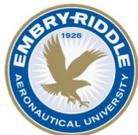




ASSURE Regulatory Research Update for REDAC SAS August 2021

Colonel, (USAF Retired) Steve 'Lux' Luxion, ASSURE Executive Director

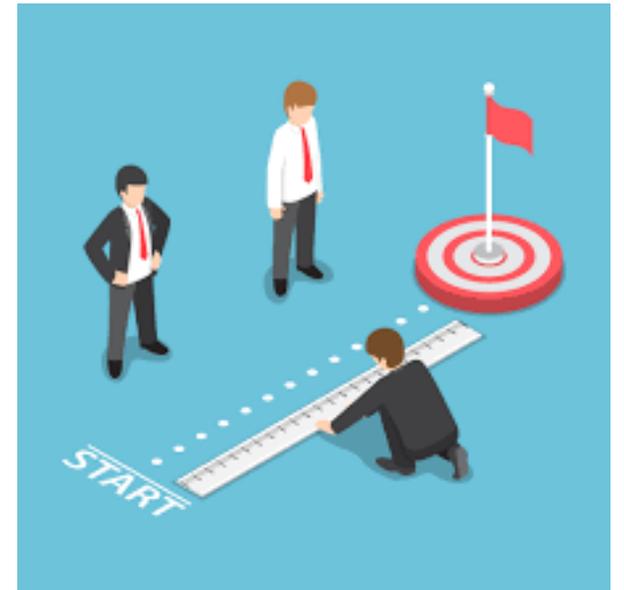
sluxion@ASSURE.msstate.edu



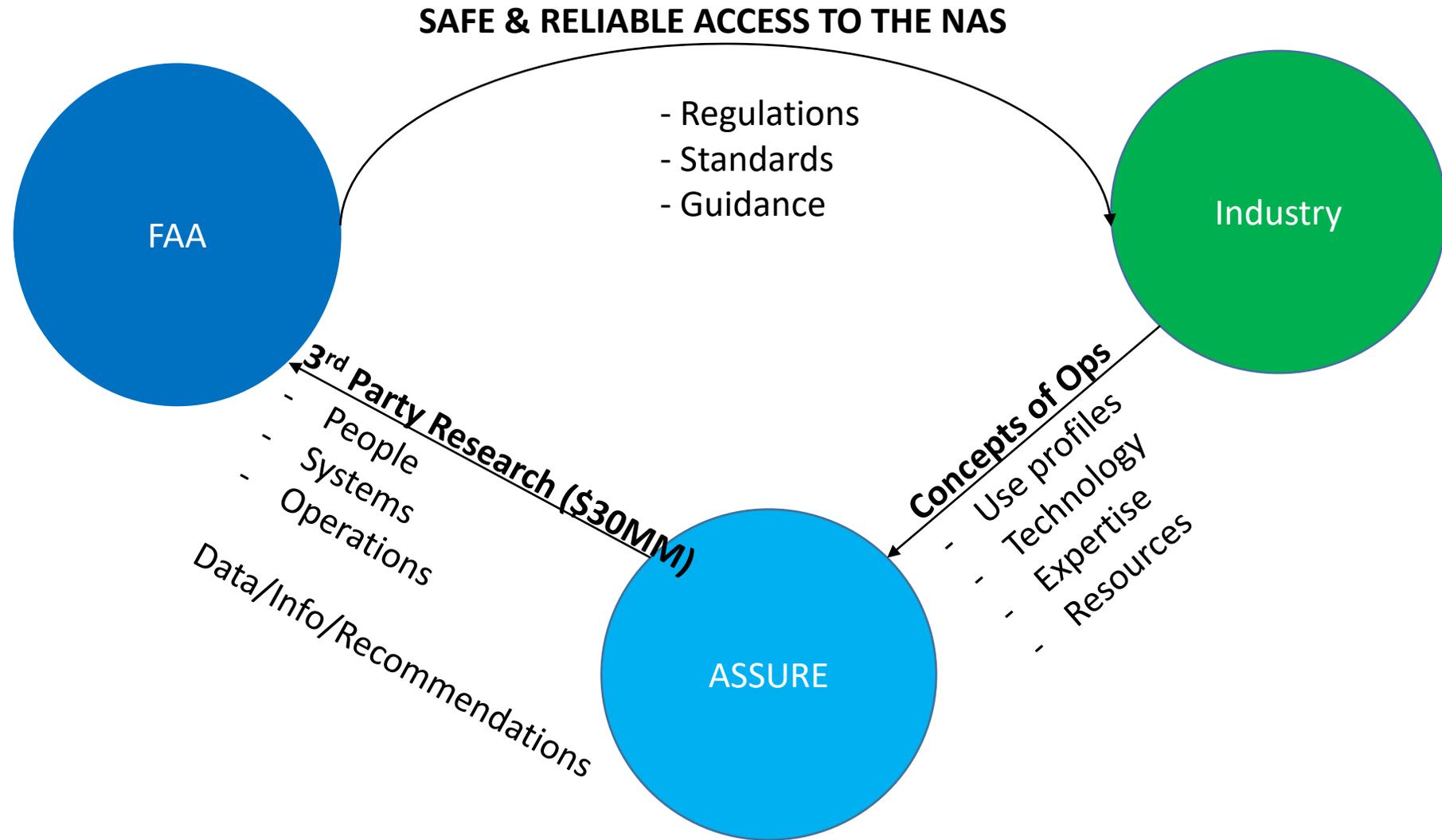
Overview

GOAL:

- High-level look at ASSURE studies and initiatives for UAS integration
 - Opportunity for questions & discussions
- ASSURE
 - Why? What? Who?
 - Center of Excellence (COE) & Non-COE (ASSURE Global)
- ASSURE Research
 - Focus on FAA Research
 - NASA Research
 - First-Responder UAS (FEMA & NIST)
- International Engagement
- Questions & Discussions



WHY ASSURE (FAA Center of Excellence for UAS)



ASSURE University Team

The FAA's Center of Excellence for UAS Research

Alliance for System Safety of UAS through Research Excellence

CORE TEAM

- Alabama
UNIVERSITY of ALABAMA in HUNTSVILLE
- Alaska
UNIVERSITY of ALASKA in FAIRBANKS
- Arizona
EMBRY AERONAUTICAL UNIVERSITY-PRESCOTT
- California
UNIVERSITY of CALIFORNIA DAVIS
- Florida
EMBRY RIDDLE AERONAUTICAL UNIVERSITY
- Kansas
KANSAS STATE UNIVERSITY
UNIVERSITY of KANSAS
WICHITA STATE UNIVERSITY
- Montana
MONTANA STATE UNIVERSITY
- New Mexico
NEW MEXICO STATE UNIVERSITY
- North Carolina
NORTH CAROLINA STATE UNIVERSITY
- North Dakota
UNIVERSITY OF NORTH DAKOTA
- Oregon
OREGON STATE UNIVERSITY
- Ohio
THE OHIO STATE UNIVERSITY
- Pennsylvania
DREXEL UNIVERSITY

AFFILIATE TEAM

- Alabama
AUBURN UNIVERSITY
TUSKEGEE UNIVERSITY
- Indiana
INDIANA STATE UNIVERSITY
- Israel
TECHNION - ISRAEL INSTITUTE OF TECHNOLOGY
- Louisiana
LA TECH UNIVERSITY
- Ohio
SINCLAIR COMMUNITY COLLEGE
- Canada
CONCORDIA UNIVERSITY
- United Kingdom
UNIVERSITY of SOUTHAMPTON

MISSISSIPPI STATE UNIVERSITY
LEAD UNIVERSITY

Steve Luxion "LUX"

NANYANG TECHNOLOGICAL UNIVERSITY
SINGAPORE
Air Traffic Management Research Institute



ASSURE – Global

ASSURE (Global)

- Solve problems/seek opportunities outside the FAA
- Another mechanism to conduct FAA/Gov't work
- Leverages
 - ASSURE Alliance and its relationships (teaming)
 - Knowledge & experience gained from FAA research
- With only one contract and NDA, if required
 - ASSURE does the rest to leverage our teammates to best meet the needs of the sponsor
 - Master Teaming Agreement with subordinated funded Task Orders
- Currently partnered with contractors supporting NASA, DoD, State DoTs, & Foreign Gov't



ASSURE/COE Research

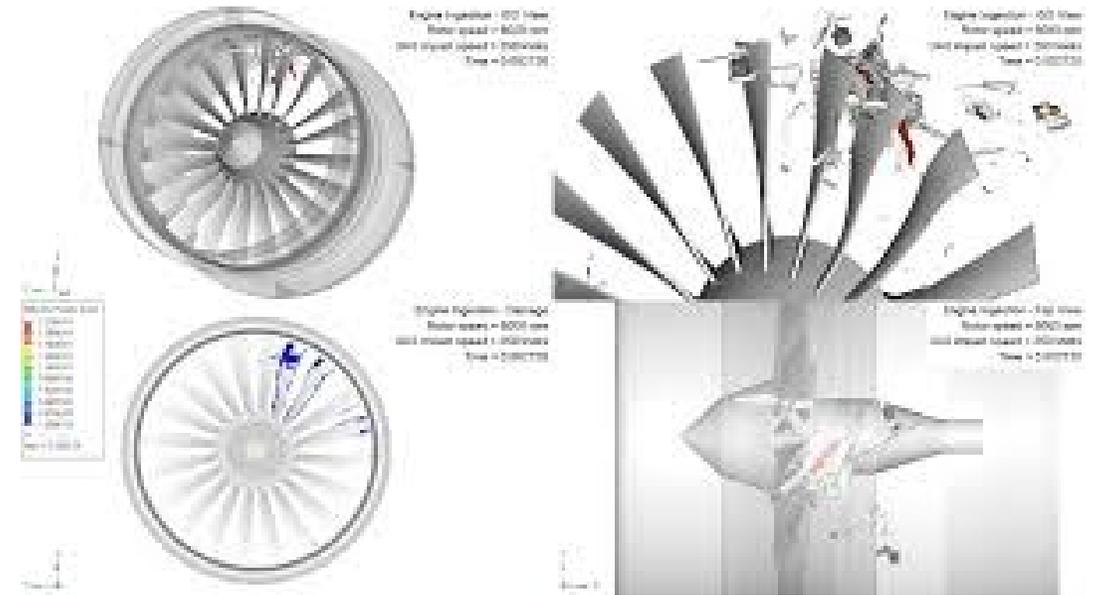
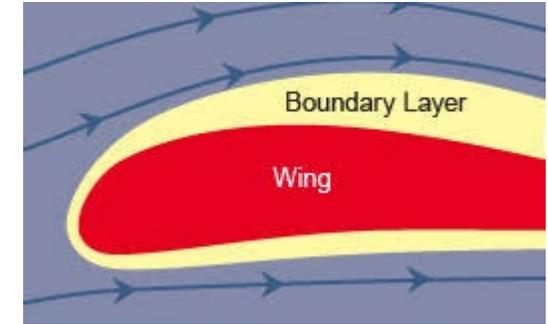
Applied **Regulatory** Research Supporting the FAA

- 33 Active Projects
- 16 Completed
- 11 Proposed
- 57 Total Projects
- \$38.7 Million Active Projects
- \$110 Million Total Level of Effort Since Inception

Current Work – Collision Follow-on Studies (~\$8.3 Million Level of Effort)

Air-to-Air Collision

- Rotorcraft
- General Aviation
- Engine Ingest Modeling
- Boundary Layer Effects
- Heavier UAS (-25 Kgs/55 lbs)

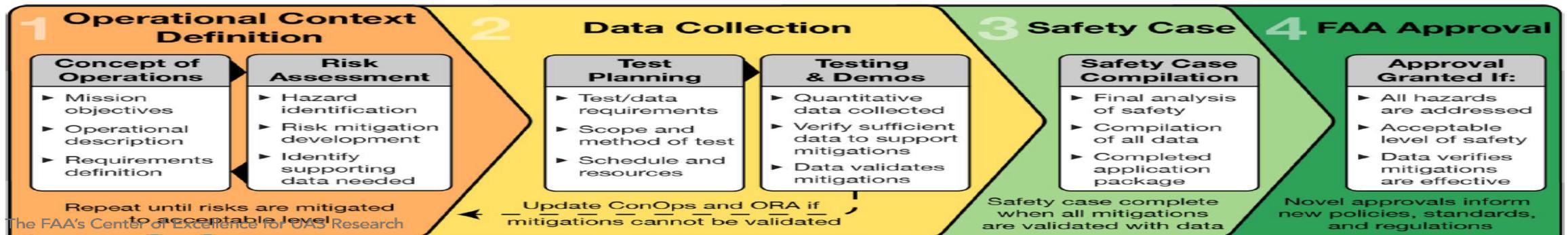


Current Work – Enabling Data/Info Structures (~\$2.6 Million Level of Effort)

Data → Information → Knowledge

- Test Data Collection & Analysis
- ASIAs (Aviation Safety Analysis & Sharing System) (Phase 1 & 2)
- Risked-Based Training & Standards for Waivers & Issuance

Updates: Safety Case Development



The FAA's Center of Excellence for OAS Research

Increasing FAA involvement

Steve Luxion "LUX"

www.ASSUREuas.org

Enablers – (~\$5.0 Million Level of Effort)

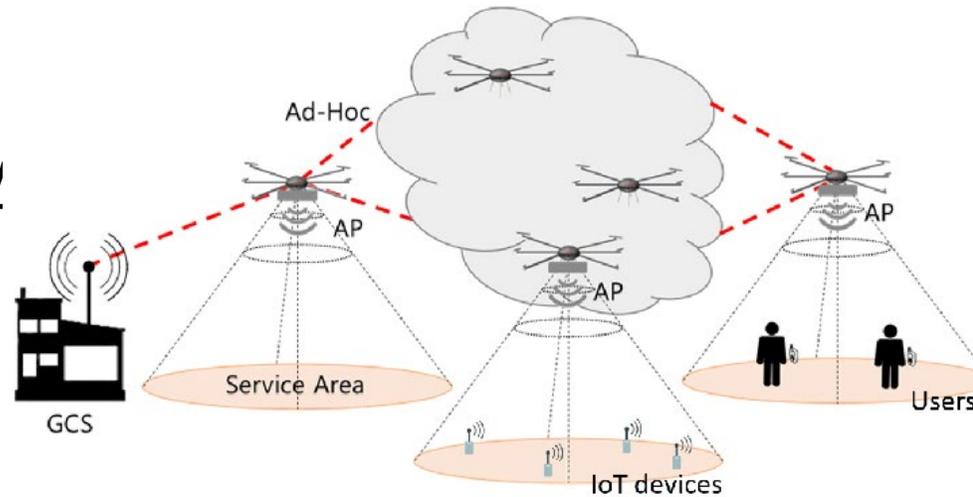
Database Infrastructure & Framework

- Test Data Follow-On: Working System for Test & Safety Cases
- Risk-Based Thresholds for Test Cases (Evaluation Framework)



Multiplier / Ops Efficiency

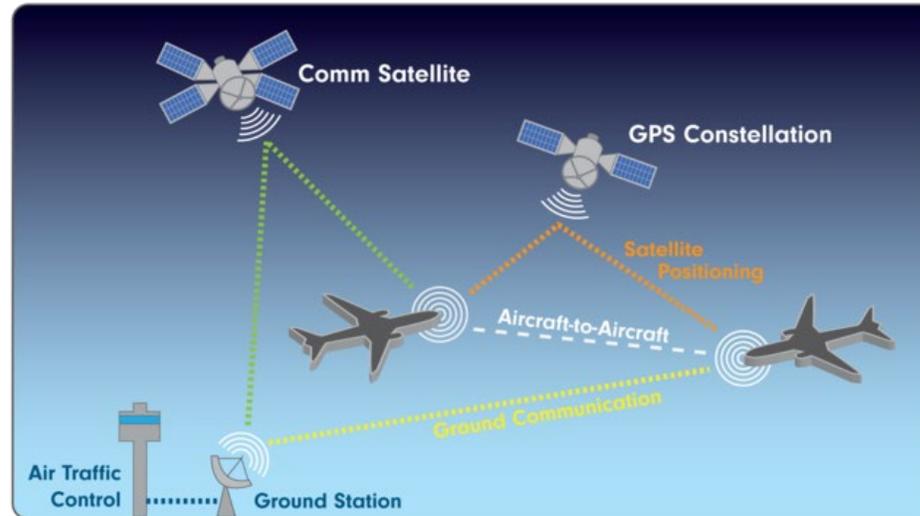
- **Multi-Aircraft Control**



Enablers– (~\$6.6 Million Level of Effort)

Risks/Mitigations/Security

- Wake Turbulence
- Cyber Security
- GPS & ADS-B Risks
- UAS Visual Ops Stds



Current Work – Enabling Airspace Capes (~\$10 Million Level of Effort)

Airspace: Integration & BVLOS

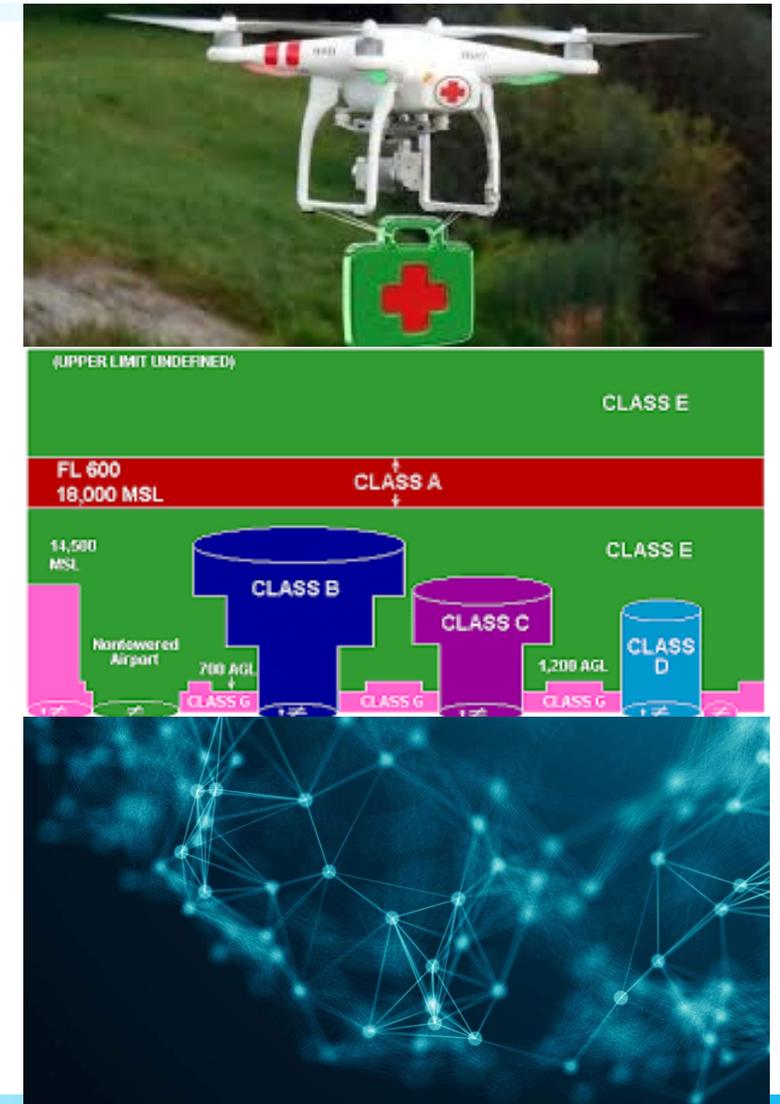
- DAA for BVLOS
- Shielded UAS Ops – DAA

Airspace: Quantitative Risk

- Integrated Non-Segregated and Extended Operations in the NAS
- sUAS Mid-Air Collision Likelihood

Airspace: Use Forecasting

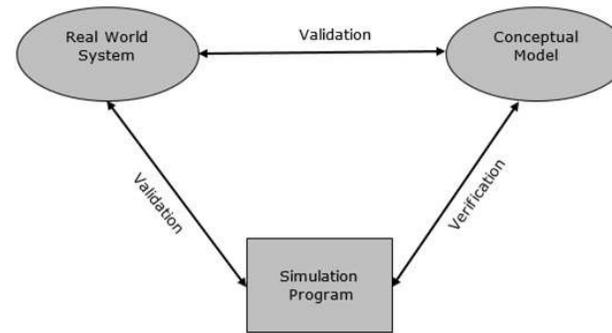
- e-commerce, Emerging UAS Network & Implications on NAS Integrations



Application/Ops Studies (~\$7.6 Million Level of Effort)

Public Safety

- Disaster Preparation & Recovery
- Ops Over People: Compliance Method
- Safety Research Facility (Validation/Verification)
 - ASTM Remote ID
 - Collision Avoidance & Well Clear Volumns
 - Standards
 - Tracking
 - Mapping
 - Analysis



Application/Ops Studies (~\$8.6 Million Level of Effort)

Operations

- Airports – Risk Mitigations for UAS Ops
- Advanced/Urban Air Mobility
- UAS Air Carrier Ops
- UAS Cargo Ops



STEM Minority Outreach (1 of 2)

(~\$977K Level of Effort)

- NMSU – Lead
 - 12 Drone Camps
 - Outfitting Aviation Outreach Tailer
 - Train the Teacher/Trainer (TTT) – Curriculum & Workshops for After-School Programs
- UAH – TTT Roadshow & Workshops in collaboration:
 - AL Ag. & Mech Univ (HBSU),
 - NASA MSFC Minority Univ. Research & Education Project
 - US Space & Rocket Center
- UAF – “Alaskan UAS Airshow” – Rural Outreach
- UC-D – Summer Drone Academy Summer Pgm.



STEM Minority Outreach (2 of 2)

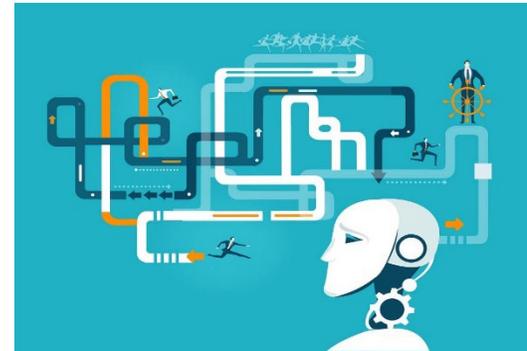
(~\$977K Level of Effort)

- The OSU – “Translating Engineering K-8th Grade”
 1. Underrepresented minority participation in engineering
 2. Introduce teachers to project-based learning
 3. Encouraging undergraduate research in this area
- Sinclair – Inactive Experience for Middle Schoolers
 - UAS Introduction (technologies, applications, & careers)
 - 45-minute simulator for students in Mobile or Tactical GCS
 - Despite Covid-19 Restrictions (as of 14 July 2021) served:
 - 96 Days
 - 28 locations
 - 5,369 individuals



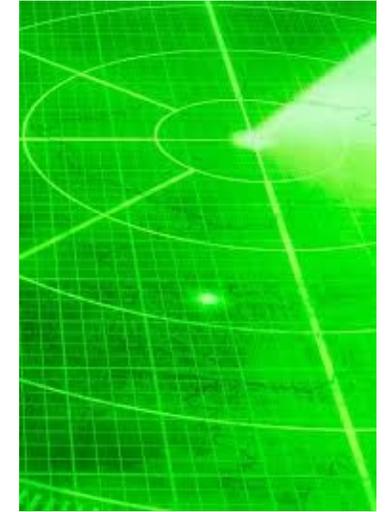
Starting Now or Soon

- UAS Detection & C-UAS
- sUAS Traffic Analysis-What's happening <400'
- UAS Advanced Materials
- UAS Right-of-Way Rules
- Flight Data Recorder
- Safe Automation Design & Engineering
- Live Full-Engine Ingest of UAS



Requirements/Proposals– (Starting in ~6 months)

- UAS Electromagnetic Compatibility
- DAA Track Classification & Filtering
- Need for Cybersecurity Oversight & Risk Mgt
- Track & Analyze Standards to Improve Research
- UAS Disaster Prep & Response III
- STEM Minority Outreach (IV)



ASSURE NASA Research

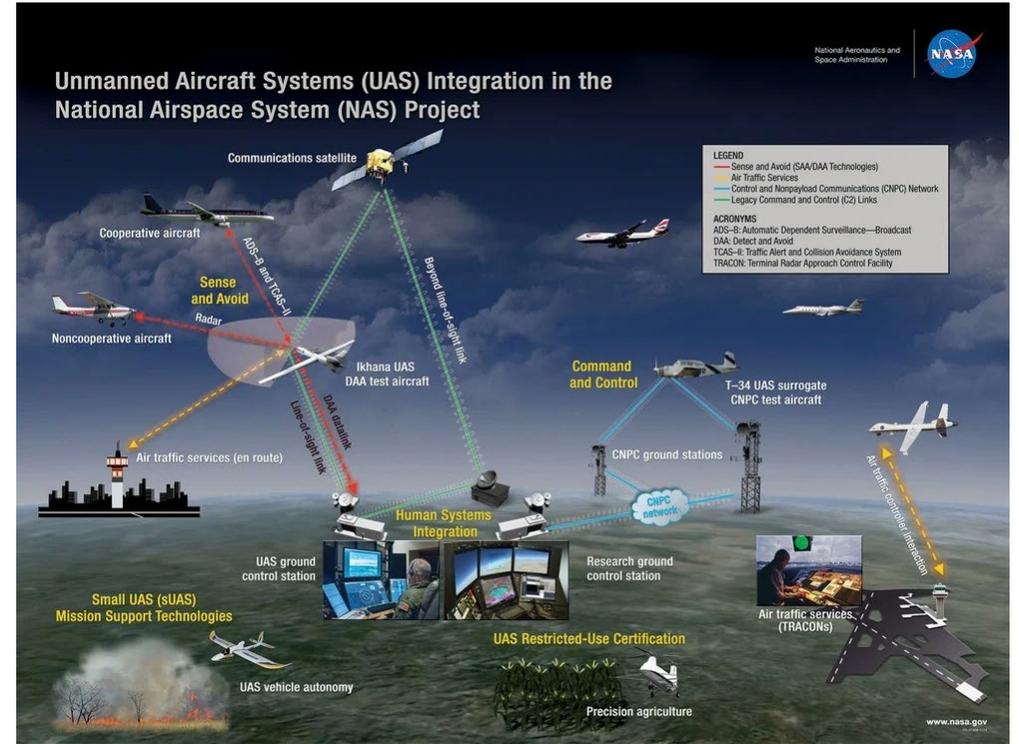
Applied Technology Research

- 9 Projects

- \$4.6 Million

Command, Control, & Communications (C3)

- C3 Comprehensive Assessment
- C3 in Denied/Degraded Environments
- UTM Spectrum Considerations
- Multi-Vehicle Ops Approaches

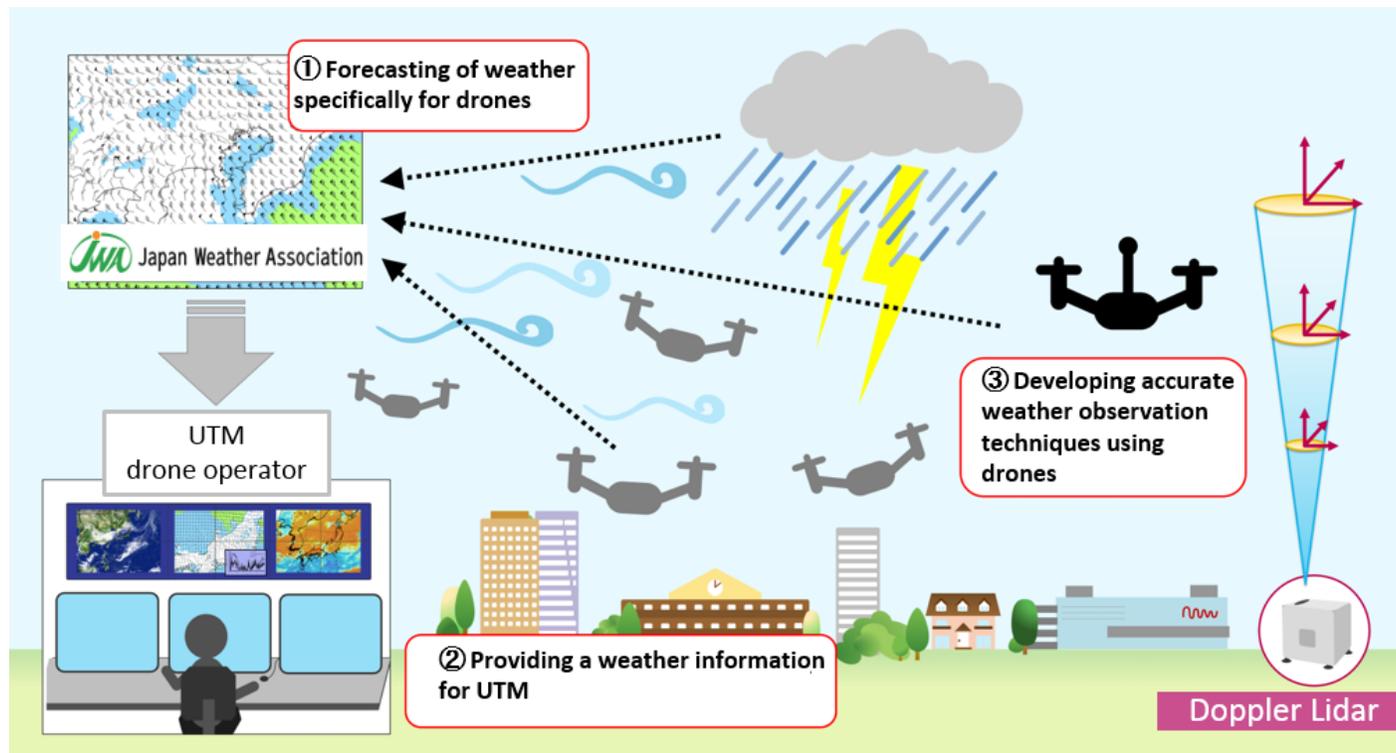


Beyond-Visual-Line-of-Sight (BVLOS) Ops

- BVLOS Economic Benefit Analysis
- Min. Operator Display Requirements
- sUAS DAA Flight Testing
- Develop Safety Cases for BVLOS



Develop detailed open-source WX forecasting for low-altitude UAS ops



ASSURE - CNA 1st Responder UAS

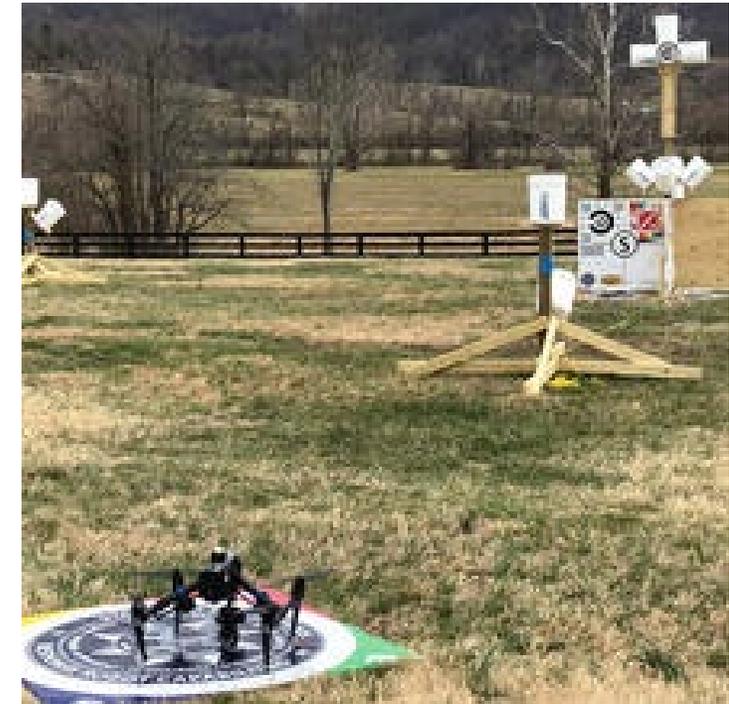
Standards, Education, Training, Testing, Certification, & Credentialing

- FEMA: \$2 Million

- NIST: \$2.25 Million

First Responder UAS – Standards, Education, Training, Testing, Certification & Credentialing

- Gap discovered from FAA Disaster Prep & Recovery Project
- Highly-fragmented response: UAS use, knowledge, training....
- Need: Standards, Educ, Training, Testing, Certification & Credentialing Org
- Focus on 1st Responders in crawl, walk, run
- Start with local/municipal Police/Fire/EMT and build
 - Repeatable
 - Scalable
- Partner with **CNA** Institute of Public Research
- Congressional Demonstration Appropriation
 - NIST \$3.25 million for MSU/KSU (~\$2.25 million for demo)
 - FEMA Continuing Training Grants \$2 million
 - First Responder use of UAS Education & Training



International



- Success with Transport Canada & Israel
 - Participate in projects together
 - Top off research for particular nation's needs
 - Different expertise and needs
- FAA International Regulator Roundtable on Research
- Growing International Network, Collaboration & Coordination
 - Singapore (Nanyang Tech Univ.),
 - S. Korea, Australia, NZ
 - EASA:
 - Member of Advisory Board for BVLOS Demonstrations
- India (State of Telangana)
 - Discussions to create UAS ecosystem (airspace, id test sites, establish partnerships, training and testing)
 - Based on success, more locations within and external to India



Questions/Comments



ASSUREuas



ASSUREuas



ASSURE UAS

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Back Up Slides

ASSURE Guiding Principles

Vision

ASSURE is the go-to high-quality research organization and brand for working complex autonomy issues with focus on unmanned aircraft systems (UAS) in policy, regulations, standards, training, operations, and education.



Mission

Provide high-quality research & support to autonomy stakeholders both within the US and beyond to safely & efficiently integrate autonomous systems into the national & international infrastructure, thereby increasing commerce and overall public safety & benefit.

Working w/ASSURE

Working with ASSURE (General Info)

- Collaborate with ASSURE COE partners
 - Join ASSURE through website: www.ASSUREuas.org
 - Participate & influence research
- IDIQ Contract with the FAA (US Federal Agencies)
 - Align/Fit into 11 FAA UAS Research Areas
 - Memo between Federal Agencies
 - MIPR Funds: FAA will contract and provide program management
- ASSURE (Global)Non-Profit
 - Single contract vehicle w/Miss State University;
 - We do the rest through Master Service Agreements with our schools & partners
 - Leverages
 - ASSURE Alliance and its relationships
 - Knowledge and experience gained from FAA research
 - No Cost: ad hoc teaming based on need

Thank You



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ASSURE UAS

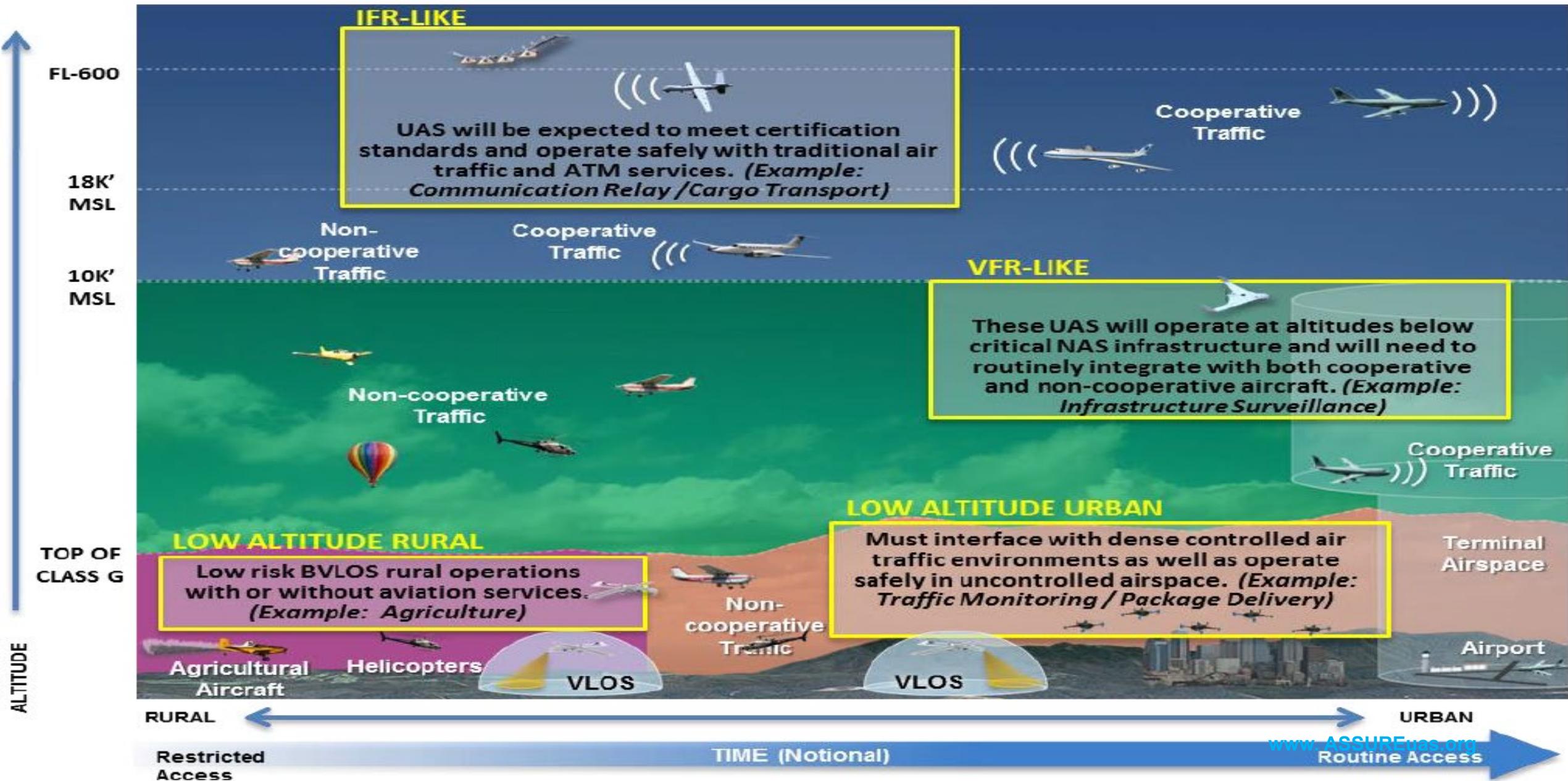
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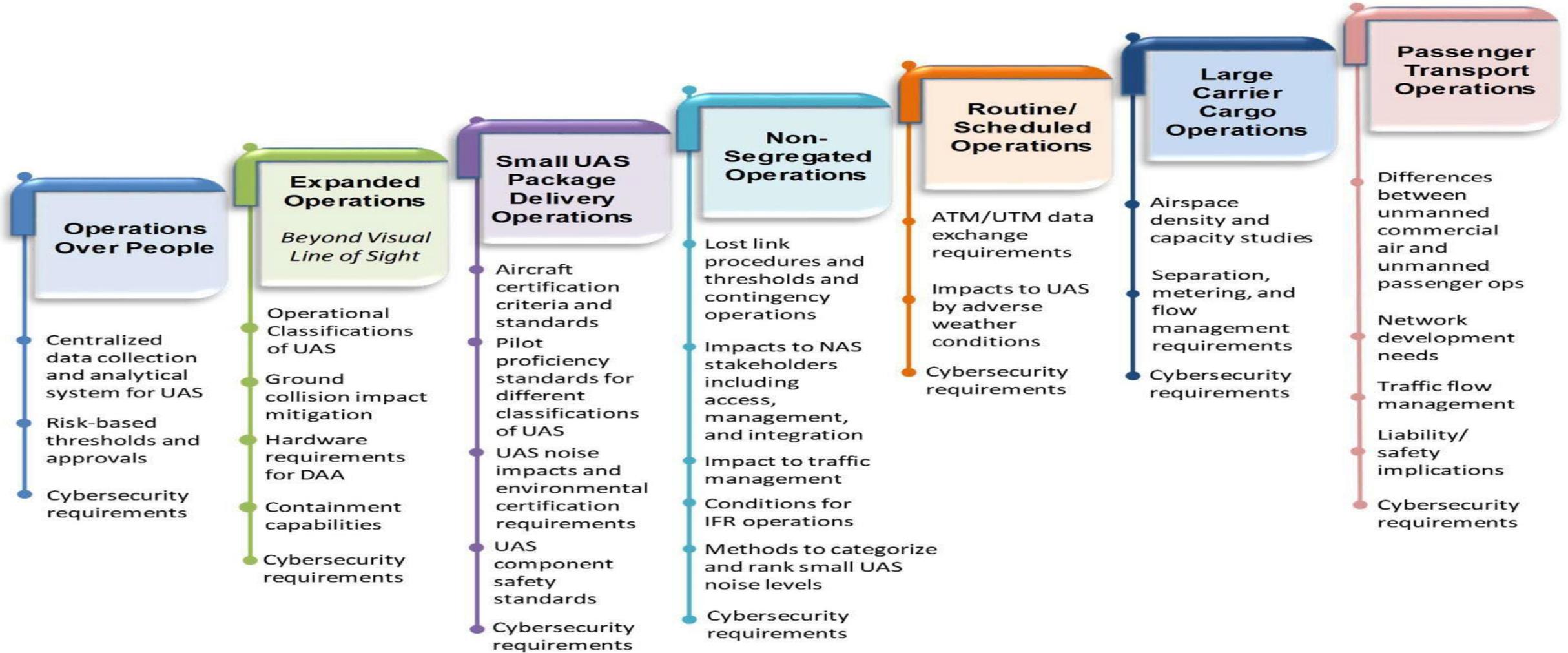
FAA Strategic Plan

ASSURE Research Supports This Plan
Applied Regulatory Research

UAS Integration Landscape



Needs for Operational Capabilities



Operational Capabilities to Full Integration

