I. **BACKGROUND:**

This document provides additional amplifying information to the FY 18 NPS RFI (FEDBIXOPS Solicitation #: RFI-JIFX_FY18_Request_For_Information). This addendum is specific to experimentation involving larger unmanned air systems. The original RFI remains valid, and researchers are encouraged to submit experiment proposals addressing any element of the original RFI.

The Naval Postgraduate School Field Experimentation project is seeking to better understand the emerging capabilities of larger (group 2, group 3) tactical unmanned air systems (TUAS) that have potential to meet a variety of DoD and government needs. specifically for Experimentation Cycle 18-3 (4-9 June, 2018). More information about the field experimentation program, and directions for submitting an experiment proposal can be found at nps.edu/fx. Participants are not required to have a fully operational system at the 18-3 event, experiment proposals for partial systems, and individual components are solicited as well.

II. **OPERATIONAL CONTEXT:**

TUAS systems are employed in austere environments and provide multi-disciplined persistent ISR of commodities of interest; i.e., Persons of Interest (POI), Weapons of Mass Destruction (WMD), infrastructure, etc, and organically support SOF Direct Action Operations. Additionally, UAS provide real-time situational awareness to operational and Command and Control (C2) elements during mission execution. UAS are particularly relevant to Major Combat Operations (MCO), Direct Action (DA), Special Reconnaissance (SR), Counter-Insurgency (COIN), Security Force Assistance (SFA), Humanitarian operations (HA), Search and Rescue and Foreign Internal Defense (FID).

A notional, fully fielded TUAS would likely include many of these characteristics:

- **Expeditionary**. TUAS systems will be highly portable, will have a minimal footprint, and be able to be deployed in a timely manner. Expeditionary systems will be capable of operations on both land and in maritime environments, including operations conducted from ships or combatant craft. The system will be capable of being employed in austere locations or semi-permissive environments without the need for robust logistical support.

- **Tactical and Operational Mobility**. The entire system will be transportable by rotary wing aircraft (MH-60 objective and CH 53) and will be employable from organic Naval waterborne craft (Combat Craft Medium (CCM)) and/or civilian vessels, without significant craft modifications or an increase in vessel signature (walk-on / walk-off). A generic system is defined as follows: Up to 10 Air Vehicles (AV); four Ground Control Station (GCS), and two Mobile GCS (MGCS) with associated data links, launch & recovery equipment (LRE); modular payloads (consisting of Full Motion Video (FMV) and/or Signals Intelligence (SIGINT); UHF/VHF Communication relay; Laser designation; other INTs) and a pack up kit (PUK) with system spares.

- **Processing, Exploitation and Dissemination (PED)**. Phase I PED will occur on-site. The sensor/payload operator or Intelligence Specialist (IS) will provide the immediate tactical exploitation of collected data in order to provide situational awareness, targeting information, and actionable intelligence to the tactical Commander via voice over data link communications (UHF/VHF LOS communications), and through tactical messaging, chat, or other networked solution. Encrypted beyond Line of Sight (BLOS) communication is the ultimate desired capability of interest.

- **Maintenance**. System should be modular in nature, have a common / open architecture (i.e. Ethernet based connections) and limited to no proprietary components. All maintenance should be simplified and minimized. Pre-flight and post-flight checks should be expeditious in nature so the system can be easily and quickly employed from transport. All required maintenance tools must fit in a single man portable case with specialty tools minimized.

III. **FX 18-3 OBJECTIVES**:

- Experiment with TUAS systems currently in development (i.e. TRL 5-7)

- Inform the development community of emerging government needs for future TUAS development.

- Define system based on footprint vs platform size. Seeking systems that are truly expeditionary.

- Collect feedback / recommendations from industry regarding UAS improvement strategy to develop systems to TRL 9.

- Collect feedback / recommendations from industry on how best to define payload bay and standardize interface in order to facilitate payload/sensor modularity and stream line future payload/sensor integration efforts.

- Collect information regarding estimated footprint of entire systems by weight, cube, and number of pallets required to transport TUAS system. Pallet dimensions are 104” x 88” (actual pallet is 108” x 88”, 104” X 84” is usable space). 10K lbs. is pallet maximum load.

V. **CAPABILITIES OF INTEREST (COI):**

FX 18-3 overall intent is to develop information about the near-term potential for industry to meet a variety of capabilities and needs. Industry is encouraged to submit the application to participate in FX 18-3 with systems or components that have the capacity to meet any following:

COI	Attribute
Payload / Sensor Capability	Air Vehicle shall be capable of carrying and operationally utilizing inflight modifiable multi-INT sensor payloads at mission altitude. **5lbs payload capacity or better** Potential Payloads:

	Imagery. High Definition (HD) Electro Optic, HD IR, and HD low-light TV with laser Target Marker. Medium Wave IR, Short Wave IR. **Sensor**. Other sensors that exploit data across the entire electromagnetic spectrum (gamma rays, x-rays, ultra-violet, visible, infrared, microwave, radio wave) in the maritime domain. Capability to conduct the following: GEOINT, SIGINT, MASINT, RADINT, other INTs)
Air Vehicle Endurance	8 hours or greater with **mission payload** at sea level, at standard day conditions, at cruising speed, at optimal operational altitude up to 8,000 feet Above Ground Level (AGL)
Launch and Recovery	1. Runway independent launch and recovery at maximum payload and full fuel load. 2. Launch and recovery from a single Combatant Craft Medium without any additional launch or recovery equipment.
Modular / Interchangeable Payloads	Payloads/Sensors shall meet aircraft space, weight, and power (SWaP) limits and shall be capable of being swapped and shall be designed to permit system maintainers to rapidly exchange one type of payload for another. Payload input, output, power connections, and mechanical mounting shall be common / standard from one payload to another. Trained Technicians must be capable of changing payloads without altering airframe or power supply.
Operating Conditions – Density Altitude	At maximum gross weight, capable of launch and recovery in ambient temperatures of -20F to 120F at a density altitude of 4500 ft or greater.
Fuel	Aircraft propulsion system shall operate on DoD/NATO standard Heavy Fuel (JP5, JP8), or their equivalents. A low fuel indicator light is desired. Fuel dump capability would be an objective.
Navigational Accuracy	Navigational accuracy and anti-jam properties shall be equivalent to that provided by M-Code GPS. System should be capable of autonomous takeoff and landing.
Environmental Protection	Survive exposure to rain, salt spray, fog, sand, and dust
Open Architecture	Open Architecture; STANAG 4586 compliant
C2 / Data Communications Link Encryption	TUAS shall be capable of providing two-way real-time National Security Administration (NSA) certified encrypted communications between GCS, aircraft, payloads and payload control equipment within 100km line of sight (LOS) telemetry range
Payload Power	System should provide continuous power of, at a minimum, 150 watts. A minimum of half of power should be available to power payloads.
Tactical GCS (TGCS)	One man lift, (e.g. no more than 50 lb. per container). Containers should be designed to be handled by an individual capable of lifting the contents of the container not to exceed 50 lbs. total weight, with the capability to mount to vehicle using existing mounts and space inside vehicle and organic connectors to power the system equipment. No vehicle mods should be required to have the mobile system affixed to the vehicle or craft. System should be suited for rapid install and removal, not to exceed 30 minutes for both events. System should have proper shielding not to interfere with vehicle/craft C4I systems. No primary system interface is required for operation once installed. Mobile GCS should permit level IV (full flight) control with at least 20 km range.
Operating True Air Speeds	Loiter speed of less than or equal to 50 Knots True Airspeed (KTA).

Ground Control Station	System shall have an embedded Automated Training Device (ATD) and facilitate realistic training without the need to fly the air vehicle. The embedded ATD capability is required to mirror fit, form, and function and shall emulate all aircraft procedures, in-flight emergencies, and flight characteristics. The GCS shall provide the operator the capability to control one aircraft within line-of-site range and antenna coverage. GCS should be capable of controlling multiple aircraft.
Service Ceiling	At least 18,000 ft. Mean Sea level (MSL)