

BROAD AGENCY ANNOUNCEMENT (BAA)

1. Agency Name

United States Air Force Academy (USAFA)
Colorado Springs, CO

2. Funding Opportunity Number

USAFA–BAA-2015

3. Funding Opportunity Title

Research Interests of the United States Air Force Academy (USAFA)

4. Types of Instruments Awarded

Research and Development contracts, grants and cooperative agreements

5. Announcement Type

"Amendment 0001 to Initial Announcement"

6. Catalog of Federal Domestic Assistance (CFDA) Numbers

12.800

7. Due Dates

This announcement remains open until superseded. White papers and proposals are reviewed and evaluated as they are received and may be submitted at any time; however, there is an initial preference for White papers over full applications/proposals. The White paper submission process is discussed in sections IV and V of this BAA. Proposals will be due according to specific instructions contained in a separate Request for Proposal (RFP) notice resulting from favorable White paper evaluations or calls issued against this BAA. Calls may be placed against this BAA and specific information related to due dates will be provided in each call. The calls may also include specific terms which apply to the call such as further technical details, cut-off date for White paper and/or proposal submission and any pertinent clauses, such as available Government Furnished Property (GFP) or specific Organizational Conflict of Interest (OCI) requirements. Proposals or White papers submitted in response to calls should be submitted according to directions contained within each individual call and in accordance with this BAA. Late bid and proposal provisions (in accordance with (IAW) Federal Acquisition Regulations (FAR) 52.215-1(c) (3)) will apply to this BAA.

8. Additional Overview

USAFA's Research Laboratory is announcing to business and academia the intent to solicit proposals for USAFA research efforts through this BAA. This strategy provides USAFA an acquisition tool with the flexibility to solicit proposals and make awards to develop technologies to meet present and future Air Force research needs as technology issues are identified. USAFA invites White papers and proposals for research in many broad areas. These areas are described in detail in Section I, Funding Opportunity Description. Additional information regarding USAFA Research Centers, Departments and Institutes may be found at <http://www.usafa.edu/df/dfe/dfer/?catname=research>.

USAFA is seeking unclassified research White papers and proposals that do not contain proprietary information. Requests for White papers/proposals are also transmitted via calls which may be published separately from the BAA at various times during the open period of the BAA (note: the first Call may be published with the BAA).

At this time, it is anticipated awards will be made in the form of grants, cooperative agreements or contracts. USAFA reserves the right to select and fund for award all, some, or none of the White papers and/or proposals in response to this announcement. All awards are contingent upon funds availability for the program areas identified. Unless specifically indicated in a RFP or a call, cost sharing is permitted and encouraged, but not required. This announcement will remain open until replaced by a successor BAA or until it is cancelled. White papers and proposals may be submitted at any time.

Awards based on responses to this BAA are considered to be the result of full and open competition. Small businesses are encouraged to submit White papers against any Research Center's Areas of Interest (solicitations) described within this BAA. The North American Industry Classification System (NAICS) code, unless otherwise stated in the BAA amendments shall be: 541711, Research and Development in Biotechnology and 541712, Research and Development in the Physical, Engineering and Life Sciences (except Biotechnology). The size standard for both NAICS codes is 500 employees. White papers and proposals submitted in response to this BAA shall be in accordance with the requirements of this BAA and its appropriate amendment(s).

Interested offerors should be alert for any BAA amendments, calls, or other changes to the requirements of this BAA or its subsequent amendments. Amendments to and/or calls on this BAA will be posted to the FedBizOpps.gov and/or Grants.gov website and published when they occur. Interested parties are encouraged to periodically check these websites for updates and amendments.

USAFA will not issue paper copies of this announcement. The costs of White papers and/or complete proposals in response to this BAA are not considered an allowable direct charge to any

award resulting from this BAA or any other award. Technical and cost proposals, or any other material, submitted in response to this BAA will not be returned.

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I. Funding Opportunity Description

The USAFA invests in an active research program for three main reasons. First and foremost, research significantly enhances the cadet learning experience. Our research is done by, for and with cadets who work alongside fellow cadets and faculty mentors. Research provides cadets with rich independent learning opportunities as they tackle ill-defined problems and are challenged to apply their knowledge and abilities.

Second, our research program provides opportunities for essential faculty development. Research broadens and deepens the experience base of the faculty. This infuses current, relevant, state-of-the-art and cutting-edge applications and examples into the curriculum. This also helps our faculty remain current in their respective fields.

Third, at USAFA we strive to conduct research to enhance the ability of the Air Force to perform its mission. There are ongoing research projects spanning topics as diverse as super hypersonics, cyber security, spatial disorientation, athletic performance and homeland defense.

This BAA is located at the [FedBizOpps.gov](https://www.fedbizopps.gov) and [Grants.gov](https://www.grants.gov) website(s). Research areas of interest to the USAFA's Research Center Directors are described in detail in the sub-sections below.

a. Research Centers

1. Aeronautics (Aeronautics Research Center)

The Aeronautics Research Center (ARC) performs a range of aeronautical research tasks in support of Air Force (AF), Department of Defense (DoD), National Aeronautics and Space Administration (NASA) and other government and commercial sponsors. Making use of the highly diverse and advanced experimental facilities housed in the USAFA Department of Aeronautics, the ARC pursues a range of aeronautic and propulsion research efforts. The research program in this center is geared toward providing all undergraduates with a rich, relevant research experience while answering critical research needs of our highly varied customer base. Researchers may expect extensive access to premier facilities, tremendous latitude of pursuits and single-minded focus on research tasks, but must seek to incorporate student participation in their projects, typically two to four students per

semester. Substantial effort in this center is directed toward the solution of multi-disciplinary problems which may require skills beyond classical aeronautics disciplines, including plasma and laser physics, optics, automatic controls and applied mathematics. The ARC, in partnership with the USAFA Modeling and Simulation Center, is a leader in the complementary employment of experiment and simulation to solve complex fluid, aerodynamic and control problems.

Current research strengths include several complementary thrusts. Closed loop flow control efforts focus on aero-optic control and control of flexible structures under aerodynamic loading. There is extensive effort in the development of automatic control algorithms and techniques, experimental flow control methodologies, fluid-structure interactions and computational fluid dynamics (CFD) simulations. Well-developed and modern force and moment measurement capabilities in low speed ($M < 0.1$) and subsonic (up to Mach 0.6) wind tunnels are employed in the investigation of numerous air vehicle modifications as well as development of new aircraft and Unmanned Aerial Systems (UAS) designs. Flight test of small air vehicles can be arranged using USAFA facilities. A Mach-6 Ludwig tube is now available, complementing an existing Mach 4.4 blow down facility for supersonic and hypersonic investigations, emphasizing shock wave-boundary layer interactions. Operating engines, including an F-109 turbo fan and several internal combustion engines, are used for fuels and flow quality investigations, with a current emphasis in ejectors, ducted fans, and propellers for small air vehicles. Researchers are encouraged to propose topics in these areas and other allied aeronautics subjects.

A list of current and available research facilities can be found at http://www.usafa.edu/df/dfan/research_centers/aero_research_center/facilities/facilities.cfm

Thomas E. McLaughlin, Ph.D.
Director, Aeronautics Research Center
Department of Aeronautics
PH (719) 333-2613
E-mail: Tom.Mclaughlin@usafa.edu

2. Aeronautics (High Performance Computing Research Center)

The High Performance Computing Research Center (HPCRC) is a multi-disciplinary center which shares a dual mission of providing high performance computing resources to USAFA cadets and research/teaching personnel, as well as conducting physics-based modeling and simulation research tasks in support of AF, DoD, NASA and other government and commercial sponsors. Making use of distributed/shared memory computing systems and a dedicated research network, the Center pursues a range of computational research efforts. The research program in this center is geared toward providing undergraduates with

scientific computing experience supported by the DoD High Performance Computing Modernization Program and projects which answer critical research needs of our highly varied customer base. Researchers may expect extensive access to premier facilities, tremendous latitude of pursuits and single-minded focus on research tasks, but must seek to incorporate cadet participation in their projects, typically two to four cadets per semester.

The HPCRC, in partnership with the USAFA Aeronautics Research Center, is a leader in the complementary employment of experiment and simulation to solve complex fluid, aerodynamic and control problems. Current fluid/aerodynamic research interests include: 1) massively-separated flow aerodynamics, including turbulence modeling, 2) chemical, oxygen, iodine laser operation optimization, 3) reduced-order modeling for aircraft stability and control characterization 4) fluid-structure interaction as applied to aero-elasticity, 5) non-equilibrium gas dynamics typical of high-altitude, rarefied flows as well as high-speed atmospheric re-entry, 6) gas turbine propulsion devices (including inlets, compressors, turbines and nozzles), and high-speed propulsion devices such as ramjets and scramjets, 7) other topics of interest involving the use of high performance computing resources for the solution of complex scientific and engineering problems.

The HPCRC also works in partnership with other USAFA academic departments and research centers to develop computational simulation capabilities using high performance computing (HPC) resources. Current research interests in this area include: 1) development of tools and techniques to ease the delivery of HPC services to users and researchers without a significant computational background (including undergraduate students), 2) development of software methods, processes, tools and utilities to solve complex science and engineering problems using HPC resources (including General Purpose Graphical Processing Units or GPGPUs), and 3) development of parallel software processes and tools to improve maintainability, efficiency and scalability.

Andrew Lofthouse, Lt Col
Director, High Performance Computing Research Center
Department of Aeronautics
PH (719) 333-9526
E-mail: Andrew.Lofthouse@usafa.edu

3. Astronautics (Space Systems Research Center)

The Space Systems Research Center performs a wide range of activities involving the design, assembly, integration, test, launch and flight of small satellites and sounding rockets to conduct research for the AF and the DoD. This unique program blends science, technology and organizational skills like none other at the USAFA. The Center is currently operating FalconSAT-3 (launched 2007) and developing FalconSAT-6 (to launch 2016),

which hosts DoD Space Experiments Review Board-approved experiments. Other research areas are educational nanosatellites of the CubeSat form factor. Designing a satellite is a complex, multi-disciplinary undertaking requiring expertise across a number of technical disciplines. The Department of Astronautics in partnership with the Space System Research Center aims to extend this expertise through researching and applying design experiences and examples to support the AF and DoD.

Currently available facilities, instrumentation and research efforts can be found at <http://www.usafa.edu/df/dfas/Research/research.cfm?catname=dfas>

David Barnhart, Lt Col, Ph.D., PE

Director, Space Systems Research Center

Department of Astronautics

PH (719) 333-3315

E-mail: David.Barnhart@usafa.edu

4. Biosystems, Microbial Fuel Cells/Microbial Solar Cells and Microbial Extremophiles (Life Sciences Research Center)

The Life Sciences Research Center's (LSRC) primary mission is to support the AF's research programs at Air Force Office of Scientific Research (AFOSR) and Air Force Research Laboratories (AFRL) through faculty and cadet research efforts. The USAFA has a long-term vision to establish a multi-year alternative energy program of planning, research and infrastructure investment. The vision involves a mix of research and alternative energy production facilities in solar electric, fuel cells, waste-to-methane and other multiple conservation efforts. Very little data exist regarding the full elucidation of energy transformation within biosystems. Heretofore, an elegant model has not existed which could be further examined at the omics level in terms of augmenting energy production in microorganisms. A deeper comprehensive investigation of the means by which photosynthetic organisms can be harnessed while capturing solar energy for conversion to chemical energy would be of value in emerging technologies such as bioelectrochemical systems. Such systems would include microbial fuel cells (MFCs) and Microbial Solar Cells (MSCs). This research would be in direct support of the Air Force research objectives which include the "exploration of natural and synthetic processes, mechanisms and/or pathways for understanding energy production in biosystems."

Given the recent high interest in the use of microbial fuel cells (MFC) in alternative energy production, the Life Sciences Research Center within the Department of Biology has developed a growing MFC research program. To this end, the center is seeking potential research partnerships in developing the growth and metabolic properties of certain microbial organisms for the purposes of optimizing MFC energy production. Ultimately, the center's goal is to have these MFCs function on a sustainable basis through the use of photosynthetic organisms. These types of fuels cells are known as Microbial Solar Cells

(MSCs) which run in combination with varying photosynthetic organisms such as algae or cyanobacteria. Research efforts will focus on strain selection/cultivation/manipulation to improve the overall metabolism of select photosynthetic/microbial cultures to increase renewable energy capability. A proposed solution would include a commercial or academic partner with experience in conducting and participating in R&D relating to the production of MFCs/MSCs along with placing an exceptional research scientist at USAFA with an extensive background in associated fundamental microbial mechanisms across the biotic-abiotic interface

Additionally, the center is also interested in the extremophiles area and focused on discovering and understanding basic natural mechanisms used by organisms that could be used to either harden/repair soft material-based devices or provide energy to small bio-sensing devices. This will enable the AF to employ biological systems with optimum performance and extended lifetimes. As protein and nucleic acid molecules are increasingly used as catalysts, sensors, and as materials, it will be necessary to understand how one can utilize these molecules in extreme environments, with the ability to regulate the desired function as conditions change, and to store devices for prolonged periods of time. Areas of interest include; the mechanisms for survival and protein stability in extremophilic archaea, and enzymatic engineering for faster catalysis in materials identification or degradation.

Potential collaboration with on-going research at nonprofit, educational and for-profit institutions is desired. On-site research is desired. A PhD in biochemistry, microbiology, molecular biology, cell biology, bioengineering, or a related field for such research is desired. A recipient with prior experience with biological fuel cells (microbial and/or photosynthetic) and/or extremophiles is desired. Collaboration is desired to include leadership and guidance on the research areas proposed for laboratory technicians/students, partner scientists, chemists and engineers on experimental work at the intersection of chemistry, biology, and nanotechnology.

Because of the USAFA mission to prepare young men and women for leadership positions within the AF, cadet participation with researchers is expected as part of our independent study projects (499s) and cadet summer research program (visiting partner labs). Additionally, there is potential for cross disciplinary involvement from a number of academic departments aside from Biology such as Chemistry (biochemistry), Engineering (model production), and Management (project analysis). Development of this research thrust may also result in potential collaboration opportunities with other academia, private companies and other AF research agencies.

Donald V. Veverka, Ph.D.
Director, Life Sciences Research Center
Department of Biology

PH (719) 333-9670

E-mail: Don.Veverka@usafa.edu

5. Chemistry (Chemistry Research Center)

The opportunity to participate in research by faculty, staff, and cadets is important to the overall mission of the USAFA. The Chemistry Research Center (CRC) provides for professional development of faculty members and resident researchers in addition to enhanced education of cadets through research programs in support of the AF as well as DoD Research and Development (DoD R&D) directives. In order to accomplish a portion of this, the CRC has had proven success by external partnering with academia, industry, and national laboratories in order to leverage an expanding technology base.

Current topics of interest in the CRC are renewable materials, light harvesting organic electronics, fluoropolymer coatings, synthetic spice metabolites, green fluorescent protein-based sensors, energetic materials, carbon aerogels, and omniphobic composites. Research may take place on-site using the laboratories and analytical instrumentation located in the Department of Chemistry at USAFA. A short description of the CRC research and capabilities is available at <http://www.usafa.edu/df/dfe/dfer/centers/crc/>.

Dr. Scott T. Iacono
Associate Professor
Director, Chemistry Research Center
Department of Chemistry
PH (719) 333-6005
E-mail: Scott.Iacono@usafa.edu

6. Computer Science (Academy Center for Cyberspace Research)

The Academy Center for Cyberspace Research (ACCR) conducts research in a wide range of research areas within the field of Computer Science in support of the AF, DoD and other government and commercial sponsors. The center seeks to develop cadets as cyber innovators by participation in and exposure to research projects in the domain of cyberspace. All cadets in the Computer Science major receive research experience through independent studies, course projects and summer research opportunities. Current research focus areas for ACCR include cyberspace education and training, cyber-warfare topics and information assurance. State of the art computing facilities are available to students and researchers for conducting studies in an isolated network environment running virtual machine (VM) software for rapid reconfiguration and testing. Parallel architectures are also available for studies using neural networks and parallel algorithms. ACCR is especially interested in research with proposed student projects. Current topics of interest include the application of concurrent coding theory to the development of jam

resistant communications without requiring a shared secret, Supervisory Control And Data Acquisition (SCADA) systems, vulnerabilities and defenses, identifying and categorizing malware, finding application and web vulnerabilities and cyber situational awareness. Researchers are encouraged to propose topics in these areas as well as other cyberspace topics.

Currently available facilities, publications and research efforts can be found at <http://www.usafa.edu/df/dfe/dfer/centers/accr/>.

Gregory M. Schechtman, Col, USAF
Director, Academy Center for Cyberspace Research
Department of Computer Science
PH (719) 333-7664
E-mail: GREGORY.SCHECHTMAN@USAFA.EDU

7. Engineering Mechanics (Center for Aircraft Structural Life Extension)

The Center for Aircraft Structural Life Extension (CAStLE) performs a range of structural integrity research tasks in support of AF, DoD, Department of Homeland Security (DHS), NASA and other government, academic and commercial sponsors. Making use of the extensive experimental and computational facilities housed in the USAFA Department of Engineering Mechanics, CAStLE pursues a range of research efforts in a wide variety of fields. These fields include engineering mechanics, mechanical engineering, aerospace engineering, corrosion engineering, and material science. CAStLE places more emphasis on applied research and that part of development not related to the development of a specific system or hardware procurement. CAStLE research programs are also available to provide USAFA cadets and faculty with rich, relevant research experiences while answering critical research needs of our highly varied customer base. Researchers may expect extensive access to premier facilities, tremendous latitude of pursuits and single-minded focus on research tasks, but must seek to incorporate cadet participation in their projects. CAStLE is a leader in the complementary employment of experiment and simulation to solve complex static stability, static strength and fracture mechanics problems. Current research strengths include; advanced barrier coatings; static strength, static stability design, corrosion modeling, prevention and control; validation testing, analysis and methods development, computational structural and fracture mechanics; failure analysis, flight data acquisition system development, installation, maintenance and data analysis; educational curriculum research and development; structural risk analysis; and research tied to the USAF Aircraft Structural Integrity Program (ASIP). The interaction between corrosion, cracking, and other material degradation/damage mechanisms and their effect on structural integrity has been a long-standing interest of CAStLE. There is DoD-level interest in material degradation in structures—to include corrosion, cracking and other service

related damage mechanisms. Researchers are encouraged to propose topics in these areas and other allied integrity subjects.

Currently available facilities, instrumentation and research efforts can be found at <http://www.usafa.edu/df/dfe/dfer/centers/castle/>.

Gregory A. Shoales, Ph.D., P.E.,
Director, Center for Aircraft Structural Life Extension (CASTLE)
Department of Engineering Mechanics
PH (719) 333-6213
E-Mail: Gregory.Shoales@usafa.edu

8. Laser and Optical Physics (Laser & Optics Research Center)

The Laser and Optics Research Center (LORC) performs a range of research tasks in support of the AF, DoD, DOE, National Science Foundation (NSF) and other government and commercial sponsors. Making use of the extensive experimental facilities housed in the USAFA Department of Physics, the Center pursues a range of research efforts. The research programs in this center are geared toward providing all undergraduates with a rich, relevant research experience while answering critical research needs of our highly varied customer base. Researchers may expect extensive access to premier facilities, tremendous latitude of pursuits and single-minded focus on research tasks, but must seek to incorporate student participation in their projects, typically two to four students per semester.

Current research areas of emphasis comprise five broad areas. In the atomic physics area, precision measurements of atomic properties are a primary focus of investigation. These include measurements of atomic state lifetimes and branching ratios in alkalis such as cesium, sodium, potassium and rubidium along with alkaline-earth elements such as strontium which have atomic clock applications. Also the interaction of alkali atoms with inert gases is being studied for their collisional excitation transfer properties which are important to the operation of alkali lasers. This area is closely related to our second area of emphasis: the study of diode-pumped alkali lasers (DPAL). Key objectives of the DPAL research program are investigating their potential for scaling to high average power, investigating various amplifier and resonator configurations and improving the spectral and spatial output characteristics of high power semiconductor diode pump sources. Applications such as second harmonic generation and sum frequency generation are also part of this effort. Other gas lasers such as carbon monoxide lasers operating infrared wavelengths are also investigated.

Fiber laser research involves novel fiber designs including photonic crystal fibers and acoustically-engineered fibers for the suppression of non-linear effects in high-power fiber

lasers, fiber components necessary for coherent beam combining, fiber laser and amplifier characterization, novel fiber manufacturing and processing methods, high-brightness, efficient, wavelength-stabilized pump sources, modeling and simulation of fiber lasers and amplifiers and fiber laser applications including but not limited to remote sensing, tracking, directed energy weapons and communications.

High-performance imaging research is focused on novel wavefront measurement and manipulation techniques including holographic wavefront sensing and correction and photon sieve telescopes. Key objectives include developing and demonstrating imaging technology suitable for integration into rugged compact devices and aerospace platforms.

Nanomaterials research includes the application of novel materials structures for the manipulation of light including negative index materials, phonon-photon superlattices, tunable dielectrics, ferro-electric and ferro-magnetic oxides, surface plasmonics and black silicon for photo-detector and solar cell applications.

Researchers are encouraged to propose topics in these areas and other related subjects.

Martin D. Johnson
Deputy Director, Laser & Optics Research Center
Department of Physics (USAFA/DFP)
PH (719) 333-2579
E-mail: Martin.Johnson@usafa.edu

9. Physics (Space Physics & Atmospheric Research Center)

The Space Physics and Atmospheric Research Center (SPARC) studies the natural environment from the troposphere to the sun in support of AF, DoD, NASA, NSF and other government and commercial sponsors. Making use of the extensive experimental facilities housed in the USAFA Department of Physics, the SPARC pursues a range of efforts. The research program in this center is geared toward providing all undergraduates with a rich, relevant research experience while answering critical research needs of our highly varied customer base. Researchers may expect extensive access to premier facilities, tremendous latitude of pursuits and single-minded focus on research tasks, but must seek to incorporate student participation in their projects, typically two to four students per semester. Substantial effort in this center is directed toward the solution of multi-disciplinary problems which may require skills beyond classical physics disciplines, including plasma and laser physics, advanced miniaturization techniques, use of MicroElectroMechanicalSystems (MEMS), development of miniaturized automated satellite constellations and advanced data mining techniques for large data systems. The SPARC is a leader in the development of miniaturized payloads for small satellites, and the application

of data provided by these payloads to relevant Department of Defense problems. SPARC research interests vary depending on the sponsoring agencies interests.

Current research strengths include several complementary thrusts. Space physics and space weather study the relationship of the space environment and the effects this environment have on mankind. Topics in space weather can range from experimental, such as developing new instrumentation to measure the space environment, to theoretical, such as developing assimilative models which can be used to predict the space environment into the future. Linked with space physics and space weather, the micro- and nano-satellite thrust develops aggressively miniaturized spacecraft for use in small inexpensive constellations devoted to exploiting the entire range of space activities of interest to sponsors. The applied physics thrust considers all applications of physics to the practical applications of technology of interest to sponsors. In the past has included studies of plasma actuators, high speed spectroscopy in support of brief duration phenomena in the troposphere, mesosphere and the ionosphere, studies of the aurora and applications of weather modeling to highly dynamic small scale areas such as the USAFA. Finally, the Department supports a wide range of basic research in astronomy and astrophysics in support of the USAFA observatory.

Matthew G. McHarg, Ph.D.

Director, Space Physics and Atmospheric Research Center

Department of Physics

PH (719) 333-2460 (Desk), PH (719) 333-3510 (Front Office)

E-mail: Matthew.Mcharg@usafa.edu

10. Center for Physics Education Research (CPER)

The Center for Physics Education Research (CPER) was founded in 1994 to build a USAFA center of gravity providing impetus, opportunities and tools for physics faculty at USAFA and nationwide, as well as engage in and apply Scholarship of Teaching and Learning-like (SoTL) research activities within the Department of Physics. The CPER maintains extensive ties and collaborations with similar research programs nationwide.

The primary goals of the CPER are to:

- Engage in research initiatives that quantify gains in student understanding and appreciation of physics. Efforts in this category leverage the random assignment of students within Core Physics sections to categorize and assess gains in performance of students within a single semester and across multiple semesters. In addition to analyzing performance on standardized assessments, there is considerable interest in analyzing student response patterns, developing assessment rubrics and understanding prior student knowledge and correlating

learning gains with other metrics such as instruction techniques and student engagement.

- Develop and share tools for enhancing teaching and student learning in physics. Of particular interest is the research and development related to pedagogical techniques and supporting tools for the Just-in-Time Teaching (JiTT) initiative, the signature CPER effort. This effort includes the extension of JiTT to develop student Self-Explanations under a Worked Example model of instruction. Additional efforts include development of tutorials (to include computer simulations) for both beginning and intermediate physics students.
- Maintain a connection between course and curriculum development (content, assessment methods, pedagogical approach) and physics education research. CPER is actively and intimately involved with several national level efforts to engage in collaborative education research and bring the research results into the classrooms, both nationally and at USAFA, as soon as warranted by the assessment results.

Current research in this area includes

- Do-It-Yourself Modeling (DIY), examination of concept visualization techniques in eight disciplines ranging from Astronomy to Sociology, development of classroom lessons based on the group's prior work and developing and testing mobile technology techniques for monitoring student engagement. These topics (and supporting grants) are in the NSF IUES (Improving Undergraduate Education in Science) category.
- Proliferate lessons learned on a national level by disseminating research results through conference presentations, workshops and publications.
- In addition to disseminating results and lessons learned on CPER goals on a national level, CPER personnel are also developing research tutorials and annotating JiTT content for national distribution. The CPER is also interested in improving meteorology education. Evaluating the utility of textbooks on Physics of Space Weather and designing/testing an assessment of student learning gains in general meteorology courses are of particular interest.

Researchers are encouraged to propose research topics in these areas and other related subjects.

Kimberly de La Harpe, Ph.D.
Director, Center for Physics Education Research
Department of Physics (USAFA/DFP)
PH (719) 333-9719
E-mail: kimberly.deLaHarpe@usafa.edu

11. Academy Center for Unmanned Aircraft Systems Research (UAS)

The USAFA Center for UAS Research educates cadets as they prepare to become AF Officers, develops premiere UAS research capabilities and faculty and provides world-class UAS research facilities, supporting a real-world experience for our cadets and producing needed research solutions for our military partners and sponsors. The research in support of this Center focuses on providing autonomous, decentralized solutions for systems of UAS that may also incorporate the use of land and water assets. Researchers may expect access to premier facilities, including lightweight UAS vehicles with supporting command and control infrastructure and test and development equipment.

Current research areas support the Center's goals. These include control system algorithms to direct autonomous vehicles; robotic control and navigation; robust communication systems that meet the challenges of dynamic and unpredictable network topology changes; inexpensive sensor network designs that incorporate fusion techniques for target identification, localization and tracking; and event-driven, multithreaded software architectures. Researchers are encouraged to propose topics in these areas or in areas they feel will complement the Center's work.

George York, Ph.D.
Department of Electrical and Computer Engineering
PH (719) 333-9193
E-mail: George.York@usafa.edu

12. Center of Innovation (COI)

The USAFA COI performs a wide range of cadet focused research and innovation tasks, projects and programs in support of departments such as Department of Homeland Security (DHS) Science and Technology (S&T), Office of the Secretary of Defense (OSD), DoD, and Intelligence Agencies. The COI also focuses on cadet research and innovations that support a Title III Section 313 DHS S&T program called "Technology Clearinghouse to Encourage and Support Innovative Solutions to Enhance Homeland Security." The COI pursues a variety of research efforts as well as prototyping and field testing novel technologies for use by warfighters and first responders. The COI focuses on creating novel linkages between old and new technologies that can lead to game changing process innovations. The COI research program is geared toward providing all undergraduates with a rich, relevant research and innovation experience while answering critical needs of our highly varied customer base. Researchers may expect extensive access to premier facilities, tremendous latitude of pursuits and single-minded focus on research and innovation tasks, but must incorporate student participation in their projects, typically two to four students per semester. Specifically, the COI is interested in championing

innovations in the cyber and information technology (IT) realm with the state-of-the art networks, computational nodes, trusted enclaves, delayed tolerant networks, and disruptive software applications. Lastly, COI is interested in Accelerator Research, its processes and models, that can accelerate USG innovations.

The COI is also interested in research related to homeland security of Cyber Systems; and Industrial Control Systems (ICS) (SCADA systems) used in vertical markets defined as part of the critical infrastructure industries, vital to the welfare of the United States. This research also includes Cyber Physical Security (CPS) protecting Industrial Control Systems. SCADA research interests include Distributed ICS security; Control Center security (protecting the ICS Control Centers managing enterprises from cyber-attacks); Access Control of SCADA systems; Detection of ICS anomalies that may attack ICS systems.

Current research strengths include several complementary thrusts. Virtual SCIFs capability; Silicon Photonics; Silicon Energy Storage; Core Routing & Switching; ad hoc encrypted mobility; IP and digital communications; virtualization; media and content and network management. Augmented Smartphone Applications Through Cloud Execution; Distributed Applications with Adaptable Security; Router Bricks: Enabling General-Purpose Network Infrastructure; Cloud Computing - near term platform approaches, security federation, enterprise collaboration and scalable data storage; internet-scale general-purpose information exchange service facilitates, controls and monitors the secure borderless delivery of messages among a wide range of internet-connected devices and enterprise applications; Collaborative Data Management - Automatic assignment of semantics to data; Software Routers; SCADA and Cyber Physical Security Research. Researchers are encouraged to propose research topics in these areas and other allied COI subjects.

Terry Pierce, Ph.D.
Director, USAFA Center of Innovation
Special Advisor for Disruptive Innovation DHS S&T
PH (719) 333-3974
E-mail: Terry.Pierce@usafa.edu

13. Civil and Environmental Engineering Research

The Department of Civil and Environmental Engineering performs engineering research to help the cadets learn how to solve complex problems. Efforts are wide-ranging within the fields of civil and environmental engineering, including interdisciplinary topics, and reflect the interests of individual faculty members. Current topics are listed below. One topic of particular interest is combined finite element and discrete element modeling of aircraft loading on granular soils. However, white papers that demonstrate a link to DoD civil and environmental engineering needs will be considered. Cadet involvement is critical to the research.

Current topics of faculty research interest are:

- Subsurface contamination with a focus on modeling
- Sustainable design
- Building energy modeling
- Building information modeling
- Virtual design and construction
- Reality capture
- Immersive reality visualization
- Energy foundations and other near-surface geothermal energy topics
- Soil classification techniques and refinements
- Design and construction in developing countries
- Critical infrastructure protection
- Blast-resistant building design
- Static testing of structural components
- Engineering education
- Discrete element modeling of granular material
- In-situ geotechnical testing
- Laboratory pavement testing

On-site research is desired. USAFA has a large, field site, including heavy construction equipment that may be available for use to construct experimental earth structures and test beds. USAFA also has a fully-functional soils laboratory. The department has a 30-ft by 60-ft bay with a 19-ft clear height beneath a 5-ton crane and multiple universal testing machines, including one with a capacity up to 300 kips. A static testing capability of structural components is provided by a 25-ft long reaction floor with an 8-ft gage width and an MTS hydraulic system with multiple 55-kip actuators.

Karen S. Henry, Ph.D., PE
Professor of Civil Engineering
Dept of Civil and Environmental Engineering
PH (719) 333-7726
E-mail: Karen.Henry@usafa.edu

14. Electrical and Computer Engineering Research

The Department of Electrical and Computer Engineering (DFEC) conducts research to produce needed solutions for our military partners and sponsors while providing real-world engineering experience for our cadets and aiding in the professional development of our faculty. Research in the areas of energy security and smart grid technology are sought to

include concepts associated with effective demand management, integration of multiple generation sources and communication of energy events.

The DFEC research program currently includes investigations in the following areas:

- RF measurement and systems development
- Circuit development
- Robotics
- Renewable energy

Examples of existing research include improvised explosive device (IED) detection, radar cross section (RCS) analysis, antenna design, portable wind power generation and autonomous robot algorithms. Researchers are encouraged to propose topics in these areas or in areas they feel will complement the department's work.

Virginia Trimble, Capt
Department of Electrical and Computer Engineering
PH (719) 333-3842
Email: Virginia.Trimble@usafa.edu

15. K-12 STEM (Science, Technology, Engineering & Math) Research & Outreach

The USAFA's research centers and AF research institutes are described at <http://www.usafa.edu/df/dfe/dfer/index.cfm?catname=research>. Most serve the USAFA's STEM research mission directly, which in turn addresses the nation's impending shortfall in the STEM workforce. USAFA faculty members have individually performed a wide variety of STEM research and outreach tasks at both local and national levels as part of their professional commitments to the community for many years. In 2010, the USAFA created the K-12 STEM Outreach & Research Center to sustain and expand STEM outreach. The Center's goal is to address Air Force and DoD goals to enhance the quality of K-12 STEM education and encourage greater numbers of US citizen high school graduates to pursue college degrees and careers in STEM.

The Center brings the extensive facilities at the USAFA, the business and technical talents of its faculty and its leadership role in the community and nation to partnerships with universities, K-12 school systems, nonprofit foundations, professional and industry societies and other agencies in southern Colorado (loosely defined as south of the Palmer Divide). Those partnerships provide K-12 teachers and students in southern Colorado with rich and wide experiences in STEM, including:

- Training of K-12 educators, with emphasis on improved methods of organizing and providing coherent curriculum packages from national providers (e.g., NASA,

American Institute of Aeronautics & Astronautics, American Chemical Society, Civil Air Patrol).

- “Kindle the fire of curiosity” experiences for younger K-12 students and teachers and “sustainment of interest” experiences for older K-12 students and teachers.

Researchers may expect seasonal (i.e., summer) access to premier classroom and laboratory facilities, tremendous latitude in defining pursuits and single-minded focus on STEM education, but they must seek to incorporate K-12 faculty and student participation in all their projects. Researchers are encouraged to submit science-based proposals in these and associated STEM outreach areas which develop and implement coordinated programs that lend themselves to longitudinal studies of their efficacy.

Currently available facilities, instrumentation and research efforts can be found at <http://www.usafa.edu/?catname=Dean%20of%20Faculty>.

James Solti, Ph.D.
USAFA Chief Scientist and Director of Research
PH (719) 333-2853
E-mail: James.Solti.1@us.af.mil

16. Center for Space Situational Awareness Research (Department of Physics)

The Center for Space Situational Awareness Research (CSSAR) in the Department of Physics (DFP) conducts research across a variety of areas in support of the AF, DoD, NASA and other government and commercial sponsors. Making use of USAFA’s extensive experimental facilities housed in several academic departments, DFP pursues a range of research efforts. The Space Situational Awareness (SSA) relevant research programs are geared toward providing all undergraduates with a rich, relevant research experience while answering critical research needs of our highly varied customer base. Researchers may expect extensive access to premier facilities, tremendous latitude of pursuits and single-minded focus on research tasks, but must seek to incorporate cadet participation in their projects, typically one to two cadets per semester.

With more nations building and launching satellites, space has become increasingly congested, contested and competitive. SSA is thus a vital component of U.S. national security due to the role space and cyberspace play in our military operations. CSSAR is developing world-class SSA capabilities and facilities at USAFA to include the 2-meter Fast-Tracking Telescope (FTT), the Falcon Telescope Network (FTN), the Falcon Radar Fence (FRF) and the Cadet Space Operations Center (CSOC). The FTN is a global network of small aperture robotic optical telescopes focused on satellite characterization through simultaneous observations from multiple illumination geometries. It will also be used for

testing handoff and cueing techniques as well as smart network and resource management. The CSOC will be the hub in which all of USAFA sensors are operated and controlled. The CSOC will be a test bed for new SSA algorithms that allow for improved capability in maintaining SSA leading to predictive analysis and assessment.

Current research areas of emphasis include space object characterization via resolvable and non-resolvable imaging using optical and radar observations, improvements to satellite orbit determination and prediction (methodology, algorithms and processing), modeling of space surveillance sensors to enhance algorithm development, fusion of disparate data sources to maximize the situational awareness, and development of FTN and CSOC capability. Researchers are encouraged to propose topics in these areas and other related subjects.

Francis K. Chun, Ph.D.

Professor of Physics

PH (719) 333-2601 (Desk), PH (719) 333-3510 (Front Office)

E-mail: Francis.Chun@usafa.edu

17. Human Performance Lab

The body of the Airman is as important to mission success as technology and weapons. The USAFA's Human Performance Lab (HPL) is a key element to identifying how the AF can keep our Airmen physically safe as they complete their missions in a wide variety of terrains and environments.

Under the direction of the USAFA Athletic Department, the HPL applies sports science principles to improve USAFA athletic teams and individual cadet performance. Coaches, cadet athletes and cadets receive specific physiological information by way of testing, research, training and education. The lab also provides subject matter expertise on the Air Force fitness program and battlefield Airman human performance issues, offering scientific data through research and exercise science principles. As a result, the HPL offers a venue for cadet researchers and qualified exercise physiology interns to complete independent study research in the fields of exercise physiology, strength and conditioning, biology, biochemistry and biomechanics.

The HPL tests and trains more than 1,000 cadets and approximately 100 faculty and staff members annually. Some of the projects undertaken by the HPL are joint efforts with the AFRL, Air Force Special Operations Personnel, Air Force Security Forces, the Injury Prevention Research Laboratory and the Academy's Life Sciences Research Center. Most HPL projects offer cadet research components as well as direct Air Force or Department of Defense field applications. Researchers are encouraged to propose topics in these areas and other related subjects.

Michael F. Zupan, Lt Col
Director, Human Performance Lab
PH (719) 333-4188
E-mail: Michael.zupan@usafa.edu

b. Research Institute

1. Institute for Information Technology Applications

The Warfighter's Edge Team (a Rapid Application Development team, under the Institute for Information Technology Applications) performs a myriad of cutting edge software development with research necessary for interaction with legacy software solutions. The team is primarily focused on the needs of unit level warfighters. Development projects range from interface development using plug in technologies to direct database calls to web service requests. The development team is geared toward interfaces with AF programs such as Portable Flight Planning System (PFPS) [and its 5.0 follow on], FalconView, Joint Mission Planning System (JMPS), Patriot Excalibur, TaskView, Theater Battle Management Core System (TBMCS) – Unit and force level and other common warfighter programs. Development is conducted with Team Foundation Server in the .NET programming language (C# or VB) with unit tests covering code. Agile development, specifically SCRUM is performed by the Warfighter's Edge Team.

Code is produced on the Defense Research and Engineering Network (DREN), is compliant with DoD regulations including Standard Technical Implementation Guides (STIGs), Application Software Assurance Center of Excellence (ASACoE) certifications, Air Force Network Integration Center (AFNIC), Enterprise Information Technology Repository (EITDR) processes and requirements. Software is used on NIPR (Unclassified but Sensitive Internet Protocol Router), SIPR (Secret Internet Protocol Router) and JWICS (Joint Worldwide Intelligence Communications System) networks, therefore appropriate security clearances must be held. Research agreements with outside agencies are common.

Strengths are a self-contained sustainment capability including subject matter experts on staff with real world operational aircrew, Certifications and Accreditation (C&A) and testing. Researchers are encouraged to propose topics in these areas and other related subjects.

An overview of some products can be found at <http://wedge.hpc.mil>.

Andrew Berry, Lt Col
Director, Warfighter's Edge

PH (719) 333-9798

E-mail: Andy.Berry@WEdge.hpc.mil

2. Institute for National Security Studies

The United States Air Force Institute for National Security Studies (INSS) is a strategic policy research institute located within the faculty at the USAFA. It is primarily sponsored by HQ USAF/A10S (Strategic Stability and Countering Weapons of Mass Destruction Policy), but it also partners with and supports other members of the DoD strategic community. INSS serves as a locus for research related to strategic studies, emphasizing enduring and emerging strategic issues, global and regional strategic challenges, nuclear deterrence and arms control, strategic stability, and sustaining particularly the human infrastructure necessary to ensure long-term strategic security. In addition to its research efforts, the Institute conducts a broad range of other activities, including workshop planning and organization, curricula development and delivery, and scholarly publications. INSS is currently undertaking a multi-year research project examining the concept of strategic stability as it has changed from its Cold War conceptualization. Achieving and maintaining strategic stability was the primary objective of the United States-Soviet Union strategic relationship across the Cold War, and it remains at the center of the US-Russia strategic relationship today. However, the Cold War concept of strategic stability was largely a quantitative calculation of balance across the two sides' strategic systems and weapons. Ensuring one's comfort with that semblance of balance placed the calculus of strategic stability at the forefront in nuclear targeting and in arms control negotiations.

The 2010 Nuclear Posture Review places strategic stability at the heart of the US-Russia and the US-China relationships today. However, those strategic relationships have fundamentally changed, and while there is still concern over the numbers and capabilities associated with the Russian and the Chinese nuclear forces, today the emphasis is shifting to avoiding tension and building a transparent, predictable, and positive set of relationships beyond just the nuclear balances. Strategic stability now must be redefined around a qualitative construct within these strategic relationships, plus there are at least six additional nuclear states—allies and friends, states of concern, adversaries—that complete the complex and dynamic nuclear landscape today. Our understanding of strategic stability requires a review and update.

The purpose of this research effort is to develop a policy-relevant understanding of the roots, contemporary manifestations, and policy implications of national characterizations of strategic stability by each of the major and regional nuclear powers; through research initiatives to further develop understanding of the dynamics among major power characterizations of strategic stability as they shape the strategic environment for United States policy and posture; and to also develop an understanding of the key regional dynamics of multiple nations' characterizations of strategic stability as the central context

for redefined strategic relationships among nuclear powers and within the regions within which those powers and our strategic allies reside.

The departure point for this research focus is a belief that much of the thinking about today's United States strategic policy has been heavily dependent on straight-line evolution from Cold War concepts, and that this foundation has been updated almost solely based on primarily technical considerations and current geopolitical issues. It is thus reactive to a relatively incomplete understanding of fundamental national worldviews and the factors that shape basic strategic decisions among the nuclear states.

Researchers are encouraged to propose topics in these areas and other related subjects. An overview of INSS publications can be found at <http://www.usafa.edu/df/inss/pubs.cfm>.

James M. Smith, Ph.D.
Director, USAF Institute for National Security Studies
PH (719) 333-2717
E-mail: James.Smith@usafa.edu

c. Other

1. Department of Behavioral Sciences and Leadership

The Department of Behavioral Sciences and Leadership is involved in multiple research efforts that span the domains of human behavior. Specifically, the Department has expertise in areas such as human factors, leadership, sociology, social psychology, clinical psychology, social work, general psychology, organizational psychology, biopsychology and cognition. Research programs in the department are designed to build upon what is learned in the classroom and provide undergraduates with relevant, applied experience in research. Cadets may participate in independent study projects, summer research programs and/or ongoing faculty research projects, leveraging the expertise of our diverse faculty as well as numerous DoD agencies, academic institutions and private business collaborators.

Current topics of interest range across the behavioral sciences and include:

- The examination of leaders' decision making and performance in complex socio-cultural and technological contexts. The research goal is to enhance flexible and adaptive decision making and consequent behavior, which may include some or all of the following: civilian, military, interagency individuals and teams. Teams may cross the spectrum of civilian teams to current and potential military and civil-military (interagency and coalition) operations.

- Psychosocial resiliency. Research scenarios may range from civilians and first responders affected by 9/11 or the Boston Marathon bombing to soldiers who have deployed during Operation Iraqi Freedom and Operation Enduring Freedom.
- Research DoD policies, including changes therein, and their impact on civilian and military personnel (e.g.: Don't Ask, Don't Tell).
- Researching and accessing "Respect for human dignity."
- Reframing the discussion and researching and analyzing new methods or best practices surrounding suicide prevention in military, industry, civilian, and government environments.

Douglas R. Lindsay, Lt Col, Ph.D.
 Director of Research
 Department of Behavioral Sciences & Leadership
 PH (719) 333-4348
 E-mail: Douglas.Lindsay@usafa.edu

2. Department of Foreign Languages and the Office of International Programs

Our ever-expanding global AF mission demands increasing foreign language capability and intercultural competence in our officer corps to support national security strategies. Foreign language programs at USAFA seek to expand the opportunities for USAFA cadets to enhance their foreign language skills and their understanding of world cultures in Arabic, Chinese, French, German, Japanese, Russian, Portuguese or Spanish. Beyond the classroom, language acquisition and cultural understanding is enhanced through study abroad opportunities for cadets such as the Cadet Summer Foreign Language Immersion Program, the Cadet Cultural Immersion Program, the Semester Exchange Abroad Program, the Semester Study Abroad Program and the Cadet International Academy Visits Program. Research and assessment tools within these programs and in-classroom curricula are essential to produce officers with some level of foreign language proficiency and intercultural competence. Research interests in foreign language and international programs include but are not limited to the following areas:

- Methods to assess foreign language proficiency of students in different levels,
- Methods to assess foreign language proficiency in various modalities,
- The impact of language and/or cultural immersions on language and intercultural competence development of students,
- The use and effectiveness of various technologies in teaching and assessing foreign languages.

Leann Derby, Lt Col
 Director of Assessment
 Department of Foreign Languages

PH (719) 333-2376

E-Mail: LeAnn.Derby@usafa.edu

3. Interdepartmental Program of Operations Research and Analytics

This interdepartmental program leverages the talents of faculty members across multiple departments in the disciplines of operations research, systems engineering, management and others. These individuals provide exceptional educational opportunities for cadets primarily supporting capstone projects in operations research. In addition, the program supports cadet projects such as new venture analyses, systems engineering process improvements, as well as a number of independent study projects and summer research programs. This is accomplished through numerous collaborations with other governmental and nonprofit agencies. The program supports local organizations as our students work with real clients in real agencies addressing real issues. While local organizations provide USAFA cadets an opportunity to experience organizational dynamics, the program also supports defense and homeland security agencies worldwide.

Each year cadets enrolled in Mathematical Sciences, Operations Research, Management and Systems Engineering Management Capstone courses develop projects that solve real world problems for client organizations with tools they have learned at the USAFA. Faculty and staff directly support these initiatives through both mentorship and research. While mathematics and management are well known fields, the operations research and analytics disciplines have developed within the advent of computer technology. Operations research and analytics methods focus on analyses that combine mathematical, econometric, computer systems and managerial concepts to improve operations and processes. Current topics of interest range across operations research and the management sciences and include, but are not limited to:

- Scheduling, routing, assignment and resource allocation issues,
- Modeling and simulation of organizational operations and processes,
- Statistical analysis of organizational processes and business functions,
- Decision models supporting both strategic and tactical decisions

James K. Lowe, Ph.D.

Professor of Operations Research

USAFA Department of Management

PH (719) 333-3122

E-mail: Jim.Lowe@usafa.edu

II. Award Information

- a. The Government anticipates the award of grants, cooperative agreements and/or contracts under this BAA. It is anticipated that the cumulative amount for awards issued under this BAA will not exceed \$99 million dollars.
- b. The amount of resources made available to this BAA will depend on the quality of the proposals received and the funds availability.
- c. Awards may be proposed for up to five years. Awards may start any time during the fiscal year.
- d. Historically, USAFA has supported a robust BAA process under the predecessor USAFA BAA 2009-01, awarding 127 grants, cooperative agreements and contracts to 79 different academic institutions, nonprofit organizations and industrial firms, totaling \$89 million (as of Nov 2014). The table below depicts the historical data in support of the previous research centers. This is provided for historical reference only and is not indicative of any future business plans for the USAFA.

USAFA-BAA-2001-9-1 AWARD STATISTICS AS OF Nov 14			
Section	Research Center, Institute, Department	Number of Awards	Average Award Value
I.a.1.	Aeronautics - Aeronautics Research	20	\$ 361,730.39
I.a.2.	Aeronautics - Modeling & Simulation Research	4	\$ 377,407.00
I.a.3.	Astronautics - Space Systems Research	7	\$ 475,081.05
I.a.4.	Bioenergy & Biomimetics	3	\$ 43,491.67
I.a.5.	Chemistry	4	\$ 236,092.28
I.a.6.	Computer Science	4	\$ 296,875.23
I.a.7.	Engineering Mechanics	32	\$ 1,478,740.29
I.a.8.	Laser & Optical Physics	26	\$ 424,971.78
I.a.9.	Physics	12	\$ 241,651.59
I.a.10.	Center for Physics Education Research	1	\$ 225,750.00
I.a.11.	Academy Center for Unmanned Aircraft Systems	4	\$ 554,764.74
I.a.12.	Center of Innovation	8	\$ 585,070.20
I.a.13.	Civil and Environmental Engineering Research	0	\$ -
I.a.14.	Electrical & Computer Engineering Research	2	\$ 182,664.07
I.a.15.	Science, Technology, Engineering & Math Outreach	3	\$ 1,269,846.66
I.a.16.	Center for Space Situational Awareness Research	6	\$ 495,176.03
I.a.17.	Human Performance Lab	0	\$ -
I.b.1.	Institute for Information Technology Applications	1	\$ 40,000.00
I.b.2.	Institute for National Security Studies	0	\$ -
I.c.1.	Behavioral Sciences & Leadership	1	\$ 140,000.00
I.c.2.	Foreign Languages and International Programs	0	\$ -
I.c.3.	Operations Research and Analytics	0	\$ -

III. Eligibility Information

All responsible, potential applicants from academia and industry are eligible to submit proposals. USAFA particularly encourages proposals from small businesses, historically black colleges and universities, minority institutions and minority researchers. However, no portion of this BAA is set aside for a specific group.

Proposals from Federal Agencies, including subcontracting/sub-recipient efforts will not be evaluated under this BAA. Federal agencies should contact the Department of Research associated with the given technical area listed in Section I of the BAA to discuss funding through the internal Government procedures. Cost sharing is encouraged but not required.

IV. Application and Submission Information

- a. **Internet Address to Request Announcement Package** – This announcement may be accessed from the Internet at the Grants.gov web site (<http://www.grants.gov>). See 'For Electronic Submission' below. A copy of this BAA is also posted on FedBizOpps.gov site (<https://www.fbo.gov/>).
- b. **Marking of White Papers and Proposals** – As previously stated, **USAFA is seeking White papers which do not contain proprietary information.** If proprietary information is submitted, USAFA will make every effort to protect the confidentiality of the proposal and any evaluations. However, under the Freedom of Information Act (FOIA) requirements, such information (or portions thereof) may potentially be subject to release. If protection is desired for proprietary or confidential information, the proposer must mark the White paper and/or proposal with a protective legend found in FAR 52.215-1(e), Instructions to Offerors – Competitive Acquisition, (modified to permit release to outside non-government evaluators and support contractors retained by USAFA. See section V). **It is the offeror's responsibility to notify USAFA of proposals containing proprietary information and to identify the relevant portions of their proposals that require protection. The entire proposal (or portions thereof) without protective markings or otherwise identified as requiring protection will be considered to be furnished voluntarily to USAFA without restriction and will be treated as such for all purposes.** Since the Government anticipates the award of grants, cooperative agreements, and/or contracts, this statement is applicable to proposals for all three of these potential instruments.
- c. **Content and Form of Application Submission (White Paper or Proposal)**
 1. **White Papers** – Before submitting a research proposal, you may wish to further explore potential proposal opportunities. You can do this by contacting the appropriate USAFA

Department/Center/Institute/Director who can provide greater detail about a particular opportunity; the Department/Center /Institute/Director may then ask for a White paper. The initial preference is for White papers over full applications/proposals. However, in your conversations with a Government official, be aware only warranted Contracting and Grants Officers are authorized to commit the Government.

If you prefer, or the Department/Center/Institute/Director requests, you may submit a White paper, which must briefly describe the proposed research:

- objective,
- length of effort,
- general/technical approach,
- rough-order of magnitude cost,
- anticipated outcome,
- impact of specific research,
- government/cadet involvement,
- public purpose

The White paper may also contain any unique capabilities or experience you have (e.g., collaborative research activities involving AF, DoD, or other Federal laboratory). For additional information regarding White papers and for your ease and consistency, please see the AFRL BAA Guide for Industry at <http://www.wpafb.af.mil/library/factsheets/factsheet.asp?id=9218>.

White Paper Format –

- Paper Size – 8.5 x 11 inch paper
- Margins – 1 inch
- Spacing – single or double spaced
- Font – Times New Roman, 10 or 12 point
- Page Limitation – None; although 3-5 pages is normal. Unnecessarily elaborate White Papers are not desirable
- Content – as described above

White papers must be submitted to 10MSG.LGCC@us.af.mil; they should NOT be submitted directly to the Department/Center/Institute/Director or to Grants.gov. Based on this review, the Government will determine which of them have the potential to best meet the AF's needs. Those offerors submitting White papers assessed as best meeting AF needs will be asked to submit a technical and cost proposal, contingent upon funds availability.

- 2. Full Proposals –** All proposals should be submitted electronically and must include the SF 424 Research and Related Form (R & R) form as the cover page. Proposals must also include all other forms listed in Grants.gov as “mandatory forms.” Unnecessarily

elaborate brochures, reprints or presentations beyond those sufficient to present a complete and effective proposal are not desired. To convert attachments into PDF format, Grants.gov provides a list of PDF file converters at http://www.grants.gov/help/download_software.jsp.

Full Proposal Format –

- Paper Size – 8.5 x 11 inch paper
- Margins – 1 inch
- Spacing – single or double spaced
- Font – Times New Roman, 10 or 12 point
- Page Limitation – None, although unnecessarily elaborate proposals are not desirable
- Attachments – submit in **PDF** format (Adobe Portable Document Format)
- Content – as described below

Required Advance Preparation: Proposals For Electronic Submission –Proposals must be submitted through Grants.gov. There are several one-time actions your organization must have completed before it will be able to submit applications through Grants.gov. Well before the submission deadline, you should verify the persons authorized to submit proposals for your organization have completed those actions. If not, it may take them up to 21 days to complete the actions before they will be able to submit applications.

The process your organization must complete includes obtaining a Dun and Bradstreet Data Universal Numbering System (DUNS) number, registering with the System for Award Management (SAM) <https://www.SAM.gov> (previously Central Contract Registry or CCR), registering with the credential provider and registering with Grants.gov.

Designating an E-Business Point of Contact (EBiz POC) and obtaining a special password called MPIN are important steps in the SAM registration process. Go to http://www.grants.gov/applicants/get_registered.jsp. Use the Grants.gov Organization Registration Checklist at <http://www.grants.gov/web/grants/applicants/organization-registration.html> to guide you through the process. To submit a proposal through Grants.gov, applicants will need to download Adobe Reader. To download a free version of the software, visit the following web site: http://www.grants.gov/help/download_software.jsp. Consult Grants.gov to ensure you have the required version of Adobe Reader installed.

Should you have questions relating to the registration process, system requirements, how an application form works, the submittal process or Adobe Reader forms, call Grants.gov at 1-800-518-4726 or support@grants.gov for updated information.

Grants.gov utilizes a self-service web portal with FAQs and updates available at <http://www.grants.gov/web/grants/support/general-support/faqs.html>

The Grants.gov Organization Registration Checklist is located at <http://www.grants.gov/web/grants/applicants/organization-registration.html> to guide you through the process.

d. Submitting the Application (Steps to Formally Submit a Proposal) –

- 1. Submission – Application forms and instructions are available** at Grants.gov. To access these materials, go to <http://www.grants.gov>, select “Apply for Grants.” In the “Download a Grant application Package” section, enter the funding opportunity number for this announcement (USAFA-BAA-2015). You can also search for the Catalog of Federal Domestic Assistance (CFDA) Number 12.800, for Research Interests of the U.S. Air Force Academy. On the Selected Grant Applications for Download page, click on 'download' under the heading 'Instructions and Applications' to download the application package.

All required forms to be submitted as part of the proposal will be listed as a “mandatory form” in the ‘Instructions and Applications’ section on Grants.gov. Individual calls may have additional requirements; these requirements will be specified in the applicable call.

Note: All attachments to all forms must be submitted in PDF format (Adobe Portable Document Format). Grants.gov provides links to PDF file converters at this site: www.grants.gov/help/download_software.jsp.

- 2. SF 424 Research and Related Form (R & R) –** The SF 424 (R&R) form can be downloaded from the following website: <http://www.grants.gov/web/grants/forms.html> and must be used as the cover page for all electronic proposals. Complete all the required fields in accordance with the “pop-up” instructions on the form and the following instructions for the specified fields. To see the instructions, roll your mouse over the field to be filled out. You will see additional information about that field. Mandatory fields will have an asterisk marking the field and will appear yellow on most computers. In Grants.gov, some fields will self-populate based on the BAA selected. Please fill out the SF 424 first, as some fields on the SF 424 are used to auto populate fields in other forms. The completion of most fields is self-explanatory except for the following special instructions:

- **Field 1:** The Applicant Identifier may be left blank.
- **Field 3:** The Date Received by State and the State Application Identified are not applicable to research.

- **Field 7:** Complete as indicated. If Small Business is selected, please note if the organization is Woman-owned and/or Socially and Economically Disadvantaged. If the organization is a Minority Institution, select "Other" and under "Other Specify") note you are a Minority Institution (MI).
- **Field 9:** List USAFA as the reviewing agency. This field is pre-populated in Grants.gov.
- **Field 16:** Choose 'No' and check 'Program is Not Covered By Executive Order 12372'.
- **Attachments:** All attachments to all Grants.gov forms must be submitted in PDF format (Adobe Portable Document Format).

3. Assurances (Non-Construction Programs) – All awards require some form of certification of compliance with national policy requirements, for that reason an SF 424B needs to be completed and submitted with the application package via www.grants.gov. For assistance awards, i.e., grants and cooperative agreements, proposers using the SF 424 (R&R) are providing the certification by completing block 17 of the form for all applicable national policy requirements, to include:

(1) Prohibiting discrimination:

(i) On the basis of race, color, or national origin, in Title VI of the Civil Rights Act of 1964 (42 U.S.C. 2000d, et seq.), as implemented by DoD regulations at 32 CFR part 195;

(ii) On the basis of age, in the Age Discrimination Act of 1975 (42 U.S.C. 6101, et seq.) as implemented by Department of Health and Human Services regulations at 45 CFR part 90;

(iii) On the basis of handicap, in Section 504 of the Rehabilitation Act of 1973 (29 U.S.C. 794), as implemented by Department of Justice regulations at 28 CFR part 41 and DoD regulations at 32 CFR part 56;

(iv) On the basis of sex or blindness, in Title IX of the Education Amendments of 1972 (20 U.S.C. §1681, et seq.), as implemented by DoD regulations at 32 CFR part 196.

(2) The Clean Air Act (42 U.S.C. 7401, et seq.) and Clean Water Act (33 U.S.C. 1251, et seq.), as implemented by Executive Order 11738 (3 CFR, 1971-1975 Comp., p. 799) and Environmental Protection Agency (EPA) rules at Subpart J of 40 CFR part 32.

(3) For human subjects, the Common Federal Policy for the Protection of Human Subjects, codified by the Department of Health and Human Services at 45 CFR part 46 and implemented by the Department of Defense at 32 CFR part 219.

(4) For animals, rules on animal acquisition, transport, care, handling, and use in 9 CFR parts 1-4, Department of Agriculture rules implementing the Laboratory Animal Welfare Act of 1966 (7 U.S.C. 2131-2156), and guidelines in the National Academy of Sciences (NAS) "Guide for the Care and Use of Laboratory Animals" (1996), including the Public Health

Service Policy and Government Principles Regarding the Care and Use of Animals in Appendix D to the guide.

(5) The quality of the human environment, and provide help the agency may need to comply with the National Environmental Policy Act (NEPA, at 42 U.S.C. 4321, et. seq.) and to prepare Environmental Impact Statements or other required environmental documentation. In such cases, the recipient agrees to take no action that will have an adverse environmental impact (e.g., physical disturbance of a site such as breaking of ground) until the agency provides written notification of compliance with the environmental impact analysis process.

(6) Drug-Free Workplace: The recipient agrees to comply with the requirements regarding drug-free workplace requirements in Subpart B (or Subpart C, if the recipient is an individual) of 32 CFR part 26, which implements sec. 5151-5160 of the Drug-Free Workplace Act of 1988 (Pub. L. 100- 690, Title V, Subtitle D; 41 U.S.C. 701, et seq.).

(7) Officials Not to Benefit: No member of or delegate to Congress, or resident commissioner, shall be admitted to any share or part of this agreement, or to any benefit arising from it, in accordance with 41 U.S.C. 22.

(8) Debarment and Suspension: The recipient agrees to comply with the requirements regarding debarment and suspension in Subpart C of 32 CFR part 25, which implements E.O. 12549 [3 CFR, 1986 Comp., p. 189]; E.O. 12689 [3 CFR, 1989 Comp., p. 235]; and Sec. 2455 of Federal Acquisition and Streamlining Act of 1994 (Pub. L. 103-355). The recipient also agrees to communicate the requirement to comply with Subpart C to persons at the next lower tier with whom the recipient enters into transactions that are “covered transactions” under Subpart B of 32 CFR part 25.

(9) Contracts, Grants, Loans and Cooperative Agreements: The recipient agrees to comply with the requirements regarding Contracts, Grants, Loans and Cooperative Agreements. The recipient confirms that it certified in the grants.gov application to the best of his or her knowledge and belief, that:

(i) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(ii) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative

agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

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

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

(10) Requirements Regarding Representations: Representation by Corporations Regarding an Unpaid Delinquent Tax Liability or a Felony Conviction under any Federal Law—Fiscal Year 2015 Appropriations.

(i) In accordance with sections 744 and 745 of Division E, Title VII, of the Consolidated and Further Continuing Appropriations Act, 2015 (Pub. L. 113-235), none of the funds made available by this or any other Act may be used to enter into a contract with any corporation that—

(a) Has any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability, where the awarding agency is aware of the unpaid tax liability, unless the agency has considered suspension or debarment of the corporation and made a determination that this further action is not necessary to protect the interests of the Government; or

(b) Was convicted of a felony criminal violation under any Federal law within the preceding 24 months, where the awarding agency is aware of the conviction, unless the agency has considered suspension or debarment of the corporation and made a determination that this action is not necessary to protect the interests of the Government.

(ii) By signing this award, the Offeror represents that—

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

(b) It is not a corporation that was convicted of a criminal violation under any Federal law within the preceding 24 months.

If it is determined a contract is the appropriate vehicle, USAFA will request representations and certifications in accordance with the FAR from prospective awardees.

4. **R&R Other Forms** – The following other forms must be used for all electronic proposals: R&R Senior/Key Person Profile form, R&R Project/Performance Site Locations form, R&R Other Project Information form, the R&R Budget form and any other forms listed in the “Mandatory Forms” portion of Grants.gov. The R&R Subaward Budget Attachment Form is required when sub-awardees are involved in the effort. Primes should ensure that subrecipients’ cost information reflects the same level of detail as the primes’ cost information. The format should follow the Prime’s submission as well. See section IV.d.(10) R&R Budget Form for detail on submission of the Prime’s budget information. The SF-LLL form is required when applicants have lobbying activities to disclose. PDF copies of all forms may be obtained at the Grants.gov website.
5. **R&R Senior/Key Person Profile Form** – Complete the R&R Senior/Key Person Profile Form for those key persons who will be performing the research. The principal purpose and routine use of the requested information are for evaluation of the qualifications of those persons who will perform the proposed research. For the principal investigator and each of the senior staff, provide a short biographical sketch and a list of significant publications (vitae) and attach it to the R&R Senior/Key Person Profile Form.
6. **R&R Project/Performance Site Locations Form** – Complete all information as requested.
7. **R&R Other Project Information Form: Human Subject/Animal Use and Environmental Compliance** –

Human Subject Use. Each proposal must address human subject involvement in the research by addressing Field 1 and 1a of the R&R Other Project Information Form. If Field 1 indicates “Yes”, the U.S. Air Force must receive a completed OMB No. 0990-0263 form before a contract, grant, or cooperative agreement may be awarded to support research involving the use of human subjects. Attach the document to the R&R Other Project Information Form. If using Grants.gov, a completed OMB No. 0990-0263 form shall be attached in field 12 of the R&R Other Project Information Form.

Refer any questions regarding human subjects to Laura Neal of the Plans and Programs Directorate, Institutional Review Board (IRB) at: (719) 333-6593 or via email at: Laura.Neal@usafa.edu or irb.administrator@usafa.edu.

Animal Use. Each proposal must address animal use protocols by addressing Field 2 and 2a of the R&R Other Project Information Form. If selected for award, additional documentation in accordance with Air Force standards will be required. Refer any questions regarding animal subjects to Dr. George Mastroianni, Chair of the USAFA

Institutional Animal Care and Use Committee (IACUC) at: (719) 333-4218 or via e-mail at: George.Mastroianni@usafa.edu.

Environmental Compliance. Federal agencies making contract, grant or cooperative agreement awards and recipients of such awards must comply with various environmental requirements. The National Environmental Policy Act of 1969 (NEPA), 42 U.S.C. Sections 4321-4370 (a), requires agencies consider the environmental impact of “major Federal actions” prior to any final agency decision. With respect to those awards which constitute “major Federal actions,” as defined in 40 CFR 1508.18, federal agencies may be required to comply with NEPA and prepare an environmental impact statement (EIS) even if the agency does no more than provide grant funds to the recipient. Questions regarding NEPA compliance should be referred to the applicable USAFA Department/Center/Institute/Director. Most research efforts funded by USAFA will qualify for a categorical exclusion from the need to prepare an EIS. U.S. Air Force instructions/regulations provide for a categorical exclusion for basic and applied scientific research usually confined to the laboratory, if the research complies with all other applicable safety, environmental and natural resource conservation laws. Each proposal shall address environmental impact by filling in fields 4a through 4d of the R&R Other Project Information Form. This information will be used by USAFA to make a determination if the proposed research effort qualifies for categorical exclusion.

Abstract – Include a concise (not to exceed 300 words) abstract that describes the research objective, technical approaches, anticipated outcome and impact of the specific research. In the header of the abstract, include the Department/Center/Institute/Director’s name and Department who should receive the proposal for consideration and evaluation. Attach the Abstract to the R & R Other Project Information form in field 7.

8. R&R Other Project Information Form: Project Narrative Instructions –

Project Narrative. Describe clearly the research including the objective and approach to be performed, keeping in mind the evaluation criteria listed in Section V of this announcement. This section may describe the anticipated involvement by the Government including USAFA Cadets, as well as the potential public benefit(s) which may result from the research. Also briefly indicate whether the intended research will result in environmental impacts outside the laboratory and how the proposer will ensure compliance with environmental statutes and regulations. Attach the proposal narrative to R&R Other Project Information form in field 8.

Project Narrative – Statement of Objectives. This narrative should not contain proprietary information. Describe the actual research to be completed, including goals and objectives, on one-page titled Statement of Objectives. This statement of

objectives may be incorporated into the award instead of incorporating the entire technical proposal. Active verbs should be used in this statement (for example, “conduct” research into a topic, “investigate” a problem, “determine” to test a hypothesis).

Project Narrative – Research Effort. Describe in detail the research to be performed. State the objectives and approach and their relationship and comparable objectives in progress elsewhere. Additionally, state knowledge in the field and include a bibliography and a list of literature citations. Discuss the nature of the expected results. The adequacy of this information will influence the overall evaluation. Proposals for renewal of existing support must include a description of progress if the proposed objectives are related.

Project Narrative – Principal Investigator (PI) Time. PI time is required. List the estimate of time the principal investigator and other senior professional personnel will devote to the research. This shall include information pertaining to other commitments of time, such as sabbatical or extended leave; and proportion of time to be devoted to this research and to other research. Awards may be terminated when the principal investigator severs connections with the organization or is unable to continue active participation in the research. State the number of graduate students for whom each senior staff member is responsible. If the principal investigator or other key personnel are currently engaged in research under other auspices, or expect to receive support from other agencies for research during the time proposed for USAFA support, state the title of the other research, the proportion of time to be devoted to it, the amount of support, name of agency, dates, etc. Send any changes in this information as soon as they become known. Submit a short abstract (including title, objectives and approach) of research and a copy of the budget for both present and pending research projects.

Project Narrative – Facilities. When applicable, describe facilities available for performing the proposed research and any additional facilities or equipment the organization proposes to acquire at its own expense. If applicable, indicate how and when government-owned facilities or equipment already possessed will be used. Reference the facilities contract number or, in the absence of a facilities contract, the specific facilities or equipment and the number of the award under which they are accountable.

Project Narrative – Special Test Equipment. List special test equipment or other property required to perform the proposed research. Segregate items to be acquired with award funds from those to be furnished by the Government. When possible and practicable, give a description or title and estimated cost of each item. When information on individual items is unknown or not available, group the items by class

and estimate the values. In addition, state why it is necessary to acquire the property with award funds.

Project Narrative – Equipment. Justify the need for each equipment item. Additional facilities and equipment will not be provided unless the research cannot be completed by any other practical means. Include the proposed life expectancy of the equipment and whether it will be integrated with a larger assemblage or apparatus. If so, state who owns the existing apparatus.

Project Narrative – High Performance Computing Availability. Researchers are supported under a USAFA grant, contract or cooperative agreement and meet certain restrictions, are eligible to apply for special accounts and participation in a full-spectrum of activities within the DoD high performance computing modernization program. This program provides, at no cost to the user, access to a range of state-of-the-art high performance computing assets and training opportunities that will allow the user to fully exploit these assets. Details of the capabilities of the program can be found at the following Internet address: <http://www.hpcmo.hpc.mil>. Researchers needing high performance cycles should address the utilization of this program to meet their required needs. USAFA Department/Center/Institute/Directors will facilitate the establishment of accounts awarded.

9. **R&R Budget Form** – Estimate the total research project cost. Categorize funds by year and provide annualized budgets for projects lasting more than one year. Each budget year cannot exceed 12 months (For Example, a 3 year project would consist of 3 separate 12 month budgets). In addition to the Research and Related (R&R) Budget forms available on Grants.gov, the budget proposal should include a budget justification for each year, clearly explaining the need for each item. The following cost element categories listed below must be included in the budget form (when the category is a component of the budget):
- i. **Direct Labor:** Direct labor should be detailed by number of labor hours to be worked by proposed person within each budget year by the hourly rate of that person.
 - ii. **Labor and Overhead/Fringe Rates:** Direct labor hours, with their applicable rates must be broken out by each budget year and the bases used clearly identified. The source of labor, overhead and fringe rates and all pricing factors should be identified. For instance if a Forward Pricing Rate Agreement (FPRA) is in existence, it should be noted along with the Administrative Contracting Officer's (ACO's) name and telephone number. If the rates are based on current experience in your organization, provide the history base used and clearly identify all escalation, by year, applied to derive the proposed rates. If computer usage is determined by a rate, identify the basis used and rationale used to derive the rate.

- iii. **Material/Equipment:** List all material/equipment items by type and kind with associated costs and advise if the costs are based on vendor quotes, data and/or engineering estimates; provide copies of vendor quotes and/or catalog pricing data.
- iv. **Subcontractor Costs:** Submit all subcontractor proposals and analysis with your cost proposal (See FAR 15.404-3(b)). If the subcontractor will not submit cost and pricing information to the offeror, the subcontractor must submit this information directly to the Government for analysis. On all subcontracts and interdivisional transfers, provide the method of selection used to determine the subcontractor and the proposed contract type of each subcontract. An explanation shall be provided if the offeror proposes a different amount than that quoted by the subcontractor. The offeror's proposal must also:
 - Identify principal items/services to be subcontracted. Identify prospective subcontractors and the basis on which they were selected. If non-competitive, provide selected source justification.
 - Identify the type of contractual business arrangement contemplated for the subcontract and provide a rationale for same.
 - Identify the basis for the subcontract costs (e.g., firm quote or engineering estimate, etc).
 - Identify the cost or pricing data or information other than cost or pricing data submitted by the subcontractor.
 - Provide an analysis of the proposed subcontract in accordance with FAR 15.404-3(b). Provide an analysis concerning the reasonableness, realism and completeness of each subcontractor's proposal. If the analysis is based on comparison with prior prices, identify the basis on which the prior prices were determined to be reasonable. The analysis should include, but not be limited to, an analysis of: materials, labor, travel, other direct costs and proposed profit or fee rates.
- v. **Special Tooling or Test Equipment:** When special tooling and/or test equipment is proposed, attach a brief description of said items and indicate if they are solely for the performance of this particular contract or project and if they are or are not already available in the offeror's existing facilities. Indicate quantities, unit prices, whether items are to be purchased or fabricated, whether items are of a severable nature and the basis of the price. These items may be included under Direct Material in the summary format.
- vi. **Consultants:** When consultants are proposed in the performance of the grant, cooperative agreement or contract, indicate the specific project or area in which such services are to be used. Identify each consultant, number of hours or days proposed and the consultant's rate per hour or day. State the basis of said rate and provide an analysis of the acceptability of the consultant's rate based upon the scope of work/research to be accomplished.
- vii. **Travel:** Travel costs must be justified and related to the needs of the project. Identify the number of trips, location/destination and purpose. Travel costs should

be broken out by trip, to include the number of travelers, airfare, per diem, lodging, etc.

viii. Conferences and Workshops: USAFA understands it is essential for the scientific community to maintain clear lines of communication for thorough and well-reasoned research to be accomplished. Support for conferences and workshops are an extremely valuable tool. It allows our technical managers the opportunity to receive current information in their respective disciplines. It also allows for the opportunity to inform the research community of the current thrust of USAFA's programs. Conferences and workshops constitute a key forum for research and technology interchange. USAFA accepts proposals from all recognized scientific, technical or professional organizations who qualify for federal tax-exempt status. USAFA's financial support through appropriate financing vehicles for conferences and workshops is dependent on funds availability, Department/Center/Institute/Director's discretion and certain other restrictions including:

- USAFA support for a workshop or conference is not to be considered as an endorsement of any co-sponsoring organization, profit or nonprofit.
- The subject matter of the conference or workshop is scientific, technical, or involves professional issues that are relevant to USAFA's mission of managing the AF's Research Programs.
- The purpose of our support is to transfer federally developed technology to the private sector or to stimulate wider interest and inquiry into the relevant scientific, technical, or professional issues relevant to USAFA's mission of managing the AF's Research Programs.
- Proposals for conference or workshop support should be submitted with the original proposal; in some instances, a minimum of six months prior to the date of the conference is necessary. Proposals should include the following:
 - (A) Summary indicating the objective(s) of the conference/workshop,
 - (B) Topic(s) to be covered and how they are relevant to USAFA's mission of managing the USAFA's Research Programs,
 - (C) Title, location and date(s) of the conference/workshop,
 - (D) Explanation of how the conference/workshop will relate to the research interests of USAFA,
 - (E) Chairperson or principal investigator and his/her biographical information,
 - (F) List of proposed participants and method (or copies) of announcement or invitation,
 - (G) A note whether foreign nationals will be present.

Evaluation Criteria for Conference Support: Anticipated use of funds requested from USAFA proposals for conferences and workshops will be evaluated using the following criteria. All factors are of equal importance:

- Technical merits of the proposed research and development,
- Potential relationship of the proposed research and development to the Department of Defense,
- The qualifications of the principal investigator(s) or conference chair(s),
- The realism and reasonableness of cost including proposed cost sharing and funds availability. Cost Information (in addition to information required on SF 424 Research and Related (R & R) Budget forms):
 - a) Total project costs by major cost elements,
 - b) Anticipated sources of conference/workshop income and amount from each source,
- ix. Fee: Applicants who enter a fee on Part J of the budget will not be eligible to receive a grant or cooperative agreement.
- x. Attachment: Educational and nonprofit organizations should submit a spending profile which aligns itself with DoDGARs 32.22, as an attachment to the cost proposal. Attach the budget justification and/or spending profile to Section K of the R&R Budget form.

e. Grants.gov Application Receipt Notices –

Submission – The applicant’s approved account holder for Grants.gov will receive a confirmation page upon completing the submission to Grants.gov. This confirmation page is a record of the time and date stamp that is used to determine whether the proposal was submitted by the deadline. After an institution submits an application, Grants.gov generates a submission receipt via email and also sets the application status to “Received.” This receipt verifies the application has been successfully delivered to the Grants.gov system. Next, Grants.gov verifies the submission is valid by ensuring it does not contain viruses, the opportunity is still open and the applicant login and applicant DUNS number match. If the submission is valid, Grants.gov generates a submission validation receipt via email and sets the application status to “Validated.” If the application is not validated the application status is set to “Rejected.” The system sends a rejection email notification to the institution and the institution must resubmit the application package. Applicants can track the status of their application by logging in to Grants.gov.

- f. Submission Due Dates and Times** – This announcement remains open until superseded or cancelled. White papers and proposals may be submitted at any time. Again, there is an initial preference for White papers over full applications/proposals. For additional information regarding the BAA process and for ease of offerors and consistency, USAFA has adopted the procedures used in the ARFL BAA Guide for Industry at <http://www.wpafb.af.mil/library/factsheets/factsheet.asp?id=6790>.

V. Application Review Information

Proposals submitted under this BAA are evaluated through a peer or scientific review process. If selected for contract award, evaluation will be on a competitive basis according to Public Law 98-369, Competition in Contracting Act of 1984, 10 USC 2361, and 10 USC 2374. If selected for grant/assistance instrument award, evaluation will use merit-based competitive procedures according to DoDGARS citation of 32 C.F.R Sec 22.315.

Additionally, in accordance with 2 CFR 200.205, an evaluation of risk posed by applicants is required before they receive Federal awards. This evaluation may incorporate results of the evaluation of the applicant's eligibility or the quality of its application. If the Federal awarding agency determines that a Federal award will be made, special conditions that correspond to the degree of risk assessed may be applied to the Federal award. In evaluating risks posed by applicants, the Federal awarding agency may use a risk-based approach and may consider any items such as the following:

- (1) Financial stability;
- (2) Quality of management systems and ability to meet the management standards prescribed in this part;
- (3) History of performance. The applicant's record in managing Federal awards, if it is a prior recipient of Federal awards, including timeliness of compliance with applicable reporting requirements, conformance to the terms and conditions of previous Federal awards, and if applicable, the extent to which any previously awarded amounts will be expended prior to future awards;
- (4) Reports and findings from audits performed under Subpart F—Audit Requirements of this part or the reports and findings of any other available audits; and
- (5) The applicant's ability to effectively implement statutory, regulatory, or other requirements imposed on non-Federal entities.

Proposals may be evaluated by the appropriate USAFA Research Directors and USAFA Staff, other military services, DoD agencies, civilian agencies and non-Government sources. Non-Government sources can include academia, nonprofit institutions, and support contractor personnel. Non-Government evaluators are authorized access only to those portions of the proposal data and discussions that are necessary to enable them to perform their respective duties. Non-Government evaluators are also required to sign non-disclosure agreements which prohibit them from disclosing proprietary information submitted by contractors. **However, as previously stated in this BAA, USAFA is seeking White papers and proposals that do not contain proprietary information. If proprietary information is submitted, it is the offerors responsibility to mark the relevant portions of their proposal.** Employees of commercial firms under contract to the Government may be used to administratively process proposals and may gain access to proprietary information contained in proposals and/or post award documentation. These support contracts include

non-disclosure agreements prohibiting their contractor employees from disclosing any information submitted by other contractors.

- a. **White Papers** – White papers submitted under this BAA are evaluated through a peer or scientific review process. White papers will be evaluated by the appropriate USAFA Technological Program Manager. Additionally, White papers may be evaluated by outside evaluators retained by USAFA which may include other Government personnel with subject matter expertise or support contractor personnel. Employees of commercial firms under contract to the Government may be used to administratively process White papers. These support contracts include non-disclosure agreements prohibiting their contractor employees from disclosing any information submitted by other contractors. White papers submitted for a particular research area listed in Section I shall be evaluated under criteria as specified in their description in addition to the following four primary criteria. Subject to funding availability, all other White papers will be evaluated under the following four primary criteria, of equal importance, as follows:

1. Technical merits of the proposed research,
2. Potential relationship of the proposed research to the Department of Defense and/or USAFA,
3. Potential for cadet/government involvement in the proposed research (cadet/government involvement is preferred however each recipient should identify and recommend a level of involvement that best fits their technical approach),
4. The proposer's/ principal investigator's/ team leader's/ key personnel's qualifications, capabilities, related experience, facilities, or techniques or a combination of these factors are integral to achieving USAF objectives.

Upon completion of the review, White papers will be placed in one of three categories. Category I papers will be funded as possible, Category II papers would only be funded following those in Category I and papers considered to be Category III will not receive funding. A breakdown of the criteria for each category follows:

Category I

- White Paper is well conceived
- Scientifically & technically sound
- Pertinent to program goals and objective
- Offered by a responsible offeror
- Competent staff
- Supporting resources

Category II

- Scientifically or technically sound but requires further development

Category III

- Not scientifically or technically sound or does not meet agency needs

White Papers may be submitted for one or more topics or for a specific portion of one topic. A proposer may submit separate White papers on different topics or different proposals on the same topic. The U.S. Government does not guarantee an award in each topic area.

Further, be advised as funds are limited, otherwise meritorious White papers may not be funded. Therefore, it is important that White papers show strength in as many of the evaluation areas as practicable for maximum competitiveness.

White papers must be submitted to 10MSG.LGCC@us.af.mil; they should NOT be submitted directly to the Department/Center/Institute/Director. Unless otherwise stated in a call, all White papers will be evaluated as stated above and if selected for funding, a formal Request for Proposal will be sent to the recipient.

- b. Proposals** – Proposals submitted under this BAA are evaluated through a peer or scientific review process. If selected for contract award, the requirements of the Federal Acquisition Regulation will apply. Proposals will be evaluated by the appropriate USAFA Technical Program Manager. Additionally, proposals may be evaluated by outside evaluators retained by USAFA which may include support contractor personnel. Employees of commercial firms under contract to the Government may be used to administratively process proposals. These support contracts include non-disclosure agreements prohibiting their contractor employees from disclosing any information submitted by other contractors. Proposals submitted for a particular research area listed in Section I shall be evaluated under criteria as specified in their description in addition to the following six primary criteria and the realism and reasonableness of proposed costs. Subject to funding availability, all other proposals will be evaluated under the following six primary criteria, of equal importance, as follows:

1. Technical merits of the proposed research,
2. Potential relationship of the proposed research to the DoD and/or USAFA,
3. Potential for cadet/government involvement in the proposed research (cadet/government involvement is preferred however each recipient should identify and recommend a level of involvement that best fits their technical approach),
4. The proposer's, principal investigator's, team leader's, or key personnel's qualifications, capabilities, related experience, facilities, or techniques or a combination of these factors are integral to achieving USAF objectives,
5. The likelihood of the proposed effort to develop new research capabilities and broaden the research base in support of U.S. national defense,
6. The proposer's and associated personnel's record of past performance.

Following the evaluation, proposals will be placed in one of 3 categories. Category I proposals will be funded as possible, Category II proposals would only be funded following those in Category I and proposals considered to be Category III will not receive funding.

Category I

- Proposal is well conceived
- Scientifically & technically sound
- Pertinent to program goals and objective
- Offered by a responsible offeror
- Competent staff
- Supporting resources

Category II

- Scientifically or technically sound but requires further development

Category III

- Not scientifically or technically sound or does not meet agency needs

Offerors must indicate in their proposal, unless a match is required, if they are “not willing or able to cost share” or “able to cost share and/or offer these facilities/equipment/etc.”

Further, be advised as funds are limited, otherwise meritorious proposals may not be funded. Therefore, it is important that proposals show strength in as many of the evaluation areas as practicable for maximum competitiveness.

Additional administrative information regarding submission of applications is contained in Section VIII. The technical and cost information will be analyzed simultaneously during the evaluation process. The AF reserves the right to select for award any, all, part or none of the proposal received.

VI. Award Administration Information

- a. **Award Notices** – Should your proposal be selected for award, the Contracting or Grants Officer will receive correspondence from the Department/Center /Institute/Director stating this information. This is not an authorization to begin work. Your business office will be contacted by the Grants or Contracting Officer to negotiate the terms of your award.
- b. **Reporting Requirements** – Grants and cooperative agreements typically require quarterly and/or annual and final technical reports, financial reports, final patent reports and closeout activities/documents. Contracts typically require annual and final technical and

patent reports. Additional deliverables may be required based on the research being conducted. Additional reporting requirements associated with certain awards will be based on the nature and source of funding. Failure to comply with terms and conditions of any federal awards, to include delinquent reports and close out information may deem an offeror ineligible for current and future awards.

VII. Agency Contacts

Should you have questions about a technical research area, please contact the Department/Center/Institute/Director listed for the research topic areas listed in Section I. Should you have questions about the BAA or procedures for submission of a proposal, please email 10MSG.LGCC@us.af.mil.

**** Important Notice Regarding Questions of a Business Nature ****

All questions shall be submitted in writing by electronic mail (10MSG.LGCC@us.af.mil).

VIII. Additional Information

- a. The cost of White paper and proposal preparation in response to this announcement is not considered an allowable direct charge to any resulting award. Such cost is an allowable expense to the normal bid and proposal indirect cost specified in FAR 31.205-18, or OMB Circular A-21, Cost Principles for Educational Institutions or OMB Circular A-122, Cost Principles for Nonprofit Organizations (in effect before 26 Dec. 2014) and OMB 2 CFR 225 Cost Principles for State, Local and Indian Tribal Governments, and OMB 2 CFR 230, Cost Principles for Nonprofit Organizations (effective on 26 Dec. 2014).
- b. Every effort will be made to protect the confidentiality of White papers and proposals and any evaluations. The proposer must mark the proposal with a protective legend in accordance with FAR 52.215-1, Instructions to Offerors – Competitive Acquisition, if protection is desired for proprietary or confidential information. Offerors are reminded that this BAA is seeking unclassified research White papers and proposals that do not contain proprietary information.
- c. Offerors are advised employees of commercial firms under contract to the Government may be used to administratively process White papers and proposals. These support contracts include non-disclosure agreements prohibiting their contractor employees from disclosing any information submitted by other contractors.
- d. Only contracting or grants officers are legally authorized to bind the government.
- e. Responses should reference Broad Agency Announcement USAFA-BAA-2015.

- f. USAFA expects the performance of research funded by this announcement to be predominantly fundamental*. DoD Instructions [5230.24](#) and [5230.27](#) define contracted fundamental research in a DoD context as follows:

“Contracted Fundamental Research. Includes [research performed under] grants and contracts are (a) funded by budget Category 6.1 ("Research"), whether performed by universities or industry or (b) funded by budget Category 6.2 ("Exploratory Development") and performed on-campus at a university. The research shall not be considered fundamental in those rare and exceptional circumstances where the 6.2-funded effort presents a high likelihood of disclosing performance characteristics of military systems or manufacturing technologies are unique and critical to defense and where agreement on restrictions have been recorded in the contract or grant."

*Note: A limited amount of performance of research funded by this announcement may be deemed advanced research. See the DoDGARS definitions for basic, applied, and advanced research, as noted below

Basic research. *Efforts directed toward increasing knowledge and understanding in science and engineering, rather than the practical application of that knowledge and understanding. It typically is funded within Basic Research (Budget Activity 1 and Research Category 6.1) programs within Research, Development, Test and Evaluation (RDT&E). For the purposes of this part, basic research includes:*

- (1) Research-related, science and engineering education, including graduate fellowships and research traineeships.*
- (2) Research instrumentation and other activities designed to enhance the infrastructure for science and engineering research.*

Applied research. *Efforts that attempt to determine and exploit the potential of scientific discoveries or improvements in technology such as new materials, devices, methods and processes. It typically is funded in Applied Research (Budget Activity 2 and Research Category 6.2) programs within Research, Development, Test and Evaluation (RDT&E). Applied research normally follows basic research but may not be fully distinguishable from the related basic research. The term does not include efforts whose principal aim is the design, development, or testing of specific products, systems or processes to be considered for sale or acquisition; these efforts are within the definition of “development.”*

Advanced research. *Advanced technology development that creates new technology or demonstrates the viability of applying existing technology to new products and processes in a general way. Advanced research is most closely analogous to precompetitive technology development in the commercial sector (i.e., early phases of research and development on which commercial competitors are willing to collaborate, because the work is not so coupled to specific products and processes that the results of the work must be proprietary). It does not include development of military systems and hardware where specific requirements have been defined. It is typically funded in Advanced Technology Development (Budget Activity 3 and Research Category 6.3A) programs within Research, Development, Test and Evaluation (RDT&E).*

- g. Federal Awardee Performance and Integrity Information System (FAPIS) –** There is a Government-wide policy on the use of the Federal Awardee Performance and Integrity Information System (FAPIS) in the award of contracts and grants that may affect the agencies' processes for judging proposed recipients to be qualified to receive contracts and financial assistance awards. The policy implements requirements of section 872 of the Duncan Hunter National Defense Authorization Act for fiscal year 2009 (Public law 110-417). See the FAPIS website at <https://www.fapis.gov/fapis/govt/policy.jsp> for further policy information.
- h. SAM Registration –** Prospective awardee shall be registered in the SAM database prior to award, during performance, and through final payment of any award resulting from this announcement. Offerors may obtain information on registration and annual confirmation requirements via the Internet at <https://www.sam.gov> or AskSAM@gsa.gov.

Awardees must:

1. Be registered in the System for Award Management (SAM) prior to submitting an application or proposal,
 2. Maintain an active SAM registration with current information at all times during which it has an active Federal award or an application or proposal under consideration by an agency, and
 3. Provide its DUNS number in each application or proposal it submits to the agency.
- i. Ombudsman –**
1. An ombudsman has been appointed to hear and facilitate the resolution of concerns from offerors, potential offerors and others for this acquisition. When requested, the ombudsman will maintain strict confidentiality as to the source of the concern. The existence of the ombudsman does not affect the authority of the Program Officer or Contracting Officer. The ombudsman may refer the party to another official who can resolve the concern.
 2. Before consulting with an ombudsman, interested parties must first address their concerns, issues, disagreements, and/or recommendations to the Grants or Contracting Officer for resolution. Consulting an ombudsman does not alter or postpone the timelines for any other processes.
 3. If resolution cannot be made by the Grants/Contracting Officer, concerned parties may contact the USAFA Ombudsman: Ms. Kelly Snyder, Director of Business Operations 10th Contracting Squadron, USAFA. Telephone: (719) 333-2074. Email: Kelly.Snyder@us.af.mil. Concerns, issues, disagreements and recommendations that cannot be resolved at the USAFA level may be brought by the concerned party for further consideration to the U.S. Air Force Pentagon, Washington DC 20330-1060, phone number (703) 588-7004.

4. The ombudsman has no authority to render a decision that binds the agency.
5. Do not contact the ombudsman to request copies of the solicitation, verify offer due date, or clarify technical requirements. Such inquiries shall be directed to the Grants/Contracting Officer.

j. Reporting Subawards and Executive Compensation – Any grant or agreement award resulting from this announcement may contain the award term set forth in 2 CFR, Appendix A to Part 25 http://www.ecfr.gov/cgi-bin/text-idx?tpl=/ecfrbrowse/Title02/2cfr25_main_02.tpl

k. Additional Subcontract /Subaward Reporting Requirements –

The Federal Funding and Transparency Act and 22 September 2010 DDR&E memo, “New Reporting required Under DoD Grant and Cooperative Agreements” require that as of 01 October 2010 awardees of contracts and recipients of grants have been required to report Executive Compensation and First-Tier Subcontract/Subrecipient Awards for any contract or grant valued at \$25,000 or more excluding classified contracts or contracts/grants with individuals.

l. Grant Payment Process –

1. The USAFA no longer sets up automatic payments for Grants to educational and nonprofit recipients. Therefore, all recipients must access Wide Area Workflow (WAWF) and complete WAWF’s Standard Form (SF) 270, Request for Advance or Reimbursement, for payment. Recipients should submit SF 270s as expenses occur; however, recipients should have no more than one month cash on hand at any given time.
2. Each recipient must register with WAWF at <https://wawf.eb.mil>. To begin the registration process, click on the accept button at the bottom of the page. WAWF will display the login page with a block for new users with hyperlinks to instructions for "Pre-registration for Vendors" and the actual registration link. Please note that each recipient must be registered in <http://SAM.gov> and have an Electronic Business Point of Contact set up to approve new registrations within their Institution. Each recipient will also need to set up a Group Administrator (GAM) to register their CAGE Code and DUNS number, in addition to setting up an organizational email address for email notification from WAWF advising on the status of vouchers submitted for payment. The recipient will also need to contact the WAWF Help Desk to register their CAGE code within the WAWF system. WAWF Help Desk information is available at the WAWF web site.
3. If you encounter any problems with your WAWF registration please click on "Vendor Customer Support" in the blue bar at the bottom of the login page. This link will provide phone numbers and an email address to the WAWF Help Desk.

- m. Prohibition Against Contracting with Corporations that have an Unpaid Delinquent Tax Liability or Felony Conviction under Federal Law** – Offerors should be aware that: OUSD(AT&L)/DPAP Memo, 21 Feb 14 Class Deviation -- Prohibition Against Contracting with Corporations that Have a Delinquent Tax Liability or a Felony Conviction - <http://www.acq.osd.mil/dpap/policy/policyvault/USA000945-14-DPAP.pdf#zoom=100%> - precludes Contracting Officers from awarding funds to any corporation that has an unpaid delinquent tax liability or felony conviction under Federal law. This requirement, applicable to contracts and requiring a certificate from offerors, has not yet been implemented for grants. However, because Public law 113-76 does include grants, it is anticipated that OMB guidance for grant implementation will occur during the period this BAA is active.
- n. USAFA Policy on No Cost Extensions (NCE's)** – USAFA grants NCE's only in situations in which the extension is truly warranted and properly documented. USAFA Requirements which are incorporated into every USAFA grant by reference, require prior written approval “to extend the period of performance, without additional funds, beyond the expiration date of the grant.” For an extension to be granted, 2 CFR 200.308(d)(2) indicates recipients are to provide notice “in writing and with the supporting reasons and revised period of performance at least ten (10) calendar days before the end of the period of performance specified in the Federal award.” In no event will the period of performance be extended merely for the purpose of using unobligated balances. Institutions should make every effort to insure work is completed on time. If a recipient deems an NCE is truly warranted, it should submit its request for an extension and supporting reasons to the relevant Grants Officer and Program Officer.
- o. Debriefings** – When requested, a debriefing will be provided. The debriefing process will follow the time guidelines set out in FAR 15.505 and 15.506, but the debriefing content may vary to be consistent with the procedures that govern BAAs (FAR 35.016).
- p. Employment Eligibility Verification** – As prescribed by FAR 22.1803, FAR Clause 52.222-54, “Employment Eligibility Verification,” is hereby incorporated by reference in this solicitation. Any grant, cooperative agreement or contract awarded as a result of this BAA that is above the Simplified Acquisition Threshold and contains a period of performance greater than 120 days, shall include this clause content in its award. This clause content provides the requirement of recipients/contractors to enroll as a Federal Contractor (recipient) in the E-Verify program within 30 days after award.
- q. Contractor Manpower Reporting Application (CMRA):** Upon award of research and development (R&D) contracts with a total value greater than or equal to the Simplified Acquisition Threshold (SAT), a reporting requirement may be levied within the PWS to comply with the applicable sections within the Contractor Manpower Reporting

Application (CMRA). This provides implementing direction consistent with the Department's commitment to improve visibility into and accountability of contracted services in accordance with the requirements of sections 235 and 2330a of title 10, United States Code which requires the Secretary of Defense to submit to Congress an annual inventory of contracts for services performed during the prior fiscal year for or on behalf of the Department of Defense (DoD). The inventory must include the number of contractor employees using direct labor hours and associated cost data collected from contractors. Guides for the CMRA system are available at <http://www.ecmra.mil>. Note: This requirement does not apply to grants or cooperative agreements.

*** End of BAA Announcement ***