

X222-PDCSO1: 2nd Air Force Nuclear Weapons Center Pitch Day

ADDITIONAL INFORMATION

N/A

TECHNOLOGY AREAS:

Air Platform | Electronics | Ground Sea | Information Systems | Materials | Nuclear | Sensors | Space Platforms

MODERNIZATION PRIORITIES:

Artificial Intelligence/ Machine Learning | Autonomy | Control and Communications | Cybersecurity | General Warfighting Requirements (GWR) | Microelectronics | Network Command | Nuclear

KEYWORDS:

Aeroshell Material; Artificial Intelligence; Data Management; Digital Engineering; Missile Technology; Modeling and Simulation; Radiation Hardening; Robotics; Sensors; Supply Chain

OBJECTIVE:

The Air Force Nuclear Weapons Center (AFNWC) is seeking technologies and solutions that support the mission of its execution and functional directorates. Our twenty-three technological areas of interest include: Advanced Automated Analysis Methods for Critical System Evaluations, Advanced Parts Management System, Alternative to GPS-Based Navigation, AR/VR Technologies, Artificial Intelligence for Counterfeit Parts, Digital Engineering Technologies, Digital Environment Tools Development, Digital Solutions for Supply Chain Risk Management (SCRM), Digital Transformation for Air Delivered Capabilities, Digitization and Management of Authoritative Resources, Hybrid Ceramic Throats for High-Temperature Propellants, Kubernetes Day 1/Day 2 Service Improvement at the Tactical Edge, Missile Field Real-Time "Health Of Fleet" Capability, Novel Utility Corridor Trenching/Trenchless Methods, Nuclear Protection of Carbon-Carbon Composites, Robotics, Scale-Up And Testing of Hardened Aeroshells to Thermo-Mechanical Effects, Sea-Based Platform System for Testing, Software Bill of Material (SBOM) Integration with DOD Platform One, Stakeholder Concern-Directed Modeling, Strategic Radiation Hardened (Rad-Hard) Microelectronics (ME), Technology Database, and Telemetry Package (Receiver) for Tracking and Terminal Scoring.

ITAR:

The technology within this topic is restricted under the International Traffic in Arms Regulation (ITAR), 22 CFR Parts 120-130, which controls the export and import of defense-related material and services, including export of sensitive technical data, or the Export Administration Regulation (EAR), 15 CFR Parts 730-774, which controls dual use items. Offerors must disclose any proposed use of foreign nationals (FNs), their country(ies) of origin, the type of visa or work permit possessed, and the statement of work (SOW) tasks intended for accomplishment by the FN(s) in accordance with section 3.5 of the Announcement. Offerors are advised foreign nationals proposed to perform on this topic may be restricted due to the technical data under US Export Control Laws.

DESCRIPTION:

The Air Force Nuclear Weapons Center (AFNWC) consists of several functional directorates and five major execution directorates - Air Delivered Capabilities; Ground Based Strategic Deterrent Systems; Minuteman III Systems; Nuclear Command, Control and Communications (NC3) Integration; and

Nuclear Technology and Integration. The AFNWC commander is dual-hatted as the Air Force Program Executive Officer (PEO) for Strategic Systems, and the NC3 Integration director is dual-hatted as the Air Force PEO for NC3.

ADVANCED AUTOMATED ANALYSIS METHODS FOR CRITICAL SYSTEM

EVALUATIONS - Develop a capability to automatically import, process, and assess system states that lead to a user defined end-state. Output digital state diagrams that lead to user defined system end state conditions and identify common/singular nodes that are critical to achieve user defined end-state.

ADVANCED PARTS MANAGEMENT SYSTEM - AFNWC is seeking a parts management tool that can predict demand and obsolescence problems and optimize inventory levels to ensure availability of parts to improve weapon system readiness.

ALTERNATIVE TO GPS-BASED NAVIGATION - A low size, weight, and power (SWAP) navigational solution is needed that can provide accurate navigational data in the absence of GPS.

AR/VR TECHNOLOGIES - Current VR solutions are non-user friendly, unsafe, or awkward to use. VR objects and environments are currently unrealistic, and lack a “real-world” feel. A realistic omnidirectional locomotion system is needed that can support user training needs.

ARTIFICIAL INTELLIGENCE FOR COUNTERFEIT PARTS - We need an AI solution to aid in identifying potential military counterfeit parts.

DIGITAL ENGINEERING TECHNOLOGIES - We are seeking digital engineering solutions (methods, processes, and tools) to transform the engineering, research, requirements, acquisition, test, cost, and sustainment communities. Examples include code inspection, business tools, modeling/simulation/analysis, and data analysis/validation/visualization tools to facilitate cyber security and nuclear surety certification activities.

DIGITAL ENVIRONMENT TOOLS DEVELOPMENT - Minuteman III (MMIII) uses outdated tools incapable of consolidating technical data across disciplines and associated supporting organizations. MMIII requires updated digital tools to manage weapon system technical data and transfer years of MMIII data to the replacement of the weapon system.

DIGITAL SOLUTIONS FOR SUPPLY CHAIN RISK MANAGEMENT (SCRM) - We are interested in a digital tool for managing supply chain risk by identifying susceptibilities, vulnerabilities and threats throughout DoD’s “supply chain” and developing mitigation strategies to combat those threats whether presented by the supplier, the supplied product and its subcomponents, or the supply chain (e.g., initial production, packaging, handling, storage, transport, mission operation, and disposal). Proposed software tool must integrate data, enable data visualization, provide data analytic functions, and have the ability to share information between various government organizations, agencies, and contractors. Enterprise-wide solution must allow individual users to access all appropriate and relevant data in order to make data-driven decisions based on their individual role/function.

DIGITAL TRANSFORMATION FOR AIR DELIVERED CAPABILITIES - We seek a method to incorporate digital engineering tools into our sustainment programs. Using SysML and common

digital engineering tools, we need a digital environment that can be used across the spectrum of our sustainment portfolio.

DIGITIZATION AND MANAGEMENT OF AUTHORITATIVE RESOURCES - Many documents developed during the procurement of Air Force systems are not in digital format and provide technical and operational instructions/policies that evolve throughout time. In some cases, it is difficult to determine which document is authoritative (the most current policy/guide). We need a tool to establish digitization and management of authoritative resources as we transition to a digital engineering environment.

HYBRID CERAMIC THROATS FOR HIGH-TEMPERATURE PROPELLANTS - Technology for hybrid ceramic throats needs to be developed and matured to enhance range, speed, and size, weight, and power (SWAP) efficiency of missile systems.

KUBERNETES DAY 1/DAY 2 SERVICE IMPROVEMENT AT THE TACTICAL EDGE - We need a service that enables an operator with minimal training to manage Day 1/Day 2 operations for Platform One Kubernetes based mission applications and Kubernetes environments for disconnected clusters/at the tactical edge.

- Day 1: Tasks required to deploy
- Day 2: Tasks required to operate and maintain

MISSILE FIELD REAL-TIME “HEALTH OF FLEET” CAPABILITY - Watchtower, the MFs’ current Real-Time Common Operating Picture framework, fuses and visualizes missile field data, but lacks a tool/application for Real-Time “Health of the Fleet” assessment. This topic seeks the innovative power of small businesses to develop, demonstrate, and deliver tools/applications that are suitable for integration, and operational use for agilely and reliably assessing ICBM fleet health and informing resource optimization for fleet health risk management.

NOVEL UTILITY CORRIDOR TRENCHING/TRENCHLESS METHODS - Current traditional trenching/trenchless methods for installing fiber optic cables at depths of up to 8 feet are significantly limited by soil types and environmental/real estate constraints. An economical trenching/trenchless method is needed for installing fiber optics at depths of up to 8 feet with minimal environmental and real estate impacts.

NUCLEAR PROTECTION OF CARBON-CARBON COMPOSITES - We need to develop innovative processing trials and techniques to enhance nuclear protection of carbon-carbon aeroshells and motor components for future systems.

ROBOTICS - Develop a robotic application that can approach the challenges of general maintenance of nuclear facilities, project test preparation and such applications of value to nuclear weapon systems or infrastructure that can improve performance or overcome challenges.

SCALE-UP AND TESTING OF HARDENED AEROSHELLS TO THERMO-MECHANICAL EFFECTS - We need to characterize, scale-up, and test hardened aeroshell material technologies to enable system level enhancements to future missiles and subsystems.

SEA-BASED PLATFORM SYSTEM FOR TESTING - ICBM test launches verify the accuracy and reliability of the weapon system and provide valuable data to ensure a continued safe, secure and effective nuclear deterrent. However, current flight test tracking and scoring systems have limited capabilities are hard to sustain. A replacement sea-based scoring platform is needed.

- See <https://www.afnwc.af.mil/News/Article/2398073/afnwc-team-supports-icbm-test-launch/> for background info.

SOFTWARE BILL OF MATERIAL (SBOM) INTEGRATION WITH DOD PLATFORM ONE - Establish a consistent approach for DOD Platform One tooling to produce a Software Bill of Material (SBOM).

STAKEHOLDER CONCERN-DIRECTED MODELING - We need improved modeling practices to allow Stakeholders to dynamically query requirements or architectural models in order to satisfy their concerns over the system(s) being defined by those models.

STRATEGIC RADIATION HARDENED (RAD-HARD) MICROELECTRONICS (ME) - The nuclear enterprise requires a trusted supply of advanced strategic radiation-hardened microelectronics (Rad-Hard ME). Radiation effects modeling tools, Rad-Hard ME design rules, enabling technologies, hardness assurance test methods and hardness surveillance protocols are needed to support current AFNWC systems and future needs.

TECHNOLOGY DATABASE - The driving pace and competition for leading-edge technology across the Air Force and industry has outpaced our ability to track innovation and technology opportunities across the varied industry sectors. We need a centralized repository that is able to identify and track technology development efforts across the AFNWC, industry and academia.

TELEMETRY PACKAGE (RECEIVER) FOR TRACKING AND TERMINAL SCORING - ICBM test launches verify the accuracy and reliability of the weapon system and provide valuable data to ensure a continued safe, secure and effective nuclear deterrent. However, current flight test tracking and scoring systems have limited capabilities are hard to sustain. A telemetry package (operating in S or L band) is needed to receive telemetry data and send encrypted data to land-based control station.

- See <https://www.afnwc.af.mil/News/Article/2398073/afnwc-team-supports-icbm-test-launch/> for background info.

Proposals for technologies and solutions not previously considered and which may not fit directly within one of the twenty-three areas are also welcomed.

PHASE I:

This topic is intended for technology proven ready to move directly into a Phase II. Therefore, a Phase I award is not required. The offeror is required to provide detail and documentation in the Direct to Phase II proposal which demonstrates accomplishment of a “Phase I like” effort, including a feasibility study. This includes determining, insofar as possible, the scientific and technical merit and feasibility of ideas appearing to have commercial potential. It must have validated the product-market fit between the proposed solution and a potential AF stakeholder. The offeror should have defined a

clear, immediately actionable plan with the proposed solution and the AF customer. The feasibility study should have:

- Identified the prime potential AF end user(s) for the non-Defense commercial offering to solve the AF need, i.e., how it has been modified;
- Described integration cost and feasibility with current mission-specific products;
- Described if/how the demonstration can be used by other DoD or Governmental customers.

PHASE II:

Eligibility for D2P2 is predicated on the offeror having performed a “Phase I-like” effort at least in part separate from the SBIR Programs. Under the phase II effort, the offeror shall sufficiently develop the technical approach, product, or process in order to conduct a small number of advanced manufacturing and/or sustainment relevant demonstrations. Identification of manufacturing/production issues and or business model modifications required to further improve product or process relevance to improved sustainment costs, availability, or safety, should be documented. Air Force sustainment stakeholder engagement is paramount to successful validation of the technical approach. These Phase II awards are intended to provide a path to commercialization, not the final step for the proposed solution.

PHASE III DUAL USE APPLICATIONS:

Phase III efforts will focus on transitioning the developed technology to a working commercial or warfighter solution.

SPECIFIC X222-PDCSO1 DIRECT TO PHASE II (D2P2) PROPOSAL PREPARATION -

Maximum SBIR funding per award will be \$1.5M. Maximum performance period will not exceed 27 months, including 24 months for technical effort and 3 months for reporting. Proposals exceeding this amount or period will not be considered.

Offerors shall follow Section X, “Direct to Phase II Proposal Instructions” when preparing proposals along with these specific X222-PDCSO1 proposal preparation instructions.

Topic-Specific Volume 5, Supporting Documents:A Customer Memorandum is NOT required under this topic, but may be provided.

A DRAFT slide deck IS required in Volume 5 for proposals submitted under this topic. The slide deck is considered DRAFT as those offerors that are invited to Pitch Day will have the opportunity to address Government-posed clarifications in a FINAL version as further explained below. Slide decks shall consist of no more than 12 slides. All slides shall be numbered consecutively, and each slide shall contain the company name, topic number, and proposal number assigned by DSIP. A sample slide deck is provided at Attachment X. Offerors may, but are not required to, utilize this sample as a template. Failure to provide a DRAFT slide deck within Volume 5 will be cause for rejection of the proposal without evaluation.

Offerors are encouraged to identify the applicable technical area above in the proposal's title or subtitle.

This Pitch Day topic will utilize a three step evaluation/selection process, labeled below as Initial Peer Review, Clarifications, and Pitch Day.

Initial Peer Review: Proposals that conform to the requirements within this CSO will be peer reviewed on the following criteria, listed in descending order of importance: The appropriateness and relevance in fulfilling a need of the Air Force Nuclear Weapons Center (AFNWC). An account of how the proposal meets an AFNWC technical area indicates appropriateness and relevance. While not required, a signed customer memorandum and/or letter of support from other Government personnel may be indicators of appropriateness and relevance.

Technical approach. The technical approach soundness, technical merit, and innovation of the proposed technical approach, as well as its differentiation from current customer alternatives. Includes the proposed Principal Investigators'/Project Managers', supporting staff, and consultants' qualifications to execute the proposed approach.

The potential for Government or private sector commercialization and benefits expected to accrue from commercialization. The SBC's record of commercializing SBIR or other research, the existence of Phase II follow-on commitments for the subject research, and matching funding, whether from Government or private sources, are evidence of commercialization potential.

Based on the outcome of this evaluation and funds availability, technically acceptable proposals will be invited to participate in Pitch Day. Offerors will be advised via electronic correspondence.

Clarifications: This step consists of limited interactions between the Government and offerors invited to Pitch Day to allow the Government to streamline award issuance following Pitch Day. After notice of invitation but prior to Pitch Day, offerors may be contacted by the awarding Contracting Office to gain clarification on proposal elements to include, but not limited to, data rights assertions and cost volume elements. This contact should not be construed to mean award is assured. Additionally, during this step, Offerors may be provided with questions from the Government regarding technical approach. Said questions will be asked to gain further insight into the approach proposed and can be addressed within the FINAL slide deck to be presented on at Pitch Day; proposal revisions will not be allowed and responses to posed clarifications shall be included as part of the FINAL slide deck. No proposal elimination is conducted during this step.

Pitch Day: Those offerors invited to Pitch Day will receive event information, e.g. date/time, via electronic correspondence. Offerors must attend the Pitch Day either virtually or in-person to be considered for award. No award preference will be given to those who attend in-person. Please note, the Pitch Day may be held virtually in its entirety for all offerors.

On Pitch Day offerors will present their FINAL slide deck. The FINAL slide deck shall reflect the technical approach presented for the Initial Peer Review; no material changes to the technical approach are allowed. The slide limit and formatting information enforced for the DRAFT applies to the FINAL slide deck. FINAL slide decks must be submitted to the Government prior to Pitch Day.

Information regarding submission of the FINAL slide deck will be provided via electronic correspondence during the Clarifications step. Failure to provide a FINAL slide deck by the required deadline will result in disqualification from Pitch Day and award.

Pitch Day presentations will be used to validate the Initial Peer Review. A Pitch Day presentation could provide additional clarification or insight on the ability to fulfill Air Force Nuclear Weapons Center needs, technical approach, and/or potential for commercialization, serving as a basis to elevate the proposal in priority for funding. Selection for award will be based upon importance to agency programs and funds availability in accordance with DAR 2018-O0016, Class Deviation – Defense Commercial Solutions Opening Pilot Program.

REFERENCES:

1. For more information on the Air Force Nuclear Weapon Center and its overarching technical need areas, please visit our website – <https://www.afnwc.af.mil/Innovation/>
2. AFNWC will host an Industry Collider on 27 April, during the pre-solicitation phase. This virtual event will provide companies with the opportunity to hear from AFNWC subject matter experts as they discuss the Center's technical need areas.
3. Snyder, Don, Shrrill Lingel, Feorge Nacouzi, Brian Dolan, Jake McKeon, John Speed Meyers, Kurt Klein, and Thomas Hamilton, *Managing Nuclear Modernization Challenges for the U.S. Air Force A Mission-Centric Approach*, Santa Monica, Calif. RAND Corporation, RR-3178-AF, 2019.

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