UMEX Company Experience

Unmanned Experts, Inc. (UMEX) is a small business with principal locations in Colorado, Virginia, and New York. In business since 2010, UMEX prides itself on both its expertise and its reputation; these elements stem directly from our highly-trained and carefully selected staff. Our team of exceptionally motivated professionals has over 25,000 flying hours on unmanned aircraft systems (UAS) and nearly 50,000 flying hours on manned aircraft. Our team also includes professionals with exceptional backgrounds in both hardware and software research, development, test and evaluation (RDT&E), and domain expertise in law enforcement, public safety and homeland security (LE/PS/HLS), and geospatial science and remote sensing.

UMEX has several focus areas that are particularly relevant to border security RDT&E and technology insertion. These include the following, which are described in more detail below:

- Subject matter expertise in
    - Tactical and operational UAS technology and utilization with experience in establishing forward-deployed UAS units under austere circumstances
    - Intelligence, surveillance and reconnaissance (ISR)
    - Border enforcement, particularly in a joint operational environment.
- LE/PS/HLS operational evaluation, testbed development and counter-drone
- RDT&E initiatives that address every major aspect of LE/PS/HLS usage, including:
    - Forensics, including photogrammetry and 3-D scene development
    - Tactical situation awareness and integration into command and control (C2) structures such as the Incident Command System
    - Communications operability and interoperability

In short UMEX provides the unique ability to facilitate UAS and UAS-related technology RDT&E and integration into real-world programs, and is looking forward to working with the BSTC and its members to apply our skills to border security.

Subject Matter Expertise

UAS Technology and Utilization

Over the preceding 11 years UMEX subject matter experts (SME) have been at the forefront of UAS development and fielding. UMEX members formed the initial cadre for the introduction of the MQ-9A Reaper medium-altitude, long-endurance (MALE) UAS into both USAF and RAF services. UMEX members were responsible for the development of all training and operational programs, and were central to trials and testing efforts including experience in the USAF Operational Test program. In addition, UMEX SMEs have served in senior Standards & Evaluation posts and Safety Officer positions with numerous military organizations and civilian companies. In these, we wrote and mentored UAS standards, novel CONOPs and training packages, and ran fleet-wide safety programs.

<u>Forward-deployed UAS Unit Establishment</u>

UMEX team members formed the inaugural UAS squadron at Tallil Air Base, Iraq, which involved the design, establishment, implementation and command of a new, forward-deployed UAS unit at a novel airport under austere conditions. This included all aspects of structural layout, communications, operations, airspace integration, frequency management and engineering.

Intelligence, Surveillance and Reconnaissance (ISR)

UMEX' team members have significant experience with ISR and remote sensing technology, and we offer worldwide capabilities to provide honest broker technology support in these areas. Our intelligence and image analysts have a wide range of ISR programmatic and teaching experience, including the development of the UK's first Qualified Weapons Instructor (QWI) ISR course. This course covered all aspects of UK/Coalition ISR fusion, intelligence, sensor systems and integration and dissemination systems. QWI courses are the Royal Air Force or Royal Navy equivalent to the United States Air Force Weapons School Course or US Navy's TOPGUN School. UMEX is at the forefront of translating military lessons-learned about the UAS ISR role for operational and tactical LE/PS/HLS.

UMEX also believes strongly that focusing on UAS platforms and sensors can detract from the real requirements of the mission, which is most often an intelligence product (full motion video, still imagery, tracking information, communications recordings, etc.). UMEX approaches UAS utilization from a 'full spectrum' ISR standpoint and considers the entire Tasking-Collecting-Processing-Exploiting-Disseminating (TCPED) chain of intelligence product delivery. This approach delivers practical and workable solutions that address the many requirements of a problem domain such as border security, rather than simply providing a platform or sensor capability.

Integrated Border Enforcement

UMEX SMEs have supported U.S.-Canadian (CANUS) border integrity and integrated border enforcement partnerships, and the RDT&E, operational integration, and deployment of border security technology. Our SMEs work with practitioners and agencies in the field and at the headquarters level to help technology developers understand operational and environmental requirements, evaluate technologies under real-world conditions, and adapt technologies to provide better products for border security.

Operational Evaluations, Testbed Development and Counter-Drone

UMEX currently holds 333 exemptions that permit commercial aerial data collection operations with 9 types of small UAS (SUAS) that we maintain in our fleet, including industry-leading fixed wing and vertical takeoff and landing (VTOL) aircraft. UMEX can provide a SUAS platform and professional crew to support operational evaluation of aerial data collection instruments and CONOPS, either at our testbed facilities, or at customers' locations. We are also teamed with Liteye Systems to offer the AUDS Anti-UAV Defense System for UAV detection, tracking and disruption.

Aerial data collection includes any remote sensing and measuring by an instrument(s) aboard the unmanned aircraft. Examples include imaging (photogrammetric, video, thermal infrared, etc.), electronic measurement (geophysical, lidar, signals intelligence, etc.), chemical measurement (particulate measurement, etc.), or any other gathering of data by instruments aboard the aircraft. Examples of recent UMEX work in this area include:

- Counter-Drone operational evaluation support, which included providing SUAS targets and flying support as well as the AUDS for evaluation
- Development of a law enforcement and public safety testbed in cooperation with law enforcement and fire agencies in Colorado
- Test and evaluation support for electrical tower, bridge and wind turbine infrastructure inspection, including aircraft, pilot, crew and data reduction
- Operational testing and data collection supporting the development of cutting-edge software for UAS tasking and management and ground-based sensor placement with simulator and live-flight trials at Fort Huachuca using RQ-7B Shadow UAS.

LE/PS/HLS RDT&E

Forensics

UMEX conducted an R&D project under a cooperative agreement with the National Institute of Justice (NIJ), the science and technology arm of the U.S. Department of Justice, to evaluate the use of SUAS photogrammetry for capturing forensic accident scene information and expediting scene clearance. UMEX continues to pursue SUAS photogrammetric quality, reliability and forensic RDT&E work in partnership with organizations such as the American Society for Photogrammetry and Remote Sensing (ASPRS), the U.S. Geological Survey (USGS), and the Northeast UAS Airspace Integration Research Alliance (NUAIR), the program manager for the FAA-designated Griffiss UAS Test Site. In December 2013 the FAA designated Griffiss International Airport (Griffiss) in Rome, NY as one of six national UAS test sites to aid in researching the complexities of integrating UAS into civil airspace.

C2 Integration

Is working with NASA on the UAS Traffic Management (UTM) project under a Space Act Agreement (SAA) to investigate the integration of UAS into civil C2 architectures such as Next Generation 911 and the Incident Command System. We are applying our military and homeland security subject matter expertise in this area to help support the broad adoption of UAS technology by LE/PS/HLS agencies.

Communications Operability and Interoperability

UMEX is working in partnership with UAS manufacturer Aeryon Labs of Canada to evaluate airborne mobile ad-hoc networking (MANET) for LE/PS/HLS using the Aeryon SkyRanger as an airborne communications relay node in Trellisware's Tactical Scalable MANET (TSM™)

UMEX is also participating in the National Public Safety Telecommunications Council (NPSTC) UAS and Robotics Working Group to improve public safety communications and interoperability. NPSTC's member organizations represent fire, EMS, law enforcement, transportation, and telecommunications organizations, and combined, NPSTC provides a powerful, united voice on vitally important issues that affect public safety telecommunications. Other UMEX support for NPSTC includes participation in the Cross-Border Communications Working Group and the development of the U.S.-Canadian Cross-Border Communications report.

The NPSTC (UAS&R WG) was formed to address specific goals and objectives regarding public safety's UAS needs and usage, in partnership with NPSTC's participating organizations such as the International Association of Chiefs of Police (IACP), our DHS sponsors, the National Institute of Science and Technology (NIST), the Federal Aviation Authority (FAA), and other participants in the private, public and academic sectors.