28 July 2025

SPECIAL OPERATIONS FORCES ACQUISITION, TECHNOLOGY, AND LOGISTICS
DIRECTORATE OF SCIENCE AND TECHNOLOGY (SOF AT&L-ST)

BROAD AGENCY ANNOUNCEMENT
USSOCOM-BAAST-2020, Amendment 7
FOR
TECHNOLOGY DEVELOPMENT AND ADVANCED TECHNOLOGY DEVELOPMENT

1.0 Introduction:

United States Special Operations Command (USSOCOM), Special Operations Forces Acquisition, Technology, and Logistics (SOF AT&L), Directorate of Science and Technology (S&T), transformed the BAA infrastructure to better align with the USSOCOM Commander's strategic priorities and vision. As such, the S&T Directorate will continue to evolve its investment strategy by focusing on SOF modernization. These will include broader disruptive technology[1] that meet the demands of the strategic vision and Future Operating Environment (FOE). USSOCOM will continue making some investments in Special Operations Forces (SOF) enhancements in the programs of record.

2.0 General:

2.1 Agency: United States Special Operations Command (USSOCOM)
2.2 Program Office: Science and Technology Directorate (SOF AT&L-ST)
2.3 BAA Number: USSOCOM-BAAST-2020
2.4 BAA Title: SOF AT&L-ST
2.5 Points of Contact (POCs):
Contracting Officer: baast20@socom.mil
Attention: Jerryl McCoy
Technical POC: baast20@socom.mil
Attention: BAAST Team

3.0 Closing Date: Unless amended, this opportunity will remain as an open-ended announcement from the date of posting through 31 December 2030. Quad Charts and White Papers may be submitted at any time during this 5-year period subject to the submission process described in paragraph 5.7 of this BAA. USSOCOM, SOF AT&L-ST reserves the right to review submissions (White Papers/Quad Charts) at any point throughout this open-ended Broad Agency Announcement.

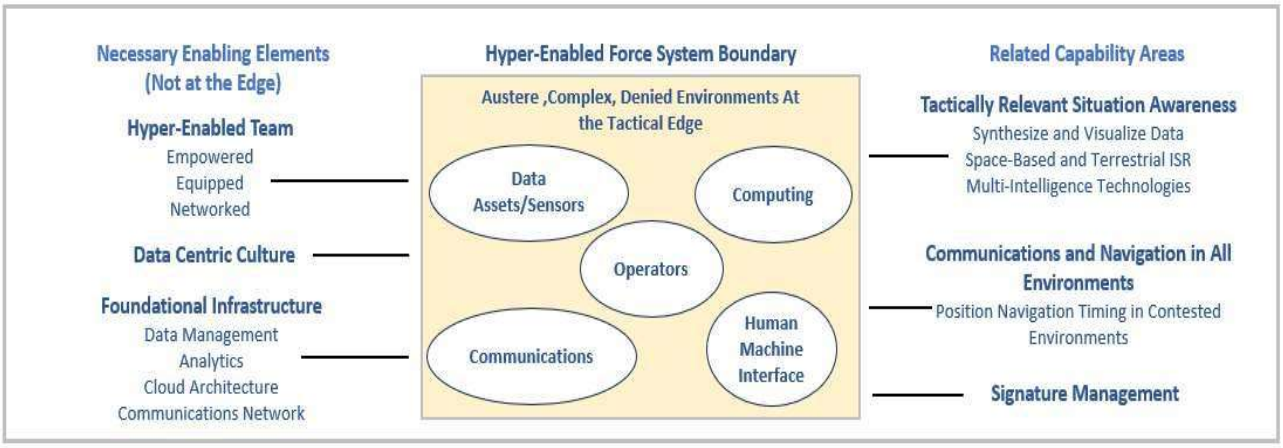
The Government may amend or update the technical capability areas and request a separate call for Quad Charts and White Papers at any time during the active period for this announcement.

[1] Advanced technologies tend to be significant "game improvers," disruptive technologies tend to be "game changers".

4.0 Technology Areas of Interest:

SOF operates across the continuum of crisis and conflict, spanning all domains, including space and cyber. It will be at the forefront of U.S. efforts to confront emerging realities where opponents may possess overmatching capabilities. The new "normal" for SOF will be to operate in communication contested environments, under threat of targeting by high-end military capabilities, including Weapons of Mass Destruction, where ubiquitous surveillance is routine, and information is weaponized. The FOE is a world of "Convergence": the point where the gap between non-state and state actor capabilities diminishes and the threat to force and mission success increases significantly. Core SOF missions such as Unconventional/Irregular Warfare, Military Information Support Operations, Direct Action, Counterterrorism, Security Force Assistance, Counter Proliferation of Weapons of Mass Destruction, and more are expected to remain key to SOF operations; however, the operational environment in which these missions will be executed is changing in accordance with global themes and trends. SOF missions will not significantly change, but how they are executed and the environment in which they are conducted is, and will continue, to evolve. SOF will be empowered by technologies that enable Tactics, Techniques and Procedures to build and retain access and placement, as well as enable partner force capabilities.

To permit SOF success in such a complex and dynamic environment, S&T seeks to gain information advantage to hyper-enable the force across all mission sets. The Hyper-Enabled Force is SOF empowered by technologies and information systems that accelerate tactical decision making by increasing situational awareness, reducing cognitive workload, and simplifying mission-appropriate information sharing. No single technology will independently make Operators hyper-enabled. Instead, Operators will become hyper-enabled through the integration of information and technologies. More specifically, the Hyper-Enabled Force will have technologies that permit the persistent, near real-time collection of data; the rapid, automated distillation of that data into mission relevant information; the dissemination of that information to the personnel who require or can best use it; the presentation of that information in easily understandable formats and user-friendly modalities; the ability to use that information to select, direct, and implement tailorable, non-lethal and lethal effects to best meet mission objectives; all the while maintaining freedom of movement and tactical invisibility. Thus, S&T seeks Quad Charts and White Papers in the areas of Battlespace Awareness, Multi-Domain Communications & Computing, Human Interface, Scalable Precision Effects, and Emplacement and Access to build the Hyper-Enabled Force (see diagram below for a depiction of the Hyper-Enabled Force concept.



USSOCOM is interested in receiving Quad Charts and White Papers from all responsible sources (reference FAR 9.1) from industry, academia, individuals, Federally Funded Research and Development Centers, National Laboratories, and Government laboratories capable of pursuing, developing, and evolving disruptive capabilities that must be made available to the SOF Operator within the next five to seven years to achieve mission success in the FOE.

USSOCOM employs capabilities in all domains: terrestrial, maritime, air, space, human and cyber. SOF personnel place a premium on technologies that are small, lightweight, rugged, modular, multi-use, easy to use, have low power consumption, require minimum maintenance, open architectures, and designed for operation in extreme environments at the edge of operations. Technology designs should consider comprehensive signature management approaches enabling low visibility and clandestine capabilities.

This BAA will sub-divide each technology capability area into two parts (disruptive technologies and SOF enhancements). The request for disruptive technologies is focused on peer/near-peer adversary technologies, new technologies that displace existing technology, and modernization of the SOF capabilities in all domains. These topics are contained within Sections 4.1 thru 4.5. Secondly, this BAA includes a request for technology insertion and SOF enhancements (also referred to as incremental improvements) aimed at supporting the SOF AT&L Program Executive Offices (PEOs) with advanced technology that addresses areas within their programs of record. These SOF enhancements are found in each technology focus area Section 4.1 thru 4.5. SOF enhancement technologies will be identified during initial proposal screening and subsequently evaluated separately by the requisite PEO and program office.

4.1 Battlespace Awareness Capability Area: USSOCOM S&T's Battlespace Awareness capability area is focused on automated and persistent near- real-time data/information collection, processing, exploitation, and dissemination solutions, systems, and capabilities to include up and down cross-domain and multi-domain functionality enabling predictive analysis to augment SOF Operators and analysts. Focus is on increasing and enhancing SOF's ability to manage and understand threats and the environment, process multiple data and communications inputs for optimized decision-

making, across SOF activities and missions to support rapid, on-the-move ability to learn and communicate knowledge across a mission stakeholder team to search, locate and process High Value Targets. Sought solutions will be required to integrate, interoperate, and communicate with other systems using open source and/or standardize interfaces and solutions to provide capabilities across domains, spectra, and decision-making echelons from the tactical edge to senior Commanders and inform national and strategic systems.

SOF are interested in technologies that measure the physical characteristics of a given field of view, day, and night, and in all weather conditions. Mission elements to be enhanced include advanced situational awareness, mission/operations, terrain mapping (including subterranean/undersea/urban/interior}, change detection, and event forensics, to include advanced facial recognition, advanced language translation, and locating objects under vegetation.

4.1.1 Battlespace Awareness Disruptive Technology Areas Include:

4.1.1.1 Collaborative Autonomy: SOF is interested in improving Battlespace Awareness by leveraging Autonomous or Remote-controlled Systems (ARCS} that share data in real time, allowing them to work together with minimal intervention ("collaborative autonomy"). Battlespace data collected by individual ARCS elements and collaboratively shared through data transport services should inform ARCS automated tasking, positioning, and execution activities to meet overall SOF mission intent. Data collection systems integrated with ARCS, without degradation of ARCS range and endurance, and able to seamlessly operate with crewed systems while reducing operator burden, reliance on full-time high-speed communications link, and decision loop cycle time are especially of interest to SOF. Data collection systems must include modular and open system (MOSA} software and modular (internal/external payload} hardware designs allowing quick install/removal options for multi-mission use. Component sourcing established supply chain and software code sources will comply with U.S. acquisition laws and not come from or be tied to prohibited nations or groups. Documentation on component sourcing, established supply chain and software code sources is of special interest to SOF.

4.1.1.2 Autonomy-Enabled ISR/Battlefield Situational Awareness (SA) Data Collection: SOF is interested in collecting audio, visual (day & night), and radio frequency data across all domains, from seabed to earth orbit. Data collection systems on small autonomous & remote-controlled vehicles (air, ground, sea-surface, undersea, space) and unattended placed systems are of interest. Data Collection capabilities from outside of contested and denied areas are also especially interesting to SOF. These data collection systems must have secure data-at-rest protections and connect to secure data transport services with data in transit protections such as zero-trust communications links to increase automated detection, identification, and localization capabilities to support multi-domain situational awareness. These

networking solution searches must explore the entire electromagnetic spectrum to identify and localize communication capabilities, which are difficult to defeat.

- SOF is also interested in data collection systems able to securely edge process, disseminate, and query information in operating environments unfavorable to the utilization of traditional networks and computer servers given bandwidth for information, backhaul to computational centers and infrastructures is not regularly available to small teams.
- SOF desires computing hardware and software applications for multi-domain crewed and uncrewed systems, large and small, optimized for computing at the edge to support the organization and fusion of data collected from multiple intelligence disciplines to recognize patterns and anomalies from various sensor types.
- Furthermore, SOF desires data collection systems enabling augmented reality (AR) capabilities to provide warfighters with visual cues to identify and discern targets, foes, and friendly forces.
- Documentation on component sourcing, supply chains and software code sources are of special interest to SOF.
- SOF is interested in Low cost (<l0K), one time use RF sensor that support localization of potential targets that would be integrated on UxS and leave behind systems.
- SOF has an interest in A-ISR capabilities to support data collection that include improved communications redundancies, reduced signatures, self-protection, long-range imagery (Video/Still) GPS independence, cost efficiency, payload flexibility, and the ability to interact and deploy sub-platforms through human-machine teaming.
- SOF has an interest in advanced technologies for data collection to include: open-IP cameras, horizontal motion imagery (HMI), room audio/video feeds, source-enabled RF collection systems, crowdsourcing data, and managed attribution systems.

4.1.1.3 Autonomy-Enabled ISR/Battlefield Situational Awareness (SA) Data TRANSPORT:

SOF has an interest to improve its ability to transport large volumes of data with 1) high bandwidth, 2) low latency, 3) reliable data integrity, 4) robust storage capabilities, and 5) specialized hardware Graphics Processing Units (GPU) to handle the heavy computational demands of processing large image and video datasets-along with compatible software frameworks for data manipulation, and model training. Data infrastructure must be scalable to meet operational demands. Data transport must operate reliably in congested or contested environments, minimizing probability of detection or compromise. Modernized data transport must rely on data-driven automation to determine the best path of data transportation, while simultaneously providing automated tools for planning, orchestration, agile maneuver, and Command and Control (C2). Ultimately, future data transport systems must be redundant, automated, autonomous, survivable, and reliable-facilitating machine-

to-machine data exchanges.

4.1.1.4 Autonomy-Enabled Data Processing & Exploiting: SOF is interested in processing and exploiting audio, day & night visual, and radio frequency data received from the data collection systems described previously in paragraph 4.1.1.2. Processing & exploitation systems providing predictive analytics, utilization of AI/ML models, proprietary algorithms, edge processing, data fusion, human/machine teaming, cross domain tools, and response recommendations based on real-time data updates are especially interesting to SOF. Processing and exploitation systems must provide battlespace geographic orientation and use easily understood language and audio/visual symbology to include common military graphics/symbology. These processing and exploitation systems should use standard software interfaces allowing the cybersecurity testing necessary for integration onto SOF Information networks and must be able to connect to secure data transport services. Data storage and management techniques enhancing the predictive reliability, speed, and maintenance of processing and exploiting systems are also interesting to SOF in a dynamic Electromagnetic battlespace.

- Autonomy-Enabled Data Processing, Exploiting and Dissemination - SOF has an interest in increased PED capability to: detect, collect, locate, analyze, and exchange data and information in land, air, space, sea, cyberspace, and the information environment, in real-time, near real-time, and or post mission. Technologies that advance an overarching architecture and associated infrastructure capable of employing edge processing, data fusion, data storage, data retrieval, and cross domain/discipline analytic tools that utilizes Human-Machine Teaming, AI/ML/CV algorithms.
- SOF is interested in technology to automate and provide initial triage of feeds from various sensor types:
    - Activity Based Intelligence: SOF is interested in capabilities to improve the intelligence value of time sensitive GEOINT PED activities/products that forensically analyzes data in a spatial and temporal context. Interest in technology with the ability to apply AI/CV to both live and historical imagery via automated imagery analysis with object detection.
    - Interest in Advanced Analytics in support of data collection from captured enemy materials (CEM) includes but is not limited to:
        - A modular suite of CEM processing and visualization system that leverages complex data processes in order to allow an analyst to better understand the contents of large volumes of CEM holdings; machine-learning and deep neutral networks.
        - "Bring your own data" model
        - Allows multiple analysts interacting with data from different workstations, with no degradation to capability/capacity

4.1.1.5 Advanced Autonomy and Artificial Intelligence: SOF is interested in the modular, open integration of cutting-edge solutions incorporating artificial intelligence and machine

learning to enable enhanced autonomy in unmanned systems. Specific areas of interest include but are not limited to agentic AI and vision language action (VLA) models to achieve more sophisticated autonomous behaviors like adaptive learning; neural radiance fields (NeRFs) for 3D scene representation and navigation; generative AI for simulation and data augmentation; advanced automatic target recognition (ATR) algorithms with edge node refinement and autonomous model retraining; advanced machine learning operations (MLOPs) to support data management, model training, validation, and monitoring. Solutions should be designed with well-defined interfaces and adherence to open standards to promote interoperability and integration into existing architectures.

4.1.1.6 Modular Maritime Domain Awareness System for SOF Littoral Operations:
This area covers modular, scalable maritime domain awareness (MDA) solutions to support SOF operations in contested littoral, coastal, and riverine environments where traditional naval ISR assets are unavailable or inadequate. These solutions should enable real-time fusion of data from organic and external sensors (e.g. AIS, nanosatellite imagery, HF radar, passive RF, and tactical SIGINT) and deliver unclassified local and global outputs to support time-sensitive operational decisions at the edge. Interoperability with TAK and ability to function in salt-spray, high-EMI, or high-humidity conditions are key considerations.

- By decentralizing access to maritime situational awareness, this capability would allow SOF teams to independently assess vessel traffic, surface and sub-surface anomalies, and movement patterns for mission planning, insertion/exfiltration, and threat avoidance. A fused, common operating picture will significantly reduce reliance on national assets, enable clandestine maneuvering, and improve survivability during coastal operations in disconnected or denied environments.

4.1.2 Battlespace Awareness SOF Enhancement Technology Areas Include:

4.1.2.1 Sensors: This area covers various multi-domain persistent surveillance systems and sub- systems including but not limited to Reconnaissance, Surveillance, Target Acquisition (RSTA) systems, indication & warning systems, and unattended sensors. Interconnected and interoperable technologies that provide advanced capabilities, reduce Size, Weight, and Power (SWaP), increase flexibility in space, aerial, ground, underground, and maritime/riparian environments are of particular interest. Sensor systems should integrate with existing multi-domain SOF systems based on open architectures. Additional interest areas include but are not limited to:

- Alert, highlight, communicate, and process at the tactical edge.
- Accommodate multiple wavelengths in small COTS applications (still imagery focus)
- Swappable/modular capabilities across all domains
- Algorithms for fusing data from sensors, data sources, networks, to reduce false positives.
- Algorithms for location, classification, characterization, and identification of items of interest
- Detection via handheld and/or hands-free (cell phone size) electronic scan of small

devices, such as sim cards, SD cards, or similar items on a person
- Detection of Directed Energy (Laser, HPM, sonic, other) for all contexts
- Utilizing Light Detection and Ranging (LIDAR) and Laser Detection and Ranging (LADAR) technology systems capable of significant resolution at high altitude or orbit while simultaneously providing real-time processing capability fused into mapping and video.
- Detection of optical glass at ranges beyond 3 Km in a ruggedized, low SWaP form factor.
- Digitally relay basic target positional information upon target detection (IOC) track quality 8 or better (FOC).
- Detection of fiber-optic or fully autonomous UxS and other threats that cannot be detected through RF signatures; low SWaP-C solution
- Man-portable discrete intrusion detection systems
- Technologies and techniques for collecting and analyzing signals from sensor-agnostic platforms - aerial, ground-based, man-packed, and maritime.

4.1.2.2 Quantum Sensing: SOF is tracking the transformational opportunities that quantum technology presents to military applications and national security. SOF is actively monitoring advancements and investing in research and developments to ensure readiness and maintain a technological advantage.

- Quantum Sensing is considered the most mature application, quantum sensing utilizes quantum principles within sensor technology. It offers potential for enhanced capabilities in positioning, navigation, and timing - particularly in GPS-denied environments. Emerging applications also include improved intelligence, surveillance, and reconnaissance (ISR), with potential impacts on submarine detection and the ability to detect underground structures or concealed forces.

4.1.2.3 Signals intelligence (SIGINT}: These areas concentrate on broad spectrum communications intercept and location. Technologies of interest should provide or improve the capability to Detect, Intercept and Locate Signals of Interest (SOI) of all types at frequencies ranging from Low Frequency (LF) and below to HF to EHF are of particular interest. Platforms and operational environments can be on air, land, sea, or space, manned or unmanned. Small form-factor, Low SWAP designs, are desired for applications ranging from aerial platforms to man-portable systems. Technologies of interest:

- Detect:
    - Improved reception sensitivity
    - Small multiband antennas and antenna arrays for detection of RF SOIs at enhanced standoff ranges.
    - Detection of SOI while maintaining signature management.
    - Improved filtering to reject out of band emitters.
    - Tools to analyze unknown signals, to include modulation recognition, signal identification and specific emitter identification

in an Electromagnetic environment.

- Detection of electronic devices in a room, vehicle, etc. using a handheld device Intercept:
  - Improved analytical tools that automate steps in the SIGINT workflow.
  - Advanced signal recording, bandwidth, and capacity
  - Multi-function, small form factor sensors capable of concurrently detecting, intercepting, and localizing multiple SOIs on one sensor.
  - Capabilities and technologies focused on emerging commercial wireless standards.
  - Low cost, small form factor RF sensors capable of hosting automatic targeting recognition techniques.

- Locate to TQ8 (to a specified standard):
  - Improved Direction-Finding (DF) accuracy and ability to separate emitters in a cochannel environment and DF arrays mounted in inconspicuous locations.
  - Ability to collect and locate Frequency Agile (FA) SOIs and emerging communication technologies.
  - Geolocation in GPS-denied environments
  - Provide Geolocation data to the user via the Android Tactical Assault Kit (ATAK) Common Operational Picture
  - When networked, provide Geolocation data to MCS-COP.
  - Survey
    - 5G, 6G Microwave, WIFI
  - Exploitation
    - Geolocation: 5G, 6G, Tactical Data Links, Radar- LPP/HDC, LPI, LPD, OTH, ELINT DF < 40 gHz, ELINT monopulse DF
    - Denied Area: Alt PNT, GPS Hardening
    - De-Modulation: Tactical Datalinks- internals/externals, WIFI > 5 gHz
    - Decryption: Wifi > 5 gHz
    - Platform: Group 3 SIGINT Payloads
  - Data Flow
    - Data Processing
      - Data Formatting- Al enabled data aggregation, Automated Watchlist capability, CDS, DTEC (Outside of DTA), SIGINT Deconfliction role (Automation}, Data Sharing- Unclassified Data Flow
    - Analysis
      - Content - language, Al/ML Packet Analysis Metadata

4.1.2.4 Electromagnetic Warfare (EW): This area concentrates on detection, direction finding, and classifying threats in the electromagnetic spectrum (including but not limited to microwave, infrared, visible light, ultraviolet, x-ray, and gamma ray). Technologies of interest are:

- Low SWAP for multi-domain platforms, esp. aerial crewed or uncrewed applications
- Countermeasures, counter-countermeasures, and electronic protection
- Ruggedized sensors configured for dismounted/man packed form factor.
- Improved energy efficiency to operate on organic battery power.
- Ability to passively detect, classify and locate (to a specified standard} signals ranging from 3 kHz beyond 40 GHz.
- Integrated with existing commercial, military, and custom signal analysis packages.
- Ability to send detection data back to higher order analysis tools.
- Modular subcomponents to support replacement, repair, and sustainment.
- Ability to acquire source agnostic data
- Technologies to address UxS payload development and UxS device defeat
- Al/ML spectrum characterization
- Unattended sensors
- All-Domain ALT-PNT, GPS hardening, and Constellation development
- Signature management
- Space-based capabilities
- WIFl 7, 5/6/7G cellular development
- Robotic TAC-EW
- Sub-Surface scalable effects

4.1.2.5 Technical Support Systems: This area concentrates on items critical to mission success but is often not part of the initial design. Technologies of interest should improve performance, reduce SWaP, and enhance ease of use. Technologies of interest are:

- Unmanned/robotic/collaborative autonomous emplacement of unattended sensors in denied areas.
- TTL
- Emplacement of sensors via air, land, and water
- Avoid detection by adversaries.
- Provide orientation of sensor, if required
- Provide 3-dimensional RF modeling software to enhance mission planning and sensor emplacement relative to topological earth database.

4.1.2.6 Data Exfil: Technologies that provide additional data transfer capabilities/speed/bandwidths, reduce SWaP, increase flexibility in orbital, aerial, ground, underground, and maritime/riparian communication environments.

- Multiband, micro-sized devices capable of transmitting and receiving RF over distances greater than currently achieved.
- Integrate into aerial platforms, crewed or uncrewed, with modular open-system architectures
- New technologies that provide long distance data transfers in miniature packages, low signature, and are multipath resilient.

- Data transport devices designed to perform in restricted propagation environments.
- Data transport technologies to maximize limited bandwidth (e.g., compression, transmission technologies)
- Quantum and laser {optical) communications technologies

4.1.2.7 Biometrics: SOF are in search of tactical multi-modal biometric enrollment and matching devices; must include a combination of an iris, facial, DNA annotation, voice, and fingerprint capture, processing, and matching capabilities to enhance real-time tactical and operational decision making across the full range of future operating environments. Wearable biometric devices should be capable of identifying biometric features autonomously and matching to local datasets or worldwide datasets. With a minimum range of eight feet up to a kilometer or more. The capability needs to both store and upload data to current SOF capabilities, operate while stationary or moving, and be capable of supporting both overt and clandestine operations. Software applications should have the ability to operate on TAK (smart phones, or small smart phone like packaging). There is particular interest in technologies with a small form factor that provides the capability to rapidly (< 2 min) identify personnel, reduce false alarm rates and/or offer novel approaches at short to long distances in all environmental conditions. In addition, technologies of interest include rapid, portable handheld DNA collection and processing for matching against authoritative databases and on-board watchlists.

4.1.2.8 Forensic Science and Technical Exploitation: This area covers the multidisciplinary scientific processes to establish facts of both physical and electronic information obtained from target locations in controlled environments at tactical, operational, and strategic levels. In the short term, there is a need to process multi-media devices on or near target locations and enable rapid collection, processing, exploitation/analysis, dissemination of results, and target development. There is also a focus on updating equipment that can provide greater fidelity of chemicals of interest in forward areas including but not limited to illicit narcotics, explosives and precursors controlled under international conventions to prevent misuse.

- Media and cell phone exploitation capability:
    - Exploit multiple cellular or operating systems without limitations and increased data processing.
    - Simultaneously collect (image) multiple target devices
    - Conduct a simultaneous automated search and triage to extract all aspects of data (e.g., available, hidden, and deleted) and metadata based on multiple user defined parameters, including, but not restricted to, text, still image and video, time, location, and hashtag value, and compare to on-board Defense Watchlists.
    - Conduct Optical character recognition (OCR}, Optical word recognition (OWR), intelligent character recognition (ICR), intelligent word

recognition (IWR), and Convolutional Neural Networks and Image Classification of exploited data.
  - The device should enable safe evidence handling and save all captured data in the event of interruption (rapid disconnect)
  - Innovative transmission or transfer of large images and data pages over the internet.
  - Conduct non-destructive exploitation and basic analysis of commercial off the shelf (COTS) and non-standard autonomous small uncrewed Multi-domain Systems (sUMS) that operate in air, land, and/or sea to include removable media and/or internal controllers.

- Document exploitation capability:
  - Document exploitation, to include rapid scan and translation of foreign language via on-board disconnected OCR and OWR; small form factor devices such as a tablet, or mobile device.

- Chemical and Biological exploitation capability:
  - Chemical analysis capabilities that are deployable to austere and power constrained environments
  - Operated in a shelter and semi temperature-controlled environment.
  - Detect and provide fidelity for organic and inorganic materials.
  - Trace evidence collection, identification, and processing
  - Small form-factor devices such as a tablet, or mobile device

- Vehicle Exploitation:
  - A device or capability to collect, preserve, analyze, exploit, and disseminate telematics data from vehicle on board systems (e.g., location history, connected device interactions, text messages, call logs, contacts, and other data of intelligence value).
  - Exploit vehicle "smart" systems or controls
  - Exploitation can be conducted remote or directly
  - The device should save all captured data in the event of interruption (rapid disconnect)
  - Ability to utilize in future operating environments (FOE)
  - UxS exploitation capabilities: obtain raw data and/or code while maintaining industry standard of forensic integrity, obtain flight data, waypoints, configuration files, parameter, and all other available data or code to convert into one and/or multi-format report.

4.1.2.9 TTL Systems, Sensors, or Tags: This area covers Tagging, Tracking and Locating (TTL) technologies that can be discreetly concealed in or on objects, humans, animals, and/or vehicles and vessels in adverse maritime conditions. Technologies of interest

should be optimized to operate on extremely low SWaP constraints, have reliable and redundant geolocation capabilities, survive exploitation attempts, support waveform diversity, and support long duration missions. Additional features and or capabilities in support of TTL mission to include:

- TTL sensors/systems/tags capable of employing Micro-Electro-Mechanical systems (MEMS) Inertial Navigation Systems (INS) dynamically for periods when Radio-Frequency-dependent geolocation is degraded, denied or non-existent.
- Capabilities that exploit personal electronic devices for TTL without risk of discovery and compromise
- Capabilities that exploit organic vehicle/vessel electronic systems for TTL that provide persistent and reliable geolocation.
- Small form factor (AA battery size) energy harvesting technologies for trickle charge of sensors.
- High density small size and weight new energy sources to enable longer mission durations.
- Broadband directional and omni-directional micro-size antenna solutions capable of a wide useable bandwidth, to include tunable antennas, in the Ultra High Frequencies (UHF) range and beyond.
- Frequency agile tags/sensors able to operate at various frequency ranges while maintaining comparable SWaP
- Tag on a chip (IC) solution capable of sticker applications
- Sensors/Tags capable of employing signals of opportunity dynamically for periods when GPS is degraded, denied, or non-existent in a low SWaP form factor.
    - Systems/Sensors/Tags that make use of various Global Navigation Satellite Systems (GNSS) constellations simultaneously in low SWaP form factor.
- TTL systems/sensors/tags that have robotic characteristics to enable automation of emplacement and repositioning mid operation.
- TTL systems/sensors/tags with undetectable electromagnetic radiation signatures
- Capabilities to discretely leverage existing close-circuit television security systems, public safety systems, Smart City technologies, or other ubiquitous sensors or systems for TTL.
- New and Novel non-traditional TTL capabilities not limited to the RF spectrum such as optical tagging, big data analytics, cyber surveillance capabilities, or other means of tracking a person, vehicle, vessel, or activity.

4.1.2.10 Non-Radio Frequency Tagging, Tracking and Locating (TTL): Across the spectrum of conflict SOF require the ability to track a person or vehicle without the use of traditional electronic emitters, or other means that can be detected, to continue monitoring after losing contact with the subject. The tag on a person or vehicle must be undetectable by electromagnetic sensing devices, but accessible for near-real-time updates. The tag must not emit an RF signature while in use. The user should be able to retrieve or remotely interrogate the tag. The tag must be adaptable to fit numerous

Concept of Operations (CONOPs) requirements for power and concealment. Conversely, SOF needs awareness and means to counter adversarial TTL systems.

4.1.2.11 Enhanced Color Night Vision: SOF seeks head-worn and/or weapon mounted and small modular cameras with color night vision capability. This capability will aid Operators in rapid and efficient target identification, discrimination of targets and host nation partners, and differentiation of various laser colors/wavelengths for command and control. This capability would provide SOF Operators and Aviators greater clarity during transition to NVG's during End Evening Nautical Twilight (EENT) giving them the tactical advantage over our enemies and provide the ability to detect and classify activity (personnel, animal, vehicle, etc.) at range in a ground ISR mission during a moonless night. The selective colorization of image intensifiers will enhance visual acuity in extreme lighting conditions, differentiate laser emissions, and improve identification/recognition of persons, signals, and modern LED lights. Proposed specifications per optical channel may include:

- FOV: 40 degrees (+ - 2 degrees)
- Latency: Below 4ms
- Refresh rate: Faster than 240 Hz frame rate
- Power consumption: No more than 150 milliwatts at peak power, generally 120 or less (no more than 40 milliamps at 3v)
- Depth of field: Improve over currently fielded equipment by 15%
- Starlight sensitivity: Equal to or better than the current fielded Generation 3 image intensifiers. Operational threshold: 2x10-6-foot candles
- Color feature: Colorization of the optical channel is preferable to consistent colorization.
- Color accuracy: Primary colors must be accurately perceived by the Operator. Unique colorization of various friendly and enemy laser wavelengths is desired.
- Performance during colorization: Must not be degraded below 72 lp/mm, SNR 33, 2376 FOM, Resolution during colorization: 1.3 cycles per milli-radian.
- Power consumption during colorization: Desired battery life of at least one operational period of darkness

With respect to Ground ISR, variants derived from developed sensors allow enhanced night vision camera developments that include using modular camera system to include interchangeable lenses for medium to long-range surveillance.

4.1.2.12 Midwave Infrared (MWIR)/Shortwave Infrared (SWIR) Dual Band Systems: SOF is seeking dual-band (MWIR/SWIR) imaging technology that utilizes a single focal plane (FPA) array for both hand-held and weapon-mounted imager applications. This dual-band, single-FPA capability will enable USSOCOM operators to clearly see SWIR lasers (pointers, designators, laser range finders) present on the battlefield & see through glass while maintaining the advantages of MWIR imaging with reasonable SWaP. Salient characteristics of a solution should include:

- Imager must have a single focal plane array capable of detecting both MWIR & SWIR energy.
- Imager must be able to run in MWIR-only, SWIR-only, or 'Fused' mode without requiring filters.
- Imager must be able to both distinguish and present MWIR and SWIR bands separately [e.g, overlay SWIR lasers energy in red on a monochromatic gray MWIR image for display to the user].
- MWIR imaging capability should be at a minimum comparable in performance to current MWIR-only systems.
- System approach should consider low-cost MWIR/SWIR optics & novel optical materials.
- Imager must be capable of observing bullet-trace from a co-located weapon platform (e.g. machine gun and sniper rifle)

4.1.2.13 Optical Augmentation Protection: Devices leveraging the Optical Augmentation (OA) phenomenon to detect magnified day optics continue to proliferate modern battlefields, increasing threat of detection for USSOCOM snipers and reconnaissance teams. USSOCOM is looking for additional innovative ways to protect against detection via adversary OA devices & methods. Salient characteristics of such a device should include:

- Should be compatible with magnified day optics from 1x to 35x magnification
- Should not noticeably alter view through the day optic – either in resolution or color spectrum.
- Should not induce any boresight shift to the day optic.
- Should not interfere with attaching inline 'clip on' night optics in front of day optic.

4.1.2.14 Digital Low-Light Enhancement Algorithms: Digital low-light sensors continue to advance, but additional improvement in the form of real-time, low-latency processing to improve performance is required to maximize performance for a given system SWaP-C. Characteristics that innovative technologies should consider include:

- Algorithims should enhance resolution/contrast of digital low-light imagers in starlight or darker conditions.
- Algorthims should be intended for use on low-power, small form factor electronics suitable for integration into small hand-held or weapon-mounted imagers.
- Algorithims should introduce minimal additional photon-to-photon latency into the imager processing pipeline.
- Algorthims should not introduce artifacts in the scene that are distracting to the user.

4.1.2.15 Advancements for Infrared Intensifier Tubes & Wide Field of View Optics: Analog Infrared Intensifer (I2 Tubes) remain the premier night vision solution for helmet-mounted applications (i.e, night vision goggles) due to low-light performance, low power draw, & extreme low-latency. However, the analog nature of the technology inhibits easily displaying digital information (video from a different source, blue force tracking data, navigation information, etc) or capturing what the operator can see via photo or video to be able to send across the tactical data network. Augmenting an analog I2 tube & associated optics to

enable wide field of view with the capability to capture scene information and display digital information is desired for USSOCOM's next-generation Night Vision Goggle (NVG) solution. Characteristics that innovative technologies should consider include:

- Solutions could be integrated directly into an I^2 tube, or could be external to the I^2 tube, but internal to the greater NVG housing.
- Solutions should be able to display/capture at least 640x480 video
- Solutions should minimize additional Size, Weight, or Power draw required
- Solutions should maintain the standard NVG eye relief of approximately 25mm
- Solutions should exceed 80° field of view per eye and pursue a goal of 120° field of view per eye.

4.1.2.16 ISR Robotics: Robotics are ubiquitous on the modern battlefield at the lowest echelons. SOF teams of the future will continue to deploy robotics to assist in mission execution and require dramatic reductions in cost to achieve acceptable losses in increasingly contested environments.

- SOF are seeking approaches and solutions to significantly reduce the cost of contemporary battlefield robotics through reduced sensor count, reduced processor power, and lower mass while retaining similar capability for obstacle avoidance and payload.
- Increased heterogeneity and number of robotics on the battlefield leads to issues with tasking, operator overload, and deconfliction. Simultaneously, increasing challenges to the electromagnetic spectrum require fewer RF control link emissions from SOF teams. Traditional command and control links for robotics must be replaced by distributed dispatcher - agent task focused strategies for robotic control.
    - SOF seeks architectures and software capable of deconflicting, tasking, and reporting data from multiple heterogeneous robots while minimizing RF emissions from any central or peripheral node.

- Communications are an exploitable link in warfare, particularly radio frequency communications. Most robotic systems include an RF control link, and these links will be increasingly jammed or destroyed on tomorrow's battlefields. Most robotic systems are commercial derivatives and come equipped with little, if any, RF spectrum awareness or protections as spectrum is licensed commercially.
    - SOF seeks low cost, disposable, easily integrated components to enable ubiquitous equipping of robotics with basic RF spectrum awareness of common robotic radio bands.

- Robotic emplacement of sensors is a requirement for the future ISR environment. To be successful in certain environments the platforms need to avoid detection while transporting the sensor to its required location.
    - SOF are seeking robotic platforms that use technology to either avoid

detection or blend into the environment (biomimicry) while emplacing sensors.

- SOF are seeking long range robotic emplacement in all domains and possible domain transitions in route. Platforms that can function in multiple domains and/or platforms that can carry other platforms to extend range or avoid detection is desired.

4.1.2.17 AI/ML Scene Optimization for Digital Imagers: Digital imaging systems are proliferating across all domains as the technology matures and miniaturizes. These systems are found on a wide variety of platforms ranging from airborne sensors to digital weapon sights, many with multi-spectral capabilities (thermal, low-light sensors, fused). These systems often have multiple different digital settings that the operator must change to optimize the displayed scene for the specific situation. Shifting this optimization task to AI/ML algorithms that could be contained within the processor module would enable SOF operators to gain situational awareness quicker & increase operational capability in dynamic situations. Potential settings for AI/ML optimization could include but are not limited to:

- Gain
- Level
- Focus
- HDR Settings
- Blend ratios (for fused sights)

4.1.2.18 Sensor Integration and Fusion: To enhance ISR-T effectiveness for unmanned systems, SOF requires the integration and fusion of new and diverse sensor modalities into existing autonomy architectures. This involves developing advanced algorithms and techniques for combining data from multiple sensors to create a more complete, accurate, and actionable understanding of the environment for ISR-T purposes. Solutions should provide methods to rapidly and efficiently integrate new sensor types into existing unmanned systems architectures, and modifications to existing architectures to better support advanced sensor capabilities optimized for ISR-T missions. Proposals should demonstrate compatibility with open autonomy reference architectures and promote modularity and extensibility.

4.1.2.19 Command and Control (C2) for ISR-T: For unmanned systems, SOF seeks innovative C2 concepts and capabilities to enable effective coordination of autonomous systems and cutting-edge heterogeneous swarm configurations across different modalities (maritime, ground, air) specifically to support ISR-T operations. Solutions should be intuitive and effective, providing operators with full control over systems with confidence and reduced cognitive load, enabling rapid tasking and dynamic re-tasking in response to evolving threats and targeting opportunities. Solutions should adhere to established human-machine-interface (HMI) principles and provide standardized interfaces for data exchange and control, ensuring seamless integration with existing ISR-T workflows and systems. The focus is on C2 solutions that directly enhance the speed and accuracy of the ISR-T kill chain.

4.2 Multi-Domain Communications & Computing Capability Area: USSOCOM must be able to utilize disruptively new and enhanced existing technologies to transform networks and data management techniques required to facilitate the HEO concept in the FOE. The FOE will encompass an increasingly contested and dynamic electromagnetic spectrum and will require an innovative and comprehensive approach for SOF to effectively operate while remaining resilient and secure.

4.2.1 Multi-Domain Communications & Computing Disruptive Technology Areas Include:

4.2.1.1 Edge computing: SOF seeks multi-domain, interoperable, platform agnostic, low SWAP technology solutions that provide advanced computing to support SOF operations in degraded, disconnected, contested or anti-access/ area denial (A2/AD) communications environments. Data collection, management, storage, and dissemination has become very complex. Edge computing hardware solutions need to be able to process data from multiple sources and sensors to process and analyze such data to further enable SOF Operators. Edge computing solutions miniaturized to a very small form factor (i.e. - individual chips) for applications ranging from aerial/maritime platforms to body-worn hardware components supporting either individual or multiple functions in a low-power consumption manner are of interest. Edge compute devices must facilitate multiple varieties of evolving analytical software and toolset processing needs. Those applications must include the fusing of multiple disparate data sources. The output must enable the SOF end user with the right data, at the right time, and at the right location. Technologies with the following attributes are preferred:

- Provide low-power consumption computing relative to existing, Commercial-Off- The-Shelf (COTS) CPU/GPU hardware.
- Support software applications that provide advanced data analytics and visualization tools that reduce Operator cognitive load.
- Provide ability to compute and derive insights at multiple points within a tactical network prior to reach-back to enterprise-level network connection.
- Support networking of multiple body-worn computing chips that can fuse multiple data types.
- Innovative cognitive radios that employ AI/ML/Deep Learning to intelligently sense spectrum, adjust transmit power, and "roam" when in an Electronic Warfare cluttered environment and stay below or within defined "noise levels" with very little user interaction. Radios need to integrate with military hardware owned and carried by SOF operators. Software should be available as a plugin or add on as required.
- Provide enhanced Commercial Solutions for Classified and Data at Rest capabilities.
- Support containerized applications.
- Compute Triage for edge applications
- Algorithms that optimize processing and reduce battery consumption
- Distributed computing across edge devices (using multiple meshed devices to

process a problem set)

- SOF is interested in body-worn forward edge compute (FEC) device for dismounted or mounted teams operating in Disconnected, Degraded, Intermittent, and limited (DDIL) environments. This device aims to provide local processing for applications like ATAK and language translation, ensuring continued situational awareness and communication when an enterprise or cloud services are unavailable. The enhanced effort includes integrating AI/ML capabilities directly onto the body-worn device, particularly for tasks like object recognition and natural language processing. This also includes enabling drone control in complex, RF- denied environments through a leapfrogging mesh network architecture. Key challenges include heat management, maximizing battery life while maintaining a small and lightweight form factor, ensuring ruggedization and establishing ruggedized commercial connections.

4.2.1.2 Quantum Technology: SOF is tracking the transformational opportunities that quantum technology presents to military applications and national security. SOF is actively monitoring advancements and investing in research and developments to ensure readiness and maintain a technological advantage. This BAA has identified two areas of quantum technology that appears most promising to the greater SOF community:

- **Quantum Computers:** While still in early development, quantum computers possess the theoretical capability to dramatically outperform today's computers for specific tasks. Potential military applications include advancements in artificial intelligence (AI), particularly machine learning and target identification, and the potential for breaking current encryption methods. However, significant hurdles remain in error correction and algorithm development. The National Security Memorandum on Promoting United States Leadership in Quantum Computing (NSM-10) directs agencies to migrate to quantum-resistant cryptography, with NSA aiming for completion by 2035. NIST released initial standards for this transition in August 2024.

- **Quantum Communications:** This area, including Quantum Key Distribution (QKD), aims to establish secure communication networks leveraging quantum physics. While QKD offers theoretically un-hackable communication, current limitations in range and relay security hinder immediate deployment. The DSB has determined that current QKD implementations are not yet suitable for DOD mission use.

4.2.1.3 Non-Global Positioning Systems (GPS) Positioning, Navigating and Timing: SOF requires the ability to maintain accurate Position, Navigation and Timing (PNT) in areas where satellite Global Positioning System (GPS) services and other radio navigation signals are unavailable or untrusted. Effective navigation and situational awareness in space, in the air, on land or at sea environments are critical to SOF. SOF seeks alternative modalities for achieving enhanced and Assured PNT (APNT) services. SOF

operates in areas of incidental or deliberate GPS interference or denial. Incidental denial includes GPS services lost due to movement into subterranean areas (caves, basements, bunkers) or signal-blocking environments (urban canyon, parking garage, buildings, and dense urban areas). Deliberate denial includes electromagnetically contested environments. SOF are interested in countering the proliferation of advanced adversary Global Positioning System (GPS) jamming and spoofing capabilities. Capabilities should consider a multimodal approach that combines multiple PNT methods to determine the actual result. Capabilities should consider advances in Enhanced-PNT devices for mobile platforms that provide options for distributed networks of cooperative devices such as: celestial attributes, multi-platform-based beacons/triangulation (SUAS platforms and services), common timing, and the detection of jammers or other attack vectors. Such capabilities should have cognitive/automated attributes to assure seamless transition when interruptions or disruptions occur. Technologies with the following attributes are preferred:

- Solutions must be applicable to and integrate with multiple platforms including, but not limited to: Maritime, Fixed Wing, Rotary Wing, tactical vehicles, dismounted forces, and all groups of Unmanned Systems (UAS), etc.
- Solutions that perform as well or better than onboard primary PNT system(s)
- Alternate Timing solutions should consist of the following:
    - Rb Oscillator that can hold 1us at 1 week.
    - Dimensions: 3.65" x 5.25" x 2.13" in or smaller, small is preferred
    - Weight (± 3%) 3.72 lbs. Less weight is preferred.
    - Power (Steady State @ 25 °C) 20 W
    - Digital Adjustment Resolution (RAFS-C) ≤1.0E-15
    - Operating Temperature (at Baseplate): -20 to +60 °C
    - Storage Temperature Range -40 to+ 75 °C
- Solution accuracy must be equal to or greater than the following:
    - Position error (xy) < 1% distance travelled.
    - Position error (z) < 2% distance travelled.
    - Heading error< 20 degrees/hr

4.2.1.4 Quantum and Magnetic Anomaly Sensing for Passive Assured PNT in GPS-Denied Domains: USSOCOM is keen to develop and field compact, passive navigation technologies that provide assured Positioning, Navigation, and Timing (PNT) for SOF elements operating in GPS-denied environments. These include subterranean, underwater, and complex/congested environments where access to satellite-based navigation is either degraded or denied. Technologies of interest include quantum gyroscopes, gravity-gradient sensors, magnetic anomaly navigation systems, vision-based navigation, and celestial navigation, which enable precise movement and orientation without emitting RF signatures or relying on vulnerable external signals.

- These capabilities are essential for maintaining operational security, particularly during missions that require strict emission control or maneuvering in GPS-suppressed environments. Reliable navigation in these contexts not only reduces mission risk but

also enhances SOF's ability to operate autonomously in hostile, complex, and congested terrain. Systems should support integration with dismounted kits, vehicles, and uncrewed systems (UxS), and demonstrate resilience in extreme operational conditions (e.g. low-light, high-pressure, or magnetically complex environments). Compatibility with emerging seabed-based or subterranean reference architectures would further improve positioning confidence in disconnected or edge conditions.

4.2.1.5 Cyber Defense Effects: The interconnectivity of global data through the neural networking of IoTs has presented a unique opportunity for adversaries to become innovative in leveraging typical and atypical cyber exploits and vulnerabilities. SOF requires survivable (resilient and secure) cyber defensive technologies enhanced to strategically defend and defeat both non-kinetic and kinetic cyber effects across all-domains. While non-kinetic effects are often associated with cyber, e.g., non-violent attacks, disruption of service, and/or the loss of data, kinetic effects can be the resultant of non-kinetic cyber-attacks. The SOF need for an optimizing and configurable cyber defense is based on the emerging utilization of cyber kinetic effects, which can cause injury or death, direct or indirect physical damage, or an environmental impact that could harm human health (e.g., air emissions, chemical spills). Technologies with the following attributes are preferred:

- Cyber Detection, Tampering, Prevention
- Cyber Evaluations
- Data Poisoning Prevention
- Protection of Al Systems and ML Models
- Homomorphic and Polymorphic Cryptography
- Blockchain in Data Management
- Generative Al Software Development
- Topological Anomaly Detection (TAD)
- Quantum-Influenced Commercial Encryption
- Crypto Modernization

4.2.1.5.1 Security at the Edge: The operational SOF environment requires edge computing devices prioritizing fight-thru capabilities, where functionality, connectivity, and security are all essential. Edge computing devices can take any form, and endpoints are everywhere due to the proliferation of Internet of Things (IoT) devices. SOF is seeking cyber-survivable (cybersecurity and cyber resilient) capabilities at the edge device endpoint, cloud, and network. Technologies with the following attributes are preferred:

- Semi or Full Autonomy in Functionality and Performance
- Elimination or Mitigation of Vulnerabilities and Exploits
- Platform-agnostic
- Incorporate DevSecOps practices/architecture throughout life cycle

4.2.1.5.2 Automated Cyber Infrastructure Assessment: SOF is interested in establishing and/or modernizing technologies that underpin and enable software applications that

operationalize data for the warfighter.

- Dedicated platform, services to support operational, intelligence-focused, and data science applications.
- Modernized authentication and authorization cyber infrastructure.
- Centralized application framework to support a common series of SOF-Specific tools.
- Embedded (Non- Software as a Service (SaaS)/Platform as a Service (PaaS)) automation of cyber maturity, software development process maturity, and supply chain hardening.

4.2.1.5.3 AI/ML Capabilities: SOF is seeking various multi-domain, platform agnostic AI/ML enhanced computing solutions and cyber defense technology solutions comprising of some or all the following attributes:

- IoT systems and sensors agnostic algorithms
- IoT systems and sensors integration and optimization of AI/ML capabilities without jeopardizing functionality and performance
- Supply chain data analytics and management
- Machine and deep learning data transmission between systems and/or sensors
- Data security at the tactical edge
- Predictive analytics utilizing ML algorithms to analyze historical data and predict potential vulnerabilities and enemy actions
- Anomaly detection employing ML algorithms to identify unusual patterns or behaviors that may indicate potential cyber security threats, conduct predictive cyber analytics, and mitigate threats
- Simulations and Wargaming
    - SOF are interested in advanced simulation and wargaming platforms capable of integrating current real-world, historical and artificially generated data at multiple classification levels into a consolidated, realistic and flexible platform. This platform could incorporate Artificial Intelligence and/ or Machine Learning capabilities for enhanced realism and decision-making insights. Those AI/ML enabled capabilities should aggregate, analyze, and refine intelligence data from diverse sources, providing Commanders with timely, actionable insights to inform rapid and effective decisions.

4.2.1.5.4 AI Model Assurance, Risk Management, and Ethical Verification for Mission-Critical ML: This topic covers frameworks, toolkits, and lifecycle methodologies that ensure mission-critical AI/ML systems remain secure, interpretable, and operationally reliable across varied SOF use cases, to include ISR processing, automated targeting, logistics optimization, and autonomous platform control. As AI/ML becomes increasingly foundational to decision cycles and autonomous action in contested environments, ensuring the integrity and trustworthiness of these systems is vital to mission assurance and force protection.

- Capabilities of interest include adversarial red-teaming environments,

continuous audit trails, bias detection and mitigation tools, and transparent model interpretability interfaces that operators can use without specialized training. Third-party certification pipelines and automated revalidation mechanisms are also desired to ensure these systems maintain efficacy over time and under evolving mission conditions. These safeguards would allow operators to better understand, challenge, or validate AI-derived outputs in real-time, particularly under ambiguous or degraded conditions. By building assurance and accountability into AI/ML deployments from design to deployment, SOF can maintain technological overmatch without compromising ethical or operational standards.

4.2.2 Multi-Domain Communications & Computing SOF Enhancement (Incremental) Technology Areas Include:

4.2.2.1 Information Systems: Technologies concentrate on exascale and zettascale compute processing and exploitation of intelligence and information data for global situational awareness and decision support to commanders at all echelons. Software applications will be deployed in a loosely coupled, open architecture that separates display and user interactions from data preparation, analytics, and algorithmic processing. Technologies should provide new capabilities via Application Programming Interface (API) processing of all sources of stored and streaming data. Areas of interest include:

- Connecting strategic and tactical Special Operations Forces commanders via near real-time collaboration leveraging advanced fused analytics, auto-correlation across joint functions, and warfighting domains
- Application of industry open standards, data quality and data management sufficient to execute advanced computational artificial intelligence and machine-learning algorithms for shared situational awareness and military decision making.
- Fusion of real and synthetic data streams enabled by advanced algorithmic processing of multi-dimensional data visualize, collaborate, and act on unsynchronized and/or synchronized information in support of planning, rehearsal, and execution.
- Data interchange for metadata, user generated content, and associated data structures and semantic representations to enable interoperable ingest, export, and exploitation by other designated information system or sub-systems.
- Network Infrastructure Automation (NIA) utilities and tools.
- Local communication applications and capabilities for air-gapped networks.

4.2.2.2 Data Visualization: Multi-modal interfaces and associated information presentation designs that permit SOF Operators to receive and intuitively understand networked information from communication, computing, and sensor systems. Physical aspects of the technology must not interfere with the Operator's native ability to see,

hear, or feel the local environment nor constrain the Operator's ability to move.

4.2.2.2.1 Digital Engineering, Virtual Rehearsal, and Synthetic Mission Training Toolkit: USSOCOM seeks an integrated digital engineering and training ecosystem that supports mission rehearsal, performance modeling, and system design through virtual environments and synthetic data. Existing VR systems focus primarily on immersive display technologies but do not provide the underlying simulation infrastructure needed to support high-fidelity operational rehearsal, red-teaming, or generative system design workflows.

- These capabilities should enable operators to rehearse engagements across a spectrum of realistic threat scenarios, from IADS to small-unit ambushes, while also allowing acquisition professionals to down-select prototypes or iterate on design digitally before physical integration. Use cases also include cultural and language training, decision-making under stress, and AI training through synthetic environments. Interoperability with TAK and open developer frameworks are important to ensure that this system is usable across the SOCOM enterprise and adaptable to changing mission demands.

4.2.2.2.3 Obfuscated Data Transport Systems/ Architectures: This area covers secure communications transport networks used to route information, worldwide, to desired locations in a manner that takes full advantage of the trends in commercially available networks in foreign nations to obscure the originating source and final destination from third-party discovery. Technologies of interest would provide networks constructed potentially using a combination of co-location sites, public telecommunications service providers, and public cloud service providers and incorporate threat countermeasures.

4.2.2.2.4 Group 1 UAS Payloads: This area covers the ability for SOF to send and receive messages via a Group 1 UAS in urban and/or rural environments. This small UAS should include payloads for the following capabilities:

- Radio broadcast (FM)
- Television broadcast (analog/digital)
- Cellular (GSM/LTE/5G/6G) detection and broadcast
- Non-RF communications detection and broadcast
- Internet of Things detection and broadcast
- Loudspeaker
- Sonic projection
- Air-drop capability up to 10 lbs
- Electronic warfare/ electronic attack detection and broadcast
- Long-term viability either with solar panels or other energy source
- Holographic projection capability
- Secure transmissions (Type 1 encryption or NSA accepted substitute)
- Beyond Line of Site tactical data links, voice and data communications relays for austere environments (also applies to Group 2 UAS)

4.2.2.5 All-Terrain Terrestrial Platform: This area should focus on payloads similar to the group 1 UAS but with the ability to travel on the ground through all land terrains. Specifically, the all- terrain platform should be able to provide several capabilities to SOF:

- Radio broadcast (FM)
- Television broadcast (analog/digital)
- Cellular (GSM/LTE/5G/6G) detection and broadcast
- Non-RF communications detection and broadcast
- Internet of Things detection and broadcast
- Loudspeaker
- Sonic projection detection and broadcast
- Drop capability
- Electronic warfare/ electronic attack
- Long-term viability either with solar panels or other energy source
- Holographic projection capability
- Secure data transmission (Type 1 encryption or NSA accepted substitute)

4.2.2.6 Low-Visibility Communications: This product line covers hardware and software solutions to provide low visibility team communication and situational awareness capabilities. Technologies of interest would provide:

- The ability to have two-way obfuscated communications between SOF personnel and allied personnel.
- Allow more diverse infrastructure employments beyond those just found in US/Western industrialized countries including low-bandwidth and high-latency disadvantaged communications channels.
- Disassociation of user signatures
- End-to-End Type 1 encryption or NSA accepted substitute.
- USSOCOM seeks solutions to receive and transmit communication and electronic countermeasure signals from commercial vehicles without compromising commercial external appearance of a target commercial vehicle being operated by SOF.

4.2.2.7 5G/6G Communications: Advancements in commercial data transport {5G/6G and beyond) is important to SOF because it offers higher performance and additional capabilities, particularly for data-driven applications and for machine-to-machine communication. SOF must have access to a 5G/6G defense industrial base that provides trustworthy technologies. It is also important that SOF have access to trustworthy technologies at the lower end of the value chain, specifically in the 5G/6G Radio Access Network (RAN) and 5G/6G Core. SOF seeks radio frequency (RF) technologies including millimeter wave systems, as well as dynamic spectrum utilization capabilities. SOF also seeks networking technologies in both the RAN and 5G/6G Core, with an emphasis on open architectures and virtualization approaches which leverage U.S. and Allied industry expertise. Potential solutions should include:

- Operations across all 5G/6G spectrum bands, including the contiguous spectrum available at high frequencies above 24 GHz in the millimeter wave bands (mmW)
- How to control RF spectrum signatures, to reduce adversary targeting
- Techniques to identify, track, and mitigate threats and vulnerabilities.
- Provide a zero-trust model for 5G/6G.
- Modernization of electromagnetic battle management tools for command and control
- Enhanced Mobile Broadband (eMBB)- higher quality and rich content services to multiple users with full mobility.
- Low Latency (>= 10x less than 4G)
- Massive Machine-to-Machine Communications - massive scale automation through widespread sensor networks and multiple connected devices; sensor data from the Internet of Things (IoT)
- Data rates above 500Mbits/second
- 100x number of connected devices per unit area (compared with 4G LTE)
- Ability to fall back to 4G if needed.

4.2.2.8 Enhanced High Frequency (HF) and Satellite Communications: Significant advances in HF radio technologies as alternatives to traditional voice Satellite Communications (SATCOM) or Mobile User Objective System (MUOS) capabilities in RF contested expeditionary environments. These technologies would be integrated to support both Reconnaissance Surveillance Target Acquisition (RSTA), air assets (helicopter and fixed wing), and SOF mission sets.

4.2.2.9 Satellite Communications on the Move: This area should focus on the reduced size, weight, and power to conduct reliable satellite communications on various platforms across multiple domains while additionally extending enterprise capabilities to individual operators while in transit and on the objective. Technologies of interest would provide:

- Beyond Line of Site (BLOS) small form factor SATCOM terminals
- LPI/LPD/LPX waveforms
- Video transcoding

4.2.2.10 Space-Based ISR, Mobility, and Tactical Communication Tools: USSOCOM is pursuing a broader class of space-accessible capabilities that enable SOF to maintain persistent situational awareness, resilient communications, and adaptive logistics support across contested or infrastructure-limited theaters. While SATCOM on the move remains a core need, evolving mission demands highlight the importance of additional tools such as space domain awareness (SDA), secure optical or quantum communications, and sub-orbital lift for high-speed material delivery. These capabilities offer novel paths to tactical advantage by unlocking space as an operational domain, not just a support layer.

- SOF elements require rapid, low-latency access to EO/IR and SAR imagery in a format and timeframe compatible with edge decision-making. These systems must be tailored to work under conditions of degraded or intermittent connectivity and avoid

reliance on exquisite terminals or fragile high-bandwidth links. Integration with team-level platforms or tactical ground stations is essential. Beyond ISR, systems that support tactically relevant, low-signature communications from space that are outside traditional RF channels would provide new levels of resilience in jamming-rich or attribution-sensitive missions. Sub-orbital logistics, meanwhile, should enable point-to-point delivery of critical supplies to units otherwise cut off by terrain, enemy action, or time constraints. These capabilities collectively offer a resilient, space-enabled toolkit that aligns with the DoD's growing emphasis on space as a warfighting and maneuver domain.

4.2.2.11 AI-Enabled Electromagnetic Spectrum Management and Emission Control: USSOCOM is in search of adaptive, AI-enabled tools to manage electromagnetic spectrum use and emission control in increasingly congested and contested RF environments. Conventional spectrum planning approaches rely heavily on static pre-mission coordination, which is inadequate for dynamic engagements involving jamming, deception, or rapid maneuver. As spectrum becomes more contested in both conventional and irregular warfare, there is a growing need for tools that allow SOF teams to maintain access, reduce RF exposure, and exploit spectral opportunities in real time.

- Capabilities of interest include predictive jamming avoidance models, intelligent frequency modulation, spectrum-aware routing, and dynamic emission control planning. Systems should provide intuitive interfaces (like an Electromagnetic Spectrum Common Operating Picture) to inform operator decision-making without requiring technical expertise and integrate seamlessly with tactical platforms such as TAK. The ability to autonomously shift communication profiles, leverage opportunistic use of commercial infrastructure, and tailor emissions to specific terrain and threat environments will significantly improve survivability and operational flexibility. These capabilities will also support EMCON operations, enabling SOF elements to remain connected without compromising concealment or signature management. This line of effort supports a more agile and resilient electromagnetic posture across the SOF enterprise.

4.3 Scalable Precision Effects Capability Area Introduction: USSOCOM seeks to study, design, develop and demonstrate advanced technology concepts and materials associated with the application of non- kinetic effects, and overmatching lethality. These technologies may include non-kinetic effects, directed energy (DE), electromagnetic warfare (EW), tactical offensive cyber effects, Military Information Support Operations (MISO), and targeting enhancements for precision strike capabilities. The major developmental goal is a standalone effects system which gives an Operator or platform the ability to tailor the effects directed onto a target, ranging from incapacitation up through and including scalable effects. Allowing for a wider range of non-kinetic effects on adversarial targets and infrastructure without increasing the logistical burden on a small SOF formation at the edge or during clandestine activities.

4.3.1 Scalable Precision Effects Disruptive Technology Areas Include:

4.3.1.1. Non-Traditional/Non-Kinetic Effects: USSOCOM Directorate of S&T is seeking to develop the next generation of non-kinetic effects capabilities. These next generation capabilities will be focused on potential SOF specific targets during peer/near peer engagements, encompassing all phases and levels of conflict. The immediate goal is to bound the problem by conducting a comprehensive analysis of potential SOF targets and their vulnerabilities to emerging, non-traditional/non-kinetic technologies and then determine the ability to leverage these new technologies to effectively deny, degrade, disrupt, deceive, or destroy adversarial targets and infrastructure.

4.3.1.2. Directed Energy and Electromagnetic Warfare: Directed energy technologies for delivering non-kinetic scalable effects on a multitude of hard and soft targets. Offensive electronic warfare payloads with overmatching target effectiveness at tactically and operationally relevant ranges. Solutions can encompass airborne, mounted, dismounted, or other ways of delivering DE and EW effects for small SOF formations at the edge of operation or clandestinely. SOF is also interested in capabilities to disrupt adversary Electronic Warfare jamming while remaining undetected.

4.3.1.3. Tactical Offensive Cyber Effects: A cyber capability that is available at the tactical edge and operator portable, that can provide situational awareness and exploit capabilities of and on electronic systems and networks.

- Cyber platforms with the capability to provide digital and physical situational awareness in connected environments through utilization of Internet of Things (IoT) devices, networks, and systems.
- Cyber applications capable of tracking and exploiting targeted mobile electronics, Supervisory Control and Data Acquisition (SCADA) systems, networking and IoT devices.
- Cyber payloads with deny, disrupt, degrade, or destroy capabilities that can be employed to both networked and air gapped computer devices and systems, and Internet of Things (IoT) devices, networks, and systems.
- Systems should be able to be employed by SOF Operators with relative ease and short training cycles at the edge of operations or clandestinely.
- Tactical cyber effects include gaining access to and gathering information from enemy networks, disrupting or destroying enemy electronic systems and networks, gathering information about enemy cyber capabilities and vulnerabilities, gaining unauthorized access to sensitive information on enemy systems and networks, and disrupting or disabling enemy systems and networks to create operational advantages.

4.3.1.4. Advanced Technology Augmentations to Military Information Support Operations (MISO): MISO adaptive technologies to compete against peer and near-peer adversaries and other malign actors as the informational environment becomes

more saturated, more complex, more confusing, and more contested. With these adaptations, SOF can use cohesive command and control of information to enhance friendly decision-making and influence foreign target audiences, support communication disruption, gain, and maintain information advantage over the opponent. Exploit advancements in MISO to maximize adversary perceptions and behaviors, shape the operational environment, and support overall mission, campaign, and operational objectives at the tactical and operational level.

- Provide resilient, reliable, and survivable information architectures that may only experience minimal degradation in contested environments.
- Provide a next generation capability to collect disparate data through public and open-source information streams such as social media, local and mainstream media, print, audio, video, etc. To enable MISO planners to develop more focused and precise messaging or joint targeting and conduct real-time monitoring for continuous analysis of social media and other digital platforms to assess the effectiveness of MISO.
- Provide a next generation construct comprehensive models of entire societies to enable MISO planners to use these models to experiment or test various multiple scenarios. The predictive outcomes of these models should enable planners to asses multiple scenarios, select appropriate scenarios while effectively managing risks, and adjust variables against virtual target audiences to enhance and refine their operations.
- Provide technologies that can both identify and produce manipulated media such as deepfake detection and response strategies to mitigate adversaries' use of deepfakes to exploit fraud, manipulation, and disinformation.
- Provide enhanced voice analysis and recognition systems.
- Provide capability to analyze the vast amount of information, assess, synchronize, and conduct/coordinate MISO operations, activities, and investments central to operations in the information environment.
- Generate next generation capability to "takeover" Internet of Things (IoT) devices to collect data and information from local populaces and enable breakdown of what messaging might be popular and accepted through sifting of data once received. This would enable MISO planners to craft and promote messages that may be more readily received by and resonate with local populace.
- Provide a capability leveraging agentic Al or multi-LLM agent systems with specialized roles to increase the scale of influence operations throughout the 7-step MISO process.
- Provide a capability leveraging open-source frameworks to create a multimodal environment to brainstorm and test operational campaigns against agent-based replicas of individuals and groups.
- Provide a capability to expedite workflows via agentic systems that replicate specific knowledge, skills, abilities, personality traits, and sociocultural attributes required for different roles of individuals comprising a team.

- Provide a capability to rapidly advanced simulations and reliably collect data from individuals on attitudes wargaming to prepare MISO personnel for complex and behaviors utilizing tools such as online survey mechanisms.
- Develop a platform to automatically collect, manage, analyze, and communicate dynamic information related effects and their relation to ongoing physical operations to create integrated effects across the information environment to enhance achievement of operational objectives.
- Build integration of information related effects and data with the SOF data layer and provide access to applications hosted on the SOF data layer.
- Build a cross-domain system capable of ingesting raw data and timely finished intelligence to feed Target Audience Analysis with calculations of TA susceptibility and accessibility for better prioritization of MISO efforts that are guided by command priorities for message alignment with physical joint operations.
- Develop automated systems to scrape the information environment, analyze the situation and respond with messages that are in line with MISO objectives. This technology should be able to respond to post(s), suppress dissenting arguments, and produce source material that can be referenced to support friendly arguments and messages. This program should also be able to access profiles, networks, and systems of individuals or groups that are attempting to counter or discredit our messages. The capability should utilize information gained to create a more targeted message to influence that specific individual or group. The information environment moves too fast for military remembers to adequately engage and influence an audience on the internet. Having a program built to support our objectives can enable us to control narratives and influence audiences in real time.

4.3.1.5. Targeting Enhancements for Precision Strike:

- **Dual Band Designator**
  - **Background.** The current conflict has shown the tactical and operational impact of enhanced ISR and long-range precision strike capabilities. Semi-active Laser Seekers (SAL) continues to be a key component of Special Operations Forces (SOF) precision strike capabilities. Likewise, our adversaries have developed active and passive countermeasures to degrade current SAL capabilities. Extending and hardening our SAL capabilities at the tactical level across SOF is critical to future Special Operations and support Conventional/Coalition operations. This system needs to be compatible with current NATO SAL seekers and SOF unique seekers designed to overcome threat countermeasures. USSOCOM seeks to develop the ability to effectively designate targets at the ranges SOF can detect and identify targets with platform mounted and team level Intelligence Surveillance and Reconnaissance (ISR) systems.

  - **Maritime Dual Band Designator (DBD)** USSOCOM seeks to develop and

integrate on the SOF's Maritime FLIR a dual band coded laser designator that operates in 1064nm and compatible with NATO SAL seeking munitions. Size, weight, power, data interface must make it suitable and effective when integrated on the FLIR ball. The system must include a laser spot tracker or have means to ensure both lasers remain bore sighted with the FLIR. The Coded Out of Band Laser Designator (COBLD} compatible with SOF's Short Wave Infrared (SWIR) Laser Fire and Forget Seeker. The COLBD laser designator must be capable of operating in the maritime environment with power level and beam divergence suitable and effective at the range the FLIR can identify military targets when used with the SOF SWIR LFF seeker. The COBLD shall use an encoded scheme compatible with the SWIR LFF seeker. The COLBD designator should withstand a maritime fighting environment including gun shock.

- **Tactical level Coded Out of Band laser Designator (COBLD).** The COBLD's size, weight, power must make it suitable and effective when configured in a hand-held, individual/crew served weapon. The COBLD cost must make it affordable for use by individual soldiers or for a Class II Unmanned Aerial Systems. The designator shall be compatible with SOF's Short Wave Infrared (SWIR) Lase Fire and Forget (LFF) Seekers. The base requirements are that the COLBD laser designator must be capable of operating with power level and beam divergence suitable and effective at 3000m (objective), 1500m (threshold) range in a good visibility and be fully effective when operating in a military environment against military targets when used with the SOF SWIR LFF seeker. The COBLD shall use an encoded scheme compatible with the SWIR LFF seeker. The COLBD designator should withstand the SOF maritime fighting environment including gun shock. As a goal, the COBLB should weigh less than one kilogram including batteries and fasten with a Picatinny rail.

- **Electronic Countermeasure Seeker**
  - **Background.** The current conflict has shown the tactical and operational impact of enhanced ISR and long-range precision strike capabilities. The resulting requirement for dispersion complicates command, control, and logistics which are further degraded by electronic attack on communication and navigation systems. GPS and command link jamming degrades ISR and precision munition capabilities needed for attack in depth against command, control, and logistics centers. While this effects both sides it favors the side that can employ mass without regard for casualties. Under the cover of the jamming, he can prepare, and mass then turn it off to launch a wave of guided munitions and/ or a major ground/air attack. Traditional anti-radiation munitions have focused on air defense radars launched from large platforms.

  - **Electronic Countermeasure Seeker (ECS).** USSOCOM seeks to develop the ability to detect, identify, and target enemy electronic warfare systems that

jam GPS, command data link, and communications frequencies. Size, weight, power, data interface must make it suitable and effective when integrated on Class I & II UAS, as an additional sensor larger ISR platforms, or the seeker on small, guided munitions. The CONOP is to send multiple small weaponized UAS to penetrate electronic countermeasure operational environments and loiter. They would conduct a preplanned autonomous attack on active emitters. Location, type of signal and jam to signal ratio, etc., would determine threat identity to prevent fratricide. The ECS Seeker integrated on guide munitions (A700, Griffin, Hellfire, guided 2.75 Rocket, etc.) carried on manned or unmanned platform to target enemy EW systems to support maneuver or unmanned system operations. Employed as an additional sensor on ISR platforms the seeker aid in locating enemy EW jammers for artillery attack.

4.3.1.6. Dismounted Counter-UAS and Coordinated Swarm Effectors for SOF Survivability: USSOCOM is interested in a modular, layered defense system designed to detect, track, and defeat commercial small UAS (sUAS) and first-person view (FPV) drone swarms in support of SOF units operating in austere or contested terrain. The proliferation of inexpensive, militarized drones has created a growing threat to dismounted teams that lack organic C-UAS tools suitable for tactical carry and quick deployment.

- Capabilities should include passive and active sensors (like EO/IR, thermal, acoustic, RF), sensor fusion, autonomous interceptors or swarming countermeasures, and TAK integration for shared situational awareness. AI-driven decision support to classify and prioritize threats, coupled with rapid deployment and operation in GPS- and comms-denied conditions, would enhance survivability and reduce operator burden. This system could take the form of a family of interoperable components or a scalable platform that adapts to mission size and terrain.

4.3.2. Effects SOF Enhancement Technology Areas Include:

- Develop an architecture that allows current systems to be updated in order to process and share situationally obtained information onboard or off board those current and developmental systems.
- Expand the capability of Operators on the battlefield by means of using multiple sensors to provide target inputs to the actionable entity. Improvements are sought to increase situational awareness in real-time through enhanced spatial resolution, noise reduction, and enhanced contrast. Examples include optical and geometric super resolution techniques.

4.3.2.1 Sensor Integration and Fusion for Targeted Effects: SOF requires the integration and fusion of new and diverse sensor modalities into existing autonomy architectures to enhance targeting and situational awareness for precision effects delivery. This includes developing algorithms and techniques for combining data from multiple sensors to create a more complete and accurate understanding of the environment, enabling better target identification and effects assessment. Methods to rapidly and effectively integrate new

sensor types into existing unmanned systems architectures, and modifications to existing architectures to better support advanced sensor capabilities are needed. Proposals should demonstrate compatibility with open autonomy reference architectures and promote modularity and extensibility. This ensures that autonomous systems can be rapidly adapted to leverage new sensor technologies for optimized effects delivery.

4.3.2.2 Command and Control (C2) for Coordinated Effects: SOF seeks innovative C2 concepts and capabilities for unmanned systems to enable effective coordination of autonomous systems and cutting-edge heterogeneous swarm configurations across multiple domains (maritime, ground, air, cyber, etc.). These solutions should be intuitive and effective, providing operators with full control over systems with confidence and reduced cognitive load. The C2 systems should facilitate the coordinated application of scalable precision effects, from non-lethal to overmatching lethality, across a range of targets and environments. Solutions should adhere to established human-machine-interface (HMI) principles and provide standardized interfaces for data exchange and control, ensuring seamless integration with existing SOF systems and workflows.

4.4 Human Machine Interface Focus Area Introduction: The growing reliance on increasingly complex equipment and autonomous systems, while offering advanced capabilities, places a significant burden on USSOCOM personnel. Human-machine interfaces address this challenge by integrating human factors considerations into all system elements, designing user interfaces that account for the physical, cognitive, and sensory abilities of SOF operators; minimize potential burden; and optimize human-machine teaming and warfighter performance. Interfaces should be designed using open architectures with maximum interoperability. Specific areas of focus include:

4.4.1. Human-machine interfaces that optimize how information is collected, prioritized, and portrayed to the user through multi-sensory modalities that account for human sensation, perception, and cognitive abilities. This includes use of visual (e.g., augmented, mixed, and virtual reality), aural, and haptic technologies that enhance information processing and situation awareness, while accounting for environmental variation (e.g., temperature, moisture, lighting, vibration), user comfort, interference, and nauseogenic effects.

4.4.2. Human-machine interfaces that account for real-time battlefield and operator state conditions to support situation awareness, decision-making, planning, and performance augmentation. This includes sensor integration to address environmental features and operator neuro-physiological condition (e.g., stress, fatigue), as well as machine learning, artificial intelligence, or other strategies to reduce operator burden and increase the speed and accuracy of the observe-orient-decide-act (OODA) loop decision cycle. Interfaces should maximize trust and transparency and include safeguards for task allocation and authority transfer.

4.4.3. Human-machine interfaces that allow for natural, simplified, and intuitive control with

minimal training requirements. This includes haptic/gesture, vocal, and visual controls, as well as brain-machine interfaces, that are designed to accelerate the decision-to-action time sequence, reduce operator workload, facilitate operator concealment, and optimize command and control during human-machine teaming. Interfaces should maximize operator safety and be ruggedized for diverse environmental conditions.

4.4.4. Natural Language Interfaces for Edge-Based AI/ML Decision Support: USSOCOM is eager to field natural language-based interaction systems that allow operators to query, direct, and receive feedback from AI-enabled tools using spoken or written language at the tactical edge. These tools should enable dismounted teams to gain insight from mission data, whether for navigation, real-time translation, threat analysis, or local pattern-of-life intelligence, without requiring network access or technical expertise.

- By embedding LLM capabilities into wearable or portable mission systems, SOF operators could interact fluidly with onboard AI using mission context to drive decision making. These interfaces should deliver interpretable, context-aware outputs while preserving operational security and enabling use in contested or degraded environments. Compatibility with edge compute devices and interoperability with TAK or team-based mission software are key enablers.

4.5 Emplacement and Access Capability Area: Introduction: USSOCOM seeks technologies that provide the SOF Operator with improved and versatile mobility capabilities in ground, air, maritime, and space operating environments.

4.5.1 Signature Management: USSOCOM seeks solutions for signature reduction in visual, infrared, radio frequency, acoustic, and digital/cyber domains for currently fielded and future systems. USSOCOM is interested in advanced technologies, which provide multispectral signature reduction for personnel and platforms while minimizing the size, weight, and power requirements. Technologies that provide exceptional performance will be considered for next generation platforms and personnel solutions. Contractors and organizations selected for projects in this area will likely require active security clearances and cleared working facilities.

- USSOCOM seeks solutions to receive and transmit communication and electronic countermeasure signals from commercial vehicles without compromising commercial external appearance of a target commercial vehicle being operated by SOF.
- USSOCOM seeks solutions to receive communication signals while maintaining signature management of platforms to support SIGINT & EW applications

4.5.1.1 Cyber/Digital Signature Management: USSOCOM seeks technologies, techniques and procedures that will facilitate SOF operating in an environment equipped with ubiquitous technical surveillance, allowing them to complete their missions without impacts to their health, safety, and operational effectiveness. Technology solutions in this area must focus on protection or obfuscation of the personally identifiable information and personal and professional attributes

of personal, organizations, facilities, equipment, and capabilities increasingly under attack from intelligence collection, cyber operations, electronic warfare, information warfare, and digital surveillance.

4.5.1.2 Commercial Platform Reconfiguration & Anti-Exploitation Modules: USSOCOM seeks modular systems that enable SOF teams to tactically reconfigure and harden commercial off-the-shelf (COTS) platforms - such as vehicles, smartphones, and electronics - commonly used during low-visibility and denied-environment operations. These commercial systems, while offering cost and access advantages, are embedded with sensors, telemetry software, and communications protocols that adversaries can easily exploit for tracking, surveillance, or targeting.

- To mitigate these risks, capabilities of interest include tools that allow selective disabling or spoofing of IMEI, GPS, and RF emissions; secure sandboxing or overwatch of internal data pathways; and the ability to co-opt native sensor systems (e.g., dashcams, microphones, or antennas) for tactical ISR collection. These modules must operate autonomously or semi-autonomously with minimal operator input (supported by permanent or temporary modification to the host platform). Field-configurability, resistance to over-the-air reset or OEM interference, and flexible deployment across heterogeneous platforms are all key attributes. As adversaries grow more adept at exploiting the digital exhaust of commercial technologies, this capability set is essential to ensure SOF can operate, surveil, and maneuver within surveillance-heavy environments while preserving operational security and plausible deniability.

4.5.2 Mobility: USSOCOM seeks capabilities/concepts for multi-domain mobility platforms that are versatile, increase SOF mobility capabilities and offer reduced multispectral signature management characteristics. For airborne applications, SOF is particularly interested in runway- agnostic solutions, alternate mobility methodologies, and innovative approaches to traditional mobility concepts. SOF is interested in a truly "All Terrain" system that is capable of navigating in all forms of terrain (e.g., mountains, snow, frozen tundra, swamps, water, desert, etc.) in multiple environments (i.e., night, rain, snow, dust, urban, smart city, etc.) and is interoperable with existing logistical systems. Both manned and unmanned solutions are acceptable for submission.

- USSOCOM seeks solutions to reduce or eliminate cyber vulnerabilities of commercial and military vehicles. This includes the ability to mask or emulate digital signature of commercial vehicles and the ability to protect the vehicle's CAN from cyber or electronic attack.
- Request addition of force protection techniques that include collection of near RF signals to classify as friend or foe.
- USSOCOM seeks solutions for mobility over the snow/arctic in all seasons. This includes vehicles both physically larger and additional payload capacity than traditional snowmobiles while retaining high-speed snow mobility in all terrain types.

4.5.2.1 Additional areas of interest related to this topic would include advanced materials, hybrid/electric systems, and increased range/speed capabilities.

- Mobility improvements, lethality upgrades, survivability upgrades, modular capabilities to increase effectiveness of ground and maritime mobility platforms.

4.5.2.2 Stratospheric Platforms for Contested Environment ISR, EW, and Effects Delivery: USSOCOM seeks stratospheric platforms to include balloons, gliders, and powered vehicles that provide persistent, low-signature access to ISR, communications relay, electronic warfare, and effects delivery across contested/denied, deep, or expansive operational areas. These platforms offer lower cost, longer dwell, and greater survivability than traditional aircraft or satellites, particularly in high-threat or bandwidth-constrained environments.

- Use cases include airborne jamming, persistent ISR, communication relay, and target cueing for long-range fires, all while maintaining a low operational footprint and signature. Modularity for payload integration, runway-independence, and signature-managed profiles for EMCON are important attributes. These platforms align with increasing DoD interest in the stratosphere as a maneuver space and reflect proven use of high-altitude systems in current peer-conflict theaters.

4.6 Contested Logistics Introduction: USSOCOM requires the ability to assure logistical support to deployed service members in highly contested environments. Logistical solutions shall be capable of operating in Disrupted, Degraded, Intermittent and Limited (DDIL) environments, be attritable in nature, and have the flexibility to support all classes of supply. SOF must establish redundant, resilient, and responsive logistics capabilities that can sustain full spectrum special operations in a contested environment,

4.6.1 Autonomous Delivery Platforms: USSOCOM requires the development of multi-domain resupply platforms to support operations in deep and denied operating environments. USSOCOM seeks multi-modal autonomous platforms that can distribute, deliver, and emplace varying payloads in support of SOF in all domains from seabed to space. Interoperable systems with effective ranges and payloads are critical for effective SOF sustainment and must have minimal signatures with high survivability against kinetic and cyber effects.

- Solutions should have all or some of the following characteristics:
    - Capable of transporting material ranging from 100 lbs to 1000 lbs to point of need
    - Capable of traversing round trip distances ranging from 100 km to 2000 km
    - Must be capable of completing pre-planned resupply mission without C2 link (fully autonomous)
    - For air platforms, must be airdrop capable if not a VTOL platform

- Some of the preferred common characteristics for deep area support Robotics and Autonomous Systems (RAS) include:
    - Inexpensive and easily manufactured
    - Common mobility platform with modular payloads
    - Common size, shape, and dimension payloads
    - Swarm capability

    - Full autonomous operation

- Autonomous delivery systems will find have greatest advantage using multi-domain capability for mission accomplishment. Multi-domain capability gives the force options to deliver logistics over or through multi-domains including underground or subsurface. Systems must profit from modular, quick on-off payload systems that support additional capability payloads like electronic warfare, signal, or loitering munition.

4.6.2 Edge Manufacturing and Maintenance: USSOCOM requires the ability to manufacture and modify technology at the point of need. Solutions should have all or some of the following characteristics:

- Ruggedized advanced manufacturing

4.6.3 Power Generation & Storage: USSOCOM requires the ability to generate and store power to recharge its warfighting technology at the edge in a non-permissive environment. The increase in UxS, EW, EUDs, sensors, IoT Devices, communications, edge compute, and more has dramatically increased the power required to conduct SOF-P operations.

- Solutions should have some or all of the following characteristics:
    - Man Packable (<20 lbs)
    - Low Audible Signature
    - Multi-fuel capable
    - Easily Maintained
    - Low Thermal Signature
    - Reduced Visual Signature
    - Able to store and manage energy usage
    - Compatible with both military and commercial cabling interfaces

- USSOCOM seeks solutions for energy generation, production, and management. Solutions should consider reducing signature to prevent detection.
    - USSOCOM seeks solutions for energy generation to produce larger amounts of energy from a primary source. Technology should consider reducing signature to prevent detection when used.
    - Power production solutions that can be sourced locally, produce reliable power, have low size and weight characteristics, and either fit into the local pattern of life or operate with little to no signature. Solutions could be through multi-source or multi-fuel.
    - Power distribution either wave or beamed power
    - Power management through advanced energy storage that have low signature, low weight, fast recharge, and high capacity

4.6.4 Point of Need Class I Supply Production: USSOCOM requires the ability to feed and

hydrate service members in a logistically contested environment by utilizing resources local to the area of operation. Solutions should have some or all of the following characteristics:

- Man Packable (<20 lbs)
- Low SWAP systems that can produce potable water from ambient air.
- Novel shelf stable food solutions that maximize caloric density while maintaining nutrient profiles required to support optimal physiological performance.

5.0 Supplemental Submission Instructions and Information:

5.1 UNCLASSIFIED Submissions: Each Offeror must submit both a Quad Chart and White Paper, as well as complete the requisite data fields for USSOCOM-BAAST-2020 at the following URL: https://www.socom.mil/SOF-ATL/Pages/_archive/BAAST2030-Sub-Form.aspx. If you experience problems uploading attachments, you are still required to complete requisite data fields and then email attachments to BAAST20@socom.mil. Subject line of email should state, "Quad Chart/White Paper-Topic Area-STBAA20-Company Name."

5.2 CLASSIFIED Submissions: Each Offeror must submit both a Quad Chart and White Paper, as well as complete UNCLASSIFIED requisite data fields for USSOCOM-BAAST-2020 at the following URL: https://www.socom.mil/SOF-ATL/Pages/_archive/BAAST2030-Sub-Form.aspx. All CLASSIFIED Quad Charts and White Papers will be submitted to the following email address baast20@socom.smil.mil. Subject line of email should state, "Quad Chart/White Paper-Topic Area-STBAA20-Company Name."

5.3 Quad Chart and White Paper Submission Process:

5.3.1 Each Offeror should only submit one submission with one Quad Chart and One White Paper aligned to the specific Topic Area in Section 4.0 (Technology Areas of Interest) best aligned to their submission. BAAST Reviewers will determine applicability of submissions that may be cross-cutting across other Technology Areas of Interest. Offerors can submit more than one submission for other Topic Areas, but each submission (Quad Chart/White Paper) must be different.

5.3.2 Interested Offerors shall submit a Quad Chart following the example below (6.1.5.4 Quad Chart Structure). The intent of the Quad Chart is to allow the Government to quickly ascertain relevancy to USSOCOM Focus Areas. The Quad Chart shall include: (1) Program Overview with a description of the technology effort, technical performance required to achieve and complete the effort and associated drawing or schematic, as applicable; and the "So What" or relevancy and SOF unique applicability: (2) technical resources and team members, (3) estimated costs by Government Fiscal Year, and deliverable, as applicable; and (4) proposed schedule.

5.3.3 White Paper Submission Process: Interested Offerors shall submit a White Paper as described below. The purpose of the White Paper is to allow the Government to evaluate the technical and programmatic details of the proposed work.

5.4 White Paper Content and Format:

5.4.1 Format: White Papers shall use the format described at Appendix A - White Paper Format. White papers shall meet the following requirements: (1) Paper Size - 8.5 x 11inch paper; (2) Margins - 1"; (3) Spacing - single; (4) Font – Times New Roman, 12 Point; (5) Microsoft Office 2010 or compatible format and/or PDF format. The Integrated Master Schedule is not restricted in size. The naming convention of white papers shall conform to the following format: CompanyName_WhitePaperTitle_MMDDYYYY.doc or pdf and contain no more than 50 characters and no special characters.

5.4.2 Number of Pages: White papers will not exceed five pages. The cover page, and Integrated Master Schedule are not counted in this page limit. All pages shall be numbered.

5.4.3 Cover Page: Labeled "WHITE PAPER" and shall include: (1) BAA number and Technology Areas of Interest as referenced in Section 4 above; (2) white paper title; and (3) Offeror information to include address, phone, and technical contact with email address.

5.4.4 Technical: The Offeror shall submit a description of the scope of work necessary to satisfy the BAA stated technical challenges and design objectives. This shall include: (1) technical approach; (2) technical risk areas; (3) design maturity; (4) any other technical data/information to be conveyed for consideration. The Offeror shall identify the management, technical qualification and composition of the research team, key personnel, and subcontractors. The Offeror must address the quality assurance process to assess its capability to successfully develop the technology and configuration control plan.

5.4.5 Price/Cost and Schedule: The Offeror shall provide a determination of the cost to develop the technology through each phase from concept development through prototype proofing. Each Offeror shall submit a Rough Order of Magnitude (ROM) of the costs based on work areas of development to perform the overall technology development effort. The Offeror shall submit a schedule by major tasks to develop the technology through completion of the prototype and proof of readiness.

5.6 Technology Development Cost and Schedule: Offerors are advised to consider if the proposed solution meets the following criteria:

5.6.1 S&T Activities: USSOCOM desires proposals that conform to the definitions of Budget Activity 2, Applied Research or Budget Activity 3, Advanced Technology Development. Please refer to the DoD Financial Management Regulation Volume 2B, Chapter 5 for the full definitions. The abbreviated definitions are listed below:

<u>Applied Research</u> - Applied research is defined as systematic study to gain knowledge or understanding necessary to determine the means by which a recognized and specific need may be met.

Advanced Technology Development - Includes all efforts that have moved into the development and integration of hardware for field experiments and tests.

5.6.2 Technology Readiness Level (TRL): USSOCOM SOF AT&L desires proposals with TRLs between two (2) and six (6). The TRL definitions are listed below:

TRL 2 - Technology concept and/or application formulated. Invention begins. Once basic principles are observed, practical applications can be invented. Applications are speculative and there may be no proof or detailed analysis to support the assumptions. Examples are limited to analytic studies.

TRL 3 - Analytical and experimental critical function and/or characteristic proof of concept. Active research and development is initiated. This includes analytical studies and laboratory studies to physically validate analytical predictions of separate elements of the technology. Examples include components that are not yet integrated or representative.

TRL 4 - Component and/or breadboard validation in laboratory environment. Basic technological components are integrated to establish that they will work together. This is relatively "low fidelity" compared to the eventual system. Examples include integration of "ad hoc" hardware in the laboratory.

TRL 5 - Component and/or breadboard validation in relevant environment. Fidelity of breadboard technology increases significantly. The basic technological components are integrated with reasonably realistic supporting elements so it can be tested in a simulated environment.

TRL 6 - System/subsystem model or prototype demonstration in a relevant environment. Representative model or prototype system, which is well beyond that of TRL 5, is tested in a relevant environment. Represents a major step up in a technology's demonstrated readiness.

5.6.3 Cost and Schedule: In addition to the S&T activities and TRL, USSOCOM desires white papers that are scoped between $5 to $15 million total cost of development and between 3 to 5 years to complete all efforts required to obtain a TRL of 6 (refer to section 5.2.2 for definition) for each submission under USSOCOM-BAAST-2020. Offerors that do not conform to the cost and schedule criteria may be considered for award at the Government's discretion, but the offeror is required to provide rationale why their proposal does not meet the cost and schedule criteria and why it still meets the S&T activities and TRL criteria to make an accurate assessment.

5.7 Evaluation Period: Quad Charts and White Papers submitted from date of issue, of Current Amendment, through 5 January 2026, will be evaluated from 5 January 2026 to 17 April 2026 for inclusion in SOF AT&L-ST's FY27 program plan. USSOCOM, SOF AT&L-ST reserves the right to review submissions (Quad Charts/White Papers) at any point throughout this

open-ended Broad Agency Announcement.

5.7.1 Quad Chart and White Paper Review Process: USSOCOM SOF AT&L-ST will conduct peer reviews starting 5 January 2026 through 17 April 2026. At the end of the review, USSOCOM SOF AT&L-ST will notify Offerors whose Quad Chart and White Paper were selected for submission of a proposal. A request for proposal will use similar Review Criteria for evaluation as are outlined in paragraph 6.0 below unless the request for proposal specifies different criteria.

5.7.2 Use of Support Contractor Personnel: Per SOFARS Provision 5609.507-1, the offeror's attention is directed to the fact that Government Support Contractor personnel may review and provide support during proposal evaluations. They may have access to offeror's proposals and may be utilized to objectively review a proposal in a particular functional area and provide comments and recommendations to the Government's decision makers. They may not establish final assessments of risk, rate, or rank offerors' proposals. All advisors shall comply with procurement Integrity Laws and shall sign Non-Disclosure and Rules of Conduct/Conflict of Interest statements. The Government shall take into consideration requirements for avoiding conflicts of interest and ensure advisors comply with safeguarding source selection and proprietary data. Submission of proposal in response to the solicitation constitutes approval to release the proposal to Government Support Contractors.

6.0 Quad Chart and White Paper Review Criteria

6.1 Review Criteria: The Government will review each Quad Chart and White Paper and select the Offerors that have the greatest potential to meet the needs of USSOCOM technology requirements. A determination will be made if the Offeror's submission met BAA criteria set forth in paragraphs 5.6.1, 5.6.2, and 5.6.3 (S&T Activities, TRL, and Cost and Schedule), is technically qualified, and has a comprehensive understanding to undertake the development of the technology based on the information stated in the Quad Chart and White Paper.

6.1.1 Importance to Agency Programs: The degree to which the technical approach is relevant to the proposed area of interest.

6.1.2 Technical: The degree to which the technical approach is disruptive or enhancing, innovative, feasible, achievable, complete, and supported by offerors that have the expertise and experience to accomplish the proposed tasks. Of paramount importance is the probability for transition of this effort into an acquisition program, a military system, or other military capability. This probability of transition is measured by the existence of standing or evolving formal requirement for the capability, and acquisition program funding in the context of the end-state TRL of the proposed effort. Additional salient characteristics surrounding the technical approach include a brief discussion on: 1) Theoretical Rationale, Scientific Methods, and Research, 2) Significance, Relevance, Disruption, and Innovation, 3) Impact to SOF, 4) Technical Risk, as well as 5) Personnel and Facilities.

6.1.3 Schedule: The degree to which the proposed schedule is achievable; the resources, facilities, and equipment available; and the allocation of time per major task.

6.1.4 Funding Availability: The Government will review the proposed ROM to determine if it is a fair estimate of the proposed scope of work and whether funds are available to support the proposed scope of work. Higher Command priorities may preclude awards under this BAA.

6.1.5 White Paper and Quad Chart Format Guidance.

6.1.5.1 White Paper Introduction – Title, technology area of interest as referenced in the specific technology area per Section 4 of this BAA, period of performance, estimated cost, name and address of the Offeror, technical and contracting points of contact, and telephone numbers.

6.1.5.2 White Paper Objective – Task objective with description of work to be performed.
6.1.5.3 White Paper Technical Summary and Proposed Deliverables - The White Paper should include the anticipated period of performance as well as a ROM cost. The ROM cost consists of the total cost-plus profit/fee, if any. It is a best estimate of the anticipated cost of the effort and should be consistent with any dollar value or ranges specified in the announcement, as well as the level of work being proposed. The White Paper does not include any of the material that usually accompanies a cost proposal. It must include a short technical description of the concepts and plans to accomplish the technical objectives. It also briefly describes the technologies to be pursued in the effort. It should also identify any Independent Research and Development (IR&D) work underway within the company that may have direct application. The White Paper should address only that specific part of the BAA the Offeror intends to accomplish.

6.1.5.3 Quad Chart Structure - The Quad Chart presents the overall view of the proposed work in a snapshot. It is essential that the quad visually present the relevant information of what the project will accomplish, a description, the technical efforts necessary to achieve results, benefit to SOF, technical and management resources, costs, and schedule/major milestones. It is preferred that Quad Charts be provided in the latest version of Microsoft (MS) Power Point or Adobe Acrobat and follow the template below:

Program Name and Technology Area of Interest

Program Overview

Description

The So-What

Document was last saved: Just now **e Applicability**

Drawing/Schematic (if hardware focused)

Participant POC

- Offer name and address
- Technical POC: Name, phone # and email address
- Contracting POC: Name, phone # and email address

Proposed Cost

(U) Funding Profile				
Prior	FY27	FY28	FY29	Total
$0.00	$0.00	$0.00	$0.00	$0.00

Proposed Schedule

Milestone/Event	FY27				FY28				FY29			
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
Date of Proposed Award												
Proposed Period of Performance												
Proposed Design Reviews												
Proposed Prototype Deliveries												
Proposed Demonstration(s)												
TRL Level												
Other												
Other												

1