

Drone Wisdom

Commercially Available UAS

“We know where we are going, and we are on our way!”
RADM Moffett, USN, Medal of Honor Recipient & Architect of Naval Aviation 1920



J.C. Coffey
Executive Director
Unmanned Systems, Cherokee Nation

NASA UAS Workshop
March 2021

NASA – Blue UAS, Buy American, Commercially Available

Evolution

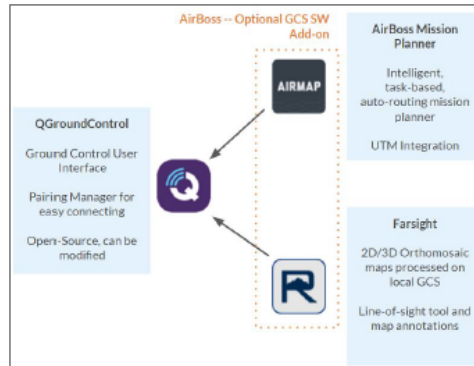
- *The History – Using DOD Lessons Learned*
- *Requirements and Capabilities*
- *The Threat*
- *Buy American*
- *Commercially Availability*

BLUE SUAS CONFIGURATION

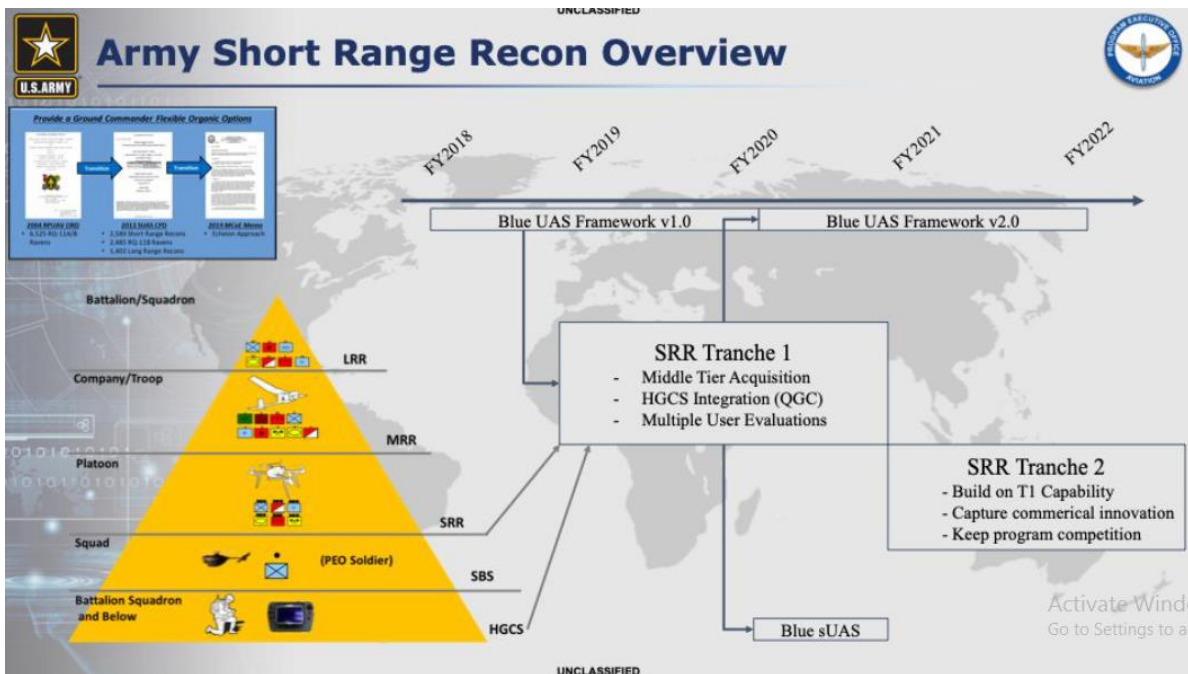
Leverage Army Program of Record investments to develop interagency solution

Features

- Open architecture: avoids vendor lock and allows simple integration with ground controller of choice
- Compliant with FY20 NDAA Section 848 and Trade Agreements Act
- DoD cyber validated: ATO to be granted for all 5 configurations
- Configurations available in ISM/DoD frequency bands
- Optional mission planning & photogrammetry/mapping SW



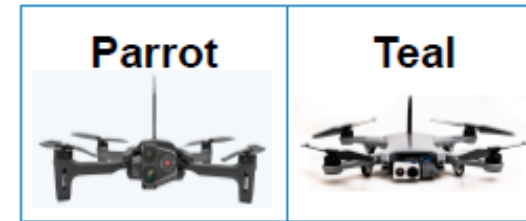
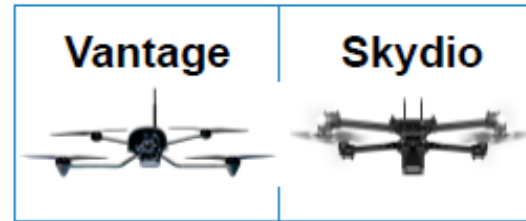
| Specifications | Capabilities |
|----------------------|--|
| Operational Range | 3+ kilometers |
| Flight Endurance | 30+ minutes |
| Environmental Rating | Flies through dust and rain (IP53) |
| Assembly Time | 2 minutes or less |
| Take-off Weight | Less than 3 lbs |
| Payload | High Resolutions Day/Night Stabilized Optics |
| Architecture | Built around an open source protocol (MAVLink) |



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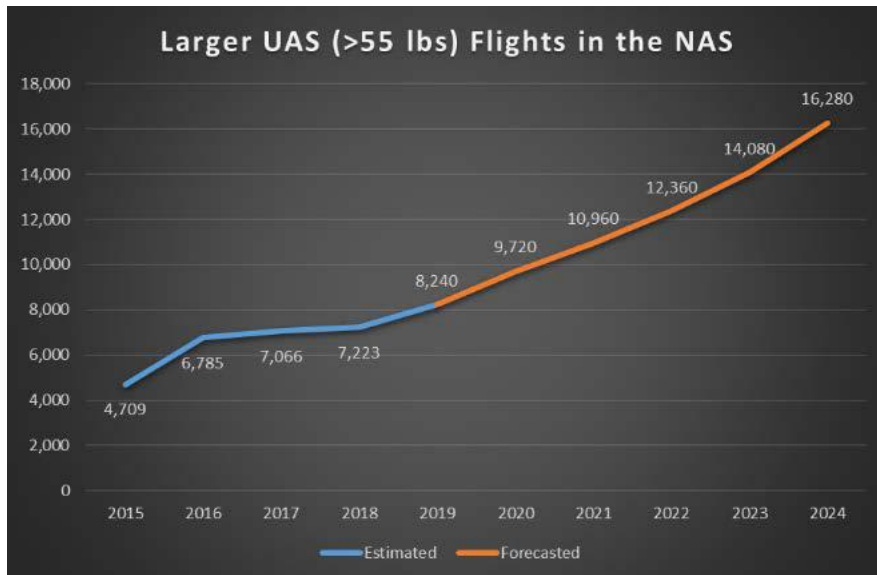
Path Forward

- *Not a UAS Problem, It is a consumer electronics problem!*
- *The Waiver Process is Available*
- *Numerous Platforms Coming*
- *Approved Parts Lists*
- *Mission Expansion into Larger UAS*



Top COA Applications

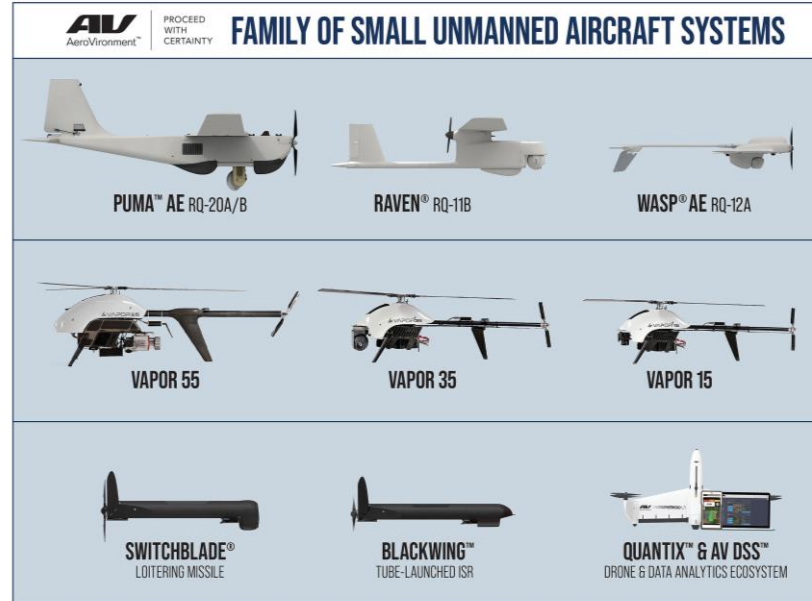
- Real Estate
- Construction
- Infrastructure
- Advertising
- Filmmaking
- Agriculture
- Events
- Emergency Management



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Additional Considerations

- Easily available
- AUVSI – UXS Database
<https://www.auvsimembers.org/eweb/dynamicpage.aspx?webcode=PlatformHome&site=platformdb>
- ~ 3700 platforms across 1350+ companies, ~ 1360 platforms from US Companies
- Advanced searches



WWW.AVINC.COM



| |
|-----------------------|
| ExEye |
| GoPro Karma |
| Indago 3 |
| MITRE Mini Quad |
| Nibbler |
| Nibbler 2.0 |
| Nibbler 3.1/ Sneebler |
| Parrot Anafi |
| Pegasus III |
| Phoenix ACE XL |
| Shield AI Nova |
| Skydio R1 |
| Skydio R3 |
| Skyfront Perimeter |
| SM UAS |
| Yuneec Typhoon H |
| Fixed Wing UAS |
| Gatewing X100 |
| Parrot Disco |
| SenseFly eBee |
| SenseFly eBee X |
| Storm |
| Zeta Sky Observer |
| Zipline |



UAS Regulatory Structure Risk Based Approach

Increasing risk to public / mitigations / requirements

Part 107, Small UAS

Operating Limitations
Size / Energy

Part 21 "Permit to Fly"
Pending Rule

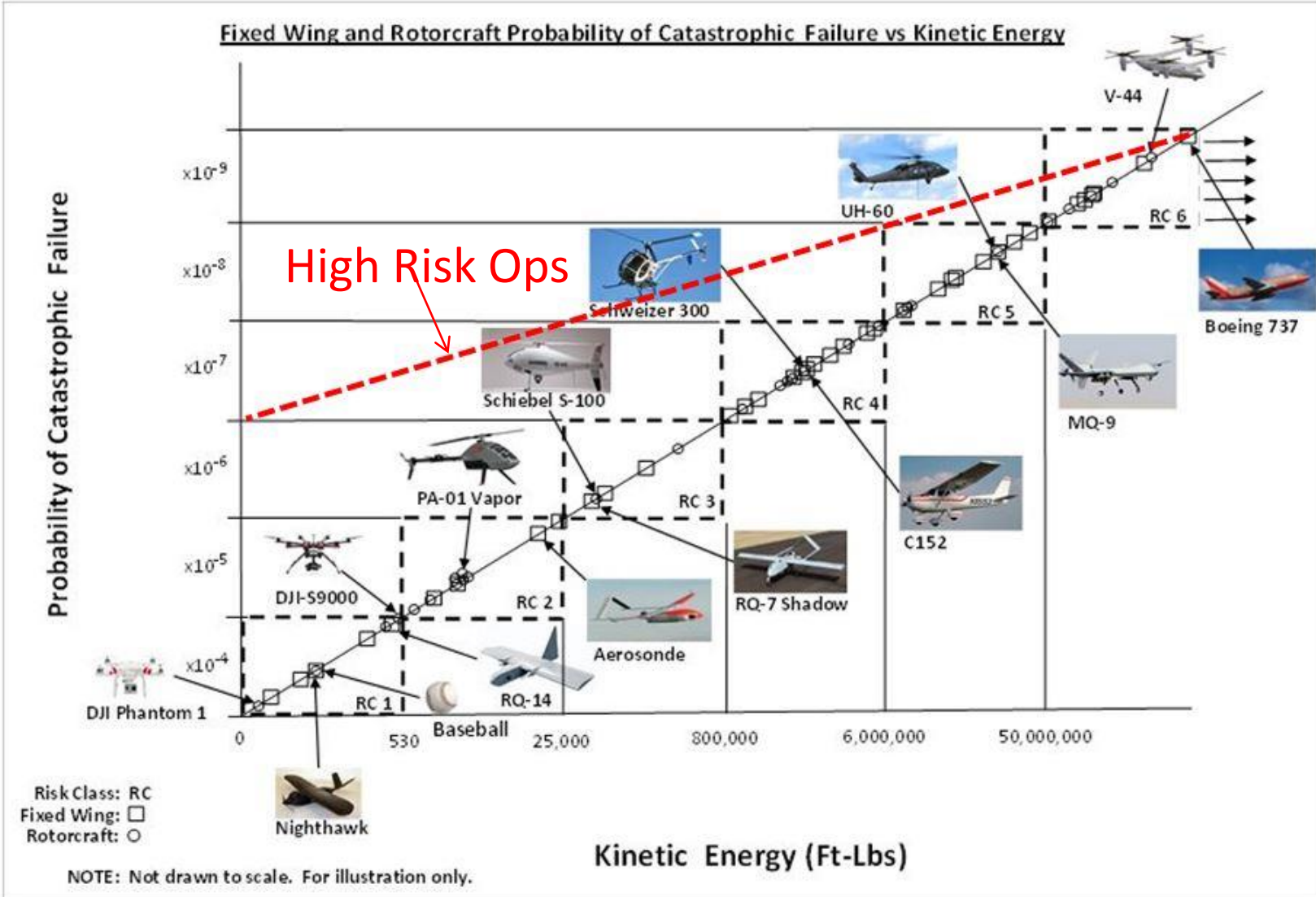
Airworthiness Certification
Industry Standards
Operating Limitations
Size/Energy

14 CFR 21.17(b) Special Class Type Certification

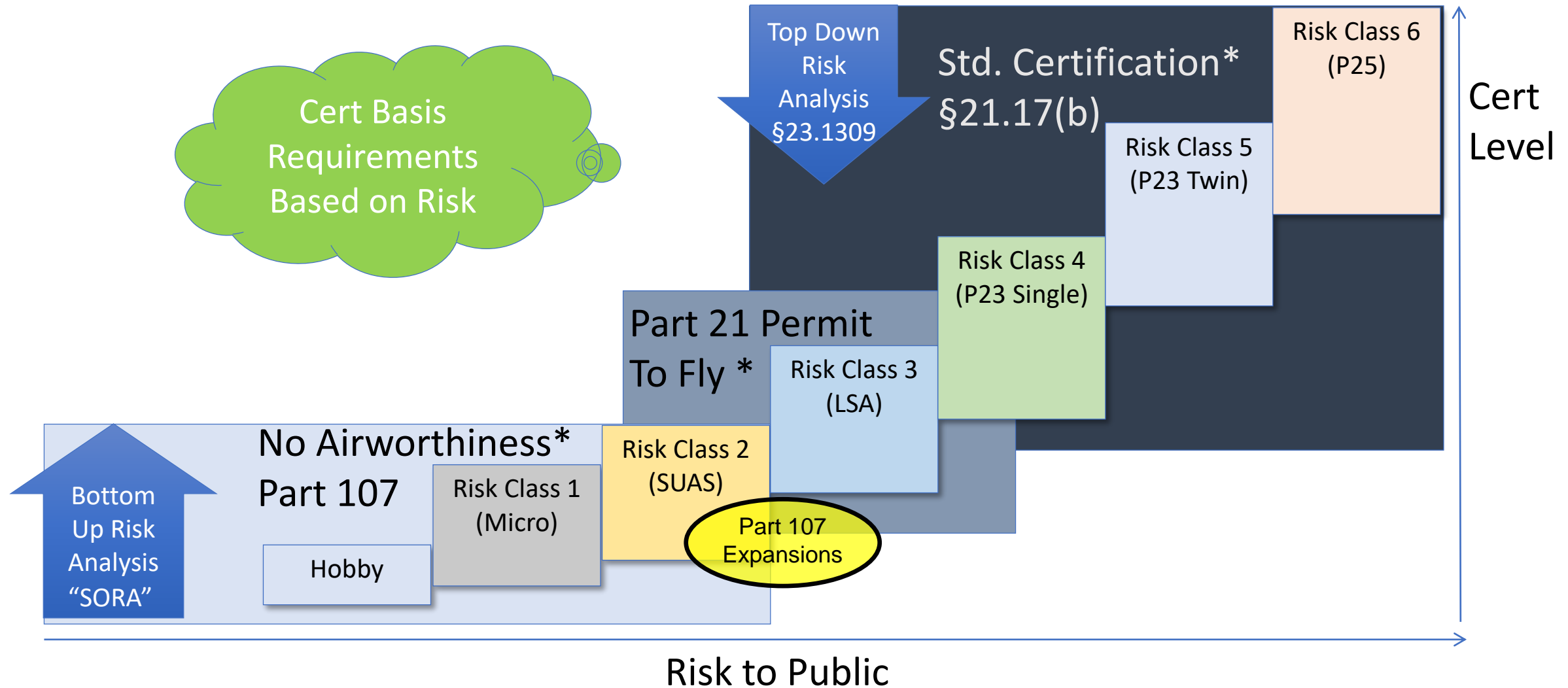
Airworthiness Certification
Production Approval/PC
Design Approval/TC
Customized Standards
Operating Limitations
Size/Energy

FAA UAS System Safety Targets – Initially Energy Based

- For Applicability of Airworthiness & Design Requirements
 - RC1 and RC2, Small UAS (Open, Part 107)
 - RC2 and RC3, Mid-Sized (Specific, Permit to Fly)
 - RC4 to RC6, Large UAS (Certified, Std. Cert)
- Does Not Set “Operational Safety” Target



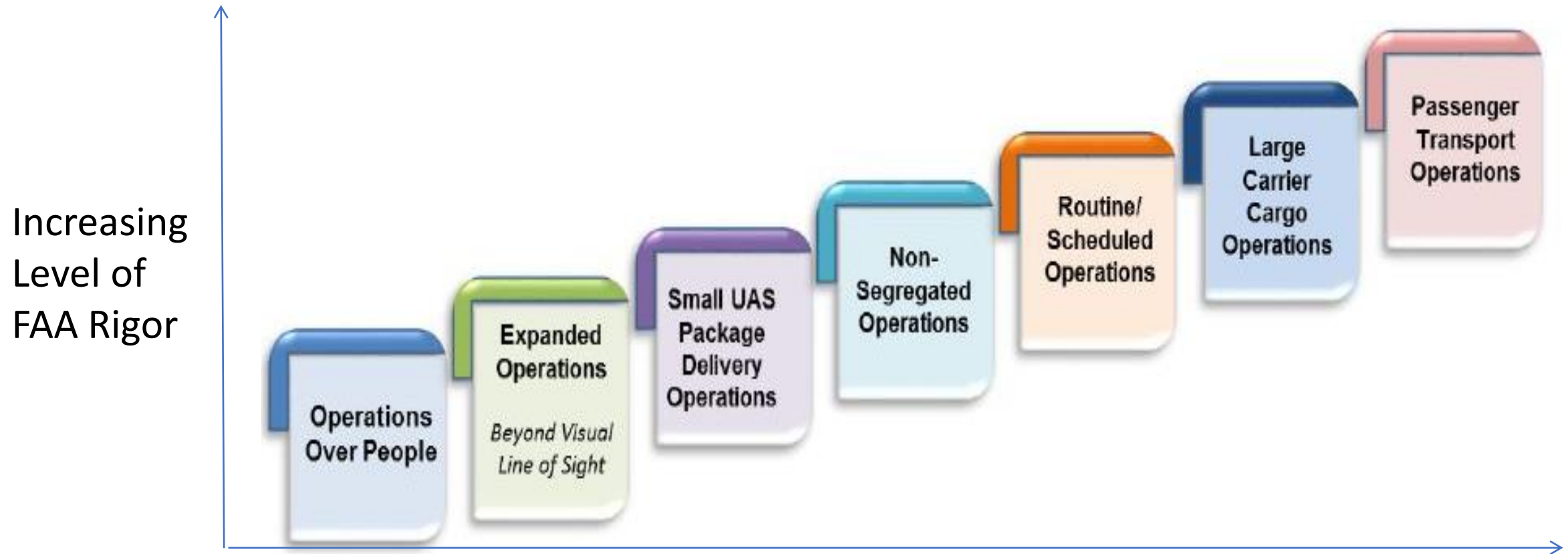
Resulting Risk-Classes Overlaid with Rules



- Dependent Upon Operational Integration
- LSA – Light Sport Aircraft

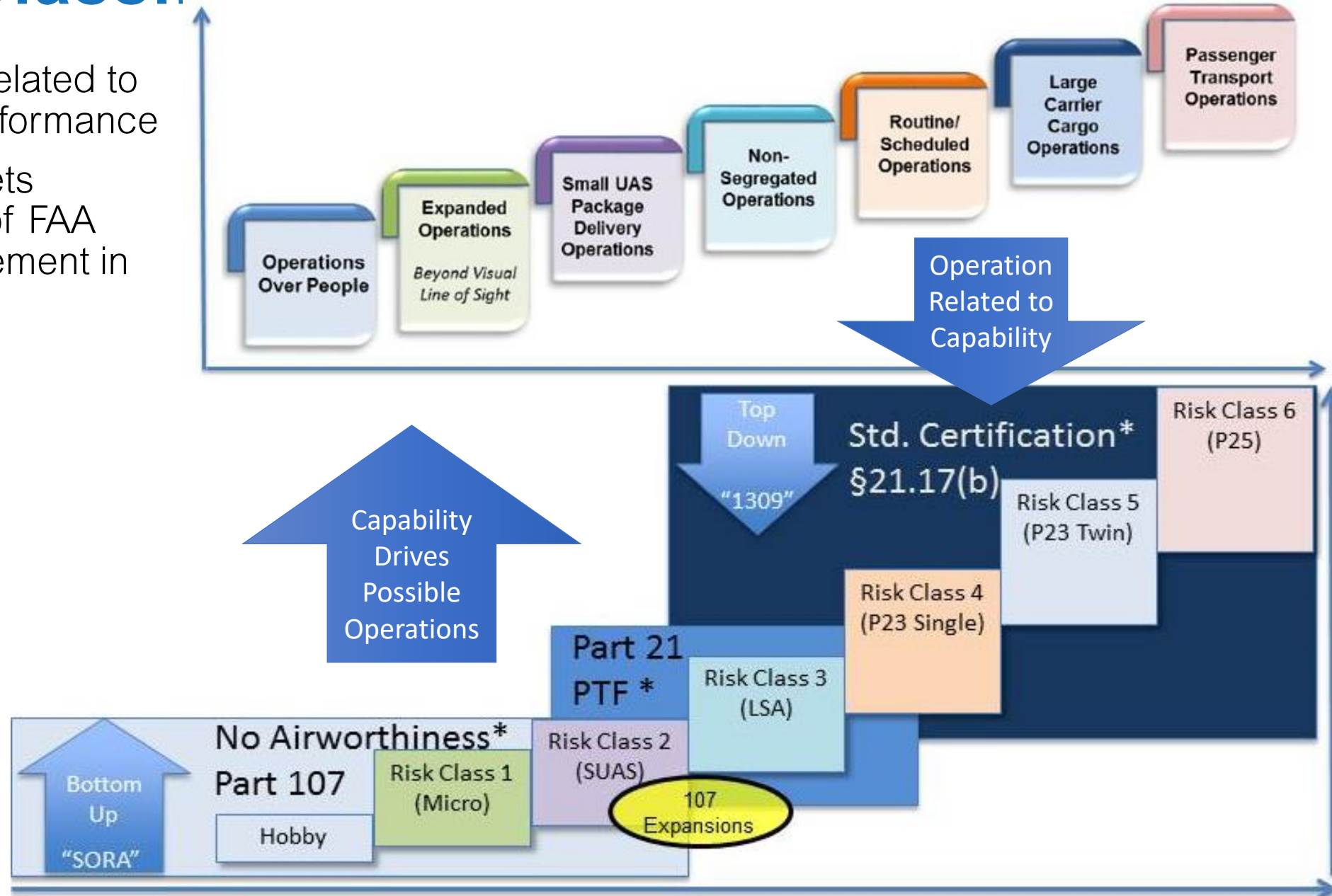
Risk-Based Operational Classification Strategy

- For Applicability of Operational Requirements - Address Operational Risk Exposure While Avoiding a “Zero-Risk” Mentality



The Two Classifications Are Notionally Related

- “Typical Use-Case” Related to Size, Capability, & Performance
- Level of Integration sets Requirements, Level of FAA Oversight, and Involvement in Tactical Operation



NASA – UAS and Underserved local community involvement

Breakout

Using UAS in local community involvement – Government and Beyond

- **With no limitations, what would you like to achieve with a UAS in the next 5-10 years?**
- **What is preventing you from achieving this and are UAS essential for its accomplishment?**
- **How can NASA help to remove these limitations?**

Introduction and Resources

- **Federal Tribal Interest Group for Unmanned Systems**
- **The NOAA Tribal Relations Website is: <https://www.legislative.noaa.gov/tribalrelations.html>**
- **The BIA Tribal Climate Resilience Program website is: <https://www.bia.gov/bia/ots/tribal-climate-resilience-program>**
- **The *Executive Order On Advancing Racial Equity and Support for Underserved Communities Through the Federal Government* specifically action items to address. (See Section 10)**

[Executive Order On Advancing Racial Equity and Support for Underserved Communities Through the Federal Government](#)

NASA – UAS and Underserved local community involvement

Executive Order On Advancing Racial Equity and

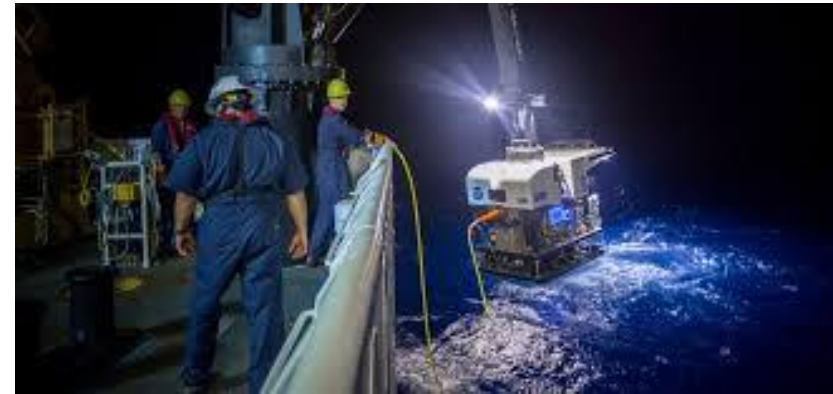
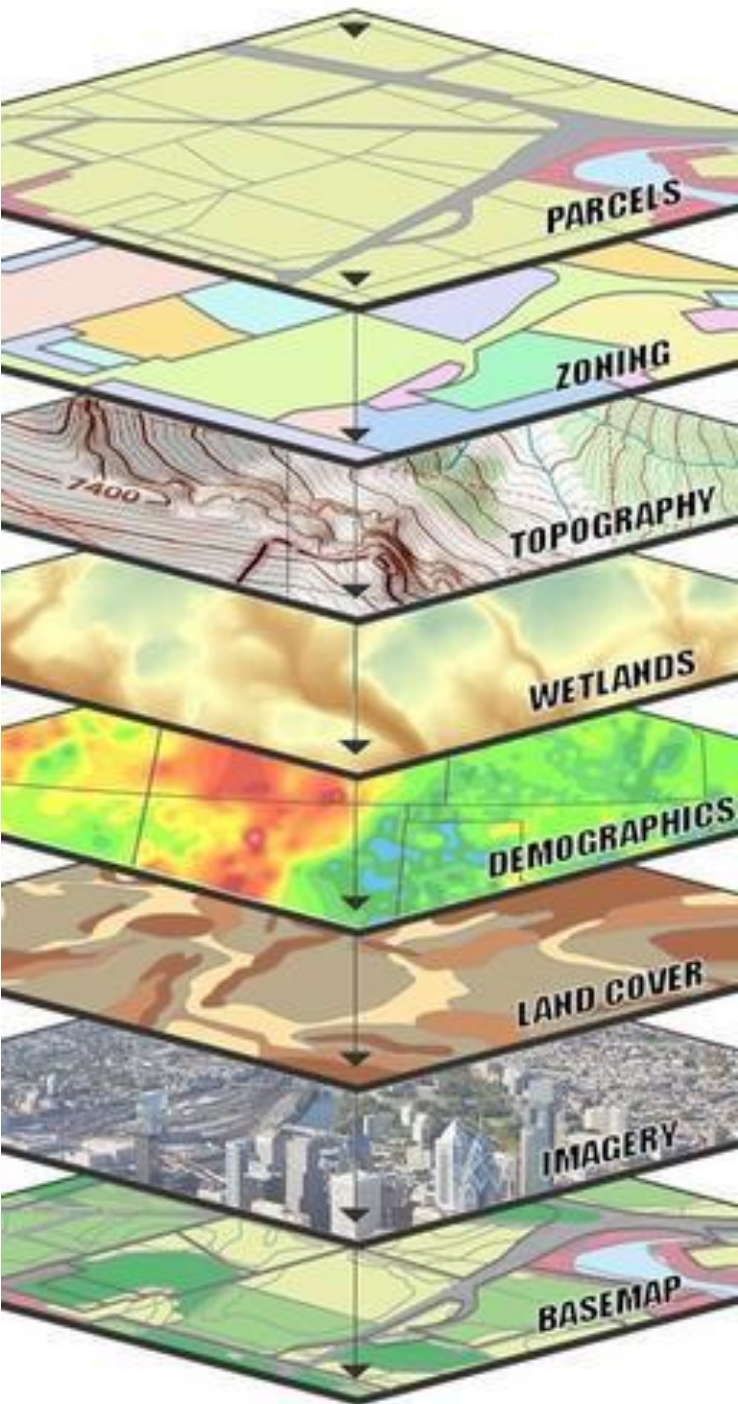
Support for Underserved Communities Through the Federal Government (Jan 2021)

- **The head of each agency, or designee, shall conduct such review and within 200 days of the date of this order provide a report to the Assistant to the President for Domestic Policy (APDP) reflecting findings on the following:**
- **(a) Potential barriers that underserved communities and individuals may face to enrollment in and access to benefits and services in Federal programs;**
- **(b) Potential barriers that underserved communities and individuals may face in taking advantage of agency procurement and contracting opportunities;**
- **(c) Whether new policies, regulations, or guidance documents may be necessary to advance equity in agency actions and programs; and**
- **(d) The operational status and level of institutional resources available to offices or divisions within the agency that are responsible for advancing civil rights or whose mandates specifically include serving underrepresented or disadvantaged communities.**

Our Vision is to be a leader in UXS...

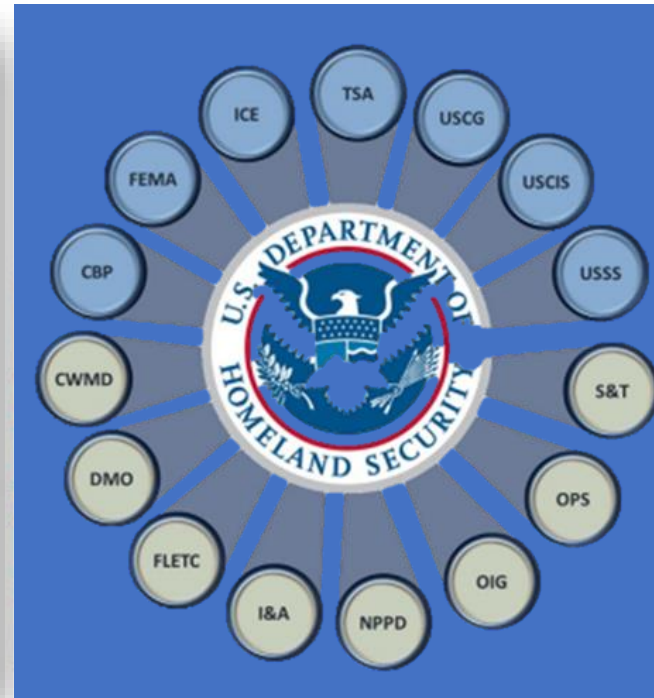
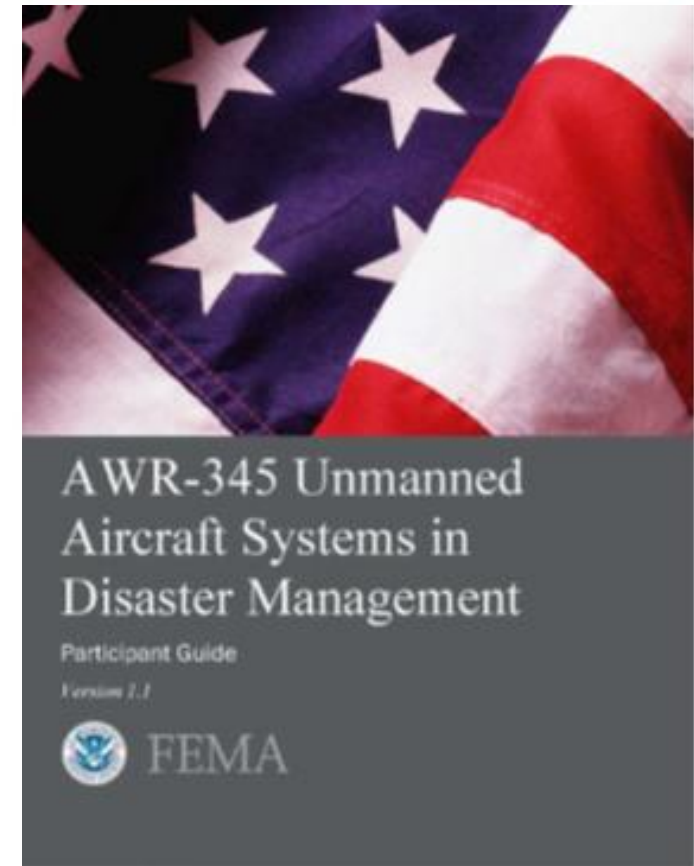
Native Americans have always been connected to nature, the environment and surroundings.

With drones and the IoT we will be more connected then ever at sea, in the air and on land the possibilities are endless. We will be there!



UAS Solutions – Getting Started

- User (requirements) understanding
- First Responder – First Net Integration with AT&T
- Data management, ML and AI
- Package & PPE delivery – FAA UAS IPP
- Infrastructure inspections – border wall, coastal, tunnel, power lines, bridges, cellular towers, etc.
- *Do you need your own air force? What part of it?*



| Missions | ISR | Inspection | Security | Mapping / GIS | SAR | Delivery / Retrieval | Comm Networks |
|-----------------|------------------|--------------------------------------|------------------|---------------|------------------|----------------------|------------------|
| Capabilities | | | | | | | |
| Navigation | US BORDER PATROL | | BIOHAZARD | CISA | US BORDER PATROL | BIOHAZARD | US BORDER PATROL |
| Mobility | CISA | | US BORDER PATROL | | | US BORDER PATROL | CISA |
| Comms | FEMA | U.S. DEPARTMENT OF HOMELAND SECURITY | CISA | FEMA | FEMA | FEMA | CISA |
| Decision Making | FLETC | | FLETC | | FLETC | FLETC | FEMA |
| Sensing | | | ICE | | | ICE | |
| Manipulation | X | | | X | | | X |
| Agencies | CWMD | CBP | CISA | FEMA | FLETC | ICE | USCG |

Cherokee Nation UAF FAA UAS IPP & Beyond – Pilot Shortage

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Level 1
certification



Level 2
certification



Level 3
certification

- Once size does not fit all when it comes to the level safety systems complexity required.
- Higher risk activities will require more complex safety systems and certification.
- The three levels of certification are directly proportional to the level of safety system requirements.

Parting Gifts

Big Data Expert in the “Drone Age.” Take a look: www.uswisdom.com

Sophisticated UXS Operations: <https://www.youtube.com/watch?v=M2WjYkyaJL8>

Expertise in protecting the C6 – Cyber & Counter-UXS

Data Management including ML & AI

Flight Safety International - Tribal Discount



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