

Distribution Statement:

**The Washington Headquarters Services,
Acquisition Directorate
On behalf of the Department of Defense releases the
FY 2019 Rapid Innovation Fund
Broad Agency Announcement**

Announcement Number: HQ0034-19-BAA-RIF-0001

Issue Date: January 14, 2019

Close Date: March 8, 2019

Important

Please assess the entire solicitation carefully prior to any response.

The Rapid Innovation Fund utilizes a two-phase process to solicit offers and select a source for award.

- Phase One – Submission of White Papers
- Phase Two – Submission of Proposals (By Invitation Only)

White Paper Submission: DoD begins accepting white paper submissions 12 February 2019 via the DoD Rapid Innovation Fund Program submission portal located <https://www.dodrif.us>.

Submission Deadline: 15:00 Eastern Standard Time, March 8, 2019

Classified White Papers are not accepted under the DoD Rapid Innovation Fund Program.

Help Desk: questions@dodrif.us

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- 1.0. Executive Summary.** The goal of the Rapid Innovation Fund (RIF) Program is to facilitate the rapid insertion of innovative technologies into military systems or programs that meet critical national security needs. This goal reflects the strategic approach of the National Defense Strategy: building a more lethal force, strengthening alliances, and reforming DoD business processes. The Department of Defense (DoD) seeks mature technologies for final development, testing, evaluation, and integration. Of particular interest are the technology areas identified by the National Defense Strategy: Networked Command Control and Communications, Hypersonics, Space, Cyber, Machine Learning and Artificial Intelligence, Autonomy, Microelectronics, Directed Energy, Quantum Science, and Missile Defense.

Offerors selected for award may receive up to \$3 million in RIF Program funding and will have up to two years to perform the work. There is a source selection preference for technologies from small businesses. There are two phases in the source selection process: 1) White Paper submission and 2) Proposal submission are requested by invitation only. Publication of this announcement does not obligate the DoD to review any white paper submission beyond an initial administrative review, or to award any specific project, or to obligate any available funds.

2.0. General Information

- 2.1. Introduction.** This Broad Agency Announcement (BAA), procurement instrument identification number HQ0034-19-BAA-RIF-0001, constitutes the solicitation of offers for research and development (R&D) for the RIF Program. The RIF Program was enacted by Congress in Section 1073 of the National Defense Authorization Act of Fiscal Year (FY) 2011 to facilitate the rapid insertion of innovative technologies into military systems or programs that meet critical national security needs. The RIF Program was made permanent by the 2017 NDAA.

The goals of the RIF Program reflect the strategic approach of the National Defense Strategy: building a more lethal force, strengthening alliances, and reforming DoD business processes. In meeting critical defense needs the program places emphasis on the engagement of small innovative businesses in solving defense needs. The BAA is to include the validation and transition of innovative technologies developed predominantly by small businesses, to include those from Small Business Innovation Research (SBIR) and DoD reimbursed Independent Research and Development (IR&D). IR&D does not include R&D performed under a grant or contract from the Government. IR&D is defined in Federal Acquisition Regulation (FAR) 31.205-18(a). SBIR and IR&D are examples of technology development efforts that may potentially qualify for the RIF Program.

Offers submitted in response to this BAA should resolve operational challenges or other critical national security R&D needs as characterized by the DoD requirements. The R&D needs are guided by the National Defense Strategy to include: Networked Command Control and Communications, Hypersonics, Space, Cyber, Machine Learning and Artificial Intelligence, Autonomy, Microelectronics, Directed Energy, Quantum Science, and Missile Defense.

DoD organizations participating in the RIF Program BAA may include but are not limited to the Military Services (e.g. Department of Army, Department of the Navy,

Department of the Air Force, Combatant Commands, and Other Defense Agencies such as: Chief Information Officer / Defense Information Systems Agency (CIO / DISA); Combating Terrorism Technical Support Office (CTTSO); Defense Intelligence Agency (DIA); Defense Logistics Agency (DLA); Defense Threat Reduction Agency (DTRA); Joint Improvised-Threat Defeat Office (JIDO); Joint Science and Technology Office for Chemical and Biological Defense (JSTO-CBD); Missile Defense Agency (MDA); National Geospatial Agency (NGA), National Reconnaissance Office (NRO); North American Aerospace Defense Command / United States Northern Command (NORAD / USNORTHCOM); Office of the Assistant Secretary of Defense for Research and Engineering (R&E); United States Africa Command (USAFRICOM), United States Central Command (USCENTCOM), United States Indo-Pacific Command (USINDOPACOM); United States Southern Command (USSOUTHCOM); United States Special Operations Command (USSOCOM); and United States Transportation Command (USTRANSCOM). These organizations are herein referred to as the DoD Components.

- 2.2. Soliciting Agency.** On behalf of the Office of the Secretary of Defense, the soliciting contracting office is: Washington Headquarters Services (WHS) Acquisition Directorate (AD), 1155 Defense Pentagon, Washington, DC 20301-1155.

Table 1: Solicitation Contract Officers

Name	Organization	Role	Email
Sharon Hilton	WHS-AD	Primary Contracting Officer	sharon.a.hilton.civ@mail.mil
Christopher Clarke	WHS-AD	Contract Specialist	christopher.a.clarke22.civ@mail.mil

2.3. Key Dates

Table 2: BAA Key Dates

Event	Date	Time
BAA Release on Federal Business Opportunities (FEDBIZOPPS) located FBO.gov	14 Jan 2019	N/A
Web portal opens for white paper submissions	12 Feb 2019	N/A
BAA Closes for white paper submissions	8 Mar 2019	3:00PM EST

3.0. Eligible Sources

- 3.1. Industry and Academia.** All responsible firms and academic institutions capable of satisfying the Government's needs may submit a white paper under this BAA. Historically Black Colleges and Universities (HBCUs) and Minority Institutions (MIs) are encouraged to submit White Papers and/or participate in teaming arrangements in submitting white papers; however, no portion of this announcement will be set aside for HBCU and MI participation.

- 3.2. Foreign Participants.** Some requirements may cover export-controlled technologies. Research in these areas is limited to “U.S. persons” as defined in the International Traffic in Arms Regulations (ITAR), 22 Code of Federal Regulations (CFR) statute (§) 1201.1.

Foreign participants and/or individuals may participate to the extent that such participants comply with any necessary Non-Disclosure Agreements (NDAs), security regulations, and any other applicable statutes.

- 3.3. Federally Funded Research & Development Centers (FFRDCs).** Federally Funded Research & Development Centers (FFRDCs), including Department of Energy National Laboratories, are not eligible to receive awards under this BAA, although, participation in teaming arrangements with other eligible participants is allowed to the extent that such an arrangement is permitted under the sponsoring agreement between the Government and the FFRDC.
- 3.4. Department of Defense Laboratories.** DoD laboratories are not eligible to receive awards under this BAA and should not submit white papers in response to this BAA. As with FFRDCs, these organizations may participate in teaming arrangements with eligible sources from academia and industry that are submitting offers in response to this BAA.
- 3.5. University Affiliated Research Centers (UARCs).** UARCs are eligible to submit proposals under this BAA unless precluded from doing so by their DoD UARC contracts.
- 3.6. Teaming.** Teams are encouraged to submit proposals in any and all areas. Offerors must be willing to cooperate and exchange software, data and other information in an integrated program with other contractors. To receive small business preference, 51% of the work effort needs to be completed by small business and the prime contractor needs to be a small business.
- 4.0. North American Industry Classification System (NAICS) Code.** The NAICS codes for this announcement are 541715: Research and Development in the Physical, Engineering, and Life Sciences (except Biotechnology), and 541714: Research and Development in Biotechnology. Please review page 34 of the SBA Business Size Standards dated 1 Oct 2017, located <https://www.sba.gov/sites/default/files/2018-07/NAICS%202017%20Table%20of%20Size%20Standards.pdf>. Offerors are only required to have one of the above NAICS codes in order to submit.
- 5.0. System for Award Management (SAM).** All Offerors submitting white papers must have an active registration in SAM at <https://www.sam.gov/portal/public/SAM> prior to the BAA close date.
- 6.0. Award Instrument Types.** In accordance with FAR Part 16, any resultant FAR contract awarded by the Government for the RIF Program shall be offered as a firm-fixed-price contract or a cost-reimbursement type contract. If a proposal for cooperative agreement is selected for award, that award shall be in accordance with DoD Regulation 3210.6-R, Department of Defense Grant and Agreement Regulations. Other Transaction Authority (OTA) contracts will be in accordance with 10 U.S.C 2371. Awards may be made consistent with 10 U.S.C. 2358, 10 U.S.C. 2361, and 10 U.S.C. 2374(a). Determination of contract types and funding arrangements are chosen at the sole-discretion of the Government.
- 6.1. Solicitation Amendments.** Official amendments or links to amendments will be posted to FEDBIZOPPS <https://www.fbo.gov>.

- 6.2. RIF Program Inquiries.** During the BAA open period, Offerors may submit written questions to questions@dodrif.us, Subject: FY2019 RIF Question, or insert [DoD Component / Requirement Number] if the question pertains to a technical requirement. The questioner and respondent shall remain anonymous. All relevant and/or BAA clarification question(s) will be posted as an amendment to this solicitation on FEDBIZOPPS not later than Feb 25, 2019. Offerors are advised to monitor FEDBIZOPPS during the solicitation period for amendments to the solicitation.
- 6.3. DoD Component Inquiries.** Non-technical questions pertaining to a particular DoD Component should be submitted in accordance with Section 13.0 of this solicitation. During the open BAA period Offerors may submit technical questions directly to a specific requirement's Technical Point of Contact (TPOC) via email or contact the TPOC at the phone number provided. Questions to TPOCs should be limited to specific information related to improving the understanding of a particular requirement. Offerors will not request guidance on solution approach and will not submit any material to the TPOC.
- Emails to TPOCs shall utilize the following format within subject lines: FY2019 RIF Question for [Insert DoD Component / Requirement #].
- 6.4. Notifications.** Notification of white paper and proposal selection is not an authorization to begin work.
- 6.4.1. White Papers.** Offerors of white papers submitted in response to this BAA will receive an email message indicating whether or not their white paper was selected for invitation to submit a proposal. Offerors notified that their white paper was selected to receive an invitation to submit a proposal will later receive an email or other written notification from the DoD Component Contracting Officer providing specific instruction formally requesting follow-on submission of the related proposal.
- 6.4.2. Proposals.** Offerors that submit a proposal will receive an email or other written notification if their proposal has been selected for award.
- 6.5. Debriefings.** White papers are not entitled to a debriefing.
- 7.0. Program Funding.** Funds have been appropriated for the RIF Program by the U.S. Congress. Proposals selected for award may receive up to \$3M in RIF Program funding. White papers or proposals submitted for greater than \$3M may be eliminated from further consideration. Awards for greater than \$3M require OUSD(R&E) waiver and congressional notification.
- 8.0. Period of Performance.** The performance period for any contract award shall not exceed 24 months from date of contract award.
- 9.0. Two-Step Solicitation Process**
- 9.1. General Information.** Hard copies of this solicitation will not be issued. The Government reserves the right to fund all, some or none of the proposals in response to this BAA and to create and maintain a reserve list of proposals for potential funding, in the event that sufficient funding becomes available. Funding will not be provided to Offerors for reimbursement of costs incurred to respond to this solicitation. White

papers, technical and cost or price proposals (or any other material) submitted in response to this BAA will not be returned. All submissions will be treated as sensitive competitive information and their contents will be disclosed only to authorized personnel for the purposes of evaluation.

9.2. E-mail Addresses. It is the Offerors' responsibility to ensure: (1) correct e-mail addresses are provided at the time of submission, (2) e-mail notifications reach the intended recipient(s), and (3) the e-mail is not blocked by the use of 'spam blocker' software or other means that the recipient's Internet Service Provider may have implemented as a means to block the receipt of certain e-mail messages.

9.3. Electronic Submissions. White papers for the RIF Program can only be submitted electronically and must be done so by way of the RIF Program submission website at <https://www.dodrif.us>.

A valid white paper submission consists of a 1-page cover sheet, a 3-page technical description (to include cost), and a 1-page quad chart to result in 5 total pages. White paper submissions may not have a combined page count in excess of five pages. The RIF Program submission website will generate a confirmation message indicating a successful submission that the Offeror may save for their records.

White Papers remaining in the system after the due date that have not been finalized will not be evaluated.

9.4. Phase 1: Submission of White Papers. White Papers shall address one of the requirements listed in Section 13.0 of this announcement. Only UNCLASSIFIED white papers will be accepted, and each white paper should focus on only one requirement. There is no limit on the number of white papers an Offeror may submit in response to this BAA.

All white paper submissions must comply with the guidelines and templates provided within this BAA, the DoD RIF Program submission website, and instructions provided by components.

Completed white papers must be successfully entered into the DoD RIF submission website no later than 15:00 EST, March 8, 2019 in order to be considered submitted and there will be no exceptions to this rule. Any modification or revision of a white paper received after the due date and time will be considered "late" and cannot be considered a successfully submitted white paper.

Offerors are encouraged to complete all white paper submissions early to avoid any file transfer delays due to high volume or problems encountered during the course of the submission transfer from the originator's computer server to the DoD RIF Program submission website.

Upon successful completion of a white paper submission, the RIF Program submission website shall provide a printable receipt establishing evidence of the occurrence for which Offerors are encouraged to retrieve and maintain within their records.

Failure to meet these guidelines may result in the rejection of a non-compliant white paper during evaluations.

9.4.1. White Paper Structure

9.4.1.1. Sections. A complete white paper consists of three sections: a cover sheet (section one), a technical description (TD) (section two; to include cost), and a Quad Chart (section three).

9.4.2. Page Count. Page Count. The white paper submission is limited to five pages: 1-page cover sheet, a 3-page technical description (to include cost), and a 1-page quad chart to result in 5 total pages.

9.4.2.1. Section One - Cover Sheet. The cover sheet is generated by the RIF Program submission website for the user to complete online, and must be completed in order for the RIF Program submission website to permit the upload of the associated TD and Quad Chart.

Offerors that intend to submit multiple white papers must prepare a separate cover sheet for each white paper. Offerors are responsible for ensuring that all three sections per white paper have been submitted and accepted by the website.

9.4.2.2. Section Two - TD. TDs shall be prepared outside of the RIF Program submission website, saved in .PDF format, and subsequently uploaded to the RIF Program submission website as an attachment when instructed. A TD should adequately describe the proposed approach and resulting contributions towards providing a solution to the intended requirement.

The TD shall include the following sections in the order given below, as applicable:

9.4.2.2.1. Contribution to the Requirement. Provide a high-level project overview describing in 3-5 sentences how this technological contribution addresses one or more of the goals listed below:

- Enhanced Military or DoD System Capability – Describe how the proposed project significantly increases or improves the military capabilities in relationship to requirements identified in Section 13 and/or acquisition program needs.
- Accelerated Military or DoD System Development Capability – Describe how the proposed project accelerates the development and ability to deploy military or system capabilities required for use by the Department of the Defense.
- Reduces Costs – Describe how the proposed project reduces the development, acquisition, sustainment, demilitarization, or total ownership costs of the identified fielded system or acquisition program.
- Reduce Technical Risks – Describe how the proposed approach can reduce the probability of program failure.
- Improve the timeliness and thoroughness of test and evaluation outcomes – Describe how your innovative technology contributes to improving testing timelines/results.

9.4.2.3. Technical Approach. Describe how the proposed technical approach is innovative, feasible, achievable, complete, and supported by a technical team that has the expertise and experience to accomplish the proposed tasks, including;

- Project objectives and scope;
- Overview of tasks and methods planned to achieve each objective;
- The final product to be delivered;

- Key Personnel (including subcontractors and consultants);
- Facilities/Equipment necessary to carry out the proposed effort;
- Related Prior or Current Work, including SBIR/STTR contracts and IR&D projects.
- The current Technology Readiness Level (TRL) of the technology and/or product and what you think is required in testing by the Government in order for a technology or product to be incorporated into a defense system or military program. DoD seeks an entry TRL of 5 - 6 for RIF Program technologies, and maturation up to a TRL between 7 - 9 at the end of work (for descriptions of TRL, review <http://acqnotes.com/acqnote/tasks/technology-readiness-level>.) In circumstances of exceptional technical merit, proposals with a lower TRL rating will be considered for award, as warranted by the Source Selection Authority.

Discuss the benefits of the product or technology as it applies to the requirement addressed and a feasible plan to transition deliverables to a Government acquisition program, including any restrictions on Government use, release, or disclosure of technical data or computer software presenting transition difficulty and/or increased risk/cost to the Government.

9.4.2.3.1. Schedule. Propose a project schedule and describe how the schedule is achievable for the projected technical approach. Technologies should be accepted for insertion by a military system or defense program within 24 months of contract award, though actual integration and insertion usually occur beyond the two-year RIF performance period. Discuss and/or use a Gantt chart or similar master planning tool to describe:

- Major activities/milestones to include transition and/or deployment events
- Deliverables
- Metrics/measures of success
- Potential risks and risk mitigation plans

9.4.2.3.2. Costs. Name and describe the estimated costs for the proposed technical approach, including:

The methods (e.g., expert judgment, analogous estimating, parametric estimating) used to ensure that the proposed costs are realistic for the technical approach proposed.

Additional funds, if any, expected to complete the project including the timing, source, amount, and planned use of the funds. Describe funding dependencies, if any or known, such as a firm commitment from a government organization, and/or Internal Research and Development, which may be critical to the completion of a task.

9.4.2.4. Text & Font Format. Text shall be at least single-spaced, formatted on 8½ x 11-inch sized paper, with a minimum of one-inch margin all around. Pages shall be numbered consecutively. Font size shall be of minimum 10-point font and preferably Times New Roman. Bolding, underlining, and italics may be used to identify points of emphasis. Graphic presentations, including tables, while not subject to the same font size and spacing requirements, shall have spacing and text that is easily readable.

9.4.2.5. Headers. The Offeror's name and applicable requirement number shall be in the header of each page. The header may be included in the one-inch margins.

9.4.2.6. Section Three – Quad Chart. The unclassified Quad Chart shall be prepared outside of the respective DoD RIF submission website in Landscape orientation and then uploaded to the submission site as an editable PowerPoint attachment. A Quad Chart template can be found at the Federal Business Opportunity website, FY2018 DoD Rapid Innovation Fund (RIF) Broad Agency Announcement, on the right-hand side column, titled "Appendix 1 - Quad Chart Format". The Quad Chart should be formatted as stated and include the following information:

- Heading (Arial 24pt Bold)
 - Title of Project
 - Company
 - Requirement number (#)
- Upper Left Quadrant:
 - Picture or graphic illustrating proposed technology development
- Lower Left Quadrant (Arial 12pt Normal):
 - Project objectives and scope
 - Key personnel, facilities/equipment
 - Related prior or current work
- Upper Right Quadrant (Arial 12pt Normal):
 - How the technology contributes and addresses the requirement
 - How the technology will transition to existing military systems or programs
 - Technical Readiness Level (current level and anticipated level at project completion)
- Lower Right Quadrant: (Arial 12pt Normal):
 - Estimated costs
 - Major activities/milestones to include transition and/or deployment events
 - Deliverables, metrics/measures of success
 - Potential risks

The Government's decision to invite an Offeror to submit a Proposal will be based upon the evaluation results of the White Paper submission. If an Offeror does not submit a White Paper by the specified due date and time, it is not eligible to participate in Step 2 of the solicitation process.

9.4.2.6.1. Virus Check. Perform a virus check before uploading the White Paper. If a virus is detected, it may cause rejection of the file.

Security: Do not lock or encrypt any files uploaded as part of your White Paper submission.

9.5. Phase 2: Submission of Proposals. Proposals are requested by invitation only. The Government will extend invitations for submission of Proposals for those White Paper submissions that merit further consideration. Proposals shall expand on the White Paper submission providing sufficient detail that represents an innovative approach to accelerating the transition of defense-related technologies. Invitations or Requests for Proposals will be sent from respective DoD Component contracting officers to Offerors. The anticipated due date and time for Proposals will be included in the proposal invitation.

Offerors are advised only properly warranted Government contracting officers are legally authorized to contractually bind or otherwise commit the Government. The Government reserves the right to request any additional, necessary documentation once it makes the award instrument determination. Offerors may be removed from award consideration should the parties fail to reach agreement on award terms, conditions and cost/price within a reasonable time, or if the Offeror fails to timely provide requested additional information.

9.5.1. Format of Proposals. Specific DoD Component information for Proposal preparation instructions will be provided with the invitation or request for Proposals. Do not lock or encrypt any files submitted as part of the proposal submission. Perform a virus check before uploading any files to the submission websites. If a virus is detected, it may cause rejection of the file. Proposal prices and terms and conditions shall remain valid for 180 days from the submission date of the Proposal.

10.0. White Paper and Proposal Evaluations

The evaluation process will be conducted using technical subject matter expert reviews as described in FAR 6.102(d)(2) and 35.016. Each White Paper will be evaluated based on the merit and relevance of the specific White Paper as it relates to the evaluation factors stated herein rather than against other White Papers for requirements in the same general area. Each Proposal will be evaluated based on the merit, relevance and cost of the specific Proposal as it relates to the evaluation factors stated herein rather than against other Proposals for requirements in the same general area.

10.1. Evaluation Factors. White Papers and Proposals will be evaluated using adjectival ratings applied to each of the non-price factors:

Factor #1 – Contribution to the Requirement: The degree to which the technical approach is relevant to the proposed requirement.

Factor #2 – Technical Approach/Qualifications: The degree to which the technical approach is innovative, feasible, achievable, complete and supported by a technical team that has the expertise and experience to accomplish the proposed tasks. This includes an evaluation of the probability for transition of this effort into an acquisition program, a military system, or other military capability.

Factor #3 – Schedule: The degree to which the proposed schedule is achievable within 24 months from award.

Factor #4 – Cost Estimating Methods, Risks and Controls: The degree to which the proposed costs are realistic for the technical approach and the methods used to demonstrate the Offeror’s ability to complete the total project for the amount requested are in accordance with the BAA. This includes an evaluation of the potential cost risks and controls used to mitigate those risks.

During evaluations, Factors #1 and #2 are equally important; Factors #3 and #4 are equally important. When considered together, Factors #1 and #2 are significantly more important than Factors #3 and #4.

10.2. Adjectival Ratings. During the evaluation of White Papers and Proposals, the following adjectival ratings will be used for each of the non-price factors. White Papers will receive a “Go” or “No Go” determination as to whether it will receive further consideration. If during any evaluation a factor is deemed “Marginal” or “Unacceptable”, that evaluation will automatically receive a “No Go” determination and will not receive further consideration.

Outstanding (O) – The White Paper/ Proposal meets requirements and indicates an exceptional approach and understanding of the requirements. Strengths far outweigh any weaknesses. The risk of unsuccessful performance is very low.

Good (G) – The White Paper/ Proposal meets requirements and indicates a thorough approach and understanding of the requirements. Strengths outweigh any weaknesses. The risk of unsuccessful performance is low.

Acceptable (A) – The White Paper/ Proposal meets requirements and indicates an adequate approach and understanding of the requirements. Strengths and weaknesses are offsetting or will have little or no impact on contract performance. The risk of unsuccessful performance is no worse than moderate.

Marginal (M) – The White Paper/ Proposal does not clearly meet requirements and has not demonstrated an adequate approach and understanding of the requirements. One or more weaknesses are not offset by strengths. The risk of unsuccessful performance is high.

Unacceptable (U) – The White Paper/ Proposal does not meet requirements and contains one or more deficiencies. The proposal is not awardable.

11.0. Award Information

11.1. Commitment to Small Business. It is the policy of the DoD to provide maximum opportunity to small businesses, including small businesses in all socioeconomic categories to participate in DoD acquisitions. DoD is strongly committed to providing prime and subcontracting opportunities for small businesses, including small businesses in all socioeconomic categories, and, Historically Black Colleges and Universities, and Minority Institutions to support the RIF program.

Selection preference shall be given to small business offers addressing the above evaluation factors. If a small business (prime) proposer is teaming with an other-than-small business on the project, the small business must perform at least 51 percent of the cost of the work.

Awards to other than small business Offerors are allowed but ONLY after the approval authority determines the offer is superior to an offer received from a small business. Offers from an other-than-small business proposer must demonstrate how it intends to provide meaningful small business participation opportunities to support its proposed project (see Section 11.5).

11.2. Basis of Award. The Government intends to make multiple awards resulting from this announcement and reserves the right to select for award any, all, part, or none of the Proposals received. The awards will be made based on the best Proposals that are determined to be most beneficial to the Government with appropriate consideration given to the evaluation factors, order of importance, and selection preferences. Awards will be made to the Offerors whose offer is determined to provide the “best value” to the Government based on the factors/preferences, this may not necessarily be the proposal offering the lowest cost/price or receiving the highest evaluated rating.

11.3. Negotiation and Discussions. Each Component will determine if negotiations or discussions are required.

11.4. DCAA-Approved Accounting System. Offerors selected for a cost-type award must have a Defense Contract Audit Agency (DCAA)-approved accounting system. Guidance is available at <http://www.dcaa.mil>. Offerors are encouraged to obtain DCAA accounting system approval prior to the award timeframe. Lack of a DCAA approved accounting system will delay and possibly prevent a cost-type or any other award. Questions may be addressed to the Component Point of Contact listed in Section 13.0. While a DCAA audit is pending, a Component contracting officer may make a determination that the Offeror’s accounting system is acceptable in accordance with FAR 242.7502 and the clause at FAR 252.242-7006, Accounting System Administration.

11.5. Subcontracting Plans. For Proposals in excess of \$700,000 by other than small businesses, the Offeror is required to submit a Subcontracting Plan in accordance with

FAR 52.219-9. As such, subcontracting plans will be reviewed (and negotiated as necessary) to ensure subcontracting plans are compliant with FAR Subpart 19.7.

- 11.6. Contract Options.** RIF statute encourages the Department use mechanisms to facilitate transition of technology into acquisition programs. Under FAR 52.217-7, 52.217-8, and 52.217.9, contracting offices may include options in RIF contracts for further testing, low rate production, or full rate production of technologies developed under the RIF program. These options can be executed by the cognizant contracting activity beyond the performance period for the RIF deliverables, e.g., beyond the 24-month performance for the baseline RIF contract.
- 11.7. Exemptions from Cost/Pricing Data and Audit and Records Examination.** Pursuant to the January 2018 DFARS Class Deviation (DARS Tracking Number 2018-O0009, Offerors that are small businesses concerns or nontraditional defense contractors may be exempt from providing certified cost or pricing data requirements as specified by Federal Acquisition Regulation (FAR) 15.403-1(b) as well as requirements for audit and records examination under FAR 52.215-2. Notwithstanding these exemptions, the head of the contracting activity may determine that the requirements for the submission of certified cost or pricing data or audit and records examination are required based on the past performance of the specific small business or nontraditional defense contractor, or based on analysis of other information specific to the award. If the HCA makes a determination not to apply the exemption from the audit and records examination requirements, the performance audit shall be initiated within 18 months of the contract completion.
- 12.0. Other Information**
- 12.1. Submission Costs.** The cost of preparing submissions in response to this solicitation is not considered an allowable direct charge to any resulting or any other contract. However, it may be an allowable expense to a normal Bid and Proposal indirect cost as specified in FAR 31.205-18.
- 12.2. Provisions and Clauses.** This BAA lists some provisions and clauses that may be required to be incorporated in resulting contracts. Similar provisions may be included in the terms and conditions of resulting Cooperative Agreements and Other Transactions. Component contracting officers are required to insert applicable provisions and clauses in their invitations for Proposals.

52.252-1 SOLICITATION PROVISIONS INCORPORATED BY REFERENCE (Feb 1998)

This solicitation incorporates one or more solicitation provisions by reference, with the same force and effect as if they were given in full text. Upon request, the contracting officer will make their full text available. The Offeror is cautioned that the listed provisions may include blocks that must be completed by the Offeror and submitted with its quotation or offer. In lieu of submitting the full text of those provisions, the Offeror may identify the provision by paragraph identifier and provide the appropriate

information with its quotation or offer. Also, the full text of a solicitation provision may be accessed electronically at <http://farsite.hill.af.mil>. Note: These provisions do not apply to White Paper submissions, but may be incorporated by the Component contracting offices if Offerors are invited or requested to submit proposals.

52.204-10 – Reporting Executive Compensation and First-Tier Subcontract Awards (Oct 2018)

252.211-7003 – Item Identification and Valuation (Aug 2008)

52.215-22 – Limitations on Pass-Through Charges—Identification of Subcontract Effort (Oct 2009)

52.215-23 – Limitations on Pass-Through Charges (Oct 2009) (ALT I)

52.217-5 – Evaluation of Options (July 1990)

52.217-7 – Option for Increased Quantity -- Separately Priced Line Item (Mar 1989)

52.217-8 – Option to Extend Services (Nov 1999)

52.217-9 – Option to Extend the Term of the Contract (Mar 2000)

52.219-28 – Post-Award Small Business Program Representation (Jul 2013)

52.222-54 – Employment Eligibility Verification (Oct 2015) (This clause will not be include in Cooperative Agreements or Other Transactions)

DFARS:

252.704-7008 Compliance with Safeguarding Covered Defense Information Controls

252.204-7012 – Safeguarding Covered Defense Information and Cyber Incident Reporting (October 2016)

252.227-7013 – Rights in Technical Data--Noncommercial (Feb 2014)

252.227-7014 – Rights in Noncommercial Computer Software and Noncommercial Computer Software Documentation (Feb 2014)

252.227-7015 – Technical Data—Commercial Items (Feb 2014)

252.227-7016 - Rights in Bid or Proposal Information (Jan 2011)

252.227-7017 – Identification and Assertion of Use, Release, or Disclosure Restrictions (Jan 2011)

252.227-7030 - Technical Data--Withholding of Payment (Mar 2000).

252.227-7037 – Validation of Restrictive Markings on Technical Data (Sept 2016)

252.232-7003 – Electronic Submission of Payment Requests and Receiving Reports (Jun 2012)

252.235-7002 – Animal Welfare (Dec 2014)

252.235-7004 – Protection of Human Subjects (Jul 2009)

12.3. BAA-100 Organizational Conflicts of Interest (OCI). The primary purpose of this provision is to aid in ensuring that; the Contractor's objectivity and judgment are not biased because of its present, or currently planned interests (financial, contractual, organizational, or otherwise) which relate to work under a contract; the Contractor does not obtain an unfair competitive advantage by virtue of its access to non-public Government information regarding the Government's program plans and actual or anticipated resources; the Contractor does not obtain any unfair competitive advantage by virtue of its access to proprietary information belonging to others.

12.3.1. Scope. The restrictions described herein shall apply to performance or participation by the Contractor and any of its affiliates or their successors in interest (hereinafter collectively referred to as "Contractor") in the activities covered by this clause as prime contractor, subcontractor, co-sponsor, joint venture, consultant, or in any similar capacity. The term "proprietary information" for the purposes of this clause is any information considered to be so valuable by its owner that it is held in secret by them and their licensees. Information furnished voluntarily by the owner without limitations on its use, or which is available without restrictions from other sources, is not considered proprietary.

12.4. Access To and Use of Government Information. If the Contractor, in the performance of this contract, obtains access to information such as plans, policies, reports, studies, financial plans, or data which has not been released or otherwise made available to the public, the Contractor agrees that without prior written approval of the contracting officer, it shall not: (a) use such information for any private purpose unless the information has been lawfully released or otherwise made available to the public, (b) compete for work based on such information after the completion of this contract, (c) submit an unsolicited proposal to the Government which is based on such information after such information is released, or (d) release such information unless such information has previously been lawfully released or otherwise made available to the public by the Government.

12.4.1. Access to and Protection of Propriety Information. The Contractor agrees that, to the extent it receives or is given access to proprietary data, trade secrets, or other confidential or privileged technical, business, or financial information (hereinafter referred to as "proprietary data") under this contract, it shall treat such information in accordance with any restrictions imposed on such information. The Contractor further agrees to enter into a written agreement for the protection of the proprietary data of others and to exercise diligent effort to protect such proprietary data from unauthorized use or disclosure. In addition, the Contractor shall obtain from each employee who has access to proprietary data under this contract, a written agreement which shall in substance provide that such employee shall not, during his/her employment by the Contractor or thereafter, disclose to others or use for their benefit, proprietary data received in connection with the work under this contract. The Contractor will educate its employees regarding the philosophy of Part 9.505-4 of the Federal Acquisition Regulation so that they will not use or disclose

proprietary information or data generated or acquired in the performance of this contract except as provided herein.

- 12.4.2. Subcontracts.** The Contractor shall include this or substantially the same clause, including this paragraph, in consulting agreements and subcontracts of all tiers. The terms “Contract”, “Contractor”, and “Contracting Officer”, will be appropriately modified to preserve the Government’s rights.
- 12.4.3. Disclosures.** If the Contractor discovers an organizational conflict of interest or potential conflict of interest after award, a prompt and full disclosure shall be made in writing to the contracting officer. This disclosure shall be made on the OCI Analysis/ Disclosure Form provided as an Attachment to this contract, and shall include a description of the action the Contractor has taken or proposes to take in order to avoid or mitigate such conflicts.
- 12.4.4. Remedies and Waiver.** For breach of any of the above restrictions or for non-disclosure or misrepresentation of any relevant facts required to be disclosed concerning this contract, the Government may terminate this contract for default, disqualify the Contractor for subsequent related contractual efforts, and pursue such other remedies as may be permitted by law or the contract. If, however, in compliance with this clause, the Contractor discovers and promptly reports an organizational conflict of interest (or the potential thereof) subsequent to contract award, the contracting officer may terminate this contract for the convenience of the Government if such termination is deemed to be in the best interest of the Government.
- 12.4.5. Modifications.** Prior to contract modification, when the Scope of Work is changed to add new work or the period of performance is significantly increased, the contracting officer may require the Contractor to submit either an organizational conflict of interest disclosure or an update of the previously submitted disclosure or representation.
- 12.5. BAA-200 Export Control.** The International Traffic in Arms Regulations (ITAR), 22 CFR Parts 120 through 130, and the Export Administration Regulations (EAR), 15 CFR Parts 730 through 799, will apply to all projects with military or dual-use applications that develop beyond fundamental research, which is basic and applied research ordinarily published and shared broadly within the scientific community. More information is available at https://www.pmddtc.state.gov/?id=ddtc_kb_article_page&sys_id=24d528fddbf930044f9ff621f961987.
- 12.6. Publication Approval.** Government review and approval will be required prior to any dissemination or publication, except within and between the Contractor and any

subcontractors, of classified and non-fundamental information developed under this contract or contained in the reports to be furnished pursuant to a contract.

- 12.7. Essentially Equivalent Work.** While it is permissible, to submit proposals containing a significant amount of essentially equivalent work for consideration under numerous federal program announcements, it is unlawful to enter into awards requiring essentially equivalent effort. If there is any question concerning this, it must be disclosed to the soliciting agency or agencies before award.

Essentially equivalent work is defined as (1) substantially the same research is proposed for funding in more than one contract proposal or grant application submitted to the same Federal agency; (2) substantially the same research is submitted to two or more different Federal agencies for review and funding consideration; or (3) a specific research objective and the research design for accomplishing an objective are the same or closely related in two or more proposals or awards, regardless of the funding source.

- 12.8. Security Classification.** In order to facilitate intra-program collaboration and technology transfer, the Government will attempt to enable technology developers to work at the unclassified level to the maximum extent possible. If access to classified material will be required at any point during performance, the Offeror must clearly identify such need to the contracting office extending the invitation for proposal.
- 12.9. Recombinant DNA.** All research involving recombinant DNA must include documentation of compliance with Department of Human and Health Services (DHHS) recombinant DNA regulations, and shall comply with the applicable federal and state law, regulation and any additional agency guidance. Research must be approved by an Institutional Biosafety Committee (IBC).
- 12.10. Department of Defense High Performance Computing Program.** The DoD High Performance Computing Program (HPCMP) furnishes the DoD S&T and DT&E communities with use-access to very powerful high-performance computing systems. Awardees may be eligible to use HPCMP assets in support of their funded activities if Program Office approval is obtained and if security/screening requirements are favorably completed. Additional information and an application may be found at <http://www.hpcmo.hpc.mil/>.

12.11. Limitations on Other Transactions.

- 12.11.1. Other Transactions.** Offerors are advised that an Other Transaction (OT) for Prototype Agreement in accordance with 10 U.S.C. § 2371b(d)(1) may only be awarded if:

(A) There is at least one nontraditional defense contractor or nonprofit research institution participating to a significant extent in the prototype project.

(B) All significant participants in the transaction other than the Federal Government are small businesses (including small businesses participating in a program described under section 9 of the Small Business Act (15 U.S.C. 638)) or nontraditional defense contractors.

(C) At least one third of the total cost of the prototype project is to be paid out of funds provided by sources other than other than [1] the Federal Government.

(D) The senior procurement executive for the agency determines in writing that exceptional circumstances justify the use of a transaction that provides for innovative business arrangements or structures that would not be feasible or appropriate under a contract, or would provide an opportunity to expand the defense supply base in a manner that would not be practical or feasible under a contract.

12.11.2. Definitions. For purposes of determining whether or not a participant may be classified as a nontraditional defense contractor and whether or not such participation is determined to be participating to a significant extent in the prototype project, the following definitions are applicable:

- “Nontraditional defense contractor” means an entity that is not currently performing and has not performed, for at least the one-year period preceding the solicitation of sources by the Department of Defense for the procurement or transaction, any contract or subcontract for the Department of Defense that is subject to full coverage under the cost accounting standards prescribed pursuant to [section 1502 of title 41](#) and the regulations implementing such section.
- “Significant Extent” In evaluating the significance of expected NDC/nonprofit research institution participation, pursuant to 10 U.S.C. §2371b(d)(1)(A), the Agreements Officer (AO) is expected to consider input from relevant technical advisors (Legal, Engineering, Program Management, Pricing, Logistics, etc.) in assessing the totality of the circumstances for each proposed prototype project before making an independent judgement as to the significance of expected NDC or nonprofit research institution participation.

The AO should consider, by way of illustration and not limitation, whether the NDC/nonprofit research institution will supply a new key technology, product or process; supply a novel application or approach to an existing technology, product or process; provide a material increase in the performance, efficiency, quality or versatility of a key technology, product or process; accomplish a significant amount of the prototype project; cause a material reduction in the cost or schedule of the prototype project; or, provide for a material increase in performance of the prototype project.

AOs should not establish blanket rules or thresholds for determination of significance, and agencies must not establish local policies which infringe on the AO's judgment in making such determinations. Blanket policies which provide that expected NDC/nonprofit research institution participation must represent a predetermined percentage of total project value, or total labor dollars, etc., to be considered "significant," are arbitrary and infringe upon the Agreement Officers responsibility to make a reasoned, prudent and independent determination for each individual prototype project.

For additional information and guidance please see the Other Transactions Guide at the below link:

[https://www.dau.mil/guidebooks/Shared%20Documents%20HTML/Other%20Transactions%20\(OT\)%20Guide.aspx#toc44](https://www.dau.mil/guidebooks/Shared%20Documents%20HTML/Other%20Transactions%20(OT)%20Guide.aspx#toc44)

12.12. Technical and Administrative Support by Non-Government Personnel. The DoD may use non-government personnel (e.g. contractor support personnel) in the review and administration of offers submitted in response to this BAA. Support contractor employees may have access to offers including information that may be considered proprietary. All contractor support personnel having access to any proprietary data are required to execute nondisclosure agreements certifying that they will not disclose any information pertaining to this solicitation including any offers, the identity of any Offerors, or any other information relative to this BAA. The contracts for provision of support personnel contain Organizational Conflict of Interest clauses and include contractual requirements for non-disclosure of proprietary contractor information.

12.13. Foreign Participants. A foreign participant is any person who is not:

- a citizen or national of the United States; or
- a lawful permanent resident; or
- a protected individual as defined by 8 U.S.C. § 1324b(a)(3).

"Lawful permanent resident" is a person having the status of having been lawfully accorded the privilege of residing permanently in the United States as an immigrant in accordance with the immigration laws and such status not having changed.

"Protected individual" is an alien who is lawfully admitted for permanent residence, is granted the status of an alien lawfully admitted for temporary residence under 8 U.S.C. § 1160(a) or 8 U.S.C. § 1255a(a)(1), is admitted as a refugee under 8 U.S.C. § 1157, or is granted asylum under Section 8 U.S.C. § 1158; but does not include (i) an alien who fails to apply for naturalization within six months of the date the alien first becomes eligible (by virtue of period of lawful permanent residence) to apply for naturalization or, if later, within six months after November 6, 1986, and (ii) an alien who has applied on a timely

basis, but has not been naturalized as a citizen within 2 years after the date of the application, unless the alien can establish that the alien is actively pursuing naturalization, except that time consumed in the Service's processing the application shall not be counted toward the 2-year period.

13.0. Component Instructions and Requirements

13.1. Introduction. Each White Paper submitted may only support a single DoD Component requirement. Submissions addressing more than one requirement at a time will not be accepted.

Each DoD Component's requirements are more fully described in each Component's Annex, as follows:

- Section 14.0: Department of the Army Annex
- Section 15.0: Department of the Navy Annex
- Section 16.0: Department of the Air Force Annex
- Section 17.0: Office of the Secretary of Defense / Defense Agencies Annex

14.0. Department of the Army Annex. The guidance within this section applies to the U.S. Army Only

14.1. Points of Contact. General purpose questions should be addressed to Rob Saunders, 703-697-0502, robert.m.saunders14.civ@mail.mil. Please include the term “U.S. Army RIF technical question” in the subject line.

Technical Point of Contacts (POCs) may be inquired about the requirements they are directly listed below.

14.2. Specific Instructions. Requests for Full Proposals and any resultant contract awards will be by way of direction from the Army Contracting Office. The Army Contracting Office and the BAA issuing contracting office are mutually exclusive.

14.3. Department of the Army FY19 Rapid Innovation Fund Requirements:

Requirement: ARMY-FY19-01-JPEOA&A01

Sponsor: Joint PEO Armaments and Ammunition (JPEO A&A)

Title: Manufacturing Technologies for Extended Range Artillery Propulsion Items

Military System or Acquisition Program Customer: Joint PEO Armaments and Ammunition

Description: JPEO A&A and PM-Combat Ammunition Systems (PM-CAS) are interested in manufacturing technologies to increase the maturity of propelling charges currently in development for extended range artillery ammunition. Specifically, production scale technologies to manufacture long (12” to 24” length), kerfed, solvent process triple base propellant sticks. The goal is to mature manufacturing technologies to Manufacturing Readiness Level (MRL) 6 or higher.

Technical Point of Contact: Rich Cirincione, 973-724-7091, richard.cirincione.civ@mail.mil

Topic Identifier: ARMY-FY19-02-JPEOA&A02

Sponsor: Joint PEO Armaments and Ammunition (JPEO A&A)

Title: Manufacturing Technologies for Extended Range Artillery Propulsion Cases

Military System or Acquisition Program Customer: Joint PEO Armaments and Ammunition

Description: JPEO A&A and PM-Combat Ammunition Systems (PM-CAS) are interested in manufacturing technologies to increase maturity of molding foamed celluloid bead raw material into large cylindrical combustible cases. Specifically, the molded cases are cylinders capped at one end with dimensions of 15.5 cm in diameter and up to 125 cm long with a wall thickness of 3.3 mm, and can be one piece or up to three pieces joined together. The molded cases also include embedded electronic sensors, such as passive RFID tags. The goal is to mature manufacturing technologies to Manufacturing Readiness Level (MRL) 6 or higher.

Technical Point of Contact: Vince Matrisciano, 973-724-2765, vincent.r.matrisciano.civ@mail.mil

Requirement: ARMY-FY19-03-JPEOA&A03

Sponsor: Joint PEO Armaments and Ammunition (JPEO A&A)

Title: Maturation of Advanced Reserve Battery Technology

Military System or Acquisition Program Customer: Joint PEO Armaments and Ammunition

Description: JPEO A&A is interested in increasing the technical and manufacturing maturity of advanced reserve battery technologies currently under development, including but not limited to lithium reserve, super capacitors and energy harvesters. Specifically, these technologies must be manufactured in a form factor of 1 cubic inch or less, have a unit cost of no more than \$25/unit at a yearly quantity of 500,000 units, and have the following performance factors: rise time of 10 ms at 2 mA and 100 ms at 40 mA to a peak power of 4 V minimum, 40 mA, for a duration of at least 100 seconds. It must be capable of surviving gun launch acceleration to 70,000 Gs and operate in the temperature range of -55 degrees C to 125 degrees C.

Technical Point of Contact (TPOC): Vince Matrisciano, 973-724-2765, vincent.r.matrisciano.civ@mail.mil

Requirement: ARMY-FY19-04-PEOAVN01

Sponsor: Army Program Executive Office (PEO), Aviation

Title: Crashworthy Troop Seat and Crew Chief Seat

Military System or Acquisition Customer: Future Vertical Lift (FVL) Project Office (PO) Future Long Range Assault Aircraft (FLRAA)

Description: The FVL platform will require the ability to transport troops and a crew chief in hostile environments that will unfortunately lead to hard landings/crashes. The future soldier along with their basic combat load will weigh more than any soldier in the history of the Army. This weight will introduce greater loads on the aircraft troop seats and crew chief seats and will demand more stringent Requirements on the crashworthiness of these seats. The FVL PO is interested in new designs and technologies that will provide greater crashworthiness protection to the soldier of the future. Proposals should assume a 365 lbs soldier (this includes combat load) and troop seat width should range between 21" and 24". The crew chief seat width should range between 25" and 27". MIL-STD-1290A & MIL-STD-85510 should be used as guidance for crashworthiness Requirements. Proposals can address one seat or both.

Technical Point of Contact (TPOC): Matt Rhodes, 256-313-5543, matthew.t.rhodes8.civ@mail.mil

Requirement: ARMY-FY19-05-PEOAVN02

Sponsor: Army Program Executive Office (PEO), Aviation

Title: Next Generation Rescue Hoist

Military System or Acquisition Customer: Future Vertical Lift (FVL) Project Office (PO) Future Long Range Assault Aircraft (FLRAA)

Description: The Future Vertical Lift Program Office is interested in innovative technologies to develop a rescue hoist that will eliminate uncontrollable oscillations, uncontrollable spinning and lift up to 1,000LB. There have been several catastrophic accidents where the crew chief was not able to control oscillation to the point the cable makes contact with the aircraft resulting in the cable breaking and the load falling. Uncontrolled rotation has also caused injuries and death. Controlling oscillation and rotation would result in a stable hoist that would also make insertion and extraction quicker which lessens the hovering aircrafts exposure to enemy fire. There are also emerging Requirements including 1,000 LB lift capability, self-fault detection, IR lighting, and a readout to the operator of how far the load is from the ground. FVL PO is interested in new designs and technologies to proceed forward with a rescue hoist suitable for MEDEVAC, Special Operations, and Security and Support missions executed using the FLRAA.

Technical Point of Contact (TPOC): Bryce Anderson, 256-313-1544,
paul.b.anderson32.ctr@mail.mil

Requirement: ARMY-FY19-06-PEOAVN03

Sponsor: Army Program Executive Office (PEO), Aviation, Aviation Turbine Engines (ATE) Project Office

Title: A Modular Open System Approach (MOSA) to a Common Distributed Engine Control System (CDECS)

Military System or Acquisition Customer: Army PEO Aviation

Description: The US Army's Aviation Turbine Engine Project Office (ATE PO) desires to evaluate alternatives to traditional engine control systems. Traditional engine controls systems are most often specific to an engine or engine family and uniquely designed to meet a given engine's sensors and effectors while being able to handle the Size, Weight, Power and Cooling (SWAP-C) restrictions of the installed engine. The ATE PO manages several engines from various OEMs, with different designs, different power outputs, and uncommon engine control systems. A common expandable and adaptable distributed engine control system is desired that adheres to the "Major System Component" of the Modular Open System Approach (MOSA) as defined in PLAW 144-328 (DEC. 23, 2016). The Common Distributed Engine Control System (CDECS) shall be capable of installation on and support of the engine control functions of any US Army inventory turboshaft engine. The CDECS shall be a dual-redundant engine control system that can operate as either the primary engine control system or as a backup to an engine's existing analog or digital engine control system. The CDECS shall support a set of common engine sensors interfaces (temperature, pressure, torque, frequency, etc.) and engine control effectors (actuators, torque motors, etc.). The MOSA and distributed hardware architecture shall provide accommodations different size engines and allow for expansion to add sensors to the engine environment when required. The CDECS shall also provide for a processing of controls law, accessory engine function calculation, and health monitoring algorithms in either the distributed nodes or a centralized processing module. The CDECS shall also support the Future Airborne Capability Environment (FACE) and allow for the incorporation of third party software. The data architecture shall be the FACE data architecture.

The CDECS shall operate with 28 VDC power. The CDECS shall operate from -54°C to 250°C. CDECS hardware can be developed in multiple packages to support lower and higher temperatures pending installation locations. The CDECS shall meet Electromagnetic Environment Effects testing IAW MIL-STD-461G. The CDECS shall provide a Time Trigger Ethernet, ARINC-429 (transmit and receive), and Mil-Std-1553 interfaces capable connecting to the air vehicle for control and data traffic exchanges. All CDECS devices and sensors shall be connected to the through FACE conformant Platform Specific Services Segment (PSSS) components and supplied with a FACE conformant data model. Any software components created to meet the Requirements herein shall be individual and granular FACE Units of Conformance (UoCs) to ensure modular upgradeability and replaceability of individual functions with loose coupling to other related functions. Control Laws nor Health Management algorithms need not be developed under this effort only a demonstration of hardware with the supporting software architecture that accepts FACE UoCs. Target applications may include the T700-701D, T55, and future Army Aviation engines including the Improved Turbine Engine.

Threshold outputs would include:

- A demonstrated Distributed Engine Control System architecture running in a Systems Integration Lab or other representative environment.

- A documented software architecture that is FACE conformant with GPR.
- An Interface Control Document of the Distributed Engine Control System, including a well-defined intra-control systems communication format.
- Hardware **Requirement** Specifications to support a Distributed Engine Control System that meets the various environmental conditions of a military turboshaft engine.
- Demonstration of third party FACE application integration.

Objective outputs would include:

- Prototype Distributed Engine Control System hardware that meets the various environmental conditions of a military turboshaft engine.

Technical Point of Contact (TPOC): Matthew Sipe, 256-313-0440, matthew.sipe.civ@mail.mil

Requirement: ARMY-FY19-07-PEOAVN04

Sponsor: Army Program Executive Office (PEO), Aviation, Aviation Turbine Engines (ATE) Project Office

Title: Hybrid Electric Alternatives for Army Aviation Helicopters

Military System or Acquisition Customer: Army PEO Aviation

Description: The US Army's Turbine Engine Project Office (ATE PO) desires to evaluate hybrid electric alternatives to traditional aircraft Auxiliary Power Units (APU). The future of Army Aviation is likely to demand more electrical power resources for continuous needs as well as on-demand services. This power needs to be provide in a more fuel efficient manner and be available during all aircraft operations. These future systems need to support more demands for electric power and ability to convert electrical energy to drive mechanical systems through existing gearboxes. Size, Weight and Power (SWaP) considerations are critical to any aircraft modification or improvement program. SWaP trade spaces need to be well understood to determine the best applications and uses of a hybrid electric APU system.

Threshold outputs:

- Proof of concept power supply system that optimizes performance and SWaP
- Design for energy storage capacity, specific energy, and energy density
- Models for fuel and weight savings
- Design of a hybrid electric APU system utilizing COTS
- Defined architecture and design for integrating into the aircraft
- Thermal and power management designs
- Trade studies and business case analyses for use for proposed system
- Basic system demo with a breadboard design
- Specifications and design documentation for the system and components with GPR

- Transition plan and options for further development and fielding.

Objective outputs:

- Design using engineering solutions for specific aircraft applications
- System demo utilizing multiple aircraft simulated/representative systems and power loads to demonstrate model verification, system performance, and operability
- Modular Open Systems Approach (MOSA) for the architecture.
- FACE UoP for the management system software.
- Sustainability models for use of hybrid system.

Technical Point of Contact (TPOC): Matthew Sipe, 256-313-0440, matthew.sipe.civ@mail.mil

Requirement: ARMY-FY19-08-PEOAVN05

Sponsor: Army Program Executive Office Aviation

Title: Onboard Wind Sensing System

Military System or Acquisition Customer: PEO Aviation – Utility Helicopters

Description: The UH-60M Product Office of the Utility Helicopter Project Office (UHPO) is interested in a light weight onboard wind sensor that can detect wind velocity and direction, and in particular during the landing phase (less than 300 feet AGL and airspeeds less than 65 KIAS). Wind sensor should be able to detect winds at approximately 1000 meters away (or appropriate distance that would give pilots the ability to go-around before committing to landing). Winds detected need to be analyzed (preferably via existing computing systems or in-work technologies such as the Crew Mission Station) and displayed to the pilots showing the computed relative wind speed and alerts to azimuths that could cause directional control loss.

Technical Point of Contact (TPOC): Michael Acosta, (256) 313-3350, michael.j.acosta2.ctr@mail.mil

Requirement: ARMY-FY19-09-PEOAVN06

Sponsor: Army Program Executive Office Aviation

Title: Ballistically Tolerant Fuel Hose

Military System or Acquisition Customer: PEO Aviation – Utility Helicopters

Description: The UH-60M Product Office of the Utility Helicopter Project Office (UHPO) is interested in ballistically-tolerant fuel lines for the UH-60M. The lines shall be self-protecting against 12.7 mm projectiles impacting at 1600 FPS. The minimum bend radius shall not exceed 3.75". The inside diameter (ID) shall be at least 0.75" and the outside diameter (OD) shall not exceed 1.385." This capability will minimize the integration impact of the Improved Turbine Engine (ITE) while supporting system vulnerability Requirements. The technology should provide sufficient flexibility to facilitate ease of installation in a field environment.

Technical Point of Contact (TPOC): Chad Appleton, (256) 955-6883, robert.c.appleton4.civ@mail.mil

Requirement: ARMY-FY19-10-PEOAVN07

Sponsor: PM-UAS/Technical Management Division SFAE-AV-UAS-TM

Title: UAS Vision Based Nav / AITR Combo (Simultaneous Aided Target detection and Imagery based Navigation – SATIN)

Military System or Acquisition Customer: PM-Unmanned Aircraft Systems

Description: While there has been much focus on the use of Artificial Intelligence or Machine Based Learning techniques for semantic scene understanding and object detection for Imagery Analyst, there is a need for Aided Target Detection / Aided Target Recognition (AITD/AITR) to help the UAS operator. In addition, there are ongoing efforts at Motion Imagery processing to support Vision Based Navigation in GPS Denied Environments. Current and Future UAS have Requirements both AITR and operations in Anti-Access Area Denial (A2AD) areas AITR/AITD Requirements include: automated search and detection for military targets of interest, automatic recognition and classification of targets to include military versus civilian vehicles, weapon/no weapon discrimination, and automated target tracking. In addition, there is a critical need to provide UAS operators with Situational Awareness of the ongoing mission such as semantic geo-registration and Structured Observation Management. So there is a critical need for a FACE compliant system that can perform both the AITR mission while supporting processing of sensor data for denied navigation environments, and doing so in

a manner that takes into account flight criticality. The goal for this effort is a system that can combine the best of both worlds into a processing form factor that can fit onto a Class 2 and/or Class 3 Unmanned Air Vehicle.

Technical Point of Contact (TPOC): Kevin Bush, kevin.w.bush8.civ@mail.mil, 256-313-4341

Requirement: ARMY-FY19-11-PEOAVN08

Sponsor: Program Executive Office, Aviation, PM Aviation Systems

Title: 5th Display for Army Helicopter Platforms

Military System or Acquisition Customer: Army, PEO Aviation

Description: The Aviation Systems Project Office is interested in solutions for a 5th display that can be installed in the cockpits across PEO AVN helicopter platforms. The 5th display will have the ability to quickly add commercial and non-commercial software applications that provide pilots with additional information as they perform their missions. Technologies of interest include Common Off-the-Shelf (COTS) ruggedized displays that can meet Army Design Assurance Level (DAL) Level A hardware and software airworthiness Requirements and a modular open systems software architecture that allows the display to be reconfigured by the Army without having to be modified by the vendor.

Technical Point of Contact (TPOC): Jennifer Kerns, 256-876-7856, jennifer.w.kerns.civ@mail.mil

Requirement: ARMY-FY19-12-PEOAVN09

Sponsor: Program Executive Office, Aviation, PM Aviation Systems

Title: Aviation Execution Matrix Creation

Military System or Acquisition Customer: Army, PEO Aviation

Description: During mission planning, aviation units create an execution matrix to aid in ensuring all required tasks are completed. This project will create an execution matrix based on a given AMPS mission plan. The matrix will include general tasks related to selectable mission profiles (movement, assault, attack, etc.). The matrix should also allow for user-entry of tasks. Each task should have a trigger (i.e. timing or location) that will generate a status report message template for pilot confirmation.

Technical Point of Contact (TPOC): John Van Houten (256) 876-6997, john.a.vanhouten2.civ@mail.mil

Requirement: ARMY-FY19-13-PEOC3T01

Sponsor: Army Program Executive Office (PEO) C3T, PM Tactical Radio

Title: Digital RF Link Simulator for Tactical Network Radio Systems

Military System or Acquisition Customer: Army PEO C3T, PM Tactical Radio, CERDEC S&TCD

Description: The Army and PEO C3T is embarking on a tactical radio network modernization strategy that encompasses both military purpose built radio systems as well as leveraging advanced commercially available radio technology. PEO C3T is soliciting proposals to develop a 100+ port digital RF link simulator with rich feature sets which will enable the Army to evaluate performance and scalability of potential radios/waveform networks and technologies for its Network Modernization in a realistic, high fidelity, controlled, and repeatable laboratory environment. It will enable PEO C3T / PM TR / PM TN to support the current accelerated acquisition strategy that requires evaluation of multiple vendor products under identical, repeatable conditions, saving the Army the cost and time required to alternately perform these necessary evaluations in the

field. Digital RF link simulator must emulate realistic channel effects such as path loss, delay, interference, jamming, multipath and Doppler while taking mobility and terrain into account while also supporting testing of directional waveforms. Digital RF link simulator should allow all different possible mesh topologies and latencies ranging to support close ground and distant airborne operations. It must support a wide frequency range, potentially from VHF to 70 GHz to cover for ground tactical radios and emerging millimeter wave technologies. Digital RF simulator must support channel bandwidth ranging from 10 KHz to 250 MHz. For example, it is desired that a digital RF link simulator support full mesh between 64+ SISO radios, 40+ 2x2 MIMO radios, and 25+ 4x4 MIMO radios in frequencies ranging from VHF to S-band. In higher bands, Offerors should highlight what topologies can be supported. Prospective Offerors can propose what can be reasonably supported and highlight the limiting factors. This link simulator must be able to interface with external tools such as matlab to provide channel modeling inputs. Digital RF link simulator must provide visualization and reporting capabilities.

Technical Point of Contact (TPOC): Dr. Akber Qureshi, 443-676-7592, muhammad.a.qureshi5.civ@mail.mil

Requirement: ARMY-FY19-14-PEOC3T02

Sponsor: Army Program Executive Office (PEO) C3T PdM WESS, USARSTRAT

Title: WGS Ka-Band Detection and Geolocation of Interference Signals

Military System or Acquisition Customer: Army PEO C3T, PEO EIS/PdM WESS, USARSTRAT

Description: This effort is to develop and demonstrate a Ka band geolocation capability for Wideband Global System (WGS) satellites. Ka-band WGS is the primary wideband MILSATCOM capability providing BLOS (beyond line of sight) communications between Brigade Combat Teams (BCTs) down to the company level and for reach back communications between the BCT TOC (Tactical Operations Center) and Regional Hub Nodes (RHN)s. The Army is interested in technologies and systems which can 1) quickly detect the presence of interference, 2) report characteristics of the interfering signal(s) and 3) geolocate the interfering signal(s). Key performance parameters for this capability include 1) time to detect, characterize and geolocate interfering signals(s), 2) geolocation accuracy, and 3) the number of interfering signals at the same frequency which can be separately resolved. The Army is interested in solutions which rely on the ability to configure WGS to receive the interfering signals on two or more Ka band antennas. But an ideal solution would not require any special WGS configuration or operation.

Technical Point of Contact (TPOC): Mr. Richard Greel, 443-395-8438, richard.e.greel.civ@mail.mil

Requirement: ARMY-FY19-15-PEOC3T03

Sponsor: Army Program Executive Office (PEO) C3T

Title: Tactical Server Virtualization

Military System or Acquisition Customer: Army PEO C3T, PM Mission Command

Description: Program Executive Office (PEO) Command, Control, Communications Tactical (C3T) is interested in innovative technologies that are able to aide in the instantiation and fault tolerant virtualization technologies in a tactical environment. The technologies shall be able to be used in a command post that has the ability to virtualize a bare bone server stack within one hour. The solution shall be able to automatically install windows server software products and enterprise software products such as e-mail, chat and sharepoint. The solution must be able to scale to support 150 users or more.

Technical Point of Contact (TPOC): Mr. Deepak Bupathi, 443-395-8420, deepak.bupathi.civ@mail.mil

Requirement: ARMY-FY19-16-PEOC3T04

Sponsor: Army Program Executive Office (PEO), PEO C3T, PM MC, PdM JBC-P

Title: Blue Force Tracking (BFT) persistent global coverage with managed access (MA)

Military System or Acquisition Customer: Army PEO C3T, PM MC, PdM JBC-P

Description: Seeking a BFT managed access fielded system that is compatible with the current BFT network, that can be used all over the world, including the north and south poles, that can also be used for satellite redundancy in any area of the world, and that leverages existing government services by DISA to produce a significant cost savings. Currently, BFT coverage capabilities extends from latitudes of -82 to 82 degrees due to the technical and physical attributes of the satellite systems used and that are available in the frequency of interest; in addition, BFT users operating in regions in between (-82 to 82 degrees) not currently in coverage require between 7-10 days for a new beam to be instantiated for their area of operation. Testing and demonstration of the proposed technology shall be required to validate performance and assess true global coverage; in addition, a cost savings analysis of the current vs proposed “managed access” system shall be provided.

Technical Point of Contact (TPOC): Martin Ortiz, 443-395-0971, martin.r.ortiz2.civ@mail.mil

Requirement: ARMY-FY19-17-PEOC3T05

Sponsor: Army Program Executive Office (PEO), PEO C3T, PM MC, PdM JBC-P

Title: Surrogate Blue Force Tracking (BFT) network Mini HUB for Ground/Air Local coverage in denied SATCOM environments

Military System or Acquisition Customer: Army PEO C3T, PM MC, PdM JBC-P

Description: Seeking a surrogate BFT network mini HUB that is easily transportable, is managed in a local area of operations, and is interoperable with BFT-1 and/or BFT-2 network(s). This surrogate BFT network mini HUB shall be compatible with either or both BFT-1 or BFT-2 networks. It shall be managed from the local area of operations or deployment area. The mini HUB can either be located at the ground and provide local LOS communications for BFT or can be used as an Airborne BFT communications systems for BLOS coverage either through Manned or Unmanned Aerial Vehicle (UAV). The BFT Mini HUB shall be managed locally either when used on the ground or via telemetry when used as an Airborne BFT system; BLOS communications can also be provided/performed via an Airborne Relay system. Currently, BFT coverage capabilities extends from latitudes of -82 to 82 degrees due to the technical and physical attributes of the satellite systems used and that are available in the frequency of interest; in addition, BFT users operating in regions in between (-82 to 82 degrees) not currently in coverage require between 7-10 days for a new beam to be instantiated for their area of operation. Proposal shall provide solutions that overcome these physical and logistics limitations. Testing and demonstration of the proposed technology shall be required to validate performance and assess LOS and BLOS coverage. Testing of BFT applications shall be performed and quantified using BFT transceivers, Multi Family of Computer Systems (MFoCS), Joint Battle Command-Platform and Joint Capabilities Release (JCR) applications. An analysis of alternatives shall be presented.

Technical Point of Contact (TPOC): Martin Ortiz, 443-395-0971, martin.r.ortiz2.civ@mail.mil

Requirement: ARMY-FY19-18-PEOCSCSS01

Sponsor: PEO Combat Support & Combat Service Support

Title: High Speed Subsurface Surveillance

Military System or Acquisition Customer: Program Manager Transportation Systems (PM TS), Product Directorate Army Watercraft Systems (PD AWS)

Description: Subsurface surveillance that includes detection of conventional and hybrid threats, Anti-Access/Area Denial (A2/AD) operations, and subsurface threats that include hostile swimmers, mines, man-made obstacles, entanglement devices, and natural obstacles. Functionality is needed at a speed of at least 31 knots and system needs to be compatible with a lightweight high speed naval craft with a beach landing capability. False readings should be minimal and user interface should be straightforward.

Technical Point of Contact (TPOC): Lillian El-Gothamy, 586-282-4313, lillian.l.el-gothamy.civ@mail.mil

Requirement: ARMY-FY19-19-PEOCSCSS02

Sponsor: PEO Combat Support & Combat Service Support

Title: Revise High Hard Steel Specification Military System or Acquisition

Military System or Acquisition Customer: Program Manager Transportation Systems (PM TS), Product Directorate Mine Resistant Armor Protected Vehicle Systems (PD MRAP-VS)

Description: The current MIL-DTL-46100 specification for High Hardness Armor steel clearly dictates required ballistic qualifications, but results in materials completely unsuited to structural application. MIL-DTL-46100 is widely used in Army Tactical Vehicles in core structural applications, rather than as a non-structural appliqué. This material has led to excessive cracking, which leads to non-mission capable (NMC) status and costly inspection and repair activities. Approximate impact to date within PdM MRAP Vehicles alone:

- 100% MaxxPro Dash inner support bracket (2526 population)
- 20% MaxxPro Dash outer support bracket
- 5% MaxxPro floor (2827 Population)
- 25% M-ATV floor and rear wall (5395 population)
- 17 Buffalo Vehicles, several with ~0 miles, complete wash out of hulls due to extensive cracking

The development of a revised specification or grades as a subset to the existing specification has the potential to save millions in life cycle sustainment costs.

“MIL-A-46100 was originally developed as an appliqué armor and was never intended to be used in a welded structural application.” - LAV Armor Plate Study, MTL TR 92-26, 1992

Technical Point of Contact (TPOC): Dave Mrozcka, 586-282-2479, david.j.mrozcka.civ@mail.mil

Requirement: ARMY-FY19-20-PEOCSCSS03

Sponsor: PEO Combat Support & Combat Service Support

Title: Modeling and Simulation of Ballistic Shock Testing on different Armor non homogeneous weld joint geometries

Military System or Acquisition Customer: Army armor customers

Description: Develop a capability of testing same type materials joined by welds configured with unique interlocking ballistic joint geometries and different filler metals to determine which joint geometry performs best to provide the maximum level of strength when tested against ballistic shock test Requirements.

Technical Point of Contact (TPOC): Robert Rappold, 586-282-6279,
robert.c.rappold.civ@mail.mil

Requirement: ARMY-FY19-21-NCFT01

Sponsor: Network Cross Functional Team (N-CFT)

Title: Protected AEHF SATCOM

Military System or Acquisition Customer: Army Program Executive Office (PEO),
Command Control & Communications Tactical (C3T)

Description: Project Manager Tactical Networks (PM TN) is interested in innovative technologies that will enable a transit case based, reduced Size, Weight, and Power (SWaP), protected tactical terminal for Advanced Extremely High Frequency (AEHF) Satellite Communications (SATCOM). Enabling technologies may include Ethernet/Internet Protocol (IP) Interfaces, network monitoring, network traffic management, enhanced and adaptive data rates, software defined components and potential improvements to the ground terminal performance envelope. Additionally, advances in integrated circuit (IC) technology that enable Radio Frequency (RF) transmitters that combine high efficiency with high linearity, such as Efficient, Linearized, All-Silicon Transmitters (ELASTx).

Technical Point of Contact (TPOC): Genie Chaiken, 443-395-8460,
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Requirement: ARMY-FY19-22-NCFT02

Sponsor: Network Cross Functional Team (N-CFT)

Title: Next Generation High Frequency (HF) radio

Military System or Acquisition Customer: Army Program Executive Office (PEO)
Command Control & Communications Tactical (C3T) and CERDEC Space & Terrestrial
Communications Directorate (S&TCD)

Description: Project Manager Tactical Radio (PM TR) and CERDEC S&TCD are interested in revolutionary leaps forward in HF radio technologies as alternatives to traditional voice SATCOM or MUOS capabilities in Electronic Warfare (EW)-contested and non-permissive environments. Enabling technologies should include IP interfaces, beam forming for both ground and sky wave applications, software portable waveforms, and significantly enhanced data rates over current HF technologies. These technologies would be integrated to support both Reconnaissance Surveillance Target Acquisition (RSTA), air assets (helicopter and fixed wing), and Army Special Operations Forces (SOF) mission sets.

Technical Point of Contact (TPOC): Dan Duvak, 443-395-7926,
Daniel.v.duvak.civ@mail.mil

Requirement: ARMY-FY19-23-NCFT03

Sponsor: Network Cross Functional Team (N-CFT)

Title: Airborne Wideband Satellite Communications

Military System or Acquisition Customer: Army Program Executive Offices (PEO),
Aviation and Command Control & Communications Tactical (C3T)

Description: The Aviation and C3T PEOs are interested in innovative technologies to provide increased command and control (C2), situational awareness (SA), and situational understanding (SU) while enroute on rotary wing aircraft. Tactical communications transport methods being considered are wideband satellite communications (WBSATCOM) that integrate into either roll-on/roll-off mission packages or currently fielded mission command and SA systems on board the aircraft. Technologies should include the capability to utilize both commercial and MILSATCOM frequency bands and

be able to work through-the-rotors (TTR). These technologies will be integrated to support the desired capability of Air Mission Command On The Move (AMCTM).

Technical Point of Contact (TPOC): Al Abejon, 253-313-0459,
Alvin.a.abejon.civ@mail.mil

Requirement: ARMY-FY19-24-NCFT04

Sponsor: Network Cross Functional Team (N-CFT)

Title: Cognitive radios in contested environments

Military System or Acquisition Customer: Army Program Executive Office (PEO) Command Control & Communications Tactical (C3T)

Description: Project Manager Tactical Radio (PM TR) is interested in innovative cognitive radios that employ Artificial Intelligence/Machine Learning/Deep Learning (AI/ML/DL) to intelligently sense spectrum, adjust transmit power, and “roam” when in an EW-contested environment with very little user interaction. The technologies should provide a high node density within a small geographic area at the battalion-level and below, support higher bandwidths and mesh capabilities, and be able to be implemented at both the ground and aerial tiers in different form factors. Radios should be resilient to jamming (power nulling) and offer enhanced LPI/LPD characteristics with technologies like Direct Sequence Spread Spectrum (DSSS) with low power Requirements. Proposed systems should be optimized to be simplistic to operate and integrate with current Army SBU tactical networks and EUDs.

Technical Point of Contact (TPOC): Steve Kirchhoff, 703-545-6424,
Stephen.r.kirchhoff.mil@mail.mil

Requirement: ARMY-FY19-25-RIA-JMTC01

Sponsor: Rock Island Arsenal – Joint Manufacturing & Technology Center (RIA-JMTC)

Title: Direct Labor Multiplier

Military System or Acquisition Customer: Army Material Command (AMC)

Description: The RIA-JMTC is interested in innovative technologies to provide decreased time and costs associated with machine maintenance and setups. The technologies should be augmented reality (AR) or virtual reality (VR) in order to visualize machine setups for machine technicians and automated for the locating of machine work instructions and programs. Proposed solutions must analyze Logistics Modernization Program (LMP) data and develop a method to automate pre-production processes. Development of templates for AR/VR content and software training workshops will be key and essential to the lifelong success of the program.

Technical Point of Contact (TPOC): Travis Themas, 309-782-5471,
travis.l.themas.civ@mail.mil

IT PoC: Susan Frembgen, 309-782-7306, susan.f.frembgen.civ@mail.mil

Requirement: ARMY-FY19-26-RIA-JMTC02

Sponsor: Rock Island Arsenal – Joint Manufacturing & Technology Center (RIA-JMTC)

Title: Artificial Intelligence (AI) for Capacity Planning

Military System or Acquisition Customer: Army Material Command (AMC)

Description: The RIA-JMTC is interested in innovative technologies to provide decreased cost and labor needed for process planning and production scheduling of CNC machined parts. The technologies should improve efficiency of process planning activities and improve utilization of RIA-JMTC pool of CNC machines by implementing

advanced scheduling technologies and methodologies. Proposed solutions must demonstrate technologies that semi-automate process planning, schedule optimization and software training workshops on 15-20 most utilized CNC machines at RIA-JMTC.

Technical Point of Contact (TPOC): Michael Nabb, 309-782-5596,
michael.a.nabb.civ@mail.mil

IT PoC: Susan Frembgen, 309-782-7306, susan.f.frembgen.civ@mail.mil

Requirement: ARMY-FY19-27-PEOSLD01

Sponsor: U.S. Army Program Executive Office Soldier (PEO Soldier)

Title: Interactive Sniper Electro-optical Engagement (ISEE) Display

Military System or Acquisition Customer: U.S. Army Program Executive Office Soldier (PEO Soldier), Project Manager Soldier Weapons (PM SW), Product Manager Crew Served Weapons (PdM CSW)

Description: The US Army has a need for an electro-optical display capable of overlaying ballistic calculation information. The device shall have an embedded digital camera that can capture and transmit reconnaissance, surveillance, and target acquisition (RSTA) data. It shall allow for seamless Spotter/Shooter communication that is battlefield network ready. It shall allow for retrofit or easy integration with existing sniper optics. The proposal shall explore and define the optical interface, electronics and display, communication interface, and integration options, while maintaining minimal SWaP. This topic supports the Top 10 OUSD(R&E) technology priority of a fully network command, control and communications.

Technical Point of Contact (TPOC): Marc Dalangin, 973-724-6194,
chester.m.dalangin.civ@mail.mil

Secondary **Technical Point of Contact (TPOC):** Bob Galeazzi, 973-724-6656,
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Requirement: ARMY-FY19-28-PEOSLD02

Sponsor: U.S. Army Program Executive Office Soldier (PEO Soldier)

Title: Advanced Technologies for Soldier Protective Equipment and Environmental Protection

Military System or Acquisition Customer: U.S. Army Program Executive Office Soldier (PEO Soldier), Project Manager Soldier Protection and Individual Equipment (PM SPIE), Technical Management Directorate (TMD)

Description: US Army has a need for advanced materials, processing, and integration technology for lighter weight Soldier equipment to increase Soldier lethality and provide protection from various operational and environmental threats.

Novel fiber based, film, or other advanced materials with improved tenacity, durability and ballistic performance are desired for application in hard armor, soft armor, and helmets. Technology is needed for improved hard armor inserts such as ultra-hard ceramics, advanced alternative materials, or novel integration methods. Advanced manufacturing methods are needed for hard armor and combat helmets to improve ballistic performance and reduce weight. High performance energy absorbing materials are needed for blunt impact protection for head, extremities, etc. Advanced transparent materials with improved scratch resistance and ultrafast transitioning are needed to improve ballistic eyewear. Advanced technologies are needed to provide hearing protection without negatively impacting communication. Environmentally protective materials/systems are needed which provide improved comfort and dexterity for mission execution across a wide spectrum of environments. Thermally protective materials are desired with improved durability, strength, and moisture vapor transport. Advanced

technologies are needed for load bearing equipment to improve Soldier mobility. Breakthrough concealment technologies are needed to include color changing films, fibers, and fabrics that do not emit their own visible wavelength light and are not developed into a final product. Alternative spacial vector protection technologies are needed with increased deterrence, functional time, and low toxicity. Technologies and processes which combine multiple capabilities, reduce weight and/or reduce cost are desired. This topic supports Army Modernization Priority Soldier Lethality.

Technical Point of Contact (TPOC): Chris Baker, 703-704-0417, christopher.r.baker5.civ@mail.mil

Secondary Technical Point of Contacts (PoCs): Antonio Johnson, 703-704-0872, antonio.g.johnson10.ctr@mail.mil; Suzanne Horner, 703-704-0050, susanne.e.horner.civ@mail.mil

Requirement: ARMY-FY19-29-PEOSLD03

Sponsor: U.S. Army Program Executive Office Soldier (PEO Soldier)

Title: Interface Blue Force Tracking (BFT) with Common Missile Warning System

Military System or Acquisition Customer: U.S. Army Program Executive Office Soldier (PEO Soldier), Project Manager Soldier Warrior (PM SWAR), Product Manager Air Warrior (PdM AW)

Description: Army aviation lacks the ability to automatically disseminate threat information upon detection of missile threats to aircraft triggering flare or chaff response. This proposal will specifically address Integrated ASE (iASE) and Digital Interoperability by proposing new connections between the Blue Force Tracking (BFT) system and iASE on the UH-60L Blackhawk helicopter which generates automatic spot reports for hostile fire without a direct electrical interface to the iASE equipment. The intent is to provide the host aircraft commander with threat status of aircraft when chaff or flares are fired by iASE, allowing other aircraft in area to rapidly verify and act on this information and then disseminate threat information to other aircraft and ground assets via BFT. Threats must be communicated and disseminated so appropriate aviation units can take action and counter threats that demonstrate hostile intent or that engage in a hostile act to an air or ground asset. Success is measured by transmission of a spot report to the battlefield commander when chaff or flare is released, and the information is available to the host aircraft commander within thirty seconds of a flare/chaff event. Previous effort by the Navy on the MV-22 Osprey accomplished much of the software modifications to the Interactive Situational Awareness Software (ISAS) common to the UH-60L Blackhawk, but work was terminated due to the Navy and Marine Corp moving all situational awareness development effort to the Joint Global Command and Control System (GCCS-J) Common Operating Picture. By contrast, the Army has elected to continue SA evolution with a next generation version of BFT. This effort would fold in software changes to ISAS with a hardware development effort for a dedicated LRU allowing intercept of chaff/flare signals without direct wire interface and relaying that information to the GPS Message Router (GMR). Software changes to the GMR will be required. This project supports Army Modernization Network, Air and Missile Defense, Soldier lethality; and National Defense Strategy Improve Force Readiness and Lethality. Work on this aircraft platform will migrate to digital aircraft if successful.

Technical Point of Contact (TPOC): Mark Murray, (256) 842 8530, gilbert.l.murray2.civ@mail.mil

Secondary **Technical Point of Contact (TPOC):** Mardie Turnbough, (256) 876-6559, mardenna.l.turnbough.civ@mail.mil

Requirement: ARMY-FY19-30-PEOSLD04

Sponsor: U.S. Army Program Executive Office Soldier (PEO Soldier)

Title: Electronic Textile (E-Textile) Power Delivery System

Military System or Acquisition Customer: Army PEO Soldier / Project Manager Soldier Protection and Individual Equipment (PM SPIE) / Product Manager Soldier Clothing and Individual Equipment (PM SCIE)

Description: PM SCIE is seeking novel solutions to power Soldier carried equipment. The e-textile power delivery systems shall be capable of seamlessly integrating into the Army Combat Pant (ACP) with no adverse effects to the ACP capabilities (Flame Resistance, insect vector control, interoperability, signature management, etc), durability (threshold of 120 days field use and shelf life of 5 years, machine washable/dryable), or comfort. Technology Readiness Level (TRL) 6 prototypes desired by FY20. Prototypes shall be capable of providing enough power to the exoskeleton Bionic Boot, currently in development by Project Manager Soldier Warrior (PM SWAR). Expected power consumption for the Bionic Boots is 50-65 W total, or 25-32 W per boot.

Technical Point of Contact (TPOC): Clay Williamson, 703-805-8517, lannes.c.williamson.civ@mail.mil

Requirement: ARMY-FY19-31-PEOMS01

Sponsor: Army Program Executive Office, Missiles and Space (PEO MS)

Title: Hemispheric Resonating Gyro (HRG) Automated Resonator Balancing Station (ARBS)

Military System or Acquisition Customer: Multiple Launch Rocket System (MLRS) Family of Munitions (MFOM), Precision Fires Rocket and Missile Systems (PFRMS) Project Office (PO)

Description: The PFRMS PO seeks to advance the development of small, low-cost, highly accurate and reliable navigation systems for Long Range Precision Fires (LRPF) applications.

HRG based navigation systems are an attractive solution for systems that require low size, weight, power, and cost (SWaP-C) and high performance. However, a critical step in manufacturing precision HRG resonators is the ability to measure the resonator imbalances due to machining and material imperfections. Updated methods to balance the resonator need to be developed to reduce the time required for balancing over that required using current techniques. State-of-the-art measurement equipment can be implemented to fully characterize the vibrational modes of the resonator and provide the precise measurement required for the balancing process. This methodology is expected to be much faster, more accurate, and more robust than current measurement techniques. The improved system will need to be able to measure resonators with the same or higher degree of accuracy as the existing equipment. Once the measuring system is established, techniques for balancing will be developed which can quickly be transitioned to the production of high performance navigation systems for LRPF applications.

Technical Point of Contact (TPOC): John G. Reynolds, 256-842-7217, john.g.reynolds.civ@mail.mil

Requirement: ARMY-FY19-32-PEOMS02

Sponsor: Army Program Executive Office, Missiles and Space (PEO MS)

Title: Low Cost, Near Infrared (NIR) Camera for Missile Seekers

Military System or Acquisition Customer: Family of Missiles and Rockets, Joint Attack Munition Systems (JAMS) Project Office (PO)

Description: PEO M&S JAMS program office is looking for a lightweight, low cost (i.e., < \$1500 each) complementary metal oxide semi-conductor (CMOS) camera

designed to operate at visual wavelengths to military NIR wavelengths for integration into missile guidance sections for target acquisition and tracking. The sensor and electronics shall perform as a compact camera with the following size, weight, power, and cooling (SWaP-C) Requirements (i.e., electronics size < 1.5"x1.5"x1", weight < 0.5 lb wo/optics, power < 1.5 W, no external cooling required) and can be interfaced with optional optical assemblies for imaging applications. The camera sensor shall have adequate imaging characteristics (e.g., resolution, optical transfer function (OTF), dynamic range, frame rates, quantum efficiency, etc.) to be able to classify and track tank-sized targets in ground clutter at extended missile-to-target ranges in noon sun to moonless starlight environments during missile flight. The sensor and its electronics shall be able to operate in aviation missile environments and be ruggedized to pass MIL-STD-810 qualification tests as part of an overall guidance section design. The camera electronics shall have fast read-out integrated circuit (ROIC) data throughput and shall have input/output (I/O) interface capabilities to the latest generation of signal processing chips. The end product supports the Army's objectives for lethality and long range precision fires as well as reducing overall missile system cost.

Technical Point of Contact (TPOC): Daniel Shady, 256-876-1319,
Daniel.g.shady.civ@mail.mil

Requirement: ARMY-FY19-33-PEOGCS01

Sponsor: Program Executive Office Ground Combat Systems (PEOGCS).

Title: Low cost Embedded Vehicle Prognostics and Instrumentation (EVP&I)

Military System or Acquisition Program Customer: PEOGCS and Product Director Main Battle Tank Systems (Pd MBTS).

Description: Although much has been done in recent years in the area of predictive maintenance and condition based monitoring, there presently is no technology that can accurately predict the time-remaining-to-failure in vehicles and components. Vehicle diagnostic procedures are usually top down, i.e., tests are performed on a given subsystem first and then on selected components to isolate faults. This effort will explore an alternative approach to execute these procedures via pattern recognition and matching. A prognostic capability based on a pattern recognition algorithm with arbitrary programmable tolerances is desired. The ideal solution would require simple instrumentation (pressure, temperature or vibration) allowing the system to create and then search through a data set containing many different patterns, looking for a match with a selected pattern using variable tolerances. The match obtained and the tolerances needed for recognition identify how far the associated subsystem or component has varied from some calibrated setting. This can be a measure of wear or a measure of environmental conditions (i.e., road conditions), or could indicate whether a replacement component has been improperly installed. The desired tool will enable the same diagnostic capability under a wide range of state variables. The desired solution will include a system wide concept as well as "kernels" which could be included in existing subsystems or Line Replaceable Modules (LRMs).

Every mechanical assembly and most electro-mechanical assembly's exhibit wear phenomena that are monotonic. These wear phenomena appear as distinct deformations to whatever pattern the mechanical action produces. Any process that can measure these pattern deformations with arbitrary tolerances can measure the wear state of these assemblies. If the wear state is plotted as a function of time, and then extrapolated to a failure limit, the time-remaining-to-failure can be predicted.

This effort will create a brass board or prototype to demonstrate the ability to identify faults, predict failures, and useful time remaining before failure which would be automatically reported to the vehicle crew and passed up the chain of command. Ideally,

allowing a commander to task organize units and vehicles for missions based on expected time to failure and the risk of failure during mission duration.

Install EVP&I demonstrator in a vehicle or vehicle subsystem to develop patterns and tolerances for at least two of the following vehicle subsystems: Audio based engine listen, LRU current draw profile, vibration profile (tracks and firepower/gun tube) or Drive Train.

Technical Point of Contact (TPOC): Joseph Riolo, (586)-282-3660, joseph.p.riolo.civ@mail.mil

Requirement: ARMY-FY19-34-PEOGCS02

Sponsor: Program Executive Office Ground Combat Systems (PEOGCS)

Title: Predictive Maintenance Toolset

Military System or Acquisition Program Customer: PEOGCS and Product Director Main Battle Tank Systems (Pd MBTS).

Description: The Army seeks to improve equipment availability and fleet readiness across the force by reducing equipment down time as defined by time spent in maintenance or awaiting parts. The substandard equipment readiness experienced by major weapon platforms calls into question Operational Tempo (OPTEMPO), impacts Mean Time Between Failure (MTBF) Rates, effectiveness of existing service schedules, accuracy of supply forecasting, depot production sufficiency, and more.

PEOGCS is seeking a predictive tool incorporating statistically based predictions that will improve equipment readiness and operational availability. To develop this capability, the PEOGCS is interested in a pilot effort focused on M1A1/M1A2 fleet readiness, maintenance, and supply data to establish predictive maintenance capabilities. This pilot shall demonstrate a capability that will improve unit motor pool operations and unit equipment readiness, improve demand planning, and forecasting of repair parts supply. For the purpose of evaluation, a data set will be provided to vendors for the creation of proposals and updated prior to contract award. Further access to data will be established for the duration of the contract. Proposals must demonstrate current and predicted results and outcomes based on data and analysis, and should be accompanied by supporting implementation strategy where applicable.

The Government envisions a notional multi-phase development and evaluation pathway to the solution. White Papers shall baseline the overall effort and approach to verify the prototype solution. Proposals should include: methodology and approach towards conducting the pilot, what data and information is to be used and where it will be sourced from, what analysis will be performed and to what end with as much specificity as possible, areas of prediction and expected answers or outcomes to influence, how validation will occur, and their approach to Army integration of the prototype solution. White Paper submissions shall present an approach that aligns with the proposed solution. The estimated ROM shall be broken out by phase, as the Government initially may fund only the first Phase or it may choose to fund the entire effort. The solution shall be inclusive of all hardware, software, technical documentation and testing required to demonstrate functionality and interoperability of the Predictive Maintenance solution.

Technical Point of Contact (TPOC): Joseph Riolo, (586)-282-3660, Joseph.p.riolo.civ@mail.mil

Requirement: ARMY-FY19-35-PEOGCS03

Sponsor: Army Program Executive Office Ground Combat Systems (PEOGCS)

Title: Affordable 360° Situational Awareness (360 SA) for Ground Combat and Combat Support platforms

Military System or Acquisition Customer: Program Executive Office Ground Combat Systems (PEOGCS), Product Director Main Battle Tank Systems (Pd MBTS).

Description: PEOGCS is interested in innovative approaches that leverage ongoing commercial technology developments which have made daylight and thermal camera technology a near commodity. The result is that vision systems can be made affordable at the platform level (\approx \$20K). The goal is to maintain crew orientation with the area immediately surrounding the vehicle: to include vehicle perimeter security and awareness of any soldiers or dismounts in the immediate danger zone. The ability to zoom in on individual camera views and to overlay both daylight and infrared video in real time is also desired. The 360 SA system should require minimal setup time and enable one crewmember to monitor the entire 360° perimeter from within the vehicle. System function should be easy to learn with the capability for graceful degradation in the face of combat damage. The system should provide mission logging and driver vision improvement to enhance vehicle maneuvering while reducing collisions and rollovers. 3D Vision is also a desirable capability as a response to the recent increase in driving accidents.

The 360 SA capability which provides vehicle operators and crew members with a 360° panoramic view of the area surrounding the vehicle shall also provide persistent 360° situational awareness using scene stitched camera video in a modular and scalable system. The video should combine camera video generated from any combination of fixed or panoramic cameras including both daylight and thermal. In addition the system shall provide selectable road, track and rear views. The system should be hardware agnostic with regard to cameras, processors, and displays. Mature technology solutions are desired that can satisfy this **Requirement** at an affordable platform cost.

Technical Point of Contact (TPOC): Joseph Riolo, (586)-282-3660,
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Requirement: ARMY-FY19-36-DFSC01

Sponsor: Defense Forensic Science Center (DFSC)

Title: Enhanced or Novel Forensic Analysis Methods

Military System or Acquisition Program Customer: Defense Forensic Science Center (DFSC)

Description: Produce novel and practical tools, software, workflows, or platforms that have the potential to advance forensic applications that assist criminal justice and expeditionary missions in support of warfighters. Examples include development of enhanced touch DNA and/or trace chemical sample collection techniques; development of improved tools for examining aged, degraded, or otherwise compromised physical evidence; development of novel bioinformatics platforms for the interpretation of next-generation sequencing data (e.g. probabilistic analysis, stutter characterization); and improved/simultaneous inorganic and organic methods for the extraction, detection, and exploitation of post-blast material in a field environment. Priority consideration will be given to projects that demonstrate potential for increased quality of result and/or decreased time/cost related to the collection, screening, analysis, or interpretation of sexual assault forensic evidence.

Technical Point of Contact (TPOC): Hillary (nee Lathrop) Culbertson, Ph.D,
hillary.h.lathrop.civ@mail.mil, 404-496-7132

Requirement: ARMY-FY19-37-EPG01

Sponsor: United States Army Electronic Proving Ground (EPG)

Title: Modernization of Compact Range Pedestal and Positioning System

Military System or Acquisition Customer: US Army Aviation Aircraft, US Army Ground Vehicles, and US Army Communication Platforms.

Description: It is vital that the Army be able to accurately and expeditiously measure the radiation patterns and gain of antennas mounted on its combat platforms (tactical vehicles, helicopters, missiles, UAVs, etc.). This facility supports all of DoD/services and is critical for ensuring survivability of the platforms against a peer competitor. These Requirements come from several acquisition program executive offices, commands, and R&D organizations.

EPG already possesses a sizeable antenna pattern/gain test setup capable of providing a large, 50 ft. test “quiet” zone (a uniform electromagnetic illumination), but with an outdated less-than-optimal pedestal/positioner system. With the current positioning system, crane services are required which increase complexity of mounting test articles and increase safety risks and test costs. Also with the current pedestal system, man lifts are frequently used while test articles are mounted in place, which incurs additional safety risks that can be avoided with a better positioning and control system. Safety is a key driver and **Requirement** for this investment.

This work will modernize and enhance the Compact Range pedestal and positioner system to improve safety, efficiency, accuracy, and utilization. The test process will be made more efficient and cost effective, which could also improve range utilization and effectiveness for the Army.

The design of the new pedestal and positioning system will satisfy the below Requirements:

- Focused on safety and efficiency for mounting, dismounting, raising, and lowering the potential test articles typically consisting of combat platforms (helicopters, missiles, UAVs, etc.).
- Facilitates loading of test platforms (max 40 tons) at ground level and raising them to the elevated test location (approximately 36 ft.) within the optimum test zone of the Compact Range measurement system.
- Position test articles so that they can be irradiated from 0° to 90° elevation and rotated 360° in azimuth at each elevation. Position control needs to integrate with current data collection software.
- Optimized for antenna pattern and gain measurements as well as radar cross section (RCS) measurements for frequencies covering 6 GHz to 40 GHz.

Technical Point of Contact (TPOC): Mr. Jeffery Massey, 520-533-8170, jeffery.g.massey.civ@mail.mil

Requirement: ARMY-FY19-38-EPG02

Sponsor: United States Army Electronic Proving Ground (EPG)

Title: Complex Threat Environment Simulator (CTES)

Military System or Acquisition Customer: Army T&E

Description: CTES is required to provide testers the capability to reproduce any currently known military threat signal in the HF, VHF, and UHF frequency bands including cellular (CDMA, GSM, TDMA, 3G, 4G, LTE) as well as GPS-specific threats. CTES will provide testers the means to produce and transmit realistic representations of military threat signals that can be used for both laboratory (injected signal) and outdoor testing (over-the-air-transmission). It will allow the tester to select the threat waveform/signal(s) from a comprehensive library of known and regularly updated threats using an intuitive graphical user interface (GUI). The top-level development of the CTES is envisioned as follows:

Phase I: Build a standardized threat signal intelligence library. Includes consistent threat signal descriptions, technical characteristics, and critical parameters based on validated intelligence.

Phase II: Create software to stimulate and control signal generator(s) to allow the replication of the known threat waveform by stimulation of specialized signal generators. This would allow an initial laboratory (developmental test) capability.

Phase III: Establish an over-the-air signal transmission capability for each threat waveform. This involves adding the appropriate vehicle-mounted amplifiers, antenna systems, and other subsystems needed to realistically transmit the threat signal under outdoor (operational test) conditions.

Once established, CTES would provide a critical test capability that will allow testers to ensure military systems are not vulnerable to threat signal exposure.

Technical Point of Contact (TPOC): Mr. Eric Fisher, 520-533-8146, eric.d.fisher.civ@mail.mil

Requirement: ARMY-FY19-39-EPG03

Sponsor: United States Army Electronic Proving Ground (EPG)

Title: Discrete Identification and Rapid Analysis of the Electromagnetic Environment (DIRAEE)

Military System or Acquisition Customer: Army T&E

Description: DIRAEE technology is required to provide testers the capability to listen, record and analyze RF spectrum and its content at prescribed bandwidths during communication, GPS and electronic warfare test events. The Army T&E community tests various RF systems (radios, jammers, and GPS transmitters and receivers) each with their own complex waveforms. When testing such systems, engineers require the proper tools and visualization aids to conduct evaluation and analysis of the system during a test event. With the ever increasing complexity of RF and EW waveforms, the test engineer will require more robust analytics with higher fidelity than what is commonly provided with traditional spectrum analyzers. Test engineers need to be able to reconstruct/deconstruct the RF domain to determine the cause and effect of unexpected results and/or unexpected behavior of the system under test.

To better characterize the local multi-spectral environment and to help determine causality during various RF tests, the DIRAEE will need to be able to receive, record and store digital and analog signals between 300 MHz and 6 GHz and allow the operator to tailor bandwidths. Signals types will range from push-to-talk (HF, VHF, and UHF), varied modulation, frequency hopping, 802.11, 802.16, and cellular (CDMA, GSM, TDMA, 3G, 4G, LTE, etc.). DIRAEE will not only possess amplitude/frequency/phase versus time data, but will also incorporate digital signal processing technologies in order to analyze waveforms and IQ data. The DIRAEE will be required to record (hours TBD) and provide seamless playback of recorded data at full bandwidth.

Technical Point of Contact (TPOC): Mr. Christopher J. Carlson, 520-538-4478, christopher.j.carlson22.civ@mail.mil

Requirement: ARMY-FY19-40-PEOIEWS01

Sponsor: Army Program Executive Office Intelligence, Electronic Warfare & Sensors (PEO IEW&S)

Title: Effective Real-time Video Processing Enhancement Toolset

Military System or Acquisition Customer: PEO IEW&S / PM Terrestrial Sensors / Force Protection Systems

Description: Video Electro Optics and Infrared (EO/IR) sensors are becoming ubiquitous across Army systems and platforms. In addition, quality of video is the most important factor for effective video analytics/computer vision capabilities that are being integrated into Army C2 systems. The majority of the Army's Cross-Functional Teams (CFTs) (i.e. Long Range Precision Fires; Next Generation Combat Vehicle; Future Vertical Lift; and Soldier Lethality) require high quality video. Video enhancement improves the interpretability or perception of information in videos for human viewers and providing better input for automated video analytics and computer vision techniques. The principal objective of video enhancement is to modify attributes of the video to make it more suitable for a given task or a specific user. The quality of video can be less than ideal for a number of reasons including poor or variable lighting, haze, atmospheric turbulence, internal sensor noise, platform vibrations and other degradations, worsened when multiple degradations are present. The intent of this topic is to enhance video before passing it to the user and/or video analytics/computer vision algorithms, which can significantly improve classification, identification and automation. Most enhancement algorithms are designed to operate on still images. Video can provide a rapid stream of images, allowing for temporal analysis to strengthen enhancement, but the software must be efficient to keep up with 30 Hz video (or faster for higher framerates). Video enhancement needs to address not only scintillation and warping but also additional techniques for super resolution, image stabilization, local area contrast enhancement, deblurring, dehazing, and others. The choice of attributes and the video enhancement algorithms used are specific to a given Army objective and can introduce a great deal of subjectivity into the choice of video enhancement methods. The intent of this topic is to develop effective real-time video processing enhancement toolset that can be used across the Army to support various and different user's Requirements.

Technical Point of Contact (TPOC): Clair Guthrie, 703-772-7624, clair.e.guthrie.civ@mail.mil or Dr. Mathew Barr, 703-704-1666, matthew.j.barr3.ctr@mail.mil

Requirement: ARMY-FY19-41-PEOIEWS02

Sponsor: Army Program Executive Office Intelligence, Electronic Warfare & Sensors (PEO IEW&S)

Title: Automated Polygonal 3D Model from LIDAR Point Cloud Software

Military System or Acquisition Customer: PEO IEW&S / PM Terrestrial Sensors / Combat Terrain Information Systems

Description: The US Army needs the capability to generate polygonal 3D models in .obj format from in situ LIDAR data (.xyz or .las) for cross platform visualization and analysis. This effort requires easy to use software interfaces that run on Windows 10 to render stand-off capture terrain data and urban objects for visualization and analysis to support the military decision making process, rehearsal, and training. The capability should be able to handle dense point cloud data (>40M pts), automatically reduce point density to a maximum usable quantity, and render a 3D object in the .obj file format. The solution should be Windows 10 compatible, able to run on a PC or laptop, require less than 10GB of storage space, and provide usable derived products in minutes rather than hours. The solution should not require network resources and should function either stand-alone or as part of a data pre-processing workflow. The solution should be able to utilize LiDAR data collected through COTS sensors and be able to work with commercial software (e.g., Autodesk, Bentley, Trimble...). This capability will support the Soldier Lethality CFT, Synthetic Training Environment CFT as well as the Next Generation Combat Vehicle CFT.

Technical Point of Contact (TPOC): George Ohanian, 703-428-6874,
George.H.Ohanian.civ@mail.mil or Cory Baron, 703-428-6702,
Cory.j.baron2.civ@mail.mil

Requirement: ARMY-FY19-42-PEOIEWS03

Sponsor: Army Program Executive Office Intelligence, Electronic Warfare & Sensors (PEO IEW&S)

Title: Unified Identity Collection and Resolution Software (UICRS)

Military System or Acquisition Customer: PEO IEW&S / Army PM DoD Biometrics

Description: Design concept is to develop a unified collection software platform that is multi operating system and cross-hardware platform compatible. The design concept allows cross-development in Microsoft Windows, Windows Phone, Google Android, Apple iOS, Linux (Generic) with multiple publication points (i.e. Google Play, Apple Store, Yum, APT etc.). The design concept also allows for the integration of deployed and future industry collection capabilities supporting the collection of Finger, Face, Iris, Voice, and other expanded modalities. The design concept further expands the integration of NIST Biometric Web Services (BWS) described in NIST Special Publication 500-288, BIAS which defines a framework to deploy and invoke biometric operations, such as enrolling, identifying (comparing one to many), and verifying (comparing one to one) biometric information over a service-oriented architecture, and the OASIS BIAS TC which has a Simple Object Access Protocol (SOAP) Profile aligning to INCITS 442:2010 – Biometric Identity Assurance Services (BIAS).

Technical Point of Contact (TPOC): William Graves, 703-704-1949,
william.r.graves4.civ@mail.mil

Requirement: ARMY-FY19-43-PEOIEWS04

Sponsor: Army Program Executive Office Intelligence, Electronic Warfare & Sensors (PEO IEW&S)

Title: Advanced Signal Detection and Characterization Utilizing Artificial Intelligence (IL)/Machine Learning (ML)

Military System or Acquisition Customer: PEO IEW&S / PM Electronic Warfare & Cyber

Description: PEO IEW&S is interested in innovative technologies to perform advanced signal detection and characterization of electromagnetic (EM) signals to be utilized in Space Control and other EM spectrum activities. The PM is interested in algorithms that incorporate state-of-art AI and ML processes that can be incorporated into Commercial, Off-The-Shelf (COTS) products. Proposed solutions should utilize a Modular, Open Systems Approach (MOSA) to allow software algorithms and hardware packages to be easily portable to various Army systems. Approaches should address use of neural network design and training processes; use of performance and model monitoring tools; and data analytics for validation and visualization. Preference is for solutions to be agnostic to future systems basing modes to allow rapid capability increase for fielded systems.

Technical Point of Contact (TPOC): Mr. Ivan Franklin, 255-955-3518,
ivan.l.franklin4.civ@mail.mil

Requirement: ARMY-FY19-44-PEOIEWS05

Sponsor: Army Program Executive Office Intelligence, Electronic Warfare & Sensors (PEO IEW&S)

Title: Bridge Military Load Classification (MLC) Calculator

Military System or Acquisition Customer: PEO IEW&S / PM Terrestrial Sensors / Combat Terrain Information Systems

Description: Develop a standardized Windows 10 based calculator, driven by existing U.S. Army, Joint, and NATO defined standard and non-standard bridge types that utilizes commercial of the shelf camera to supports identification and classification of bridge load capability to support military equipment. The US Army needs a MLC capability that leverages a hand held camera in combination or inclusive of a lasers finder to identify and calculate bridge MLC from a minimum distance of 1000 meters. The capability should include the ability to address any type of bridge (regardless of material, length or location) and account for modern bridge building techniques (lighter material and longer spans) used in non-US countries. Proposal should focus on the enhanced and innovative data capture and algorithms that can utilize hand held cameras/lasers or smart device cameras and be capable of running on Windows, iPhone or Android baselines. This capability will support the Soldier Lethality CFT as well as the Next Generation Combat Vehicle CFT.

Technical Point of Contact (TPOC): George Ohanian, 703-428-6874, George.H.Ohanian.civ@mail.mil or Cory Baron, 703-428-6702, Cory.j.baron2.civ@mail.mil

Requirement: ARMY-FY19-45-PEOIEWS06

Sponsor: Army Program Executive Office Intelligence, Electronic Warfare & Sensors (PEO IEW&S)

Title: Multi-Mission UAS Payload and UGV payload

Military System or Acquisition Customer: PEO IEW&S / Maneuver Units, MCoE, Fort Benning, Georgia

Description: UAS Situational Awareness and Counter Explosive capabilities will provide maneuver units with the technology solution to maximize force protection while traversing the battlefield. The NGCV/OMFV will now have a set of tools that increases the probability of detecting explosive hazard threats. The OMFV will have the capability to launch, control, and task multi-purpose Unmanned Aerial Systems (UAS) that can carry modular, adaptive payloads to detect explosive hazards. Employment of robotic systems increases survivability and enables the performance of redundant tasks in order to enhance continuous operations. Improvised explosive devices and landmines will also continue to be an inexpensive and effective weapon against US forces. This capability will support the Next Generation Combat Vehicle CFT as it is listed in the CDD.

Technical Point of Contact (TPOC): LTC David Bretney, 703-704-1970, david.o.bretney.mil@mail.mil, Nick Andreyko, 703-704-3542, Nicholas.m.andreyko.civ@mail.mil

Requirement: ARMY-FY19-46-RDECOM01

Sponsor: Aviation and Missile Research, Development and Engineering Center (AMRDEC)

Title: Advanced Manufacturing Technology for Rocket Nozzle Insulation

Military System or Acquisition Customer: Program Executive Office Missiles and Space (PEO MS), Guided Multiple Launch Rocket System (GMLRS)

Description: The Precision Fires Rocket and Missile Systems Project Office (PO) is interested in advancing the state of the art of manufacturing of rocket nozzle insulation for the GMLRS. Developed technologies should further reduce nozzle material and production cost while demonstrating full chopped square bond in place design. Chopped square production methods provide more options for component design, allowing for

more optimized configurations that enhance performance, production methods and reduce material waste. In addition an emphasis shall be placed on reduction of production lead time while informing nozzle development for future missile systems within PEO MS.

Technical Point of Contact (TPOC): Ms. Cheryl Steely, 256-313-1773, cheryl.r.steely.civ@mail.mil

Requirement: ARMY-FY19-47-RDECOM02

Sponsor: Research, Development and Engineering Command

Title: Cost Effective C4ISR Technologies

Military System or Acquisition Program Customer: PEO IEWS, PEO Soldier, PEO C3T, PEO GCS, PEO Ammunition, PEO CS & CSS

Description: Cost effective, C4ISR technologies in the areas of Sensors, Assured Tactical and Strategic Networks, Position, Navigation and Timing (PNT), Mission Command, Tactical and Deployed Power, Electronic Warfare, Cyber Electro Magnetic Activities, and Intelligence Analysis and Processing.

Technical Point of Contact (TPOC): Richard Nabors, (703)704-1768, richard.a.nabors.civ@mail.mil

Requirement: ARMY-FY19-48-RDECOM03

Sponsor: Aviation and Missile Research, Development, and Engineering Center (AMRDEC)

Title: Physics-Based High Fidelity RF (Radio Frequency) Predictive Tools in EM (Electromagnetics)

Military System or Acquisition Customer: Army PEO Missiles and Space

Description: Army ground-based radars require accurate signatures of emerging threats and electronic attack (EA) patterns in order to develop effective discrimination algorithms and electronic protection (EP) techniques. High fidelity, physics-based, EM predictive tools for the full gamut of radar frequencies are required to meet these needs. The AMRDEC has been supporting the development of such tools that exploit recent advances in numerical modeling. These methods have been demonstrated via comparison with measurement that they are able to provide very accurate RF signature of targets of interest to the Army, as well as electromagnetic field effects on antennas. Further, they have also been shown to have exceptional computational efficiency such that they can be executed on workstation class computers as well as on DoD HPC (high performance computing) assets. However, to provide the most immediate benefit to the Army, these next generation EM computing technologies should: be enhanced with more friendly user interfaces, add RF jammers to its antenna field to fully enable EA/EP capability, and be compared against plume/plasma/hardbody RF signature measurements to validate capability for emerging threats, and add quick input of CAD (computer aided design) geometries for direct access to configuration geometries.

Technical Point of Contact (TPOC): Ed Vaughn, 256-876-3726, milton.e.vaughn.civ@mail.mil

Requirement: ARMY-FY19-49-RDECOM04

Sponsor: Edgewood Chemical Biological Center

Title: Molecularly Controlled Filtration Media from Biorenewable Sources

Military System or Acquisition Customer: Joint Services General Purpose Mask (JSGPM)

Description: Develop a filtration media for the targeted adsorption of chemical threats of interest. The ability to control the molecular makeup of the material to target various

chemical classes (basic gases, acidic gases, chemical warfare agents) within one material is of specific interest. Specifically, mixtures of materials is not of interest. The process for deriving said material should be green and sustainable, preferably from biorenewable sources. Materials should be scaled to at least 1 kg quantities for testing and comparison to current state-of-the-art. Targets of at least 0.10 grams of target chemical per gram of filtration media should be able to be achieved for ammonia, hydrogen sulfide, sulfur dioxide, cyanogen chloride, and sarin. Interested parties must be able to demonstrate or describe how they will be able to scale-up said material beyond kg scale and how the material will be engineered for use as a filtration media.

Technical Point of Contact (TPOC): Dr. Jared DeCoste, 410-417-2815, jared.b.decoste2.civ@mail.mil

Requirement: ARMY-FY19-50-RDECOM05

Sponsor: United States Army Tank Automotive Research, Development and Engineering Center (TARDEC)

Title: Conformable Hydrogen Storage for Military Applications

Military System or Acquisition Program Customer: PEO CSCSS

Description: In order for the Military to take advantage of all the benefits a fuel cell can offer, such as silent power, reduced signatures, and water production, vehicles must be able to carry useful quantities of hydrogen. One approach to achieving higher storage quantities is through Conformable Hydrogen Storage technology. A storage system capable of storing 10kg of hydrogen would provide adequate range for a variety of platforms. The technology should maximize the amount of hydrogen stored in irregular space claims and be configurable to other such space claims. Storage pressure should be 70MPa. Testing of the system should include thermal, burst, cyclic fatigue, and permeation at a minimum. Design should adhere to CSA NVG2 and HGV2 standards.

Technical Point of Contact (TPOC): Kevin Centeck, 586-282-8537, kevin.s.centeck.civ@mail.mil, Ben Paczkowski, 586-282-1695, benjamin.v.paczkowski.civ@mail.mil

Requirement: ARMY-FY19-51-RDECOM06

Title: Compressed Hydrogen Storage Vessel Coating for Increased Survivability

Sponsor: United States Army Tank Automotive Research, Development and Engineering Center (TARDEC)

Military System or Acquisition Program Customer: PEO CSCSS

Description: In order to increase hydrogen tank survivability, there is a desire for a ballistic coating for a hydrogen storage carbon overwrapped pressure vessel (COPV) for use in a militarized hydrogen fuel cell vehicle pressurized to 70MPa. The coating will demonstrate an increased resilience and reduced leakage rate vs a non-coated vessel. Coatings shall be applied to the external overwrap, the liner under the wrap, and potentially replacing the lining if hydrogen permeability is low enough to allow for sustained storage. A lightweight material is desired to maintain the stored energy density, however reducing the chance of a leak after penetration is paramount.

Technical Point of Contact (TPOC): Ben Paczkowski, 586-282-1695, benjamin.v.paczkowski.civ@mail.mil, Kevin Centeck, 586-282-853, kevin.s.centeck.civ@mail.mil,

Requirement: ARMY-FY19-52-RDECOM07

Title: Fuel Cell Mission Extension for Trackless Moving Target - Vehicle

Sponsor: United States Army Tank Automotive Research, Development and Engineering Center (TARDEC)

Military System or Acquisition Program Customer: PEO STRI

Description: To increase the effectiveness and efficiency of training using the existing Trackless Moving Target – Vehicle, a fuel cell solution variant is sought. Augmenting the existing electric platform, currently using batteries, with a fuel cell, will enable longer missions for training, reduce the time to recharge the system, and increase training “up-time”, which increases training efficiencies. Fuel cell system sizing and integration, hydrogen storage and integration, and vehicle demonstration are all requested in this effort.

Technical Point of Contact (TPOC): Kevin Centeck, 586-282-8537, kevin.s.centeck.civ@mail.mil, Jarrod Hoose, 586-282-4671, jarrod.j.oose.civ@mail.mil

Requirement: ARMY-FY19-53-COE01

Sponsor: Engineer Research and Development Center

Title: Military Engineering Technologies in Complex Contested Environments (Army)

Military System or Acquisition Program Customer: PEO CS&CSS, PEO Intelligence Electronic Warfare & Sensors

Description: Develop and demonstrate the ability to project power into a contested theater, with increased protection levels while fighting into/inside complex urban environments. Technologies and products should help planners identify impacts on distributed operations, locate and establish entry points, enable wide area security and Joint Reception, Staging, Onward Movement and Integration of Joint Forces and Supplies, and providing tools for protecting and projecting forces. Force Protection solutions may include hardening of critical assets, passive defense measures suitable for complex environments, protection from and detection of subterranean threats, methods to assess vulnerability-risk, and resource allocation prior to and after deployment. Force Projection solutions may include decision support tools for strategic-level remote engineering assessments of infrastructure; operational-level standoff assessments of infrastructure; technologies for remote monitoring of critical assets; mobility planning in extreme climates and dense urban environments; or terrain surfacing technologies for unmanned aerial systems, airfield landing strips, helicopter landing zones, and for Logistics-over-the-Shore operations.

Technical Point of Contact (TPOC): Pamela Kinnebrew, 601-634-3366, pamela.g.kinnebrew@usace.army.mil

Requirement: ARMY-FY19-54-SMDC01

Sponsor: AMRDEC Energy Laboratory & SMDC HEL Project Office

Title: High Energy Laser (HEL) Hybrid Power System

Military System or Acquisition Customer: U. S. Army Space and Missile Defense Command (SMDC) - Redstone Arsenal, AL

Description: U. S. Army Space and Missile Defense Command (SMDC)’s High Energy Laser project, in partnership with the US Army Aviation and Missile Research, Development, and Engineering Center (AMRDEC) Energy Lab (AEL) is interested in innovative advanced technology and unique approaches to support design, prototype development, test, and evaluation of a Hybrid power solution for the 100kw HEL program. The US Army/SMDC HEL Office intends to adapt smart power solutions, innovative design, and prototype hardware that can be demonstrated and tested within 24 months. This path will support an accelerated fielding of innovative technologies into a Military system. This approach meets the mandatory Joint Capabilities Integration and

Development System (JCIDS) Key Performance Parameter (KPP) for Energy, and will be optimized for efficiency, reliability, and sustainment, while aggressively pursuing technology to provide power at a much lower Space, Weight, and Power (SWAP). The goal of this RIF project is to improve Energy Resiliency/Assurance and improve overall system reliability. Testing of the new prototype power system design will be required to substantiate performance with the proposed HEL systems to determine if it meets Army Requirements as part of a Demonstrate and Validation of a Technology Readiness Level TRL 7 and prototype fielding in 24 months. The AEL is responsible for standardization of hybrid power solutions for current and future military applications for weapon systems and missile platforms. The HEL Hybrid Power System solution task will support AEL and SMDC by delivering a fully functional prototype for the 100KW HEL Program. This effort would include the design and packaging of an innovative hybrid power system consisting of key elements such as Super Capacitors, advanced Batteries designs, and generators (preferably a Commercial or Government Off the Shelf-COTS or GOTS) to support the 100kw HEL. This would allow a future GFE Hybrid power solution to be provided with full TDP to the winner of the future HEL prime contractor competition. The proposed innovative hybrid power systems with key elements described above should be focused on novel utilization of advance fuel efficiency approaches with specific focus on meeting Army Operational Energy Policy and Goals, reduced maintenance hours (improve Mean-Time-Between Failure –MTBD), and improves overall system availability (Ao). The proposed systems should have the following Requirements in mind: Modularity; Multi-fuel capability; Power on self-test capabilities, and possessing run-quiet/Silent Watch attributes. Proposers should address other advancements offered that increase the effectiveness of the Army Energy Assurance/Resilience goals. Proposed technologies and systems should also be mindful of future Requirements surrounding the need for Pre-eminence in Space-Defense and Directed Energy as part of the Top 10 OUSD(R&E) technology priorities.

Technical Point of Contact (TPOC): Larry Phillips, 256-955-9985, Lawrence.s.phillips2.civ@mail.mil & the AMRDEC Energy Lab (AEL) Technical POC: William Nikonchuk, 256-842-3374, William.p.nikonchuk.civ@mail.mil

Requirement: ARMY-FY19-55-USASOC01

Sponsor: US Army Special Operations Command (USASOC)

Title: Structure Occupancy Detector

Military System or Acquisition Customer: US Army Special Operations Command (USASOC)

Description: USASOC is seeking a detector that can determine with high confidence whether structures are occupied or vacant. Detection must be effective through the majority of building materials utilized worldwide to include concrete, cinderblock, wood, drywall, plaster, and earthen structures. Structure thickness up to six inches should not adversely affect detector performance. At a minimum, the system must be capable of determining whether a structure is occupied or vacant, and detection efficiency must not be impacted by body position or physical activity of occupants. Ideal solutions will additionally classify occupants as human versus animal, adult versus child, armed versus unarmed, and will characterize occupants as awake versus asleep (based on respiration rate and/or other physiological signals). The detector must demonstrate a very low false positive rate to ensure that a structure identified as vacant is indeed vacant. Proposed solutions must include a user interface that quickly and accurately presents clear, concise and meaningful data regarding occupancy status of a structure (as well as any occupant classification/characterization, if included) with no downstream analysis or interpretation required of the user. Proposed solutions must be able to differentiate between closely

apposed independent structures. Ideal solutions will additionally localize detections to specific areas within structures. Proposed solutions must be capable of detection at standoff ranges (minimum tens of meters, objective hundreds of meters) and not require physical contact with the structure. The size, weight and power (SWaP) of the detection system must be compatible with a man-portable or small UAS (sUAS)-borne solution. Proposed solutions may utilize multiple distributed sensors, provided that all system components are man-portable or sUAS-compatible.

Technical Point of Contact (TPOC): Dr. Stephanie McElhinny, 919-549-4240,
stephanie.a.mcelhinny.civ@mail.mil

15.0. Department of Navy Annex. The guidance within this section applies to the U.S. Navy Only

15.1. Points of Contact

Name	Organization	Role	Email	Address:
Jeanelle Tortorice	Naval Air Systems Command (NAVAIR)	NAVAIR RIF Program Lead	NAECTO@navy.mil	48150 Shaw Road, Unit 5, Patuxent River, MD 20670-1906
Shadi Azoum	Space and Naval Warfare Systems Command (SPAWAR)	SPAWAR RIF Program Lead	shadi.azoum@navy.mil	4301 Pacific Highway, San Diego, CA 92110
Saber Fatnassi	Marine Corps Systems Command (MCSC)	MCSC RIF Lead Advanced Technology Integrator	saber.fatnassi@usmc.mil	2200 Lester St., Quantico VA 22134
Timothy Petro	Naval Facilities Engineering Command (NAVFAC)	Program Manager – Research and Development	timothy.petro@navy.mil	1100 23 rd Avenue, Port Hueneme, CA 93043
Mark Deebel	Naval Supply Systems Command (NAVSUP)	Program Manager	mark.deebel@navy.mil	5450 Carlisle Pike, Building 309, Mechanicsburg, PA 17055
Mark Hrbacek	Strategic Systems Programs (SSP)	Future Capabilities Manager (SP2024)	mark.hrbacek@ssp.navy.mil	1250 10th Street SE Suite 3600, Washington Navy Yard, DC 20374-5127
Dr. Henry Molintas	Naval Sea Systems Command (NAVSEA)	NAVSEA Chief Technology Office (05T)	henry.molintas@navy.mil	1333 Isaac Hull Ave SE, Washington, DC 20376
CDR Paul Haeurstein	Bureau of Medicine and Surgery (BUMED)	Joint Program Liaison (M21)	paul.g.haeurstein.mil@mail.mil	1564 Freedman Drive, Frederick, MD 21702

15.2. Department of Navy (DoN) Specific Instructions. DoN has eliminated the All-Navy Reduction in Total Ownership Cost (RTOC) topic, however the DoN still maintains a strong interest in technology that improve reliability and operational readiness; that reduce or mitigate system or component obsolescence; that reduce maintenance, manpower and training costs; or that extend service life. All RTOC submissions should be strongly aligned to the National Defense Strategy or a specific Navy System Command (SYSCOM) Commander's Intent within the existing DoN listed RIF BAA topics. RTOC related submissions are expected to have a higher initial TRL and strong acquisition program office interest (and programmed out-year funding for implementation) to be considered for selection.

15.2.1. Duplicate Submissions. While multiple white papers from the same Offeror detailing different technologies will be considered, DoN will only evaluate one paper per Offeror detailing the same technology. Similar submissions from the same Offeror to multiple requirements or SYSCOMs will be combined and reviewed by the organization of the DoN's choosing. Duplicate submissions will be administratively rejected. In addition, DoN will coordinate with OSD RIF on cross-service duplicate submissions.

15.2.2. Technical Inquiries. During the open BAA period, Offerors may submit technical questions regarding specific Navy topic areas directly to the Technical POC (TPOC) listed under each topic. Offerors have an opportunity to ask technical questions only about specific requirements. Questions should be limited to specific information related

to improving the understanding of a particular requirement. Offerors may not ask for advice or guidance on solution approach and may not submit any material to the TPOC. Please note: All questions should be submitted NLT two weeks prior to the white paper submission period deadline. Questions received within the last two weeks of the white paper submission period may not receive a response.

15.2.3. White Paper Clarification Questions. DoN reserves the right ask questions of Offerors when necessary to clarify the white paper submission for evaluation.

15.2.4. Contracts. Separate contracts for the contractor and sub-contractor are strongly discouraged except where required by law, policy or security. In cases where split contracts are approved, the contracts must be awarded simultaneously.

15.2.5. Technology Transition Philosophy. DoN's goal is for acquisition programs to deploy, field, or purchase the product of RIF projects within 12 months of RIF project completion. As such, the DoN seeks at least TRL 5-6 projects with a plan for achieving TRL 8 within 24 months of RIF contract award. DoN project selection is heavily influenced by availability of acquisition program funding and timing for insertion of technologies at the end of the RIF contract, as well as alignment with the National Defense Strategy, OUSD R&E Modernization Priorities and SYSCOM Commanders Intent.

15.3. DoN FY2019 RIF Requirements:

All Naval Programs

Requirement #: FY19-DoN-RIF-ANP-01

Title: Development of Additive Manufacturing (AM) Technology

Military System or Acquisition Program Customer: All Naval Programs

Description: Additive manufacturing has the potential to increase readiness and improve maintenance and sustainment operations through reducing long lead times and eliminating obsolescence related issues. Furthermore, the technology enables improvements to current systems (e.g., light weighting, part count reduction, and increased system performance) through designs that are not possible by conventional manufacturing techniques. However, for the technology to transition from indirect uses to efficiently producing qualified end use parts, several technology barriers need to be overcome as follows:

Non-destructive evaluation techniques need to be developed to allow the inexpensive evaluation of components produced through additive manufacturing. Correlations also need to be drawn between the detected defects and the corresponding material properties of the component.

Large area additive manufacturing techniques need to be developed to allow the benefits of AM to a larger number of components. To date popular AM techniques are either limited in size or require extensive post processing for acceptable surface finishes. Techniques that allow much larger components to be produced with minimal post processing are desired.

A large-scale data storage and management infrastructure that will enable the storage, access and transfer of AM related material property data across multiple Department of Navy entities is needed. This will enable the naval AM community to maintain, manage, and verifiably retrieve the large amounts of material property data and more rapidly produce AM components with confidence in final material properties.

Cybersecurity methodologies are desired that ensure data transferred between naval networks and AM equipment are safe and secure. DON desires methodologies that allow networked AM machine access while ensuring cybersecurity requirements are met. This will necessitate an effort to establish a fully integrated and scalable data architecture, leveraging user authentication and configuration management techniques to ensure data integrity is securely managed in transit and at rest throughout the AM process.

Supporting data access tools are required with analytical capability to optimize selection of viable families of AM candidate parts without requiring the burden of manual item-by-item review. The solution should also include analytical capabilities to effectively manage product technical and logistics information and provide users with substantive assessments on an item's suitability to AM production.

Smart workflow management processing that will assess required production workloads and will optimize and distribute AM jobs. The processing of workloads will leverage smartgrid technologies to assess and distribute desired workloads based on user defined criteria such as priority, materials, and urgency.

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SPAWAR

Requirement #: FY19-DoN-RIF-SPAWAR-01

Title: Naval Message Mining for Predictive Analytics

Military System or Acquisition Program Customer: Command and Control Office Information Exchange (C2OIX)

Description: There are hundreds of Operational Naval message types within the C2 Portfolio that are a rich source of data, which if properly ingested, would provide qualitative information to support the future architecture of the tactical Information Exchange architecture. CASREP is a message type that can be analyzed to reduce duration of in-service or maintenance of essential equipment by developing learning techniques, information retrieval, automatic concept mapping, etc. Another message type of interest is COMSPOT which is used to report actual or forecast outage. Data mining techniques can predict future outage or enhance resource allocation and scheduling. From the massive data store of C2OIX, we want to learn about fleet readiness and, better yet, to predict schedule and performance for the future readiness. Data preparation and data governance is needed for initial setup and ongoing operation.

Technical POC: Assistant PEO S&T, Raphael Pei, raphael.pei@navy.mil, (619) 524-4536

Requirement #: FY19-DoN-RIF-SPAWAR-02

Title: Cybersecurity Data Framework

Military System or Acquisition Program Customer: Information Assurance Cyber Security Program Office (PEO C4I/PMW 130), Cybersecurity Portfolio which includes Programs and Projects.

Description: Organization of cybersecurity data for reuse and validation of analytic tools to ensure analytic results are correct and accurate. A cybersecurity data architecture, framework, and governance that addresses ingestion of various types of data - raw sensors, alarms, events, logs, and other disparate data; provide a mechanism of data organization - tagging, indexing, and classifying; and ability to translate from machine to machine and machine to human; and allow for reuse of data for various cybersecurity analysis.

Technical Point of Contact(s): Assistant PEO S&T, Raphael Pei, raphael.pei@navy.mil, (619) 524-4536

Requirement #: FY19-DoN-RIF-SPAWAR-03

Title: Federated Real-Time Collaboration

Military System or Acquisition Program Customer: Command & Control Program Office (PMW 150), Maritime Command and Control Portfolio which includes Programs and Projects.

Description: The current Operational Transform (OT) algorithms in Navy Wave are heavily optimized for the original mission workflows, focused on intra-ship collaboration. Collaboration workflows require multiple ships and shore collaborators, each with their own servers. These servers need to be able to communicate with each other. Additionally, when multiple sites are collaborating, and certain sites are disconnected, the remaining sites should still be able to collaborate.

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Requirement #: FY19-DoN-RIF-SPAWAR-04

Title: Replication and Synchronization

Military System or Acquisition Program Customer: Distributed Common Ground System – Navy (DCGS-N).

Description: The Navy is interested in innovative approaches to synchronize enterprise cloud data for the Distributed Common Ground System – Navy (DCGS-N). Navy AFLOAT tactical networks may experience low bandwidth, disruption, intermittency, and high latency characteristics. There may also be long periods of time when connectivity is minimal between AFLOAT and shore-based cloud networks during operations in isolated, contested, and congested transport environments. Replication will keep AFLOAT units' DCGS-N Inc 2 data synchronized with shore-based cloud data during normal connected operations as well as during Denied - Disrupted/Disconnected, Intermittent, Low-bandwidth (D-DIL) operating conditions. Synchronization will minimize bandwidth concerns and constraints for AFLOAT units during operations in D-DIL conditions and should systematically prioritize what data types need updating and in what order. Replication and Synchronization should only update the delta between the current AFLOAT database and what is available from the shore-based cloud. Proposed solutions should be able to use multiple network paths of potentially different characteristics (in terms of latency, bandwidth, packet loss, and reliability) to complete the synchronization. The Replication and Synchronization solution will allow Navy AFLOAT DCGS-N Inc 2 systems, combat systems and combat support systems to support Warfighters in any and all conditions with the most current and accurate data.

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Requirement #: FY19-DoN-SPAWAR-05

Title: Assured Communications for Cross-Domain Networking

Military System or Acquisition Program Customer: Joint Capability Technology Demonstration (JCTD-Under C-WOLF) Antenna Improvements, Advanced High-Rate (AdvHDR) Satellite Communications.

Description: The Unclassified Summary of the 2018 National Defense Strategy (NDS) states that “we cannot expect success fighting tomorrow’s conflicts with yesterday’s weapons or equipment.” To address the scope of our competitor’s ambitions, the DoD

must invest in the modernization of key capabilities, to include C4ISR. C4ISR investments will “prioritize developing resilient, survivable, federated networks and information ecosystems.”

In line with this guidance, the PEO C4I Assured Command and Control (AC2) acquisition gap includes providing our naval commanders with a more robust, protected, resilient, and reliable information infrastructure to enable uninterrupted worldwide communication. The PEO C4I Undersea Networking (UN) focus area includes the ability to provide survivable and effective asymmetric advantages through enhancements in communications, unmanned operations, and the use of distributed systems to conduct Undersea Warfare (USW) missions.

White papers should focus on a technical method, components, modules, or configurations that advance, improve, or enhance any or any combination of the following capabilities:

Reliable Communications Across the Air-Water Interface— This technology would provide reliable communication methods across the air-water interface, to include the development of hardware or communication modes that could include improved free space optical components and time-sensitive communications with other fleet platforms. It would include capabilities that offer improved manufacturing or reduced Size, Weight, Power, Cost (SWAP-C) and increased power efficiency of current optical communications designs (blue-green lasers) used on or in conjunction with unmanned aerial vehicles, manned aircraft, and unmanned undersea vehicles.

Reliable Optical Communications Components for Distributed Systems—This technology would allow distributed systems through water or across the air-water interface to conduct USW missions by leveraging improved architecture and physical components for reliable communications. Capabilities desired include improvements to current components [blue-green lasers, blue-green optical filters, optical detectors, modems, etc.] for optical communications to enhance connectivity across a cross-domain and cross-platform communications network. This may include new efficiencies in the manufacturing process or new ruggedized packages, as well as reduced SWAP-C and increased power efficiency for current designs.

Improve RF Data Transmission and Dissemination—This technology would provide improvements to RF beyond line of sight (BLOS) military communication capabilities, such as those provided by the Mobile User Objective System (MUOS). Military BLOS RF communications for unmanned systems is an enabling capability for undersea connectivity. However, certain size, weight, and power (SWaP) and security concerns present significant challenges for unmanned military BLOS communications. Capabilities desired include an interoperable small form-factor radio that may be used onboard unmanned/ unattended systems. Interoperability is desired between the small form-factor radio and the MUOS ground stations, as well as with radios built by different manufacturers, using waveforms acceptable to transmit classified data. A solution could also include Type One NSA certified cryptography embedded within the radio. Solutions should also consider the impact that the sea surface environment may have on RF transmissions. The RF transmit power and receive sensitivity of the small form-factor radio will need to be sufficient to close the link using a compact UUV antenna located at or near the seawater surface.

Reliable HEMP Protection—This technology would provide enhanced High Altitude Electromagnetic Pulse (HEMP) protection to systems connected to fiber optic paths. Solutions should provide reduced size, weight, power, and cost (SWAP-C), as well as components that optimize noise performance of optical links.

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Requirement #: FY19-DoN-RIF-SPAWAR-06

Title: Resilient Communication to enable Assured Command and Control

Military System or Acquisition Program Customer: Automated Digital Network System (ADNS), Command and Control Processor (C2P), Commercial Broadband SATCOM Program (CBSP), Consolidated Afloat Networks and Enterprise Services (CANES), Digital Modular Radio (DRM), Navy Multi-band Terminal (NMT), and Tactical Mobile (TacMobile)

Description: Resilient Communication (RC) focus area is central to the Assured Command and Control (AC2) framework. The objective for AC is to enable certainty of priority electronic transmissions when needed by the strategic, operational, and tactical force. Transport (stealth, waveforms, bandwidth efficiencies, and algorithms), network (gateway access, enclave access, security, analytics) and data (transfer and dissemination) are the general elements that will enable RC.

Communications Technology:

- Data Link Waveforms - All military C3 systems use standardized TDL to transmit, relay and receive tactical data, and require improved Low Probability of Detection (LPD), Low Probability of Intercept (LPI), and Low Probability of Exploitation (LPE).
- Bandwidth Efficient and Resilient Communications System - Develop new communications technologies (e.g. adaptive coding, dynamic resource allocation, radio aware routing, protected waveforms, interference excision, micro form factor development for an RC2 modem/radio [less than 5lbs.]) to yield the best combination of higher user data throughput, spectral efficiency, communications resiliency, and ease of integration with Automated Digital Network System.

Information Technology (Network):

- Optimization of Radio Routing Interface - Develop technologies to optimize the radio-router interface that allows dynamic routing strategies based on changing link status. Load distribution/flow control/dynamic Quality of Service (QoS) between WAN gateway (such as ADNS and SATCOM) functionality needs to be optimized due to ever increasing data rates and the asymmetric nature among data links. This technology will allow deeper levels of integration between the router and radio to maximize data throughput, link efficiency and thus facilitating mission completion.
- Sustainable/Adaptable Networks (Agile/Episodic Enclave Solutions) - Capability should incorporate bandwidth aware Service to manage applications with high data transfer/high priority operational requirements such as Navy Tasking, Collection, Processing, Exploitation, and Dissemination (TCPED) or USAF Planning and Direction, Collection, Processing and Exploitation, Analysis and Production (PCPAD) for massive ISR data transfer. This should include new routing functions that address mission constraints of mobile infrastructures applicable to air, afloat and ashore platforms. Examples include the stand-up/expand new routing functions to support a large deployment of new nodes such as a UAV swarm, creating networks for communicating with coalition partners, standing up live networks to facilitate train-like-you-fight exercises, or Local Area Network (LAN) technologies for network enclaves (transport,

data centers, and application hosting environments) that can be rapidly spun up and brought down based on various mission demands.

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Requirement #: FY19-DoN-RIF-SPAWAR-07

Title: Software Defined Network for Navy Tactical network for Assured Communication (AC)

Military System or Acquisition Program Customer: Automated Digital Network System (ADNS), Consolidated Afloat Networks and Enterprise Services (CANES), Digital Modular Radio (DRM)

Description: Assured Communication (AC) focus area is central to the Assured Command and Control (AC2) framework. The objective is to enable software defined network (SDN) infrastructure to modernize the navy tactical network while maintaining open interfaces within the system to maximize interoperability and compatibility with current solutions. SDN not only enables network administrators to manage network services from a central management tool, reduce hardware footprint, tighten the security but also extends the future capability. The technology should be able to decompose the network functions inherent within the current CANES/ADNS architecture to move away from today's hardware-centric design while maintaining common and open interfaces between vendors.

In addition, there is a need to automate processes and technologies that will improve the timeliness and assuredness of CANES/ADNS deployments/installations, and tests within development environments and on deployed assets. Proposed automation approaches should include (i) a comprehensive solution for automation across the variety of COTS hardware and software; (ii) decoupling of hardware and software configurations to enable parallel developments across multiple subsystem teams and to enable more frequent software releases that are independent of hardware platforms, (iii) consideration for the wide range of installation stages/conditions within the CANES/ADNS system lifecycle to include lab and production facility installations, system lockdowns prior to NOC/GiG connection for installation finalization, data migration dependencies, installation of third-party server hosted C4I applications, re-installation of individual components/servers/microservices by shipboard administrators, software update/change delivery mechanisms to fielded systems. It is desired that proposed automation solutions are not limited to just build/deployment methods and technologies, but also consider automated test and configuration extraction/audit/remediation for improvement of the CANES DEVOPS pipeline and (potentially) shipboard self-checks (e.g. Built-In-Tests). As part of the automation, technology is needed to aggregate the diverse cross section of CANES existing and planned system management tools and functions to optimize overall effectiveness of the CANES system management suite while simplifying and reducing workloads for the shipboard administrator. System management functions within CANES are diverse and include capabilities such as help desk/service management, operations management, configuration management, performance management, backup/restoral, application/micro service management and an ever-increasing focus on cybersecurity management. A comprehensive system management approach that orchestrates the various CANES management tools and optimizes administrator/maintainer workflows is desired. The USG is seeking responses that (i) include consideration for the CANES System Management/Site Reliability Engineering requirements and suite of tools, (ii) include consideration for the wide scope of hardware and software within CANES (e.g. Workstation/Server Operating Environments and Application Suites, Video Solutions, Cross Domain Technologies, Network Transport and Security Devices, etc.), and (iii)

include consideration for shipboard administrator and maintainer job duties and workflows.

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Requirement #: FY19-DoN-RIF-SPAWAR-08

Title: Assured Position, Navigation, and Timing (APNT)

Military System or Acquisition Program Customer: Global Positioning System (GPS) based Position, Navigation, and Timing System (GPNTS).

Description: Enterprise Alignment Efforts (EAE) has a focus on core conditions that support battlefield requirements that enable Joint and Product Interoperability. EAE is aligned to corporate functions to build interoperable product lines, promote cost effectiveness, and integrated capability for the fleet.

White papers should focus on a technical method, components, modules, or configurations that advance, improve, or enhance any or any combination of the following capabilities:

(1) GPS Independent PNT Solutions - This technology would provide Joint interoperable and precise position and time references services for surface, sub-surface, air, and space-borne assets that enable safety of navigation, communications, command and control, combat and weapon systems operating in Global Positioning System (GPS) challenged domains. It would provide Assured Positioning, Navigation and Timing (APNT) capabilities based on GPS-independent PNT solutions to address cyber security issues including confidentiality, availability, and integrity. A GPS/APNT solution should provide the synchronization signals required for integration with currently used air/surface/ undersea communications assets, such as the Time Frequency Distribution System [TFDS]. An APNT solution with an embedded, independent battery is desired, though not required. A GPS/ APNT capability should also survive shocks due to transport or an EMP event.

(2) Diverse Sensor Applications - This technology would provide/develop/leverage multi-sensor integration and algorithms that complement existing navigation sensors to provide APNT service during operations with limited navigational information and when sensor degradation occurs. This solution includes multi-sensor and fusion to produce reliable PNT solutions that enhance mission performance and success.

(3) Miniaturized and Scalable PNT Solutions for Unmanned Vehicles - This technology would enable diverse application of APNT on unmanned vehicles and requires the solutions to address Size, Weight and Power (SWaP) reductions. Development and deployment of miniaturized and scalable APNT solutions with emphasis on reduced SWaP GPS receivers and chip scale atomic clocks. The solution would allow employment of APNT technologies on SWaP constrained platforms to improve C4I dependent mission performance and completion.

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Requirement #: FY19-DoN-RIF-SPAWAR-09

Title: SPAWAR: Spectrum Planning Tool for Ultra High Frequency (UHF) Satellite Communications (SATCOM)

Military System or Acquisition Program Customer: Mobile User Objective System (MUOS)

Description: Provide advanced spectrum planning capabilities to support optimal use of UHF SATCOM spectrum in dynamics environments. The tool will be used to evaluate potential operational plans, analyze system capacity, analyze frequency re-use opportunities and provide support for other analysis efforts. The planning tool must account for all satellites providing UHF SATCOM including Fleet Satellite (FLTSAT), UHF Follow On (UFO), Mobile User Objective System (MUOS) and other satellites providing UHF capability. The tool must account for both legacy 5 and 25 kilohertz channels as well as MUOS 5 MHz carriers. The planning tool must account for addition and loss of new satellites, repositioning of satellites, MUOS beam patterns, and the rapid movement of user terminals. The tool must be easily operated by third party personnel without the aid of the developers. The tool must have a path to information assurance accreditation.

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NAVSEA

Requirement #: FY19-DoN-RIF-NAVSEA-01

Title: NAVSEA: Improving Warfighting Affordability, Capability, and Commonality

Military System or Acquisition Program Customer: NAVSEA Program Executive Offices/Program Managers for Ships, Submarines, Aircraft Carriers, Unmanned and Small Combatants, Integrated Warfare Systems, Expeditionary Forces, and Special Warfare.

Description: Deliver near-term, emerging technologies to improve operational availability, capability, affordability, effectiveness and lethality under a constrained budget coupled with evolving threat environments. Solutions need to be innovative, affordable, and adaptable to evolving peer and non-peer threats. Solutions also should be applicable across multiple platforms at the single platform and force level by using open architecture, modularity and commonality. Proposals should focus on advancing, improving, and enhancing:

- (1) Power Projections / Offensive Capability;
- (2) Ship Self-Defense / Force Protection;
- (3) Modernization / commonality of command, control, communications, computers, combat systems, intelligence, surveillance, and reconnaissance (C5ISR) elements and systems;
- (4) Warfare system Cyber defense, other support systems and resiliency;
- (5) Shipboard signatures management;
- (6) Integration of unmanned autonomous vehicles and non-organic sensors;
- (7) Human systems integration with and across operational systems to improve decision making and reduce sailor / operator workload;
- (8) System, platform and cross platform and multi-domain interoperability;
- (9) Systems automated test and analysis capabilities;
- (10) Advanced technologies for periscope systems;
- (11) Emergency underwater communications;
- (12) Transformational Reliable Acoustic Path System (TRAPS) underwater communication network, a deep water Anti-Submarine Warfare (ASW) system capable of autonomous, long-range, passive detection and localization of low-level acoustic signals from targets of interest;
- (13) Equipment and tools to improve arctic and littoral operational capabilities;

(14) Advanced and / or low cost optical, night vision, and infrared signatures technology including, but not limited to, polarimetric imaging, Shipboard Passive / Augmented Detection and Evaluation (SPADE) and high strength, optically clear sensor windows; and/or,

(15) Combat systems resiliency, combat readiness, material readiness and personnel readiness in Anti-Access / Area Denial (A2/AD) environments.

Technical Point of Contact(s): Dr. Henry Molintas, henry.molintas@navy.com, 301-227-5230, or Douglas Marker, douglas.marker@navy.mil, 540-653-3117, or Timothy Barnard, timothy.barnard@navy.mil, 202-781-4902.

Requirement #: FY19-DoN-RIF-NAVSEA-02

Title: NAVSEA: Reducing Production, Operation, Maintenance and Decommissioning Costs

Military System or Acquisition Program Customer: NAVSEA Program Executive Offices/Program Managers for Ships, Submarines, Aircraft Carriers, Unmanned and Small Combatants, Integrated Warfare Systems, Expeditionary Forces, Special Warfare, and Naval (Public) Shipyards.

Description: In an era when the expected service life of U.S. Navy ships is 30 to 50 years and beyond, NAVSEA needs creative and innovative approaches to reduce Total Ownership Costs. Ownership costs include the design, acquisition, operation, maintenance, modernization, repair, and disposal costs associated with fielding a ship or submarine. Shipboard Preventive Maintenance is critical to ensure ships remain operational to and beyond their expected service life. Also, at the end of service life, disposal and recycling must be efficient and low-cost. Additionally, NAVSEA needs to provide capability and capacity flexibility for production, operation, maintenance, disposal, and repairs at any time. Proposals should focus on enhancements and innovations that:

- (1) Provide improved reliability, reduced maintenance and increased material availability resulting in increased operational availability;
- (2) Control corrosion and mitigate the resulting degradation;
- (3) Employ data analytics to increase availability, reliability, lethality, training, manning and effectiveness;
- (4) Develop / improve approaches to enable flexible infrastructure and modular outfitting into shipbuilding and modernization;
- (5) Insert new technologies, equipment and tools into ship maintenance to improve effectiveness, and reduce energy consumption and cost;
- (6) Systemically address component and system obsolescence issues;
- (7) Maintain or improve shipboard signatures;
- (8) Improve methods, tools, and systems to optimize in-service maintenance requirements and modernization throughout the platform life cycle;
- (9) Improve techniques, methods, and tools to design / inspect / validate shipboard systems;
- (10) Improve material and/or personnel transfer at sea technologies;
- (11) Improve techniques, tools, and methods for workforce and/or sailor training / development to ensure trade and technical excellence;
- (12) Improve techniques, tools, and methods for sailor training / development to increase navigation expertise, especially in congested waters;
- (13) Improve safety of sailors and shipyard personnel;

- (14) Provide a versatile, light-weight advanced composite canister launcher system that allows for delivery of multiple mission-driven autonomous C4ISR and vehicle payload packages;
- (15) Modernize the towed array handling system Control Indicator Unit (CIU);
- (16) Improve and streamline process and record keeping compliance; and/or,
- (17) Realize and extend the full-service life.

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Requirement #: FY19-DoN-RIF-NAVSEA-03

Title: NAVSEA: Improving Cybersecurity Products and Processes

Military System or Acquisition Program Customer: NAVSEA Program Executive Offices/Program Managers for Ships, Aircraft Carriers, Unmanned and Small Combatants, Integrated Warfare Systems, Expeditionary Forces, Special Warfare, and Naval (Public) Shipyards.

Description: To safeguard the information, tools, systems and controls used to design, procure, operate, and maintain Navy ships. Defenses to protect, detect, characterize, counter, and mitigate unauthorized activity and vulnerabilities need to be incorporated in all systems and platforms. Processes for implementing cybersecurity need to create consistency and to allow **for rapid changes** and adaptations as new threats and methods are identified. Applicable DoD and DoN requirements and instructions will form the foundation of the controls. The resultant system will continually check, assess, probe, and adapt to threats. Proposals should focus on enhanced and innovative:

- (1) Techniques, tools and approaches for locally managed and controlled two-factor authentication for control systems;
- (2) Techniques, tools, and systems to detect, identify, react to, and protect against actions by internal and external threats;
- (3) Techniques, tools and systems to counter identified threats for both ashore and afloat environments to prevent, anticipate, or mitigate intrusion, data manipulation or exfiltration;
- (4) Cybersecurity techniques, tools, procedures and systems (hardware and software solutions) to set boundaries, detect intrusions, and prevent unauthorized system access at key points in systems;
- (5) Techniques, tools, procedures and systems to inject cybersecurity into software and hardware development, configuration, and specifications for both ship systems and critical shore systems to counter cyber threats; and/or,
- (6) Techniques, tools and approaches to protect systems with aperiodic updates/patching to address cybersecurity vulnerabilities and/or zero-day vulnerabilities.

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Requirement #: FY19-DoN-RIF-NAVSEA-04

Title: NAVSEA: Power and Energy Systems

Military System of Acquisition Program: NAVSEA Program Executive Offices/Program Managers for Ships, Aircraft Carriers, Unmanned and Small Combatants, Integrated Warfare Systems, Expeditionary Forces, Special Warfare, and Naval (Public) Shipyards.

Description: New designs of naval platforms, payloads, support systems, and unmanned vehicles and systems have increased capabilities and automation, but as a result have increased power needs. In other words, ships will need to accommodate a diverse set of high energy systems. Energy efficiency also is desired to maximize time on station without refueling. Future naval systems, particularly those supporting electric weapons and high-powered sensors, are anticipated to employ Medium Voltage Direct Current (MVDC) power for primary distribution. Areas of interest include:

- (1) An affordable and highly reliable point of use power converter adhering to MIL-PRF-32272A with the exception that efficiencies higher than those specified are desired as well as the incorporation of energy storage to provide hold up power to loads for up to 2 seconds. A Mean Time Between Failure in excess of 30,000 hours (threshold) is desirable;
- (2) Low Magnetic Signature MVDC cable / bus duct / bus pipe suitable for 12 kV MVDC applications. The cables / bus duct / bus pipe must be suitable for naval combatant applications (i.e., meet applicable inspection requirements tailored for MVDC applications from those listed in MIL-DTL-24643/22E and MIL-DTL-24643/76) and scalable via paralleling (if necessary) and/or a family of ampacities from 50 to 4000 amps. The minimum bend radius should be less than 30 inches (threshold) and less than 24 inches (objective). Multiple parallel cables will likely be required to meet the bend radius and 4000-amp requirement. Termination kits for connecting the cable / bus duct / bus pipe to power system and load equipment are needed;
- (3) A family of MVDC disconnect devices (and associated switchgear, if necessary) for no or low load interruption for 12 kV MVDC applications. The family of disconnects must be able to be locally or remotely operated (via the electric plant control system) to open and close in less than 100 millisecond (ms) (threshold) or 10 ms (objective). Minimizing volume, weight, and cost is desirable. The family of disconnect devices should range from 100 amps to 3000 amps (threshold) or 4000 amps (objective);
- (4) A family of MVDC high speed circuit breakers (and associated switchgear, if necessary) for 12 kV MVDC applications. The family of circuit breakers must be able to be locally or remotely operated (via the electric plant control system / protection relays) to open and close in less than 4 ms (threshold) or 0.4 ms (objective). Additionally, the breakers must automatically open on an over-current condition and other waveform properties, as necessary, within an overall system of breaker coordination. Minimizing volume, weight, cost and energy consumption is desirable. The family of circuit breakers should range from 250 amps to 3000 amps (threshold) or 4000 amps (objective);
- (5) Protection relays for 12 kV MVDC applications to implement differential protection in both breaker and breakerless architectures; and/or,
- (6) Electrically driven podded propulsors designed for low acoustic signature and Grade A shock.
- (7) The products developed under this topic are anticipated to transition to the Integrated Power and Energy System (IPES) being developed by PMS 320 to support future surface ship designs (such as the Future Surface Combatant) and future modernization programs. These topics are consistent with the Naval Power and Energy Systems Technology Development Roadmap approved by COMNAVSEA on 8 October 2015.

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Requirement #: FY19-DoN-RIF-NAVSEA-05

Title: Integrated Unmanned/Optionally Manned Maritime Systems

Military System or Acquisition Program Customer: NAVSEA Program Executive Offices / Program Managers for Ships, Aircraft Carriers, Unmanned and Small Combatants, Integrated Warfare Systems, Expeditionary Forces, and Special Warfare

Description: NAVSEA seeks technology for enabling interoperable unmanned (or optionally manned) Maritime Systems (unmanned surface vehicles and unmanned underwater vehicles). (UUVs)). A facility and personnel clearance at the SECRET level may be required for work associated with UUVs. Proposals should focus on one or more of the following key enabling capabilities to conduct warfare missions, maintenance, or training:

- (1) Ease of launching, handling, and recovery (via surface ships and/or submarines);
- (2) Safe and dense energy systems;
- (3) Improved reliable power control system;
- (4) Increased system reliability and reduced maintenance, including sustained operations;
- (5) Autonomous control operation with artificial intelligence for required sensor augmentation;
- (6) Cross-domain interoperability of unmanned (i.e., aerial, surface, undersea and amphibious) systems;
- (7) High fidelity and multi-domain situational awareness capability;
- (8) Modularity to handle various payloads;
- (9) Use of advanced systems/sensors/payloads to address future threats (e.g., enemy swarms); and/or,
- (10) Faster and increased bandwidth data handling and transfer.

Technical Point of Contact(s): Kevin Moyer, kevin.s.moyer1@navy.mil, 202-781-5186, or Dr. Henry Molintas, henry.molintas@navy.mil, 301-227-5230

Requirement #: FY19-DoN-RIF-NAVSEA-06

Title: Maritime Vessel Stopping (MVS) Occlusion Technologies, Development, and Deployment

Military System or Acquisition Program Customer: NAVSEA Program Executive Offices / Program Managers for Ships, Aircraft Carriers, Unmanned and Small Combatants, Integrated Warfare Systems, Expeditionary Forces, and Special Warfare.

Description: The DoN seeks to identify near-term, emerging technologies to provide the Maritime Vessel Stopping (MVS) operational capability to occlude any type of marine propulsor with either foldable and rapidly deployable mechanical systems or chemical means via dissolvable / biodegradable material to reversibly slow / stop small, medium, and large vessels in a wide range of marine / maritime environments. Areas of interest include:

- (1) A dissolvable/biodegradable material solution to occlude any type of marine propulsor, including a capability to hydrodynamically model the effect of propeller occlusion on blade efficiency, percentage of thrust loss, material's behavior in a wake field, and accounting for targeted vessel behavior; and/or,
- (2) A deployment methodology for placing occluding material or mechanical systems within necessary target range to slow / stop potentially hostile vessels.

Technical Point of Contact(s): Peter Pham, NAVSEA SEA 06-EXM (PMS 408) Washington Navy Yard, DC: Expeditionary Missions Program Office, peter.pham2@navy.mil, (202)781-1500

Requirement #: FY19-DoN-RIF-NAVSEA-07

Title: NSWC Dahlgren Division, Combat Direction Systems Activity, Dam Neck VA: Integrated Training Systems

Military System of Acquisition Program Customer: Advanced Training Domain (ATD); Combined Integrated Air and Missile Defense (IAMD) and Anti-Submarine Warfare (ASW) Trainer CIAT

Description: The DoN seeks technologies and products which improve the efficiency and effectiveness of Navy integrated training systems: those systems aboard ships and at shore sites used to prepare ship's crews to fight and win in a contested battlespace. Areas of interest include:

- (1) After Action Reporting (AAR) for use following the training event to provide event reconstruction and meaningful feedback to the training audience; and/or,
- (2) Capability that supports real-time (or near real-time), automated (or partially automated) evaluation of operator performance during a training exercise, with feedback of operator performance to ensure training scenario and operator actions remain within exercise training objectives.

Technical Point of Contact(s): Karl Hines, karl.hines@navy.mil, 757-492-7104.

Requirement #: FY19-DoN-RIF-NAVSEA-08

Title: NSWC Corona Division, Portable Shipboard Beamforming Array Antenna for Missile Telemetry Reception

Military System of Acquisition Program Customer: NAVSEA Program Executive Offices / Program Managers for Ships, Submarines, Littoral Combat Ships, and Integrated Warfare Systems.

Description: NSWC Corona and serviced program offices require the capability to autonomously acquire, track and receive a minimum of six (6) separate highly dynamic vehicles radiating no less than eight telemetry streams with a single man-portable shipboard antenna, without having personnel on the weather deck. Tri-band track and receive capability is required over portions of the L, S and C frequency bands (1435-1535 Megahertz (MHz), 1785-1850 MHz, 2200-2290 MHz, 2360-2395 MHz, 4400-4940 MHz, 5090-5150 MHz) with hemispherical (Azimuth +/- 90 deg, Elevation -30 to +120 deg) coverage for one side of a ship. Dual orthogonal polarization is required for each telemetry stream, i.e., Left Hand/Right Hand Circular (LHC/RHC) Polarization or Horizontal/Vertical (H/V) Polarization with telemetry data rates of up to 20 Mbps. The Figure of Merit or G/T (Antenna Gain to Noise Temperature ratio measured at boresight of each beam) required is a minimum of -4 dB/K for L-Band, 2 dB/K for S-Band, and 7 dB/K at C-Band. The antenna should be operable in a shipboard, seawater splash environment, with appropriate radio frequency (RF) filtering for shipboard high-power RF emitters.

Technical Point of Contact(s): William Debbaneh, william.debbaneh@navy.mil, (951) 393-5673

Requirement #: FY19-DoN-RIF-NAVSEA-09

Title: NSWC Crane Division: Shipboard Sensor for Small Unmanned Aerial System (S-UAS) Detection and Tracking

Military System of Acquisition Program Customer: NAVSEA Program Executive Offices for Integrated Warfare Systems and Ships, PMs for Above Water Sensors, Surface Weapons, Expeditionary Missions, and Special Warfare.

Description: Require persistent wide area detection, tracking, classification, identification and disruption of Small Unmanned Aerial System (S-UAS). A possible method to is to employ counter S-UAS air / ground platforms adapted for deployment on surface ships. Proposals should focus on improving sensor and electronic warfare suitability for surface ship applications without reducing already proven effectiveness for S-UAS detection and tracking. Proposals should address the following operational capability and suitability parameters:

- (1) Provide hemispherical air search coverage (360-degree azimuth and horizon to zenith);
- (2) Passively detect and track S-UAS at day or night at ranges exceeding 3,000 yards;
- (3) Simultaneously track 50 or more S-UAS and provide accurate contact position updates;
- (4) Provide full capability when underway on a surface ship in rough seas;
- (5) Operate continuously in maritime conditions for over 5,000 hours; and/or,
- (6) Provide capability to disrupt communications and/or operations, distract, or divert UASs.

Technical Point of Contact(s): Richard Woodruff, richard.woodruff@navy.mil, 812-854-6334

Requirement #: FY19-DoN-RIF-NAVSEA 10

Title: Improved External Volume (Implodable) Tool Capability for Faster Integration with U.S. Navy Submarines

Military System or Acquisition Program Customer: NAVSEA PMS 340, PMS 392, PMS 397, PMS 399, PMS 406, PMS 450

Description: NAVSEA requires expanded tools to assess implosion resulting from hydrostatic pressure and underwater explosion (UNDEX) to: ensure compliance with Naval Ship Critical Safety Items (CSI), enable faster risk assessments for determining CSI, provide for lighter weight designs with increased payload capacity, and ultimately reduce impacts to Cost Schedule and Performance (CSP). Currently, NAVSEA has reduced ability to optimize designs and assess manned and unmanned autonomous systems (Shallow Water Combat Submersible, Dry Combat Submersible, Dry Deck Shelter, Large Diameter UUV, other UUVs, etc.), as well as TEMPALT External Volumes (EVs) due to lack of data and prediction capability. Consequently, overly conservative criteria are used to determine EV CSI, which greatly impacts CSP, as well as system characteristics such as weight, design feasibility, ease of maintenance, and overall effectiveness of the EV systems to ensure they are not a risk to the submarine or personnel. NAVSEA requires improved prediction and integration tools to reduce the CSP impacts associated with integrating these systems with submarine host platforms and open design space for EVs, e.g., lighter weight UUVs. Currently, NAVSEA's fast running PC-based implosion prediction tool, WAIie, cannot evaluate 80% of EVs because geometry, material, or size are outside the tool's capability range. Additionally, the WAIie tool assesses only one EV at a time; but today's systems have tens to thousands of EVs that require aggregate assessment for risk to submarine platform or personnel. A tool for assessing effects of multiple implosions, ACES, has been established but requires expansion to new EV designs (material/shapes) and updated to calculate effects to Deep Submergence Systems (DSS) geometry and personnel exposed to EV failure in an undersea environment and in DSS.

The updated prediction tool, WAIie, will leverage machine learning and ensure the tool has the capability for adding new test data and analyses as it becomes available in the future. The existing prediction capability and interpolation limits require modification and expansion for deep submergence system EVs, TEMPALT designs, UUVs, and implosions within a launch tube (in-tube). The prediction capabilities for hydrostatic and UNDEX induced implosion pulses for free-field and in-tube implosions will be expanded and established. The in-tube implosion prediction capability already has a basis for test data to draw from and will enable faster TEMPALT assessments with less reliance on physics-based tools which are computationally intensive.

ACES will be expanded to integrate with different geometry and CAD programs for more efficient modeling and assessments. The algorithms will be expanded to cover DSS designs in addition to submarines providing for faster, more efficient risk assessments.

Technical Point of Contact(s): Katherine Snedeker, Katherine.snedeker@navy.mil, 202-781-0604

Requirement #: FY19-DoN-RIF-NAVSEA-11

Title: PEO SUB/SEA 073 – Submarine and Surface Ship Hull Friction Drag Reduction

Military System or Acquisition Program Customer: VIRGINIA Class Program Office (PMS 450)

Description: NAVSEA is seeking the implementation of a combined friction drag reduction and antifouling coating technology that would improve the performance of the Navy's submarines and ships. The selected technology should generate a measurable amount of friction drag reduction and have good antifouling properties. Because of platform constraints, this coating should have exceptional durability to high hydrostatic pressures and high Reynolds forces. Performance of the coating technology should be attainable for the full duration of deployment and require minimal maintenance between CNO availabilities. Implementing the technology should additionally have a minimal impact on the manufacturing and paint process, as well meeting all environmental safety requirements.

With the goals of the 2018 National Defense Strategy in mind, development of this technology seeks to improve the military advantage of the Joint Force and to harness innovations produced by the National Security Innovation Base. Implementing this technology to improve the performance of the US Navy's ships would support dynamic force employment for counteracting the nation's adversaries with more lethal, agile, and resilient assets.

Technical Point of Contact(s): Steven Weinstein, SEA 073T, steven.weinstein@navy.mil, (202) 781-3220

Requirement #: FY19-DoN-RIF-NAVSEA-12

Title: NAVSEA 07TR – Piloting and Navigation Operations Training Device

Military System or Acquisition Program Customer: Submarine Training Directorate (SEA 07TR)

Description: NAVSEA is seeking the development through implementation of a small-footprint shore-based training device that virtualizes Ship Control Operations Training. This device should have no requirements for reinforced foundations or other structural needs, should be able to run on commercial energy sources (plug into standard wall outlets), and would be based on the 688-class of submarine.

Development and implementation of this technology is necessary to meet the goals of the 2018 National Defense Strategy. Specifically, with the life-extensions for 688-class submarines in mind, development of this technology seeks to meet the Defense Objectives of (1) Continuously delivering performance with affordability and speed, and (2) Establishing an unmatched 21st century National Security Innovation Base that effectively supports Department operations. By making this training device in a mixed-reality manner, leveraging off of virtual technology, we will implement the “Advanced autonomous systems” approach to include rapid application of commercial breakthroughs to gain competitive military advantage of having training devices on navigational control of the 688-class quickly deployable in a fiscally-advantageous manner to many locations, with ease of life-cycle support for planned modifications. Additionally, this meets the implementation of “Delivering performance at the speed of relevance”. Rapidly fielding training solutions that are agile to change and exceptionally fiscally efficient allows us to remove cumbersome logistics processes and streamlines our upgrade capability as well as provide multiple diverse environments with one training solution.

Technical Point of Contact(s): Roger McPherson, NAVSEA 07TR7,
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Requirement #: FY19-DoN-RIF-NAVSEA-13

Title: NAVSEA: Submarine Escape and Rescue Program: Atmospheric Contaminant Control and Reduction

Military System or Acquisition Program Customer: NAVSEA PMS391, Submarine Escape and Rescue

Description: The Submarine Escape and Rescue program is seeking means to passively manage and reduce atmospheric contaminants in the submarine atmosphere during a distressed submarine (DISSUB) event to improve personnel survivability and physiology. The solution should, at a minimum, target the removal and/or reduction of contaminant levels for the seven Submarine Escape Action Limit (SEAL) gases: Carbon Monoxide (CO), Hydrogen Cyanide (HCN), Ammonia (NH₃), Chlorine (CL₂), Hydrogen Chloride (HCl), Sulfur Dioxide (SO₂), and Nitrogen Dioxide (NO₂). Due to the fact it is anticipated that, in the event of a DISSUB event, it is expected that there will be no power, responses should identify the power requirements and alternative means of providing power, if required. Additionally, solutions provided should be capable of operating at increased internal pressures of up to 5 atmospheres absolute (ata), minimize the footprint associated with the equipment and minimize maintenance requirements as much as practical.

This proposed topic aligns to the National Defense Strategy and the Submarine Commander’s Intent to Strengthen Alliances and Attract New Partners.

Technical Point of Contact(s): Jay Smith, jay.j.smith@navy.mil, 215-897-7250

Requirement#: FY19-DoN-RIF-NAVSEA-14

Title: Warfare Tactical Operator Adaptive Training (High Velocity Learning)

Military or Acquisition Program Customer: PEO Submarines, SUB-S, Submarine Warfare Federated Tactical Systems (SWFTS)

Description: Chief of Naval Operations (CNO) ADM Richardson has called for the expanded use of learning-centered technologies, simulators, online gaming, and analytics. These technologies have high potential to accelerate learning and bolster sailor skill-level

and proficiency in safely executing highly complex and dangerous missions at sea. In the area of Submarine Warfare Federated Tactical Systems (sonar, combat, electronic warfare, imaging, navigation, etc.), current training systems do not include the ability for sailors, following certification in specified ratings, to effectively maintain and improve individual skills and proficiency in the elemental tasks of submarine tactical systems. An adaptive training approach is required that provides a custom learning experience to each sailor; allowing sailors who learn quickly to progress through the curriculum at high velocity, slower-learning sailors to advanced more slowly, and the least capable sailors to receive slow intense training and remedial instruction as necessary. Additionally, such individualized training requires an approach that uses a multi-modal approach (e.g., annotated animations, audio, video, haptic) to keep sailors engaged in the work flow. Other aspects that would improve effectiveness of training would include use of high-fidelity simulation and tactical displays to ensure training realism, and personalized metrics to tailor curriculum to match sailor style preferences.

This topic aligns to the Tactical Submarine Evolution Plan Capabilities and directly supports the National Defense Strategy objective to “Build a More Lethal Force” by providing the sailors the maximum proficiency in warfighter readiness by leveraging advanced technologies, simulators, online gaming, and analytics to defeat enemies.

Technical Point of Contact(s): Joseph Soler, joseph.soler@navy.mil, 202-781-4082

NAVAIR

Requirement #: FY19-DoN-RIF-NAVAIR-01

Title: Naval Air Systems Command (NAVAIR): Naval Aviation Innovative Technologies

Military System or Acquisition Program Customer: All NAVAIR Programs

Description: The Naval Air Systems Command is seeking mature innovative aircraft, weapon and related system technology that accelerates or enhances naval aviation capability; reduces the development, acquisition, sustainment or lifecycle costs of NAVAIR acquisition programs or fielded systems; reduces technical risk; or improves the timeliness and thoroughness of test and evaluation outcomes. The emphasis is on technologies that increase material readiness and increase speed of capability delivery. The proposed technologies should have a minimum technology readiness level of 5, a demonstration path into a NAVAIR acquisition program, with funding available to transition the technology to the operational user within 12 months of completion of the contract. White papers should focus on the final maturation, testing, certification and/or integration needed to ensure that the technology successfully makes it to operational users.

Technical Point of Contact(s): Jeanelle Tortorice, 301-342-6032, jeanelle.tortorice@navy.mil

Requirement #: FY19-DoN-RIF-NAVAIR-02

Title: NAVAIR (AIR-1.0): Naval Warfighter Health, Survivability and Protection

Military System or Acquisition Program Customer: PMA-202 Aircrew Systems Program Office

Description: The Department of the Navy (DoN) seeks Ready Basic Aircrew by improving life support technologies and personal protective equipment to optimize

warfighter performance, effectiveness, safety and survival. Technologies that improve hearing protection/performance and mission endurance, such as those that minimize vibration, improve sitting endurance, reduce aircrew mounted equipment bulk/weight, improve vehicle habitability/aircrew readiness, and provide bladder relief, especially for female pilots, are desired.

Technical Point of Contact(s): Keith King, 301-342-8443, keith.king@navy.mil

Requirement #: FY19-DoN-RIF-NAVAIR-03

Title: NAVAIR (PEO(A)): Rapid Restraint System for CH-53K Tactical Bulk Fuel Delivery System (TBFDS)

Military System or Acquisition Program Customer: NAVAIR PEO(A) Program Executive Office for Air Anti-Submarine Warfare, Assault & Special Mission Programs, PMA-261, CH-53K

Description: The tactical bulk fuel delivery system (TBFDS) is an air transportable fuel delivery system that is capable of range extension and offload fuel delivery. Internally carried by the CH-53K, the system has a maximum design capacity of 2,400 gallons.

An innovative CH-53K TBFDS restraint system that reduces crew efforts and weight while increasing operational capability, reliability, maintainability and affordability is sought. The TBFDS restraint system shall be capable of restraining the TBFDS to NAVAIR crash g-load requirements (20/20/10) and NAVAIR environmental requirements to include MIL-STD 810G; focus on ease of on/offload, human factors, and be capable of analysis and verification through validated models/simulation and test.

Technical Point of Contact(s): Michele Hoefer, 301-342-4813, michele.hoefer@navy.mil; or Todd Anderson, 301-995-3173, todd.anderson@navy.mil

Requirement #: FY19-DoN-RIF-NAVAIR-04

Title: NAVAIR PEO(A): Digital Vertical Line Array (DVLA) Sonobuoy and Exploiting a Unique Noise Environment

Military System or Acquisition Program Customer: Program Management Air (PMA)-264 Air Anti-Submarine Warfare Sensors, Mission Planning

Description: PMA-264 continues to explore the utility of a vertical line array sonobuoy for a number of operational applications.

In addition to the airborne ASW tactical utility of the vertical line in deep oceans, a DVLA sensor can also be employed to support the Multi-Static Active Coherent (MAC) family with shallow water environmental measurements such as bottom loss. Thus, real-time in-situ measurements can be utilized for real-time range predictions. Vertical line arrays have been deployed in a number of test scenarios for environmental acoustic data collections of bottom loss, active target strength investigations, and beamforming studies. The Program Customer is interested in technologies that implement a vertical line array design tuned to the MAC frequency, with minimal impact to the original physical architecture of the AN/SSQ-77C XN. The technology should have the capability to incorporate high TRL subassemblies, including the high-performance RF telemetry platform (SG-90 in the AN/SSQ-101B) and lower self-noise hydrophones.

PMA-264 also continues to explore the operational utility of a vertical line sonobuoy and adaptive signal processing techniques to address unique noise environments.

Vertical line arrays have been deployed in a number of test scenarios for environmental acoustic data collections of bottom loss, active target strength investigations, and beamforming studies. The Program Customer is interested in technologies that deliver air-deployable vertical line array sonobuoys and the related signal processing tuned to the MAC frequency. The technology should have the capability to incorporate high TRL subassemblies, including proven signal processing, a high-performance RF telemetry platform (SG-90 in the AN/SSQ-101B) and low self-noise hydrophones. The technology should be capable of adaptive signal processing to provide additional sensor system performance by compensating for equipment tolerances of the sonobuoy components.

Technical Point of Contact(s): Ben Harrison, 301-342-2028, Benjamin.b.harrison@navy.mil

Requirement #: FY19-DoN-RIF-NAVAIR-05

Title: NAVAIR (PEO(A)): Passive Broadband for Airborne Low Frequency Sonar

Military System or Acquisition Program Customer: PMA-299 Multi-mission Maritime Helicopter Program Office

Description: PMA-299 is interested in integrating a passive broadband mode which would interface with the AN/AQS-22 ALFS via software modification to allow acoustic analysis without active pinging.

Technical Point of Contact(s): Stephanie King, 301-757-5319, stephanie.a.king1@navy.mil

Requirement #: FY19-DoN-RIF-NAVAIR-06

Title: NAVAIR (PEO(T)): Improved Supportability and Reliability for Aircraft Launch and Recovery Equipment

Military System or Acquisition Program Customer: PMA-251

Description: The Navy seeks technologies and products to improve supportability and reliability within Aircraft Launch and Recovery Equipment. Technologies are sought that improve reliability and operational readiness; that reduce or mitigate system or component obsolescence; or that extend service life.

Technical Point of Contact(s): Mark Blair, 732-323-7310, mark.r.blair@navy.mil

Requirement #: FY19-DoN-RIF-NAVAIR-07

Title: NAVAIR (PEO(T)): Aircraft Threat Detection and Countermeasure

Military System or Acquisition Program Customer: PMA-272, Advanced Tactical Aircraft Protection Systems Program Office

Description: Potential solutions are sought to survivability gaps faced by aviation units as they deploy worldwide to conduct full-spectrum operations. Aircraft must be able to face and survive against lethal threats in a wide variety of environments and conditions. Aircraft require new systems that ensure incoming threat munitions, rockets, and missiles can be defeated through jamming, dazzling, expendable airborne countermeasures, or other means in all spectrums. Capabilities are sought to detect, defeat and/or suppress the effects of enemy air defense systems (e.g., infrared (IR), radio frequency (RF), millimeter wave (mmW), ultraviolet (UV), ballistic munitions from heavy machine guns and small arms, and directed energy (DE)) with active, semi-active, and passive countermeasures. Countermeasure systems can be a repurpose of an existing system and must prevent guided munitions or their effects from damaging aircraft and have the ability to produce

an optimal survivability solution against the most dangerous threats. Detecting, locating, and defeating the source or effects of unguided ballistic munitions (e.g., small arms fire, rocket propelled grenades (RPG) and unguided rockets) is especially critical to the future of aircraft survivability. Aircraft systems must gain and maintain situational awareness of all threats including those threats with reduced/glide signatures.

Technical Point of Contact(s): Ronald (Ron) Tucker, 301-757-7878, ronald.tucker1@navy.mil

Requirement #: FY19-DoN-RIF-NAVAIR-08

Title: NAVAIR (PEO(U&W)): Sense and Avoid with Autonomy Considerations

Military System or Acquisition Program Customer: PMA-266, PMA-263, PMA-262, PMA-268, PMA-281

Description: Manned aircraft comply with a “see and avoid” requirement in order to operate in the national airspace system. Unmanned air systems (UAS) lack the ability to “see” and avoid, which can reduce situational awareness (SA) of the operator and increase risk of collision. Consequently, an adequate “sense and avoid” (SAA) capability is necessary to achieve an equivalent level of safety (ELOS). Also, due to the nature of UAS missions, there are potential situations in which automated systems may benefit the operation. However, autonomy and its use in unmanned aircraft is not well utilized nor implemented. The technological capabilities available to these UAS systems is not integrated well enough to provide the optimal level of autonomy (LOA) to supplement the capabilities of human operators.

The DoN (including MQ-8, MQ-25, MQ-4C, as well future Marine Corps UAS) seeks an ELOS for UAS in integrated airspace. The SAA solution will need to provide the following capabilities: 1) a display solution to effectively integrate sensor data and provide situational awareness and recommended actions to the operator, 2) definition for technologically feasible and appropriate levels of autonomy per various UAS use cases, and 3) consideration for scenarios that include control of multiple unmanned air vehicles (UAV).

The display solution must consider human factors requirements, including usability and workload, in order to prevent operator complacency and task saturation. The solution should also use algorithms that support rules sets and displays in order to create a complete tactical picture.

Technical Point of Contact(s): Dave Kyser, 301-342-5071, david.kyser@navy.mil / Ed Otten, 301-342-9295, edward.otten@navy.mil

Requirement #: FY19-DoN-RIF-NAVAIR-09

Title: NAVAIR (PEO(U&W)): Condition-Based Maintenance for Improved Readiness

Military System or Acquisition Customer: PMA-266, PMA-263, PMA-262, PMA-268

Description: The DoN seeks to improve aircraft readiness and reduce cost through condition-based maintenance. Current practices for preventative maintenance on unmanned air vehicles (UAV) are conducted in accordance with defined schedules that may not reflect actual need for maintenance procedures. This method can lead to unnecessary maintenance cost, man hours, and UAV down-time if parts are still functional beyond their scheduled replacement date.

Condition-based maintenance uses sensor data and defined indicators to determine when a maintenance action should occur. UAVs utilize numerous sensors that provide source data that can support condition-based maintenance. The DoN seeks a data-flow infrastructure to support the collection, sorting, and initial analysis of sensor data. In addition, data set analysis, correlation, and machine learning solutions are sought in order to identify maintenance indicators and confidence levels. These indicators must be correlated to improve diagnostics and create an effective decision support system that is integrated into a complete maintenance picture.

The resulting decision support system and user interface must be designed with human factors considerations. These factors include the efficacy of the human-system interface, clarity of the presentation of information, action guidance, error reduction, ease of configuration, and learnability.

Condition-based maintenance optimizes the cost of and schedule for maintenance practices by reducing unnecessary actions and accurately predicting part longevity for future maintenance planning.

The solution should consider existing sensors already available on the aircraft as well as others currently available and even new, innovative options. The solution should also be applicable for both large and small UAVs and the focus should be on algorithm development that could be implemented in existing systems onboard the UAV (e.g. an algorithm upgrade for a HUMS processor or a new software package residing on a vehicle management computer).

Technical Point of Contact(s): Dave Kyser, 301-342-5071, david.kyser@navy.mil / Angelo Viray, 301-757-9212, jose.a.viray@navy.mil

Requirement #: FY19-DoN-RIF-NAVAIR-10

Title: NAVAIR (PEO(U&W)): Assisted Maintenance using Digital Solutions

Military System or Acquisition Customer: PMA-266, PMA-275

Description: The DoN seeks a digital solution that improves maintainer capability, efficiency, and accuracy when performing maintenance procedures on complex, integrated systems. The sophisticated electronics, software, wiring, etc. that are combined into the systems of modern Navy aircraft and ships create significant diagnostics and maintenance challenges for maintainers. Maintainers must often reference multiple sources (pubs, interactive electronic technical manuals, job aids), consider data from unique sensors and measurements, and make decisions on the appropriate next step based on an incomplete representation of the system. The lack of an integrated, easy to use display solution to systematically identify the next step for investigation increases maintenance time and decreases operational readiness.

The digital solution should consider the delivery and display of information from publications, manual sources, and integrated diagnostic sensors and measurements. The solution should consider applications of virtual and augmented reality, and also enable real-time, remote collaboration to support the on-site maintainer from separate geographic locations. Additionally, the resulting solution must consider human factors requirements to ensure optimal usability with complex systems.

Technical Point of Contact(s): Dave Kyser, 301-342-5071, david.kyser@navy.mil / Ed Otten, 301-342-9295, edward.otten@navy.mil

Requirement #: FY19-DoN-RIF-NAVAIR-11

Title: NAVAIR (PEO(U&W)): Technologies to Aid Sensor Discriminator Algorithms that Effectively Reject Non-Group 1 UAS

Military System or Acquisition Program Customer: PMA-266

Description: The DoN and other agencies seeks solutions that would mitigate the threat associated with small Group I UAS. Publicly available information has demonstrated that our adversaries have begun to use weaponized small unmanned systems to damage and disrupt high value DoN systems. The systems utilize noncomplex operating systems and utilize data links that are not encrypted. Disabling these small systems non-kinetically both protects these high value DoN systems from attack and eliminates the risk of damage often associated with kinetic attacks. The solution should consider hardware options that are not complex or expensive. Additionally, the solution should have the ability to be quickly moved to different sites.

Technical Point of Contact(s): Mike Dickerson, 301-997-4313, mike.dickerson@navy.mil

Requirement #: FY19-DoN-RIF-NAVAIR-12

Title: NAVAIR (JSF): F-35 Life Support System (LSS) Sensor Suite

Military System or Acquisition Program Customer: JSF, F-35

Description: Modern and legacy fighter aircraft are equipped with limited sensing capability within the Life Support System (LSS), which results in system failures that remain undetected. The analysis of aircraft performance influences on pilot-reported symptoms are also hampered by inadequate sensing within the system. This capability gap puts pilots at risk and hinders physiological event (PE) root cause investigations across all DoD aircraft.

Physiological symptoms may result from failures within the LSS that restrict or disrupt the breathing gas flow, pressure, or oxygen concentration delivered to the pilot or be caused by cabin pressurization fluctuations or decompressions. PEs can be the result of a single failure or the compounding of multiple failures, stacking up until the operator recognizes their subjective physiological symptoms. Many fighter platforms lack even basic sensing capability such as cockpit pressurization or oxygen concentrations delivered to the pilots. As a result, pilots, physicians, and investigative teams rely heavily on pilot-reported physiological symptoms and low-fidelity data to isolate system failures. Robust sensing capability within fighter aircraft LSS is critical to protecting pilots from physiologic threats and will ultimately provide the fleet with the tools needed to reduce and eventually eliminate PEs. Ideally this sensor suite would detect cabin pressurization, and oxygen concentration, pressure, and flow to the pilot. These sensors would detect system issues before they could lead to pilot injury or degraded performance as a result of decompression sickness, hypoxia, hypercapnia, and hypocapnia. A comprehensive sensor package could combine flow, pressure, oxygen concentration, and gas sensing (ex: CO) and measure at a point in the oxygen hose just prior to the oxygen mask. It is essential that the sensors included are not focusing on physiological sensing, but aircraft performance sensing. Sensor packages should be capable of operating within the conditions described by AIR STANDARD ACS (ASMG) 4039 and ADV PUB ASMG 4060 Ed 1 v2. All sensors should be able to withstand the altitude, temperature, and G envelope of 5th generation fighter aircraft: Altitude: 0-60,000 feet, Temperature: -70 to 140F, Acceleration: -9 to 9 Gz. The extreme vibration environment should be considered, and all sensor packages will be required to pass MIL-STD-810G testing. The sensors should be capable of outputting an analog signal or, more, interface with an IEEE 1394 databus. Ideally the sensor package could be adapted to other serial busses with minimal

changes. Interfacing with the aircraft vice a separate recording package is critical to achieving a long-term solution. Size and weight should be minimized, with consideration given for compact, integrated solutions. Detection using separate sensors integrated at different points within the LSS is also acceptable. Aircraft mounted systems are preferred over man-mounted sensors so that integration challenges and ejection impacts can be minimized. Sensors can be integrated anywhere within the LSS as long as they provide the capabilities described.

The vendor shall deliver a minimum of three robust prototypes that have completed some airworthiness testing in accordance with (IAW) MIL-STD-810 (with specific levels IAW F-35 specification requirements). Examples of relevant airworthiness testing include, but is not limited to vibration, shock, electromagnetic interference, water/salt spray, sand/dust blowing, oxygen compatibility, rapid decompression/explosive decompression, and altitude testing.

Technical Point of Contact(s): Pearle Lipinski, 301-342-8479, pearle.lipinski@jsf.mil

Requirement #: FY19-DoN-RIF-NAVAIR-13

Title: NAVAIR (NAWC-WD): Development of Missile Fly-out Stimulation and Scenario Emulation Technologies for Testing and Evaluation of Missile Warning Systems and Infrared Countermeasures

Military System or Acquisition Program Customer: PMA-272, DAIRCM (MH-60S, AH-1Z, UH-1Y), DoN LAIRCM/ATW (CH-53K, MV-22, P-8)

Description: NAVAIR has the need to improve missile fly-out stimulation and scenario emulation technologies and desires to develop Infrared (IR) missile simulation systems to support test and evaluation in both ground (aircraft installed) and laboratory (standalone) environments. Next generation Missile Warning Systems (MWS) with IR countermeasures (IRCM) are currently under development to enhance the survivability of Naval platforms. Key MWS and IRCM response functions are needed for effective test and evaluation of these next generation MWS. Presently, MWS testing is performed using live fire missile testing in a low clutter environment and on-aircraft testing using ground-based missile simulators, relegated to the atmospherics of the day and the existing clutter environment of the local area. The Navy desires to improve this testing technologies in four key areas: 1) IR scene projector technologies, 2) synthetic high clutter backgrounds for scenario development, 3) scene generator to MWS ARINC-818 Interface, and 4) an enhanced Target Board Emulator (TBE).

IR scene generation used in the development of missile fly-out scenarios against Navy helicopters and aircraft is a cost-effective method to test next generation missile warning (MWS) and jamming systems. The current laboratory test environment has a limited dynamic range and bit resolution, which decreases the scenes' level of detail and thus impacts the usable signal levels needed for proper MWS testing. Therefore, the Navy has a need for the development of IR scene projector with better dynamic range, higher resolution, and faster frame rates. Testing the effectiveness of MWS in and around industrial and urban surroundings cannot be done properly without a well-defined high temperature clutter model of IR background for use in an IR scene generation system. The IR scene development process will develop a material database from 0.2 to 20.0 microns and will include the material thermal properties, the material composition, and spectral emissivity and reflectivity of industrial and urban environments. The database will include the local materials and geometry and work with digital elevation data. The Advanced Threat Warner (ATW) sensor with the ARINC-818 interface will provide the

ability to electrically inject the IR scene into the sensor and allow the sensor to process the data before it goes to the control processor. All atmospheric, clutter, and geometries can then be tested in a highly repeatable environment. The Improved Target Board Evaluator (ITBE) capable of simulating dual band MWIR (mid-wave infrared) threat missile signatures will provide the needed ground test data. The TBE will not only provide the simulation required to elicit a response from the MWS, but it shall have the enhanced capability of monitoring the beam center of the DIRCM (Directional Infrared Countermeasures) pointing response with an accuracy of no less than 1 mrad at a distance of 15 yds (approx. ½ “) from the DIRCM. This inclusive test environment will directly support the testing of 5th generation aircraft.

Technical Point of Contact(s): Michael Clelland, 301-538-2305, michael.clelland@navy.mil

Requirement #: FY19-DoN-RIF-NAVAIR-14

Title: NAVAIR (NAWC-WD): Tri-Band L, S, C Electronically Steerable Beam Forming Antenna Array

Military System or Acquisition Program Customer: NAWCWD Point Mugu Sea Range (PMSR)

Description: The NAWCWD PMSR requires the capability to simultaneously track and receive a minimum of sixteen (16) separate highly dynamic vehicles radiating no less than 56 telemetry streams. Tri-band downlink (track and receive) capability is required over portions of the L, S and C frequency bands (1435-1540 Megahertz (MHz), 1755-1850 MHz, 2200-2400 MHz, 4400-4940 MHz, 5090-5150 MHz). Dual orthogonal polarization is required for each telemetry stream, i.e. Left Hand/Right Hand Circular Polarization or Horizontal/Vertical Polarization. Telemetry signal bandwidth of up to 20 MHz The Figure of Merit or G/T (Antenna Gain to Noise Temperature ratio measured at boresight) required is a minimum of 7 Decibels per degree Kelvin (dB/K) for L-Band, 9 dB/K for S-Band, and 15.5 dB/K at C-Band.

Technical Point of Contact(s): Kevin Bossoletti, (805) 989-1514, kevin.bossoletti@navy.mil

NAVSUP

Requirement #: FY19-DoN-RIF-NAVSUP-01

Title: NAVSUP Ammunition Perfect Order Module (APOM)

Military System or Acquisition Program Customer: Ordnance Information System (OIS)

Description: NAVSUP is aligning the business model for the Navy's \$39B ammunition supply chain with best practices in global supply chain management. This software solution is required to enable real-time risk assessment of operational and readiness trade-offs based on intensity, vulnerability and individual node criticality. Ordnance logisticians require an agile operating model to quickly assess, evaluate, and execute optimal order fulfillment strategies to predict and mitigate the impacts of unexpected disruptions, such as: weather, ammunition availability, pier closure; often encountered with order fulfillment actions. Fleet customers need an automated tool that will remove the complexity of the ordering process. The insertion of this technology will integrate pieces of push logistics into the broader operating model for the ammunition supply chain

to produce improved efficiencies across the value chain. This technology solution will leverage the positioning and total asset visibility capabilities of Global Ammunition Strategic Positioning Module (GASPM) and Lot Serial Number Accuracy (LSNA) and existing requisition sourcing logic within OIS to support activity-based cost-to-deliver analytics. The capability includes real-time data analytics, visualization software, a front-end user interface, automated sourcing logic and a distribution optimization model to facilitate informed supply chain decision-making focused on reducing risk exposure and total ownership costs.

Technical Point of Contact(s): Mark Deebel, 717-605-7039, mark.deebel@navy.mil

MARCOR

Requirement #: FY19-DoN-RIF-MCSC-01

Title: MCSC: Forensic Case File Analysis Tool

Military System or Acquisition Program Customer: Portfolio Manager Command Element Systems (PfM CES), Program Manager Intelligence Systems (PM IS), Identity Operations (IDOPs)

Problem Statement: The Expeditionary Forensic Exploitation Capability (EFEC) system allows Marines to collect, store, and disseminate information of forensic value for the purpose of identifying threat actors and linking them to adversarial actions. The primary method of collection is through site exploitation, which results in vast amounts of Captured Enemy Material (CEM). CEM includes biological (DNA, fingerprint), chemical, media, and documentary evidence. Evidence from these operations are organized into case files. Each case file consolidates disparate data points from CEM as well as photography, notes, sketches, and descriptions that support site exploitation. This information is most valuable when it can be analytically and geographically linked to other case files to uncover patterns and trends that associate to people, places and events throughout the battlespace. **Operators lack the manpower to manually perform this analysis across such a large and disparate forensic data set. EFEC does not have a solution to enable this analysis.**

Description: The EFEC team is seeking a solution driven by artificial intelligence and machine learning that would perform keyword searching and automated pattern matching of forensic information from forensic collections such as images/videos, contacts, documents, casting impressions, tool marks, chemical/biological exploitation, geo-referenced events, CEM descriptions, hash files, cryptocurrency precursors, etc., found in documented case files. This solution would have the capability to predict future outcomes based on matched patterns. The output would be a linkage between case files that associate people, places and events with a similarity score or confidence level that would support prioritization of analysis or other investigatory efforts. Further, this solution would be built with open architecture to support continued evolution of forensic technology. **Use Case:** During on-site exploitation, Marines detain a subject and collect his cellphone, enemy documents, and weapon (or weapons cache). CEM is brought back to the EFEC lab and a case file is created for this site exploitation event. The case file contains information including site documentation, subject's name, affiliation, cell phone information, site drawings, and photography. This automated link analysis tool runs case file information against previous collected information to link subject to possible persons, places, trends and events of interest. The artificial intelligence algorithm produces results that demonstrate the analytical links between the subject and other known illicit actors' contacts list, photos, texts as well as a holistic look at trends in weapons trafficking and explosive material use over time.

Technical Point of Contact(s): Teresa Sedlacek, 703-432-2849,
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Requirement#: FY19-DoN-RIF-MCSC-02

Title: MCSC: Ground Counter Fire Sensor (GCFS) Replacement

Military System or Acquisition Program Customer: MCSC: Portfolio Manager Ground Combat Element Systems (PFM GCES), Program Manager Fires (PM Fires), Ground Counter Fire Sensor (GCFS)

Description: PM Fires is seeking a replacement for the legacy GCFS system. GCFS is an acoustic indirect fire detection and location system which can locate the Point of Origin (POO) and Point of Impact (POI) of indirect fires which includes artillery, mortars, and rockets. Additionally, GCFS can locate Improvised Explosive Device (IED) detonations. The legacy GCFS system is very large, requires manual survey, has a large logistical footprint, and cannot digitally export targeting data. It does not fulfill the GCFS Increment 1 Capabilities Production Document. PM Fires desires to replace the current GCFS system with a similar passive acoustic system but with additional capabilities to improve overall system reaction time, reduce the logistical footprint, reduce setup time, exploit newer algorithms to improve POO, POI, reduce false alarms, and digitally export data to the artillery Advanced Field Artillery Tactical Data System (AFATDS). The system shall be capable of covering a 20km area in frontage. For indirect fires 60mm and larger within range of hitting the GCFS Command Post (CP), the system shall have a probability of POO acquisition of at least 0.90 and provide POO/POI accuracy of 2 percent of range. The sensor posts shall be capable of self-survey of each individual microphone and maintain the ability to be emplaced with manual survey. The system shall include, and support array-based sensor posts as well as single microphone sensor posts. The system shall be capable of processing and displaying at least 6 events per second. The system shall be capable of exporting POO/POI messages digitally to AFATDS via JVMF messages. The system shall include a sensor planning tool to assist with listening post emplacement. The command post shall be able to communicate with sensor posts up to 15 km away. The system prototype shall be at Technology Readiness Level 6 or higher upon submission for topic consideration.

Technical Point of Contact(s): Joshua Culp, 703-432-3706, joshua.culp@usmc.mil or Bryan Freeman, 703-432-3459, bryan.freeman@usmc.mil

Requirement#: FY19-DoN-RIF-MCSC-03

Title: MCSC: Foreign Object Damage Mitigation Equipment (F2ME) – Runway Vacuum and Sweeper (RVS)

Military System or Acquisition Program Customer: Family of Foreign Object Damage (FOD) Mitigation Equipment (F2ME)
B2127 – Runway Sweeper

Description: The Marine Corps requires a debris mitigation system capable of removing or relocating foreign objects from aircraft operating surfaces at Forward Arming and Refueling Points in austere environments in order to reduce engine repair costs and enhance aircraft sortie rates. The current USMC FOD mitigation capability is not configured properly with adequate equipment to provide the necessary support for all USMC and Joint aircraft platforms in support of the Marine Corps Operating Concept. Analysis has outlined growing costs and decreased flight hours/operation due to FOD incidents. The amount of debris and required timelines for removal is disproportionate to our current FOD mitigation equipment capabilities in the air combat element.

The MHE-CE Team is seeking a F2ME – Runway Vacuum and Sweeper (RVS) capable of removing debris on aircraft operation surfaces in support of USMC aircraft and various joint platforms in austere environments. The capability should be able to clear, without causing damage, a minimum of 6,500 square feet per minute (sqft/min) of airfield surface, to include surfaces consisting of aluminum matting generation 2 (AM2). The effectiveness of the RVS should be able to pick up and retain 94% by weight of all debris in its path, while maintaining an Environmental Protection Agency air quality standard of Particulate Matter 10 (PM-10). The RVS should be designed to facilitate rapid cleanout of debris by an individual person in less than 5 minutes. The RVS should operate on JP8/F24 diesel fuel; operate in austere environments, temperature ranging from -25° Fahrenheit (F) to 120°F, and crosswind conditions with wind speeds up to 20 miles per hour. The RVS should be transportable by land via common rail carrier, commercial truck, and tactical vehicles; air via C-130, C-17, and C-5; and sea via Navy amphibious assault ships, landing craft utility, Maritime Preposition Fleet (MPF), and commercial shipping.

Technical Point of Contact(s): Jarrett Penn, (703) 432-5921, jarrettpenn@usmc.mil

Requirement#: FY19-DoN-RIF-MCSC-04

Title: MCSC: CAD File Research and Repository

Military System or Acquisition Program Customer: PM-AMMUNITION (test bed)

Description: Additive manufacturing/subtractive manufacturing (AM/SM) has made significant strides and continues to do so in industry and within the Department of Defense (DOD). Recently PM-AMMO, MCSC was contacted by an EOD team with a request for technical drawings in order to create a CAD file. This is not the first occurrence for such a request. Internal to the ammunition enterprise, Ammunition Technicians and their Officers alike have requested access to technologies so that they can be leveraged to educate and train their Marines. The CAD files could be used to 3D print training aids to support qualification and certification training for ammunition technicians. Most importantly the need is for an economical resource. EOD would like this information for training and disassembly purposes. It should also be noted that as ammunition configurations change, and they change often; many times, an EOD technician is not aware of a change until they are taking apart the round itself. A gap in access to such manageable information places Marines at a greater risk to loss of life and limb.

Currently the roadblocks are a myriad of factors that require the need for outsourced solutions or services. There is no central repository for ammunition assets (technical drawings). Even if the DOD were to own all technical drawings for ammunition items, finding them involves too much time in man-hours to be practical. There needs to be an accessible central repository for technical drawings. Legally, there are unique items that are held by industry and either the cost of proprietary rights prevents access to the technical drawings or industry is unyielding in providing them. There needs to be a legal process and understanding by which this information is accessible. There is also no cohesion across the military branches. The men and women who work with munitions have no consistent resource by which to rely upon. These “factors” all lack a reason by which service members lives should be placed at an increased risk whether by lack of access to training tools or lack of knowledge when rendering a live munition safe. PM-AMMO is open to all solutions by which through technology and service, technical drawings of munitions can be converted into CAD files (or similar files) and held in a central repository. Benefits could be applied to Augmented/Virtual Reality, amplifying service/inspection reference material with actionable tools, AM/SM training aids, and a common thread that can communicate to users. In other words, a change is made to an

ammunition item's configuration and those in the "need to know" are notified. As mentioned above, EOD technicians often do not have visibility of changes being made to munitions. If there was a common access tool that could communicate changes it would streamline Configuration management at the Strategic levels and inform in near real-time those changes to those that need to know and understand it the most. Common access would also improve and expedite decision and dialogue between industry and the DOD. Review and visualization of such information proves critical at all levels. Creating a system that can provide such access would be invaluable to the ammunition enterprise and all those that use it. It can also be the first step in creating a product that could be applied to a multitude of other organizations and this information is also in line with the strategic picture frequently referenced by the CMC.

Technical POC : Mr. Jon Carpenter (jonathan.carpenter@usmc.mil); Mr. Charles D. Black (charles.d.black1@usmc.mil); Mr. Lance A. Wine (lance.wine@usmc.mil); SSgt Alexander Long (alexander.long@usmc.mil)

Requirement#: FY19-DoN-RIF-MCSC-05

Title: MCSC: Munitions Integrated Tablet (MIT)

Military System or Acquisition Program Customer: PM-AMMUNITION (test bed)

Description: The Marine Corps ammunition enterprise manages, issues, and maintains all Class (V)W (ground conventional ammunition) assets for the United States Marine Corps. The nature of ammunition is inherently dangerous, and the communication of critical safety concerns is severely gapped. Hazards and concerns for ammunition are communicated with Notice of Ammunition Reclassification (NAR) and Ammunition Information Notices (AIN); this information can be the difference between life and death. Current management of this information requires stockpiling information and referencing the information appropriately during handling but as information changes there is no immediate way to validate that the ammunition being used forward is subject to a new NAR or AIN or that assets being received and stored are subject to the same information until after stowage and handling has occurred. Emerging network capabilities and handheld devices now provide the chance to place such information in the hands of Marines in real-time as they handle munitions.

Recently a Deliberate Urgent Needs Statement (D-UNS) was approved and submitted identifying this gap. The fleet Marines who interact daily with munitions have acknowledged the benefits of having information at their fingertips and the additional capabilities a networked handheld device could provide. Their commands have provided concurrence.

Outside of increasing the safety of handlers and users alike, a handheld device could also increase inventory accuracy, capture/expedite reporting, increase efficiencies in man-hours, and data created can be used immediately or accumulated for further analysis (machine learning, AI, COTS solutions, etc.).

What is needed for a Munitions Integrated Tablet is a hardware/software suite that is capable of connecting to both MCEN and tactical networks. It would need to be portable, rugged, HERO safe, and capable of scanning 2DBC barcodes, reading CAC, and taking photographs and video. Transactional and reporting methods would utilize mobile applications in a disconnected environment, connect to other networks such as NOTM/ANW2/MUOS, and also used cached web applications to later connect to MCEN. It is assumed that MCEN availability results in MCEN connectivity. With 4g/LTE service, handhelds would be able to have mobile connectivity to MCEN. The catalyst for such a product would be for it to maintain Marine Corps Cyber Security requirements with fluidity.

PM-AMMUNITION, MCSC would be able to facilitate test bed analysis with an iterative approach to design and development by providing access to user acceptance testing. Success of such a product would be easily transferable across the whole of the Marine Corps Logistics picture at Strategic, Operational, and Tactical levels providing a significant increase in the safety, accountability, and employment of ammunition or other assets.

Technical Point of Contact(s): Mr. Jon Carpenter (jonathan.carpenter@usmc.mil); Mr. Charles D. Black (charles.d.black1@usmc.mil); Mr. Lance A. Wine (lance.wine@usmc.mil); SSgt Alexander Long (alexander.long@usmc.mil)

Requirement #: FY19-DoN-RIF-MCSC-06

Title: MCSC: PEO LS Ground Based Air Defense (GBAD) Medium Range Intercept Fire Control Radar and RF Data Link

Military System or Acquisition Program Office:

Description: The GBAD Medium Range Intercept team is seeking a high precision, high update rate radar to support cruise missile defense missions. To be considered, the radar should be capable tracking inbound cruise missiles, when given a cue from a surveillance radar; as well as outbound interceptors when given a launch cue from a fire control system. The radar should be capable of encoding RF dwells with an encrypted data link payload that contains the measurement reports of both the threat and interceptor. The radar will only be required to track a handful of targets at a time. The ideal radar would be capable of full 360-degree operations; however, 90-degree coverage may be considered. Since there is a high data rate requirement a rotating radar is not desirable. A suitable radar will be vehicle mountable and be capable of being run on vehicle power and generator power.

Technical Point of Contact(s): Michael Klapp, 703-432-5178, michael.klapp@usmc.mil

Requirement #: FY19-DoN-RIF-MCSC-07

Title: MCSC: PEO LS Ground Based Air Defense (GBAD) Medium Range Intercept Low Cost Seeker Development

Military System or Acquisition Program Customer:

Description: The GBAD Medium Range Intercept team is looking for an RF seeker capable of supporting cruise missile defense missions. The seeker should be no more than 6 inches in diameter and 12 inches long. This must contain all power equipment necessary to power the seeker for 30 seconds. The seeker should have a total field of view of 30 degrees and be capable of detecting cruise missile sized targets to support terminal guidance at least 10km away. The seeker will receive cues from a ground-based radar via an uplink to the interceptor. The seeker should employ electronic countermeasures to enable function through masking jammers and standoff jammers. The seeker should have a production cost of no more than \$50k. Other options that may be considered are semi-active RF seekers with a ground-based illuminator. Unit cost for semi active seekers should remain below \$50k, and illuminators should cost no more than \$300k.

Technical Point of Contact(s): Michael Klapp, 703-432-5178, michael.klapp@usmc.mil

Requirement#: FY19-DoN-RIF-MCSC-08

Title: MCSC: Small Form Factor, Amphibious High Frequency On-The-Move Vehicular Antenna System

Military System or Acquisition Program Customer: Assault Amphibious Vehicle Family of Vehicles (AAV FoV), Product Manager, Assault Amphibious Vehicle (PdM AAV), Program Manager, Advanced Amphibious Assault (PM AAA)

Description: In satisfaction of AAV FoV requirements, and the High Frequency Radio II (HFR II) Capability Requirement Changes (CRC) requires a low profile vehicular OTM HF wideband (1.6 to 30 MHz) innovative antenna system to support the AAV FoV platform for both Line of Sight (LOS) and Near Vertical Incidence Sky-wave (NVIS) modes, non-concurrently, while on-the-move (OTM) supporting tactical beyond line-of-sight voice and data for mounted and dismounted forces across the Marine Air Ground Task Force (MAGTF) by 2024. The amphibious combat platforms will be required to support the infantry with greater bandwidth over greater distances to both transmit and receive critical data and voice information. The Marine Operational Concepts require flexible and robust beyond line of sight (BLOS) voice and data communications capability. With the movement to multi-band/multi-channel transceivers and more capable communication transceivers being employed within Marine Forces and Naval fleet there is a need to provide Marine Corps combat amphibious vehicles with a smaller low profile OTM HF wideband communications antenna capable of supporting LOS and NVIS with frequency adjust during operation for automatic link establishment (ALE) servicing the 1.6 to 30 MHz frequency range. The Amphibious Vehicular High Frequency On-The-Move Antenna System will operate within the AAV operational environment, and acts as a primary means of communication while operating in a satellite degraded/denied environment. The greater capability is not just for the command and control (C2) specific variant vehicles, but also to personnel variant vehicles that carry the infantry maneuver force.

Technical Point of Contact(s): Mr. Robert Gose, (703) 784-1156, Robert.gose1@usmc.mil

Requirement #: FY19-DoN-RIF-MCSC-09

Title: MCSC: Mobile Recycling Facility – Expeditionary (MRF-X)

Military System or Acquisition Program Customer: Expeditionary Fabrication Laboratory (EXFAB), Portfolio Manager Logistics Combat Element (PfM LCES), Program Manager Supply and Maintenance Systems (PM SMS).

Description: The Marine Corps requires a plastic recycling system capable of recycling thermoplastic plastic food, beverage and shipping packaging and failed 3-D prints into filament and pellet form that can be fed into an extrusion device. A significant amount of waste/scrap materials are generated daily on military operating bases. These materials are either recycled or burned in open pit fires, inflicting damage to the environment and personnel health. Additive manufacturing (AM) technologies are critical to maintaining operational readiness of the military and allowing on-demand manufacturing of critical and complicated parts. Developing methods to process waste into useful AM feedstocks is expected to have a great impact on many parts of the USMC, as well as other units in remote locations in which re-use of materials could present significant cost and energy savings. This project also could significantly reduce costs for additive manufacturing processes and be a key cost enabler for the expansion of this technology for the USMC. The SMS Team is seeking an Expeditionary Mobile Recycling Facility (MRF-X) capable of cleaning, drying, and processing thermoplastics into pellets and filament for use in material extrusion equipment such as 3-D printers and injection molders in remote and

austere environments. The MRF-X shall have all equipment housed in a standard or expandable 20-foot ISO container, with proper tie-downs and ruggedizing necessary for transport by land and sea. The unit shall contain duct work to support a 60,000 BTU ECU and meet OSHA standards of temperature range of 68-76 °F and humidity range of 20-60%. In addition, the unit must be able to be powered by a generator. The unit shall have plastic sorting, cleaning, drying and shredding capabilities. Automation of all or part of these capabilities is preferred. In addition, the unit shall have an automated recycling system (ARS) capable of processing thermoplastic shreds from consumer-grade packaging such as PET, as well as shreds from failed 3-D prints. The ARS shall melt and reconstitute thermoplastics into 2.85 ± 0.1 mm diameter filament spools or pellets at an output rate exceeding 2 kg per hour.

Technical POC: Dr. Nicole Zander, (410) 306-1965, nicole.e.zander.civ@mail.mil

Requirement #: FY19-DoN-RIF-SSP-01

Title: Strategic Systems Programs (SSP): Modular Flight Test Instrumentation for Persistent Unmanned Surface Vehicles

Military System or Acquisition Program Customer: Strategic Systems Programs (SSP)

Description: SSP is integrating persistent autonomous unmanned surface vehicles (USVs) to serve as instrumentation platforms for TRIDENT II D5 missile launch and terminal areas. Use of these platforms and others like them are consistent with SSP's long-term vision for flight test instrumentation (FTI) that can reduce life cycle cost by decreasing staffing and logistics requirements, reduce the sustainment cost of legacy instrumentation, and reduce human and equipment safety risks, while increasing the fidelity and flexibility of data collection to support flight test instrumentation for future enhanced weapon systems. SSP is seeking innovative cost-effective instrumentation concepts that provide enhanced data to support assessment of aging and / or emerging missile capabilities and that are suitable for modular deployment on existing persistent autonomous USVs. These innovative technologies must be efficient in their usage of power and data bandwidth to be compatible with the persistent USV concept, and will provide data products for trajectory development, performance evaluation, and anomaly investigation. Of particular interest are multi-band technologies that provide multi-spectral data collection from small form factor instrumentation suitable for persistent USV integration.

Technical POC: Kamini Leach, 202-433-5768, kamini.leach@ssp.navy.mil

Requirement #: FY19-DoN-RIF-SSP-02

Requirement Title: Receiving/Processing Variety of Modulation Schemes for Sensor Data Fusion **Military System or Acquisition Program Customer:** Strategic Systems Programs Office (SSP)

Description: SSP is seeking innovative, cost-effective technologies to meet the requirements associated with flight test telemetry data recording during Trident II D5 missile flight test operations. SSP's technology insertion efforts and long-term vision goals are focused on the development and deployment of concepts and architectures to be employed across the flight test corridor. Such capabilities include the ability to receive and process a variety of modulation schemes to include Pulse Code Modulation (PCM) and Shaped Offset Quadratic Phase Shift Keying (SOQPSK). Also important are concepts that provide opportunities for sensor data fusion.

Technical POC: Kamini Leach, 202-433-5768, kamini.leach@ssp.navy.mil

Requirement #: FY19-DoN-RIF-SSP-03

Requirement Title: Strategic Systems Program (SSP) Long Range / Long Endurance Drone Flight Test Instrumentation Support

Military System or Acquisition Program Customer: SSP Flight Test Instrumentation Program.

Description: The Navy's Strategic Systems Programs (SSP) Trident II D5 Life Extension (D5LE) flight test program requires flight path presence of sensors to capture data for performance assessment in the launch, mid-course, and terminal areas in international waters. The Department of Defense has drone capability – global hawk, reaper, broad area maritime demonstrator, etc. Modifying available drones or developing a new drone with a tailored payload to capture telemetry and optical information would reduce costs and ensure no gaps in flight test data collection, both along the flight path and off-axis collection. Cost reduction could be seen by replacing surface ship (reduces personnel and maintenance / operating costs) and land collection capabilities (personnel costs, maintenance and operations costs, logistics cost). A drone capability supplies an unmanned platform that could deliver equivalent quality data at specific times required by flight testing.

Technical POC: Kamini Leach, 202-433-5768, kamini.leach@ssp.navy.mil

Requirement #: FY19-DoN-RIF-SSP-04

Requirement Title: Strategic Systems Program (SSP) Telemetry Collection and Flight Test Program Data Collection

Military System or Acquisition Program Customer: SSP Flight Test Instrumentation Program

Description: The Navy's Strategic Systems Programs (SSP) Trident II D5 Life Extension (D5LE) flight test program requires telemetry collection to assess missile performance in support of National and Navy requirements. Currently, telemetry is collected using Cape Canaveral, Jonathan Dickinson Missile Tracking Annex (JDMTA), and Ascension Island telemeters along with the Portable Adaptable Telemetry System (PATS) deployed to St. Croix, U.S. Virgin Islands and the S-Band Mobile Array Telemeter (SMART) installed on the Navy Mobile Instrumentation System (NMIS) ship. The pending implementation of Autonomous Flight Safety System on the Eastern Range / Western Range and subsequent divestiture of range safety equipment (which also collects performance data) may lead to gaps in information collection.

Development of new telemetry equipment and collection techniques, such as space based / S-Band receivers based in space and telemetry receivers from unmanned aerial vehicles (UAVs) may mitigate the loss of telemetry resourcing due to changes in range architecture. Cost reduction could be seen by developing lower cost telemetry to replace divested or obsolete equipment as well as from reduction of personnel costs from having to maintain and operate legacy telemetry equipment. Unmanned and/or updated telemetry equipment could deliver equivalent quality data at specific times required by flight testing.

Development of new tracking and data collection techniques using laser technology may mitigate the loss of position tracking resources from potential changes in range architecture. Cost reduction could be seen by developing lower cost tracking and data collection resources to replace divested or obsolete equipment as well as from reduction

of personnel costs from having to maintain and operate legacy telemetry equipment. An incorporation of laser technology could deliver equivalent missile and reentry body track quality and performance data at specific times required by flight testing.

Technical POC: Kamini Leach, 202-433-5768, kamini.leach@ssp.navy.mil

Requirement #: FY19-DoN-RIF-NAVSUP-01

Requirement Title: NAVSUP Ammunition Perfect Order Module (APOM)

Military System or Acquisition Program Customer: Ordnance Information System (OIS)

Description: NAVSUP is aligning the business model for the Navy's \$39B ammunition supply chain with best practices in global supply chain management. This software solution is required to enable real-time risk assessment of operational and readiness trade-offs based on intensity, vulnerability and individual node criticality. Ordnance logisticians require an agile operating model to quickly assess, evaluate, and execute optimal order fulfillment strategies to predict and mitigate the impacts of unexpected disruptions, such as: weather, ammunition availability, pier closure; often encountered with order fulfillment actions. Fleet customers need an automated tool that will remove the complexity of the ordering process. The insertion of this technology will integrate pieces of push logistics into the broader operating model for the ammunition supply chain to produce improved efficiencies across the value chain. This technology solution will leverage the positioning and total asset visibility capabilities of Global Ammunition Strategic Positioning Module (GASPM) and Lot Serial Number Accuracy (LSNA) and existing requisition sourcing logic within OIS to support activity-based cost-to-deliver analytics. The capability includes real-time data analytics, visualization software, a front-end user interface, automated sourcing logic and a distribution optimization model to facilitate informed supply chain decision-making focused on reducing risk exposure and total ownership costs.

Technical POC: Mark Deebel, 717-605-7039, mark.deebel@navy.mil

Requirement #: FY19-DoN-RIF-BUMED-01

Title: Immersion/Survival Suit for Naval Operations (ISSNO)

Military System or Acquisition Program Customer: Naval Surface and Submarine Forces

Description: The Navy and Marine Corps desires a capability to extend life expectancy due to hypothermia and/or immersion to the maximum extent possible of injured and uninjured warfighters in the maritime environment. Specifically, this capability should be targeted to those warfighters that are expected to be immersed in water for an extended period of time until their eventual rescue and recovery. The capability should be lightweight, easy to don, and offers flotation (while keeping the head supported) with and extended hypothermia protection beyond current immersion suite capabilities, as well as protection from predators (e.g., sharks, jelly fish, etc...) in the event of water immersion. The capability should also be designed to limit water flushing when immersed and have integrated features that will enhance visibility, GPS tracking, and allow for physiological monitoring transmission (i.e., is the warfighter still alive) to inform rescue and recovery. This capability is needed in both warm and cold climates.

The solution sought will give our warfighters that are otherwise stranded and/or isolated in a maritime environment (in or out of the water) the best chance at survival for what is likely to be an extended period until rescued/recovered.

Technical POC: Naval Advanced Medical Development (NAMD), 301-319-6457,

Requirement #: FY19-DoN-RIF-BUMED-02

Title: Rapid Patient Warmers

Military System or Acquisition Program Customer: Naval Surface, Air, Submarine, and Marine Corps Forces.

Description: The Navy and Marine Corps desires a capability to rapidly rewarm hypothermic personnel, whether recovered from water immersion or due to other environmental exposure. Hypothermia is a medical emergency that must be addressed as quickly as possible before death results. Specifically, this capability should be targeted to those platforms that will respond and provide initial medical care to address hypothermia in our Naval Warfighters. The capability should be lightweight, easy to use, airworthy, and function in a variety of climes. The capability should also be designed in a manner to not interfere with other safety, medical, and/or rescue equipment. The solution sought will give our warfighters that are hypothermic the best chance at survival by being rewarmed as quickly as possible.

Technical POC: Naval Advanced Medical Development (NAMD),301-319-6457, usn.detrick.navmedrschcensvsmd.list.amdpo@mail.mil

16.0. Department of the Air Force Annex. This section is specific to the Department of the Air Force Only

16.1. Points of Contact

16.1.1. Technical Questions. Air Force Annex technical questions should be addressed to the AF RIF Program Management Office: Ms. Lori Miller, AFLCMC/OZT, lori.miller.5@us.af.mil.

16.1.2. Contracting Questions. Air Force Annex contract inquiries should be addressed to the AF RIF Contracting Office: Mr. Michael Webb, AFLCMC/PZIEA, michael.webb.34@us.af.mil

16.2. Technical Inquiries. During the open BAA period, Offerors may submit technical questions regarding specific Air Force topic areas directly to the Technical POC (TPOC) listed under each topic. Offerors have an opportunity to ask technical questions only about specific requirements. Questions should be limited to specific information related to improving the understanding of a particular requirement. Offerors may not ask for advice or guidance on solution approach and may not submit any material to the TPOC. Please note: All questions should be submitted NLT two weeks prior to the white paper submission period deadline. Questions received within the last two weeks of the white paper submission period may not receive a response.

16.3. Ombudsman. AFFARS clause 5352.201-9101, Ombudsman (Aug 2005), will be contained in any contracts or agreements resulting from this BAA.

16.4. Updates of Publicly Available Information Regarding Responsibility Matters. Any contract or assistance award exceeding \$500,000.00 for which an Offeror checked “has” in paragraph (b) of the provision 52.209-7 shall contain the clause/article, “Updates of Publicly Available Information Regarding Responsibility Matters (Jan 2011)”.

16.5. Nuclear Weapons Related Material (NWRM). Proposed efforts may require management, delivery, or use of Nuclear Weapons Related Material (NWRM). Therefore, AFFARS clause 5352.223-9003, Enhanced Security of Products, is hereby incorporated by reference. If the effort proposed requires NWRM, the Offeror will include the appropriate security information as provided by the vendor(s).

16.6. Air Force Requirements

Air Force Life Cycle Management Center

Requirement #: USAF-19-AFLCMC-1.C

Title: Safe Removal and Surface Preparation of Air Force Canopy Films/Coatings

Military System or Acquisition Customer: Air Logistics Complexes ("Depots")

Description: Demonstrate and provide equipment to safely and affordably remove film/coating from Air Force aircraft canopies, and prepare the canopy substrate to successfully accept a new application of the film/coating, utilizing laser and supporting robotic technology. Laser technology has proven to be an instrumental technology in the safe and efficient removal of aircraft outer mold line coatings in a depot setting, reducing lead-time and costs significantly. However, lack of sufficient material testing of effects of various laser technologies on enterprise Air Force substrate materials results in a need to expand said capabilities to additional applications. The current available methods of film/coating removal on canopies result in damage to the canopy substrate and do not

allow for re-application of the film/coating. The damage to the substrate results in condemnation of the canopy and high costs of demilitarization and procurement of new canopies. The equipment demonstrated will be transitioned into production through current proven Air Force facilities for specific production of canopy film/coating removal and reapplication.

Technical Point of Contact(s): Jesse L. Holdaway, jesse.holdaway@us.af.mil (937) 255-4794 or Michael H. Froning, michael.froning@us.af.mil (937) 255-8679

Requirement #: USAF-19-AFLCMC-1.D

Title: Improved Cold Spray (CS) Nozzle Material or Surface Treatment to Increase Life and Performance

Military System or Acquisition Customer: Air Logistics Complexes ("Depots")

Description: Demonstrate and provide production-capable equipment which increases the life and performance of CS nozzles. CS repair offers a cost-effective way to repair metal components. One of the challenges inherent to current technology is design, fabrication, and durability of the converging/diverging spray nozzles. One challenge is creating complex shaped nozzle geometries (e.g., curved, short throw, smooth interior finish). Current nozzles are also subject to wear and clogging. The Air Force is looking to develop new nozzle designs that address these shortcomings. Vendors replying to this topic will need to demonstrate significant expertise in CS equipment design and application, materials science, and wear abatement. The equipment demonstrated will be transitioned into production through current proven Air Force facilities for specific CS repair applications.

Technical Point of Contact(s): Jesse L. Holdaway, jesse.holdaway@us.af.mil (937) 255-4794 or Michael H. Froning, michael.froning@us.af.mil (937) 255-8679

Requirement #: USAF-19-AFLCMC-1.E

Title: Semi-/Autonomous Match Drilling of Holes in Air Force Replacement Assets

Military System or Acquisition Customer: Air Logistics Complexes ("Depots")

Description: Demonstrate and provide portable equipment to autonomously/semi-autonomously map/locate holes on condemned assets and match drill those holes in replacement aircraft assets, in a safe and affordable manner. One of the challenges inherent to replacement of aircraft parts is match drilling holes from the condemned part to the new part. These challenges regularly result in condemnation of new replacement parts due to incorrectly located or drilled holes. Advancements in 3D Scanning, robot vision, and robot control have enabled enhanced capability in initial production of assets, reducing lead-time and costs significantly. However, lack of sufficient efforts has prohibited this technology from successfully being widely integrated into the maintenance environment. The Air Force is looking to develop an integrated system that addresses these shortcomings. Vendors replying to this topic will need to demonstrate significant expertise in integrated robotic system design, prototyping and successful production system delivery. The equipment demonstrated will be transitioned into production through current proven Air Force facilities for specific aircraft repair applications.

Technical Point of Contact(s): Jesse L. Holdaway, jesse.holdaway@us.af.mil (937) 255-4794 or Michael H. Froning, michael.froning@us.af.mil (937) 255-8679

Requirement #: USAF-19-AFLCMC-1.F

Title: Development of Cold Spray (CS) Bore Repairs on Air Force Assets

Military System or Acquisition Customer: Air Logistics Complexes ("Depots")

Description: Demonstrate and provide CS equipment to safely and affordably repair damage to inner bores of Air Force wheels, gearboxes, or other assets. CS repair offers a cost-effective way to repair metal components. One of the challenges inherent to current CS technology is the inability to reach some desired internal, limited diameter part features in the repair area with the desired perpendicular spray plume. Development of CS repairs requires expensive material testing and process refinement. The Air Force is looking for the selected vendor to develop new internal bore repair techniques that address these shortcomings, and to define and complete the material testing and process definition required to complete a certifiable repair. Vendors replying to this topic will need to demonstrate significant expertise in CS equipment design and application, materials science, and wear abatement. The equipment demonstrated will be transitioned into production through current proven Air Force facilities for specific CS repair applications.

Technical Point of Contact(s): Jesse L. Holdaway, jesse.holdaway@us.af.mil (937) 255-4794 or Michael H. Froning, michael.froning@us.af.mil (937) 255-8679

AFLCMC/Armament Systems Development Division

Requirement #: USAF-19-AFLCMC-1.G

Title: Improved Wear/Corrosion Resistant and Low Friction Coatings for Ferrous and Non-Ferrous Armament Substrates

Military System or Acquisition Customer: Armament Systems Development Division

Description: Both ferrous and non-ferrous armament hardware components used in gun systems, bomb racks, missile launcher and rail applications are subjected to high cyclical loading, sliding and bearing wearing, high temperatures, and corrosive conditions. Various heat treatments, metal plating processes, and thermal spray coatings are currently employed to improve component durability. In addition, dry, solid film lubricants are often applied to help prevent corrosion, improve surface lubricity, and prevent sticking and seizing. Interior surfaces present a significant coating challenge due to limited internal diameters and large aspect ratios. The USAF is looking to mature an existing surface chemistry alteration or coating technology that can produce consistent coatings to close tolerances, provide good corrosion resistance, and eliminate the need to apply lubrication. Goal is to both improve current wear resistance and component durability by an order of magnitude. Focus should be on optimizing the process parameters to provide the tight tolerance control and surface finish required for armament applications, while minimizing dimensional impact compared to previously used coatings.

Technical Point of Contact(s): Michael H. Froning, michael.froning@us.af.mil (937) 255-8679 or Mark J. McMullan, mark.mcmullan.1@us.af.mil (478) 327-2846

Requirement #: USAF-19-AFLCMC-1.H

Title: Automated Large Area 3D Scanning, Modeling, and Inspection System

Military System or Acquisition Customer: Depots and Field Maintenance Units

Description: The USAF is increasing use of robotics and associated automation to perform maintenance on aircraft and aircraft systems. Applications include laser removal of paint and coatings, robotic application of paint, reverse engineering, and non-destructive inspection. Laser and white light scanning technologies are commercially available to reverse engineer and build Computer Aided Design (CAD) models but are limited in their ability to build accurate and precise models of large structures, as well as components that cannot be easily removed for inspection. Particularly challenging are large aircraft outer mold line surfaces. The Air Force needs an integrated, portable, user-friendly approach for quickly, accurately, and cost-effectively scanning and building 3D CAD models of aircraft. The goal of this solicitation is to develop and assemble a

complete solution based upon commercially-available hardware and software integrated into a cohesive system that can be utilized across the USAF Enterprise at both Depot and field level. Successful vendor proposal must demonstrate strong knowledge and track record of integrating state-of-the-art critical supporting technologies including: drones (tethered and untethered), automation, laser and light scanning, and mapping hardware and software. Proposals will be judged upon the proposed system's ability to generate models capable of sub-micron levels of precision and accuracy with minimal operator intervention. Other key considerations will be ease of operation, portability, adaptability to various modeling requirements (part size and location either internal or external to an aircraft), set-up time, scan rate, and overall system physical size.

Technical Point of Contact(s): Jesse Holdaway, jesse.holdaway@us.af.mil (937) 255-4794 or John Hedke, john.hedke@us.af.mil (937) 656-6873

Requirement #: USAF-19-AFLCMC-1.L

Title: Interference Fit Fastener Verification Tool

Military System or Acquisition Customer: A-10

Description: Aircraft structural design commonly uses interference fit fasteners to improve the performance of a joint in multiple areas such as static, fatigue, wear/fretting, and more. Interference fit fasteners are fasteners whose diameter is slightly larger than the hole in which the fastener is being installed. Decades of test data and real-world use data have demonstrated that interference fit fasteners are far superior to clearance fit fasteners. As a result, most design and rework analysis require the use of interference fit fasteners. However, there is currently no way to verify that an installed fastener is actually creating an interference fit with the part. There are ample opportunities for an installed fastener to not actually be interference. The possibilities range from a fastener being stocked in the wrong bin, to the incorrect reamer being used prior to fastener install. As a result, the fatigue benefit of using an interference fit fastener is excluded just in case the fastener installed is not actually interference fit. Consequently, there is a need for a tool that can verify that an installed fastener is actually creating an interference with the parent material. The tool should be capable of identifying the percent interference of the fastener and verifying that the interference is around the full circumference of the hole. A similar RIF effort under announcement number AFRL-PK-11-0001 and proposal number AFRL11-03-P-0004 was successful in developing a tool capable of verifying a hole was cold expanded properly. The tool developed under this effort could utilize a similar approach, or a different approach to the solution, but must be capable of verifying fastener interference around the circumference of the hole and quantifying a percent interference of the fastener and the parent material.

Technical Point of Contact(s): Jacob Warner, jacob.warner@us.af.mil (801) 586-7143 or Hazen Sedgwick, hazen.sedgwick@us.af.mil (801) 586-0346

Requirement #: USAF-19-AFLCMC-1.M

Title: Development of Augmented Reality System for Application in Additive Manufacturing (AM)

Military System or Acquisition Customer: Air Logistics Complexes ("Depots") and Field Units

Description: The US Air Force is currently implementing AM across the Enterprise. Key to that implementation is developing standardized processes, procedures, and training in order to achieve our long-term goal of printing anywhere, on-demand. As the use of AM continues to grow, it becomes increasingly important to develop a capable and efficient workforce, as well as consistent process aids and controls to support that growth.

AM equipment and processes are complex, requiring proper equipment setup and maintenance and strict adherence to detailed technical orders for proper equipment operation and part builds. Based on successes in various industrial settings, it is expected that the application of emerging virtual, augmented, and mixed reality technologies can revolutionize AM operator training and support task execution. Therefore, AFLCMC/EZP is interested in technical solutions which provide organic AM units with Virtual/Augmented/Mixed Reality (V/A/MR) capabilities for operator training, equipment maintenance training, and task execution. AFLCMC/EZP desires a user-friendly solution which enables the AM units to develop their own unique task training and instructions affordably and efficiently. The goal of this solicitation is to develop and assemble a complete solution based upon commercially available hardware and software, integrated into a cohesive system that can be utilized across the USAF Enterprise at both Depot and field level. Successful vendor proposal must demonstrate strong knowledge of and significant experience in: AM equipment and processing, V/A/MR hardware and software, and implementation and integration of complex hardware/software systems. **Technical Point of Contact(s):** Michael H. Froning, michael.froning@us.af.mil (937) 255-8679 or John Hedke, john.hedke@us.af.mil (937) 656-6873

Air Force Nuclear Weapons Center Commander

Requirement #: USAF-19-AFNWCC-2.A

Title: Air Launched Cruise Missile (ALCM) Desiccant Modification

Military System or Acquisition Customer: AFGSC

Description: Bottom Line Up Front (BLUF): Need for a shorter or modified desiccant assembly or alternative desiccant on the ALCM to allow the desiccant assembly to be changed in less than ten (10) minutes versus 24 hours. The current desiccant assembly has an overall length of approximately 4.5"-5", and would need to be reduced to a length no greater than 2.125". The increase in desiccant life would be necessary due to the decrease in volume of a shortened desiccant canister, and potentially would allow longer maintenance periods and reduced man-hours over the lifetime of the missile. Current desiccant used is molecular sieve type 4A, having an adsorbed water percent of 20-21 (percent w/w). Background details: The Common Strategic Rotary Launcher (CSRL) is used to carry and deploy ALCMs from a B-52. During regular maintenance periods, the desiccant assembly (P/N 232-30766-5) for each missile uploaded onto a CSRL needs to be examined and replaced if their serviceable life has passed. When a missile is on a CSRL position 1, position 2, or position 8 stored in the weapon structures, the capability does not exist to change expired desiccants due to the adapter on which they are stored. If the desiccant needs to be changed, a crew must be assembled to open the structure, tow the package to the Integrated Maintenance Facility, upload the package to a frame, and change the desiccant by removing the desiccant assembly. The process is reversed for storing the CSRL back in a structure after. The need here is for the capability to replace a desiccant assembly in those positions without the adapter/trailer getting in the way and without using all the necessary manpower, possibly by modifying the desiccant assembly to fit the form of the scenario. Why is this important? This would save thousands of man-hours a year on desiccant replacement, and the development of a potentially longer-life desiccant could be used on the follow-on cruise missile and other comparable weapon systems.

Technical Point of Contact(s): Hugh Maguire, hugh.maguire@us.af.mil (405) 739-8863

Air Force Sustainment Center

Requirement #: USAF-19-AFSC-3.A

Title: Additive Manufacture (AM) of Tooling Via Large Format Material Extrusion

Military System or Acquisition Customer: Air Logistics Complexes ("Depots")

Description: Demonstrate and provide an additive manufacturing machine to rapidly and affordably produce large sheet metal and composites tooling utilizing material extrusion 3D printing. 3D printed polymer tooling has proven to be an instrumental technology in the rapid manufacture of small tooling and fixtures in the depots, reducing lead-time and costs significantly. However, limited print size and high material costs of the common machines being used across the Air Force results in a need to expand said capabilities to rapidly produce large tooling (greater than 4' X 4' X 2') using additive manufacturing. The amount of print time and material required for large sheet metal and composites tools, coupled with competing priorities for printing other items, is becoming prohibitive and resulting in backlog. The need is for an additive machine specialized for large tooling. The machinery demonstrated will be transitioned into production through current proven Air Force AM facilities (REACT) for specific production of sheet metal and composites tooling (not for direct additive manufacture of aircraft parts). The provided machine shall have a minimum build volume of 4' X 4' X 2' (L X W X H) and shall extrude carbon filled Polyetherimide (PEI) or equivalent materials with low Coefficient of Thermal Expansion (CTE), capable of handling curing temperatures of up to 400 degrees Fahrenheit. Materials extruded shall also survive sheet metal forming pressures of up to 8,000 PSI. The machine shall be capable of extruding a minimum of 5 lbs/hr. The machine shall produce an "as printed" surface finish of no more than 1000Ra (micro inch). If the machine cannot produce the as printed surface finish requirement, means shall be provided to post process items to or below said requirement. All software shall be provided for build setup and sending jobs to the machine (if accomplished on a separate computer). Additionally, all materials used and suppliers of said material shall be identified for future acquisition of materials.

Technical Point of Contact(s): Jason Mann, jason.mann.6@us.af.mil (405) 622-7607 or Kyle Taylor, kyle.taylor.4@us.af.mil (405) 582-5438

Requirement #: USAF-19-AFSC-3.B

Title: Deployable Aviation/Diesel Fuel Desulfurization Capability

Military System or Acquisition Customer: Aerospace Fuels

Description: Develop, demonstrate, and provide a deployable system capable of converting a high sulfur content aviation turbine or diesel fuel, meeting various international specifications, into an Ultra-Low Sulfur Diesel (ULSD) fuel alternative (less than 15 parts per million (ppm)), meeting the minimum specification requirements of an ASTM D975 Standard Specification for Diesel Fuel Oils, Grade No. 1-D S15 product. The ULSD diesel fuel alternative shall be fit for purpose for use in commercial-off-the-shelf Environmental Protection Agency (EPA) Tier IV diesel ground support equipment and ground vehicles; existing U.S. Air Force support equipment, vehicles, and generators requiring ULSD; and power generation fuel cells in various foreign contingency or humanitarian relief scenarios. To date, the process technology consists of separate, pilot-scale process components that convert aviation turbine fuel having sulfur levels as high as 2,200 ppm, to a fuel successfully with less than 15 ppm sulfur, while meeting all required composition and chemical property parameters. Preliminary cost and engineering data for the design and construction of a deployable prototype have been generated. The proposed program shall consist of successive phases which will culminate in a production prototype that shall be capable of operating at a deployed site under continuous flow conditions at standard atmospheric pressure and ambient temperature,

for extensive U.S. Air Force field testing. The desired deliverable must be air transportable, self-contained including external fuel storage, self-powered, conform to current fuel operational standards, require very little training, minimize the generation of hazardous waste, minimize required consumables, have minimum deployed environmental impact, have a limited logistics footprint, have a targeted conversion cost of less than \$0.50 per gallon, and be able to convert 2,500 gallons per 20-hour period. Applicable testing data, along with an operations and maintenance manual, must be included in the delivery in addition to on-site training. Defense Production Act Title III funding does not apply because the deployment capability would not enhance the domestic industrial base.

Technical Point of Contact(s): Gordon J. Walker, gordon.walker@us.af.mil (312) 785-8017 or Steven P. Freund, steven.freund.2@us.af.mil (312) 785-6367

Requirement #: USAF-19-AFSC-3.C

Title: General Purpose Research Range (GPRR) for F-16 Radome and Radar Antenna

Military System or Acquisition Customer: Air Logistics Complexes ("Depots")

Description: Integrate existing Government Off-The-Shelf (GOTS) and Commercial Off-The-Shelf (COTS) hardware with custom software to improve Hill Air Force Base production resiliency by increasing resources, capabilities, and understandings of Radio Frequency (RF) systems. Novel technologies in GPRR include Quiet Zone (QZ) characterization, and real-time acquisition of multi-frequency/dual-polarization/phased array antennas. Reduces test time by 85 percent on each FCRATS antenna. Enterprise-wide collaboration is considering possibility of Tinker Air Force Base radome test methods applied at Hill Air Force Base - increasing enterprise-wide commonality and resilience with test capabilities at multiple locations.

Technical Point of Contact(s): Dr. Dean Boren, dean.boren@us.af.mil (801)586-1898

Requirement #: USAF-19-AFSC-3.D

Title: High Pressure Warm Forming (HPWF) Cell for Manufacturing Titanium Sheet Metal Parts

Military System or Acquisition Customer: Aviation platforms, Air Logistics Complexes ("Depots")

Description: HPWF technology is more energy efficient than hot forming and super plastic forming technologies traditionally used to manufacture titanium components. HPWF technology performs at a lower temperature environment (550 degrees Fahrenheit instead of 1,400 degrees Fahrenheit) with drastically shorter cycle time, and does not require expensive argon gas, thereby increasing production efficiency while reducing costs. The technology has been demonstrated in a relevant environment, being used commercially. Hill Air Force Base currently does not have the capability to manufacture complex titanium sheet metal parts which are increasingly common on fifth generation airframes, including the F-22 and F-35 which Hill Air Force Base is scheduled to maintain.

Technical Point of Contact(s): Jadee Bodell, jadee.bodell.2@us.af.mil (801) 777-1723

Requirement #: USAF-19-AFSC-3.E

Title: Real Time Radio Frequency Countermeasures (RFCM) Analysis System

Military System or Acquisition Customer: ALQ-251 Radio Frequency (RF) Countermeasures System, AFSOC AC/MC-130J aircraft, WR-ALC

Description: Develop, test, and demonstrate a RFCM Analysis System. The system will perform software and hardware testing to measure the RF output of an Electronic

Warfare (EW) system and objectively compare test results to expected data, innovating how lab testing is performed. Currently, EW RF Countermeasure testing is performed subjectively by a technician requiring a high degree of experience and education. Technicians of this caliber are rapidly diminishing, and test results are evaluated on a pass/fail basis, as assessed by the technician. This system will enable the Air Force to cost-effectively modernize its hardware-in-the-loop test equipment by reducing man-hour and training costs. Also, this concept could be applied to other manpower intensive systems, such as retrieving parts from depot manufacturing processes for quality assurance testing. This will reduce manpower costs for those systems as well.

Technical Point of Contact(s): Eric Persson, eric.persson.2@us.af.mil (478) 926-7962

Air Force Test Center (AFTC)

AFTC/412th Range Squadron (TENG)

Requirement #: USAF-19-AFTC-4.A

Title: Range Automated Ground Target Systems

Military System or Acquisition Customer: Air Force (AF) / Weapon System Program Offices, Precision Attack SPO

Description: Multiple Edwards AFB flight test customers have a need for ground-based targets.

The 412 TW has a need for automated intelligent vehicle systems on the Precision Impact Range Area (PIRA). This capability would provide a cost savings, eliminate mission cancellations due to lack of available personnel, while eliminating potential risk to range personal. This capability would enable night target operations, targeting with high power directed energy, improves target testing by increasing the number of vehicles that can run a mission, eliminates driver fatigue, increases repeatability of tests, and increases test accuracy (e.g., spacing and speed).

Technical Point of Contact(s): John Streets, john.streets.1@us.af.mil (661) 277-0260

AFTC/412th Test Wing (TW) 461st Flight Test Squadron (FLTS)

Requirement #: USAF-19-AFTC-4.B

Title: Vertical Takeoff and Landing (VTOL) Sky-Launch System

Military System or Acquisition Customer: Department of Defense

Description: VTOL capable aircraft are nearly always a compromise in capabilities due to the additional weight, drag, and increased energy requirements to enable VTOLs. This project seeks to demonstrate the ability to launch a Conventional Takeoff and Landing (CTOL) small aircraft of Unmanned Aerial Vehicle (UAV) on a modular VTOL platform that is self-powered and automated. This platform will launch vertically, carrying the small aircraft or sUAV, accelerate above stall speed, and then disconnect and drop away autonomously and land to recharge. Due to energy savings and decreased weight and drag, this will provide increased combat radii to the CTOL aircraft and increased payload capacity. This will provide increased combat capability to remote and austere land or sea theaters of operation.

Technical Point of Contact(s): Lt Col Raven LeClair, raven.leclair@jsf.mil (661) 275-3466

AFTC/412th Test Wing (TW) 461st Flight Test Squadron (FLTS)

Requirement #: USAF-19-AFTC-4.C

Title: Automated Inflight Air-Air Electric Aircraft/small Unmanned Aerial Vehicle (sUAV) Charging for Increased Combat Radius

Military System or Acquisition Customer: Department of Defense

Description: The objective of this project is to demonstrate automated air-air electric aircraft and sUAV charging to address the limitations of current energy storage technology, which limits flight time and combat radius of electric aircraft. Energy harvesting technology via Radio Frequency (RF) wireless charging will address operations within line of sight of friendly forces but does not address the problem of combat radius and flight time beyond friendly line of sight. An automated in-flight electric charging capability will enable extended combat operations of sUAVs and other electric vehicles.

Technical Point of Contact(s): Lt Col Raven LeClair, raven.leclair@jsf.mil (661) 275-3466

AFTC/412th Operations Support Squadron (OSS)

Requirement #: USAF-19-AFTC-4.D

Title: Control Tower Head-Mounted Display (HMD)

Military System or Acquisition Customer: Air Force (AF) / Air Traffic Control (ATC) Towers

Description: Develop a system that provides operational information and increases ATC Tower Controllers' situational awareness by using Augmented Reality (AR) to track and display aircraft and aircraft information. This system would interface with transponder, Automatic Dependent Surveillance Broadcast (ADS-B), and/or approach radar feeds to display operationally pertinent aircraft data such as call sign, aircraft type, altitude, speed, and beacon code. The HMD would be a goggle or glasses apparatus that would not interfere or degrade their vision. Current Air Force ATCs are based on 1980's technology and plain eyeballs. Foreign ATC facilities have already proven the concept. Leaders can tailor HMDs to fit individual needs of each control tower. AR would propel Air Force ATCs into the 21st century, curbing fuel costs, reducing training times, and decreasing human error. This technology could also be used by Combat Controllers and Terminal Attack Controllers to assist with close-air-support attack setups and runs, ultimately aiding the warfighter in bringing Technology-to-Warfighting and Integrating Operations.

Technical Point of Contact(s): SrA Oscar Cantu, oscar.cantu.5@us.af.mil (661) 277-2121

AFTC/412th Test Wing (TW)

Requirement #: USAF-19-AFTC-4.E

Title: Acoustic – Visual Detection and Identification Platform

Military System or Acquisition Customer: Edwards Air Force Base

Description: Detection systems often lack certain detection integrations or contain observational biases that limit the detection and identification of 100 percent of the sample population. This is true in natural resources fauna population inventories, and unmanned air and ground vehicles protect and asset security operations. What is needed is a system that integrates affordable active/passive acoustic and optical sensors to ensure that the identification (ID), tracking, interception, and engagements allows for a wider spectrum of visual and acoustic bands than can be detected using human observers. Greater than human detection capability, with human oversight and the ability to independently listen, replay, and reprocess data, not only increases situation awareness, but provides evidence of past activities. A method of using acoustic system cueing with an accompanying optical system for further investigation, photo ID and identify potential hazards. This blending of an acoustic all-aspect hearing system with an optical analysis system would provide an optimal all-weather lookout. The platform will need to be

ground or Unmanned Aerial Vehicle (UAV) based. At high speed or low with hemispherical audio detection superior to the human ear, a high-gain array improves sensitivity for the quietest conditions, and a well-designed windshield across multiple microphones quiets wind noise. The all-aspect staring array provides full situational awareness, while user-designated high-gain directional beams zero in on multiple interesting sounds while discriminating against noise. The system will adjust for changing background noise, allow the operator to replay detections to confirm detections, and potentially provide passive ranging.

Technical Point of Contact(s): James Zott, james.zott.1@us.af.mil (402) 232-3032

Requirement #: USAF-19-AFTC-4.F

Title: Energy-Efficient, Distributed, Waste-to-Energy Processes

Military System or Acquisition Customer: Edwards Air Force Base

Description: Fast Pyrolysis can convert the enormous amount of solid waste, which is typically disposed of by incineration or landfill, and turn it into a valuable commodity for resale or reducing the cost of purchased materials. Landfilling waste takes up valuable space, and eventually the costs will rise as available space is reduced. Incineration can expose personnel to potentially harmful particulate matter and air toxins. A novel method of waste conversion is needed for bases and outposts that will allow waste to be processed on-site, increasing the self-sustaining or net zero, allowing for process energy and other process inputs derived from waste material. This solicitation calls for solutions to dispose of waste efficiently and also offset the demand for liquid fuels at forward locations. Of particular interest is the development of processes that can convert waste-derived intermediate oils to value-added fuels or chemicals for resale purposes.

Technical Point of Contact(s): James Zott, james.zott.1@us.af.mil (402) 232-3032

Requirement #: USAF-19-AFTC-4.G

Title: High-Efficiency, Electronically-Controlled Diesel Engines for Multiple Power Applications.

Military System or Acquisition Customer: Department of Defense

Description: No longer is it acceptable for military engines to just be rugged and reliable; they must now also be fuel efficient, quiet, and low-emissions. Military diesel engines for power generation and vehicle prime power have significantly lagged behind high-efficiency automotive diesels in technology and performance. Existing military gensets use engine technology that has remained largely unchanged for the last 30 plus years. Both small (2 kW) and medium (5–60 kW) gensets in the field use Commercial Off-The-Shelf (COTS) fixed-speed diesel engines with mechanical fuel injection and natural aspiration coupled to COTS alternators. These gensets have low fuel-to-electric efficiency. These gensets are also heavy—the 30 kW Tactical Quiet Generator (TQG) weighs 3006 lbs., and the 30 kW Advanced Medium Mobile Power Source (AMMPS) weighs 2068 lbs. The additional weight not only hampers the operational effectiveness, but also leads to secondary fuel consumption for moving the equipment. Fuel consumption and weight are especially critical for small expeditionary combat outposts. There is a critical need for a purpose-built automotive-quality diesel engine for military power generation. Beyond the power generation application, there is a broader need for more efficient, military diesel engines for small off-road vehicle propulsion and pumps. Ideally, a common engine architecture and interface could provide a next-generation diesel “power pack” to satisfy all of these needs with improved maintainability through parts commonality.

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AFTC/412th Civil Engineer Group Environmental Management Division

Requirement #: USAF-19-AFTC-4.H

Title: Computer Vision Machine Learning for Biological Species Identification

Military System or Acquisition Customer: Air Force (AF) / DoD wide

Description: Biological surveys are often conducted using fixed-location, motion-sensing digital cameras in order to determine status of species (for instance Mohave Ground Squirrels (MGS)). These camera surveys may generate millions of photographs that must all be individually analyzed. This analysis is time consuming because a person must view every photograph, and inefficient because most photographs do not contain the species of interest. In addition, photographs may include important species other than the species of interest, and this information may be lost due to time constraints. A contractor has recently demonstrated computer vision, combined with machine learning technology, to identify MGS in photographs with greater than 90 percent accuracy. This project would extend that work to utilize computer vision and machine learning to identify all plant and animal species in each photograph and to catalog the photographs appropriately. The identification would be hierarchical to maximize the likelihood of accurate and useful information. For instance, for MGS, the hierarchy could be mammal/rodent/ground squirrel/Mohave ground squirrel/sex/age class/individual. Similar hierarchies would be developed for other plant and animal species. Successful implementation would significantly decrease the cost of conducting biological surveys, while significantly increasing the accuracy and value of the data generated.

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AFTC/412th Civil Engineer Group Environmental Management Division

Requirement #: USAF-19-AFTC-4.I

Title: Local Image Features Auto-Recognition to Decrease Human Burden

Military System or Acquisition Customer: Air Force (AF) / DoD wide

Description: Surveys conducted in order to collect visual data result in thousands of images which must be manually examined by Public Affairs (PA) personnel in order to be cleared for release. Photos are subsequently reviewed by environmental personnel for species recognition or as an aid in building topographical models. Thus, in many cases the images are manually reviewed several times. Local features auto-recognition can occur as images are captured in order to select and highlight images which may require PA review. Priority of top matches can be queued for manual review and confirmation, while remaining images can be machine reviewed. Further, the machine learning algorithm improves features recognition over time in order to identify features for manual review even without knowing why those features are important. Partial hits and outliers can also be flagged for human review. Identified features can be tagged and listed, in order to decrease number of man-hours needed for personnel to manually review images.

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AFTC/412th Civil Engineer Group Environmental Management Division

Requirement #: USAF-19-AFTC-4.J

Title: Long-term Wireless Point-to-Point Technology

Military System or Acquisition Customer: Air Force (AF) / DoD wide

Description: Retrieval of remote sensor data on DoD locations is a time-consuming activity for working groups, in part due to travel time required to retrieve physical stored data, and in part due to necessary communication security protocols. Data such as photos

must be submitted to Public Affairs (PA) and reviewed manually for classified, sensitive, or proprietary imagery. To reduce risk of exposure, open networks such as civilian cellular may not be used, and encrypted satellite equipment is expensive and bulky. Wireless network bridge technologies exist to enable point-to-point communications; however, Commercial Off-The-Shelf (COTS) solutions are restricted by design requiring a) persistent mainline power, and b) permanent installation. DoD facilities, including USAF testing sites, need a customizable solution to overcome these restrictions, for example as follows.

1. Remote, reliable power such as batteries, solar charger, power controller, and an optional tertiary fuel-based backup that does not require regular servicing for 6 months.
2. Modular, mobile hardware, readily deployable by one or two persons in less than a day from a light-duty pickup truck.
3. Adaptable deployment to include node / link number, Y splitting points, transmission frequency (such as Radio Frequency (RF), microwave, and laser communications), bandwidth between nodes for maximum flexibility.
4. Critical analysis of data backbone security vulnerabilities and assuredness, including assessment of physical proximity required to sniff data.
5. Safe functionality for personnel, wildlife, and equipment, including non-standard test equipment.
6. At least two node unit price tiers to provide a balanced tradeoff between affordability and backbone / sensor availability for different specific DoD end users and deployments.
7. Data link termination directly to the communication security authority for their control, administration, and review, as required.
8. Webcam coverage per node, with available local monitoring such as change detection, feature detection, person detection, or wildlife species detection.
9. System health reporting including battery condition, sensor availability, remaining reserve fuel, and antenna alignment.

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AFTC/AEDC

Requirement #: USAF-19-AFTC-4.K

Title: Towed Optical Plume Simulator (TOPS)

Military System or Acquisition Customer: PEO Aircraft Survivability Equipment (Multi-Service)

Description: Development and operational testing of missile warning systems on USAF and other Service aircraft requires a variety of techniques, including airborne signature simulators. To support testing requirements for F-35 and Next-Generation aircraft, innovative solutions are sought to supply a subsonic airborne towed pod that contains an ultraviolet (solar blind) emitter and two Mid-wave infrared (MWIR) emitters. Suitable emitters must be non-combustion-based and may include lasers, light emitting diodes (LEDs), and lamps. The emitters must be capable of temporal control, adequate to replicate the temporal content of typical missile signatures. The photons from the emitters must be directed to a gimballed mount that includes a pointing/tracking system so that the photons can be directed at a target aircraft. The emitters must have sufficient optical power to supply missile-representative irradiance at the receiving optics of the missile warning system on the aircraft under test. The system must be fully integrated into a towed pod that is airworthiness certified, and flight qualified.

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AFTC/Arnold Engineering Development Complex (AEDC) Hypervelocity Wind Tunnel 9 (TSTT CTF)

Requirement #: USAF-19-AFTC-4.L

Title: Reduced Cost and Fabrication Lead Time of Critical High-Temp Hypersonic Facility Refractory through Additive Manufacturing

Military System or Acquisition Customer: All DoD hypersonic weapon demonstrator and IOC systems/ MDA /ICBM programs

Description: Develop the capability/methods to additive manufacture the niobium alloy refractory material, C-103, to lower cost of high-temperature facility hardware in Tunnel 9, and allow for increased design space capability. Currently, Tunnel 9 hardware is machined from solid material billets that are machined down to final parts, with roughly 80 percent to 90 percent of billet material volume that is removed in the machining process. With the increasing time and cost of procuring billets and the difficulty finding skilled/qualified shops to machine either the Niobium alloy C-103, an additive process promises significant improvement in both the cost and schedule of manufacturing these parts. Demonstrations by Metal Technologies Inc. (MTI) have proven out the feasibility of such a technique; however, additional process development is still necessary. This includes verification of temperature-dependent material properties, as well as definition of methods to print near net shape parts. Once complete, this capability would open up the design space for many other more complex components for hypersonic ground test facilities (i.e., hot train liners and joints), as well as hypersonic flight vehicle components (i.e., nose-tips and leading edges and integrated high-temperature structures). This would save countless hours of labor involved with designing and machining complex parts.

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AFTC/Arnold Engineering Development Complex (AEDC) Space and Missiles (S&M) Combined Test Force (CTF)

Requirement #: USAF-19-AFTC-4.M

Title: Increased Test Throughput Using Additive Manufacturing (AM) of Arc Heater Facility Components

Military System or Acquisition Customer: All DoD hypersonic weapon demonstrator and IOC systems/ MDA / ICBM programs

Description: There is a significant demand signal increase for thermal protection system (TPS) material test and evaluation in support of hypersonic boost-glide (HBG) and hypersonic cruise (HC) weapon systems development for national defense. This developmental testing takes place in arc-heated test cells that provide high-speed, high-temperature flow over TPS materials. The arc-heaters in the test cells are made from high-thermal conductivity copper alloy parts with internal liquid cooling channels. Increases in test throughput (through increased facility availability) could be obtained by AM of these copper alloy parts to significantly reduce fabrication time. AEDC recently completed a prototype demonstration of arc-heater parts made using AM that showed promise. Further development is needed to identify the specific issues when AM is applied to copper alloy arc-heater parts, such as electrode segments and nozzles. Issues requiring investigation include cooling channel design, mechanical properties throughout the part, and finished size requirements of the copper-alloy AM parts.

Therefore, the goals of this Rapid Innovation Fund (RIF) are to:

1. Develop, test, and evaluate AM fabrication processes for copper-alloy arc-heater parts,
2. Obtain necessary AM equipment to accomplish the demonstration of these processes, and
3. Implement these processes and AM equipment for continued use at AEDC.

END STATE: An in-house AEDC capability to fabricate AM arc-heater parts to reduce schedule and cost risk for hypersonic thermal protection systems testing and evaluation.

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AFTC/AEDC Aeropropulsion Combined Test Force (CTF)

Requirement #: USAF-19-AFTC-4.N

Title: Model Based Systems Engineering of AEDC Facilities for Improved Performance and Reliability

Military System or Acquisition Customer: Air Force (AF)

Description: Develop a comprehensive network of engineering system models for AEDC test support facilities. This “system of models” will be used to adequately model all facility systems that support testing to provide invaluable tools for test resource planning, predictive test facility behavior to planned and unplanned test requirements, predictive maintenance of facility systems, planning for future test facility capability needs, fault detection and accommodation logic for facility controls, and for training of test facility operations personnel. This capability will provide improved facility performance and reliability for the applications listed above:

1. More efficient scheduling of critical test resources (power, water, high pressure air, etc.) will help eliminate conflicts and enable a higher test capacity throughput.
2. Predictive facility behavior models will help prevent catastrophic failures of expensive facility hardware that would otherwise require large expenditures of time and money to repair and will also help better define future capability needs based on future requirements.
3. Predictive maintenance models will help to better predict when and to what level of critical maintenance that should be performed.
4. Fault detection and accommodation logic for facility controls will allow for more robust and safe operation of facility systems, also preventing costly mishaps and lost test availability of critical assets.
5. Accurate models of facility systems will facilitate critical training of test and facility operations personnel in critical procedures, enhancing safe and efficient operation of AEDC’s vital test facilities.

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AFTC/Arnold AFB/Arnold Engineering Development Complex (AEDC)

Requirement #: USAF-19-AFTC-4.O

Title: Wireless Data Collection and Monitoring for AEDC Plant Equipment

Military System or Acquisition Customer: All test programs which utilize AEDC plant and support systems are affected.

Description: AEDC’s critical DoD weapons development mission relies upon the effectiveness and reliability of its multi-billion-dollar suite of facilities and infrastructure. AEDC has a robust reliability centered maintenance (RCM) program which significantly utilizes a condition-based maintenance (CBM) approach. One useful predictive technology that is not employed at AEDC, is the ability to capture real-time equipment

condition monitoring via wireless data collection. Currently, some plant equipment (compressors, motors, etc.) have hard-wired sensors in order to collect health data such as vibration. Expanding coverage of asset health monitoring via wireless systems is efficient, both in the overall cost and reduced installation time, over wiring every sensor. In many instances, the equipment benefiting from monitoring cannot be wired due to location. The ability to quickly identify a change in condition for remote equipment can have a significant impact on cost reduction for repairs due to early fault detection, resulting in less downtime and planned maintenance. Deploying wireless technology in AEDC plants would greatly enhance the ability to quickly identify early equipment faults, which can then be resolved via planned maintenance, without catastrophic failures. System engineers would be able to monitor their critical assets that currently have no health monitoring whatsoever. This real-time health monitoring would be readily available to engineers, operators, etc. Reduced equipment downtime directly translates into greater test throughput for the DoD's critical acquisition programs, which often have developmental critical paths governed by limited test capacity. Although wireless technology equipment is readily available for industrial applications, it would be a new concept to AEDC within the industrial/plant area. There is one section of a turbine plant that would be the pilot before wireless was deployed throughout the other plants. AEDC has several multi-billion-dollar plants, and wireless would make equipment monitoring as easy as looking at a computer monitor. Wireless equipment monitoring will reduce acquisition and lifecycle costs. Eliminating procurement of costly replacement parts for plant equipment, or even having to replace major assets due to undetected issues resulting in failures, would nearly eliminate the need for acquisitions and/or long lead times for specialized parts. There is little to no risk to test customer data being compromised with wireless technologies that would be on a dedicated network to solely monitor plant equipment conditions. Wireless technology is readily available and easily installed. The planning and coordination of wireless technology will take the majority of the time but can be accomplished well within 24 months. The implementation of wireless sensors and training development would be expeditious. The initial ROM cost is less than \$1M for the planning and procurement of the wireless technology. Additional resources may be required for training but would be at a nominal cost.

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AFTC/Arnold Engineering Development Complex (AEDC) Space and Missiles (S&M)
Combined Test Force (CTF)

Requirement #: USAF-19-AFTC-4.P

Title: STTE2...a Complex Systems Approach to Space Threat Test and Evaluation (T&E)

Military System or Acquisition Customers: USAF/USSPACECOM/National; SBIRS, GPS, WGS, AEHF, GPS, BMD, and other architectures under development

Description: Developmental T&E (DT&E) asks "How well does this system work?" while Operational T&E (OT&E) asks "Will this system accomplish its mission in its operational environment?" Modern space systems must operate in a more complex environment in which multiple influencing factors must be evaluated to determine the effect upon the system under test. Space Threat T&E 2.0 (STTE2) represents a fundamental shift in the way we think about and accomplish T&E of assets that must operate in the ever-increasing contested environment of space. Ensuring the ability to transmit and receive with other systems, while dealing with multiple threats, drives decisions for determining the most appropriate test strategies and methods. It expands the scope of single-system T&E and blurs/erases the line between DT&E and OT&E. The

traditional T&E questions will be augmented with a system-of-systems (ecosystem) perspective. This innovative approach focuses on assessing how individual assets affect the balance of the ecosystem it operates within and how the environment of the ecosystem affects individual assets trying to accomplish its mission. “How does this system affect the ecosystem?” and “How does the ecosystem affect this system?” will become the new questions. Effective implementation of STTE2 requires resources to convene working groups, map the ecosystem, assess existing tools, perform experiments, and develop/deploy training. Ecosystem mapping is the process of documenting connections and information flows between all assets within the ecosystem. The map developed under this effort will leverage existing mission threads developed by Cyber Resilience Office for Weapon Systems (CROWS) and USSTRATCOM. Commercial Off-The-Shelf (COTS) /Government Off-The-Shelf (GOTS) assessment packages will be evaluated based on their contribution to test planning and results-based assessments under the new methodology. Systems Theoretic Process Analysis (STPA) is one tool to be evaluated for test planning. Integrated Threat Analysis and Simulation Environment (ITASE), Advanced Framework for Simulation, Integration and Modeling (AFSIM), and other simulations will be evaluated as the overarching framework. This effort will leverage customer-funded system response characterization, and T&E modeling and simulation (M&S) efforts. Assessment and integration of the above tools completes STTE2 Increment I. Increment II will then refine the product using experiments and pilot projects. Once STTE2 Increment II is complete, training will be developed and deployed to the Research, Development, Test and Evaluation (RDT&E) workforce. With the rapid innovation effort complete, STTE2 will continue to grow organically in both fidelity and scope as new system response models are integrated into the simulation. Successfully implementing, STTE2 will increase the resilience of existing/future space warfighting ecosystems, and is consistent with the SMC 2.0 acquisition acceleration initiative. It will enable emergent behaviors, higher order effects (nonlinearities), and black swan (unexpected, high impact) testing. Testing path dependence across multiple domains such as space and cyber will be possible. The ability to predict and quantify effects at the battlefield and campaign levels will be enabled through innovative and rigorous combination of T&E techniques and a complex systems approach.

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AFTC/Arnold Engineering Development Complex (AEDC)

Requirement #: USAF-19-AFTC-4.Q

Title: Fly the Mission Trajectory Simulation Capability for Arc Heater Testing

Military System or Acquisition Customer: All DoD hypersonic weapon demonstrator and IOC systems/ MDA / ICBM programs

Description: The new National Defense Strategy (NDS) emphasizes the need “for the Joint Force to be able to strike diverse targets inside adversary air and missile defense networks to destroy mobile power-projection platforms”. The NDS also states the need for continued development of new game-changing technologies such as hypersonic. Hypersonic technologies may be called upon as a key enabler toward achieving the NDS objectives. Accurate simulation of hypersonic weapon boost-glide trajectories poses significant challenges for thermal protection system (TPS) evaluation in ground test facilities. Typically, aerothermal exposure is controlled through integrated heating of a candidate system by testing at a constant heating rate for a set amount of time. Boost-glide trajectories, however, subject the TPS to varying conditions, and the thermal expansion/contraction of gaps and seals, component interaction, as well as material response, cannot be effectively evaluated. Providing a realistic trajectory simulation, particularly through the boost-glide (and possibly terminal dive) portion of the flight is

highly desirable. Arc heaters appear to be well-suited to trajectory simulation. The DoD segmented arc heaters (H2, H3) are particularly useful because of their decades-long development toward high-enthalpy, high-pressure operation in support of ballistic reentry programs. Having an “excess” of enthalpy allows the heater to be operated stably while matching flight enthalpy through the addition of ambient mixing air. High-pressure operation allows optimization of test scale and nozzle Mach number (M). Additionally, the DoD segmented heaters have a wide envelope of operation and have demonstrated the ability to achieve a desired test point within just a few seconds, more than sufficient for the required environment changes along a boost-glide trajectory. While flight duplication is not possible, it is possible to duplicate flight enthalpy over a wide range of flight conditions. The simulation produced replicating flight enthalpy, H0, and vehicle impact pressure, P0’ provides flight values of cold wall heating rate at the stagnation point and a very good approximation of the flow around complete aerodynamic shapes for nozzles with M greater than 4. This Rapid Innovation Fund (RIF) topic includes vehicle trajectory optimization for AEDC’s H2 facility, facility modeling, installation of a dual mass flow control system, discrete testing for determination of facility stability, and finally, a capability to perform limited flight profile simulation within 18 to 24 months of project start.

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AFTC/AEDC Aeropropulsion Combined Test Force (CTF)

Requirement #: USAF-19-AFTC-4.R

Title: Affordable Small Turbine Engine Altitude Test Demonstration

Military System or Acquisition Customer: DoD Unmanned Aircraft System (UAS) programs; Current and future DoD cruise missile engine programs

Description: Develop a system to inexpensively provide process air to small turbine engines using existing capabilities. Providing process air in test cell T11 for altitude simulation to UAS and cruise missile class engines requires running very large air compressors capable of producing 150 lb/sec of air when only 5-10 lb/sec of air is required for testing; the remaining air is vented to atmosphere. The AEDC Aeropropulsion CTF is working on demonstrating the viability of utilizing automotive turbochargers and the in-house low-pressure air distribution system to provide process air at very cold temperatures to simulate high altitude flight. The requirement is, therefore, to incorporate these capabilities, along with an excessed electric heater to provide precise pressure and temperature control required to small engines for 5 percent -10 percent of the current power and labor cost. This system will both decrease Air Force costs overall and increase the utilization of T11 to afford high-priority small engine programs the opportunity to test at simulated altitude. Incorporating this system is crucial to make T11 a viable low-cost altitude test facility for attritable type turbines engines expected to greatly increase in application in the near future. Immediate impact will be found in F107, F112, and Gray Wolf programs, with many others in line thereafter.

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AFTC/Arnold Engineering Development Complex (AEDC)

Requirement #: USAF-19-AFTC-4.S

Title: Global Positioning System High-Power Jammer Tracking

Military System or Acquisition Customer: Air Force (AF) / Defense-wide community

Description: Develop the capability for Global Positioning System (GPS) jammers to track targets (systems under test/combat systems) that are dependent on GPS for guidance

and navigation. The current GPS jammers, used by the 746th Test Squadron (746 TS) to provide navigation warfare environments during test and large force exercises, have fixed antennas with limited areas of jamming effectiveness. Without jammer tracking capability, an airborne platform must intentionally fly into the limited projected high-power jamming environment to maintain and achieve the level and duration of GPS jamming to meet mission requirements. This often leads to planned flight profiles that are unrealistic and/or not operationally representative. Expanding the area of effective GPS jamming requires implementation of more jamming assets, which increases impact (operational/safety risk) on commercial aviation, search and rescue, and other operations not related to the test/training event. Additionally, without tracking capability, there are some GPS threats the 746 TS is unable to emulate. A GPS jammer tracking capability would accommodate much larger areas of effective GPS jamming to allow more operationally and threat representative scenarios in support of test (M-code, B-21, F-35, etc.) and large force exercises (Red Flag, etc.) while achieving the required jamming levels, minimizing the number of jamming assets required and minimizing impact outside the test/training area. The 746 TS has developed an initial GPS jamming tracking capability prototype using a portable radar as the target tracking source; however, the tracking capability needs to be further matured to be effective for use in test and training support. Improvements need to be realized to make the system fully functional and deployable. Additionally, to further improve utility, the target tracking source should be expanded to compatibility with multiple radar systems, IFF tracking, telemetry, etc. Developing and implementing the capability for six GPS jammers is estimated at \$2.7M over a 2-year period.

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AFTC/Arnold Engineering Development Complex (AEDC)

Requirement #: USAF-19-AFTC-4.T

Title: Global Positioning System (GPS) Phased Array Antenna

Military System or Acquisition Customer: Air Force (AF) / Defense-wide community

Description: Develop a GPS jamming phased array antenna with increased gain in a much smaller and lighter package versus the current dish antennas utilized by the 746th Test Squadron. This antenna will produce an order of magnitude with more effective radiated power than the current high-power jammer (HPJ) dish antennae and provide the capability to emulate more threat-realistic GPS navigation warfare environments for test and large force exercises. The current HPJ system utilizes two 6-foot diameter dishes that weight 40 lbs. each, forcing the use of a heavy-duty pedestal for positioning with a total antenna assembly weight of 250 lbs. Further, the pedestal is semi-permanently mounted to a dedicated trailer. A smaller, lighter phased array solution could be easily stored for transportation and could use a much lighter pedestal. Married with our smaller next-generation HPJ system, multiple systems could be delivered to the field in one vehicle. Development of the phased array GPS jamming antenna prototype is estimated at \$1.3M over an 18-month period.

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PEO Agile Combat Support

Requirement #: USAF-19-PEO-AGILE-5.A

Title: In-Flight Physiological Monitoring

Military System or Acquisition Customer: HQ AETC and HQ/ACC

Description: Develop a physiological monitor to identify and prevent physiological episodes in which aircrews experience unanticipated, unexplained and at times incapacitating symptoms during or after flight. These episodes create impairments to physiological functions, thereby affecting aircrew performance in tactical aircraft. These events present a safety risk and have contributed to multiple deaths and aircraft. Ideal solutions will involve real-time physiological monitoring, capable of providing actionable alerts of any impending performance decrements. Innovative approaches will address neural, respiratory, circulatory or other physiological functions, have the ability to correlate and store monitoring data from multiple devices, as well as analyze collected data, and identify parameters capable of reliable detection and prediction of performance decrements.

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PEO Battle Management

BM/Armament Systems Development Division

Requirement #: USAF-19-PEO-BM-6.A

Title: Expeditionary Air Traffic Control Approach and Landing Systems (ATCALS) Automation

Military System or Acquisition Customer: USAF Combat Forces ATCALS operations units

Description: We are seeking to develop and prototype ATCALS automation that assists and reduces air traffic controller's workload and provides safe and efficient aircraft separation and navigation guidance for military aircraft launch and recovery. The democratization of technology has allowed adversarial nations to gain relative parity in technology and capability, placing U.S. forward bases at risk of attack. Adaptive Basing is an emerging concept of operations (CONOPs) that calls for Agile Disaggregation (or dispersal) that divides operational units into geographically-dispersed subunits conducting operations coordinated in time and space. This requires significant resilience and mobility of combat forces. The large footprint required by the Air Traffic Control (ATC) operations shelters limits existing tactical ATCALS' operational mobility. These ATC operations shelters provide the necessary power and protection from extreme environmental conditions, as well as physical and cyber threats for air traffic controllers and their workstations. Existing ATCALS automation requires significant number of trained and certified controllers to manage the workload necessary for safe airspace management. Current virtual assistance technologies combine speech recognition, speech synthesis, artificial intelligence, expert systems, and machine learning to provide a wide variety of services from relatively simple tasks such as medical transcription to widely popular products such as Amazon Alexa and Apple Siri. Automation that leverages advances in these virtual assistance technologies and rugged, low power, lightweight mobile tablets will enable scalable, reconfigurable, distributed, safer and more efficient ATCALS operations. Expeditionary ATCALS automation must support independent, simultaneous operations of Precision Approach, Non-Precision Approach, and Air Surveillance. It must support simultaneous Precision and Non-Precision Approach on multiple runway ends. It must enable timely reconfiguration to support operations from small single runway operations to large-scale tactical airfield operations. It must not require dedicated controllers for Precision Approach Radar (PAR) approaches.

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Requirement #: USAF-19-PEO-BM-6.B

Title: Expeditionary Air Traffic Control Approach and Landing Systems (ATCALs) Multifunction Sensors

Military System or Acquisition Customer: USAF Combat Forces ATCALs operations units

Description: We are seeking to develop and prototype multifunction sensors to support safe and efficient aircraft separation and navigation guidance for military aircraft launch and recovery. The democratization of technology has allowed adversarial nations to gain relative parity in technology and capability, placing U.S. forward bases at risk of attack. Adaptive Basing is an emerging concept of operations (CONOPs) that calls for Agile Disaggregation (or dispersal) that divides operational units into geographically-dispersed subunits conducting operations coordinated in time and space. This requires significant resilience and mobility of combat forces. The large footprint required by the existing ATCALs radars limits current tactical operational mobility. Currently, separate monostatic radars (primary and secondary surveillance, Precision Approach Radar (PAR)) are necessary to support safe management of the tactical airspace. Significant power generation and its associated shelter is necessary for each radar. Advances in phased array radars such as Active Phased Array Radar (APAR) enable multifunction sensors that can support air and ground surveillance, weather sensing, and non-precision and precision approach. The frequency and beam agilities of the Active Electronically Steered Antenna (AESA) provide multifunction Air Traffic Control (ATC) radars that have lower total footprint and lifecycle cost. Bistatic radars can geographically disperse the ATCALs operations and help reduce the individual radar footprint. Expeditionary ATCALs multifunction sensors must be capable of independent, simultaneous operations of Precision Approach, Non-Precision Approach, and Surveillance. It must support military aircraft at velocities at a minimum from 40 to 400 Knots. It must detect, identify, and track military aircrafts within 360 degrees azimuth coverage and vertical coverage between -1 to 30 degrees within the tactical airspace. It must provide the performance necessary to azimuth and elevation guidance to all military aircraft for precision approach. It must support simultaneous Precision and Non-Precision Approach on multiple runway ends. It must support azimuth coverage of plus or minus 15 degrees of each runway end. It must support elevation coverage of -1 to 8 degrees of each runway end.

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Requirement #: USAF-19-PEO-BM-6.C

Title: Atmospheric Dust Forecasting Enhancements

Military System or Acquisition Customer: AFLCMC/Weather Systems Branch

Description: The Numerical Weather Modeling (NWM) Program Office requires innovative approaches and technologies to improve forecasting of severe low-visibility dust storms using Numerical Weather Prediction (NWP) models. In particular, the proposed solutions must be compatible with the Air Force's Global Air-Land Exploitation Model (GALWEM). The proposed solutions must improve upon GALWEM's current dust forecasting capability, particularly for forecasting extreme dust events that reduce visibility less than or equal to one mile. The proposed solution must not add significant computational expense to GALWEM. Testing of the proposed solutions will be required to substantiate the performance to determine if it can meet the Air Force's requirements. Dust and aerosol forecasting are significant challenges for Air Force Weather operators in North Africa, Southwest Asia, and Afghanistan. Both large- and small-scale dust events have significant impacts to ground, aerial, and Intelligence,

Surveillance and Reconnaissance (ISR) missions. Improved modeling techniques will improve forecasts, mitigate mission impact, and give operators the edge when working with sub-optimal dust conditions.

Technical Point of Contact(s): Dr. Frank Ruggiero, frank.ruggiero@us.af.mil (781) 225-5090 or Maj Andrew Travis, andrew.travis.1@us.af.mil (781) 225-4713

Requirement #: USAF-19-PEO-BM-6.D

Title: Improved Visibility Sensor for Fixed Base Weather Observing Systems (FBWOS)

Military System or Acquisition Customer: AFLCMC/Weather Systems Branch

Description: Air Force FBWOS have a requirement from The Observing System - 21st Century (OS21) Operational Requirements Document (ORD) to accurately detect obscurations to visibility and to accurately report the prevailing visibility. The requirement is documented in The Observing System - 21st Century (OS21) Operational Requirements Document (ORD) System Capabilities and Characteristics Parameter for Present Weather and Obscurations (Requirements Correlation Matrix - Part 1. Para 2.1.3) states: "Detects all precipitation types, obscurations, and other weather phenomena (well-developed dust/sand whirl, squall, tornadic activity [tornado, funnel cloud, or waterspout], sandstorm, dust storm). Able to discriminate between liquid, freezing, frozen forms of precipitation; accuracy 90 per cent." Current visibility sensors on the FMQ-23 and FMQ-19 Fixed Base Weather Observing Systems do not accurately detect dry particle lithometeors (dust, haze, smoke, etc.). The FMQ-19 program has an open Discrepancy Report (DR) in the Joint Discrepancy Reporting System (JDRS) (JM4885-1-0001) for Visibility output too high during dust storms. The FMQ-23 program has open discrepancy tickets for systems not accurately detecting dust and smoke on the Korean peninsula and in southwest US locations with blowing dust. Request development of fix-based instrument capable of detecting precipitation types, obscurations, and other weather phenomena (to include dry particle lithometeors) that can be tested and incorporated into existing systems.

Technical Point of Contact(s): Mr. Todd Allen, todd.allen@us.af.mil (402) 294-3946 or Maj Andrew Travis, andrew.travis.1@us.af.mil (781) 225-4713

Requirement #: USAF-19-PEO-BM-6.E

Title: Handheld Ceilometer

Military System or Acquisition Customer: AFLCMC/Weather Systems Branch

Description: Air Force Weather units require the capability to detect clouds up to 10Kft (T) 20Kft (O) as part of the First-In Weather capability. State-of-the-art hand-held observing instruments for use in deployed (expeditionary) and tactical (first-in) operations where automated weather systems are unavailable, the environment is extremely austere, or when rapid mobility is necessary. These sensors can also serve as back-up when primary systems are rendered incapable of operation or unavailable (down for maintenance or when the system is the only capability available for deployment [all available automated systems are employed elsewhere]). The requirement is documented in The Observing System - 21st Century (OS21) Operational Requirements Document (ORD) System Capabilities and Characteristics Parameter for Present Weather and Obscurations (Requirements Correlation Matrix - Part 1. Para 2.4.3) states: Threshold: Report Cloud bases surface to 10,000ft; accuracy plus or minus 200 feet: Objective: Report Cloud bases surface to 20,000ft; accuracy plus or minus 100 feet. The size of the instrument must be no more than .25 cu ft and weigh no more than 3 pounds (threshold) (objective- as small and as light as CaNDIs can technologically/economically provide to ensure one-person portability in a field environment).

Technical Point of Contact(s): MSgt Sean Shuman, sean.shuman@us.af.mil (757) 225-9226 or Maj Andrew Travis, andrew.travis.1@us.af.mil (781) 225-4713

Requirement #: USAF-19-PEO-BM-6.F

Title: Space Deconfliction System Probabilistic Risk Assessment Tool

Military System or Acquisition Customer: AFSPC and STRATCOM J39 (The Laser Clearing House)

Description: Topic description is For Official Use Only (FOUO). Access the AF RIF web portal at <https://www.dodrif.us>. Offerors must have a Joint Certification Program (JCP) number to qualify to receive FOUO data. JCP information available at: <http://www.dla.mil/HQ/InformationOperations/Offers/Products/LogisticsApplications/JCP/>

Technical Point of Contact(s): TPOC contact info will be available on the AF RIF web portal for JCP holders.

Requirement #: USAF-19-PEO-BM-6.G

Title: Reviving and Modernizing Automated Celestial Navigation (ACN)

Military System or Acquisition Customer: All classified/unclassified platforms, programs, and systems that utilize Global Positioning System (GPS) navigation

Description: On 09 Aug 2018 the Trump Administration announced its intention to create the United States Space Force (USSF). The President took this action in response to the evolving threats presented by the Chinese and Russian Space Forces, whose goal in part is to spoof/deny/defeat navigational ability for the United States of America (USA) via the GPS satellites. In view of this emerging threat, reviving and modernizing ACN, the use of which preceded that of the GPS, appears to be a highly logical course of action. ACN is predicated on celestial navigation which uses the angular measurements between celestial bodies to locate one's position in the world. By virtue of its reference points being galactic in nature, it cannot be spoofed, denied nor defeated. An ACN unit varies from a GPS receiver by autonomously observing and making angular measurements between celestial bodies, performs the complex trigonometry thereof, then compares its computations against its self-contained database of angular relationships of the sun and stars, which yields a navigational 'position fix,' which in turn is fed into the aircraft's Inertial Navigation System (INS). ACN was used extensively by both the United States Air Force (USAF) and the United States Navy (USN) up until 1997, at such time as when the GPS came into dominance. Citing just one example - the USAF Lockheed SR-71 aircraft utilized ACN during its years of operation (1966-1999). A Nortronics NAS-14V2 Astroinertial Navigation System (ANS) was mounted behind the SR-71's cockpit; the 'position fixes' it provided were used to update the aircraft's INS and yielded course guidance with accuracy of at least 91 meters (300 feet). A renaissance in progress - pairing ACN capability with an NAS-26 Astro-Inertial Navigation System (AINS) - an evolved variation of the NAS-14V2, is currently a part of the avionics equipage of the B-2 Spirit Advanced Technology Bomber (ATB). In the foreseeable future Navigation via Signals of Opportunity (NAVSOP) could result in highly-reliable and redundant automated navigational capabilities by pairing ACN capability with other capabilities, such as existing electromagnetic radiation in our environment, like cell-phone towers, television signals, perhaps even the emissions from GPS jammers themselves. In closing, note the Institute of Navigation (ION), founded in 1945, is a not-for-profit professional organization dedicated to advancing Positioning, Navigation and Timing (PNT). The ION has a military division dedicated to furthering the Guidance, Navigation and Control (GN&C) capabilities of the U. S. DoD, and lists numerous pertinent technical papers on celestial navigation on its website.

Technical Point of Contact(s): William Kossowan, william.kossowan.ctr@us.af.mil (781) 225-2246

Requirement #: USAF-19-PEO-BM-6.H

Title: Develop an Unmanned Aerial System (UAS) capable of calibrating the USAF Deployable – Instrument Landing System (D-ILS)

Military System or Acquisition Customer: USAF D-ILS

Description: Develop a UAS as Peculiar Support Equipment (PSE) capable of performing flight measurement and testing, providing expedited operational status of the USAF D-ILS. At present the Federal Aviation Administration (FAA) is the sole service provider of ‘commissioning flights’ for all USAF D-ILSs. Contention for limited flight measurement and testing services creates mission-critical schedule challenges for the Program management Office (PMO) and impacts the efficiency of operational units supporting worldwide deployments.

Technical Point of Contact(s): Mark Staples, mark.staples@us.af.mil (781) 225-0540

Requirement #: USAF-19-PEO-BM-6.I

Title: Integration of and Display Data from Missile Defense (MD) and Non-traditional Sources

Military System or Acquisition Customer: STRATCOM/J3

Description: The Program Office is attempting to modernize a 45-year-old missile warning weapon system to ingest both MD and non-traditional data. This is referred to as the Combatant Commander's Integrated Command and Control System (CICC2S). Ultimately, this upgrade to ingest new data will allow the warfighter to make more informed strategic decisions as it pertains to missile warning operations.

Technical Point of Contact(s): Glenn Winchell, glenn.winchell.1.ctr@us.af.mil (719) 554-7257

PEO Business Enterprise Systems

Requirement #: USAF-19-PEO-BES-7.A

Title: Master Architecture Conversion/Framework Tool

Military System or Acquisition Customer: Acquisition Customer

Description: AFLCMC/HI has an objective to standardize the Information Technology (IT) web-based software development, to apply an open architecture design approach to all programs, to convert legacy IT programs to a modern design that facilitates software modularity and re-use, and to implement a standard best practice architecture design for all IT programs that facilitates scalability, re-usability, and transportability.

Capabilities:

- 1) Allow the desired IT web-based architecture framework to be selected by choosing the desired layers and tiers.
- 2) Implement and identify all necessary integration between layers and tiers.
- 3) Allow software to be developed in the desired layers and tiers.
- 4) Convert current applications to the desired architecture framework.
- 5) Provide a template for the development of new applications.
- 6) Provide a fully-operational program from either the software that was converted with the tool, or from the software that was developed within the tool.

Requirements: The tool shall provide the following:

- 1) An outline or framework that new applications can be developed to;
- 2) An application design that implements open standards;

- 3) A design concept that utilizes open source technologies; and
- 4) A multi-tier architecture design that includes:
 - a) A presentation layer
 - b) A business layer
 - c) A persistence layer
 - d) A data layer
- 5) A multi-tier architecture approach that maximizes the following:
 - a) Security
 - b) Scalability
 - c) Fault tolerance
 - d) Re-usability
 - e) Transportability
- 6) The ability to convert current applications to a master architecture framework.
- 7) A modular open design approach that designers/developers can easily follow for new developments.
- 8) A standardized master architecture framework approach for the AFLCMC/Hi portfolio.
- 9) Implements best practices for open standards for application design.

Deliverable: The contractor shall deliver, as a minimum, the following:

- 1) A tool that is capable of providing a fully operational IT web-based program from the conversion of an existing program;
- 2) A tool that is capable of providing a fully operational IT web-based program from software that is developed from within the tool;
- 3) Documentation that describes how to use the tool;
- 4) Documentation that describes how the tool is designed; and
- 5) Source code and executable code for the tool.

Technical Point of Contact(s): Steven H. Duffield, steven.duffield@us.af.mil (334) 416-4831 or Toy Robinson, toy.robinson@us.af.mil (334) 416-4415

Requirement #: USAF-19-PEO-BES-7.B

Title: No Code Cloud and Mobile Device Application Platform

Military System or Acquisition Customer: Secretary of the Air Force for Acquisition

Description: PEO BES is interested in innovative technologies to provide a platform to rapidly create and deliver new business applications. The no/low code technologies should allow creating a complex application in a few months instead of the year it currently takes to code from scratch. The proposed platform should be capable of rapidly delivering applications to both a cloud environment and mobile devices. The proposed technology should be capable of subsuming a large percentage of legacy systems, provide at least a 50 percent reduction in the total lifecycle costs of Information Technology (IT) Business Systems, and provide at least a 75 percent reduction in time to develop and deploy new applications.

Technical Point of Contact(s): William Pickl, william.pickl@us.af.mil (937) 257-3465

PEO C3I & Network

Mission Planning for Dedicated Communications Platforms (MPDCP)

Requirement #: USAF-19-PEO-C3I-Net-8.A

Title: Lifetime Communications Security (COMSEC) Power Source

Military System or Acquisition Customer: AFLCMC

Description: The Air Force Cyber and Cryptologic Systems Division is interested in innovative technologies to provide lifetime (20 plus year) power source for cryptographic devices. The technologies should be capable of providing consistent 25-100 microwatts (generally 3.0-3.6V at 8-30 microamps) for 20 plus years for use in COMSEC applications. They should be producible in a variety of form factors including standard battery form factors (AA size, ½ AA size) for retrofit into existing equipment or optimized to maximize power density for future equipment. Proposed systems must continue to provide power and achieve desired lifespan under extreme thermal conditions (minus 60 degrees C - plus 85 degrees C) and meet rigorous vibration, shock, and other environmental conditions (e.g., MIL STD 810G requirements for fighter aircraft at a minimum). Anticipated production costs must be less than 5 times the lifetime battery costs of currently used batteries. (Nominally \$1,000 or less for a AA battery delivering 100 microwatts for 20 years). Technology may not introduce safety (i.e., Hazardous Materials (HAZMAT), Material Safety Data Sheet (MSDS)) restrictions greater than currently utilized lithium battery technology (i.e., radio-isotope power generators would require appropriate shielding and Nuclear Regulatory Commission General License). Testing of the power source will be required to substantiate the performance to determine if the technology meets the Air Force's requirements.

Technical Point of Contact(s): John Sherer, john.sherer.1@us.af.mil (210) 925-2596

Requirement #: USAF-19-PEO-C3I-Net-8.B

Title: Physically Unclonable Functions (PUFs) for Cryptologic Systems

Military System or Acquisition Customer: AFLCMC

Description: The Air Force Cyber and Cryptologic Systems Division (CCSD) is interested in raising the Technical Readiness Level (TRL) of PUF devices to provide a hardware basis for secure, reliable, built-in authentication of cryptologic systems. Just as human fingerprints provide a biometric basis for personnel authentication, a PUF can be an analogous basis for authenticating hardware devices and systems. Laboratory research on PUFs has provided numerous alternative physical and electronic technologies that can serve as PUFs. Other researched techniques (such as reusable fuzzy extractors) enable their use as reliable authenticators in benign (laboratory/office) environments. The goal of this work is to extend the usability of PUF authenticators into military cryptologic systems that must operate reliably in challenging and risky physical environments. Operational environments include extreme thermal conditions (minus 60 degrees C - plus 85 degrees C), harsh vibration and shock, and other environmental conditions (e.g., MIL STD 810G requirements for fighter aircraft at a minimum). The PUF must operate reliably over the typically long operational lifetimes of military COMSEC systems (10 years minimum or 20 years objectively). If a PUF's operational characteristic changes over any of these conditions or lifetimes, then it must be capable of being periodically, securely recalibrated in-place. While cryptologic national security systems are high cost systems, the PUF plus its supporting computational resources must be comparatively "low cost" (e.g., less than \$100 inclusive and proportionately less for much lower cost systems). Operational military systems must necessarily operate where exposure to adversarial attacks is common. The PUF-based authentication system must resist tampering and cloning attacks for the typical length of time to report and revoke the system's authorization (say, one week). Security levels of PUFs are selectable according to security level required of them. Here the PUF-based authenticator must be equivalent to 256-bit block cipher key security level (or higher). The goal of this work is to produce easily, inexpensively manufactured PUFs with supporting usability technologies that will pass laboratory testing in the range of operational environments experienced by military

systems. The Air Force will validate the developer's claims for their PUF via testing in a suitable test facility.

Technical Point of Contact(s): Porter B. Taylor, porter.taylor.1.ctr@us.af.mil (210) 925-2957 or Chi Le, chi.le@us.af.mil (210) 925-2829

Requirement #: USAF-19-PEO-C3I-Net-8.C

Title: Mission Planning for Dedicated Communications Platforms (MPDCP)

Military System or Acquisition Customer: Battlefield Airborne Communications Node (BACN) and Air Operations Center (AOC)

Description: Dedicated airborne platforms for the communications missions require both force-level and unit-level mission planning capability, which were addressed, in part, by the 2014 Small Business Innovation Research (SBIR) topic, "Inverse Mission Planning of Aerial Communications Technologies" (IMPACT). Some considerations include an ever-changing set of external nodes for the dedicated communications platforms (e.g., Battlefield Airborne Communications Node [BACN]; Joint Aerial Layer Network [JALN] High-Capacity Backbone [HCB] nodes; and Air Force Combat Cloud [AFCC] aerial nodes) such as troops in contact, maintenance of existing tactical data networks, terrain, weather, and myriad air operations center (AOC) planning and execution conditions. Since the battlespace situation changes on a daily, or even hourly basis, the force-level communications planner must be responsive to threats, communication capability of the subscribers (many of which are fixed or mobile ground users), and the aerial network topology, including specific communications performance of the aerial and subscribe radios and antennas. In addition, the pilot's everyday (unit-level) mission planning constraints, such as aircraft performance, fuel availability, crew duty day, and number and placement of critical nodes to be kept in the network, must be accounted for, as well as any digital transfer mechanism to the aerial node's navigation systems. The MPDCP must consider multiple constraints at the force and unit level when deriving the best routing for the communications platforms' mission. An "optimal" communications route may not necessarily be a flyable route; ultimately, the planned mission must meet safety of flight performance and the most-efficient means to meet the Joint Force Air Component Commander's (JFAAC) mission needs. The final routing solution will utilize Joint Mission Planning System (JMPS) to achieve the best routing, selecting altitudes, routing, and multiple communications constraints to maximize mission effectiveness.

Technical Point of Contact(s): Clif Banner, clifden.banner.ctr@us.af.mil (781) 225-4229

Requirement #: USAF-19-PEO-C3I-Net-8.D

Title: Space Based Radar Technologies for Moving Target Indication (MTI) Detection of Targets

Military System or Acquisition Customer: AFLCMC/HNJX

Description: AFLCMC/HNJX is interested in innovative technologies to aide in the development of a constellation of Low Earth Orbit (LEO) satellites to provide the MTI (i.e., Airborne Moving Target Indication (AMTI), Ground Moving Target Indication (GMTI)) radar modes from a space environment. The technologies should be identified in terms of Technology Readiness Levels (TRLs) at present date and to project a roadmap to improve to a higher TRL. Proposed technologies should be shown how to be integrated into a LEO satellite constellation.

Technical Point of Contact(s): Harvey Tobin, harvey.tobin@us.af.mil (781) 225-3181

Requirement #: USAF-19-PEO-C3I-Net-8.F

Title: Integration and Automation of Network Performance Tools

Military System or Acquisition Customer: Air Force 26th Network Operations Squadron

Description: AFLCMC/HNIM is in the process of developing a bottleneck performance baselining suite that targets the capture of measurements and metrics across an Air Force base boundary. The objective is to enable the determination of the health of the base boundary and, if there are symptoms of performance problems, the results of the suite's execution should support root cause analysis. Gathering enterprise network behavior performance characteristics and turning the data into actionable information currently requires multiple tools and manual processes across the Air Force. The effort described here should develop an automated capability, or Manager of Performance Data (MoPD), to conduct the gathering of data from a diverse set of tools such as Cacti, NetQoS, Packet Capture, Internet Protocol Service Level Agreements (IPSLAs), Original Equipment Manufacturer (OEM) appliances, Packet Shapers, Riverbed, and NetScout. This would enable Air Force Intranet Control (AFINC) to promptly uncover and focus on enterprise weaknesses. This MoPD should be capable of gathering data, parsing data, conducting tests, in depth analysis, and reporting for root cause and deeper troubleshooting.

Technical Point of Contact(s): James Pinder, james.pinder.2@us.af.mil (781) 225-4678

Requirement #: USAF-19-PEO-C3I-Net-8.G

Title: Blockchain Technology Tracking of Air Force Network (AFNET) Enterprise Assets

Military System or Acquisition Customer: AFLCMC/HNI

Description: Blockchain is used to create a permanent, verifiable record of exchange, with the data usually representing an asset (such as bitcoin or diamonds). Provide a study for the feasibility of a pilot program using Blockchain or Distributed Ledger Technology (DLT) to monitor the movement of physical assets like servers and laptops in the AFNET. This effort will determine whether AFNET physical assets can be tracked and reconciled in real-time as they are transferred or taken off-line.

Technical Point of Contact(s): Warren P. Rekowski, warren.rekowski.1@us.af.mil (781) 225-6475

PEO Fighter/Bomber

Requirement #: USAF-19-PEO-FB-9.A

Title: Cost-Effective Sustainment and Growth by Automated Software Optimization

Military System or Acquisition Customer: AFLCMC/WW (Fighters and Bombers)

Description: Seeking software (SW) tool to optimize legacy and developing SW efficiency. Many current processors on the A-10 and other Air Force legacy platforms are nearing 100 percent utilization. The goal is to dramatically reduce processor bandwidth consumption:

- 1) Develop or refine SW optimization tools that read ADA and C source code of the Operational Flight Program (OFP) running on the CICU and/or another A-10 processor;
- 2) Optimize the code to the minimum number of lines and processing bandwidth consumption (executable code foot print) by 50 percent and generate the resulting source code;
- 3) Generate Functional OFP (System) Diagrams (Descriptions, Finite State Machine), Transform Diagrams (minimized Boolean equations), a "Was Is" Analysis and Test Vectors (Drivers) and any other required documentation/SW of the old and new code;

- 4) Compile optimized source code and test the resulting optimized machine code in the A-10 Software Integration Lab (SIL) or on the Ground Hog to demonstrate that it runs correctly;
- 5) Show that the optimized code meets A-10C Airworthiness and Safety of Flight (SOF) criteria;
- 6) Demonstrate that the deleting of unnecessary actions by the code optimization to create a more robust system is less vulnerable to hacks and spoofing and increases cybersecurity; and
- 7) Analyze and demonstrate future SW development savings by using the SW optimization tool.

Technical Point of Contact(s): Jerry Coates, gerald.coates@us.af.mil (801) 586-2704

Requirement #: USAF-19-PEO-FB-9.B

Title: Innovative Approaches to Solving Diminishing Manufacturing Sources and Material Shortages (DMSMS) Integrated Circuit Issues

Military System or Acquisition Customer: All DoD Electronic Systems

Description: Seeking a demonstration of a potentially DoD-wide procedure for qualifying remanufactured integrated circuits using the die extraction concept to solve DMSMS issues. Seeking demonstration of locating alternative sources of integrated circuits deemed obsolete and no longer being manufactured or soon to be unavailable from trusted sources. When Integrated Circuits (IC) becomes obsolete, the silicon DIE (“the brains”) within commercial package variants may still be available from trusted sources and harvested using the Die Extraction and Repackaging (DER) process to manufacture a replacement IC in the target package footprint. Some cases require a simple duplication of the same functions without the need for programming. In other cases, similar but not identical programmable commercial ICs are still available to emulate the function, but a new software program may need to be developed for the new device. For example, in many Field-Programmable Gate Array (FPGA) obsolescence cases, larger (increased capability) FPGA devices within the same family can still be located and their DIE used as functional substitutes. In these cases, DER can assist in generating the same form and fit part, with the function dependent on a successful software conversion. This capability would reduce cost/schedule of a new design, save DoD millions of dollars, reduce time required to field replacement parts, and reduce Mission Impaired Capability Awaiting Parts (MICAP) events.

Technical Point of Contact(s): Mr. Jeffrey Sillart, jeffrey.sillart@us.af.mil (937) 713-6911

Requirement #: USAF-19-PEO-FB-9.C

Title: Semi-automated Remanufacturing of Integrated Circuits

Military System or Acquisition Customer: All DoD Electronic Systems

Description: Seeking a demonstration of technology to semi-automate the remanufacturing of integrated circuits. When Integrated Circuits (IC) becomes obsolete, the silicon DIE (“the brains”) within commercial package variants may still be available from trusted sources and harvested using the Die Extraction and Repackaging (DER) process to manufacture a replacement IC in the target package footprint. Previous Rapid Innovation Fund (RIF) projects have demonstrated the ability to remanufacture a wide variety of integrated circuits. The previous projects uncovered another problem. For certain programs, such as precision-guided missiles and ground systems, the need is for rapid remanufacturing of hundreds to thousands of integrated circuits. The original target was for replacement spares, which normally would need less than a dozen at a time. For

replacement spares, a single order could be easily satisfied by a heavily manual procedure. However, with a series of spare orders involving 50 to 100 ICs, the current manual procedure could not provide a timely delivery. The Die Extraction team has identified a need for 95 parts that would result in a \$250M cost avoidance by eliminating component redesigns.

Technical Point of Contact(s): Mr. Jeffrey Sillart, jeffrey.sillart@us.af.mil (937) 713-6911

Requirement #: USAF-19-PEO-FB-9.D

Title: Augmented Reality (AR) (Smart Glasses)

Military System or Acquisition Customer: Aviation Platforms - All Platforms

Description: Identification of opportunities and address potential benefits of implementing AR in the Technical Data environment for use on an aircraft flight-line. Specifically,

- 1) A Business Case Analysis to identify specific requirements of the user/maintainer and Air Force e-tool managers,
- 2) Working with the B1 Program Office's Technical Content Managers to identify relevant Technical Orders (TOs),
- 3) Loading digitized TOs into Smart Glasses,
- 4) Identifying TO workflow, drilldown, and defining user interactions with the Smart Glasses to access and manipulate technical content,
- 5) Prototyping, testing, and verifying hardware and software, and
- 6) Other elements as needed such as stock listing of hardware and establishing a Computer Program Identification Number (CPIN) for the software.

This brings digital capabilities to the maintainer/warfighter in a small footprint, concise, easy-to-use device that frees the warfighter's hands when executing maintenance on highly complex aircraft systems.

Technical Point of Contact(s): Mr. Carl Bell, carl.bell.1@us.af.mil (405) 734-1672

Requirement #: USAF-19-PEO-FB-9.E

Title: Electric Brakes for F/A Aircraft

Military System or Acquisition Customer: Aviation Platforms – All Platforms

Description: Seeking demonstration of electric brakes on US Air Force fighter or attack size aircraft. Venders should design both a passive (brakes only) and active (brakes and electric taxi) electric brake system, and the business case for each. Develop and install an instrumented, production representative system for cooperative ground testing on the target aircraft. Demonstrate benefit in maintenance and performance metrics as per the business case.

Technical Point of Contact(s): Mr. Michael Quinn, michael.quinn.19@us.af.mil (801) 586-4227

Requirement #: USAF-19-PEO-FB-9.F

Title: Agile Intelligence, Surveillance and Reconnaissance (ISR) Pod Low Power Synthetic Aperture Radar (SAR) Integration with Long Term ISR Sensor Growth

Military System or Acquisition Customer: A-10 System Program Office

Description: Topic description is For Official Use Only (FOUO). To get the FOUO description, access the AF RIF Program submission website portal at <https://www.dodrif.us>. Offerors must have a Joint Certification Program (JCP) number to qualify to receive FOUO data. JCP information available at:

<http://www.dla.mil/HQ/InformationOperations/Offers/Products/LogisticsApplications/JCP/>

Technical Point of Contact(s): TPOC contact info will be available on the AF RIF web portal for JCP holders.

PEO ISR & SOF

Requirement #: USAF-19-PEO-ISR-SOF-10.A

Title: Countering Directed Energy Weapons (DEWs) for RQ-4 Global Hawk

Military System or Acquisition Customer: Global Hawk Program Office and Sensors Division in AFLCMC/WI

Description: Seeking technology to protect High Altitude Intelligence, Surveillance and Reconnaissance (ISR) Electro-Optical/Infra-Red (EO/IR) Sensor Systems from DEWs and Countermeasures. DEWs are an emerging threat to the RQ-4 Global Hawk and other High Altitude ISR fleets. The Air Force requires an assessment of current optical system vulnerabilities and development of a technology maturation strategy for protecting High Altitude ISR sensors. White papers must baseline the vulnerabilities of current High Altitude EO/IR sensors, including the MS-177A sensor in the RQ-4 Global Hawk; conduct system/component vulnerability testing; derive DE Hardening and Protection system requirements; and identify a technology maturation strategy aligned with cost and risk for execution by the ISR and SOF Directorate.

Technical Point of Contact(s): Mr. Tony Cain, AFRL/RXAP, anthony.cain.2@us.af.mil (937) 255-6636, x 3046 or Jonathan Power, AFLCMC/WINA, jonathan.power@us.af.mil (937) 255-0335

Requirement #: USAF-19-PEO-ISR-SOF-10.B

Title: Augmented Reality (AR) Solution for CV-22 Wiring Maintenance

Military System or Acquisition Customer: CV-22 Program Office, in support of AFSOC

Description: The CV-22 Program Office is seeking the development of an AR toolset that will improve the accuracy and speed of maintainer-installed wiring harnesses in the aircraft nacelles. The AR toolset should provide intuitive visual overlays of complex wiring installation, routing, and clamp and abatement placement in relation to surrounding components and nacelle structure. There should be a marked improvement in installation ease using the AR toolset versus current paper diagrams. Solutions will be evaluated in light of human factor requirements to ensure effective usability of the product in the military maintenance environment without compromising safety or requiring significant changes to maintenance and safety procedures. Solutions that have the potential to grow by incorporating future revisions, such as automatically highlighting to the maintainer if the wiring is misrouted or otherwise improperly installed, and adding maintainer task instructions, will be viewed more favorably.

Technical Point of Contact(s): Mark Lowman, mark.lowman3.ctr@navy.mil (301) 737-7019

Requirement #: USAF-19-PEO-ISR-SOF-10.C

Title: Three-Band Focal Plane Array (FPA)

Military System or Acquisition Customer: Next Generation Sensors (NGS) program

Description: Seeking development of an FPA that would address the need to house the traditional imaging bands (two short-wave infrared (SWIR) bands and mid-wave infrared [MWIR]) in one operational multi-band system with an extended range capability. This new, three-band FPA will need to capitalize on the current development of Multi-band

Advanced Reconnaissance Long-range Image Experiment (MARLIE). MARLIE replaces baseline camera technologies with a combined SWIR/MWIR dual-band camera, providing full 24-hour imaging, as well as the potential for improved imaging by leveraging both bands simultaneously.

Technical Point of Contact(s): Philip D. Myers, AFLCMC/WINA, philip.myers.7@us.af.mil (937) 255-2650 or Barry Karch, AFRL/RYSMT, barry.karch@us.af.mil (937) 713-8430

Requirement #: USAF-19-PEO-ISR-SOF-10.D

Title: Multi-modal Integration into a Common Processor

Military System or Acquisition Customer: Next Generation Sensors (NGS) program

Description: Develop/Expansion of standards, procedures, and architecture for integration of geospatial intelligence sensors (Radar, Electro-Optical/Infrared (EO/IR), Lidar, and Hyperspectral Imaging [HIS]) into the Common Open Architecture Reconnaissance Processor Standards (COARPS). Currently, COARPS is designed to operate and manage modes and resources for radar only. In order to support NGS, the listed sensor modalities will need to be integrated/expanded into COARPS to allow for future cross-cueing and data fusion onboard the aircraft and/or at the ground control station. Requirement is to expand the COARPS standard into Multi-INT realms.

Technical Point of Contact(s): Philip D. Myers, AFLCMC/WINA, philip.myers.7@us.af.mil (937) 255-2650 or Barry Karch, AFRL/RYSMT, barry.karch@us.af.mil (937) 713-8430

Requirement #: USAF-19-PEO-ISR-SOF-10.E

Title: Synthetic Modeling for Assisted Target Recognition (ATR) Data

Military System or Acquisition Customer: Next Generation Sensors (NGS) program

Description: Adversaries' newly developed targets typically do not have a lot of reference data or physical models. In order for ATR algorithms to be successful, they have to be developed based on reference data and in the required modalities. This reference data will have to be built upon synthetic models to simulate these new targets and train the algorithms until more data becomes available. Requirement is to build these reference models for the classified target sets.

Technical Point of Contact(s): Philip D. Myers, AFLCMC/WINA, philip.myers.7@us.af.mil (937) 255-2650 or Juan Vasquez, 711 HPW/RHXM, juan.vasquez.11@us.af.mil (937) 344-9629

Requirement #: USAF-19-PEO-ISR-SOF-10.F

Title: Adaptable Fused Precision Navigation & Timing (PNT)

Military System or Acquisition Customer: AC-130J program

Description: The AC-130J is currently heavily reliant on Global Positioning System (GPS) to employ weapon systems. The program is investigating various non-GPS PNT options to enable operations in a GPS-degraded or denied environment. A fused PNT Hub, or integration software, is required to smartly balance and adapt the inputs from the various aiding sources and provide PNT information to the weapon systems. The PNT Hub shall utilize open system architectures to enable rapid integration of future sensors without incurring expensive system or platform integration and certification costs. The PNT Hub shall provide a system health output to user interfaces allowing operators to monitor the status/health of the PNT solution. Potential solutions should accommodate inputs from PNT technologies to include: Network/Data Link Navigation, Link 16, Iridium Satellites, Environment-Based - Vision, Celestial, Terrain, Magnetic, Highly

accurate clocks, and Sensor Fusion. This effort shall deliver a prototype system capable of undergoing demonstration in the Systems Integration Lab (SIL) and on aircraft for flight testing.

Technical Point of Contact(s): Mr. Oren Edwards, oren.edwards@us.af.mil (937) 656-8209

Requirement #: USAF-19-PEO-ISR-SOF-10.G

Title: Non-standard Tactical Weight Management for AC-130J

Military System or Acquisition Customer: AC-130J, other SOF C-130J variants

Description: The AC-130J is a highly-modified and specialized variant of the C-130J. Although the current C-130J baseline incorporated robust requirements meeting the global customer enterprise, it is significantly sub-optimized from a gross weight perspective to meet AC-130J time-on-station needs. This includes material selection, unused subsystem components, as well as the inability to rapidly deconfigure/reconfigure “green-aircraft” components for specific mission requirements. Seeking innovative technologies, materials, and/or approaches to rapidly provide significant weight savings and extend AC-130J time on station. Proposals shall include a comprehensive aircraft survey to identify weight reduction candidates, test and qualify innovative prototypes via in-flight demonstrations, as well as provide key recommendations on rapid configuration/deconfiguration approaches for various candidate items.

Technical Point of Contact(s): Mr. Oren Edwards, oren.edwards@us.af.mil (937) 656-8209

Requirement #: USAF-19-PEO-ISR-SOF-10.H

Title: Virtual/Mixed Reality Decoupling of Accelerated Aircrew Training from Low Density, High Demand Devices

Military System or Acquisition Customer: AC-130J, other SOF C-130J variants

Description: The AC-130J, due to its high degree of specialization and pace of capability upgrades, requires significant on-aircraft time for candidate aircrew, which impacts readiness when those same aircraft are also required by operational squadrons. Seeking innovative solutions to rapidly emulate aircraft flight and mission systems, presenting to students in a high-fidelity virtual or mixed-reality environment that will complement other low-density, high-demand training devices. Solutions will prioritize activities to demonstrate a checklist trainer where the AC-130J is modeled in the virtual environment, and the system can autonomously teach and evaluate all nine crew positions on checklist execution. The crew positions should be integrated so that when systems are powered on by the pilot, they should be activated in the back of the airplane, etc. Upon successful initial demonstration, the solution shall expand to include all nine crew positions conducting combat training missions in the virtual environment. Potential solutions shall incorporate architecture provisions for immediate concurrence with the regularly-updated aircraft configuration, and may also be extensible to other SOF C-130 variants. Incorporation of virtual and mixed reality technologies/components into operational applications, as well, are highly desired.

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Requirement #: USAF-19-PEO-ISR-SOF-10.I

Title: Multi-level Security for a Common Processor

Military System or Acquisition Customer: Next Generation Sensors (NGS) program

Description: Develop/Expansion of standards, procedures, and architecture for Geospatial Intelligence (GEOINT) and Signals Intelligence (SIGINT) sensors security management into the Common Open Architecture Reconnaissance Processor Standard (COARPS). Currently, COARPS is designed to operate and manage modes and resources for radar only. In order to support NGS, multi-level security will need to be integrated/expanded into COARPS to protect system data from crossing transmission networks. Requirement is to expand the COARPS standard into Multi-INT realms.

Technical Point of Contact(s): Barry Karch, AFRL/RYMT, barry.karch@us.af.mil (937) 713-8430 or Philip Myers, AFLCMC/WINA, philip.myers.7@us.af.mil (937) 255-2650

Requirement #: USAF-19-PEO-ISR-SOF-10.J

Title: Real-time Lidar Processing using Common Open Architecture Radar Processing System (COARPS)

Military System or Acquisition Customer: Next Generation Sensors (NGS) program for various ISR platforms (U-2, RQ-4, MQ-9, Gray Eagle)

Description: The NGS program will require a number of sensors to share processing assets, with standardization in how the sensors and processor interface with one another. COARPS has established standards for radar modes, but will be expanded to other modes such as lidar. The long-standoff lidar sensors of interest for NGS will use photon counting arrays with data rates approaching a giga-pixel per second. The data collected from these sensors need to be distilled, in real-time, to form mega-pixel class 3D point clouds every second. Desired solutions will help to define lidar mode standards with the COARPS community, and develop real-time processing, leveraging existing government-owned coincidence processing algorithms. The effort will also define any required sensor pre-processing to match COARPS standards or to perform initial data reduction, as well as delivering final lidar data products consistent with National Geospatial-Intelligence Agency standards.

Technical Point of Contact(s): David Rabb, AFRL/RYMM, david.rabb@us.af.mil (937) 713-4392 or Philip D. Myers, AFLCMC/WINA, philip.myers.7@us.af.mil (937) 255-2650

Requirement #: USAF-19-PEO-ISR-SOF-10.L

Title: Maritime Dropsonde

Military System or Acquisition Customer: Special Warfare Program (formerly “Battlefield Airmen”), including Guardian Angel

Description: On Joint Precision Aerial Delivery System (JPADS)-equipped aircraft, jumpmasters can gather winds aloft information for calculating release/jump points, but lack critical information about Sea State and water temperature for safe conduct of over-water drops. On non-JPADS aircraft, jumpmasters must rely on spotter chutes that are simple ballistic, round, parachutes to manually equate wind drift from airdrop aircraft to an area in the water. This method of estimating winds is imprecise and challenging, as the jumpmaster may be on an aircraft moving at over 100 mph, and over-water there are no visible fixed reference points. A Dropsonde and buoy system is needed, hand-deployed from an aircraft, to transmit winds aloft from the aircraft to the water, and comprehensive sea-state information back to the aircraft via JPADS (if available) and via man-pack radios to operator-worn, Android Tactical Assault Kit (ATAK)-based kits on non-JPADS aircraft. The contractor should determine if the sonde and buoy capabilities could be combined in one hand-deployable end-item or two items (single is preferred). The contractor will then develop and/or integrate all capabilities, to include

communications, to JPADs and via operator radios to the body-worn ATAK-based information management system, and support over-water testing of solution.

Technical Point of Contact(s): Ms. Taylor Corbett, taylor.corbett@us.af.mil (937) 656-8150

Requirement #: USAF-19-PEO-ISR-SOF-10.M

Title: Small Format Link 16 radio

Military System or Acquisition Customer: Special Warfare Program (formerly “Battlefield Airmen”), including Guardian Angel

Description: Current Special Warfare operators have a need for a power efficient, small formatted Link 16 device, capable of network entry and transmit/receive of all pertinent J-series messages. The small format Link 16 will employ an information processing function that enables a power efficient, handheld design and optimizes power consumption and resource utilization. It will be similar in size to current generation handheld tactical radios. It also will be required to possess Type 1 encryption capability and Government-approved Advanced Encryption Standard (AES) encryption with the goal of achieving Joint Interoperability Test Command (JITC) certification.

Additionally, the system must support 969 to 1206 MHz Link-16 frequency range for both Link16 data and voice and power requirements, and must interface with legacy batteries. The contractor will develop and/or integrate all capabilities, to include communications with current Joint Tactical Air Control information management systems.

Technical Point of Contact(s): Mr. Douglas Pierre, douglas.pierre.3@us.af.mil (937) 656-8142

Requirement #: USAF-19-PEO-ISR-SOF-10.N

Title: RQ-4 Cold Temperature Wheel and Strut Seals

Military System or Acquisition Customer: RQ-4B Global Hawk Program Office, AFLCMC/WIGE

Description: The Global Hawk Program Office is interested in innovative technologies to provide increased capabilities for cold temperature limitations on main landing gear strut seals and tire seals. The current seals on the wheels are qualified to minus 65 degrees Fahrenheit, and struts are limited to minus 70 degrees Fahrenheit. The ideal temperature would be to reach minus 94 degrees Fahrenheit. The technology should be backward compatible with current Global Hawk main landing gear struts and Michelin and Goodyear tires. Proposed solutions should be optimized to provide the best resistance to cold temperatures without degrading other performance parameters. Testing of the seals will be required to substantiate the performance to determine if the seals meet the cold temperature limitations.

Technical Point of Contact(s): Mr. Chris Casillas, AFLCMC/WIG, Christopher.Casillas.1@us.af.mil (937) 255-4374

Requirement #: USAF-19-PEO-ISR-SOF-10.O

Title: RQ-4B High Altitude Self-Contained AC Power Generation System

Military System or Acquisition Customer: RQ-4B Global Hawk Program Office, AFLCMC/WIGE

Description: Some RQ-4B variants lack available power to fully utilize available payload space with additional payload. The program is seeking a self-contained AC power generation system, compact enough to be attached to the underside of the wing and deliver 15-30 kilovolt-Amperes (kVA) at 60,000 feet and 104 Knots Calibrate Air

Speed (KCAS) at standard day temperatures. The system should be able to operate over an altitude range between sea level and 65,000 feet, airspeed between 90 KCAS and 150 KCAS, ambient temperature minus 60 degrees Fahrenheit to plus 60 degrees Fahrenheit from standard day, have minimal aerodynamic and endurance penalties, and provide continuous power for at least a 20-hour mission. Various testing would be needed in order to evaluate and compare the actual aerodynamic and electrical system performance to analytical predictions.

Technical Point of Contact(s): Mr. Eric Bucher, eric.bucher@us.af.mil (937) 255-0320

Requirement #: USAF-19-PEO-ISR-SOF-10.P

Title: Multiple Intelligence (Multi-INT) Mode Development Kit (MDK)

Military System or Acquisition Customer: Next Generation Sensor (NGS) acquisition program

Description: This project seeks to explore the solution space of a framework to develop a multi-INT mode development kit for use within a Common Open Architecture Reconnaissance Processor Standards (COARPs) compliant processing system. This work leverages and extends the COARPS 2.0 mode development kit for an airborne surveillance program. The culminating work product is a prototype MDK that can be provided to companies that develop sensor modes, which can then be integrated into a common, cross-platform processing system.

Technical Point of Contact(s): Philip Myers, AFLCMC/WINA, philip.myers.7@us.af.mil (937) 255-2650

Requirement #: USAF-19-PEO-ISR-SOF-10.Q

Title: MQ-9 Block 30 Ground Control System (GCS) Virtualization program

Military System or Acquisition Customer: MQ-9 (AF and other services)

Description: This project will address obsolete components, obsolescence of current Commercial Off-The-Shelf (COTS) components, lack of commonality across the GCS product fleet, and overcome software support as obsolete hardware cost rises significantly each year. The effort would evaluate hardware virtualization approaches to consider Hardware failover, Hardware/Software redundancy, assess and capture the airworthiness, safety, and cybersecurity requirements for virtualization and decoupling of hardware/software. Ultimately seeking a modular Operating System (OS)-based approach to control system modernization that will allow streamlined Human Machine Interface (HMI) application testing and insertion into the current MQ-9 control system. The threshold outcome would be virtualization of the primary drone and sensor operator's processors, with a goal of consolidating the multiple Multi-Functional Workstations (MFW) computers and upgrade the mission support software to "best of breed" utilities that support open standards and an open architecture implementation.

Technical Point of Contact(s): Ms. Sherry Royce, sherry.royce.ctr@us.af.mil (937) 255-3999

Requirement #: USAF-19-PEO-ISR-SOF-10.R

Title: MQ-9 On-board Flight Data Recorder

Military System or Acquisition Customer: MQ-9 Program (AF and other services)

Description: Seeking on-board flight data recorder to log key flight parameters and conditions experienced by MQ-9 during flight (e.g., vertical and lateral accelerations, roll and pitch angles, roll, pitch and yaw rates, true and indicated airspeed, ramp weight, fuel burned, aileron and ruddervator defections, brake servo torque, propeller speed, etc.). These key parameters need to be stored for the duration of the MQ-9 flight, sampled at

rates with enough fidelity to capture data without missing “peaks” (50Hz, 100Hz, 250Hz, etc.) and offloaded in an UNCLASSIFIED data stream following each flight. The UNCLASSIFIED data stream will serve as the foundation for Military Flight Operations Quality Assurance (MFOQA), Load / Environmental Spectra Survey (L/ESS), and Individual Aircraft Tracking Program (IATP) analysis. Proposals must provide a capability to log the data and an analysis toolset to interpret it.

Technical Point of Contact(s): Mr. Rich Tayek, Richard.Tayek@us.af.mil (937) 255-9647 or Mr. Mike Hall, Michael.Hall.6@us.af.mil (937) 255-6609

Requirement #: USAF-19-PEO-ISR-SOF-10.S

Title: GBU-54 (DSU-38) Seeker Improvement

Military System or Acquisition Customer: AFSOC

Description: Develop a material solution to prevent GBU-54 seeker lens fogging during low-speed weapons employment. An ideal solution would not require electrical power, is field installable, and requires little recurring maintenance. Current lens designs fog during descent due to low outside air temperatures (OAT) at release altitude. During the descent, the seeker lens collects condensation, reducing the ability to acquire laser energy. A solution needs to prevent or remove the condensation with enough time to acquire laser energy to enable the weapons to guide to both static and moving targets.

Technical Point of Contact(s): Capt Andrew Spurgeon, andrew.spurgeon@us.af.mil (937)255-1634 or Mr. Brad Schroeder, Bradley.schroeder.1@us.af.mil (937) 255-2493

Requirement #: USAF-19-PEO-ISR-SOF-10.T

Title: High Rate Ku/Ka Antenna

Military System or Acquisition Customer: AFSOC

Description: MQ-9 aircraft control is limited in roll, pitch, and yaw rates due to an electro-mechanical Ku band aircraft control antenna. Currently, the aircraft is limited to +/- 2°/Sec Pitch, +/- 15°/Sec Roll, +/- 1°/Sec Yaw. Overall controls are limited to +/- 10° pitch and roll +/- 20° before command/return Ku link is lost. Need an antenna that will increase these limits to threshold: +/- 4°/Sec Pitch, +/- 30°/Sec Roll, +/- 2°/Sec Yaw and +/- 20° pitch and roll +/- 40°. Objective capability would have no restrictions on maneuverability and would add Ka frequency compatibility. Design must maintain current form/fit factor of existing antenna as well as thermal, power, weight and interference considerations.

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PEO Space

Sustaining and adapting National Security Space Capabilities in an evolving, contested, competitive, and congested warfighting domain. Enhance warfighter effectiveness through integration of space capabilities into warfighting systems as envisioned by the SecAF and CSAF. Seeking technologies to maintain and enhance the constantly-evolving strategic and tactical national security advantages afforded to the U.S. by integrated air, cyber, and space systems. Energize the air, cyber, and space industrial base supporting U.S. national security. Support a more cost-effective, reliable, available, maintainable, and survivable space enterprise in the face of threats. Enable integration of space effects into air, cyber, and space systems to deter and if deterrence fails, to prevail.

Requirement #: USAF-19-PEO-SPACE-11.A

Title: Advanced Technologies to enable Space-Based Test and Evaluation

Military System or Acquisition Customer: Space and Missile Systems Center (SMC)

Description: Devise and deliver technologies, systems, and communication techniques to rapidly assemble and conduct test and evaluation activities on orbit. Specific areas of interest include:

- “Open” standardized components and interface hardware for on-orbit test and evaluation, rapid technology insertion, on-orbit assembly, and on-orbit servicing;
- Data management and architecture strategies that allow for extensibility and increased system complexity (e.g., from components to subassemblies to assemblies to subsystems to systems to satellites to planes to constellations);
- Monitor-and-assess technologies for safety and health monitoring (state of health);
- Cyber protection and multi-level security methodologies to support simultaneous testing for multiple stakeholders.

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Requirement #: USAF-19-PEO-SPACE-11.B

Title: Space Infrastructure Threat Survivability

Military System or Acquisition Customer: Space and Missile Systems Center (SMC)

Description: Devise and deliver technologies, systems, and communication techniques to increase survivability and resilience of space infrastructure against threats. Specific areas of interest include:

- Increased autonomy;
- Increased maneuvering capability (increased delta-V, higher impulse, higher specific impulse (ISP), improved real-time on-command propulsion, improved command precision in spacecraft delta-V, longer duration operation);
- Flexible software defined radio(s) in Multi-Global Navigation Satellite Systems (GNSS), combined GNSS/communication systems, ground/space systems, and hardware supporting virtualized electronic payloads;
- Compact, flexible, multi-frequency, Electromagnetic Compatibility (EMC)/ Electromagnetic Interference (EMI) tolerant, communication systems.

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Requirement #: USAF-19-PEO-SPACE-11.C

Title: Space-Logistics to Support Enterprise Resilience

Military System or Acquisition Customer: Space and Missile Systems Center (SMC)

Description: Devise cost-effective designs and logistics plans to support enterprise resilience for mission essential augmentation, surge, reconstitution, and recovery. Specific areas of interest include:

- Standardized components and interface hardware for rapid technology insertion, on-orbit assembly, on-orbit servicing, and on-orbit test and evaluation;
- Systems and techniques to shorten lead times and reduce cost of spacecraft/launcher processing;

- Launch Vehicle Health Monitoring and Built-in-Test systems;
- Ground system scheduling, planning, and on-board guidance systems which enable rapid launch replanning, real-time onboard adaptive ascent trajectory optimization, termination systems, etc.;
- Space servicing technologies for sustainment and/or repair, end-of-life management, and responsible disposal;
- Flexible, agile, and responsive tasking (i.e., communications, navigation, Intelligence, Surveillance, and Reconnaissance (ISR), etc.) for on-demand service from space systems.

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Requirement #: USAF-19-PEO-SPACE-11.D

Title: Simplify Existing Technologies to Reduce Lifecycle Cost of Military Infrastructure Systems

Military System or Acquisition Customer: Space and Missile Systems Center (SMC)

Description: Devise simplified versions of existing technologies to reduce the lifecycle cost of military infrastructure systems and interfaces. Specific areas of interest include:

- Standardized, multi-function, miniaturized/scalable components (economies of scale);
- Touch labor reductions (lower labor cost) for each program phase (production, test, verification, and operations and support);
- Standardized satellite interfaces, etc., to reduce non-recurring engineering costs and enable rapid payload integration.

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Requirement #: USAF-19-PEO-SPACE-11.E

Title: Integrated Information Superiority (Air Force Warfighter Integration Construct)

Military System or Acquisition Customer: Space and Missile Systems Center (SMC)

Description: Devise components and systems to improve information superiority across space and air domains and decrease opportunities for surprise by adversaries. Specific areas of interest include:

- Improved data fusion algorithms to augment analysis of data and information for improved warfighter battlespace knowledge and awareness;
- Improved automated analysis techniques for battlespace characterization and discrimination;
- Data fusion with data from non-traditional sources such as commercial space data-as-a-service platforms (i.e., environmental monitoring, Space Situational Awareness, etc.);
- Complete temporal and spatial coverage of the battlespace: i.e., data processing, cross-cueing, threat identification and assessment, debris detection, custody,

conjunction, satellite “black box” recorder/transmitters, and environmental monitoring/modeling.

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PEO Weapons

PEO Weapons/Armament Systems Development Division

Requirement #: USAF-19-PEO-WEAPONS-14.A

Title: High Explosive Anti-Tank/Anti-Personnel Anti-Material (HEAT/APAM) Warhead for AGR-20 (APKWS II)

Military System or Acquisition Customer: PEO Weapons

Description: The AGR-20 APKWS II is becoming the air-launched weapon of choice of many current operational scenarios due to its precision and high load out. Incorporating a shaped-charge warhead could expand its armor target set. To ensure flexibility by reducing the need for multiple types of AGR-20 variants during operations, maintaining a significant level of anti-personnel/anti-material performance is also desired with the shaped-charge warhead. This initiative envisions the design and production of approximately 25 HEAT/APAM shaped-charged warheads for use in performance and suitability evaluations for the AGR-20 APKWS II. Mil-Std 1316 compliant fuzing for AGR-20 APKWS II will be handled under a different initiative.

Technical Point of Contact(s): Mr. Kevin Fessler, kevin.fessler@us.af.mil (850) 883-3345 or Mr. James Krafcik, james.krafcik@us.af.mil (850) 883-3337

PEO Weapons/Armament Systems Development Division

Requirement #: USAF-19-PEO-WEAPONS-14.B

Title: Warhead Manufacturing Cost Reduction Using AF96 Steel and/or Modified Formulations

Military System or Acquisition Customer: PEO Weapons

Description: AF96 steel is becoming the standard for mass production of warheads requiring high-performance material properties. The DoD procures large quantities of steel-cased warheads manufactured by various methods to include casting, forging or extruding steel with welding and/or machining to meet required dimensions. Any reduction in materials or processing cost and/or schedule is highly desirable. AF96 steel has been identified as a potential lower cost warhead case material for use in higher performance applications, complex shapes, and unique embedded or embossed patterns. The Armament Enterprise is interested in determining if warheads produced from either AF96 steel, or an improved formulation, can be more cost effective while achieving mechanical properties which meet or exceed other AF96 production methods. The Government intends to provide the AF96 developmental formulation as described above. This effort should clearly demonstrate cost-effective, mass producible AF96 steel or an improved formulation of equal or greater material property. The Armament Enterprise’s primary interest is in either a 250 lb. warhead, such as the SDB I form factor, or a 500 lb. warhead, such as the MK82. The end product should be an assessment report that demonstrates the cost-effective production/manufacturing and the associated material properties, along with the delivery of a small lot (2-5) of testable SDB I or MK82 warhead cases.

Technical Point of Contact(s): Dr. Rachel Abrahams, rachel.abrahams.1@us.af.mil (850) 883-1007 or Mr. James Krafcik, james.krafcik@us.af.mil (850) 883-3337

Requirement #: USAF-19-PEO-WEAPONS-14.C

Title: Warhead Manufacturing Improvements to Air Delivered Weapons // Improved Suspension Lug Corrosion Protection Solution

Military System or Acquisition Customer: PEO Weapons

Description: DoD air delivered weapons typically use ultra-high-strength steel lugs as the primary physical load bearing interface for securing warheads to aircraft weapons carriage racks and launchers. Lugs have traditionally used a cadmium-based coating for environmental corrosion protection. Unfortunately, the availability of cadmium-coated lugs is diminishing due to environmental and toxicity concerns during the lug manufacturing process. Zinc/Trivalent Chromate-based plating has been used as an alternative to cadmium plating, but this solution appears to have insufficient environmental corrosion resistance. There have been several instances where corrosion has been a problem in the field. A long-term solution for warhead lug corrosion resistance is needed. Some manufacturers are now considering zinc/nickel plating for warhead lug corrosion control, although other innovative and cost-effective alternatives should be evaluated. The desire is to increase the manufacturing readiness level of corrosion-resistant warhead lug treatments to a level suitable for mass production and should include small production lots of MK-82, MK-84, BLU-109 and Small Diameter Bomb Increment I (SDB I) corrosion-resistant lugs which meet required standards.

Technical Point of Contact(s): Dr. Rachel Abrahams, rachel.abrahams.1@us.af.mil (850) 883-1007 or Mr. Shawn McCooney, shawn.mccooney@us.af.mil (850) 883-3499

Requirement #: USAF-19-PEO-WEAPONS-14.D

Title: 250 lb. High-Fragmentation Penetrator

Military System or Acquisition Customer: PEO Weapons

Description: A combination High-Fragmentation/Penetrating warhead design sized to the current Laser Small Diameter Bomb Increment I (LSDB-1) form factor offers the potential to greatly expand the LSDB-1 target set and employment scenarios. A warhead design incorporating high fragmentation via pre-formed fragments for lethality against light material and personnel, a high-strength steel case for penetration, and distributed fuzing with precision height of burst to control the fragmentation footprint may suggest a design strategy that could meet the demands for Cockpit Selectability and Scalable Effects in a high load out configuration across a wide target set. This effort should provide a cost effective “drop in” warhead improvement initiative for the LSDB-1 with minimum integration costs. The end product should provide a design and manufacturing description, along with the associated tech data package cost methodology.

Technical Point of Contact(s): Mr. James Krafcik, james.krafcik@us.af.mil (850) 883-3337 or Mr. Kevin Fessler, kevin.fessler@us.af.mil (850) 883-3345

Requirement #: USAF-19-PEO-WEAPONS-14.E

Title: Enhanced/Optimized Small Diameter Bomb (SDB) I Focused Lethality Munition (FLM)

Military System or Acquisition Customer: PEO Weapons

Description: DoD currently produces the SDB Increment 1 FLM and the BLU-129 with multi-phase blast explosive (MBX). The Air Force Research Laboratory (AFRL) has shown that the MBX formulations for these weapons can be significantly improved without a requalification of the explosive fill. It is also our belief that the knowledge associated with composite case warhead technology has been enhanced since 2006, and the opportunity exists to optimize the case design and identify manufacturing options for

cost reduction. It is also desired that the design incorporates an option to attach a Semi Active Laser (SAL) sensor to the SDB FLM warhead. This effort consists of utilizing AFRL's MBX research to create a new design option for an enhanced controlled blast, Laser SDB FLM. MBX formulations which achieve significantly increased performance and are cost effective to produce should provide both ACC and AFSOC a desired capability enhancement. (The MBX formulation POC is Dr. Charles "Mike" Jenkins, AFRL/RMW, (850) 882-5902, email: charles.jenkins.5@us.af.mil)

Technical Point of Contact(s): Mr. James S. Schoeneman, james.schoeneman@us.af.mil (850) 883-4924 or Mr. James Krafcik, james.krafcik@us.af.mil (850) 883-3337

Requirement #: USAF-19-PEO-WEAPONS-14.F

Title: Low Drag Weapon Pod/Dispenser for Small Precision Guided Munitions

Military System or Acquisition Customer: PEO Weapons

Description: The current fielded weaponized Unmanned Aerial Systems (UAS) have limited munition magazines to accommodate their extended loiter time over the battlefield. The MQ-9 current load-out is either 4 Hellfire missiles or 2 Hellfire missiles and 2 GBU-12 (500 lb.) Laser Guided Bombs. There are plans to add the capability to replace the 2 GBU-12s with 4 Laser Small Diameter Bombs. However, this still only provides 6 munitions for a 10 to 12 hour loiter. Replacing the GBU-12s with a low-drag pylon dispenser that is capable of dispensing much smaller munitions could significantly enhance sortie effectiveness against fixed and relocatable soft targets. A reconfigurable Weapon Pod/Dispenser that was capable of carrying 10 to 20 existing small weapons (Griffin STM, Viper Strike, Battle Hawk, Switch Blade, etc.), but also reconfigurable for future even smaller munitions, could provide an eight-fold increase in munitions.

Weapon Pod/Dispenser needs to be compatible with both an UAI and 1760 platform interface. Development of Pod/Dispenser should also address a strategy for achieving Non-Nuclear Safety Board approval, Seek Eagle Certification, Air Worthiness Assessment, and Government Technical Data Package cost methodology.

Technical Point of Contact(s): Mr. James S. Schoeneman, james.schoeneman@us.af.mil (850) 883-4924 or Mr. James Krafcik, james.krafcik@us.af.mil (850) 883-3337

Air Force Propulsion Directorate

Requirement #: USAF-19-PROPULSION-15.A

Title: Automating Data Collection for Eddy Current Inspection

Military System or Acquisition Customer: AFLCMC Propulsion Directorate

Description: The Directorate of Propulsion (LP) is interested in innovative repair technologies to collect and process raw data from the General Electric EC2000 semi-automated inspection systems. This project should address collecting and analyzing inspection data for specific part and serial numbers, and porting the data to a Government-accepted transferable data storage system. Specific data of interest includes:

- An established coordinate system for the inspected component that is properly referenced (zeroed) to the established coordinate system for the inspection machine.
- 100 percent capture and storage of digitized eddy current transducer signals during 100 percent of surface inspection, accurately recorded/indexed to the established component coordinate system.

- Capture and storage of inspection system calibration characteristics (before and after the inspection to assure consistency) for the inspection transducer and positioning/scanning system.
- Inspection set-up and configuration parameters of each specific component inspection.
- Storage of probe specific attributes - type, geometry, size, windings etc.
- Data describing the inspection process flow to identify key output points during the automated inspection and data logging process.
- Configuration control documentation about the inspection processes and software including, but not limited to scan plans.

Technical Point of Contact(s): Thomas Driscoll, thomas.driscoll@us.af.mil (405) 734-2604

Requirement #: USAF-19-PROPULSION-15.B

Title: Blade Repair of Titanium Integrally Bladed Disks (IBDs)

Military System or Acquisition Customer: AFLCMC Propulsion Directorate

Description: IBDs are used in modern turbine engines to reduce mass and increase fuel efficiency. Titanium fan and compressor stage IBDs have been fielded in modern fighter turbine engines without an approved repair process for damage that exceeds current blend limits. Foreign Object Damage (FOD) exceeding the blend limits must be repaired by replacing the entire, very costly IBD. The need exists to repair leading edge and blade tip FOD in excess of current blend repair limits to enable the safe, full-life operation and reduced ownership cost of the weapon system through component life or interval extension. Previous work demonstrated a low-cost repair process on titanium IBD material with tensile and fatigue properties similar to the base material of the IBD. This program is expected to demonstrate and mature the process to repair leading edges and blade tips of IBDs in wrought or forged materials of interest including titanium 6-4, titanium 6-2-4-2 and titanium 6-2-4-6.

Technical Point of Contact(s): Ron Van Hoosen, ronald.vanhoosen@us.af.mil (405) 734-3494

Requirement #: USAF-19-PROPULSION-15.C

Title: Inspection of Surface Flaws in the Blade Root Fillet of Blisks/Integrally Bladed Rotors (IBRs)

Military System or Acquisition Customer: AFLCMC Propulsion Directorate

Description: The complex geometry associated with the blade root fillet region of Blisks/IBRs presents unique challenges in nondestructive inspection (NDI). The high stress regions along the suction side (SS) and pressure side (PS) in the blade root fillet region are non-linear, with a changing radius of curvature, and abrupt geometry changes approaching the leading and trailing edges (LE and TE). Less than ideal component surface condition, as well as variable flaw orientation, makes traditional inspection methods potentially unreliable. Spacing between adjacent blades of the Blisk/IBR also presents challenges in accessibility. Multiple military engine/weapon system platforms, both legacy and pipeline, to include F-16, F-22, JSF, Black Hawk, and Apache utilize Blisk/IBR designs in the fan and/or compressor. The need exists to apply, with engineering development, a whole-field thermographic-based NDI method/capability that is being used for production-based inspection of turbine engine subcomponents, such as blades, to enable the safe full-life operation and reduced ownership cost of the weapon

system through component life or interval extension. The envisioned approach is a feasibility demonstration to produce lab-generated tight fatigue cracks in a Blisk/IBR blade root fillet region, detected with the chosen technique, prototype inspection system fabrication and optimization of fatigue cracking procedure, with the goal of performing and demonstrating the NDI probability of detection (POD) consistent with Mil-HDBK 1823A. Target crack size is 0.040-inch surface length by 0.020-inch depth.

Technical Point of Contact(s): Ashley Whitney-Rawls, ashley.whitney-rawls@us.af.mil (937) 255-2158

Requirement #: USAF-19-PROPULSION-15.D

Title: Low-cost Small Engine Technologies

Military System or Acquisition Customer: AFLCMC Propulsion Directorate

Description: The Propulsion Directorate and PEO Weapons are interested in the development of small turbine engines to be used in cruise missiles and Unmanned Aerial Vehicle (UAV) applications to enable a family of new low-cost small engines. Focused thrust areas are 150-300lb thrust, 600-1200 lb thrust and 1200-2000lb thrust. Interest areas for technology development include low-cost controls and accessories, innovative starting capabilities (significant interest in high-altitude cold start without use of pyrotechnic ignition), common interface/open-system architecture to enable use of family of engines in multiple weapon systems, and low-cost test and evaluation techniques or testing assets, such as a reusable captive carry system.

Technical Point of Contact(s): Aleene Falk, aleene.falk@us.af.mil (937) 255-7988

Requirement #: USAF-19-PROPULSION-15.E

Title: Legacy Sensor Package Upgrades for Prognostic Health Monitoring

Military System or Acquisition Customer: AFLCMC Propulsion Directorate

Description: The Directorate of Propulsion is interested in innovative technologies to monitor and record critical engine in-flight metrics for legacy Air Force engines, including the F100, J85, TF33, T56, and T400. These engines are characterized by a mechanical engine controller, moderate efficiency, and very limited feedback to the cockpit. Specific metrics include exhaust gas temperature (EGT) and low-speed compressor/low pressure turbine rotational speed (N1 speed). These metrics are generally monitored during test cell runs, but do not have in-flight hardware and data recording. Sensors should be non-intrusive and not require re-design of major components. The sensors and data recorder should use available mounting space on the engine frame. Data should support readings every second for a minimum of 48 flight hours. The proposal should address a secure, non-intrusive sensor and data package with capability for accessing the data on the flight line at an operational base. At this time, there is no requirement to provide data to the aircraft cockpit or to integrate with existing engine-mounted data acquisition systems. Deliverables should plan to include five hardware sets for initial testing installation/maintenance/sustainment instructions, and provision to support ground (test cell) and in-flight testing of two aircraft (projected as one left- and one right-hand engine mounted on each aircraft and one spare set). The final hardware kit should meet standards for flight safety as directed in MIL-HDBK-516C, MIL-STD-810, AFI 21-101, ASTM F2639, IEEE 135, and GFSC-STD-7000A.

Technical Point of Contact(s): Andrew Kocarnik, andrew.kocarnik@us.af.mil (405) 734-4884

PEO Mobility

Requirement #: USAF-19-PEO-Mobility-16.A

Title: Aircraft Work Unit Code (WUC) to Supply Data Cross Reference capability

Military System or Acquisition Customer: AMC

Description: Implementation of Condition Based Maintenance Plus (CBM+) in accordance with DoD's vision for improved maintenance and logistics practices is clearly driving the need to develop an automated system/process to cross-reference aircraft WUCs to Supply Data. The required automated system/process should be capable of correlating data from each aircraft platform's unique WUCs to supply system National Stock Numbers (NSNs), Part Numbers and CAGE Codes. An automated system is required to establish the initial cross references using existing data, when possible, and provide a process to keep these cross references up-to-date, based on aircraft technical data and supply data. This proposed Rapid Innovation Fund (RIF) effort will evaluate the United States Navy WUC to Supply Data cross reference capability and, where possible, leverage their existing system. The capability to rapidly correlate supply data with aircraft maintenance data will influence Aircraft Availability (AA) through the translation of negative reliability trends through supply and the translation of supply trends through reliability. It will increase the visibility of impact on non-mission capable components and systems and will provide focus on non-performing parts/systems to achieve the efficient and effective AA gains. Once the capability/process is established, it can be made available as a multi-platform solution.

Technical Point of Contact(s): Jennifer Jackson, jennifer.jackson.34@us.af.mil (478) 222-4965 or Robert Miller, robert.miller.3@us.af.mil (478) 926-5092

Air Force Research Laboratory

Requirement #: USAF-19-AFRL-18.A

Title: Real-Time Situational Awareness with Synthetic Aperture Radar (SAR) Change Detection

Military System or Acquisition Customer: AFRL/RYP

Description: Topic description is For Official Use Only (FOUO). To get the FOUO description, access the AF RIF web portal at <https://www.afrif.com>. Offerors must have a Joint Certification Program (JCP) number to qualify to receive FOUO data. JCP information available at:

<http://www.dla.mil/HQ/InformationOperations/Offers/Products/LogisticsApplications/JCP/>

Technical Point of Contact(s): TPOC contact info will be available on the AF RIF web portal for JCP holders.

Requirement #: USAF-19-AFRL-18.B

Title: Tactical Laser Relay System (TLRS)

Military System or Acquisition Customer: AFRL, SMDC, HyDRA, SDPE

Description: This topic area facilitates rapid development of a TLRS for integration with ground-based High-Energy-Laser Weapon Systems (LWS). The TLRS enables engagement of high- and low-altitude targets beyond the direct line-of-sight (LOS) capability of ground-based LWSs. This effort could include a capability demonstration, utilizing existing relay mirror system hardware, to support integration with current-generation high-energy-laser (HEL) sources. This initial tactical system would be viable for field experimentation at DoD test ranges to demonstrate the benefit of laser and optical relay technology for area-defense and point-defense missions and to mature the technology for follow-on development. Subsequent hardware development will facilitate

integration with near-to-mid-term HEL sources with higher powers than the current generation.

Technical Point of Contact(s): John McCord, john.mccord.2@us.af.mil (505) 846-4106 or John Paul Sena, john_paul.sena@us.af.mil (505) 846-6685

Air Force Medical Service (AFMS)

All end users listed will greatly benefit from the capability to utilize diesel as an additional primary fuel driving the capability to support SOF mission sets with tactical Flex Fuel Generators.

AFMS/Air Force Medical Support Agency

Requirement #: USAF-19-AFMS-19.A

Title: Adapting Flex Fuel 1Kw, 2Kw and 5 Kw, 1/2-Person Portable Generators for Special Operations Forces (SOF) Medical Teams

Military System or Acquisition Customer: AFSOC/SGR

Description: Commercial Off-The-Shelf (COTS) 1Kw, 2Kw and 5Kw “flex fuel” generators may be modifiable to use in medical SOF missions. These generators have the ability to operate on gas, JP fuels, mo-gas, kerosene, propane and with limitations, diesel. INI Power currently manufactures flex fuel generators which operate on all the above fuels. However, running diesel requires too much end user maintenance and attention. During operation the generator doesn’t run hot enough to burn all the diesel, causing the remaining fuel to seep into the oil crank case, causing it to fill to the point which triggers the generators’ safety auto shut off. Thus, the oil now mixed with diesel fuel needs to be drained down to the safe level, which will allow the generator to start again. This process has to be repeated several times (approx. every 30-40 minutes) before having to completely drain all the oil/diesel mix and add new oil. AFOSC believes there is a COTS solution to address this sustainability capability gap.

Customer: HQ AFSOC/SGR and other Special Operations Units, DoD Units deployed to austere locations. Military, Civilian “First in” Teams during Humanitarian/Natural Disasters. Teams who have to depend on local fuel source. * It is not feasible for teams to deploy with generators for each fuel type, but it is feasible to have one generator for every fuel type.

Technical Point of Contact(s): Joseph (Joe) Montalvo (HQ AFSOC/SGR), joe.montalvo.4@us.af.mil (850) 884-5837 or Daniel Dumas (HQ AFSOC/SGR), daniel.dumas@us.af.mil (850) 884-1590

Requirement #: USAF-19-AFMS-19.B

Title: Wide-Range Organic Chemical Passive Sampler for Health Exposure Assessments

Military System or Acquisition Customer: Air Force Medical Support Agency (AFMSA/SG3PB) – Total Exposure Health

Description: The Air Force Surgeon General (AF/SG) has long-standing requirement for tools which enable development of individual longitudinal exposure record (ILER). In-garrison and expeditionary chemical exposures have historically been inconsistently captured or overlooked. The sampler will detect a wide range of airborne organic chemical hazards over an extended period of time without requiring power supply. The passive sampler should be deployable to austere environments and operable in variable workplace conditions. The item should not hinder the members’ occupational duties to include flying, maintenance, and security functions. The product should require little to no maintenance and long shelf life. The sampler could be analyzed using a variety of laboratory techniques leading to qualitative and/or quantitative results. Ultimately, this

sampler will be used to better understand the exposures that may lead to adverse health effects. Customers: Air Combat Command SGX and SGP: Preventive Aerospace Medicine Team UTC (PAM Team), Air Force Special Operations (SGPB), Air Mobility Command (SGPB), and Air Force Materiel Command (SGPB)

Technical Point of Contact(s): Maj Daniel Anderson, daniel.anderson.42@us.af.mil (937) 938-3289

Requirement #: USAF-19-AFMS-19.C

Title: Rapid Drinking Water Testing in Austere Environments

Military System or Acquisition Customer: Air Force ACC/SG UTCs: EMEDS/PAM Team, AMC GRL UTC

Description: The Air Combat Command Surgeon General (ACC/SG) has a requirement to test water safety in an austere environment. The system will need to identify viable and viable but not-culturable (VBNC) pathogens at physiologically significant levels, while discriminating against non-viable organisms. It will need to identify pathogens without the use of an incubator, and at significantly reduced times when compared to current systems. Its size and weight must be that it can be carried by one person, to include consumables. Any consumables and reagents required for operation must be stable under ambient environmental conditions for an extended period of time. It must be capable of operation by a medical technician or similarly trained person.

Technical Point of Contact(s): Dr. Dirk Yamamoto, Dirk.Yamamoto.2@us.af.mil (937) 938-3288

Requirement #: USAF-19-AFMS-19.D

Title: Airman Data Analysis and Performance Tracking System (ADAPTS)

Military System or Acquisition Customer: Special Warfare Training Squadron (SWTS) Battlefield Airmen Prep

Description: The ADAPTS project is seeking to mature and transition an integrated system for monitoring, reporting, and enhancing human performance and readiness. Previous AFRL development has established proof-of-concept with system prototypes undergoing beta testing with a select set of Battlefield Airman (BA) training (e.g., 350th SWTS) and operational units (e.g., ACC Guardian Angel). The goal of this Rapid Innovation Fund (RIF) proposal is to accelerate the testing and transition of ADAPTS by expanding the suite of assessment tools and engaging a commercial partner to support system transition and sustainment via the Guardian Angel program office. Capabilities of interest include ingestion of data from wearable sensors, user-generated form entry, logging and communications, and multi-platform User Interface (UI) with cloud-based server architecture to maximize robustness and flexibility. Key outcomes are reduced trainee attrition, injury prevention, and overall increase in unit readiness. Success with initial transition customers will enable transition to all Special Warfare units. Sponsor: Air Education and Training Command (AETC)/Air Force Special Operations Command (AFSOC/24 SOW).

Military System or Acquisition Customer: Special Warfare Training Squadron (SWTS) Battlefield Airmen Prep; CMSgt Joshua J. Smith, joshua.smith.14@us.af.mil, 505-800-3391; Air Force Special Operations Command (AFSOC/24 SOW SG), Dr. John Dorsch, dorschj@jdi.socom.mil

Technical Point of Contact(s): Dr. Adam Strang, Director - STRONG Lab, AFRL/711HPW/RHCPA, Adam.Strang.1@us.af.mil (937) 938-3607

Requirement #: USAF-19-AFMS-19.E

Title: Deployable Pharmacy Compounding Device for Onsite IV Generation

Military System or Acquisition Customer: Air Combat Command (ACC)

Description: A pharmacy compounding system is a medical device that will produce the following IV solutions on-demand using onsite potable water: Normal Saline (NS), Half Normal Saline (HNS), Lactated Ringers (LR), and Dextrose 5 percent Normal Saline (D5NS). The device will leverage commercially-available IV drug concentrates and mixing systems with Water for Injection (WFI) to aseptically fill 1-liter IV bags. The onsite production of WFI is addressed with a separate device not included in this solicitation and will be integrated with this system that injects and mixes IV drug concentrates to provide compound IV solutions. In addition to producing IV drug solutions, the system will be able to reconstitute other medical compounds such as lyophilized human plasma, and perishable freeze-dried medications. This medical device will be used at Role III/Expeditionary Medical Support System (EMEDS) sites in Continental United States (CONUS) and Outside the Continental United States (OCONUS) locations and, therefore, will need to be transportable and operated outside of normal fixed facility environments. This system eliminates the need for cold-chain management of perishable liquid medications, reduces the logistical costs of transporting liquid medications, and reduces medical costs from damage of chilled or frozen liquid medications (reported to be 15 – 20 percent). While the primary customers are ACC Expeditionary Medical Units, other DoD customers include Navy (use aboard ships) and Army combat support hospitals (CSHs).

Technical Point of Contact(s): Tom Solomon, Agile Combat Support; Human Systems Division /Aeromedical (AFLCMC/WNU), thomas.solomon.ctr@us.af.mil (937) 938-3824 or Christopher McCammant, christopher.mccammant.1@us.af.mil (937) 239-5840

Air Force Materiel Command, Battle Manager for AFSIM

Requirement #: USAF-19-AFMC-20.A

Title: Low Cost Size, Weight, and Power (C-SWAP) High-Definition (HD) Mid-Wave Infrared (MWIR) Camera for Attributable Platforms

Military System or Acquisition Customer: AFMC

Description: Integrate low-cost, compact, light-weight, high operating temperature (HOT), HD MWIR imaging sensor subsystems onto attributable platforms. The HD MWIR imaging cameras shall meet small-form-factor requirements for integration onto various Unmanned Aircraft Systems (UAS) attributable platforms. In the next fight, as well as in the daily fight of countering violent extremist organizations, large exquisite platforms may not be an option for gathering the necessary Intelligence, Surveillance and Reconnaissance (ISR). Utilizing small, low-cost platforms requires the rapid innovation and integration of sensors that provide sufficient performance at a low cost and small form factors for attributable platforms. This effort will leverage progress made in high operating temperature MWIR materials and focal plane arrays, as well as in Readout Integrated Circuits (ROICs) for the innovation and integration onto attributable platforms of low C-SWAP HD MWIR cameras for the next fight, as well as countering violent extremist organizations.

Technical Point of Contact(s): Nicholaos Limberopoulos, Nicholaos.Limberopoulos.1@us.af.mil (937) 713-8916 or Tom Dalrymple, thomas.dalrymple@us.af.mil (937) 713-8750

Requirement #: USAF-19-AFMC-20.B

Title: Multifunctional Intelligence, Surveillance and Reconnaissance (ISR) Sensor Subsystems for Attributable Platforms

Military System or Acquisition Customer: AFMC

Description: Integrate multifunctional, low cost, size, weight, and power (C-SWAP) ISR sensor subsystems onto attritable platforms. Radio Frequency Direction Finding for electronic signal surveillance, Synthetic Aperture Radar (SAR), Ground Moving Target Indication (GMTI), Jamming, and Secure Anti-Jam Communications are of utmost importance for attritable platform mission scenarios. The multifunctional subsystems shall meet small form factor (SFF) requirements and be integrated onto various Unmanned Aircraft Systems (UAS) attritable platforms. Solutions offering at least two (preferably three or more) of the aforementioned functionalities will be considered for UAS attritable platforms. Utilizing small, low-cost platforms with multifunctional sensing capabilities may be the only option in the next fight, as well as to reduce costs in the daily fight of countering violent extremist organizations. This requires the rapid innovation and integration of sensors that provide multifunctionality for agility and adaptability, as well as sufficient performance at a low cost and SFFs for attritable platforms. This effort will leverage progress made in digital beamforming, software defined radio, high power sources, onboard data processing and related technologies for the innovation and integration onto attritable platforms of low C-SWAP multifunctional ISR sensor subsystems for the next fight, as well as countering violent extremist organizations.

Technical Point of Contact(s): Nicholaos Limberopoulos, Nicholaos.Limberopoulos.1@us.af.mil (937) 713-8916 or Tom Dalrymple, thomas.dalrymple@us.af.mil (937) 713-8750

Requirement #: USAF-19-AFMC-20.C

Title: Integration of Artificial Intelligence (AI) into USAF Wargaming

Military System or Acquisition Customer: HQ AFMC A5/8/9, HAF/A5

Description: HQ AFMC/A5/8/9 is interested in innovative technologies to leverage AI capabilities within the USAF wargaming enterprise. Current use of modeling and simulation (M&S) capabilities is limited to the tracking and prediction of subject matter expert (SME) adjudication, which limits the effect on gameplay or strategy. Software solution should utilize AI within the current scope and pace of a USAF Title X wargame, and inform participants and planners of multiple courses of action (COAs). Software should also interact with existing wargaming M&S tools, such as Force Tracker, Analysis of Mobility Platform (AMP), and the Integration Sustainment Wargaming and Analysis Toolkit (ISWAT).

Technical Point of Contact(s): David Farrell, david.farrell.8@us.af.mil (937) 656-3938 or Jeffrey Chiles, jeffrey.chiles@us.af.mil (937) 656-0815

Requirement #: USAF-19-AFMC-20.D

Title: Machine Learning, Mission-Level Modeling Battle Manager all inclusive: Directed Energy (DE), Kinetic Energy (KE) & Electronic Warfare (EW)

Military System or Acquisition Customer: AFRL

Description: This topic involves the development of a Machine Learning, Mission-Level Battle Manager for Advanced Framework for Simulation, Integration, and Modeling (AFSIM). The Battle Manager will integrate Command and Control, Sensor, KE Weapon, DE Weapon, Cyber Weapon, and EW Weapon capabilities into a modeling, simulation, and analysis (MS&A) framework to enable military utility assessments of emerging defense system concepts and systems-of-systems constructs. AFSIM has been chosen as the Air Force's primary MS&A tool for mission-level modeling. AFSIM is a powerful tool, but currently lacks the capability to use a rule-based approach to optimize the methodology to employ available defense systems against enemy threats/targets. This capability is essential to determine how DE Weapons, such as High-Energy Lasers and/or

High-Power Microwaves, can best be integrated into offensive and defensive combat roles.

Technical Point of Contact(s): Justin Becker, Justin.Becker.9@us.af.mil (505) 846-9260 or Teresa LeGalley, Teresa.LeGalley@us.af.mil (505) 846-5119

17.0. Office of the Secretary of Defense (OSD) / Defense Agencies Annex

17.1. Points of Contact. General or administrative questions should be addressed to questions@dodrif.us. Questions regarding specific OSD/Defense Agency requirement areas should be addressed to the **Technical Point of Contact (TPOC)** listed under each of the below requirements.

17.2. OSD RIF FY19 Requirements

Defense Information Systems Agency (CIO / DISA)

Requirement #: CIO_DISA-19-BAA-RIF-0001

Sponsor: Defense Information Systems Agency (DISA)

Title: Application of Blockchain to DoD Electromagnetic Spectrum Access and Operations

Military System or Acquisition Customer: DISA

Description: The National Defense Authorization Act for Fiscal Year 2018 mandated the Secretary of Defense brief Congress on cyber applications of blockchain technology. Electromagnetic Spectrum (EMS) access is critical for cyberspace operations and for maintaining cyberspace superiority. DoD's access to, and operations within, the EMS are increasingly congested due to a growing demand for spectrum dependent systems and constrained by complex domestic and international regulatory frameworks. Spectrum sharing mechanisms designed to increase access to the congested/ constrained EMS are evolving from human-centric, reservation-based, centralized methods which takes months to human-on-the-loop transactional, decentralized, cooperative, and opportunistic approaches which take minutes. The recent implementation of the spectrum sharing and access system for the Citizen's Band Radio Service illustrates the evolution by reducing the process to weeks. Application of blockchain may revolutionize spectrum sharing methods for DoD EMS operations, reducing the process to minutes and providing a game changing ability for the Warfighter to access the spectrum when and where needed to accomplish the mission.

DISA seeks a prototype for the application of blockchain, or other distributed ledger technology, to EMS sharing/utilization methods, tools, and techniques to improve DoD access to, and operations within, congested/constrained EMS. Potential applications of blockchain to solve existing Warfighter challenges include, but are not limited to:

- Improved validation, verification, and trust of information/data provided by users of EMS-related databases;
- Near real-time automated EMS utilization decisions, and execution of those decisions, with the use of smart contracts, microservices, etc.;
- Near real-time situational awareness of EMS utilization that may be used for visualization, interference resolution, trend analysis, or other applications;
- Auditable, unified record of EMS utilization decisions/transactions to support near real-time enforcement and interference resolution;
- Flexible models for DoD spectrum sharing and consumption, including standards and enforcement mechanisms;
- Other applications.

Any technical approach must evaluate the cost-benefit tradeoff of application of blockchain to DoD EMS access and operations compared to current non-blockchain approaches. Any technical solution must demonstrate how application of blockchain to DoD EMS Operations supports/assures automation of EMS access decisions, or increases/assures EMS access, in a way that non-blockchain solutions cannot. Any technical solution must focus on DoD strategic and operational levels of warfare (i.e., What does DoD need to do to so warfighter can accomplish the mission?); Not certification, or regulatory coordination. Any technical solution must demonstrate benefits of decentralization, transparency, immutability, availability, and/or security in a way that non-blockchain solutions cannot. Any technical solution should consider compatibility and interoperability with DISA's Blockchain-as-a-Service (BAAS) Hyperledger Fabric, and DISA's Defense Spectrum Organization (DSO) Global EMS Information System (GEMSIS) suite of tools (i.e., Joint Spectrum Data Repository, Spectrum XXI, End-To-End System Supportability).

This prototype may use the National Spectrum Consortium to award an Other Transaction Agreement.

As a follow on to this prototype, DISA may award a follow-on P-OTA without competition to the participants in the prototype OTA. The prototype OTA must be successfully completed in order to award a follow-on OTA.

Technical Points of Contact (PoC): Yuriy Posherstnik, yuriy.posherstnik.civ@mail.mil, 301-225-3797
CC: Erin Maultsby, 301-225-9451, erin.j.maultsby.civ@mail.mil.

Requirement #: CIO_DISA-19-BAA-RIF-0002

Sponsor: Defense Information Systems Agency (DISA)

Title: Field Deployable Alert Notification System

Military System or Acquisition Customer: DISA

Description: DISA deploys alert systems for use by VIP customers to request various types of assistance, from life-safety response to routine food service. Alert devices could be pre-positioned push buttons or devices which can be knocked over to signal an emergency. Additionally, DISA deploys sensor and alarm systems for various security or service monitoring applications. These systems are generally stand-alone and not integrated, each with their own maintenance support, logistics, and training requirements. In some applications, these systems must be field-deployed with quick set-up, tear-down, and turn-around times.

This project would fund the development of a highly secure, adaptable, and easily deployable Internet of Things (IoT) platform that would serve as the foundation for a sensor and alert network, which can be deployed autonomously in the field, while supporting federation back to enterprise notification systems or operation centers. The system would allow connection of enterprise devices as sensors to all classes of users to send emergency alerts or requests for assistance.

The solution would meet the following high-level requirements:

- Allow for the integration and deployment of various sensors and alerts;
- Provide blue force tracking capabilities;
- Allow federation to a centrally deployed system or operate autonomously in a mission environment if network-isolated;

- Allow for rapid automated turn-around and re-baselining of systems for high op-tempo mission cycles;
- Support accredited integration into mission networks with minimal changes or risks acceptances required for those networks; and
- Allow for the easy integration of future sensors and alert capabilities.

As a follow on to this prototype, DISA may award a follow-on P-OTA without competition to the participants in the prototype OTA. The prototype OTA must be successfully completed in order to award a follow-on OTA

Technical Points of Contact (PoC): Michael Martin, michael.martin@whmo.mil 202-757-6615

CC: Erin Maulsby, 301-225-9451, erin.j.maulsby.civ@mail.mil.

Requirement #: CIO_DISA-19-BAA-RIF-0003

Sponsor: Defense Information Systems Agency (DISA)

Title: Vehicle Communications Package

Military System or Acquisition Customer: DISA

Description: DISA currently deploys a custom-built IT package that fits in a limited space within special mission vehicles used for critical communications requirements. This package houses multiple secure and non-secure communications systems and integrated mounts and connections for antenna components. Currently, modifying the contained communications systems requires new customization work on the package, as well as integration of the systems. In addition, the density of electronics creates power and heat dissipation issues.

This project would fund the development of a new IT package that fits in the same space as the legacy package. The new package will permit rapid upgrading of the contained systems and/or the introduction of new capabilities, without a redesign of the package. To accomplish this, the new package will adapt or replicate highly integrated computer platforms being developed for tactical data center type deployments, and use innovative techniques such as network function virtualization, enhanced orchestration and automation, and advanced cooling or heat dissipation techniques.

As a follow on to this prototype, DISA may award a follow-on P-OTA without competition to the participants in the prototype OTA. The prototype OTA must be successfully completed in order to award a follow-on OTA

Technical Points of Contact (PoC): Michael Martin, Michael.Martin@whmo.mil 202-757-6615

CC: Erin Maulsby, 301-225-9451, erin.j.maulsby.civ@mail.mil.

Requirement #: CIO_DISA-19-BAA-RIF-0004

Sponsor: Joint Forces Head Quarters Department of Defense Information Networks (JFHQ DODIN) / Directorate for Intelligence (J2)

Title: Distributed Machine Learning of Computer Network Defense Data

Military System or Acquisition Customer: JFHQ DODIN

Description: JFHQ DODIN is an operational level headquarters that must view multiple disparate data sets of computer network defensive data throughout the Department of Defense (DOD). These data storage locations, Big Data Platforms (BDP), store terabytes to petabytes of relevant defensive data that informs analysis to build defensive measures.

This presents JFHQ DODIN with the problem of having more data than can be analyzed by a human, stored in multiple across various parts of the DODIN. JFHQ DODIN is interested in creating a distributed machine-learning engine that can independently build individual models for the specific mission partner as well as distribute each model to other mission partner BDPs for an ensemble model. The ensemble can then be shared across networks from tactical to JWICS (using the Unified Platform) to rapidly identify and validate Indicators of Compromise (IOCs) for dissemination. The models would support the analyst teams of JFHQ-DoDIN as they seek to proactively identify threats and vulnerabilities to the DoDIN, shift from a reactive hunt model to a proactive block, and mitigate strategy ahead of the cyber adversary or as near real-time to the intrusion as possible. The implementation of proven machine learning techniques and tools enables the rapid identification and response of JFHQ-DoDIN's mission.

Technical Point of Contact (TPOC): Leonard Gentile, 301-225-0879,
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Requirement #: CIO_DISA-19-BAA-RIF-0005

Sponsor: Joint Forces Head Quarters Department of Defense Information Networks (JFHQ DODIN) / Directorate for Intelligence (J2)

Title: In Protocol Analysis

Military System or Acquisition Customer: JFHQ DODIN

Description: JFHQ DODIN is an operational level headquarters that must view multiple desperate data sets of computer network defensive data throughout the Department of Defense (DOD) in order to develop and recommend defensive measures. The network perimeter remains the first and last line of defense. Adversaries continue to leverage the DODs need to expose services and connectivity externally to formulate new Tools, Techniques and Procedures (TTPs). This leads to abuse of permitted transports within the defensive boundary by adversary actors. The purpose of this effort will be to focus on development and deployment of new analytic approaches and machine-learning algorithms that will correlate detected threats and attacks at the network perimeter with events occurring inside the defensive boundary. A behavioral analytic approach is required that examines usage and builds models related to the behavior of humans (users), devices and applications to detect when compromise has occurred or is likely. This includes behaviors such as scanning, beaconing, peer-to-peer communication, malicious domains/phishing, and data exfiltration. The focus of the research will be on correlating behaviors from DISA perimeter security capabilities and prioritizing findings so analysts can investigate analyze and take action.

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Defense Intelligence Agency, CIO-5B, Office of Chief Technology Officer

Requirement #: DIACIO-19-BAA-RIF-0001

Sponsor: DIA, CIO, Chief Technology Office

Title: Implementing Object Level Controls for Security at the Data Layer

Military System or Acquisition Customer: DIA

Description: Currently, Security and Need to Know (NTK) are managed *within* applications and *through* a laborious, human-driven process that determines appropriate roles for each new user, one user at a time. This management of controls within applications is cumbersome, inefficient, and a barrier to implementing security protocols. It also hinders users from quickly identifying and leveraging mission critical data. Object level controls will foster better sharing, enable data discovery, improve security, reduce

costs, and ensure compliance. This RIF will develop a capability to manage Security and NTK at the data layer. This capability must be able to bridge structured, unstructured, and semi-structured data currently stored across multiple silos in different formats. The work of the RIF will be to research and implement a capability that is compatible with DoD and Intelligence Community (IC) systems, that complies with security and auditing requirements, and that uses PKIs with identity management services. The RIF will research and test performance to ensure that the security implementation does not introduce a bottleneck into data access and discovery. The research performed during the RIF will determine the feasibility of using topic modeling or other flexible and automated approaches for handling the required varieties of data and will reduce the time required to do so. Security at the data layer will support Data as a Service by enabling users to discover and consume data via multiple tools and applications. Creating object level control for Security at the Data Layer will be a game changer for DoD, since it would enable data sharing across the enterprise and across networks including the Joint Intelligence Enterprise (JIE), DI2E, NIPRNET, SIPRNET, and JWICS.

Technical POCs: Michael J. McCabe, 202-231-8125, Michael.McCabe@dodiis.mil; Earnest Turner, 202-231-3608, Earnest.Turner@dodiis.mil

Requirement #: DIACIO-19-BAA-RIF-0002

Sponsor: DIA, CIO, Chief Technology Office, Applied Research

Title: Leverage Service Mesh Capability to Transition Legacy/Monolithic Applications

Military System or Acquisition Customer: DIA

Description: DoD needs to move to modularized capabilities that can be deployed to multiple

environments (e.g., cloud, hybrid, on-prem, mobile) in order to effectively support evolving operational requirements across the DoD and IC mission continuum. The intent of this RIF is to develop a repeatable process for transitioning legacy applications by leveraging service mesh tooling at the function level. The process will identify specific applications and APIs, if applicable, for potential consolidation, transition, separation, deprecation, or transition to a microservice-based environment. The process will be based on an open framework that is designed for rapid, standards-based microservice integration at the Enterprise level. Importantly, the process will include detailed design for decoupling data from legacy/monolith applications and making it secure, accessible, and compliant with current DoD and IC standards. This RIF will also demonstrate that the process works by successfully transitioning select government designated legacy/monolithic applications. The RIF is encouraged to use existing investments, and may combine capabilities that clearly address the means to efficiently and effectively transition legacy applications and decouple the data. This RIF's value proposition is its use of industry leading service mesh capabilities to strategically implement legacy transition domain-driven design (DDD), and to guide legacy system project owners and engineers in rethinking ways to decouple the data for broadest use.

Technical POCs: Michael J. McCabe, 202-231-8125, Michael.McCabe@dodiis.mil; Earnest Turner, 202-231-3608, Earnest.Turner@dodiis.mil

Requirement #: DIACIO-19-BAA-RIF-0003

Sponsor: National Center for Credibility Assessment (NCCA) / Defense Intelligence Agency (DIA)

Title: Using Machine Learning and Natural Language Processing Algorithms for Credibility Assessment

Military System or Acquisition Customer: DIA

Description: NCCA is interested in developing Machine Learning (ML) and Natural Language Processing (NLP) algorithms and software capable of assessing the credibility of individuals who undergo National Security Screening interviews. Development of these algorithms must integrate the linguistic, behavioral, and physiological data channels collected during polygraphs and used by NCCA and throughout the polygraph and Counterintelligence (CI) Communities. The resulting capability must quickly analyze data collected from a variety of credibility assessment hardware sensors. Analytic methodologies of interest that should be researched, evaluated, and tested by the RIF include logistic regression, neural network (deep learning), decision tree and support vector machine approaches. The software and algorithms developed must use open architecture and must be compatible with current software that NCCA has developed with Microsoft Visual Studio. The software must be written using a language such as C# or Python, that can be integrated into a larger Visual Studio solution. The Source Code produced during the RIF must be shared with NCCA scientists. NCCA Scientists will test and evaluate the algorithms with actual interview data for which ground truth is known. Technical PoCs: Dean Pollina, 803-751-9160, dean.pollina@dodiis.mil; Troy Brown, 803-751-9161, troy.brown@dodiis.mil

Requirement #: DIACIO-19-BAA-RIF-0004

Sponsor: DIA, CIO, Chief Technology Office

Title: Entity Extraction and Entity Resolution

Military System or Acquisition Customer: DIA

Description: This RIF will develop a capability to automate Entity Extraction and Entity Resolution. This capability must be able to bridge structured, unstructured, and semi-structured data currently stored across multiple silos in different formats. The work of the RIF will be to research and implement a capability that is compatible with DoD and Intelligence Community (IC) systems and complies with security and auditing requirements. The overarching goal is, essentially, to put raw data into context for analysis, via application of [Natural Language Processing](#) (NLP) and analytical methods. The use of Machine Learning (ML) and Natural Language Processing (NLP) should be researched and considered as a means for the performing Entity Extraction and Entity Resolution. The research performed during the RIF will determine the feasibility of Entity Extraction and Entity Resolution and automated approaches for handling the required varieties of data and will reduce the time required to do so. Creating automated process for Entity Extraction and Entity Resolution will be a game changer for DoD, since it would enable sense making against massive amounts of data for the Intelligence Enterprise (JIE), DI2E, NIPRnet, SIPRNET, and JWICS.

Technical POCs: Michael J. McCabe, 202-231-8125, Michael.McCabe@dodiis.mil; Earnest Turner, 202-231-3608, Earnest.Turner@dodiis.mil

Requirement #: DIACIO-19-BAA-RIF-0005

Sponsor: DIA, CIO, Chief Technology Office

Title: Automated Tagging of Data for Need to Know

Military System or Acquisition Customer: DIA

Description: Need to Know (NTK) is an essential component for information security within the DoD and Intelligence Community (IC) but legacy data is not tagged with the attributes necessary for NTK enforcement. Currently, determining NTK is a laborious, human-driven process because, unlike classification markings, the attributes are not captured with the data. Hand tagging the large amount of available data would be cost and time prohibitive. This RIF will deliver a capability to automate the generation of attributes to allow for machine enforcement of NTK. Automated tagging will enable

better sharing, reduced costs, and ensure compliance. The capability must be able to operate on structured, unstructured, and semi-structured data stored in different formats. The use of Machine Learning (ML) and Natural Language Processing (NLP) should be researched and considered as a means for the labeling and tagging of data and the automatic generation of metadata. This capability should include determining the feasibility of using topic modeling or other flexible and automated approaches for handling the variety of data and should reduce the time required for this action. Automating tagging will be a key enabling capability for the machine enforcement of security policy. Leveraging machine learning will reduce the cost and effort required to tag vast amounts of historical data, a task that could not be done by hand. Automating NTK metadata generation would enable data sharing across the enterprise and across networks including the Joint Intelligence Enterprise (JIE), DI2E, NIPRNET, SIPRNET, and JWICS.

Technical POCs: Michael J. McCabe, 202-231-8125, Michael.McCabe@dodiis.mil; Earnest Turner, 202-231-3608, Earnest.Turner@dodiis.mil

Defense Intelligence Agency, Directorate for Science & Technology

Requirement #: DIAS&T-19-BAA-RIF-0001

Sponsor: Defense Intelligence Agency, Program Management Office

Title: Contamination Control Safety System

Military System or Acquisition Customer: Defense Intelligence Agency, Science and Technology Directorate

Description: Develop a mil-air transportable contamination control safety system for the storage and preservation of items that require a temperature controlled environment (-4 degrees Celsius) and prevention of gaseous cross-contamination, while meeting chemical and biological surety standards, including appropriate filtration system for ventilation. The interior design of the system will have, at a minimum, 50 self-contained, gas impermeable compartments which are non-reactive to bleach. The system will be able to connect to 175 kwatt, 208-volt, 3-phase power and have its own backup diesel generator. The storage system will include the ability to log internal temperature fluctuations and include a notification/alert system if internal temperatures rise above -4 degrees Celsius.

Technical POC: Maj Kevin Clayton, 434-995-4235, kevin.clayton@dodiis.mil

Requirement #: DIAS&T-19-BAA-RIF-0002

Sponsor: Defense Intelligence Agency (DIA)

Title: Computer Vision on Demand and Facial Recognition Capabilities

Military System or Acquisition Customer: Combatant Commands

Description: DIA is seeking innovative, platform agnostic techniques in computer vision on demand to identify specific military infrastructure and production equipment and individual personnel. The requested technology will strengthen existing applications through the ingestion of single file or bulk file data to process, index, and annotate objects or persons of interest in open-source image and video file content. Data would feed, and become discoverable. Through, the FoundRI visualization platform improving confidence in characterizations and individual/unit identities.

Technical Point of Contact: Timothy I. Wood, DRI, (202) 231-4887, Timothy.I.Wood@coe.ic.gov or timothy.wood@dodiis.mil.

Requirement #: DIAS&T-19-BAA-RIF-0003

Sponsor: Defense Intelligence Agency (DIA)

Title: Automated Access and Roles Management for Hostage Intelligence Sharing Online

Military System or Acquisition Customer: DIA

Description: DIA requires an automated method of verifying online visitors' need-to-know (NTK) access and associated user roles regarding intelligence about U.S. persons held in foreign countries. This automated system will also be used to verify NTK access for enclaves of restricted data. This automated system must contain the NTK barrier, including verification of a user's mission that requires access to captive intelligence, to adhere to U.S. Government and DIA Intelligence Oversight procedures. In addition, we require the ability to aggregate all access requests and mission verifications from the Secret Internet Protocol Router with those on the Joint Worldwide Intelligence Communications System for an automated verification system.

Technical Point of contact: Alan L. Stolte, DCTC, (703) 735-1855, Alan.L.Stolte@coe.ic.gov or alan.stolte@dodiis.mil.

Requirement #: DIAS&T-19-BAA-RIF-0004

Sponsor: Defense Intelligence Agency (DIA)

Title: Advanced Analytics to Support Big Data Exploitation of Transnational Criminal Organizations (TCO) Operations

Military System or Acquisition Customer: United States Northern command (USNORTHCOM)

Description: DIA and USNORTHCOM need to create an automated, advanced analytic big data set pattern and anomaly detection capability to provide direct support to Federal, State, Local, Tribal, and international partners with actionable predictive intelligence on TCO illicit activities and the ongoing national opioid crisis. Capabilities needed will integrate existing automated software capabilities into a new tool set for direct support to Intelligence Community/Department of Defense, USNORTHCOM, United States Southern Command (USSOUTHCOM), United States Indo-Pacific Command (INDOPACOM), and the Department of Homeland Security TCO mission sets. The outcome will provide a machine learning/artificial intelligence ability resulting in automated intelligence assistance capabilities that will leverage existing United States Government and publicly available information to produce predictive analysis for top priority national security interests and law enforcement activities.

Technical Point of Contact: John A Glodo, AMRC (202) 231-7209, John.A.Glodo@coe.ic.gov, jaglodo@dodiis.mil.

Requirement #: DIAS&T-19-BAA-RIF-0005

Sponsor: Defense Intelligence Agency (DIA)

Title: Machine Translation JWICS Capability

Military System or Acquisition Customer: DIA

Description: Europe/Eurasia Regional Center (EERC) is interested in the capability to conduct automated machine translation of both structured and unstructured data from Cyrillic to English. This capability must reside and be accessible on the Joint Worldwide Intelligence Communications System. Further, the requested capability should have an easy to use user interface and an application program interface to enable easy interaction with other IC programs.

Technical Point of Contact: Mitchell Caranzaro, EERC, (202) 231-8485, Mitchell.Caranzaro@coe.ic.gov, Mitchell.Catanzaro@dodiis.mil.

Defense Logistics Agency (DLA)

Requirement #: DLA-19-BAA-RIF-0001

Title: Seamless Flexible Fuel Bladder Technology

Military System or Acquisition Customer: New and Legacy Aircraft systems

Description: Development of additively manufactured, seamless flexible fuel bladder technology presents a unique opportunity to support the National Defense Strategy to improve force readiness across all military branches. This can be accomplished by improving survivability by meeting the current specification levels, reducing weight, and reducing total ownership costs.

This program will augment the fuel systems of ongoing DLA, Army, Navy, and Air Force Rotorcraft programs. The goal of this research is to provide the DoD a fuel system that meets or exceeds all criteria for Phase II qualification MIL-DTL-27422F, and is capable of installation on new aircraft platforms or retrofit onto legacy air platforms. The project must meet the 24-Month timeline and project budget limitations. The government expectation is a TRL 8 Seamless Crash-Resistant fuel system on a military aircraft platform at the end of the 24 Month Period of Performance.

Seamless flexible fuel bladder technology aligns with the National Defense Strategy to the extent that Fuel Systems weigh less, are ballistic tolerant, self-seal against gunfire, and increase crash survivability by improving force readiness and lethality.

Technical Focal Point: Denise Price, DLA J68 R&D, Denise.price@dla.mil , 571-344-0197

Requirement #: DLA-19-BAA-RIF-0002

Title: Microcircuit Anti-Counterfeit Covert Identification and Supply Chain Tracking System

Military System or Acquisition Customer: Electronics Supply Chain

Description: It is generally acknowledged the most effective approach to elimination of counterfeit parts within the Department of Defense logistics supply chain is a closed tracking system. DoD is seeking white papers incorporating initial covert identification introduced at the OEM and continued reporting and tracking throughout the supply chain to delivery at the end user.

The proposed system must incorporate active key participants/team members within the entire supply chain. The proposed system must be cost effective, user friendly and provide real-time counterfeit identification throughout the supply chain.

To be considered for award key supply chain system technologies must be at or near TRL 6 at the beginning of the project and conduct a TRL 8 pilot scale operational system demonstration.

Management of Supply Chain Security of Micro Circuits aligns with the National Defense Strategy to the extent that cradle to grave tracking of components improves the confidence in all systems improving force readiness and lethality.

Technical Focal Point: Denise Price, DLA J68 R&D, Denise.price@dla.mil , 571-344-0197

Requirement #: DLA-19-BAA-RIF-0003

Title: Enhancing a clean, cost effective process for converting rare earth oxides into high quality Rare Earth metals

Military System or Acquisition Customer: Various Weapons Systems Platforms

Description: DLA Strategic Materials is looking for a domestic capability that demonstrates the ability to produce rare earth metals from oxides, or use multiple feedstock including recycled scrap material. Defense weapon systems use various strategic and critical materials of which there is very limited domestic production of these materials and therefore a risk of foreign reliance. Developing an economically viable process for enhancing the production of existing processes could facilitate the establishment of a viable, competitive domestic supply chain from mine-to-magnet. DLA Strategic Materials seeks to prove the recovery optimization demonstration for rare earth metals from varied feedstocks and facilitate commercialization of that process. Innovative tasks include building on the progress of identifying large sources of oxides, rare earth scraps and developing process for extracting and processing to produce rare earth metals.

Technical Focal Point:

DLA Strategic Materials POC: Dr. Vaibhav Jain, vaibhav.jain@dla.mil, 571-767-8839

Requirement #: DLA-19-BAA-RIF-0004

Title: Deployable Additive Manufacturing Capability

Military System or Acquisition Customer: All Deployable Military Services

Description: Repair and part obsolescence are on-going supply chain challenges. Often, singular or just a few replacement parts for damaged or out of date systems are needed at a time. The cost and lead times of non-recurring expenses associated with standard manufacturing approaches can increase the cost and time to produce a “one-off” or low rate build part by orders of magnitude. Advanced manufacturing techniques (such as additive manufacturing) provide opportunities to provide on demand, zero tooling components. To realize the full capability of advanced manufacturing processes, quasi-automated manufacturing needs to be truly automated -- reducing the dependency on the user – and rapid deployment needs to be realized, allowing functionality in all environments and theaters.

The deployable system must meet DoD and military shelter safety requirements, ISO/CSC standard intermodal transportation requirements, necessary environmental controls for typical deployed environments, power consumption on the order of that already provided by deployed DoD generator systems, and provide a level of automation capable of supporting a novice controller. An ideal advanced manufacturing machine will provide flexibility in material and footprint (modular/customizable for theater). A system capable of manufacturing with plastics, metals, composites, and/or ceramics would provide maximum use.

While software currently exists to support and automate each manufacturing step individually, expert users are still required to interpret data from the previous step and establish appropriate inputs for the next step. There is an apparent need for a single software package to manage the workflow from part identification to part certification, automatically.

An ideal system would provide the following qualities:

- Part Scan to Part Geometric Certification with minimal hardware and software interfacing
- Ability to build drop-in, optimized re-design, or new design parts
- Digital tolerance control (physical part, to digital, back to physical) of +/-0.010”
- Effective with metals, plastics, filled, and ceramic materials
- A minimum print bed size of 12”x12”x12”

- Overall system size that is only nominally larger than the print bed size in a minimum of one direction, but ideally two directions, to enable efficient packaging options (e.g., containerization). For example, a columnar printing system may have a footprint the size of the print bed, but be much taller than the print bed height.
- Material storage footprint is not of immediate concern due to different environmental and human access requirements
- Be deployable within ISO standard shipping containers (8'x8' opening and up to 40' long). Containerization enables rapid deployment around the world.
- Weight and power consumption conscientious
- A target system weight would be 10% of the container payload capacity (20' ISO container is capable to ~55,000 lbs. payload)
- Target power consumption would enable operation with standard deployable generator systems (such as MEP-805, MEP-806B or PU-805B)
- Material and configuration modifiable without affecting the certification of the system

Technical Focal Point: Denise Price, DLA J68 R&D, Denise.price@dla.mil , 571-344-0197

Requirement #: DLA-19-BAA-RIF-0005

Title: Domestic Permanent Magnets Production Facility

Military System or Acquisition Customer: Various Weapons Systems Platforms

Description: DLA Strategic Materials is looking for a domestic capability of *Neodymium Iron Boron* (NdFeB) sintered magnet process development that would lead to the installation of a “state of the art” NdFeB sintered magnet production facility in the United States. Permanent magnets used in Defense weapons contain permanent magnets and there is very limited domestic production of these permanent magnets and therefore a risk of foreign reliance. Developing an economically viable process for producing permanent magnets from magnet alloys could facilitate the establishment of a viable, competitive domestic supply chain. DLA Strategic Materials seeks to prove the viability of a production process and facilitate commercialization of that process. Innovative tasks include building on the progress of identifying large sources of magnet alloys and developing process for fabrication of the permanent magnets.

Technical Focal Point: DLA Strategic Materials POC: Dr. Vaibhav Jain, vaibhav.jain@dla.mil, 571-767-8839

Defense Threat Reduction Agency (DTRA) and Joint Improvised-Threat Defeat Organization (JIDO)

Requirement #: DTRA-19-BAA-RIF-0001

Sponsor: Defense Threat Reduction Agency (DTRA) / Joint Improvised-Threat Defeat Organization (JIDO), J8

Title: 360 Sub-garment Imaging System

Military System or Acquisition Customer: US Army PM Force Protection

Description: DTRA/JIDO is seeking a novel technology to detect concealed weapons under clothing via a full 360 degree field-of-view at live video-rate continuously (no delay). The system must be able to detect a suicide vest that is 30 meters away in a full 360 degree field-of-view. Currently there are existing technologies using scanning millimeter wave techniques in a single direction, but full 360 degree field-of-view technologies do not exist. We are seeking high signal-to-noise detection with low false alarm rate detection in both active and passive systems.

Technical POC: Dr. George Pappas, 703-604-2836, george.pappas2.civ@mail.mil

Requirement #: DTRA-19-BAA-RIF-0002

Sponsor: Defense Threat Reduction Agency (DTRA) RD-NTD

Title: Enhanced 3-D Mobile Rapid Radiation Mapping and Characterization

Military System or Acquisition Customer: DoD Services, Special Operations Command (SOCOM), Joint Product Leader – Radiological Nuclear Defense (JPdL-RND), DTRA Technical Support Group, DTRA JD, 20th SUPCOM, Defense Intelligence Agency (DIA), and Combat Support Teams (CST)s

Description: Current radiation detection and imaging systems are limited to mapping and localizing radiological and nuclear materials in 2-D through static measurements. In battlefield scenarios, 2-D static measurements, which require a vehicle to stay in one location for tens of minutes at a time, provide useful but limited information about the full radiation fields and contextual conditions which are critical in the assessment of nuclear and radiological threats and for mission planning. Methods and systems are needed that enable mobile platforms with excellent localization and situational awareness, overcoming the limitations of static configurations.

Recent advances in nuclear sensing and computer vision deliver unprecedented capabilities in the detection, mapping, and visualization of complex radiation fields from mobile platforms. It allows the reconstruction of radiation fields embedded in their 3-D environments in real-time while the platform is moving through this environment. It simultaneously provides critical information about infrastructure (buildings, structures, etc.) and radiation fields with high sensitivity and accuracy. Enhancing existing sensor suites and vehicles with a 3-D, mobile radiation mapping capability that is also remotely deployable on arbitrary platforms (e.g. manned and unmanned ground and aerial systems) will provide improved capabilities in operations ranging from search in pre-detonation to mapping in post-detonation scenarios.

Recent DoD customer requirements, particularly in the area of search and contamination avoidance, demand such capability. Furthermore, the ability to simultaneously combine data products from multiple ground and aerial platforms into a single, 3-D map will provide expanded capabilities to quickly and efficiently detect nuclear threats or map contamination over large areas. The topic seeks to realize these capabilities by enhancing and complementing current systems, such as Nuclear Biological, Chemical Reconnaissance Vehicle (NBCRV), to enable mobile, 3-D radiation mapping and characterization. The topic further seeks to realize the 3-D radiation mapping capability to enable contextual and radiation data integration from multiple platforms to produce a unified data product to inform mission planning and response.

Technical POC: Dr. Hank Zhu, DTRA RD-NTD, (571)616-6555, hongguo.zhu.civ@mail.mil

Requirement #: DTRA-19-BAA-RIF-0003

Sponsor: Defense Threat Reduction Agency (DTRA) / Nuclear Enterprise Mission Assurance (NE-MA)

Title: Mobile Cyber Security Threat Detection and Analysis Toolset- Black Rhino Next Generation (BR-NG)

Military System or Acquisition Customer: Joint Staff J34, DoD CIO, Intelligence Community (IC), Combatant Commands (COCOMs), Allied Nations, DTRA/NE-MAB

Description: Provide a lightweight flyaway/portable kit configured with high-end systems pre-loaded with next generation Cybersecurity technologies and software designed to conduct Balanced Survivability Assessments of Military and Federal installations.

The BR-NG flyaway/portable kit will consist of an industry leading National Security Agency (NSA) certified NIKSUN security appliance, high performance compact servers installed with COTS and GOTS security software, and a Gigamon network tap device. The BR-NG technology stack will enable NE-MA assessors with the capability to non-intrusively collect customer's network data via tap and data aggregation hardware, and store up to 48TBs of network data within the NIKSUN database. The ingested network data collection (up to 48TBs) will be indexed and compressed to provide for enhanced data analytics through the use of NIKSUN's security and datamining technologies. The high performance small frame servers will be configured with GOTS and COTS security applications that will support Intrusion detection, vulnerability scanning, and network modeling functionalities utilized to develop the assessed Agency's threat picture.

BR-NG future capability and integration with BR-NG home-station solution: The proposed

BR-NG flyaway kit will be scaled to interoperate with BR-NG home station solution. This technical approach will enable data correlation between Government sites, and will provide

NE-MA security analyst and subject matter experts with the ability to identify cross site indicators of compromise to determine the complete threat picture impacting multiple sites.

The BR-NG flyaway can be deployed to any location world-wide, and non-intrusively tap customer's network to perform on the spot network data analytics on inbound and outbound network traffic to assess for indicators of compromise.

Technical POC: Mahone T. Scott, 571-616-6171, Mahone.t.scott.civ@mail.mil

Requirement #: DTRA-19-BAA-RIF-0004

Sponsor: Defense Threat Reduction Agency (DTRA)/JD (aka JIDO, Joint Improvised-Threat Defeat Organization)

Title: Novel Nuclear Quadrupole Resonance Detector (NNQRD)

Military System or Acquisition Customer: US Army PM Force Protection

Description: We are seeking cost effective ways to remotely detect explosives in a moving vehicle. The vehicle speed and range to vehicle will depend upon the quantity of explosive in the vehicle. What is of interest is the possibility of detecting 50 pounds, or less, of explosive in a vehicle moving at 25 mph or more. The range from sensor to vehicle must be at least one meter. In particular, one method for detecting a vehicle born improvised explosive device (IED) is by using nuclear quadrupole resonance detection (NQR). NQR is a detection method that can identify compounds through their unique chemical signatures. Explosive compounds can be identified through these NQR signatures. This method has been demonstrated for detecting explosives in stationary vehicles. JIDO is seeking innovative solutions that push the limits of this sensitivity to enable detection of explosives in moving vehicles.

Technical POC: Primary: Dr. George Pappas, 703-604-2836, george.pappas2.civ@mail.mil

Requirement #: DTRA-19-BAA-RIF-0005

Sponsor: Defense Threat Reduction Agency (DTRA) / RDIAA / RDIAR

Title: ; Space Environmental and Weather Data

Military System or Acquisition Customer: Defense Threat Reduction Agency Technical Reachback, Combatting Weapons of Mass Destruction (CWMD) Combatant Command (COCOM) Planners.

Description: The Department of Defense (DoD) is faced with the challenge of accurately and rapidly modeling the environmental effects and system impacts following a nuclear weapon detonation. One of the critical areas where nuclear weapons could pose catastrophic consequences is in the upper limits of the atmosphere. The release of ionized radiation at a high altitude can adversely impact communications, intelligence, navigation, timing, weather, environmental observations, and surveillance for both commercial and defense purposes. Current models use static representations of the space weather environment or require significant manipulation of the data before ingesting it, thereby resulting in low fidelity and non-timely information to the warfighters and first responders. To support planning and operations, the DoD requires a centralized and dynamic repository of space environmental data to include spacecraft charging, high and ultra-high frequency signal quality, solar flux/burst summaries, ionospheric indices, and other products necessary to define the dynamic space environment.

Technical PoC: Jimmie Trigg (571) 616-6395, jimmie.l.trigg.civ@mail.mil

Requirement #: DTRA-19-BAA-RIF-0006

Sponsor: DTRA

Title: Weaponizing for Low Collateral Damage Agent/Target Defeat (Overburial)

Military System or Acquisition Customer: DTRA Reachback, Geographic Combatant Command Weaponizers, DTRA Targeting/Weaponizing Assistance Cell (TWAC), DTRA JD (Joint Improvised Threat Defeat Organization (JIDO)), Air Force Central Command (AFCENT), U.S. Central Command (USSCENTCOM J2 Targeting Office), and U.S. Army Joint Technical Coordinating Group for Munitions Effects (JTCCG/ME)

Description: Deliver a planning capability for weaponizing Weapons of Mass Destruction (WMD) targets while minimizing collateral damage. This effort will provide a scientifically based method to the general weaponizing community, to plan a tactic currently only employable by expert weaponizers. Modeling and Simulation (M&S) planning tools (e.g. IMEA) require improved models to quickly and accurately predict collateral damage and collateral effects caused by air delivered weapons penetrating through building foundations, allowing soil to capture fragmentation, airblast to be channeled into the target building, and target buildings to be collapsed within their own footprint to contain or minimize the WMD threat. This is a complicated scenario, requiring a thorough understanding of multiple damage mechanisms, with the dominant mechanism expected to be dependent on building construction, weapon types and detonation locations. Many SBIRs have been conducted on groundshock and component response that could be useful for delivering this capability and ensuring success. Data being gained through a cooperative arrangement with a partner nation (Israel) will be used for validation of this new capability. This capability will provide the ability for weaponizers to more effectively plan for degrading adversary WMD capabilities and delaying their access to stockpiles.

Technical Point of Contact (PoC): Mr. Henry Marcinowski, 571-616-5425, henry.f.marcinowski.civ@mail.mil

Requirement #: DTRA-19-BAA-RIF-0007

Title: “WMD/ExplosivesPedia (WMD/Epedia)” a CWMD-E (Combatting Weapons of Mass Destruction-Explosives) Sensitive Site Exploitation Tool (CSSETT)

Sponsor: DTRA

Military System or Acquisition Customer: U.S. SOCOM J5 (Special Operations Command), and Joint Program Manager for Nuclear Chemical and Biological Contamination Avoidance (JPM NBC CA)

Description: WMD/Epedia is a dramatic expansion of the existing WMDpedia to include Explosives, Signatures, and Synthetic Narcotic Pathways, making the new WMD/EPedia into a Subject Matter Expert that allows analysts, operators, and planners to identify and utilize WMD/E evidence in near real time to quickly identify potential WMD-relevant material, precursors, hazards or equipment. Proposers are asked to contribute to

WMD/Epedia's development. The system significantly reduces discovery time for potential WMD threats, and assists soldiers in the field to understand how materials, precursors, or equipment may lead to potential WMD and Explosives pathways. Additionally it provides information for Sensitive Site Exploitation (SSE), in multiple languages, critical properties of chemicals, explosive compounds and WMD agents, and provides a comprehensive list of synonyms for equipment and chemicals.

Technical PoC: Mr. Chris Bing, 571-616-3015, christopher.g.bing.civ@mail.mil.

Joint Science and Technology Office for Chemical and Biological Defense (JSTO-CBD)

Requirement #: JSTO_CBD-19-BAA-RIF-0001

Sponsor: Joint Science and Technology Office for Chemical and Biological Defense (JSTO-CBD)

Title: Self-Detoxifying Garments for Chemical Warfare Defense

Military System or Acquisition Customer: Joint Project Manager for Protection (JPM P);

Joint Program Executive Office for Chemical and Biological Defense (JPEO-CBD)
(POC: Dr. Gene Stark, Future Acquisition, Director)

Description: The Department of Defense (DoD) requires self-detoxifying garments with an ability to increase comfort, reduce thermal burden, and provide protection and detoxification of chemical warfare agents (CWAs). This topic seeks to develop prototype self-detoxifying garments that provide a new capability to detoxify mustard agent (HD), and chemical nerve agents (e.g. GD and VX), while providing protection, thermal, and physical comfort. The maturation of this technology requires that performance evaluations are performed at the materials level (i.e. swatch) and the system level (i.e. garment). Specifically, detoxifying technology and swatches must show at least a 1-Log reduction of agents in 24 hours. Detoxification is evaluated through characterization methods such as ³¹P and ¹³C Nuclear Magnetic Resonance (liquid and solid state), Gas or Liquid Chromatography/Mass Spectrometry. The swatch must protect against a 1-10g/m² liquid challenge. The liquid protection is evaluated with the Aerosol Vapor Liquid Assessment Group (AVLAG) (TOP 8-2-501) and Low Volatility Agent Permeation (LVAP) (TOP 8-2-503) test apparatuses. Liquid protection must be retained both in pristine condition and post simulated wear such as laundering (e.g. AATCC 135), abrasion (e.g. ASTM D4157) and "gelbo flex" (ASTM F392). The swatch must be air permeable and demonstrate reduced thermal burden compared to the Joint Service Lightweight Integrated Suit Technology (JSLIST) (MIL-DTL-32102). Physical properties of the swatch that are tested include but are not limited to burst strength (e.g. ASTM D3787), stiffness (e.g. ASTM D747), abrasion resistance (e.g. ASTM D3884) and % elongation (e.g. ASTM D5034).

Offerors are expected to show in their submission a minimum technical maturity by providing preliminary performance data of the active component of their detoxifying technology that demonstrates efficacy towards HD, GD, and VX chemical agents. The detoxifying technology must be sufficiently advanced in development to complete optimization and scaling activities for incorporation into full-width textile processes

within 12 months from the project start. Materials level testing is required to characterize the textile performance and determine which approaches merit further technology and manufacturing maturation. Materials level testing includes but is not limited to AVLAG, LVAP, Moisture Vapor Transport Rate (MVTR, e.g. ASTM E96), sweating guarded hot plate (ASTM F1868), and air permeation (ASTM D737). Materials should be tested against baseline materials supplied by the government. The Offeror should propose to deliver 30 prototype protective garments based on a government provided pattern (includes hooded shirt and trousers) using their prototype textile. These designs require strategically placed materials capable of stretch elongation of at least 12%. A subset of prototypes are required to be tested at the system level. System level testing includes, but is not limited to, Aerosol System Test (TOP 10-2-0022), Man-in-Simulant-Test (TOP 10-2-022), and Sweating Thermal Manikin (ASTM F2370 & ASTM F 1291). This testing must be performed by a DoD CWA laboratory or a DoD certified commercial CWA laboratory against chemical agents. Self-detoxifying prototype garments must be tested against a baseline garment which will be supplied by the government.

References: Joint Service Lightweight Integrated Suit Technology; MIL-DTL-32102

Technical Point of Contact: Ms. Tracee Whitfield, 410-417-3285,
tracee.l.whitfield.civ@mail.mil

Missile Defense Agency (MDA)

Requirement #: MDA-19-BAA-RIF-0001

Sponsor Organization/Office: Missile Defense Agency

Title: Technologies for High G Thrust Vector Control

Military System or Acquisition Customer: Aegis BMD and Advanced Research

Description: MDA seeks technologies to enable highly maneuverable thrust vector control (TVC) capable of high G maneuvers and a low time constant. Efforts may focus on complete TVC designs, including throttleable, or specific components for TVC. Proposers should assume use of solid fuels and may focus technologies for gimballed nozzles, multiple thrusters, or other TVC designs. Solutions should facilitate low size weight and power and allow functionality at a range of altitudes and velocities. Effort should include testing to demonstrate function of proposed technology.

Technical Point of Contact: James C. Jones, james.jones@mda.mil, 540-663-7745 and Kevin Krueger, kevin.krueger@mda.mil, 256-955-4136

Requirement #: MDA-19-BAA-RIF-0002

Sponsor Organization/Office: Missile Defense Agency

Title: EO/IR Sensors and Image Processing Software to Enhance Early Warning/Denial Capabilities through Detection, Identification, and Tracking of Integrated Air and Missile Defense Threats

Military System or Acquisition Customer: Advanced Concepts Performance Assessments (DVS)

Description: MDA is looking for novel integrated sensor/processing/communication modalities that can be delivered in the 2022-2025 timeframe. These integrated systems should provide integrated air and missile defense detection, identification, and tracking capabilities from any platform while providing the information to warfighters in near real time. Technologies of interest include EO/IR sensors, automated sensor control software, beyond line of sight (BLOS) long haul communication, anti-jamming, multi-modal communications, mesh networking capability, and low power consumption. Integrated systems should use an open architecture as they will need to be easily integrated with many platforms and other sensor systems.

Technical Point of Contact: Richard Paladino, richard.paladino@mda.mil, 256-450-4337

Requirement #: MDA-19-BAA-RIF-0003

Sponsor Organization/Office: Missile Defense Agency

Title: Digital Modeling of Radio Frequency (RF) and Infrared (IR) Phenomenology in Complex Integrated Air and Missile Defense (IAMD) Environments

Military System or Acquisition Customer: Aegis BMD

Description: The Missile Defense Agency and Aegis Ballistic Missile Defense Program Office (MDA/AB) is interested in improved ability to model RF and IR scenes and phenomenology associated with a complex IAMD environment. Topics and phenomenology of interest include in line / faster than real time IR scene modeling, Post Intercept Debris (PID) modeling, improved models for celestial objects, models for impact flash / detonation associated with intercepts of BMD targets, RF and IR models of missile plume effects, etc. The technologies should be mature, scalable, and have sufficiently fast runtime to support integration with end user models (weapons system and missiles). The technology will address verification and validation of models, specifically addressing what has been done to date and what future data needs to be collected.

Technical Point of Contact: Shannon Jernigan, Shannon.Jernigan@mda.mil, 540-663-6186

Requirement #: MDA-19-BAA-RIF-0004

Sponsor Organization/Office: Missile Defense Agency

Title: Ascent Phase Typing and Impact Point Determination

Military System or Acquisition Customer: C2BMC and Advanced Research

Description: The Missile Defense Agency seeks to develop the capability for missile threat classification in the ascent phase of flight. Intercept and destruction of missile threats during the ascent phase of flight provides increased flexibility and targeting opportunities. Early intercept also forces less effective deployment of countermeasures, minimizes the potential impact of debris, and reduces the number of interceptors required to defeat a "raid" of threat missiles. A rocket launch from a threat nation may represent a peaceful activity (for example, a civilian satellite launch), a domestic weapons test, or a ballistic or hypersonic threat. The launch vehicles employed typically fly very similar trajectories early in the ascent phase, thus challenging the ability to classify the nature of the launch (threat or not). Non-ballistic trajectories also challenge early impact point determination. Therefore, rapid classification of a detected launch and trajectory is critical to enable the Warfighter to identify and, if necessary, respond to the threat. This topic seeks to enhance the Agency's Command and Control, Battle Management, and Communications (C2BMC) capabilities through the development of new typing and trajectory estimation technologies to rapidly classify foreign rocket launches. Successful proposers will design, model, and analyze a complete ascent phase estimation system that will integrate with existing C2BMC elements. The system should offer mission flexibility to test a wide range of component technologies. The RIF program should demonstrate the functional operation of the system through appropriate laboratory tests and compare results with model predictions.

Technical Point of Contact: Dr. Karla Spriestersbach, karla.spriestersbach@mda.mil, 256-450-3289, and Dr. George Mantis, george.mantis@mda.mil, 256-450-1015

Manufacturing and Industrial Base Policy (MIBP), Industrial Base Analysis and Sustainment (IBAS), (in order of priority):

Requirement #: IBAS-19-BAA-RIF-0001

Sponsor: OSD/INDPOL-Industrial Base Analysis & Sustainment (IBAS)

Title: Critical Unmanned Systems Technology Assurance

Military System or Acquisition Customer: DoD

Description: The IBAS Program has been working with government, industry supply chain, and end users to identify critical technology sectors that ensure trusted operations of current and future unmanned systems - operating in the air, surface, ground, subterranean, littoral, blue water/under water, space, and multi domains. IBAS is seeking projects that credibly enhance, revolutionize, or disrupt their respective technology sector and ensure a resilient/robust trusted supply chain for small, mid, and large scale platforms to utilize. Technologies of high interest include: autopilot, precision non-GPS dependent navigation/timing, low power processors, power harvesting, flexible low cost & Size Weight Power (SWAP) sensors, mission configurable structures, low probability of intercept/low probability of detect (LPI/LPD) communications/data links, common/affordable training, broad spectrum capable sensors, etc. Capabilities of interest include scalable joint swarming, anti-collision/collision mitigation, trusted beyond line of sight (BLOS) or over the horizon (OTH) controls, Consumer off the shelf (COTS) leveraging technologies, mission planning toolsets, robust Artificial Intelligence, portable deployment methods, and counter unmanned systems as well as counter-counter unmanned systems. Additional consideration given to assured Test & Evaluation (T&E) site access, data set standardization, and asset distribution for share test community by in across DoD user/acquisition community as well as OGA's.

Technical PoC: Ms. Adele Ratcliff, 571-372-6240, a.a.ratcliff.civ@mail.mil

Requirement #: IBAS-19-BAA-RIF-0002

Sponsor: OSD/INDPOL-Industrial Base Analysis & Sustainment (IBAS)

Title: Industrial Base Monitoring Toolkit

Military System or Acquisition Customer: OSD/INDPOL-Industrial Base Analysis & Sustainment (IBAS), US Army

Description: Design, development, and deliver a software & Artificial Intelligence (AI) driven toolset to characterize and visualize risks within the industrial base. Primary goal to monitor real time domestic defense industry production and materials consumption, with a stretch goal of showing capability to expand to include commercial and international industrial base trends. System must provide real time visualization of production flow within major sectors of the industrial base, with the ability to select key raw materials and track their progression throughout the industrial base. Reporting must be real time query based as well as automated, leveraging machine learning to identify trends, impacts, and future risks such as materials shortages, long lead delivery impacts, stockpile flow, etc. System must have a streamlined graphical user interface and be able to be hosted on isolated/local hard drives as well as cloud networks.

Technical POC: Adele Ratcliff, 571-372-6240; a.a.ratcliff.civ@mail.mil

National Geospatial-Intelligence Agency (NGA)

Requirement #: FY19 NGA-19-BAA-RIF-0001

Sponsor: National Geospatial-Intelligence Agency Source (NGA), Source

Title: Automated Procedure Assessment System

Military System or Acquisition Customer: NGA Source Aero Production System and NGA Source Foundation Aeronautical Navigation in support of seven combatant commands and four military services

Description: NGA is seeking the development of a capability to advance global flight procedures through the development of an automated change detection and data population that will enable analysts to focus on validation and flight procedure accuracy, supporting automated chart development and data for use in aircraft flight management systems. To meet the projected demand, NGA is interested in a capability to assess data and detect changes automatically; then following validation, automatically update data content for use in automated instrument flight procedure chart development. In support of approximately 15,000 aircraft and over 85,000 estimated aviators and war planners DOD-wide, NGA's Flight Procedures team evaluates and maintains nearly 7,500 aircraft instrument flight approach and departure procedures worldwide. Accuracy of the procedures are critical as the information and data provided serves as a pilot's sole means of navigation during flight at night and in adverse weather conditions. Each instrument flight procedure is susceptible to host nation changes during each 28-day international publication cycle. Currently, information justifying potential flight procedure changes are detected manually. As a result, significant man-hours are devoted solely to information and data change detection, with analysis applied only after detection. Following analysis and change validation, analysts must then manually update both published flight procedure charts and databases with revised information and data. With NGA projected flight procedure requirements anticipated to triple by 2023 in support of nearly 48,000 total procedures required worldwide, incorporating information and data from over 200 providers and four DOD military services, data review requirements will soon outpace current manpower availability. Automation will allow NGA to meet DOD identified requirements for global flight procedure capability, and enable DOD to meet the Federal Aviation Administration (FAA) and international mandates to attain full Global Positioning System based air navigation capability by 2023.

Objective:

- a) Assess host country source against standards and specifications
- b) DoD source change detection
- c) Error checking and tracking
- d) Validation of flight management coding sequences
- e) Source metrics and monitoring

Technical POC: William S Buckwalter, 314-676-0590, William.S.Buckwalter@nga.mil

Requirement #: FY19 NGA-19-BAA-RIF-0002

Sponsor: National Geospatial-Intelligence Agency (NGA), Source

Title: Ship Detection Algorithm Development

Military System or Acquisition Customer: GEOINT Broker Services and Automated Support to NGA partners

Description: Seventy-one percent of the globe is covered by water, and vessels of all shapes and sizes traverse these global commons. The USCG is tasked with supporting the tracking of vessels for Search and Rescue (SAR), as well as vessel tracking in support of narcotics trafficking, illicit migration, illegal fisheries, and maritime pollution. The USCG as well as many NGA partners with a maritime focus utilize capabilities that exist within the GEOINT Broker Services construct. Current services provide some ship detection algorithms, however, none can provide better than 40% accuracy at present – with substantial false detections. Significant time and effort is required to support the

maturation of these algorithms before they can be effectively used by the National System for Geospatial-Intelligence (NSG). The continued development of a robust artificial intelligence / machine learning / computer vision (AI/ML/CV) solution to accurately detect and classify ships at sea would allow the entire maritime community to conduct their missions to achieve success more quickly, when time is of the essence. The further improvement and development of ship detection algorithms, to expand the size of vessels able to be detected, will feed directly into the ongoing efforts to advance AI, Automation, and Augmentation (AAA) within the NSG. These algorithms will support the supplier brokering mechanisms that deliver value models and support model driven activities that accelerate timelines within the intelligence cycle. Government Furnished Information (GFI) may be available upon request.

Technical POC: CDR Lance Tinstman, 571-558-4388, Lance.W.Tinstman@uscg.mil

Requirement #: FY19 NGA-19-BAA-RIF-0003

Sponsor: National Geospatial-Intelligence Agency Source (NGA), Analysis

Title: Improved Point Cloud Compression Capabilities

Military System or Acquisition Customer: The NGA Foundation GEOINT 3D program to Combatant Commands (COCOMs), DOD military services, NGA enterprise, and USG wide

Description: The development of active and passively-derived 3D imaging modalities, combined with the depth of information that these techniques provide, has led to point clouds becoming a de facto standard data scheme for the capture, storage, transmission, and rendering of 3D objects. Unfortunately, the exquisite spatial, temporal, and/or spectral information contained within these point cloud datasets comes at the cost of data size. In many cases, even with existing point cloud compression algorithms, the dissemination of data off of these different platforms requires the physical handling and transmission of solid state data storage. To improve force readiness and lethality by getting mission critical data to those who need it, this topic seeks to develop a modality-independent data compression schema that will allow for cloud-based, numerically lossless transmission of high quality 3D data. Improved data compression capabilities would enhance delivery, storage, and processing of 3D data across the USG enterprise. This would directly improve data dissemination challenges encountered by existing operational sensors, like Buckeye and FALCON-I, and future platforms, like TACOP and EMARS. It could potentially lead to efficiencies of point cloud storage and delivery to and from libraries holding and their dependencies.

Technical POC: Jacob Graul, 571-558-2495, Jacob.S.Graul@nga.mil

Requirement #: FY19 NGA-19-BAA-RIF-0004

Sponsor: National Geospatial-Intelligence Agency Source (NGA), Research

Title: Automated Precision Target Change Service (APTCS)

Military System or Acquisition Customer: NGA Geospatially Enabled Target Materials (GETM) Program

Description: NGA is interested in emerging change detection and target monitoring technology is available for automatically assessing electro-optical imagery over targets to determine when significant and relevant changes have occurred to GETM facilities. The GETM program supports NGA customers for the production, use and dissemination of precision target materials used in the development of strike packages for Global Positioning System (GPS) guided weapons. In addition, new methods for improving the

accuracy of both GETM vectors and detected changes will improve the alignment of vectors over time and help eliminate “bad” coordinates that plague everyday analysis and targeting activities. An Automated Precision Target Change Service (APTCS) based on these technologies is expected to: (1) automate the review and update of the NGA GETMs program’s target records, and (2) improve the overall accuracy of vector data within the GETMs database. GETM is also one of the components of the emerging structured observation management (SOM) technical solutions within the National System for Geospatial-Intelligence (NSG) for replacing traditional paper materials with geospatially-integrated data, which is critical for a robust Command, Control and Communications Infrastructure necessary to support operational warfighters engaged in operations. GETM consists of vector objects that include facility outlines and intra-facility object outlines and points. The number of vector objects is on the order of hundreds of thousands to millions. Current procedures require manual assessment of each facility for possible update on a timetable that is application dependent. When the timer expires, analysts search for new data and conduct a manual review to determine whether or not an update to the facility vectors is required.

Technical POC: William Preissner, 571-557-8008, William.S.Preissner@nga.mil

Requirement #: FY19 NGA-19-BAA-RIF-0005

Sponsor: National Geospatial-Intelligence Agency Source (NGA), International Affairs

Title: Disclosure and Release Tool (DART) Modernization

Military System or Acquisition Customer: NGA, Military Combatant Commands (COCOMs)

Description: Develop a modernized, service-enabled Disclosure and Release (D&R) system that is architecturally integrated with enterprise distribution systems enabling the connection of the D&R decisions to the product/customer in (near) real time. Modernizing DART will ensure NGA can continue its mission essential functions more effectively and efficiently while increasing timely support to coalition operations and foreign partners. The goal is to advance the existing tool by modernizing and transitioning it into a cloud compliant capability within the near term. NGA seeks an opportunity to realize the inherent cloud advantages of better insight, improved collaboration, data sharing, better engagement, speed, and achieve measurable gains. A cloud compliant digital research library and synchronized geospatial product and data D&R tool will enable fast and efficient brokering of GEOINT services dissemination/distribution. NGA would like an overarching system or tool that captures the requisite Classification and Handling controls for all NGA products and data to include classified, unclassified –restricted and unrestricted, and commercially acquired data (commodities). Additionally the tool needs to be available on multiple security domains with a cross-domain capability, and co-located with the foundation geospatial product dissemination systems it supports.

Technical POC: Jacqueline Hall, 571-557-5187, Jacqueline.H.Hall@nga.mil

National Reconnaissance Office (NRO)

Requirement #: NRO-19-BAA-RIF-0001

Sponsor: National Reconnaissance Office (NRO)

Title: Multi-Functional Radiation Shielding Composites

Military System or Acquisition Customer: National Reconnaissance Office (NRO), Defense and Commercial Space Industry

Description: The NRO is interested in developing a reduced mass, low coefficient of thermal expansion (CTE) radiation shielding material for commercial-off-the-shelf (COTS) electronics. There have been demonstrations of superior mechanical and

radiation shielding capabilities of novel Tungsten-loaded, CNT-core composites. The use of this technology would allow for vast advancements in COTS electronic selection for space applications that would otherwise fail due to the harsh radiation environment and temperature gradients. This new material is also much lighter than the traditional heavy Aluminum shielding needed to meet the radiation shielding requirements. The NRO intends to use this technology to insert more efficient and powerful electronic and avionic packages into NRO systems, allowing for more advanced capabilities to be realized in a lighter weight and smaller package than previously available.

Technical POC: 1Lt Michael Waters, 703-808-1638, watersmi@nro.mil

Requirement #: NRO-19-BAA-RIF-0002

Sponsor: National Reconnaissance Office (NRO)

Title: Enhanced, Multi-Functional CNT Composites

Military System or Acquisition Customer: National Reconnaissance Office (NRO), Defense and Commercial Space Industry

Description: The NRO is interested in developing increased conductivity, reduced mass, and high purity carbon nanotube (CNT) yarns and sheets for multi-functional applications. There have been demonstrations of novel chemical and mechanical post-processing techniques to improve multi-functional properties such as high strength and modulus, increased electrical conductivity and vibration damping, and high material purity. The use of this technology would allow for vast advancements and implementation in the use of CNT composite technology for both space and terrestrial applications that would otherwise fail due to the limitations of existing composite technology. The NRO intends to use this technology to improve the structural capabilities of composites on space systems enabling wider use of composites on NRO systems.

Technical POC: Maj Daniel Ciperá, 703-808-2894, ciperada@nro.mil

United States Africa Command (USAFRICOM)

Requirement #: USAFRICOM-19-BAA-RIF-0001

Sponsor: United States Africa Command (USAFRICOM) J4

Title: The Joint Advanced Medium Mobile Power Sources (AMMPS) Micro-grid Storage (JAMS)

Military System or Acquisition Customer: Special Operations Command Africa (SOCAF), U.S. Army Africa (USARAF), U.S. Air Forces Africa (USAFAF), U.S. Naval Forces Africa (NAVAF), Combined Joint Task Force - Horn of Africa (CJTF-HOA)

Background: The Advanced Medium Mobile Power System (AMMPS) micro-grid is a US Army program of record power system. The AMMPS is designed to turn-on a second generator when an operating generator reaches 80% of its capacity, causing both generators to operate at 40% or a reduced capacity, until the load changes. Generators operating at a reduced capacity are fuel inefficient and have shorter life-spans.

Description: The Joint AMMPS Micro-grid Storage (JAMS) project will optimize level of energy storage to achieve maximize energy efficiency as generators are auto-started and auto-stopped during the micro-grid management process. In addition to energy efficiency, the JAMS project will address silent watch reserve, which is: 1) the amount of energy that can be stored for unplanned outages; and 2) the ability to have power without operating generators. The JAMS hardware should be the same or similar foot print to a 60 kilo-watt AMMPS generator; (length 82", width 36", height 52.8"). The energy storage hardware is required to be transportable by military air, land, and sea transports. Proposed systems should be optimized to provide the best performing solution with the best energy density at the lowest weight possible. Testing of the JAMS will be required by means of connecting it to an AMMPS micro grid permitting substantiation of the performance and determining if the

JAMS meets the Army's requirements. This testing is included in the contract and done at Engineer Research and Development Center – Construction Engineering Research Laboratory (ERDC-CERL). Final requirement is to communicate under the tactical micro grid standards framework.

Technical Point of Contact: CDR Aaron Park, aaron.w.park.mil@mail.mil or Mr. Charles T. Decker, 217-373-3361, Charles.t.decker@usace.army.mil

Requirement #: USAFRICOM-19-BAA-RIF-0002

Sponsor: United States Africa Command

Title: Visual Display Technology for Enhanced Decision Making

Military System or Acquisition Customer: United States Africa Command

Description: Technology of volumetric displays have advanced to the point where they could be leveraged for enhanced decision making.

CHALLENGE:

Tactical Level: Displays used for combat operations require the human operator to process large amounts of abstract information. Although humans can nominally process a small number of independent issues concurrently, combat displays can easily present hundreds of independent pieces of information. This can lead to non-optimal decision-making because of the lack of time during highly stressed conditions to fully process raw data before actions need to be taken.

Operational Level: Operational planning is usually performed using the tools of simple modeling and verbal discussion. In today's operating environment, the number of independent and dependent variables exceeds the ability properly analyze and role play during the acceptable time frame. Consequently, a significant number of assumptions are made without a sufficient validation, predictably leading to sub-optimal plans.

Strategic Level: Strategy is designed and developed across all aspects of national power. Complex interactions within theater or even inter-theater can frustrate executive decision-making and lead to unintended consequences. Furthermore, distinct cultures and inter-organizational dynamics, when acted upon by US decision-making, can react in seemingly chaotic ways. This is because human decision-makers cannot fully evaluate the complex interplay because many areas require distinct specialized knowledge that is only gained through a lifetime of study. There is no verifiable cross-domain subject matter expertise to align single area subject matter expertise. This fact will lead to imperfect alignment of understanding across staffs and decision-makers.

DESIRE:

USAFRICOM is interested in using innovative technologies to support the human systems operator, staff member, and executive decision-maker when evaluating large amounts of raw data, especially when working within unconstrained decision spaces. By using volumetric displays in conjunction with advanced data processing, the issues discussed above can be reduced by providing better visualization of incoming real-world data, as well as, real-time and highly articulated consequence modelling of proposed decisions.

Using advanced graphical and algorithmic processing the technology must be able to transform multi-faceted data into dynamic three and four dimensional views. The solution will need to include all associated supporting data processing, as well as, robust interface control to be able to rapidly process, display, and integrate data from cultural models, economic models, processed sensor information, logistical information, geographical products, meteorological products, and space systems data. Furthermore, subject matter experts must be able to modify outputs based upon expertise and micro-dynamics of on-the-ground situations. This could also include modifications based upon law or senior level guidance.

Technical Point of Contact: Commander Jason C. Kedzierski, 314-421-3859, jason.c.kedzierski.mil@mail.mil

Under Secretary of Defense for Research and Engineering (USD(R&E))

U.S. Central Command (USCENTCOM)

Requirement #: USCENTCOM-19-BAA-RIF-0001

Title: Adaptive Cyberspace Visualization Environment

Military System or Acquisition Program Customer: U.S. Central Command, U.S. Special Operations Command – Central

Description: US forces require the ability to visualize the information environment local to their operating area. Visualization environment should include a graphical representation of local social media activity relevant to the operating area. Also graphically represented on the map would be RF communication nodes such as: Global System for Mobile communications midpoints, WiFi (802.11x) midpoints, Digital Mobile Radio base stations, and Very Small Aperture Terminals emitting in that local area. Visualization should be user-friendly and understandable to persons with a non-technical background to understand.

Technical Point of Contact: Mr. Timothy Trogdon, 813-529-8870,
timothy.e.trogdon.ctr@mail.mil

Requirement #: USCENTCOM-19-BAA-RIF-0002

Title: Class 1 UAS Waypoint Mode Detection

Military System or Acquisition Program Customer: U.S. Central Command, U.S. Special Operations Command – Central

Description: US forces require innovative ways to detect and/or counter small Unmanned Aerial Station (UAS) technology operating in “waypoint” mode--targeting friendly units in the Central Command Theater. The system will detect and cue the user to high confidence threats, while being configured for Low Probability of Detection (LPD) and the lowest possible Size, Weight, and Power (SWAP). Proposals should focus on enhanced and innovative techniques and systems to detect small (under 20lbs) UAS threats.

Technical Point of Contact: Mr. Timothy Trogdon, 813-529-8870,
timothy.e.trogdon.ctr@mail.mil

Requirement #: USCENTCOM-19-BAA-0003

Title: Beyond Line of Sight Remote C2

Military System or Acquisition Program Customer: U.S. Central Command, U.S. Special Operations Command – Central, U.S. Strategic Command

Description: US forces require the ability to Command & Control Cyber Electromagnetic Activities and remotely fire Integrated Cyber Electronic Warfare effects from over the horizon via air and/or space. Command & Control mission link should provide Blue Forces secure, high availability, integrity, and minimal delay in communicating with a broad spectrum of devices. Capability should be agnostic to connecting platforms operating in air, land, or maritime environments.

Technical Point of Contact: Mr. Timothy Trogdon, 813-529-8870,
timothy.e.trogdon.ctr@mail.mil

Undersecretary of Defense for Personnel & Readiness

Requirement #: USDP&R-19-BAA-RIF-0001

Sponsor: USD (P&R)

Title: Future Lightweight Combined Operations Training Solution (LCOTS)

Military System or Acquisition Program Customer: OUSD (P&R)

Description: The Department of Defense (DoD) is seeking industry innovation to develop a lightweight, low-cost, staff-level training capability that supports the use of classified or unclassified tools. The capability shall deliver training on-demand and reduce the ratio of trainees to trainers with workflow and data configuration simplified where appropriate. An additional attribute of the lightweight solution is the creation of an open source-like and user-friendly architecture that meets identified requirements and capability gaps. LCOTS must be realistic, featuring high-fidelity challenges and scenarios enabling after-action debriefs and capturing lessons learned. Training scenarios should replicate real-world operating situations and challenges that can be dynamically loaded from open-source or classified-source training data sets. It should be web-based and cloud-enabled using a modular architecture with changeable components, enabling simple interfaces to command and control and general information technology platforms. This initiative is driven by a US and NATO cooperation consortium supported by coalition partners, particularly Sweden.

Technical POC: Joe Bricio, 757-492-7910, joe.bricio@navy.mil

Requirement #: USDP&R-19-BAA-RIF-0002

Sponsor: USD (P&R)

Title: Range Modernization Adaptive Threat Emitter for EW

Military system or Acquisition Program Customer: OUSD (P&R)

Description: The 2019 NDAA addresses the requirement to develop, integrate and enhance the electronic warfare (EW) mission area and the conduct of joint electromagnetic spectrum (EMS) operations in all domains across the Department of Defense (DoD). Additionally, the National Defense Strategy (NDS) calls for the Department to “field a lethal, resilient, and rapidly adapting Joint Force.” Therefore, the Department must replace its out-of-date, non-adaptive, and immobile adversary threat emitters currently used in DoD training ranges—these are key capabilities that must be modernized to ensure warfighters are properly trained. This effort is required to support air and ground combat training in EMS operations for potential conflict against near-peer and other adversaries, and supports the NDS priority of improving force readiness and lethality. The DoD is seeking industry innovation to develop low cost mobile and programmable threat emitters that are adaptable in order to rapidly emulate adversaries’ threat emitters as current threats change. The purpose of this effort is to: 1) develop mobile and adaptive EW training threat emitters that emulate modern adversaries, and 2) deliver a rapid prototype of the threat emitter. Attributes of the threat emitter include: 1) multi-band replication of ground-based adversary threat emitters using the operational frequency range, 2) radar signal generator that realistically represents the RF of a modern threat emitter, 3) prototype must react real-time to training range aircraft attributes, maneuvering, and electronic countermeasures, and 4) capture aircraft performance for aircrew debrief.

Technical POC: Brad Thomason, 256-842-3134, bradley.o.thomason.civ@mail.mil; Greg Knapp, gregory.f.knapp.civ@mail.mil, 703-695-2019.

Requirement #: USDP&R-19-BAA-RIF-0003

Sponsor: USD (P&R)

Title: Training Modernization Mission Integrated Engineering Assessment Model for Air Combat Training

Military System or Acquisition Program Customer: OUSD (P&R)

Description: The 2019 NDAA addresses the requirement to train pilots against the full range of 5th generation threats at training ranges. The Department of Defense (DoD) must assess the ability of its training ranges to support required training. The DoD is seeking innovation to develop a Training Modernization Mission Integrated Engineering Assessment Model from a combination of industry, academia, and/or government to assess the Department's training range infrastructure. This assessment will support training for potential conflict against near-peer adversaries and DoD's ability to support such training outside of the continental US (CONUS). The purpose of this effort is twofold: 1) assess air combat training ranges' capability to support operational relevant training against the most modern adversaries, and 2) assess the military's ability to conduct required training away from training ranges, such as during deployments outside CONUS. The mission integrated engineering effort will produce an end-to-end system model that allows sensitivity analysis to support trade studies examining the optimization of multi-billion-dollar investments supporting range infrastructure. Solution sets must examine the full range of military operations in an effects/kill chain framework including EW/Cyber, integrated operations, and optimization of Live, Virtual and Constructive (LVC) training solutions. The effects/kill chain framework will assess the balance of the LVC environment according to the way in which we plan to execute air combat to determine the correct mix of training mechanisms (LVC), and therefore the best range modernization investments.

Technical Points of Contact: Greg Knapp, 703-695-2019, gregory.f.knapp.civ@mail.mil and Joe Bricio, 757-492-7910, joe.bricio@navy.mil.

Undersecretary of Defense for Research & Engineering

Joint Capability Technology Demonstration (JCTD)

Requirement #: USDR&E-JCTD-19-BAA-RIF-0001

Sponsor: OUSD(R&E) /ODDR&E for Advanced Capabilities / Joint Capability Technology Demonstration (JCTD) Program Office

Title: Extended Range Autonomous Parachute System

Description: The Autonomous Aerial Insertion and Resupply into Dense, Urban Complex Terrain (AAIRDUCT) Joint Capability Technology Demonstration (JCTD) is seeking a powered parafoil system that is capable of delivering a minimum of 200 pounds and a maximum of 500 pounds of usable cargo from higher horizontal standoff (100km (T)/400km (O)) than the current Joint Precision Airdrop System. The system should be ground launched and/or air launched and capable of flying at low altitude (less than 500 meters) using GPS-based or non GPS- based sensors for autonomous navigation and control from release to target. Proposals should address how the system is capable of performing a controlled landing with a total impact velocity of less than 28 feet per second and an accuracy of less than 60 meters, 80 percent of the time. Lower cost systems and capabilities to enhance operational effectiveness (such a low noise emissions) are desirable.

Technical POC: Richard Benney, 508-233-5835, richard.j.benney.civ@mail.mil, or Mike Henry, 508-233-4592, michael.r.henry48.civ@mail.mil

US Army and Manufacturing Technology Program (MANTECH)

Requirement #: USDR&E-MANTECH-19-BAA-RIF-0001

Sponsor: Manufacturing Technology Program

Title: Production of BDNPA/F Utilizing Advanced Flow Reactor Technology

Military System or Acquisition Customer: US Army and Manufacturing Technology Program

Description: The Nitroplasticizer BDNPA/F is a key ingredient of many legacy and novel IM (Insensitive Munitions) energetic materials that are of interest to the DoD. The overall goal for this project is to establish and demonstrate of the manufacturing capability of the Advanced Flow Reactor (AFR) platform to produce BDNPA/F at required quantities, process documentation and a technology data package (TDP) for the production of BDNPA/F and its precursor DNPOH utilizing the AFR equipment, and demonstrate the capability for an advanced manufacturing methodology for producing materials of interest that are hindered by legacy manufacturing practices.

Technical POC: Keith DeVries, keith.a.devries2.civ@mail.mil, (812) 854-2666

Requirement #: USDR&E-MANTECH-19-BAA-RIF-0002

Sponsor: Manufacturing Technology Program

Title: High Temperature Materials for Hypersonic Vehicles

Military System or Acquisition Customer: Manufacturing Technology Program

Description: Develop capability to build seeker windows capable of withstanding the unique temperature requirements of hypersonic flight and providing transparency for optical or RF terminal guidance in sufficient amounts to counter future hypersonic threats.

Technical POC: Tracy Frost, tracy.g.frost.civ@mail.mil, (571) 372-7493

Requirement #: USDR&E-MANTECH-19-BAA-RIF-0003

Sponsor: Manufacturing Technology Program

Title: Molecular Nanomaterials

Military System or Acquisition Customer: MANTECH, US Army

Description: Development of advanced manufacturing technology to support the adoption of critical nanomaterial technologies across a broad portfolio of products and to reduce the acquisition costs of these technologies.

Technical POC: Tracy Frost, tracy.g.frost.civ@mail.mil, (571) 372-7493

Requirement#: USDR&E-MANTECH-19-BAA-RIF-0004

Sponsor: Manufacturing Technology Program

Title: Large Scale Cryogenic Treatment Equipment Capabilities

Military System or Acquisition Customer: US Army and Manufacturing Technology Program

Description: Development of material processing techniques of existing metallic alloys that produce stronger and more durable material properties than typical properties for the base alloy. Use cases include usage in light weighting or improving existing components.

Technical POC: Keith DeVries, keith.a.devries2.civ@mail.mil, (812) 854-2666

Space & Sensor Systems Office (SSSO)

Requirement #: USDR&E-SSSO-19-BAA-RIF-0001

Sponsor: Office the Assistant Secretary of Defense (Research & Engineering)/Research Directorate

Title: Prototype Demonstration of a Light-Weight, Compact High-Performance Digital Single or Dual-Band Infrared Focal Plane Array Camera for Unmanned Aerial Systems and Ground Forces

Military System or Acquisition Customers: NAVFAC Naval Facility Surveillance, NAVAIR Counter UAS, AFRL/RW, AFRL/RX, AFSOC (HFI & ISR), AFLCMC/WIN (Next Gen ISR Sensors), AFLCMC/EB (Next Gen Weapon Seekers/Sensors)

Description: This requirement calls for an affordable, very compact, lightweight, high-definition digital infrared camera sensor for intelligence, surveillance and reconnaissance (ISR) and situational awareness on small platforms and ground based operations requiring large number of sensors. Applications such as Unmanned Aerial Systems (UAS) and Counter UAS for Ground Forces require a high field-of-regard, high resolution, and multi-band capability to perform ISR and situational awareness. However, since their platforms are very small and, in some cases, high numbered, they also require very compact, lightweight sensors that are affordable. While large-format infrared focal plane arrays have many advantages for ISR, very small platforms such as UAS require them to have small pitches to reduce chip size (and thus sensor size) while obtaining needed high resolution and wide field of view. Advanced high-definition camera sensors using III-V strained layer superlattice infrared focal plane arrays offer a solution to this problem, able to be made at very large formats and small pixels, operate at higher temperatures, and at lower cost than traditional infrared material solutions, while providing similar or better performance. For this requirement, white papers are being sought for a camera sensor prototype using a III-V strained layer superlattice 2Kx4K 6-um pitch infrared focal plane array. The prototype must have a single-band or multi-band infrared spectral capability. It must include a low-noise digital readout integrated circuit with fast region of interest operation and capability for multiple adaptive windows to be controlled by the system/user. High sensitivity and ability to detect small dim objects is highly desired.

Technical POC: Leslie Aitcheson, Army NVESD, leslie.r.aitcheson.civ@mail.mil, 571-286- 9113

Requirement #: USDR&E-SSSO-19-BAA-RIF-0002

Sponsor: Office the Assistant Secretary of Defense (Research & Engineering)/Research

Title: Dual-band Mid Wavelength/Long Wavelength Infrared Search and Track with Extended Long Wavelength Infrared Performance

Military System or Acquisition Customers: F/A-18, PMA-265

Description: Most current LWIR infrared search and track systems use old 2nd Gen infrared technology that soon be obsolete and have limited performance. The purpose of this RIF topic calls for the use of the most advanced infrared staring sensors and advanced digital readout integrated circuit (DROIC) to demonstrate an Infrared Search and Track (IRST) sensor prototype. The final deliveries should include the following: dualband infrared focal plane array (IR FPA) hybridized with a DROIC and an integrated dewar cooler assembly (IDCA) for IRST applications. The sensor should support Time Delay and Integration to maintain sensitivity while the IR FPA is step scanned to cover very large fields of regard (FOR). In the dualband FPA, the MWIR spectral coverage is regular 3 um to 5 um while this effort would emphasizing on extending the III-V Sb-based type II strain layer superlattice (SLS) detector structure to >11 microns cutoff at LWIR. The prototype should support field test and data collection and demonstrate a significant improvement in angular coverage, revisit rate, and detection range.

Technical POC: Leslie Aitcheson, Army NVESD, leslie.r.aitcheson.civ@mail.mil, 571-286- 9113

Requirement #: USDR&E-SSSO-19-BAA-RIF-0003

Sponsor: Office the Assistant Secretary of Defense (Research & Engineering)/Research Directorate

Title: Demonstration of Very High Data Rate Optical Output to Enable Large-Format High-Refresh-Rate Infrared Focal Plane Arrays

Military System or Acquisition Customers: Next Generation Combat Vehicle / Future Vertical Lift / Next-Gen Overhead Persistent Infrared (OPIR) / MDA Space Sensing Layer / USAF Staring Infrared Search and Track

Description: This requirement calls for white papers proposing rapid development of a high-performance infrared integrated Dewar cooler assembly (IDCA) prototype using native optical outputs for large-format high-frame-rate applications. As pixel counts and frame rates are increasing rapidly to meet ever more challenging imaging requirements, the ability to move large quantities of inherently digital image data from a cryogenic focal plane array (FPA) to warm downstream electronics has become a severe bottleneck. Recent developments in large-format (≥ 4 Megapixels) strained layer superlattice (SLS) III-V infrared focal plane arrays (IRFPAs), manufacturable cryogenic integrated photonic modulators, and digital readout integrated circuits (DROICs) enable the development of systems that can support large formats and full-frame high refresh rates. Current DROIC technology is optimized for Low Voltage Differential Signaling (LVDS) or Current-Mode Logic (CML) communications, which employ constant electrical currents on electronic data transmission lines. Cryogenic integrated photonic modulators operated in reverse bias require variable voltage input with very small current draws. The rapid innovation development of a native DROIC optical modulator driver will further demonstrate advanced cryogenic optical communications in IRFPAs with higher output data rates and reduced energy per bit. The required prototype should be an integrated Dewar cooler assembly using a high-performance III-V SLS infrared detector on a DROIC and must have high pixel counts (≥ 4 Megapixels), high quantum efficiency, very high operability, and low spatial noise. It must be capable of field testing and data collection. Long wavelength infrared III-V SLS detector arrays are preferred, but high operating temperature III-V SLS mid wavelength infrared detectors are acceptable. Pixel pitch can be up to 20 microns, but 12 micron pitch is preferred. Optical data links should support FPA operation from 40K through 180K, as well as at room temperature for system integration. The key performance parameters of interest in this solicitation are (1) maximum data rate (and frame rate) achieved, (2) energy per bit transmitted, and (3) the bit error rate. Performance should emphasize a capability for full-frame large format high refresh rate while maintaining high sensitivity and dynamic range. Interface electronics for converting the raw data stream into a standard format for integration into a demonstrator is desired.

Technical POC (1/2): Leslie Aitcheson, Army NVESD, leslie.r.aitcheson.civ@mail.mil, 571-286- 9113

Technical POC (2/2): Peter Smith, Army NVESD, peter.j.smith40.civ@mail.mil, 703-704-1679

Requirement #: USDR&E-19-BAA-RIF-0001

Sponsor: Office the Under Secretary of Defense (Research & Engineering)

Title: Multiple Electron-Beam Lithography (MEBL) Methods

Military System or Acquisition Customer: Office of the Under Secretary of Defense (Research & Engineering)

Description: MEBL represents an opportunity to address a number of domestic microelectronics supply chain challenges for high mix/low volume production of state-of-the-art microelectronics for DoD systems. This effort will develop and demonstrate, and/or evaluate the suitability of existing commercial offerings, to support a working process flow to support one or more of the following use models:

1) Direct write of entire wafer/mask sets on 200 or 300mm wafers at 45nm node size,

- 2) Partial customization of microelectronics for mixed lithography/obfuscation or simultaneous generation of large and small features for opto-electronics applications,
- 3) Die/wafer unique markings per layer with minimal impact to existing process throughput, yield & cost, or
- 4) Development of a “Minifab” type lithography tool to support proliferation of domestic low-volume SOTA microelectronics manufacturing

Technical Point of Contact: Raymond Shanahan, (571) 372-6558, raymond.c.shanahan.civ@mail.mil

U.S. Indo-Pacific Command (USINDOPACOM)

Requirement #: USINDOPACOM-19-BAA-RIF-0001

Sponsor: United States Indo-Pacific Command / J85 – Office of Science and Technology

Title: Operational Mission Planning Tool

Military System or Acquisition Customers: Air Operations Centers, Maritime Operations Centers

Description: Develop an operational mission planning tool for use in the Air Operations Center (AOC), Target Effects Team, Master Air Attack Planning Cell and Maritime Operations Center (MOC). The goal of the mission planning tool is to decrease the time to build key warfighting products, increase the quality, and to provide visualization to allow commanders to rapidly validate plans. The tool will address Air Tasking Order, Airspace Control orders, air plans, mission effects modelling among other capabilities.

Technical Point of Contact: Dr. Jeff Sanders, 808-449-4031, jeffrey.sanders.12@us.af.mil

Requirement #: USINDOPACOM-19-BAA-RIF-0002

Sponsor: United States Indo-Pacific Command / J85 – Office of Science and Technology

Title: Vertical Takeoff and Landing of Fixed Wing Unmanned Aerial Vehicles

Military System or Acquisition Program Customer: United States Indo-Pacific Command Components

Description: Develop a vertical take-off and landing (VTOL) capability to allow operation of existing fixed wing unmanned aircraft vehicles (UAVs) in remote regions with limited or no runway support. The VTOL solution needs to be scalable to support Group 3 fixed-wing UAV. The VTOL capability will be adjustable/adaptable to support various fixed-wing UAV types. The capability will require field testing and evaluation working tightly with operational units to flush out logistics, effectiveness, suitability, concepts of operations as well as tactics, techniques and procedures.

Technical Point of Contact: Mr. Wayne Liu, SPAWARSCEN Pacific, 808-471-5528, wayne.p.liu@navy.mil and Dr. Gregory Power, USPACOM J85, 808-477-9552, gregory.power@pacom.mil

Requirement #: USINDOPACOM-19-BAA-RIF-0003

Sponsor: United States Indo-Pacific Command / J85 – Office of Science and Technology

Title: Spectral Aerial Cueing for Chemical, Biological, Radiological, Nuclear and Explosive (CBRNE) Mobile Operations

Military System or Acquisition Customers: Joint Program Office for Nuclear Biological and Chemical Contamination Avoidance (JPM NBC-CA); National Guard Bureau

Description: Unmanned aerial vehicle (UAV) Information Reconnaissance and Surveillance (ISR) is an important component of today’s military operational environment. Another important operational consideration is being able to effectively

characterize the battlefield with respect to CBRN hazards using advanced wide area detection methods. Combining the ISR capabilities of a Group 2 or 3 UAV with a long range chemical detection technology will enable commanders to receive CBRNE hazard information in a timely and effective fashion. Multispectral, hyperspectral, and/or ultraspectral imaging likely are the best demonstrated available technologies suitable to be combined with a Group 2 or 3 UAV to support this CBRNE ISR mission by being able to provide in flight wide area coverage. The detection technology needs to be able to process data and transmit relevant information in real or minimally near-real time. The objective is to cue subsequent tactical ISR assets as to where potential CBRNE hazards may be located on the ground.

Technical Point of Contact: Dr. F. Michael von Fahnstock, (808) 477 9157, frank.vonfahnstock.ctr@pacom.mil

Requirement #: USINDOPACOM-19-BAA-RIF-0004

Sponsor: United States Indo-Pacific Command / J85 – Office of Science and Technology

Title: Machine Learning and Artificial Intelligence Applications for Decision Support and Planning

Military System or Acquisition Customer: USINDOPACOM J81 / J85

Description: USINDOPACOM is seeking artificial intelligence and machine learning capabilities to enhance decision support, situational awareness and forecasting for potential contingencies in the Asia-Pacific region. These capabilities should be able to ingest and analyze open-source and classified information sources in order to develop forecasts for operational and contingency planners to utilize both for potential conflict scenarios and natural/man-made disaster response. The capabilities should operate at near real-time speed and provide the appropriate level of user interface for both operational watch officers and executive leaders to use for decision support.

Technical Point of Contact: Mr. Brian McKay, J81, (808) 477-8155, brian.mckay.ctr@pacom.mil and Dr. F. Mike von Fahnstock, J85, (808) 477-9157

Requirement #: USINDOPACOM-19-BAA-RIF-0005

Sponsor: United States Indo-Pacific Command / J85 – Office of Science and Technology

Title: Transformative Reductions in Operational Energy Consumption (TROPEC)

Military System or Acquisition Customer: USINDOPACOM Logistics Directorate (J4), and numerous DOD program management offices related to operational energy

Description: The INDOPACOM concept of multi-domain distributed operations requires a new paradigm of increasingly agile support equipment with low energy footprint and minimal logistics tail. TROPEC is an operational energy assessment program to evaluate new and existing technologies, capabilities, tactics, techniques, and procedures with an emphasis on the ability to reduce operational energy demand and water/waste logistics requirements associated with expeditionary operations, especially in tropical environments. The underlying premise is that energy technologies that work in a lab or in the CONUS may or may not work as well in the INDOPACOM AOR with its tropical climate, high humidity and frequent typhoons. The problem is spelled out in multiple documents including the 2018 National Defense Strategy, 2016 DOD Operational Energy Strategy, 2017 USPACOM Supporting Strategy for Energy Security, 2014 Quadrennial Defense Review, and 2008 Defense Science Board Report, “More Fight, Less Fuel.” In response, USINDOPACOM is seeking industry partners who will perform a series of formal independent assessments of energy technologies provided by various DOD organizations working on the operational energy problem. Any new energy technology that is being considered for military procurement should first be tested in the

Indo-Pacific AOR for environmental suitability and operational utility, and TROPEC specializes in that test process.

Technical Points of Contact: Mr. Ross Roley, IPA, USINDOPACOM J81, 808-477-7860, ross.roley_ctr@pacom.mil; Colonel Jon-Paul Maddaloni (USA), USINDOPACOM J46X, 808-477-1464 jonpaul.maddaloni@navy.mil

U.S. North American Aerospace Defense Command / U.S. Northern Command (NORAD / USNORTHCOM)

Requirement #: USNORTHCOM-19-BAA-RIF-0001

Sponsor: USNORTHCOM

Title: US Personal Information Protection

Military System or Acquisition Customer: USNORTHCOM, DIA

Description: An enhanced intelligence capability is needed to "tag" United States Person Information (USPI) with date, time stamp of collection/receipt and to have that metadata tag actively notify the end user, and any other persons specified after a predetermined period has passed. The tag will also automatically mark the USPI with the required banners notifying users that the document contains USPI. If the data is not serviced in an appropriate time frame then it will automatically be purged from the systems. By standardizing, simplifying and introducing tagging methodologies to USP data, it will allow for better safeguarding of the information and help ensure that privacy and civil liberties protections are integrated into the DoD work flow.

Technical POC: Ed Doray, 719 554-1353, Edmund.m.doray.civ@mail.mil

U.S. Special Operations Command (USSOCOM)

Requirement#: USSOCOM-19-BAA-RIF-0001

Sponsor: Joint Special Operations Command (JSOC)

Title: SOF Enterprise Architecture Innovation. The intent is to create a dynamic and stimulating environment for the USG to collaborate and engage multi partner participation (multi- agency, industry, academia and Non Traditionals) on capturing full spectrum data coverage (unclassified to Special Access Program, COTS to STO, SMU to partner force)

Military System or Acquisition Customer: JSOC

Description: The US Government is seeking industry input on the feasibility and/or availability of a platform to rapidly research, develop, deploy, and assess novel technical architectures, methodologies, and capabilities. An ideal platform would emphasize the use of inexpensive, readily-available COTS, Open Source, and open/emerging standards and practices. The platform must also provide the ability to support broad collaboration from industry, academia, and the DIY/enthusiast communities. The platform must incorporate mechanisms to assess candidate architectures, methodologies, and capabilities in real-world settings. The platform shall integrate the following NDS & Modernization Priorities: fully networked c3, defensive cybersecurity, and artificial intelligence/machine learning. This capability will provide near-term transition candidates, force generation support, and decision-making support to requirements, acquisition, training, and operational communities.

Technical Point of Contact: Scott Hausauer, 910-243-2960, hasuauers@jdi.socom.mil or Bob Tomashek 910-243-4402 tomashekr@jdi.socom.mil

Requirement#: USSOCOM-19-BAA-RIF-0002

Sponsor: Joint Special Operations Command (JSOC)

Title: On-Site/Real-time Processing of Analytics by an All Software Generic High-Speed Modem Leveraging Commercial off the Shelf (COTS) Processing Platforms

Military System or Acquisition Customer: JSOC

Description: The US Government is seeking industry input on the feasibility and/or availability of an all-digital software modem supporting a high-speed waveform for a satellite or tactical radio application using a high-level software programming language and leveraging commercially available off-the-shelf (COTS) PCs. The objective modem platform would support real-time execution of analytic applications, which would process data from sources such as, but not limited to: unattended ground sensors, biometric scanners, and video/image feeds. The COTS platform is expected to perform the analytics functions and its modem functions simultaneously, with the modem waveform performing full duplex processing at data rates up to hundred(s) of megabits per second. The architecture would support uninterrupted operation of a communications waveform while supporting one or multiple analytic processing modules. The desired analytics supported would be provided by the US Government as high-level source code or a functional library to be integrated as a part of the all-digital software modem. This development would push analytics to the tactical edge where bandwidth restrictions often cause delays in analytic processing of data, allowing actionably response to data in a timely manner (currently, data is transported back over Beyond Line of Sight (BLOS) links, processed as time and equipment permit, and then a response to the data is given). For more details contact the PoCs.

Technical Point of Contact: Todd Brown, 910-243-4240, brownt@jdi.socom.mil or Jeffrey Meneghini, 910-243-4402 meneghini.j.ctr@jdi.socom.mil

Requirement#: USSOCOM-19-BAA-RIF-0003

Sponsor: US Special Operations Command (SOCOM); US Army Special Operations Command (USASOC)

Title: Inline Near Infrared (NIR) and Mid Wave Infrared (MWIR) Fused Weapon Sight
Military System or Acquisition Customer: Program Executive Officer (PEO) - Special Operations Force (SOF) Warrior / Program Manager Special Programs (PMSP)

Description: Design, development, and manufacture of a dual-wavelength, extended capability weapon sight system. This system includes an image intensified channel for extreme low power operation, and a high-definition cooled mid-wave infrared channel to provide extended performance in detection and situational awareness across multiple theaters. This device shall have a remote control with the ability to take pictures and record video; as well as play external video via cable and/or support wireless communication (Ultra-Wideband and/or BT and/or Wifi). Potential communications targets are the Andriod Tactical Assault Kit (ATAK) End User Device (EUD) as well as a remote heads-up display/Goggle)

Technical POC: Justin Sloane, 703.704.3564; Justin.m.sloane2.civ@mail.mil

Requirement#: USSOCOM-19-BAA-RIF-0004

Sponsor: US Special Operations Command (SOCOM); US Army Special Operations Command (USASOC)

Title: Transparent-OLED (T-OLED)

Military System or Acquisition Customer: Program Executive Officer (PEO) - Special Operations Force (SOF) Warrior / Program Manager Special Programs (PMSP)

Description: Invest into the product development and manufacture of a Transparent – Organic Light Emitting Diode (T-OLED). The T-OLED will provide a high-definition display mounted on the back of an Image Intensifier (I²). The future of head-borne night

vision is Augmented Reality (AR). Currently, the goggle manufacturers are utilizing the thermal channel of the goggle with a beam combiner. This approach works but is not the best solution to a true AR solution and the beam combiner adds volume/weight to the goggle. In addition, the overlay is not full screen and does not have pixel tracking which is a necessity in a true AR feature. The investment will improve the pixel alignment that will directly impact recognition enhancement, overlay registration, distance estimation, and overall better resolution of icons; while also reducing the weight of the tube. The T-OLED is the future of bridging the gap between analog tubes and digital by creating a hybrid solution. The development of the T-OLED could also be incorporated on three current programs: Army's Enhanced Night Vision Goggle – Binocular (ENVG-B); Naval Surface Warfare: Fused-Binocular (F-BINO); SOCOM/USASOC: Fused-Panoramic (F-PANO). F-PANO was funded by Office of Manufacturing Resiliency & Assurance Industrial Base Analysis & Sustainment (OSD-IBAS).

Technical POC: Justin Sloane, 703.704.3564; Justin.m.sloane2.civ@mail.mil

Requirement#: USSOCOM-19-BAA-RIF-0005

Sponsor: Joint Special Operations Command (JSOC)

Title: Transmission Security (TRANSEC) Based Satellite Waveform Using an All Software Generic High-Speed Modem Leveraging Commercial off the Shelf (COTS) Processing Platforms

Military System or Acquisition Customer: JSOC

Description: The US Government is seeking industry input on the feasibility and/or availability of an all-digital software modem supporting a high-speed waveform for a satellite or tactical radio application using a high-level software programming language and leveraging commercially available off-the-shelf (COTS) PCs. The waveform to be implemented must be a standard specification that has support for Transmission Security (TRANSEC), which provides over-the-air (OTA) data security. The all-digital software-based modem would be capable of interoperating with existing purpose-built modems designed by modem manufacturers, implementing the same waveform. The modem shall support functionality for the following, but not limited to; being provisioned/configured, user network data, and full duplex operation of all waveform functions for OTA operations. The operation would allow all functions of TRANSEC, modulation, demodulation, etc. to be implemented in a high-level software programming language. The implementation must be portable across generic COTS processing platforms, with minimal effort, to provide usability for other Government Agencies. For more details contact the PoCs.

Technical Point of Contact: Walt Moffitt, 910-243-1338, moffitt@jdi.socom.mil or Jeffrey Meneghini, 910-243-4402 meneghini.j.ctr@jdi.socom.mil

Requirement#: USSOCOM-19-BAA-RIF-0006

Sponsor: Joint Special Operations Command (JSOC)

Title: Common Timing Distribution for a Satellite Based Waveform Using an All Software Generic High-Speed Modem Leveraging Generic COTS Processing Platforms

Military System or Acquisition Customer: JSOC

Description: The US Government is seeking industry input on the feasibility and/or availability of an all-digital software modem supporting a high-speed waveform for a satellite or tactical radio application using a high-level software programming language leveraging commercially off-the-shelf (COTS) PCs. The all software modem operating on a COTS PC should provide support for a common network timing infrastructure within a distributed public or private data center and eventually deployed to the public Cloud. The common timing source and embedded infrastructure (the focus of this requirement) shall provide stable operation for critical timing and timing recovery

operations within the waveform. The embedded timing infrastructure shall remain stable while the COTS platform is simultaneously performing waveform functionality. With this embedded timing infrastructure, the standard waveform (supported by COTS hardware) will be interoperable with existing purpose-built waveforms supporting current modems and future modem development. Operation within a cloud environment would support a communications waveform in real-time, with full duplex processing at data rates up to hundred(s) of megabits per second for modulation, demodulation, etc. to be supported by a high-level software programming language. For more details contact the PoCs.

Technical Point of Contact: Todd Brown, 910-243-4240, brownt@jdi.socom.mil or Jeffrey Meneghini, 910-243-4402 meneghinij.ctr@jdi.socom.mil

Requirement#: USSOCOM-19-BAA-RIF-0007

Sponsor: Joint Special Operations Command (JSOC)

Title: Single Channel Tactical Radio Waveform and High-Speed Satellite Waveform Using an All Software Generic High-Speed Modem Leveraging Generic COTS Processing Platforms

Military System or Acquisition Customer: JSOC

Description: The US Government is seeking industry input on the feasibility and/or availability of an all-digital software modem supporting a high-speed waveform for a satellite or tactical radio application using a high-level software programming language leveraging commercially off-the-shelf (COTS) PCs. The waveform must support transmit and receive for a single channel tactical radio application. The all software modem will utilize COTS hardware and must be interoperable with existing modems, while providing the capability to switch between a tactical waveform to a satellite waveform. The operation would be mutually exclusive such that in tactical radio mode, the satellite radio would not be operational, and vice versa. In tactical radio mode, data rates up to several megabits per second would be supported, while in satellite mode, data rates in hundreds of megabits per second would be supported (simultaneous transmit and receive). Configuration would support a communications waveform in real-time, with full duplex processing at data rates in hundreds of megabits per second for modulation, demodulation, etc. The ability to seamlessly adapt the waveform on the same COTS hardware from a satellite waveform to a tactical radio waveform would require support through a high-level software programming language. This capability would reduce the number and weight of devices carried by users at the tactical edge. For more details contact the PoCs.

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Requirement#: USSOCOM-19-BAA-RIF-0008

Sponsor: Joint Special Operations Command (JSOC)

Title: High Performance Edge Device to Support TIA 5041 Digital-IF Transport Architecture

Military System or Acquisition Customer: JSOC

Description: The US Government is seeking industry input on the feasibility and/or availability of a multi-channel, multi-transponder edge device capable of being MIL-STD-188-165B certified, which supports both Analog and Digital bi-directional transport of the modulated waveform. The minimum desired requirements include support for 32 duplex channels (carriers) and support for a 500 MHz L-Band bandwidth 950 MHz to 2150 MHz transmit (TX) and receive (RX). The optimal device would provide a rack

mounted, blade-based architecture, for modular growth and have the ability to support the TIA-5041 Digital-IF transport architecture running over 10 Gbps or 100 Gbps Ethernet. The edge device would provide waveform agnostic transport of a waveform for digitization to analog for transmission carriers and analog to digital conversion for receive carriers. For more details contact the PoCs.

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Requirement #: USSOCOM-19-BAA-RIF-0009

Sponsor: Joint Special Operations Command (JSOC)

Title: Manpack Flat-Panel Wideband Ku-band Satellite Terminal

Military System or Acquisition Customer: JSOC

Description: The US Government is seeking industry input on the feasibility and/or availability of wideband Ku-band Satellite Terminal that operates across standard Ku-band (Transmit at 14.0 – 14.5 GHz, Receive Reg1 at 11.45 – 11.7 GHz, and Receive Reg2 at 11.7 – 12.7 GHz) and 30B Ku-band (Transmit 12.75 – 13.25 GHz, Receive Band1 at 10.7-10.95 GHz, and Receive Band2 at 11.2 – 11.45 GHz). The threshold solution must be a flat-panel manually steered terminal with performance receive G/T of 5 dB/K and transmit EIRP of 36 dBW (30 degree elevation at latitude 50 degrees). The objective terminal would be electronically steered for azimuth and elevation within the same panel (not separate panels for transmit and receive). The terminal must meet Size, Weight and Power (SWaP) for tactical use. The terminal must be no larger than 3 inches in depth, 16 inches in length, and 12 inches in width. The terminal must not exceed 25 pounds in weight. The terminal shall be operable across an elevation of 15 to 90 degrees and azimuth of 360 degrees. The terminal must have an integrated iDirect 950MP Modem.

All cables must be integrated within the terminal with external cable connections limited to two Ethernet RJ-45 connections (user data) and one power connection for external facility power. The terminal shall operate for 30 minutes on one (1) 2590 series or direct replacement battery and indefinitely on standard 110-240 VAC-50/60Hz power supply. For more details contact the PoCs.

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Requirement#: SOCOM-19-BAA-RIF-0010

Sponsor: Joint Special Operations Command (JSOC)

Title: Highly Efficient SWAP SDR Transceiver

Military System or Acquisition Customer: JSOC

Description: The US Government is seeking industry input on the feasibility and/or availability of a highly efficient Software Defined Radio (SDR) transceiver. The minimum desired requirements include support for up to 5W of transmit across all frequencies in the range of 960-4500MHz with a Spurious Free Dynamic Range (SFDR) of at least 60dBc. The Instantaneous Bandwidth (IBW) for transmit and receive shall be at least 60MHz. The receive path shall provide at least 16-bits of dynamic range. Furthermore, the transceiver shall support different waveform modulations including constant envelope and high Peak-to-Average-Power (PAPR) waveforms (e.g. LTE) that could have PAPR up to 12dB. All of this capability is supported with a total system power efficiency of 35% (meaning 5W RF output consumes no more than ~15W total power) when running a constant envelope waveform across the entire frequency range. Instantaneous power draw shall be less than 30W across the full frequency range when

transmitting at 5W. The transceiver should fit within a volume that is no more than 5.9 x 2.7 x .75 inches. The optimal transceiver would support a wider frequency range from 600-6000MHz and support IBW greater than 60MHz. This transceiver would be integrated with GOTS digital equipment for a fully integrated SDR solution that runs a multitude of waveforms. For more details contact the PoCs.

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U.S. Southern Command (USSOUTHCOM)

Requirement #: USSOUTHCOM-19-BAA-RIF-0001

Sponsor: SOUTHCOM/ J7/9-1

Title: Onboard Acoustic PED

Military System or Acquisition Customer: SOUTHCOM/JIATF-S

Description: United States Southern Command (SOUTHCOM) is responsible for the Detection & Monitoring (D&M) of illicit trafficking throughout the Caribbean, Western Atlantic and Eastern Pacific basins, encompassing millions of square nautical miles. As an Information, Surveillance and Reconnaissance (ISR) challenged theater, SOUTHCOM is expanding its use of, non-traditional platforms and sensors to provide Long Dwell, Long Duration (LD2) ISR. This includes unmanned surface and subsurface (USV/UUV) platforms using acoustic sensors.

As SOUTHCOM enterprise expands its use of USVs and UUVs with acoustic sensors, turning the acoustic data into target knowledge requires strong presence from the Acoustic Intelligence (ACINT) community. This is something SOUTHCOM is not likely to see due to limited resources and higher priority missions for that community.

SOUTHCOM needs automated, on-platform Processing Exploitation and Dissemination (PED) capabilities to generate categorizations/classifications of acoustic data of pertinent targets and the automated dissemination of the exploited data to the directly to the COP/CIP in a tactically actionable timeframe.

The qualified proposal will provide on-platform PED including categorizations/classifications of acoustic data as well as the automated dissemination. The proposal will involve working with existing platform and sensor vendors to ensure effective on-board processing and PED. The proposal should also include working with SOUTHCOM and Joint Interagency Task Force South (JIATF-S) to ensure proper formatting of the PED into existing COP/CIP in a tactically actionable timeframe.

Technical Point of Contact: Dr. Andrew Higier, (305) 437-1894, andrew.m.higier.ctr@mail.mil

Requirement #: USSOUTHCOM-19-BAA-RIF-0002

Sponsor: SOUTHCOM/ J7/9-1

Title: UAS Hosted Automated Maritime Target Detection (AMTD)

Military System or Acquisition Customer: SOUTHCOM

Description:

United States Southern Command (SOUTHCOM) is responsible for the Detection & Monitoring (D&M) of illicit trafficking throughout the Caribbean, Western Atlantic and Eastern Pacific basins, encompassing millions of square nautical miles. As an Intelligence, Surveillance, and Reconnaissance (ISR) challenged theater, SOUTHCOM is expanding its use of non-traditional platforms and sensors to provide Long Dwell, Long Duration (LD2) ISR of the AOR. This includes using LD2 Group 2/3 unmanned aerial system (UAS) platforms that carry visible and thermal still and full motion video (FMV) payload(s). The payload(s) shall have the ability to perform open ocean surveillance and

reconnaissance with the innate ability to automatically locate and closely inspect surface and semi-submersible vessel targets of interest (TOI) both day and night with minimal operator intervention. Extensively searching large areas of ocean for these TOIs using existing UAS camera systems is difficult for human operators due to the workload and repetitive nature of the task.

SOUTHCOM is interested in a UAS platform agnostic solution that provides both automated wide area search target detection and high resolution visible and thermal still and FMV giving operators the ability to closely inspect detected targets real-time to determine intent. The proposed solutions shall meet the following minimum requirements:

- The UAS mounted component of the solution should weigh less than 12 lbs.
- The UAS mounted component connects to a single mechanical and electrical interface.
- Search over 500 NM² of ocean in 12 hrs at 40 kts and automatically detect 20 ft objects in sea-states of at least 5.
- High resolution day/night imaging to discern objects 3 ft in size.
- Provide target position, bearing, and speed of detected objects.

Testing of the AMTD solution will be required to substantiate the performance to determine if the capability meets SOUTHCOM's requirements.

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U.S. Transportation Command (USTRANSCOM)

Requirement #: USTRANSCOM-19-BAA-RIF-0001

Sponsor: Headquarter (HQ) Air Mobility Command (AMC)/A4TI

Title: Decision Enabled Strategic Transportation Network Information Environment (DESTNIE)

Military System or Acquisition Program Customer: HQ AMC/A4

Description: Aerial Port processes for acceptance of surface cargo, building pallets, and loading and unloading air mobility and commercial charter aircraft have not changed the 1970s. A realization of smart information systems underutilization created an air transportation reactive business posture. Therefore, the Air Transportation Division of AMC is looking to develop a tool to correct ineffective business practices, through the development of DESTNIE. First, DESTNIE provides total asset visibility and a “sense and respond” cloud-based multi-modal line of communication fed by real-time multi-domain operation center priorities (sustainment and contingency). These features will ensure aerial porters are able to provide an agile response to adjustments during logistic planning and execution iterations. Second, DESTNIE acts as the “heart” producing the “pulse” for aerial port autonomy while the human retains the “brain”—the ability to provide reasoning. Ultimately, fusing artificial intelligence (AI), multi-reality (MR) and machine learning (ML) with human cognitive performance, aerial port capabilities will be enhanced via human-machine “flex” interrogation, interpretation and course of action analysis and proposal.

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Requirement #: USTRANSCOM-19-BAA-RIF-0002

Sponsor: Headquarter (HQ) Air Mobility Command (AMC)/A3DJ

Title: High Flow, Filtered Single Point Forward Area Refueling Point (FARP) Kit

Military System or Acquisition Customer: AMC Special Operations Low Level II (SOLL II) aircrews and special operations forces.

Description: An in-line water and sediment filtration system is needed to aid in the safe transfer of fuel from SOLL II C-17 aircraft into light Special Operations aircraft sensitive to fuel quality. A light-weight, fuel filtration kit is required. This kit should be able to be added to existing FARP equipment/hoses. The filter must be a man-portable filter to prevent the transfer of water and sediment from fuel coming out of Mobility Air Force (MAF) aircraft tanks.

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Requirement #: USTRANSCOM-19-BAA-RIF-0003

Sponsor: United States Transportation Command/Directorate of Command, Control Communications and Cyber Systems (TCJ6)

Title: Situational Awareness Tool for Cyber

Military System or Acquisition Customer: USTRANSCOM J6(TCJ6)

Description: USTRANSCOM requires a situational awareness tool presented in a visual format to depict the mission relevant terrain-cyber (MRT-C) for the Joint Deployment and Distribution Enterprise (JDDE). Tool to also track cyber events and hardening efforts within the MRT-C.

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Requirement #: USTRANSCOM-19-BAA-RIF-0004

Sponsor: Headquarter (HQ) Air Mobility Command (AMC)/A3DJ

Title: C-17 Additional Sleeping/Crewrest Provisions

Military System or Acquisition Customer: AMC Special Operations Low Level II (SOLL II) aircrews.

Description: Certain mission sets require C-17 aircrews to execute extremely long flight duty periods. When crew size exceeds the minimum for an augmented crew, no suitable crew rest provisions are available. This problem is exacerbated when the aircraft cargo compartment is utilized to its maximum extent to transport cargo and personnel. A temporary, stowable rest area should be designed above the cargo loading area for crew use on long-haul flights. Structures like hammocks or rest lofts in elevated areas with oxygen and restraint provisions could be designed to offer temporary "over-flow" rest areas for large crews executing extremely long mission sets. This would provide opportunities for improved in-flight crew rest for unique missions critical to national security. Conceptual examples include hammocks, mountaineering sleeping platforms, sleeping tubes, etc.

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Requirement #: USTRANSCOM-19-BAA-RIF-0005

Sponsor: Headquarter (HQ) Air Mobility Command (AMC)/A4RM

Title: Bench Stock Inventory Tracking

Military System or Acquisition Customer: United States Air Force (USAF) Logistics Readiness Squadrons and Maintenance Groups

Description: Bench stocks are small inventories of consumable/expendable spare parts, such as nuts and bolts, held in customer workshops. These spares and their on-hand quantities are not tracked nor visible in the USAF's retail supply system, the Integrated Logistics System-Supply (ILS-S), though these parts are a layer of inventory which could in theory be tapped to recover non-mission capable weapon systems. The USAF requires a capability/tool to track consumption, and on-hand quantities, of bench stock assets. This would enable real-time visibility of quantities, and allow automated replenishment orders.

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