Air Force Nuclear Weapons Center 21.2 Topics

AFNWC Directorate: EN

Topic Title: Test Methods and Modeling for Re-Entry Vehicle Materials

Problem Description:
Vehicle structural materials undergoing re-entry conditions experience extreme temperatures and heat fluxes, combined with high aerodynamic shear and acoustic loading, and chemical degradation. An effective method for protecting the payload utilizes charring ablative materials. Incident energy is partially consumed by endothermic reactions that affect the material's composition (charring), and may cause mechanical separation and/or sublimation from the surface (ablation). This process affects the profiles of the external surface and the underlying material transition profiles, also changing flows and boundary conditions needed for analysis. The intact material may also experience large thermal strains and damage from shrinkage caused by pyrolysis. Affordable test methods are needed which present well-defined boundary conditions, permitting characterization of material properties and their evolution under such conditions. An additional challenge in testing materials in extreme environments is the cost of material samples, which require specialized experience and manufacturing control to produce with consistent quality. During re-entry, conditions at the material surfaces and underlying substrate are complicated by ionized oxygen and other atmospheric species, carbon combustion products and pyrolytic gas flows (which help to block incident heat flux), oxidation, stress-assisted reactions, heterogeneous degradation rates of material constituents, and aerodynamic boundary layer uncertainty effects. A further difficulty is that careful simulation and measurement of test specimens themselves can reveal unexpected behaviors, complicating interpretation of results and comparisons to in-service conditions. Although all of the described challenges may be addressed in one proposal, significant elements may be addressed separately within the context of realistic settings.

These technical areas are not meant to be exhaustive as this focus area is intended to be an open topic for any re-entry material characterization system.

Summary:
The AFNWC is seeking low-cost aeroshell heat shield material characterization, testing, and modeling concepts to inform re-entry vehicle design analysis & trade studies. Examples of areas of interest include

- Low-cost material testing and characterization for extreme environments.
- Development and characterization of new and existing materials and structures for re-entry flight Environments.
- Development of robust sensing methodologies for characterization of species, reaction pathways represented in liberated gases, real-time profilometry, in combination with temperature gradients, pressure, velocity, and aerodynamic (actual or simulated) loading.
- Polymer infiltration and pyrolysis (PIP) process modeling for re-entry and propulsion materials fluid structure interaction modeling for flows, especially ablative.

Focus Area: Modeling and Simulation

Solution's Limitations and Constraints (i.e. nuclear certification): N/A

Minimum desired technology readiness level (TRL):
TRL3 – Applied research: First laboratory tests completed; proof-of-concept.

Available resources (i.e. Government data, additional money, government equipment, etc.):
Access to limited re-entry vehicle environment data

Linked ideas (if applicable): N/A

Air Force Nuclear Weapons Center 21.2 Topics

AFNWC Directorate: NC

Topic Title: Adaptive Network Interchange

Problem Description:
The Air Force Nuclear Weapons Center (AFNWC) is looking for a way to improve communications in challenging environments. The objective of this topic is to identify a beyond line of sight (BLOS) radio frequency (RF) augmentation capability to assist existing RF network performance, should that network be compromised (terrorism, cyber, natural effects (i.e. sunspot activity)). The system must be rapidly deployable (land, air or sea) to replace compromised communication nodes using multiple links across multiple spectrum communications to assure survivable communications. Rapidly deployable communications (such as drones, rail, or other platforms) are encouraged. Proposed solution must include a detailed definition of the term "Rapidly". The proposed weapon system architecture must be designed with open interfaces and data exchanges and be Open Mission Systems (OMS) compliant where applicable.

Summary:
We are in search of beyond-line-of-sight (BLOS) radio frequency (RF) augmentation concepts to quickly restore RF network performance when degraded by natural or hostile events (i.e. sabotage, terrorism, cyber, weather, etc.). Examples include rapidly deployable (specify timelines) communication nodes (e.g. drones, rail, etc.) with open interface/exchange architecture and Open Mission System (OMS) compliance where applicable.

Focus Area: Communications

Solution's Limitations and Constraints (i.e. nuclear certification):
Open Mission Systems (OMS) compliant; Open Architecture; Jam and Cyber resistance protection; Provide your facility's security level, and explain any obstacles to going to a higher level (i.e. Secret).

Minimum desired technology readiness level (TRL):
TRL4 – Small scale prototype built in a laboratory environment.

Available resources (i.e. Government data, additional money, government equipment, etc.):
The government will supply additional supporting data, if available, as requested.

Linked ideas (if applicable): Dynamic Cognitive Network Management

Air Force Nuclear Weapons Center 21.2 Topics

AFNWC Directorate: NC

Topic Title: Dynamic Cognitive Network Management

Problem Description:
The Air Force Nuclear Weapons Center (AFNWC) is seeking a comprehensive network management solution, with an emphasis on meaningful information sharing. Desired technology may help modernize Air Force strategic network management by facilitating the display of network management data to critical network nodes. The network is used to disseminate messages (i.e. 280 characters in length) between mission commanders and globally dispersed air-based and ground-based force elements during global conflict. The optimal solution would be dynamic, change-cognitive, and able to traverse multiple disparate internet protocol (IP)-based and non-IP-based radio frequency (RF) waveforms while maintaining appropriate security and integrity. The technology should provide link availability information between critical nodes (i.e. command center locations and network management locations) within the network. Link availability may be represented by signal-to-noise ratio, probability of timely message receipt between nodes, or other proposed metrics that would provide meaningful network status information to commanders or network managers. The network management display should provide a user-friendly interactive overview of mission status, ensuring that network managers and commanders have real-time situational awareness related to the integrity of their network, greatly increasing efficiency in information sharing and overall mission success. The weapon system architecture must be designed with open interfaces and data exchanges, and the system must be open mission systems (OMS) compliant where applicable.

Summary:
We are interested in comprehensive information sharing network management concepts to facilitate the dissemination of short (i.e. 280 characters) messages to globally dispersed network nodes before, during, and after a crisis. The optimal solution would be dynamic, change-cognitive, and able to traverse multiple disparate internet protocol (IP)-based and non-IP-based radio frequency (RF) waveforms while maintaining appropriate security and integrity. Relevant technology would provide link availability and network status information (such as signal-to-noise ratio, probability of timely message receipt, etc.) between nodes in order to provide real-time situational awareness of network integrity. Proposed solutions should include an open interface system architecture that is open mission system (OMS) compliant where applicable.

Focus Area: Communications

Solution's Limitations and Constraints (i.e. nuclear certification):
OMS compliant; Global network connectivity;
Integration of both IP-based and non-IP-based communication systems;
Low-throughput waveform and high-throughput waveform interconnectivity;
Provide your facility's security level, and explain any obstacles to going to a higher level (i.e. Secret).

Minimum desired technology readiness level (TRL):
TRL4 – Small scale prototype built in a laboratory environment.

Available resources (i.e. Government data, additional money, government equipment, etc.):
The government will supply additional supporting data, if available, if requested.

Linked ideas (if applicable): Adaptive Network Interchange

Air Force Nuclear Weapons Center 21.2 Topics

AFNWC Directorate: ND

Topic Title: Data Synchronization

Problem Description:
Developing an air-delivered nuclear health assessment drives the need for constant aggregation and synchronization of data. With this in mind, having an integrated view of the air-delivered nuclear capabilities in order to identify interdependencies, gaps, and risks is a laborious process. There is a desire for a cross-domain digital solution (such as a nuclear-aircraft decision-integration support system), which integrates and synchronizes nuclear data, maintains version control, data integrity, and classification.

Digital technology is needed to integrate nuclear systems data, including aircraft support and test equipment. Desired technology will incorporate the capability to research and retrieve data, develop integrated schedules, and create reports for data analysis and decision making.

A digital, automated, integrated nuclear data decision tool will allow senior leaders to identify issues, gaps, and risks in order to view the current state and predict the future state of the nuclear air delivered capability.

This will involve algorithms that allow for analyzing historical data and statistics to predict future outcomes. It may include artificial intelligence (AI)/machine learning (ML) algorithms that are capable of analyzing large, multi-variable, and diverse data sets quickly – in order to provide agile support to the warfighter. This capability would increase efficiency with readily available integrated nuclear data, schedules, and planning products – accelerating senior leader's decision process.

Summary:
We are in search of a cross-domain digital air-delivered nuclear health assessment concept which integrates and synchronizes nuclear data, maintains version control, data integrity, and meets classification requirements.

The AFNWC is interested in a digital, automated, integrated nuclear data decision tool to help senior leaders identify issues, gaps, risks, view the current state, and predict the future state of the nuclear air-delivered capability. Technology will require algorithms (e.g. artificial intelligence (AI)/machine learning (ML)) that analyze historical data and statistics to predict future outcomes.

Focus Area: Data and Analytics

Solution's Limitations and Constraints (i.e. nuclear certification): N/A

Minimum desired technology readiness level (TRL):
TRL6 – Prototype system tested in intended environment close to expected performance.

Available resources (i.e. Government data, additional money, government equipment, etc.): N/A

Linked ideas (if applicable): N/A

Air Force Nuclear Weapons Center 21.2 Topics

AFNWC Directorate: NM

Topic Title: Predictive Minuteman III Sustainment Capability

Problem Description:
The Air Force (AF) is evaluating the need to create and maintain a system to digitally monitor, manage, and predict the health of the Minuteman III weapon system.

The Air Force is looking for a modern technical solution to capture and assess weapon system data to be proactive in assessing and addressing sustainment risks before they becomes issues. The nuclear enterprise currently collects a wide range of data through a variety of platforms and systems to understand the attrition and age-out of Minuteman III. Attrition consists of our supply posture (ie, D043, ILSS), failure/usage (ie, International Material Data System (IMDS)), repairs and procurements. Age-out is assessed through aging surveillance and operational testing programs. The desire is to leverage all available data sources to identify mission impact against the weapon system key performance parameters and use that to allocate resources for the greatest return on investment.

As a use-case, the technical solution would ingest near-real-time data for a given component from IMDS and estimate impact to mission capability in the field. The solution would have a real-time capability to assess supply posture and future repair and procurements to project sustainability of the particular component/system.

Enabling a predictive capability for Minuteman III sustainment would maximize mission capability return on investment by allocating resources to the greatest need.

Summary:
We are in search of a predictive health monitoring system to proactively assess Minuteman III parts supply ((i.e. D043, Integrated Logistics Support and Service (ILSS)), failure/usage data (e.g. International Material Data Systems (IMDS)), and aging surveillance and operational test results in order to identify and address risk items before they become issues. Technology should leverage all available data sources to efficiently allocate resources to prevent a negative impact on mission and weapon system key performance parameters (KPPs).

Focus Area: Data and Analytics

Solution's Limitations and Constraints (i.e. nuclear certification):
- ~61 disparate data systems that may bear some level of data integration/conglomeration.
- Some systems the program office owns, others are merely leveraged.
- Physical assets leveraged in the field to identify changes in system health need to deal with nuclear certification (such as iPads, computers, etc.).

Minimum desired technology readiness level (TRL):
TRL7 – Demonstration system operating in operational environment at pre-commercial scale.

Available resources (i.e. Government data, additional money, government equipment, etc.):
The government can provide data, to include systems such as IMDS, D043, D035, ILSS, PADS, MESL, and/or others that may be relevant towards developing a predictive health solution.

Linked ideas (if applicable): N/A

Air Force Nuclear Weapons Center 21.2 Topics

AFNWC Directorate: NM

Topic Title: Radiated Emissions Estimator

Problem Description:
The Air Force desires a technical solution to estimate the radiated emissions of new hardware and support equipment used in close proximity to sensitive Minuteman III ground and missile components for electromagnetic compatibility (EMC) evaluation. In particular, the technical solution would allow engineers to predict maximum radiated emissions of equipment with precision based on readily available hardware parameters.

Currently, engineers calculate the magnitude of electromagnetic fields generated by current loops in new hardware, but this requires extensive engineering information for the hardware. Often, vendors do not provide this information, or it requires significant effort to obtain (e.g. detailed circuit diagrams, current draw in each circuit loop, etc).

As a use-case, the technical solution will allow engineers to estimate a range of possible radiated emissions levels using more-readily available information, such as materials used in the wiring or boards and general equipment configuration (spacing and dimensions). By determining the maximum possible radiated emissions quickly, the engineers will rapidly make assessments on the suitability of candidate hardware solutions for the Minuteman weapon system. Thus, new equipment will deploy to missile wings faster.

Air Force ICBM units will benefit from expedited evaluation of new electrical hardware and support equipment. The 50-year old Minuteman III weapon system is safe, secure, and effective, but it frequently needs replacement hardware and support equipment due to its historic service life. This solution will accelerate deployment of equipment required for high mission availability for the nation's ICBM force.

Summary:
We are seeking a technical solution to accelerate electromagnetic compatibility (EMC) assessment for new hardware and support equipment used in close proximity to sensitive Minuteman III ground and missile components. Proposed solution must comply with Air Force Risk Management Framework guidelines and should allow engineers to quickly predict the maximum possible radiated emissions of candidate equipment based on readily available hardware parameters (i.e. materials, spacing, dimensions, etc.).

Focus Area: Modeling and Simulation

Solution's Limitations and Constraints (i.e. nuclear certification):
The technical solution must be compliant with Air Force Risk Management Framework guidelines; software solutions will require installation on Air Force computer systems.

Minimum desired technology readiness level (TRL):
TRL6 – Prototype system tested in intended environment close to expected performance.

Available resources (i.e. Government data, additional money, government equipment, etc.):
To facilitate the project, the government can provide representative MIL-STD-461 radiated emissions (RE) testing data for sample equipment-under-test, for comparison with the technical solution.

Linked ideas (if applicable): N/A

Air Force Nuclear Weapons Center 21.2 Topics

AFNWC Directorate: NT

Topic Title: Explainable Formal Methods for Field Programmable Gate Arrays (FPGA)

Problem Description:
As weapon-systems grow in complexity, the means to validate the system design grows in complexity as well. FPGAs are used in many existing and future weapon-systems. The ability to evaluate the programming of an FPGA concerning specific desirable and undesirable states and identify any 'common cause' logic responsible for undesirable behavior would be very useful for certification and confidence.

Analysis without validation lacks impact when competing for schedule and budget. Therefore it would be useful to incorporate a closed-loop validation mechanism, where analytical findings for a representative FPGA running the logic under analysis could be automatically validated using hardware-in-the-loop (HIL) testing.

The system must be re-configurable to consider new desirable and undesirable conditions, the output of the system would be a report that identifies the logic identified as most problematic, the results of the HIL testing confirming or disproving the analyses and if possible suggest (and text) alternative logic that preserves the desirable behavior while reducing the opportunity for undesirable behavior.

Summary:
We are in search of a closed-loop validation tool to facilitate the nuclear certification process for FPGAs. Technical solution must be re-configurable to enable hardware-in-the-loop (HIL) testing of a representative FPGA in desirable and undesirable conditions. Ideally, the HIL testing tool would enable users to confirm or disprove analytical results, identify problematic logic, and suggest alternative logic that will preserve desirable behavior while minimizing possibility of undesirable behavior.

Focus Area: Modeling and Simulation

Solution's Limitations and Constraints (i.e. nuclear certification): N/A

Minimum desired technology readiness level (TRL):
TRL1 – Basic research: Principles postulated and observed but no experimental proof available.

Available resources (i.e. Government data, additional money, government equipment, etc.): N/A

Linked ideas (if applicable): N/A

Air Force Nuclear Weapons Center 21.2 Topics

AFNWC Directorate: NX

Topic Title: Aeroacoustics Coupled with Computational Fluid Dynamics (CFD)

Problem Description:
We seek to develop a method to improve the computational speed of solving aeroacoustics codes coupled with CFD that includes rocket motor plume interactions. The problem space should consider missile silo launch, pad launch, and shroud separation with an impulse device. Solutions should focus on improving analytical/computational methods, not computer hardware.

During a missile launch, sound waves generated from the rocket plume can reflect off externals surfaces and reflect back onto the missile body. The reflected sound waves, or aeroacoustics waves, can induce vibrations into components and/or subsystems that can degrade or severely damage them, which can be detrimental to the mission. Desired solutions would numerically predict the aeroacoustics waves, identify the frequency spectrum during a launch, and aid development of proper mitigation procedures.

Summary:
The AFNWC is looking for a method to improve computational speed of solving aeroacoustics codes coupled with CFD models of rocket motor plumes. There is a need to model the aeroacoustics wave behavior and identify the incident frequency spectrum during launch and shroud separation to develop proper mitigation solutions. A point of interest is ignition overpressure (IOP).

Focus Area: Modeling and Simulation

Solution's Limitations and Constraints (i.e. nuclear certification):
This product must meet Air Force and Weapon System environment system and security requirements to include, but not limited to cybersecurity requirements, data format requirements, etc.

Minimum desired technology readiness level (TRL):
TRL5 – Large scale prototype tested in the intended environment.

Available resources (i.e. Government data, additional money, government equipment, etc.):
We have a program manager, an engineer as well as Subject Matter Experts assigned to the focus area that can identify and furnish resources as needed based on the proposed solution on a case-by-case basis.

Linked ideas (if applicable): N/A

Air Force Nuclear Weapons Center 21.2 Topics

AFNWC Directorate: NX

Topic Title: Data Science & Management Solutions for Supply Chain Risk Management (SCRM)

Problem Description:
The Air Force Nuclear Weapons Center (AFNWC) is looking for solutions to develop enterprise-wide capabilities that enable the understanding, development and execution of Digital Engineering practices. This requires the need to develop interconnected solutions that are able to gather significant amounts of data and communicate information across weapon platforms and information systems.

We are interested in developing a digital tool that integrates infrastructure data for supply and maintenance (focused towards the authorization orders and the warfighter) such as SCRM solutions. The proposed software must integrate data, enable data visualization, provide data analytic functions and communicate information among systems with both government and contractor-owned data among different organizations and agencies. These tools would allow users to manipulate data as required to make data-driven decisions based on their role/function across the weapon system.

Summary:
We are interested in a digital tool to integrate infrastructure data for supply and maintenance solutions (such as supply chain risk management). 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.

Focus Area: Data and Analytics

Solution's Limitations and Constraints (i.e. nuclear certification):
This product must meet Air Force and Weapon System environment system and security requirements to include, but not limited to cybersecurity requirements, data format requirements, etc.

Minimum desired technology readiness level (TRL):
TRL5 – Large scale prototype tested in the intended environment.

Available resources (i.e. Government data, additional money, government equipment, etc.):
We have a program manager, an engineer as well as Subject Matter Experts assigned to the focus area that can identify and furnish resources as needed based on the proposed solution on a case-by-case basis.

Linked ideas (if applicable): N/A

Air Force Nuclear Weapons Center 21.2 Topics

AFNWC Directorate: NX

Topic Title: Digital Engineering Technologies

Problem Description:
Digital Engineering is an integrated approach that uses authoritative sources of system data and models as a continuum across disciplines to support lifecycle activities from concept through their disposal. We are pursuing solutions that:

- integrate data, enables data visualization, provides data analytic functions and the ability to communicate information among systems
- provide a hybrid model of code inspection and software check with the combination of automation and targeted human interference
- enhance and improve business functions and processes for program managers
- enable end-to-end weapon system performance modeling/simulation capabilities with the ability to conduct evaluations such as performance data analysis among others
- produce data visualization tools such as dashboards and workflows that facilitate timely and accurate completion of cyber security and nuclear surety activities
- develop M&S capabilities that integrate with AFNWC systems

Summary:
Seeking solutions that integrate data, enables data visualization, provides data analytic functions and the ability to communicate information among systems (both government and contractor owned plus individuals among different organizations).

Focus Area: Data and Analytics

Solution's Limitations and Constraints (i.e. nuclear certification):
This effort must meet safety, security and operation requirements set by weapon system specifications and operational unit's concepts (CONOPS) and instructions.

Minimum desired technology readiness level (TRL):
TRL5 – Large scale prototype tested in the intended environment.

Available resources (i.e. Government data, additional money, government equipment, etc.):
We have a program manager, an engineer as well as Subject Matter Experts assigned to the focus area that can identify and furnish resources as needed based on the proposed solution on a case-by-case basis.

Linked ideas (if applicable): N/A

Air Force Nuclear Weapons Center 21.2 Topics

AFNWC Directorate: NX

Topic Title: Digitization and Management of Authoritative Resources

Problem Description:
We are seeking alternatives to establish digitization and management of authoritative resources. Authoritative resources are a significant factor in the success of developing and integrating tools and infrastructure to facilitate the adoption of Digital Engineering. These efforts require resource models and a general way to provide precise descriptions of how to manage such resources. Digitization also requires that the notion of a document and its elements can be distributed, but still be authoritative. The theme may include published reports, patents and lessons-learned materials. The mechanisms, including distributed versioning and tagging and security levels, need to be specified and be part of the resource model. Tool should allow business rules to be defined around the resource model to establish required and best practices, while maintaining the resource lifecycle.

Some examples may include, but are not limited to:

- Solutions that update information across multiple systems/domains
- Validity check of the analytical information to verify consistency with authoritative truth
- Automated data crawler (machine learning) such as DAEMON
- Query data can be inserted in the new program from source information with source identified

There are many documents developed during the procurement of Air Force systems. They provide technical and operational instructions/policies that evolve throughout time. In some cases, it is difficult to determine which document is the authoritative resource (the most current policy/guide).

Summary:
We are seeking alternatives to establish digitization and management of authoritative resources. These efforts require resource models and a general way to provide precise descriptions of how to manage such resources. Digitization also requires that the notion of a document and its elements can be distributed, but still be authoritative.

Focus Area: Data and Analytics

Solution's Limitations and Constraints (i.e. nuclear certification):
This product must meet Air Force and Weapon System environment system and security requirements to include, but not limited to cybersecurity requirements, data format requirements, etc.

Minimum desired technology readiness level (TRL):
TRL5 – Large scale prototype tested in the intended environment.

Available resources (i.e. Government data, additional money, government equipment, etc.):
We have a program manager, an engineer as well as Subject Matter Experts assigned to the focus area that can identify and furnish resources as needed based on the proposed solution on a case-by-case basis.

Linked ideas (if applicable): N/A

Air Force Nuclear Weapons Center 21.2 Topics

AFNWC Directorate: NX

Topic Title: Innovative Technologies

Problem Description:
The AFNWC is seeking technology opportunities to develop innovative approaches and designs that can be integrated into AFNWC systems.

Examples include an integrated set of in-situ non-destructive testing tools and predictive modeling capabilities to assess the structural integrity of the launch facility (LF) and/or lower launch tube (LLT)

- Modeling, simulation, and analysis (MS&A) tools to aid in static and dynamic structural assessment of LF response to simulated loads
- Tools to facilitate uncertainty analysis, nuclear certification, and design decisions using digital visualization and decision-making applications

Summary:
AFNWC is seeking technology opportunities to develop innovative approaches and designs that can be integrated into AFNWC Systems.

Focus Area: Data and Analytics

Solution's Limitations and Constraints (i.e. nuclear certification):
This effort must meet safety, security and operation requirements set by weapon system specifications and operational unit's concepts (CONOPS) and instructions. Tools used on site at LF must meet electromagnetic compatibility (EMC) requirements. Tools may be used to support nuclear certification.

Minimum desired technology readiness level (TRL):
TRL5 – Large scale prototype tested in the intended environment.

Available resources (i.e. Government data, additional money, government equipment, etc.):
We have a program manager, an engineer as well as Subject Matter Experts assigned to the focus area that can identify and furnish resources as needed based on the proposed solution on a case-by-case basis.

Linked ideas (if applicable): N/A

Air Force Nuclear Weapons Center 21.2 Topics

AFNWC Directorate: NX

Topic Title: Predictive Analytics for Weapon System Product Support

Problem Description:
As the Ground-Based Strategic Deterrent (GBSD) program evolves, we are exploring enterprise data management systems for the government to use such as Teamcenter® and Tableau. These systems will become the foundation and standard for data and configuration management, and are being used and developed under the philosophy of modularity where we can integrate other software like COTS. However, there are DoD and Air Force system requirements that need to be met in order to integrate these COTS software. Meeting these requirements has been a challenge in being able to adapt COTS software into government systems.

Desired technology will adapt commercial off-the-shelf (COTS) predictive analytics software so they can integrate to government data management systems such as Teamcenter® and Tableau among others to achieve Total Asset Visibility (TAV). TAV is the ability to have full visibility on the health of the weapon systems based on part and component historical data (from inception, maintenance and repairs, testing data, etc.) combined with predictive capabilities to ensure the reliability and availability of the systems based on identified trends.

We are mainly interested in a developed and proven technology. However, we are willing to explore and further discuss innovative ideas that may be less mature on a case-by-case basis.

Summary:
The AFNWC is in search of an adapted COTS predictive analytics software solution compatible with enterprise data management systems used by the government (such as Teamcenter® and Tableau). This will become the foundation and standard for data and configuration management to achieve total asset visibility (TAV) - In other words, full awareness of weapon system health based on part and component historical data (production, maintenance, testing, etc.).

Focus Area: Artificial Intelligence and Machine Learning

Solution's Limitations and Constraints (i.e. nuclear certification):
This product must meet Air Force and Weapon System environment system and security requirements to include, but not limited to cybersecurity requirements, data format requirements, etc.

Minimum desired technology readiness level (TRL):
TRL5 – Large scale prototype tested in the intended environment.

Available resources (i.e. Government data, additional money, government equipment, etc.):
We have a program manager, an engineer as well as Subject Matter Experts assigned to the focus area that can identify and furnish resources as needed based on the proposed solution on a case-by-case basis.

Linked ideas (if applicable): N/A

Air Force Nuclear Weapons Center 21.2 Topics

AFNWC Directorate: NX

Topic Title: Unique Item Identifier Compatible Scanners

Problem Description:
We would like to adapt a commercial off the shelf (COTS) scanner to read Unique Item Identifiers (UII) used in Air Force systems. These UIIs are typically 2-D markings such as Quick Response (QR)-Codes located on line-replaceable units (LRU). LRUs are components that are designed to be easily repaired and/or replaced in the field to ensure the system remains operational. The scanner also needs to have the ability to automate data entry and collection from and to the maintenance data collections systems known as the Integrated Maintenance Data System (IMDS) and the standard base supply system (SBSS).

We desire a scanner that is able to comply with weapon system safety and security requirements, as well as comply with DoD and Air Force system requirements. It would need to be able to incorporate security requirements and adapt to changing needs such as cybersecurity and operational security requirements based on the location and manner of use.

Summary:
We are seeking a modified commercial-off-the-shelf (COTS) scanner to read 2-D unique item identifier (UII) markings (such as quick response (QR) codes) located on Air Force line replaceable units (LRU). Desired solution would interface with the Integrated Maintenance Data System (IMDS) and the standard base supply system (SBSS) and automate the data entry and retrieval process. Tool needs to be able to adapt to changing cybersecurity and operational security (OPSEC) needs and comply with the weapon system requirements (e.g. safety, security, electromagnetic compatibility (EMC), etc.).

Focus Area: Maintenance

Solution's Limitations and Constraints (i.e. nuclear certification):
This effort must meet safety, security and operation requirements set by weapon system specifications and operational unit's concepts of operations (CONOPS) and instructions.

Minimum desired technology readiness level (TRL):
TRL5 – Large scale prototype tested in the intended environment.

Available resources (i.e. Government data, additional money, government equipment, etc.):
We have a program manager, an engineer as well as Subject Matter Experts assigned to the focus area that can identify and furnish resources as needed based on the proposed solution on a case-by-case basis.

Linked ideas (if applicable): N/A