

**UNCLASSIFIED****Joint Artificial Intelligence Center (JAIC)**

The Tradewind OTA Enterprise Office (operated by IN3), in conjunction with the Joint Artificial Intelligence Center (JAIC), provides the following opportunity:

**Aviation Enterprise Scheduling and Optimization Platform (AESOP)****Initial Submission Deadline: 08/09/2021 @ 0800 EST****I. SUMMARY**

The Tradewind OTA Enterprise Office (operated by IN3), in conjunction with the Joint Artificial Intelligence Center (JAIC) will host a competitive process to assess and acquire technical solution(s) to rapidly implement an AI/ML informed Advanced Learning Management System and tightly coupled Resource Scheduling System to optimize the flight training timelines for Naval Aviators. This program supports the requirements of the Chief of Naval Air Training (CNATRA).

**II. INTENT**

The JAIC seeks to enter into agreements (OTA) with industry partners whose solutions are favorably evaluated by subject matter experts. As such, this opportunity is considered competitive and solutions will be evaluated independently for technical merit.

**III. BACKGROUND AND CONTEXT**

The Naval Air Training Command (NATRACOM) is responsible for the flight training of student Naval Aviators and Naval Flight Officers. The mission of Naval Air Training Command (NATRACOM) is to train the world's finest combat quality aviation professionals, delivering them at the right time, right quantities, and right costs. To fulfill the mission of NATRACOM and support fleet readiness, optimal syllabus

management, flight event scheduling and resource management are critical to the expedient production of aviators, especially in the strike training pipeline.

#### **IV. PROBLEM DESCRIPTION**

An independent assessment of the Naval Aviator flight training process discovered sub-optimal flight event scheduling is a major barrier to expedient production of aviators at CNATRA. This issue results in unnecessary increases in student training time, which is a detriment to fleet readiness.

Current flight scheduling is designed around business case rules with a “linear flow” of students per scheduled event. This scheduling process is manual and is complicated by each student’s continually evolving training requirements and the natural fluctuations in asset availability. A more efficient approach is one in which an artificial intelligence enabled platform optimizes the student’s curriculum, instructor allocations, and resource scheduling. For example, when planning for upcoming training requirements, past student performance is utilized as a predictor of current student performance and subsequently predicts anticipated student progression and anticipated asset requirements for an entire training regimen. Additionally, when scheduling flight training events, an enhanced derived solution would consider multiple competing variables such as weather, maintenance, and instructor availability. Such a platform would be able to optimize scheduling based on multiple competing priorities and provide a more efficient and reliable scheduling approach.

#### **V. REQUIRED TECHNICAL CAPABILITIES**

Chief of Naval Air Training (CNATRA) has initiated a project entitled Aviation Enterprise Scheduling and Optimization Platform (AESOP), to seek a tool to automatically create flight schedules tailored to the specific needs of each student/squadron (e.g., airframe used, training phase) and to ingest and consider multiple fluctuating variables (e.g., weather, maintenance, aircraft/instructor availability) as part of the scheduling process. The tool should also:

- Seamlessly interface with the current training management system (T-SHARPS)
- Provide a learning management system and/or user interface system for instructors and students to monitor progress and view content
- Allow for human-in-the-loop inputs from squadron leadership to guide the AI’s focus onto specific issues (e.g., emphasize student production or IP requalification).

**Ultimately, the tool must demonstrate reductions in time to train for students, while simultaneously reducing administrative burden to the NATRACOM.** To support this objective, CNATRA is seeking submissions that address the following two Technology Capability Areas (TCAs), which are defined in detail in Appendix A:

- 1) Individual-and-Organization level Syllabus Scheduling Optimization and Event Forecasting
- 2) Availability and Readiness of Training Assets (Aircraft, Instructors, and Simulators)

#### **VI. PROGRAM CONDITIONS**

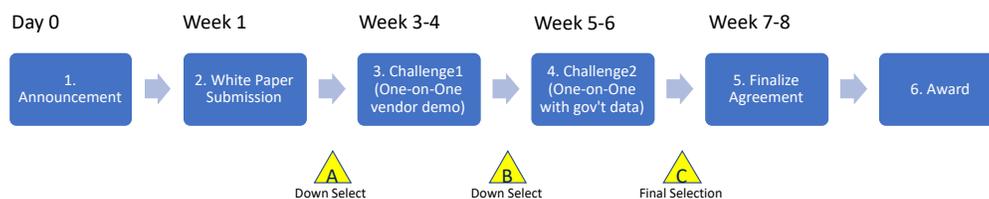
- Maturity Level - The Government seeks solutions with a maturity level that clearly demonstrate technical capability and allow assessment of viability, relevancy, and robustness for prototype

development. The goal is to develop a minimum viable product (MVP) 30 days after award, a limited implementation at 90 days, followed by an initial operating capability (IOC) at twelve (12) months.

- Teaming -The Government encourages vendors to team together to develop more robust solutions.
- Ethics Consideration -As the DoD embraces AI across a broad spectrum of use, it is committed to ensuring that all of the Department’s AI capabilities are designed, developed, acquired, and used in a responsible and ethical manner in accordance with the DoD’s AI Ethics Principles, and further described in the Department’s recently issued memorandum on implementing Responsible AI:  
<https://media.defense.gov/2021/May/27/2002730593/-1/-1/0/IMPLEMENTING-RESPONSIBLE-ARTIFICIAL-INTELLIGENCE-IN-THE-DEPARTMENT-OFDEFENSE.PDF>. An ethics compliance plan will be developed as part of this program.
- Testing and Evaluation - The Government expects progressive construction and testing of AI algorithms/automation applications. Prototype algorithms and automation applications will be subject to government-conducted Test and Evaluation to determine solution effectiveness.
- Intellectual Property – The government seeks solutions that prevent future vendor lock and is not interested in solutions requiring long term license fees. There are multiple arrangements that facilitate this situation.

## VII. COMPETITION PROCESS

The announcement serves as a competitive opportunity for interested parties to present solutions and be evaluated for participation in the next phase of competition. Not all entities participating in this opportunity will participate in future steps or obtain an agreement with the Government. It is possible that the Government may proceed to an agreement with a performer who provides an optimal solution at any point of this competition process.



The competition process utilizes the following steps:

- Announcement and Request for White Paper
- White Paper Submission (Appendix B)
  - White Paper are submitted through the Vulcan Technology Platform
  - Down Select and Notification to those who proceed to Challenge 1
- Challenge 1: Conduct One-on-One Vendor Demo (Appendix C)
  - Invitation only for standalone demonstration to allow the Government to assess the proposed solution’s ability to perform as stated in the submitted White Paper
  - Open and dynamic back-and-forth dialogue to engage in deeper technical discussions to gain additional insight to performance and efficacy of the proposed capability

- May engage in discussions regarding pricing (ROM) and potential terms and conditions of a prospective partnership
- Down Select and Notification to those who proceed to Challenge 2
- Challenge 2: One-on-One with government provided data (Appendix D)
  - Invitation only based on performance in Challenge 1
  - Conduct demonstration of capability using government data to allow a greater level of insight to the performance and efficacy of the proposed capability.
  - Engage in an open and dynamic back-and-forth dialogue to explore possible approach, design, and limits of the solution.
  - May engage in discussions regarding pricing (ROM) and potential terms and conditions of a prospective partnership
- Down Select and Finalize Agreement (may occur simultaneously)
  - Collect relevant information to support a final down-select decision
  - Final down select decision will likely follow a request for pricing to develop a prototype(s) that support the desired outcome and fulfill the TCAs
  - Invited vendors may collaboratively develop prototype project requirements with the Government teams for their specific projects and negotiate Terms and Conditions into their Agreements
- Contract Award: Subcontract with IN3 for prototype development

The selected performer will be evaluated on the technical merit of their proposed concept and its relevancy to the TCAs outlined in the announcement. All solutions result in government owned or government purpose IP rights. Additional Competition Process Guidelines are available in Appendix E.

Questions regarding this Announcement should be sent to:

Dr. William Kiser – [Tradewind004@in3indiana.com](mailto:Tradewind004@in3indiana.com)

## VIII. DISCLAIMERS

**Follow-On Production:** The potential for follow-on production for projects awarded from this announcement will be in accordance with 10.U.S.C. 2371b(f). Upon a determination that the competitively awarded prototype project(s) have been successfully completed, and subject to the availability of funds, the prototype project(s) may result in the award of a follow-on production contract or transaction without the use of competitive procedures. Prototype agreements may include multiple phases, to include follow on transaction and production efforts.

**Use of Contractor Support:** Non-Government advisors may be used in the evaluation of the submissions and proposals and will have signed Non-Disclosure Agreements (NDAs) with the Government. The Government understands that information provided in this Announcement is presented in confidence and may contain trade secret or commercial or financial information and agrees to protect such information from unauthorized disclosure to the maximum extent permitted and as required by law. A respondent's

participation in any part of the selection process under this announcement indicates concurrence with the aforementioned use of contractor support personnel.

- MITRE
- Koniag
- Tuknik Government Services
- Johns Hopkins University - Applied Physics Lab
- ERPi
- Redhorse
- Elder Research
- Cyberpoint
- Barbaricum

## **Appendix A:**

### **AESOP Technical Capabilities Area (TCA)**

The following Technology Capability Areas (TCA) are pursued as part of this announcement. The integration and utilization of each of the TCAs, can occur sequentially or in parallel. If implemented sequentially, they should follow the order outlined in this appendix. Due to the urgent need for the capabilities defined, optimal solutions are likely to be prototype implementations based on existing platforms or systems that are then customized and tested to meet the needs of this program. It is fully anticipated solutions to these TCAs will be supported with an existing Learning Management System (LMS) which is further customized to support the needs of CNATRA.

#### **TCA 1: Syllabus Scheduling Optimization and Event Forecasting**

Navy flight training is structured around a defined set of modules and exercises. In the case of Naval Aviators, one of these instructions is CNATRAINST 1542.163B, which can be downloaded at <https://www.cnatra.navy.mil/local/docs/mcg/1542.163.pdf>. This document defines the written and operational testing an aviator in training must successfully complete to progress to the next level. While this notionally follows a linear progression, it is not always practical to provide this sequentially, and elements of the training are rearranged depending on student performance and availability of resources. Additionally, it has been observed there are predictors of success that could allow certain aviators to bypass components of the training progression without any impact on future pilot performance. For instance, it may not be necessary for students with existing pilot licenses to receive training on navigation, since this has already been addressed as part of their private pilot training. Further, students with high scores in certain sections of the syllabus may show correlations that eliminate the need to complete all the sections. It is critical to identify these predictors and customize the training process for each aviator during their training regimens to ensure the required performance is maintained while optimizing flight schedules and accelerating the speed to the fleet. This can be accomplished by accelerating students with higher probability of success, as identified by their predictors and test scores.

In addition to the preceding requirement for automatically identifying students with the potential for proficiency based advancement, automatic schedule generation is also required. Training regimens are not currently automated, and schedules are developed manually by Navy personnel. As a minimum, this portion of the program will result in a learning management platform that identifies a customizable training plan for each student, provides a portal to efficiently ingest progress metrics, and a system that schedules aviator training.

In response the need to automate and add computer driven support for training scheduling, AI-based solutions are sought to increase student production, optimize training time, drive scheduling efficiencies, reduce schedule turnaround, and minimize number of labor hours required to generate a usable schedule. The Navy can provide >2,000 aviator records available covering approximately 10 years of training. This data will be made available as part of the solution development process.

During the initial award phase, the goal is the development of an MVP (minimum viable product) in 30 days, IOC (initial operating capability) at 6 months, and, based on successful development and acceptance,

a CONOPs for development of a FOC (fully operational capability) at 12 months that analyzes the syllabus, aviator success predictors and aviator performance to automatically arrange the training schedules of the classes and resources to most efficiently utilize resources and expedite aviator training.

**TCA 2: Availability and Readiness of Training Assets (Aircraft, Instructors, and Simulators)**

Once the ability to optimize students training schedules has been established, it is important to incorporate scheduling of all the resources affecting the overall timeline of student training. A resource scheduling and optimization tool is required to support the implementation of TCA 1, ingest new factors that effect scheduling, and incorporate them into the scheduling process. These independent variables are expected to evolve over time, and there is a minimum set of resources that must be addressed to support TCA2. In general, the primary constraints that impacts the overall optimization of the customized training plans are availability of assets including aircraft (including predicted availability, maintenance schedules and service life), instructors, air crews, and students. However, this variable set is anticipated to grow over time to include other factors like geographic location and anticipated weather. In addition to the obvious gains in efficiency generated through such a scheduling and planning system, the current lack of transparency in flight scheduling creation creates downstream costs to those and additional associated impacts to the NATRACOM. This system will allow broad based dissemination of training requirements and optimized schedules.

Over time, the optimization tool may be required to consider all the data sources below, combine them, then optimize them to identify who is qualified to provide the training, who is available, and other factors.

1. Weather
2. Aircraft Availability
3. Instructor/Student Availability (incl temporary detachments and snivs)
4. Seasonal Flying Hours
5. Aircraft Configuration
6. Syllabus Structure
7. Prerequisites (incl. sims and academics)
8. Turn Times
9. Crew Rest / Duty Days
10. Qualifications and Currencies
11. Bird-Aircraft Strike Hazard

## Appendix B

### White Paper Instructions

#### White Paper Content Format

- A. Cover Page (Is not part of page count)
- B. Executive Summary: A brief description of the proposed solution.
- C. Solution Description: Describe the unique aspects of your solution and/or technology as it relates to the problem statement.
- D. Value to the Government: It is the Company's responsibility to demonstrate why it is offering the best solution and what value-add this solution will bring to the Department of Defense. This is the respondent's chance to convince the Government as to why it should invest in a prototype. Respondents are reminded this is not a sales pitch and should stay on message to demonstrating why the proposed solution will address the problem statement. As an example, the Company may take a deeper dive how the solution would be used by an operational user, what processes will be used for the agile development of this item and/or what benefits the solution would provide.

#### Additional Guidelines

- A. Written in clear, concise, layman style statements. With the following formatting:
  - No less than 12 font size (Times New Roman)
  - No more than 10 pages (cover page and Performer profile information not included)
  - No less than 1 inch margins (top, bottom, left, right)
  - Number all pages
- B. Include Performer Profile Information with the following background information.
  - Name of Company, Company Address, Company URL, Company POC (name, email, phone)
  - CAGE and DUNS
  - Where is your organization based? (Core base of operations)
  - Does your Company identify as: Large/Small Business or not a commercial endeavor
  - Does your Company identify as: traditional or non-traditional contractor
- C. All submissions uploaded to Vulcan must adhere to the following naming convention.

#### **TW-21-000X\_Vendor Name\_Document Title\***

\*Document Title should specify whether the file is the vendor profile information, white paper, or other. For White paper, product name should also be provided as follows:

#### **TW-21-000X\_Vendor Name\_White\_Paper\_Product Name**

The white paper submitted for this announcement should fully explain your concept. Additional guidance and instructions will be provided to those who are selected to advance to the follow up Challenges (One-on-One discussion).

- D. The government will use a set of evaluation criteria to help guide their assessment of White Paper submissions and any follow-on Challenges (invitation only). The basic criteria for the White Paper are as follows:
- Technical merit of the proposed concept (i.e., the feasibility of the proposed solution).
  - Relevancy of the proposed concept/technology/solution to the TCA
  - Ability of Vendor to Deliver Proposed Solution
  - Agility and maturity of the development process
  - Ability to address IP in a manner that prevents vendor lock

Key points of interest for the White Paper and Challenges are the proposed solution's ability to address the following critical success factors:

- Reduced time-to-train for student aviators
- Reduced time-to-operate for staff schedulers
- User-in-the-loop design for transparency of operations and input of command-directed priorities (e.g., student production, instructor requalification)
- Integration of multiple relevant variables
- Interface with existing training management system
- Inclusion of both a staff-facing and a student-facing learning management system for progress and forecasting
- Reduced time required to publish a daily flight schedule vs manual development
- Improved correlation between daily flight schedule in progress (constantly changing due to weather, flight failure, maintenance, etc) and development of next day's schedule
- Reduced number of errors vs manual schedule development

### **Appendix C**

#### **Challenge 1: One-on-One Vendor Demo**

The date, time and location of the one-on-one sessions will be provided to those vendors selected to proceed to the one-on-one discussions. The criteria for One-on-One Discussions (listed below) is tentative and at this time is what the Government anticipates it will use in the next phase. However, the Government reserves the right to update these criteria based on information gained from industry and other sources. Final criteria will be provided with the request for One-on-One Discussions based on the evaluation of the White Papers.

- Technical merit of the proposed concept (i.e., the feasibility of the proposed solution).
- Relevancy of the proposed concept/technology/solution to the TCA
- Ability of Vendor to Deliver Proposed Solution
- Ability of the vendor to thoroughly describe their approach and development process.
- Cost and schedule for proposed solution

Further instructions will be provided with invitations upon selection to Challenge 1.

## Appendix D

### Challenge 2: One-on-One with Government Provided Data

The Government intends to conduct One-on-One Discussions with selected vendors being favorably considered after the initial One-on-One (Challenge 1) discussion and demonstration. Vendors who are selected to proceed to Challenge 2 and participate in a follow-on One-on-One discussion will be presented with government data to allow a greater level of insight to the performance and efficacy of the proposed capability. Challenge 2 is intended to provoke an open and dynamic back-and-forth dialogue to explore possible approach, design, and limits of the solution.

The Government expects the vendor to consider the feedback and discussions from Challenge 1 to refine the approach as appropriate. The Government is not seeking a fully developed solution but is focused on understanding the proposed capability to a greater degree of fidelity through the use of government data. The Government encourages invitees to focus on what innovative approach the proposed solution brings that shall be highlighted and considered by the Government. The vendors will be given the opportunity to fully describe with the use of white boards, their approach complete with detailed diagrams and flow charts, describe the process for the agile development of the product, and discuss the composition of the team responsible for the delivery of the final product. The vendors will also answer questions from the evaluation team on any aspect of their proposed design approach.

The Government may engage in discussions regarding pricing, Intellectual Property, and scalability of the solution. Selected vendors are advised to prepare a rough order of magnitude (ROM) of cost for the solution. These discussions are not meant to reflect binding agreements, but to provide additional information around a potential partnership with the vendor.

Additional details including detailed instructions related to logistics and other relevant assessment information for this event will be provided upon notification of selection to participate in Challenge 2. The date, time and location of the one-on-one sessions will be provided to those vendors selected to proceed to the one-on-one discussions.

## Appendix E

### Competition Process Guidelines

- The Government will be using the Vulcan Technology Platform to collect, receive, share, and assess white papers. Respondents interested in responding to this announcement will need to register to obtain access to Vulcan at the following website: [www.Vulcan-SOF.com](http://www.Vulcan-SOF.com)
- The following is the direct link to this announcement in Vulcan: [Vulcan | Collection \(vulcan-sof.com\)](http://Vulcan | Collection (vulcan-sof.com))
- Immediate registration on the VULCAN Portal is highly recommended. For support on technical issues, contact [contact@Vulcan-sof.com](mailto:contact@Vulcan-sof.com)
- Section 2371b requires competitive procedures be used to the maximum extent practical. This Announcement serves as a competitive opportunity for interested parties to present solutions and be evaluated for potential selection of a prototype project and is considered to satisfy the reasonable effort to obtain competition in accordance with 10 USC 2371b (b)(2).
- The Government will not reimburse interested respondents for costs of preparation of submissions, pricing information, or any other activity during the competitive selection process.
- Participation in part of the selection process (any or all Phases identified in this Announcement) are at the respondent's expense.
- Unnecessarily elaborate brochures or marketing materials are not desired.
- Use of a diagram(s) or figure(s) to depict the essence of the proposed solution is encouraged.
- All information in submissions must be unclassified and non-proprietary. Submission of a white paper under this Announcement indicates confirmation that the submission provided is unclassified and does not contain proprietary information.
- The period of performance for any white paper or proposal submitted under this Announcement should be no greater than 15 months.
- Submitted materials may be considered by the Government for a prototype award up to one (1) year after submission for same or similar requirements.