AF SUAS & the future of Micro SUAS

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This Briefing Is: UNCLASSIFIED
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Purpose/Overview

- Purpose:
  - Update on Air Force Small Unmanned Aircraft System (SUAS) Family of Systems
  - Vision of the Future – Focus for Technology

- Duration: 40 minutes
# AF UAS Capabilities

<table>
<thead>
<tr>
<th>Low Capability</th>
<th>Range / Endurance / Payload</th>
<th>High Capability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nano/Micro</td>
<td>Air-Launched</td>
<td>Mid-High Altitude Multi-Role</td>
</tr>
<tr>
<td>Man Portable</td>
<td>Multi-Mission</td>
<td>Rated UAS Aviators</td>
</tr>
<tr>
<td>Air-Launched</td>
<td>Expendable - ISR</td>
<td>SUAS Operators</td>
</tr>
<tr>
<td>Multi-Mission</td>
<td>Recoverable - ISR</td>
<td></td>
</tr>
</tbody>
</table>

- **RAVEN B**
- **WASP III**
- **BATMAV**
- **MQ-1 Predator**
- **MQ-9 Reaper**
- **RQ-4 Global Hawk**

**Small UAS**

**EXPENDABLE - ISR**

Under Development

**RECOVERABLE - ISR**

**Scan Eagle/ TIER II STUAS**

**DARPA**

**Rated UAS Aviators**

**SUAS Operators**

**Integrity - Service - Excellence**
Nano Category

- NANO:
  - DARPA only focus at this point
  - Searching for ways to navigate / communicate inside buildings
  - Transformers approach flying and crawling together for sensing other capabilities other than visual
Battlefield Air Targeting Micro Air Vehicle:

- AF Program of Record
  - Fielded with AF Battlefield Airmen
  - Close-in reconnaissance and situational awareness
- USMC, USA and SOF purchasing, Customs Border Patrol are evaluating system for their use
Service common success story:

- Ground-launched RSTA – Filled by the joint service RQ-11 B (Raven B) – Army has lead over RQ-11B
  - AF Battlefield Airmen
  - AF Security Forces
  - TACP
Two major categories

- Expendable – Off-Board Sensing
  - Assist through the weather (WX) sensing for current and next generation gunships

- Recoverable – Off-Board Sensing
  - Extend the ability of other unmanned systems MQ-1/9 Predator/Reaper for multiple target tracking and through the WX
**Multi-Mission Category**

- ISR Gap filler between Raven and Predator:
  - Currently filled by an interim solution for AF Security Forces
    - Ground Situational Awareness Toolkit (GSAT) – Scan Eagle
    - Purchased as a concept demonstrator by the AF UAV Battlelab

- AF teaming with USMC and USN for a joint program of record called Tier II Small Tactical UAS (STUAS)
  - Approved by JROC on 17 Sep 08
SUAS – Key Issues #1

- SUAS Frequency Use / Allocation
  - Frequency loss in some foreign countries
  - Need digital data links for SUAS – phased approach

- SUAS National Air Space access
  - AFSOC lead command for AF / USSOCOM airspace requests
  - SUAS flights outside of Restricted Airspace requires an FAA waiver / COA
SUAS Key Issues #2

- Service cooperation on SUAS operator joint training standards and certification
  - SUAS operators already attend similar training on Wasp III, Raven B
  - Tier II presents excellent opportunity joint training
    - AF Security Forces will train under a joint Basic and Initial Qualification Training (B/IQT) course
SUAS Micro Focus – System

- **SUAS Operator (SUASO)**
- **Air Vehicle (AV)**
- **Payload/Sensor**
- **Ground Control Station**
- **Maintenance Manning /CLS Depot**
- **Additional User/SUASO**
- **Information Exploitation (PED)**
- **Communications**
- **Purpose, Task or Mission**

**Inegrity - Service - Excellence**

**SUAS Micro Focus – System**
SUAS Micro Focus – System

SUAS Operator (SUASO)

Air Vehicle (AV)

Ground Control Station

Purpose, Task or Mission

Payload/Sensor

Air Control Station

Communications

Maintenance Manning /CLS Depot

Additional User/SUASO

Information Exploitation (PED)

Component of ISR

SUAS Operator (SUASO)

Air Vehicle (AV)

Ground Control Station

Communications

Maintenance Manning /CLS Depot

Additional User/SUASO

Information Exploitation (PED)

Component of ISR
Micro: Human Machine Interface (HMI) Challenges

- Training Selection
  - Software to ID dexterity/aptitude
- Training requirements - SUASO
  - Basic airmanship interactive training
  - Realistic simulation environment without flying
  - Error/Malfunction generation to allow practice of Eps/lost link

SUAS Operator (SUASO)

Maintenance Manning /CLS Depot

Additional User/SUASO
Micro: HMI Challenges (Cont)

- Human – Machine Interface (HMI) – ergonomics, voice recognition
- GCS/ACS – Integrated systems
  - Digital
  - Self-healing software
  - Software versus hardware – REDUCED WEIGHT
  - Cursor-on-target
  - COT interface – non proprietary
  - Standard interfaces – USB / future with ability for legacy interface
- Embedded training
Micro – HMI Challenges (Cont)

- Visual Cueing – lighting
- Acoustic cueing
  - Human / Animal
- Safety of design
- Ease of use / understanding

- Barcoding – Computer Scan
  - Ability to track all components
  - Component checks – BIT
  - Uploading latest upgrades
  - Common language

SUAS Operator (SUASO) → Air Vehicle (AV) → Payload/Sensor → Maintenance Manning /CLS Depot
Air Vehicle
- Reliable components, production standards
- Better – longer lighter batteries
- Propulsion
- Portability
- Navigation w/o GPS
- All-environment capable
- Open architecture
- Documentation
- Transformable / Modular

Sensor
- Modular
- Multi-INT
- Plug & Play
- Day/Night PID personnel
- Accuracy
- Stabilization on board
- Compression
- Sense & Avoid
- Automatic Recognition
Micro: Data Links Challenges

- Secure / Agile
- Digital Compressed
- Flex Availability
- Alternate Waveforms / Gateways
- Backwards Compatible Analog
- No added weight
Micro: ISR Exploit Challenges

- Secure
- No impact to user
- Timely analysis
- Annotated feedback either text or still image
- Common / protected access

Communications
Component of ISR

Information Exploitation (PED)
AF SUAS Technology Focus

- #1 – Track and Awareness – ability to track our SUAS and know where it is
- #2 – Spectrum Friendly Comms – tunable, digital, jam-resistant, secure, IP-addressable
- #3 – Better Smaller Sensors – Less than 2 lb EO/IR, Small “INT” packages
- #4 – More Power – improve endurance and speed w/o weight, fast recharge, alternative cell technology, small heavy fuel engine
- #5 – Autonomous Navigation – without GPS
- #6 – Sense and Avoid – small sensors to sense and prompt avoiding actions
- #7 – Next Generation – new designs for “transformer system”
Summary

- AF working to integrate all levels of SUAS into its manned / unmanned force mix
- Many opportunities exist for joint collaboration and commonality
- AF supporting COCOMs to get SUAS capabilities to the warfighter faster and smarter
- AF seeks technology from industry and academia to keep our edge in a competitive marketplace
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