

Headquarters U.S. Air Force

Integrity - Service - Excellence

AF SUAS & the future of Micro SUAS



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AFSOC Unmanned System
Technologies**

**Approved for Public Release
AFSOC/PA Oct 08**



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Classification

This Briefing Is: **UNCLASSIFIED**

Classified by:

Reason:

Declassify on:

Approved for Public Release

■ **Purpose:**

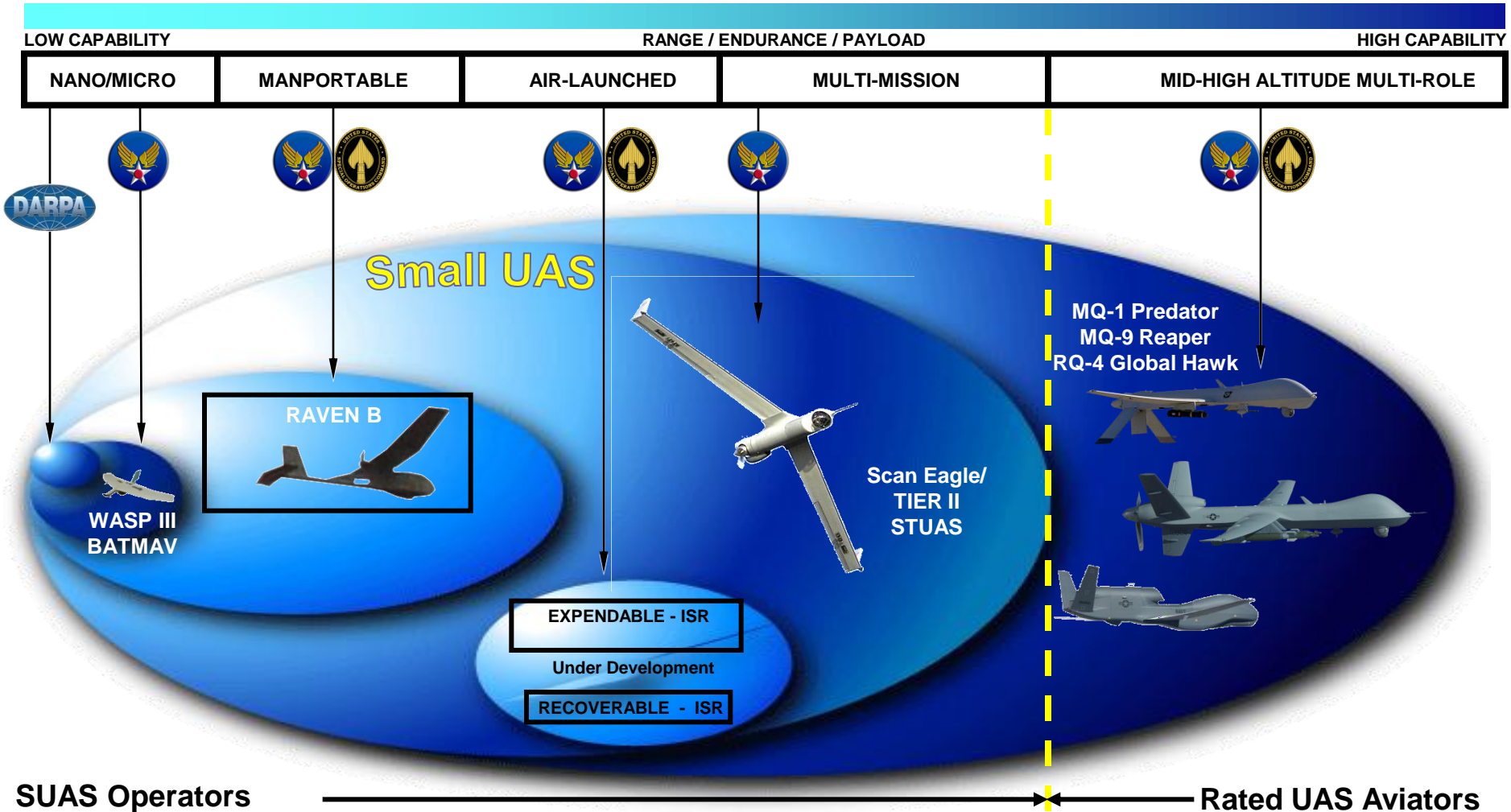
- **Update on Air Force Small Unmanned Aircraft System (SUAS) Family of Systems**
- **Vision of the Future – Focus for Technology**

■ **Duration: 40 minutes**



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AF UAS Capabilities

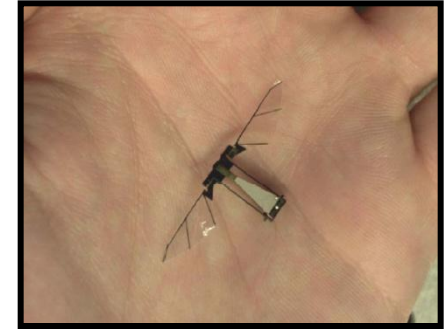
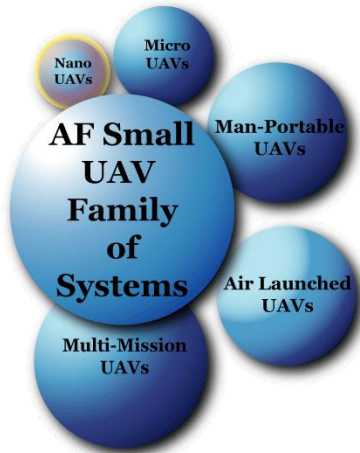


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Nano Category



Tech Demo

Fielded

Interim

Unfunded

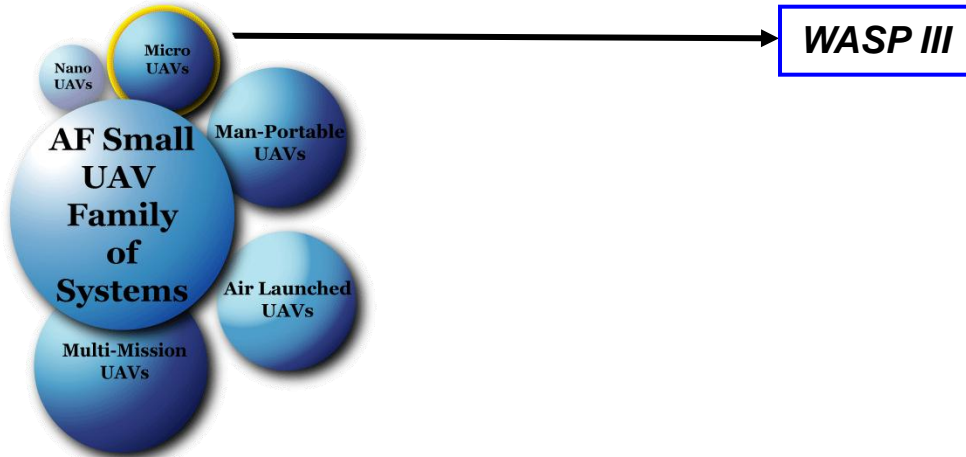
■ NANO:

- 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



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Micro Category



Wasp III

Tech Demo

Fielded

Interim

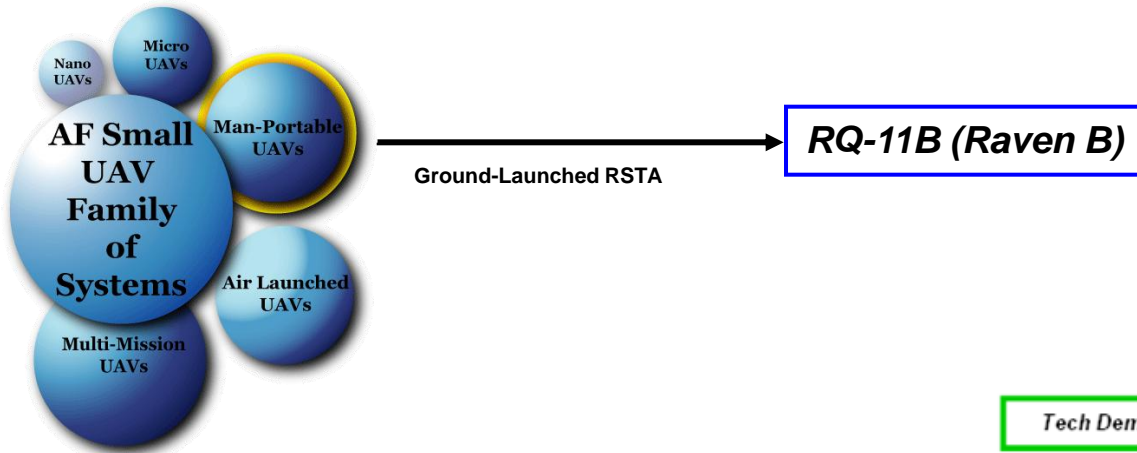
Unfunded

- **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**



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Man-Portable Category



Raven B



Tech Demo

Fielded

Interim

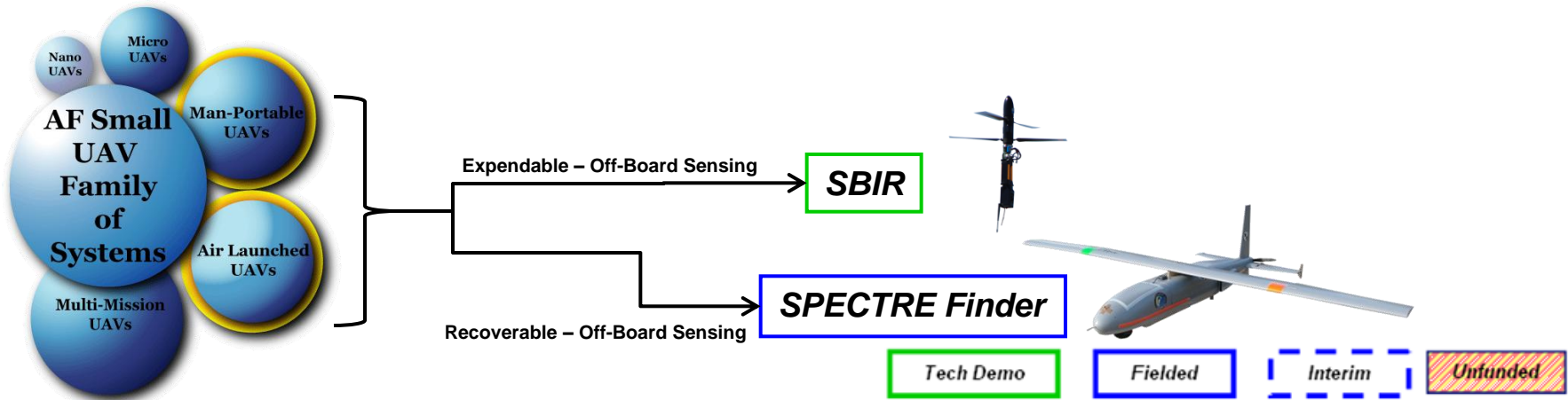
Unfunded

- 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



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Air-Launched Category



■ Two major categories

■ Expendable – Off-Board Sensing

- Assist through the weather (WX) sensing for current and next generation gunships

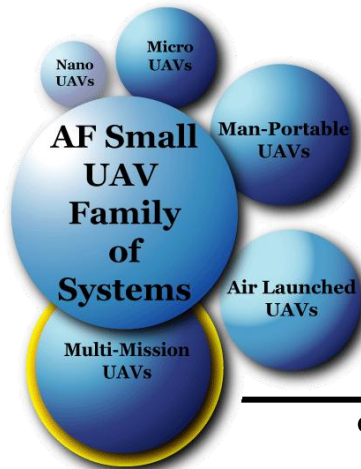
■ Recoverable – Off-Board Sensing

- Extend the ability of other unmanned systems MQ-1/9 Predator/Reaper for multiple target tracking and through the WX



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Multi-Mission Category



Ground-Launched RSTA

Scan Eagle

Tech Demo

Fielded

Interim

Unfunded



Scan Eagle

■ 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



AF Security Forces set-up control antenna for Scan Eagle



Wasp II / Raven B

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



AF Wasp III

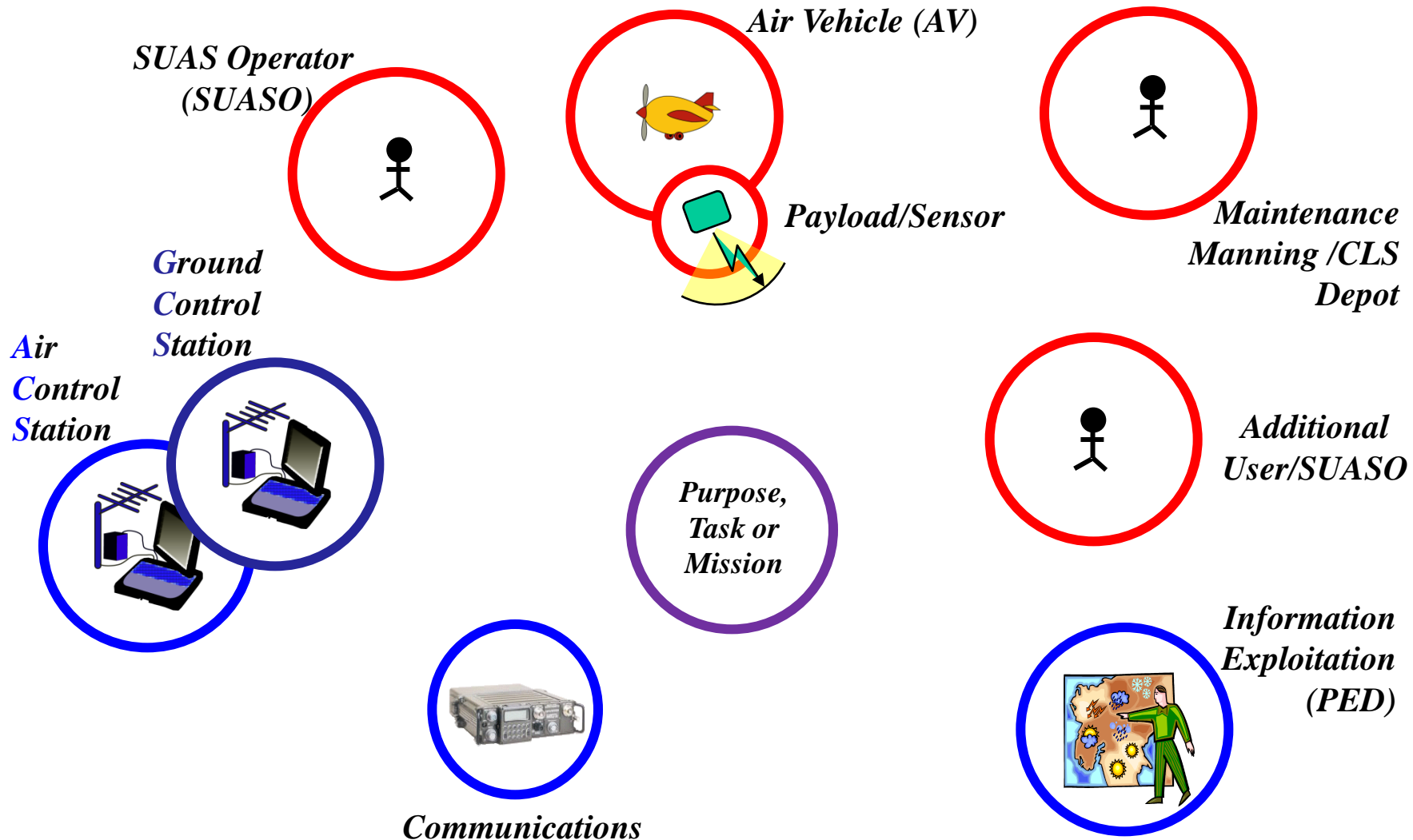


AF Raven B

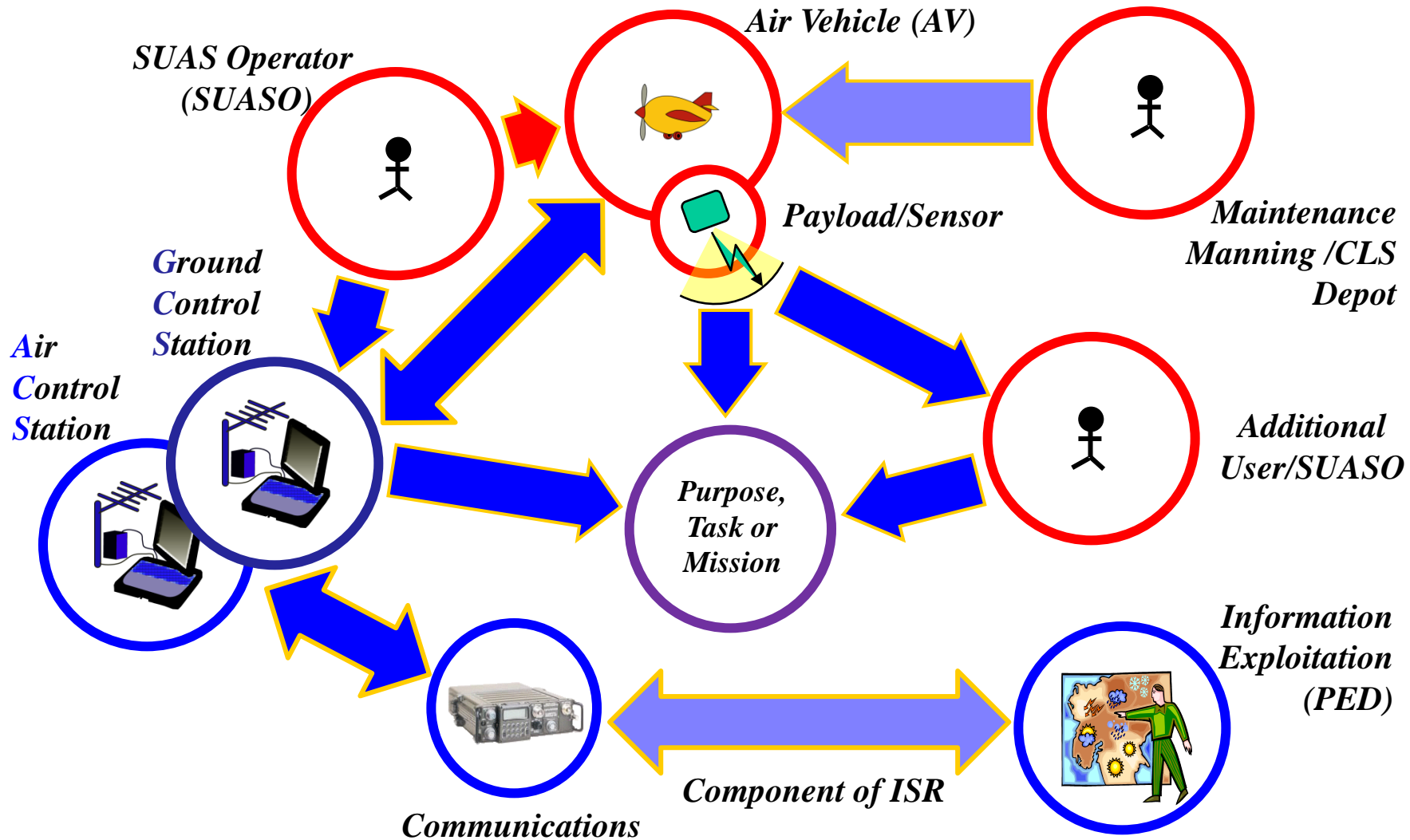


AF Scan Eagle

SUAS Micro Focus – System

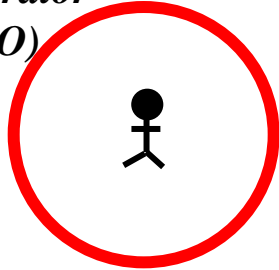


SUAS Micro Focus – System

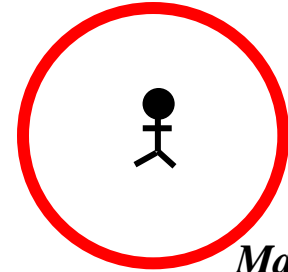


Micro: Human Machine Interface (HMI) Challenges

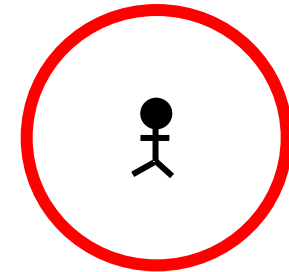
*SUAS Operator
(SUASO)*



*Maintenance
Manning /CLS
Depot*

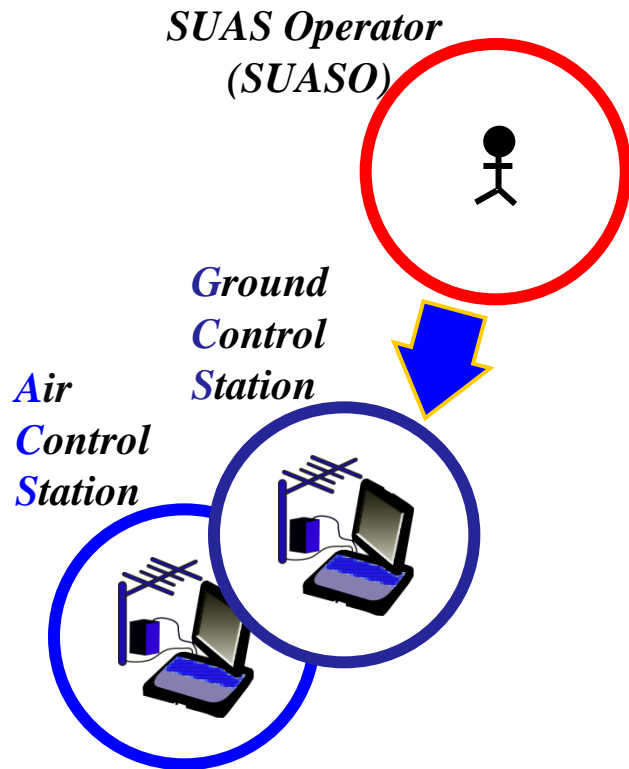


*Additional
User/SUASO*



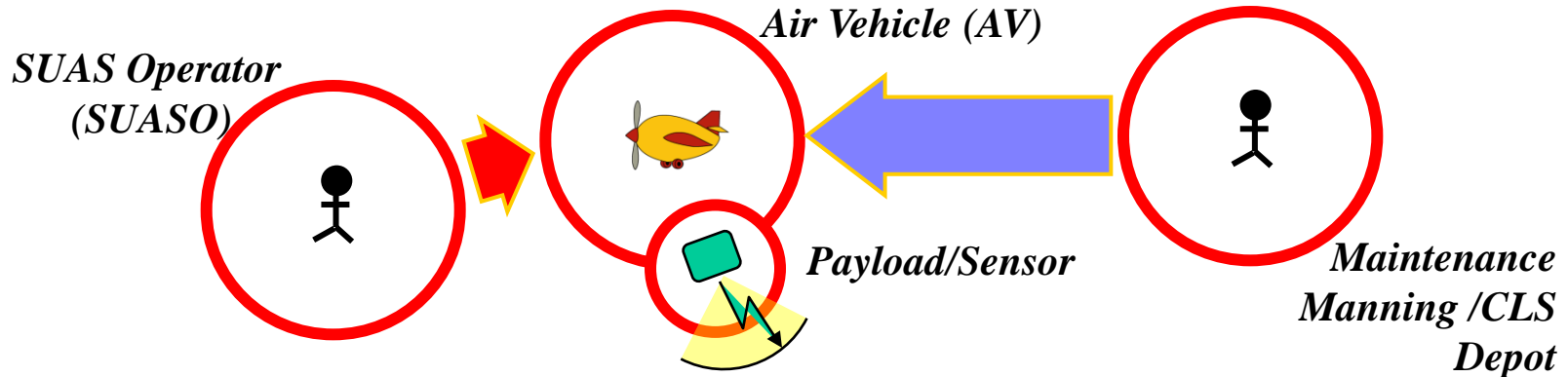
- **Training Selection**
 - **Software to ID dexterity/aptitude**
- **Training requirements - SUASO**
 - **Basic airmanship interactive training**
 - **Realistic simulation environment without flying**
 - **Error/Malfunction generation to allow practice of Eps/lost link**

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

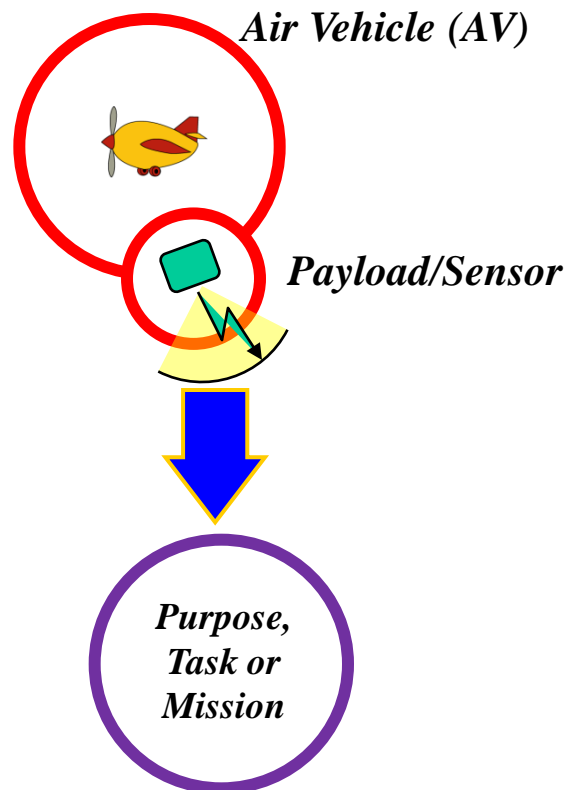


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Micro: Air Vehicle / Sensor Challenges

Air Vehicle

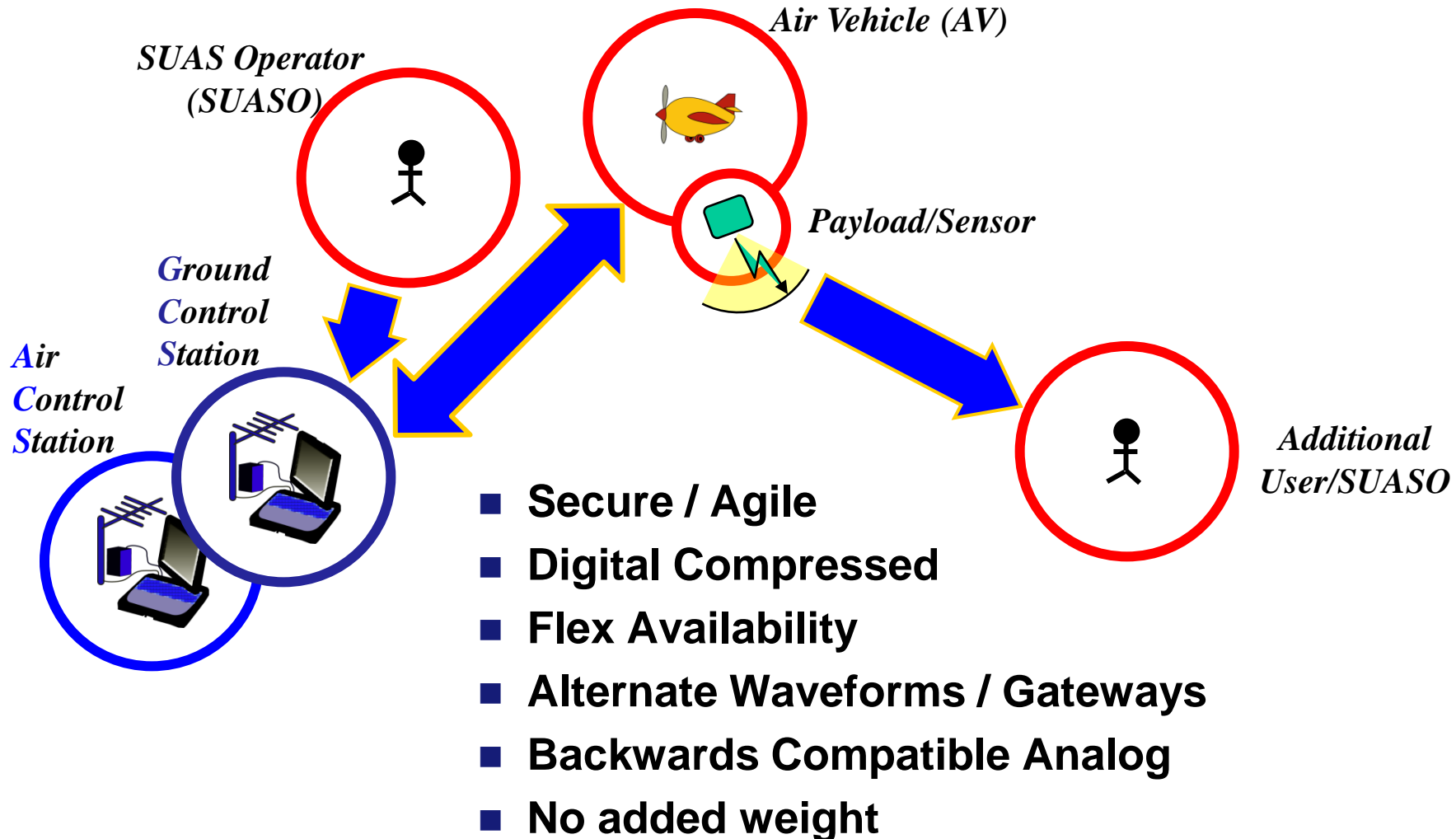
- Reliable components, production standards
- Better – longer lighter batteries
- Propulsion
- Portability
- Navigation w/o GPS
- All-environment capable
- Open architecture
- Documentation
- Transformable / Modular



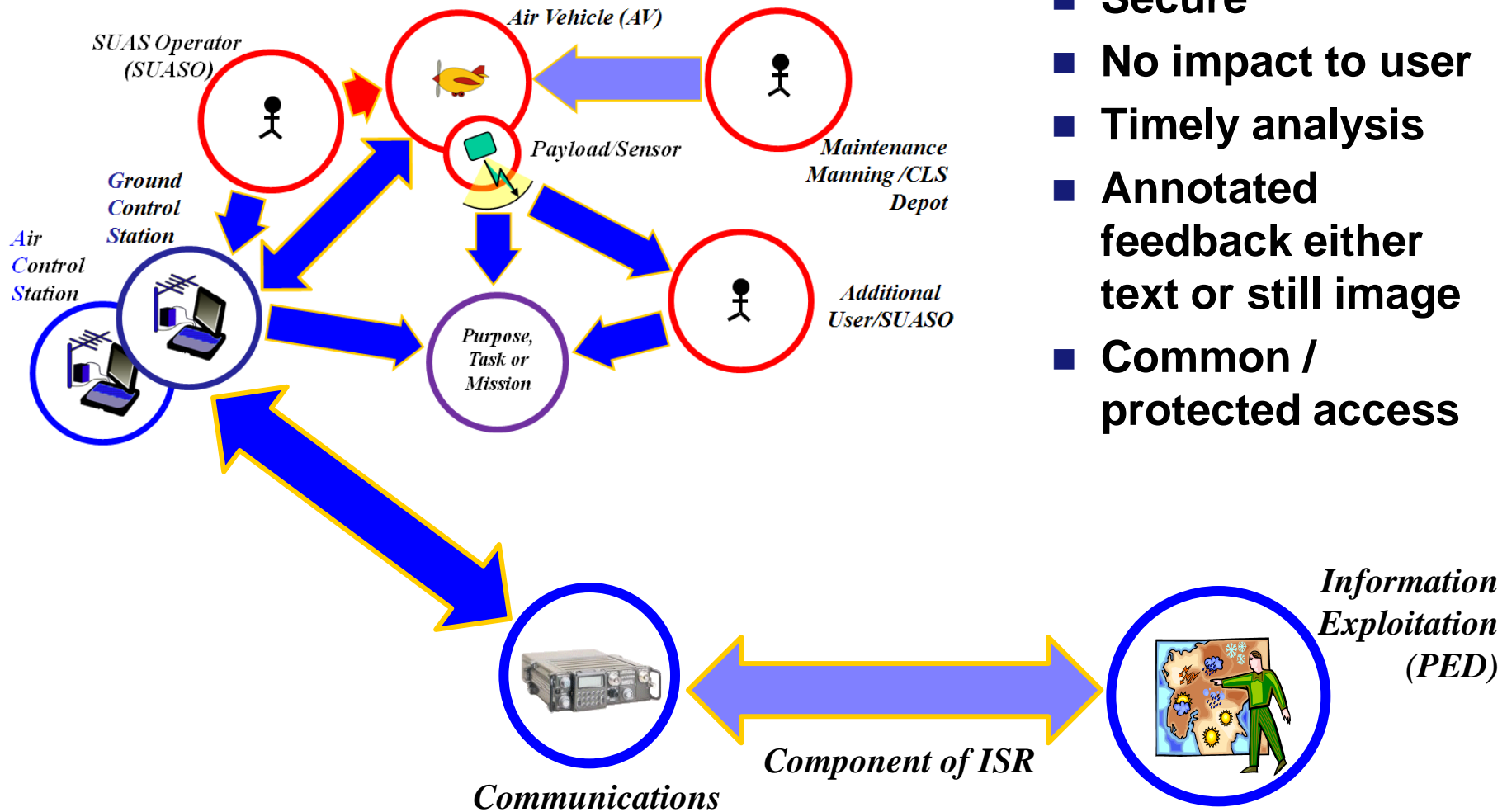
Sensor

- Modular
- Multi-INT
- Plug & Play
- Day/Night PID personnel
- Accuracy
- Stabilization on board
- Compression
- Sense & Avoid
- Automatic Recognition

Micro: Data Links Challenges



Micro: ISR Exploit Challenges



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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Questions

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