrid processing techniques when they show speed and accuracy advantages over pure digital processing. Proposed concepts should support the mission of the Munitions Directorate.

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3. RESEARCH AREA 3 - AUTONOMOUS TARGET RECOGNITION (RWTCA)

a. RWTCA is interested in investigating all aspects of Automatic Target Recognition (ATR) / Autonomous Target Acquisition (ATA) / Aided Target Recognition (AiTR) / Autonomous Target Reacquisition (ATR) technology as it applies to seekers for conventional guided weapons. Interests range from basic signal and image processing foundations through tower and flight test of advanced, real-time ATR/host signal processor implementations. Technical approaches in the areas of pattern recognition, computer vision, deep learning, machine learning, autonomous systems, and cooperative systems as they apply to weapon seekers are of interest.

b. The following technologies and research areas are of particular interest:

1) Artificial Intelligence (AI) /Machine Learning (ML), Deep Learning (DL) and/or traditional algorithms for weapon seeker target acquisition or re-acquisition.

2) Investigations and analyses of AI/ML/DL and/or traditional algorithms leading to a better fundamental understanding of their operation and limitations; especially with respect to ATR/ATA/AiTR/ATR applications.

3) Approaches for real-time / on-line training or adaptation of AI/ML/DL and/or traditional algorithms.

4) Approaches for training AI/ML/DL or traditional algorithms with synthetic target data that result in good target recognition performance when using real target data (e.g. synthetic to real domain adaptation).

5) Approaches for cooperative/collaborative ATR using multiple lower-cost networked weapon seekers.

6) Approaches for the compact representation of target appearance information.

7) Approaches for automatic/autonomous handoff of target cue information from intelligence, surveillance, and reconnaissance (ISR) or fire control sensors to weapon seekers to improve the ability of the weapon seeker to acquire or re-acquire the target selected by the ISR or fire control system.

8) Methods or tools for the assessment, evaluation, or prediction of ATR performance.

9) Methods or tools for the assessment, evaluation, and analysis of data representations across sensor modalities.

10) Methods or tools for predicting the signature of a target in one sensor domain given its signature in a different sensor domain (e.g., view with synthetic aperture radar [SAR] sensor and predict signature in IR).

11) Approaches to use/incorporate scene context (provided by an ISR or fire control system) for target re-acquisition by a weapon seeker.

12) Technologies, research, or approaches that integrate weapon, ISR, and/or fire control subsystems to provide greater overall kill effectiveness, shorter overall kill timelines, lower overall costs, reduced operator burden, and/or greater system autonomy. Topics in this area may be pursued in partnership with other AFRL Technology Directorates (e.g., Sensors Directorate).

13) Software and/or hardware approaches that more fully automate the data ground truthing process and provide approximate pixel-level target/background labeling of data sets. The process could be implemented as part of the data collection process or as a post-collection process. Objective here is to automate /mechanize data labeling to the maximum extent possible during the data collection process.

14) Algorithms, or integrated software and hardware approaches that develop or demonstrate improved performance of target detection, classification, or identification algorithms provided by cooperative, collaborative, networked, and/or swarming weapons.

15) Measurements of material properties relevant for use by signature prediction codes in the infrared spectrum (e.g., using DIRSIG) or Ku/Ka frequency bands (e.g., using Xpatch) for more accurate prediction of target signatures in this spectrum / at these frequencies. Additionally, target models (for ingestion by signature prediction codes) that contain model components with accurately typed material properties for more accurate prediction of target signatures.

16) Algorithms or integrated software and hardware approaches that develop or demonstrate alternative navigation capabilities. This may include approaches for radar-aided navigation, celestial-based navigation in a form-factor relevant for munitions, and other non-GNSS (global navigation satellite system)-based navigation approaches.

17) Alternative low-power architectures and associated representation (neuromorphic, quantum, etc..) for target detection, recognition, and tracking.

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4. RESEARCH AREA 4 - HARDWARE-IN-THE-LOOP SIMULATION TECHNOLOGIES (RWTSH)

RWTSH is interested in developing advanced capabilities related to hardware-in-the-loop (HIL) and digital simulation of guided weapon designs. RWTSH exercises closed-loop HIL simulations to verify weapon performance, with particular emphasis on guidance, navigation, and control during terminal homing. As weapon sensors and other subsystems advance, test technologies required to replicate sensor and communication feedback as if in a real mission can be challenging. The ability to provide the weapon seeker with targeting or navigation information, including countermeasures, is an area of ongoing research. Weapon seekers tested typically include visible, imaging infrared, RF, and/or LADAR seeker subsystems. Recent areas of interest include HIL simulation of collaborative weapons, multi-mode and multi-function sensors, alternate navigation concepts, and high-speed weapon environmental effects models. Emphasis for simulation technology research is on advancement and improvement of scene projection and injection technologies, real-time target scene modeling techniques, target phenomenology models, simulation architectures, RF target simulators, run-time lethality assessment and high bandwidth motion simulators. In general, innovative solutions that enhance the fidelity and accuracy of HIL simulation and allow for more efficient performance verification for advanced munitions are of interest.

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5. RESEARCH AREA 5 - ADVANCED SCENE GENERATION (RWTSH)

Integral to the development of advanced munitions programs is the capability at AFRL/RW to perform high-fidelity, simulation-based testing of munitions, components, and systems. The current capability to generate synthetic imagery for high-fidelity hardware-in-the-loop (HWIL)

and Autonomous Target Recognition (ATR) algorithm testing is based on a toolbox of independent Government and industry tools for predicting threat characteristics, environmental effects, and munitions hardware and software performance. The evolution in complexity and capability of modern weapons systems, however, is leading to demands for higher fidelity and performance from test simulations. In addition, the integrated nature of the modern battlefield requires test simulations to encompass not only the weapon itself, but also a variety of other systems. New scene generation (SG) techniques are needed in the areas of characterization of Department of the Air Force (DAF) threats, urban environments, chemical/biological effects, coupling and integration of scene generation software, multiple sensor views, and advanced computing techniques. These SG improvements must be designed to streamline the process for evaluating guided munitions concepts from initial design to final implementation, lowering development costs and shortening time from drawing board to battlefield. The improved testing realism will provide confidence that the munitions will perform as expected under a much wider variety of combat conditions than previously possible.

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6. RESEARCH AREA 6 - EO/IR/LADAR/SAL SYSTEM RESEARCH (RWTSE)

RWTSE has an interest in developing the components and systems necessary for imaging and non-imaging electro-optic, infrared, LADAR, and semi-active laser systems. These include, but are not limited to, optical sources, detectors and their readout integrated circuits, beam pointing/scanning and wide-field-of-view/multi-aperture techniques, detection schemes, and discrimination, ranging, and acquisition systems. Interests range from complete systems and devices to basic materials and components operating in subsonic through hypersonic regimes. These include the following:

- Optical sources: Optical sources of various wavelengths from the visible to the long wavelength infrared (< 12 microns) are desired.
- Detector systems: Single element and array detectors sensitive in the visible to the long wavelength infrared range are desired. Rapid rise times (approaching a nanosecond) are desired, as is operability without cryogenic cooling.
- Beam pointing and beam scanning systems: Systems that can rapidly steer a laser beam as well as the field of view of the detector are desired. Systems capable of search/track modes and variable fields of view are also desired.
- Detection schemes: Various incoherent and coherent detection schemes are of interest.
- Discrimination, ranging, and acquisition systems: Systems that can discriminate the signal from the background environment, condition the signal, and store the data are

required. These systems should be able to resolve time differences as small as or smaller than a nanosecond, dynamically adjust the gain of any amplification stages, allow variable timing/ranging techniques, and/or minimize range uncertainty.

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7. RESEARCH AREA 7 - NAVIGATION AND ESTIMATION TECHNOLOGY (RWTAN)

RWTAN is developing global positioning system (GPS)-enabled and alternative position, navigation, and timing (alt-PNT) technologies to provide robust PNT solutions for single-weapon and network-enabled weapon system concepts. GPS technologies of interest are anti-jam techniques including spatial and temporal anti-jam technologies and miniature GPS antenna technologies, including leveraging these technologies to identify and localize the jamming/spoofing sources. Alt-PNT technologies of interest include a wide variety of sensor aiding including passive sensing (electro-optical, infrared, passive millimeter wave, magnetic, external radio frequency sources, etc.) and active sensing which are appropriate for one or more combinations of altitudes, speeds, environments (over water/land, day/night, etc.), as well as size, weight, power, and cost restrictions. Navigation and estimation developments may also include theoretical foundations for improved data fusion or optimization methods, efficient or new data pre-processing, or other enabling technologies, subsystems, or concepts.

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8. RESEARCH AREA 8 - MODELING, SIMULATION, & ANALYSIS (MS&A) OF ADVANCED WEAPON CONCEPTS (RWSA)

The goal of this work is to develop/modify and employ models used to analyze advanced weapon concepts and their related concepts of employment to highlight technologies worthy of consideration for investment. The objective is to apply, modify and/or combine engineering, engagement (one-on-one), mission (few-on-few), systems-of-systems, campaign (many-on-many, military worth), level modeling techniques, tools, and analysis methods as well as virtual and constructive digital simulation which lend themselves to the quick and effective evaluation of advanced weapon concepts. Concepts include, but are not limited to, intercommunicative weapons, novel damage mechanisms, lethal and novel destruct mechanisms, multiple targeting, and time-critical delivery. Detailed modeling includes, but is not limited to, sensors, aerodynamics, autopilots, navigation and guidance schemes, propulsion, warheads, fuzes, datalinks, error filters, environment (wind, fog, and dust), lethality, vulnerability, and threats. Scenario development and visualization at each level of MS&A is also sought. Research into new simulation toolsets and architectures designed for this purpose will also be considered.

Additionally, environmental factors that influence a weapon's performance can be considered. This can include but not be limited to urban environments, collaborative simulation environments, Anti-Access/Area Denial (A2/AD) type environments, scenario generation, and infrastructure simulation common to environments that weapons may operate in. Existing tools of interest include, but are not limited to, ESAMS, RADGUNS, MATLAB/Simulink, AFSIM, EADSIM, and STORM. White papers and proposals should be designed to demonstrate substantive knowledge in any or all of the specific areas of MS&A. Some or all of the work performed under this BAA Research Area will be performed on-site (i.e., at the Government facility). Personal/facility security clearances at the SECRET level may also be required.

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9. RESEARCH AREA 9 - LETHALITY, VULNERABILITY, AND SURVIVABILITY (RWSAL and RWTCS)

a. The Air Force Research Laboratory Munitions Directorate has the mission to assess the performance and effectiveness of conventional inventory and conceptual weapon systems, both kinetic energy and directed energy, lethal and non-lethal, against a myriad of potential targets. The objective of this effort is to support AFRL/RW in assessing inventory and concept weapons against existing and developing targets. This work is broken out into three areas: 1) Target Vulnerability and Weapon Effectiveness, 2) Computational Mechanics, and 3) Novel Test Instrumentation and Techniques.

1) Target Vulnerability and Weapon Effectiveness: The goal of this work is to collect data, conduct research, develop/modify and employ responsive modeling tools, target models, and processes as part of AFRL's R&D efforts. These efforts will identify potential vulnerabilities in targets and their subcomponents for conventional or concept weapons to exploit. They will also enable understanding and predictive capability for the effectiveness of inventory, developmental, and conceptual munitions when deployed against targets and critical components. Targets of interest can include, but are not limited to maritime (above and below water level), mobile, fixed (above and below ground), hard and deeply buried, chem-bio, and air-to-air. This research will allow development of new techniques or enhancement of existing techniques to measure and compare weapon effectiveness, collateral damage, and potential collateral hazards. Research will include improvements in our ability to predict and measure component vulnerability and functional defeat

allowing assessment of weapon effects that degrade a target's ability to perform its intended functions without necessarily destroying it. It could also include research and modeling of new or conceptual damage mechanisms. Development of new target and associated functional models as well as advanced methodologies to capture the physics of structural response to conventional weapon effects would improve our abilities to assess current and conceptual weapons and ways to exploit high-interest targets or newly discovered vulnerabilities. Research to enhance or develop methodologies to account for the target-critical equipment/components, and their interconnections, and associated failure logic and failure modes could be required. Mathematical methods related to statistics and stochastic modeling, as related to lethality and vulnerability modeling are of interest.
Tools of interest for this section include, but are not limited to ASAP, MLAT, AJEM, ARM, BLASTX, BRL-CAD, Endgame Framework, FastCD, FASTGEN, FATEPEN, IMEA, JWS, CUSP, ORCA, PENCURV, PDAM, STMG, VALUE, WEAPS, and WinBLAST. In addition to improving any existing toolset, new methods for integrating high-fidelity computational mechanics codes into existing lethality frameworks and toolsets are an area of emerging interest. Simulation frameworks of interest are Endgame. We are also interested in coupling various lethality codes into digital engineering architectures, and with other codes and models.

2) Computational Mechanics: The performance assessment and development of advanced conventional weapon systems requires the capabilities to model complex weapon/target interaction phenomena and to predict environments produced by impacting, penetrating, and detonating warheads. This includes warheads for anti-maritime (above and below water line), weapons for ground targets, and air-to-air warheads. The emphasis of this effort is the development and validation of first principles continuum mechanics codes (finite- element, finite difference) yielding high-fidelity weapon and target simulations. Areas of particular interest include penetration mechanics, high-strain-rate fracture dynamics and constitutive modeling, modeling the shock survivability of fuze electronic components, predictive models for the change in material properties due to thermal cycling (energetics and electronics), fragmentation, mesoscale modeling (metals and energetics), the use of molecular dynamics and computational chemistry to guide the development of more accurate continuum scale and meso-scale material models for reactive (energetics, reactive metals) and non-reactive materials, localized shear band formation, high-pressure/high-strain-rate modeling of geologic and geologically derived materials, modeling of reacting droplet and particulate flows, equation of state and constitutive models for chemical and biological agents, numerical modeling of neutralization mechanisms for biological and chemical agents, hydrodynamic ram, atomization and aerosolization of chemical and biological agents, direct numerical simulation of detonations, coupled detonation physics and multi-phase flow, turbulent flows, accurate and efficient boundary interface treatments, the ability to span several orders of magnitude in spatial and temporal length scales, and advanced numerical methods. In addition, statistical and

stochastic, machine learning, and deep learning methods to generate special-purpose, fast-running models from large-scale datasets produced with computational mechanics codes is an emerging need. In order to meet emerging needs in digital engineering and digital twins, we are interested in approaches using Physically Inspired Neural Networks (PINNs) or similar approaches to developing machine learning surrogates of our weapon design and analysis codes. These codes typically perform numerical solutions of systems of partial differential equations with complex material models for material response. We are also interested in coupling various high-resolution codes into digital engineering architectures, and with other codes and models.

3) Novel Test Instrumentation and Techniques: The goal of this area is to research and develop new test instrumentation or equipment, and/or, techniques for gathering and analyzing test data in order to: 1) gather data with respect to new damage mechanisms and/or novel effects, and 2) reduce the cost and/or manpower needed to collect weapon effects data using existing methods.

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10. RESEARCH AREA 10 - WARHEAD RESEARCH (RWTOD)

Technologies and concepts are sought for effective, robust and affordable warhead and ordnance components in the areas of air and space defense to include: counter-maritime, counter-air, networked, collaborative autonomous (NCA), airbase defense, combined effects (including non-kinetic effectors), air dominance missiles, high speed weapon and long range strike weapons, ordnance of modular architecture weapons and swarming weapons. More specific, near-term challenges provide the call for research interests are in the advanced manufacturing of warhead materials and structures, shock response and equation of state for case materials; research into relevant target materials, fracture and fragmentation; penetration/perforation mechanics; and improving the suite of diagnostics to best extract the high-rate and violent environments of these ordnance systems. Innovative technologies for multi-functional materials are sought as well. There is interest in unique, innovative and high-performance payoff technologies that integrate the ordnance package in accordance with the larger system or engagement scenario. Also desired are highly agile and end-game responsive adaptation of the ordnance package; tailorable or synergistic output that ensures optimal energy use and coupling to target; selectable effects that maximize the use of system data and capabilities. Warhead and end-game effector technologies are sought for low-cost but effective Air Dominance missiles as well as future self-defense missile capability. Traditional and non-traditional concepts are sought to maximize the loadout and effectiveness of 5th-6th Generation aircraft.

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11. RESEARCH AREA 11 - FUZE RESEARCH (RWTO)

a. RWTO develops, demonstrates, and transitions technologies that have application to fuzes for air-delivered weapons, including, but not limited to, guided and unguided bombs, missiles, and submunitions. Fuzes must reliably remain in a safe mode until the appropriate post-deployment environments (such as freefall) are sensed; the fuze must then arm the weapon and, upon receiving a signal from a target detection device (TDD), initiate the explosive fill (or other damage mechanism). RWTO thus seeks proposals for innovative technologies that can be integrated into the design or testing of air-delivered weapon fuzes. Safe and Arm and initiation systems must comply with MIL-STD-1316F

b. RWTO is particularly interested in fuzes (including submunition fuzes) and related component or material technologies that are capable of surviving the repetitive, multi-axis shock environment experienced by a fuze during penetration of a hardened target and functioning the warhead. Materials that mitigate all or some portion of the shock spectrum are also of interest. Unique inertial detection devices or non-inertial detection devices are of interest. However, current test technologies do not fully duplicate the multi-axial fuze environment in terms of duration, repetitive high-acceleration loading, and other aspects of the mechanical loading profile. This necessitates extremely expensive sled tests for fuze research, testing, qualification, and performance evaluation. Therefore, there is interest in laboratory and field test techniques and equipment to duplicate these repetitive, multi-axial shocks.

c. Additional penetration fuzing-specific research tasks of interest include, but are not limited to, the following:

1) Develop a jam-resistant, greater than 250 kilobits/second shock-hardened, wireless data link for two-way communication with a fuze during a weapon's deep underground penetration event;

2) Develop a hardened, passive, unpowered, tri-axial device that irreversibly and measurably changes some physical configuration or property without relaxation/hysteresis to record the peak acceleration as a back-up data point for tests when a hardened fuze data recorder fails;

3) Develop a low-cost (<$100), shock-hardened accelerometer;

4) Develop non-inertial techniques and appropriate devices for detecting voids and layers during hard target penetration; and

5) Develop miniature, shock hardened transmitter and antenna to burst stored digital data upon command to retrieve post event recorded data from a buried warhead. It would also be useful for the purpose of locating a test item.

6) Advanced computational techniques for modeling high-rate conditions and fuze and fuze component response to these environments.

d. RWTO is also interested in improved sensors, techniques, and/or systems for second safety environment sensing (as defined in MIL-STD-1316) for a wide range of demonstration projects from miniature munitions to safety-critical payloads on hypersonic airframes. In the area of miniature and micro-munition fuzing, research tasks of interest include, but are not limited to, the following:

1) Ground profiling fuze sensor technology

2) Active imaging aimpoint selecting fuze sensor technology

e. In the area of fuzing the payloads on high-speed airframes, research tasks of interest include, but are not limited to, the following:

1) Ground profiling fuze sensor technology

2) Survivable conformal antenna and radome technology

f. RWTO is interested in advance additive and subtractive methods of manufacturing for polymers, components, and antennas. Unique materials that can be printed and then survive extreme environments of shock, vibration, and temperature are desired. Advanced development in equipment to print such materials is desired.

g. The final area of focused interest is in the area of in-line and out-of-line initiation systems. The RWTE Advanced Initiation Science Group is interested in novel ignition devices or ignition circuitry that can enhance reliability while reducing energy budgets for initiation systems. Additionally, concepts that would enable novel warhead designs are of interest. The Government is also interested in novel or more inherently robust manufacturing processes that can be applied to components within initiation systems. Finally, there is interest in modeling and simulation methods or techniques for characterizing performance of those systems.

1) Pressing of various energetic materials of interest to the United States

2) Air Force Development, build and test of various detonator designs research, development, build, and test of various energetic initiation experimental equipment (state of the art explosive chambers, optically and electrically based techniques, etc.).

3) Research, development and build of energetic initiation devices utilizing microelectronics fabrication techniques

4) Execution of experiments supporting energetic initiation research

5) Process development for thin film ignition devices

6) Produce hardware and evolve manufacturing processes for thin film ignition devices that can be used for discovery or component production purposes

7) Support the production and process development for hardware that will facilitate scientific discovery for initiation systems of interest to the United States Air Force

8) Other activities associated with energetic initiation research and development

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12. RESEARCH AREA 12 - MUNITIONS ENERGETIC MATERIALS (RWTE)

Munitions Energetic Materials is concerned with (1) formulation, manufacturing, and producibility; (2) characterization and phenomenology; and (3) theoretical energetics and digital design for explosives and energetic materials for munition applications. This topic includes development of explosive formulations to address impact, friction, electrostatic/electromagnetic, thermal, and vibration sensitivity and survivability; energetic materials, including nanometric explosives with higher energy density than traditional explosives. Reactive materials comprising metastable interstitial composites (MICs) and/or metal fuels in combination with oxidizers and explosives are also included. Topics related to the processing and manufacturing of explosives, oxidizers, polymeric binders (and their modification) and fuels to modify their sensitivity, processability, and performance such as recrystallization, coating, particle size/polymorphism/habit modification, and surface treatments other are included. Energetic materials characterization tools of relevance include, but are not limited to, static and dynamic mechanical properties measuring devices as well as microscopy and tomography. Use of computational tools to predict formulation properties and reactive flow models, including survivability and processing, is of interest. Constitutive modeling of these materials, including mesoscale descriptions of their dynamic mechanical response, initiation mechanisms and reactive/unreactive equations of state are included as well. Novel approaches for formulating, processing, enhancing the mechanical properties (i.e., strength, toughness) and characterizing the special features of energetic materials and functionally graded materials in terms of their performance and energy release benefits are also of interest.

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13. RESEARCH AREA 13 - FACILITIES AND EQUIPMENT ENABLING ORDNANCE TECHNOLOGIES AND ADVANCED ENERGETICS (RWTM)

AFRL/RWT anticipates a need for new, improved, and often unique capabilities to support expanding future in-house research in the areas of ordnance technologies and advanced energetics. These new RWT facilities, equipment and instrumentation will enable world-class research, development, integration, fabrication and testing of emerging ordnance technologies from fundamental science to demonstrating prototype munition-system concepts. As most of the needs are unique, developing the concepts and preliminary designs for the new equipment and associated instrumentation to be used in these facilities will need to be approached as research and development projects, not as just design projects. The new capability will also be required to meet current requirements and regulations with flexibility for future agility. Of particular interest are proposals for concept development, preliminary design, capability assessment, associated cost estimates and delivery of prototype capability for the new research equipment that will be required to pursue revolutionary changes in ordnance technologies.

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14. RESEARCH AREA 14 - MULTI-FUNCTION, MULTI-MODE RADAR RESEARCH (RWTS)

RWTS is looking to sponsor research on innovative radar frequency (RF) component and system technologies and associated software to offer improved performance or reduction in Cost, Size, Weight, and Power (CSWaP). Future multifunction radars will need to provide a wide range of sensory and communications functions. These functions may include altimeter, navigation-aiding, communication (1-way or 2-way datalink), mid-course guidance, target selection and non-target rejection, terminal tracking, and Guidance Integrated Fuzing (GIF) and aimpoint selection. The radar would require the ability to track moving and stationary targets, and would employ Ground Moving Target Indication (GMTI), High Range Resolution (HRR), Synthetic Aperture Radar (SAR), Doppler Beam Sharpening (DBS), and endgame target engagement. The general cooperative radar integrating concept would be of a software-defined radar which could transmit and receive signals from distributed apertures over various center frequencies and bandwidths to accomplish the desired objectives. Any hardware or software system or subsystem would require associated software models for integration into Hardware-In-The-Loop (HWIL) and Software-In-The-Loop (SWIL) simulations to evaluate the merits of the proposed components, subsystems, and/or systems. Target applications could include seekers small enough to be incorporated into a larger munition and dispensed to engage multiple targets in a target-rich environment, as well as nose-mounted gimbaled and/or body-fixed, including conformally mounted apertures for a munition body ranging in diameter from 2.75" to 14" or more. Technologies should consider compatibility with wide-bandwidth waveforms, including noise-like waveforms for minimum interference to other radars. The desire is to extend operating range in adverse weather and to handle high-speed environments and the temperature extremes of high-altitude cold-soak and the aerodynamic heating associated with hypersonic speeds. Special emphasis should be place on engaging targets in a steep dive trajectory where the target will have minimal range separation from the clutter background. Note that all hardware and software subsystems/systems should address the ability to function in a real-time processing

environment consistent with real-time target engagement.

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15. RESEARCH AREA 15 - MODULAR OPEN SYSTEMS RESEARCH (RWID)

a. Modular and open systems are an important element to obtain faster and cheaper solutions empowering programs with the use of competition throughout the lifecycle of a system. Modular Open Systems Approach language has been incorporated into statues as of the 2017 NDAA (10 U.S.C. §2446a). We are looking for modular and open solutions for munition systems. Solutions are needed to handle hardware and software design that promotes modularity and provides the necessary data rights to enable competition for modular components. Technologies and processes to enable severability of a system with respect to hardware and software, identification of data required to allow interoperation of hardware and software, and strategies to verify acquisition is adequate for future competition are highly desired. Modular Open Architecture synergizes well with model-based systems engineering (MBSE)/digital engineering (DE) concepts to employ a unified method of documentation that can inform all designers of a system when a requirement or design change occurs.

b. Current interest and research activities include:

1) Weapons Open System Architecture (WOSA)

2) Docker in an embedded environment

3) Kubernetes in an embedded environment

4) Open Seeker Architecture (OSA)

5) Strategies to verify open architecture and modularity requirements

6) MBSE development of system architectures (e.g., SysML, Cameo, Enterprise Architect)

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16. RESEARCH AREA 16 - SCIENCE, TECHNOLOGY, ENGINEERING AND MATHEMATICS (STEM) FOR EDUCATION OUTREACH (RWHW)

a. The AFRL Munitions Directorate serves the Department of the Air Force (DAF) STEM research mission directly, which in turn addresses the nation's impending shortfall in the STEM workforce. Munitions Directorate members have individually performed a wide variety of STEM outreach tasks at both local and national levels as part of their professional commitment to the community for many years. The Munitions Directorate K-20 STEM Outreach program seeks to sustain and expand STEM outreach throughout the local area as well as the greater southeast region. Nationally, the AFRL Munitions Directorate maintains a solid, robust internship program which brings students into the laboratory environment to directly benefit Directorate research and provide maximum exposure to students across a broad spectrum of educational backgrounds. Students conduct relevant, necessary research during an internship which focuses on areas of critical need in Directorate technology development. The Munitions Directorate's STEM Outreach focus is to address DAF and DoD goals to enhance the quality of K-20 STEM education and encourage greater numbers of US citizen high school graduates to pursue college degrees, certifications, and careers in STEM. The STEM Outreach program also seeks to increase diversity in STEM by specifically addressing communities that have traditionally been underserved by STEM as well as students who are underrepresented in STEM degree programs, certifications, and careers.

b. The Munitions Directorate STEM Outreach office brings the extensive facilities of the directorate, the technical talents of its researchers and its leadership role in the community and nation to partnerships with universities, technical schools, K-20 school systems, nonprofit foundations, professional and industry societies, and other agencies in Northwest Florida. These partnerships provide K-20 teachers and students in Northwest Florida with rich and wide experiences in STEM, including:

    1) Training of K-20 educators, with emphasis on improved methods of organizing and providing coherent curriculum packages.
    2) "Kindle the fire of curiosity" experiences for younger K-20 students and teachers, and "sustainment of interest" experiences for older K-20 students and teachers.

c. STEM outreach activities supported may include providing financial assistance to organizations supporting STEM activities, providing funding and support for national competitions by arranging for DoD personnel to participate as speakers, mentors, coaches, judges, and presenters, providing support for STEM education and outreach conferences, and supporting teacher STEM education and training initiatives. Stipends for teachers undertaking professional training in connection with these activities may be supported as well as funding for the acquisition of materials and resources needed to launch, implement, assess, and improve STEM oriented programs. AFRL encourages the

projects and program results to be published in appropriate publications and academic journals at the end of the period of performance. Participants are encouraged to develop innovative approaches that utilize their unique assets, capabilities, locations, and personnel. White papers should identify projects/programs and methods that will be used to foster and develop students in STEM fields that are relevant to the DoD mission.

d. Nationally, the AFRL Munitions Directorate maintains a solid, robust internship program for students ranging from High School to PhD which brings students into the laboratory environment to directly benefit Directorate research and provide maximum exposure to high school, undergraduate and graduate students across a broad spectrum of educational backgrounds. Students conduct relevant, necessary research during an internship which focuses on areas of critical need in Directorate technology development.

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17. RESEARCH AREA 17 - WEAPON AUTONOMY AND CONTROL TECHNOLOGY RESEARCH (RWTA)

RWTA is interested in novel hardware, software, and algorithms to synthesize multi-domain data into effective mathematical representations to enable novel munition behaviors based upon battlespace awareness, network topology, and agile munition control techniques. Modular and open architected technology is required to support and enable networked, collaborative, and autonomous (NCA) weapon concepts and capabilities especially in highly contested environments. Limited communication in contested environments might require decentralized, high-level cognitive functions: technologies that enable context-aware reasoning, multi-agent coordination, graceful performance degradation, and inherently flexible or reconfigurable operation are highly desired. Unified architectures, machine learning techniques, or mathematical languages applicable to the control and coordination of heterogeneous information services and that enable verifiable, trusted autonomy are also sought. Network-aware capabilities, especially technology that cognitively matches machines with human oversight, would enable assured cooperation and increased capacity for NCA weapon deployment. Finally, science and technology that allows for fractionated weapon performance (having capability spread across multiple assets that coordinate to deliver a desired effect) and composable functions (where disparate capabilities can be combined synergistically to create multiple desired effects) are also of interest.

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18. RESEARCH AREA 18 - TECHNOLOGY TRANSFER INVOVATIVE COLLABORATION (RWSP)

AFRL/RW seeks novel, cutting-edge toolsets (algorithms, capabilities, and/or methodologies) related to Technology Transfer (T2), Technology Transition (TT), and/or Innovation/Collaboration (IC). DEFINITIONS: T2 ensures federally funded intellectual property and research investments are transferred (intentionally shared) with state and local governments, academia, and industry through the use of T2 mechanisms, including, but not limited to: Cooperative Research and Development Agreements (CRADAs), Patent License Agreements (PLAs), and Educational Partnership Agreements (EPAs). TT is the application and/or incorporation of matured technologies into military systems for operational use by the DoD.

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19. RESEARCH AREA 19 - CYBER SURVIVABILITY FOR PRECISION-GUIDED MUNITIONS (RWTCC)

The AFRL's Weapon Cyber program is seeking cyber survivability (cybersecurity and cyber resilience integrated) research concepts and approaches that will enhance mission assurance properties of munition system architectures, including embedded real-time, inter and intra-weapon networking and communication, and solutions in the area of assured autonomy for ground and flight systems. Zero Trust capabilities and approaches for sensors, seekers, or guidance, navigation, and control (GNC) within weapon systems. Concepts and technologies that enhance the trust/authenticity, confidentiality, integrity, and availability of data at rest, in transit, or in use.

The development of tools and techniques, for physical and digital, that enhance the ability to verify and validate security concepts and technologies, as well as assess their performance impact within a relevant simulated mission context are also sought. Solutions of interest can be hardware, software, or algorithms/protocols and must be robust for use in real-time, safety-of-life-critical aviation systems. Example topics of interest include, but are not limited to, radio frequency (RF) exploitation, multi collaborative root of trust, formal methods, privacy, authentication/authorization, hardware/software assurance, physics-based security, wireless communications, network security, security architectures, and secure munitions-specific algorithms (sensor fusion, GNC, etc.). Solutions focused on detection and/or monitoring are generally ineffective for munitions applications.

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20. RESEARCH AREA 20 - STRATEGIC PLANNING, PROTOTYPING, AND EXPERIMENTATION (RWS)

The objective of this research area is to develop innovative approaches and products to determine military worth and quantify value propositions for weapon concepts as part of the Munitions Directorate's strategic planning process. Specific mission areas of interest include Air, Space, Cyber, Maritime, Nuclear Deterrence, Special Operations. Techniques for objective quantification of future weapon technologies, attributes, and their tradespaces critical to achieving operational objectives are sought. There is also interest in fast-running informative tools for analysis, study, optimization, and revelation of opportunities to address operational gaps and shortfalls. Inclusion of should-cost estimates for technologies and cost exchange ratios for blue-red forces is an important factor to senior leader decision making processes. Techniques to efficiently develop strategic planning roadmapping tools which quantify time-phased performance advancements over baseline technologies and weapon systems are highly desired. In addition, approaches to aggregate technologies into notional weapon constructs is of interest as well as novel approaches to evaluate their performance attributes and capability contributions.

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21. RESEARCH AREA 21: DIGITAL MATERIEL MANAGEMENT

The 2023 Air Force Materiel Command (AFMC) Strategic Plan calls for the deployment of Digital Materiel Management (DMM) to create a fully empowered digital workforce, trained, and equipped to deliver integrated, innovative, and trusted capability, throughout the acquisition lifecycle. AFRL/RW is utilizing DMM to transform IT infrastructure, models, tools, standards, data, architecture, lifecycle strategies, processes, policy, guidance, workforce training, culture and more, into a digital enterprise that aids Research and Development (R&D). Two research focuses dedicated to DMM are Integrated Digital Design and Automated Data Analysis and Digital Tools.

Integrated Digital Design

AFRL/RW seeks to develop and integrate a collection of high-fidelity models to understand weapon technology performance in the following areas: ordnance sciences, seeker sciences, airframe, guidance, navigation, and control. The integrated high-fidelity physics and engineering models will be used to generate mission-level data to inform investment decisions. The linking of existing tools, and the potential development of new tools to fill current gaps in high-fidelity model analysis is necessary. Leading-edge solutions to document, verify and validate the integration of the high-fidelity models is key. The models will be united in a generic simulation framework to execute and enable reuse.

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Automated Data Analysis and Digital Tools

AFRL/RW seeks integrated data solutions to discover new insights from technical data as well as business planning and execution data. Specifically, state of the art data analytics, business intelligence, machine learning, and statistical methods for storing, indexing, data tagging, and retrieving data while discovering new insights from complex data structures and disparate data sources. The goal is to reduce manual toil by autonomously tagging, storing, and securing data. Solutions should consider storage of large data from both static and streaming sources; structured, semi-structured, and unstructured data; and multiple security considerations (e.g., PII, STINFO). Additionally, novel user interfaces that allow non-expert end-users to discover new insights and design reporting and analysis packages to support their respective missions is required.

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IV. AWARD INFORMATION

1. Anticipated Funding: Note that there is no inherent funding associated with this Open BAA. All funding is subject to change due to Government discretion and availability. Each Call will have funding profiles specific to that effort. However, similarly, all offerors should be aware that due to unanticipated budget fluctuations, funding in any or all areas may change with little or no notice.

2. Anticipated Type of Awards: The Air Force reserves the right to award the instrument best suited to the nature of research proposed. Accordingly, the Government may award any appropriate contract type under the FAR or Other Transaction (OT) for Prototype, Grant, Cooperative Agreement, or OT for Research. The Air Force may also consider award of an appropriate technology transfer mechanism, if applicable. It is anticipated that awards under this BAA will generally be Cost Plus Fixed Fee (CPFF), but other contract types (e.g., Firm Fixed Price, Cost Share, Cost (no fee), etc.) may be negotiated. Cost reimbursement contracts require successful offerors to have an accounting system considered adequate for tracking costs applicable to the contract.

3. Evaluation and Award (Applicable to Both Open BAA and BAA Calls): Proposals are intended to be evaluated, and awards made, without discussions unless discussions are determined to be necessary. However, the Government may obtain clarifications to determine proposal acceptability. Discussions may be held with prospective awardees prior to award if needed. Offerors are cautioned that only COs are legally authorized to obligate funds and commit the Government.

V. ELIGIBILITY INFORMATION

1. Eligible Offeror/Applicants: This is an unrestricted solicitation. Small businesses are encouraged to propose on all or any part of this solicitation. Multiple White Paper submittals to the varying 20 Research Areas are allowed.

2. Foreign-owned Firms: Foreign or foreign-owned offerors are advised that their participation is subject to foreign disclosure review procedures. Foreign or foreign-owned offerors should immediately contact the contracting office focal point identified further below. The subject line of all correspondence must reference the BAA number, BAA title, and associated research area.

3. Federally Funded Research and Development Centers: The following guidance is provided for Federally Funded Research and Development Centers (FFRDCs) contemplating submitting a proposal, as either a prime or subcontractor, against this BAA. FAR 35.017-1(c)(4) prohibits an FFRDC from competing with any non-FFRDC concern in response to a Federal agency request for proposal for other than the operation of an FFRDC (with exceptions stated in DFARS 235.017-1(c)(4)). There is no regulation prohibiting an FFRDC from responding to a solicitation. However, the FFRDC's sponsoring agency must first make a determination that the effort being proposed falls within the purpose, mission, general scope of effort, or special competency of the

FFRDC, and that determination must be included in the FFRDC's proposal. In addition, the non-sponsoring agency must make a determination that the work proposed would not place the FFRDC in direct competition with domestic private industry. Only after these determinations are made would a determination be made concerning the FFRDC's eligibility to receive an award.

4. Government Agencies: If a Government agency is interested in performing work, offerors should immediately contact the contracting office focal point if they contemplate responding. If those discussions result in a mutual interest to pursue your agency's participation, the effort will be pursued independent of this announcement.

5. Cost Sharing or Matching: Cost sharing is not a requirement, but is allowed.

VI. TWO-STEP OPEN BAA

1. WHITE PAPER SUBMISSION INFORMATION

a. Application Package: THIS ANNOUNCEMENT CONSTITUTES THE ONLY SOLICITATION and THE GOVERNMENT IS SOLICITING WHITE PAPERS ONLY. DO NOT SUBMIT A FORMAL PROPOSAL AT THIS TIME. Those offerors whose white papers are found to be consistent with the intent of this BAA may later be invited to submit a technical and cost proposal. See Section VI 2 c of this announcement for further details. Offerors with white papers not selected for proposal invitation will be contacted by the Government and may request a feedback session. Debriefings will not be offered for white papers. An unfavorable white paper evaluation will bar the offeror from further consideration unless the white paper is subsequently revised and resubmitted. Revised white paper submissions will be reevaluated in accordance with the white paper evaluation criteria listed herein.

b. Content and Form of Submission of White Papers: Offerors are required to submit one (1) electronic copy, via e-mail, that is 5 pages or less summarizing their proposed approach/solution. Any pages over the stated 5 page maximum will not be evaluated. The purpose of the white paper is to preclude unwarranted effort on the part of an offeror whose proposed work is not of interest to the Government. The format for the white paper is as follows:

1) Page Format:

i. Paper Size - 8.5 inch x 11 inch

ii. Margins on every page shall be one-inch on top, bottom, left and right sides

iii. Font size shall be standard 12 point Times New Roman. Character spacing must be "normal," not condensed in any manner. All text, including text in tables, references, and charts, must adhere to all font size and line spacing requirements listed herein. Font and line spacing requirements do not have to

be followed for illustrations, flowcharts, drawings, and diagrams. These exceptions shall not be used to circumvent formatting requirements and page count limitations by including lengthy narratives in such items.

iv. Pages shall be double-spaced (must use standard double-space function in Microsoft Word)

2) Document Format:

i. Section A: White Paper Title, White paper in response to Research Area Number (identify #), BAA Number and Title, Period of Performance, Estimated Cost, Name/Address of Company/Commercial and Government Entity (CAGE) number, Dunn & Bradstreet Data Universal Numbering System (DUNS) Number, Technical and Contracting Points of Contact (phone, fax and email). NOTE: This section is NOT included in the page count.

ii. Section B: Task Objective

iii. Section C: Technical Summary and Proposed Deliverables

iv. Section D: Estimated Cost of Task (Rough Order of Magnitude (ROM))

3) Multiple white papers within the purview of this announcement may be submitted by an offeror. If an offeror wishes to restrict access to his/her white paper, it must be marked with the restrictive language stated in FAR 52.215-1(e).

c. Funding Restrictions: The cost of preparing white papers/subsequent proposals in response to this announcement is not considered an allowable direct charge to any resulting contract or any other contract, but may be an allowable expense to the normal bid and proposal indirect cost specified in FAR 31.205-18. Incurring pre-award costs for ASSISTANCE INSTRUMENTS ONLY are regulated by 2 CFR 200.458.

d. Classified Proposals: Offerors are encouraged to keep all elements of the proposal package and White Paper Submission UNCLASSIFIED. In the case where an offeror has a need to submit a classified appendix, please contact the technical POC for delivery instructions.

e. Standard Form 424 (SF 424), Requirement for Standard Form 424 (SF 424), Research and Related Senior/Key Person Profile (Expanded) Form and Security Program Questionnaire:

Include a completed SF 424 with all white papers.

Offeror shall submit as a part of the white paper a completed Standard Form (SF 424), Research and Related Senior/Key Person Profile (Expanded) Form for all Senior/Key Personnel proposed in support of the requirement. Additionally, the offeror shall submit a completed Security Program Questionnaire. Offeror may be asked to provide a

mitigation plan for any identified S&T Protection risks. The Government reserves the right to determine an offeror unawardable on the ground of unacceptable S&T Protection risk based on its review of the SF 424 and Security Program Questionnaire.

By submitting a white paper, the offeror certifies that it is in compliance with Section 223(a) of the William M. (Mac) Thornberry National Defense Authorization Act for Fiscal Year 2021 which requires that: (a) the PI and other key personnel certify that the current and pending support provided on the proposal is current, accurate and complete; (B) agree to update such disclosure at the request of the agency prior to the award of support and at any subsequent time the agency determines appropriate during the term of the award; and (c) the PI and other key personnel have been made aware of the requirements under Section 223(a)(1) of this Act. I am aware that any false, fictitious, or fraudulent statements or claims may subject me to criminal, civil, or administrative penalties. (U.S. code, Title 218, Section 1001).

f. If discussions have occurred about this submission with other than the research area POC, include name, email and phone of the individuals.

2. WHITE PAPER AND PROPOSAL EVALUATION

a. White Paper Evaluation Criteria: The following two criteria will be used to determine whether full proposals will be invited based on the white paper submitted. The following criteria are listed in descending order of importance:

1) White Paper Evaluation Criteria:

i. An integrated, comprehensive, and unbiased assessment of the proposed technical approach to include scientific and/or technical merits/feasibility and the potential contributions of the effort to extending the scientific understanding associated with the technologies being pursued by AFRL/RW and described in the 20 research areas of the BAA.

ii. ROM and schedule commensurate with technical approach.

b. White Papers will be evaluated and categorized as follows:

- Meets the criteria
- Does not meet the criteria

h. Proposal Evaluation Criteria: Proposals invited as a result of favorable White Paper evaluations will be evaluated in accordance with the following evaluation criteria:

1) Technical Evaluation Criteria

i. A unique and innovative approach proposed to accomplish technical

objectives. New and creative solutions and/or advances in knowledge, understanding, technology, and the state of the art being pursued by AFRL/RW and described in the 20 research areas of the BAA.

ii. The offeror's understanding of the scope of the technical effort.

iii. Soundness of the offeror's technical approach, including whether the proposal identifies major technical risks, clearly defines feasible mitigation efforts, and demonstrates related experience/qualifications of technical personnel.

iv. Potential to transition the R&D deliverables to future Government needs. (Any proposed restrictions on technical data/computer software will be considered).

2) Cost Proposal Preparation Information (Substantial but lower priority than technical):

i. The reasonableness and realism of proposed cost and fees, if any, the proposed cost share (for Cooperative Agreements and Technology Investment Agreements), and/or the offeror's projected progress to the desired solution within the parameters of available funding. Cost proposals have no page limitations.

3) Proposal Risk Assessment: Proposal risk for technical, cost, and schedule will be assessed for formal proposals, as part of the evaluation of the above evaluation criteria. Proposal risk relates to the identification and assessment of the risks associated with an offeror's proposed approach as it relates to accomplishing the proposed effort. Tradeoffs of the assessed risk will be weighed against the potential scientific benefit. Proposal risk for schedule relates to an assessment of the risks associated with the offeror's proposed number of hours, labor categories, material, or other cost elements as it relates to meeting the proposed period of performance.

Proposal Risk Assessment

Low: Little potential to cause disruption of schedule, increase in cost, or degrade desired performance. Normal effects will probably be able to overcome issue.

Moderate: Can potentially cause some disruption of schedule, increase cost, or degrade desired performance. Special monitoring required to overcome issues.

High: Likely to cause significant disruption of schedule, increased cost, or fail to meet performance goals. Risk may be unacceptable even with special efforts.

4) Review and Selection Process: The evaluation described above will generally result in proposals being placed in one of the three categories below:

   i. High Recommended: Proposals are recommended for acceptance if sufficient funding is available, and normally are displaced only by other Highly Recommended proposals

   ii. Selectable: Proposals are recommended for acceptance if sufficient funding is available, but at a lower priority than Highly Recommended proposals. May require additional development. To ensure a diversity of approaches, a Selectable proposal may be prioritized over a Highly Recommended proposal if the Selectable proposal presents a unique approach unlike any of the Highly Recommended proposals.

   iii. Not Selectable: Even if sufficient funding existed, the proposal should not be funded.

3. AWARD ADMINISTRATION INFORMATION:

a. Award Notices (White Papers): Offerors of those white papers found to be consistent with the intent of the Open BAA may be invited to submit a technical and cost proposal. Notification by email or letter will be forwarded by the Government. Such invitation does not assure the submitting offeror will be awarded a contract. Offerors of those white papers not selected for further consideration will be notified. Prospective offerors are advised that only CO are legally authorized to commit the Government. Offerors may request status of their white paper no earlier than 60 calendar days after submission.

b. Award Notices (Full proposals): Offerors will be notified whether their proposal is recommended for award after evaluation of the proposal. The notification is not to be construed to mean the award of a contract is assured, as availability of funds and successful negotiations are prerequisites to any award.

VII. TWO-STEP BAA WITH CALLS

Periodically, Calls may be issued in sam.gov or grants.gov under FA8651-22-S-0001 to request white paper and/or proposals for Air Delivered effects topic areas. The requests for white papers and/or proposals are transmitted via Calls that are published separately from the basic BAA at various times during the open period of the basic BAA. The Calls may request white papers or full proposals for the specific topic areas. The Calls may also include specific terms that apply to that Call such as further technical details and any other applicable information. Typically, proposals or white papers are submitted only when Calls to the basic BAA request them.

Subsequent Calls may contain specific objectives of the topic area to be addressed, anticipated period of performance, information peculiar to the topic area, and the expected dollar range for proposals received under the Call. Proposals in response to the Call will be accepted as specified in the actual Call. Offeror's are advised that Adequate Price Competition may be applicable to Calls issued against the BAA. The same technical and cost/price evaluation criteria may apply to

proposals submitted in response to calls as referenced in VI 2.

1. **PROPOSAL SUBMISSION INFORMATION**

   a. Content and Form of Submission of Proposals: Proposal format, due dates and times will be specified in each Call. Proposals received after the due date and time specified in the Call shall be governed by the provisions of FAR 52.215-1(c)(3). Offerors must monitor sam.gov and grants.gov in the event this announcement is amended or Calls are issued. Offerors must monitor these systems to ensure they receive the maximum proposal preparation time for subsequent amendments as this is the official notification vehicle to request proposals.

   b. Communications: The type of communication with industry is dependent upon the specificity or lack of specificity of the requirements as identified in the technical objectives stated in the BAA. For less definitive requirements, more consideration should be given to one-on-one meetings between the acquisition team and potential offerors. Conversely, the more definitive the requirement the more formal the communication. Prospective offerors may contact the technical points of contact to verify interest in the effort to be proposed prior to committing any resources to the preparation of any proposals in response to a Call under this announcement. Discussions shall not include content or rating information of other offeror's proposals or White Papers. Discussions with the points of contact shall not constitute a commitment by the Government to subsequently fund or award any proposed effort. Questions outside the scope of the technical focal point, such as contract terms or conditions, or projected award schedule, should be referred to the CO. Only COs are legally authorized to commit the Government.

   c. Funding Restrictions: The cost of preparing proposals in response to this announcement is not considered an allowable direct charge to any resulting contract or any other contract, but may be an allowable expense to the normal bid and proposal indirect cost specified in FAR 31.205-18. Incurring pre-award costs for ASSISTANCE INSTRUMENTS ONLY are regulated by 2 CFR 200.458.

2. **PROPOSAL REVIEW INFORMATION:**

   a. The technical and cost/price evaluation criteria found in Section VI 2 c, 2-Step Open BAA Section/Proposal Evaluation Criteria/Technical and Cost/Price Criteria, may also apply to proposals submitted in response to specific Calls.

   b. Proposal Risk Assessment: Technical, cost, and schedule risk will be assessed in the application of the referenced evaluation criteria. Proposal risk relates to risk identification and assessment as it relates to accomplishing the proposed effort. Tradeoffs of assessed risk will be weighed against potential scientific benefit. Schedule risk is determined by examining offerors' proposed labor hours, labor categories, materials, and/or other cost elements as they relate to completing the efforts within the proposed periods of performance.

c. Proprietary Proposal Information Protection: It is the policy of AFRL/RW to treat all proposals as privileged information, and to disclose the contents only for the purposes of evaluation. Those selected as a result of initial review will be subject to an extensive evaluation by highly qualified Government scientists. Offerors must indicate limitations, if any, to be placed on disclosure of proposal information. Offerors should note, proposal information incorporated into a resulting contract, if any, may be subject to release under the Freedom of Information Act.

VIII. TERMS APPLICABLE TO ALL BAA AWARDS:

1. Administrative and National Policy Requirements: Depending on the work to be performed, the offeror may require a classified facility clearance and safeguarding capability; therefore, personnel identified for assignment to a classified effort must be cleared for access to information at the equivalent level of security at the time of award. In addition, the offeror may be required to have, or have access to, a certified and Government-approved facility to support work under this BAA. Data subject to export control constraints may be involved and only firms holding certification under the US/Canada Joint Certification Program (JCP) https://public.logisticsinformationservice.dla.mil/jcp/search.aspx

2. Reporting: Contractors should expect any contract or assistance instrument resulting from this BAA would contain the requirement to provide various types of periodic and final technical reports, and possibly cost and other reports.

3. Data Rights/Software Assertions: It is anticipated that all data/software delivered under any resulting award will be delivered with unlimited rights; however different rights may be negotiated, as appropriate. The contractor shall identify data rights/software assertions in accordance with DFARS 227.7103-3 and/or 227.7203-3, licenses, patents, etc. that apply to any proprietary materials, technical data, products, software, or processes to be used by the prime or subcontractor(s) in the performance of this effort; and shall address acquisition of data rights or licenses, or expected recoupment of development costs for those proprietary items that will be integral to any contracts awarded under this BAA.

4. Occupational Safety and Health (OSHA): If required as a part of a resulting contract from this BAA, AFFARS 5352.223-9001 (Oct 2019) mandates that adequate health and safety requirements be identified in the contract. Contractors can gain more information regarding OSHA at https://www.osha.gov/.

IX. AGENCY CONTACTS

1. Questions of a technical nature shall be directed to the technical point of contact listed in each applicable Research Area.

2. Questions of a contractual/business nature shall be directed to the RWK BAA monitors:

   Ms. Amy Fortenberry
   203 West Eglin Blvd
   Bldg 300, Rm 112
   Eglin AFB, FL 32542-6810
   Phone: (850) 882-3657
   Email: amy.fortenberry.1@us.af.mil

   Ms. Pam King-Hasberry
   203 West Eglin Blvd
   Bldg 300, Rm 112
   Eglin AFB, FL 32542-6810
   Phone: (850) 585-3209
   Email: pamela.king-hasberry.1@us.af.mil

3. Any correspondence shall reference the BAA number and title and research area in the Subject Line.

4. In accordance with AFFARS 5301.9103 (Oct 2019), an Ombudsman has been appointed to hear and facilitate the resolution of concerns from offerors, potential offerors, and others for this acquisition announcement. Before consulting with an ombudsman, interested parties must first address their concerns, issues, disagreements, and/or recommendations to the Contracting Officer listed above for resolution. AFFARS 5352.201-9101, Ombudsman will be incorporated into all contracts awarded under this BAA. The Ombudsman is as follows:

   Ms. Tessy P. Smith
   Director of Contracting, AFRL/PK
   Air Force Research Laboratory Phone: (937) 904-4407
   Email: tessy.smith@us.af.mil

5. The BAA Guide for Industry is located at:
   https://www.afrl.af.mil/Portals/90/Documents/HQ/BAA%20Ind%20Guide%202020.pdf?ver=7AivkWvoUoptKgypgCuIvw%3D%3D

X. OTHER INFORMATION PERTINENT TO AWARD OF CONTRACTS AND/OR ASSISTANCE INSTRUMENTS

1. Support Contractors: The AFRL/RW has entered into contracts with support contractors. Support contractors may support, advise, and assist Government employees with reviewing and evaluating white paper/formal proposals. These contractors have signed general non-disclosure agreements and organizational conflict of interest statements. Any objection to support contractor access must be in writing to the CO and shall include a detailed statement of the basis for the objection.

2. Communication: Dialogue between prospective offerors and Government representatives is encouraged until submission of proposals. Discussions with any of the points of contact shall not constitute a commitment by the Government to subsequently fund or award any proposed effort. Only COs are legally authorized to commit the Government.

3. Debriefings (Proposals Only): When requested, a debriefing will be provided. The debriefing process will follow the time guidelines set out in 10 USC 2305(b)(5), but the debriefing content may vary to be consistent with the procedures that govern BAAs (FAR 35.016).

4. Wide Area WorkFlow Notice: Any contract award resulting from this announcement will contain the clause DFARS 252.232-7003, Electronic Submission of Payment Requests and Receiving Reports (Dec 2018), which requires electronic submission of all payment requests. Contractors will be required to set up an account with Wide Area Workflow through the Procurement Integrated Enterprise Environment (PIEE).

5. Item Identification and Valuation: Any contract award resulting from this announcement may contain the clause at DFARS 252.211-7003, Item Unique Identification and Valuation (Mar 2016), which requires unique item identification and valuation of any deliverable item for which the Government's unit acquisition cost is $5,000 or more; subassemblies, components, and parts embedded within an item valued at $5,000 or more; or items for which the Government's unit acquisition cost is less than $5,000 when determined necessary by the requiring activity for serially managed, mission essential, or controlled inventory. The contract will also include DFARS 252.211-7007, Reporting of Government-Furnished Property (Aug 2012).

6. Forward Pricing Rate Agreements/Recommendations (FPRA/FPRR): If formal proposals are requested, offerors with FPRAs and FPRRs should submit them with their proposals.

7. Pre-Award Clearance: Pursuant to FAR 22.805, a pre-award clearance must be obtained from the U.S. Department Of Labor, Employment Standards Administration, Office Of Federal Contract Compliance Program's (OFCCP) prior to award of a contract (or subcontract) of $10,000,000 or more unless the contractor is listed in OFCCP's National Preaward Registry https://www.dol.gov/agencies/ofccp/pre-award. Award may be delayed if an offeror is not currently listed in the registry and the CO must request a pre-award clearance from the OFCCP.

8. Limitations on Pass-Through Charges: Any contract award resulting from this announcement may contain the clause at FAR 52.215-23, Limitations on Pass-Through Charges (Jun 2020), which requires the contractor to identify in its proposal the percentage of effort to be performed by the prime contractor and the percentage expected to be performed by each subcontractor.

9. Associate Contractor Agreements: Associate Contractor Agreements (ACAs) are agreements between contractors working on Government contract projects that specify requirements for them to share information, data, technical knowledge, expertise, or

resources. The CO may require ACAs when contractors working on separate Government contracts must cooperate, share resources or otherwise jointly participate in working on contracts or projects. Prime contractor to subcontractor relationships do not constitute ACAs. For each award, the CO will identify associate contractors with whom agreements are required.

10. Post-Award Small Business Program Re-representation: Any contract above the micro-purchase threshold resulting from this announcement may contain the clause at FAR 52.219-28, Post-Award Small Business Program Representation (Sep 2021), which requires a contractor to re-represent its size status when certain conditions apply.

11. Employment Eligibility Verification: Any contract above the Simplified Acquisition Threshold and containing a period of performance of more than 120 days resulting from this announcement may contain the clause at FAR 52.222-54, Employment Eligibility Verification (Nov 2021). This clause provides the requirement of contractors to enroll as a Federal Contractor in the E-Verify program within 30 days after contract award.

12. Reporting Executive Compensation and First-Tier Sub-contract/Sub-recipient Awards: Any contract award resulting from this announcement may contain the clause at FAR 52.204-10, Reporting Executive Compensation and First-Tier Subcontract Awards (Jun 2020). Any grant or agreement award resulting from this announcement may contain the award term set forth in 2 CFR, Appendix A to Part 25 https://www.ecfr.gov/current/title-2/subtitle-A/chapter-I/part-25

13. Updates of Publicly Available Information Regarding Responsibility Matters: Any contract or assistance award that exceeds $600,000.00; when an offeror checked "has" in paragraph (b) of the provision FAR 52.209-7, shall contain the clause/article, FAR 52.209-9, Updates of Publicly Available Information Regarding Responsibility Matters (Oct 2018).

14. Contractor Business Systems: DFARS 252.242-7005, Contractor Business Systems (Feb 2012), is hereby incorporated by reference.

15. Any award resulting from this announcement will contain a requirement for notifying the awardee that the Government and select support contractors may be required to evaluate certain elements of the proposal.

16. Provisions of the Federal Acquisition Regulation may be accessed electronically at this address: https://www.acquisition.gov/

17. System for Award Management (SAM) Registration: Offerors must be registered in the SAM database to receive a contract award, and remain registered during performance and through final payment of any contract or agreement. Offerors who are not already registered should consider applying for registration before submitting a proposal. Processing time for registration in SAM, which normally takes 48 hours, should be taken into consideration when registering. The provision at FAR 52.204-7, System for Award

Management (SAM) (Oct 2018), applies. The Government shall obtain the contractor's annual FAR/DFARS Representations and Certifications (i.e., Reps & Certs) directly from the SAM repository upon submission of the contractor's proposal. It is incumbent upon the contractor to keep their SAM Reps & Certs up to date on an annual basis. Subsequent award will not occur unless the contractor's Reps & Certs are current.

18. Federal Awardee Performance and Integrity Information System (FAPIIS): Before awarding a contract in excess of the simplified acquisition threshold, the CO shall review the performance and integrity information available in the FAPIIS (available at https://cpars.gov), including FAPIIS information from the SAM exclusions and the Contractor Performance Assessment Reporting System (CPARS).

19. Government Approved Accounting System: An offeror must have a **Government-approved** accounting system prior to award of a cost-reimbursement contract per limitations set forth in FAR 16.301-3(a) to ensure the system is adequate for determining costs applicable to the contract. The acceptability of an accounting system is determined based upon an audit performed by the Defense Contract Audit Agency (DCAA).

20. Collection of Data Concerning Women in STEM under DoD Grants and Cooperative Agreements: To evaluate compliance with Title IX of the Education Amendments of 1972 (20 U.S.C. A§1681 Et. Seq.), the Department of Defense is collecting certain demographic and career information, **for grants and cooperative agreements**, 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): 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 of career information. In addition to the required fields on the form, applicants must complete these two fields for 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.

    b. Research and Related Personal Data Project Director/Principal Investigator and Co-Project Director(s)/Co-Principal Investigator(s): 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 and 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 purposes 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.

c. DISTRIBUTION A. Approved for public release, distribution unlimited. (AFRL-2022-0309).

d. Place of Performance: TBD United States

Attachment 1: Section K Representations and Certifications