DoD Unmanned Aircraft Systems (UAS) Airspace Integration

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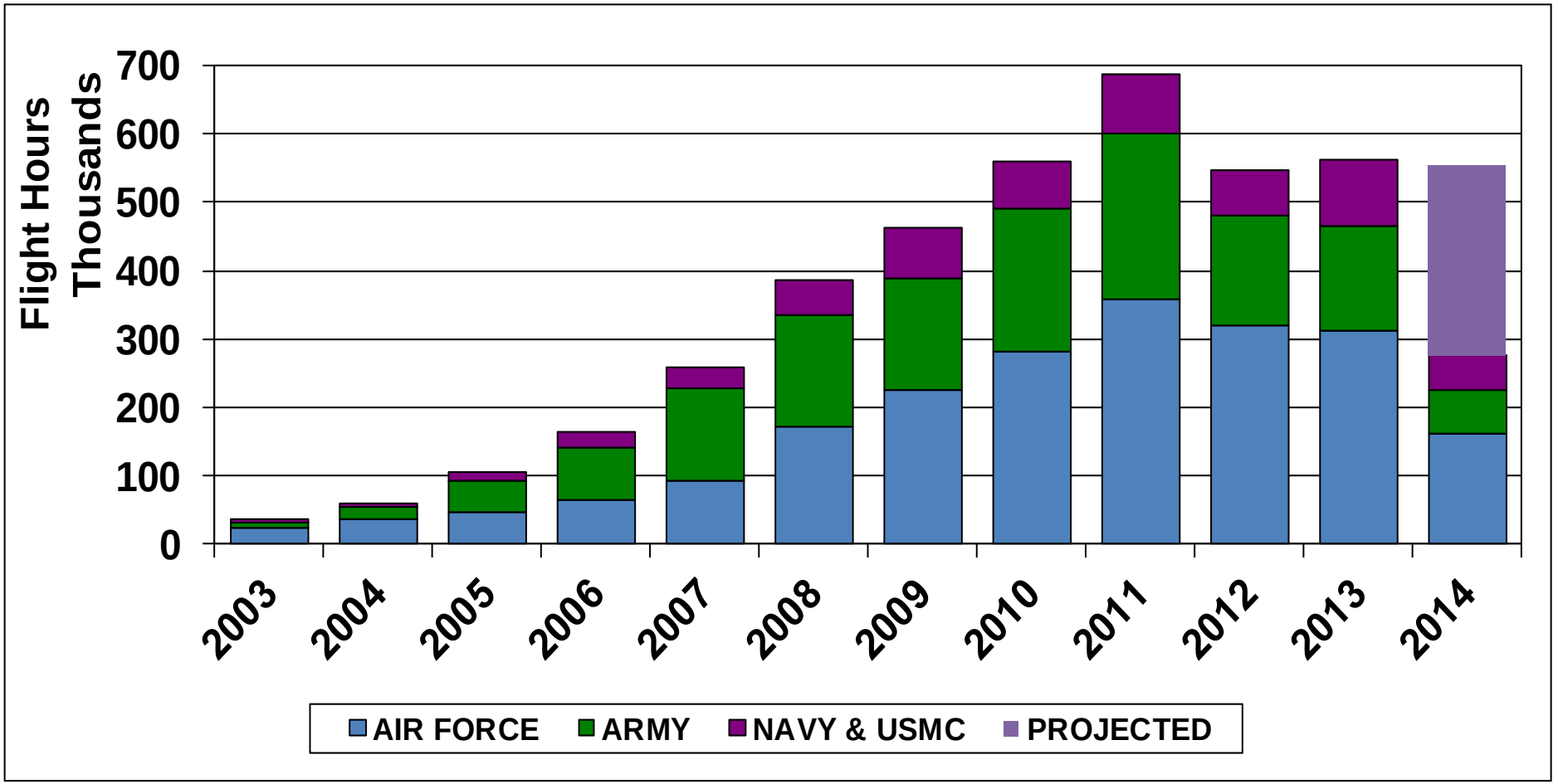
DoD UAS Flight Hours

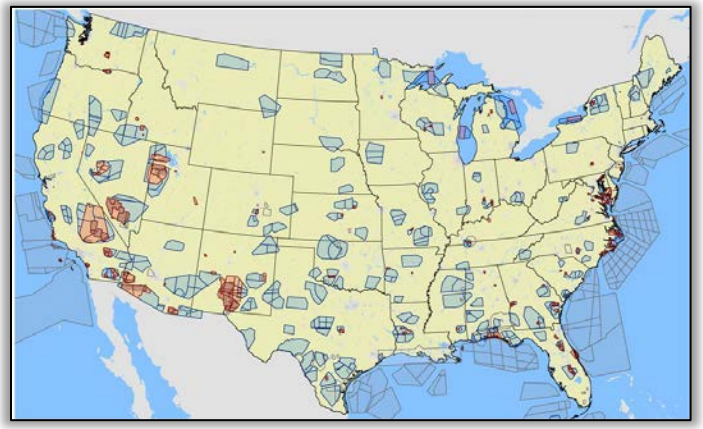
As of March 31, 2014

4.3 Million Flight Hours FY 2001- 2nd Qtr FY2014

Does not include Group 1 UAS



National Airspace System Access

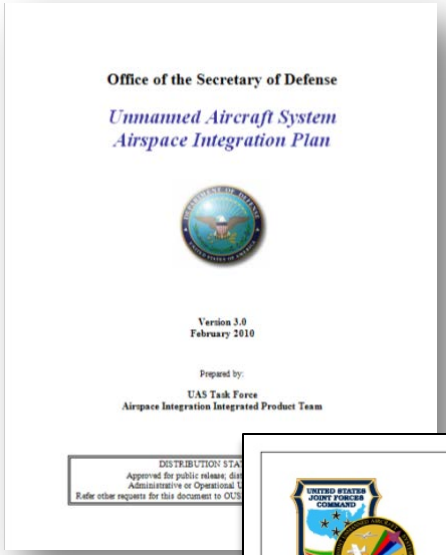


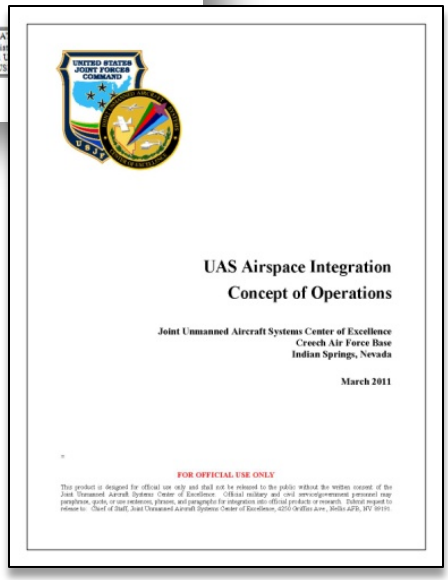
- Deployed systems are returning to U.S. bases or redeploying to other areas
- DoD UAS require NAS access to:
  - Train pilots/operators
  - Joint Exercises
  - Develop and test systems
- Many locations have no direct access to Restricted or Warning Areas
- Essential to expand access to other training areas (Military Operating Areas)
- Standardized procedures, technology development and regulatory updates needed for UAS integration

Expanded access is required to support increasing demand in fiscally constrained environment

DoD Publications

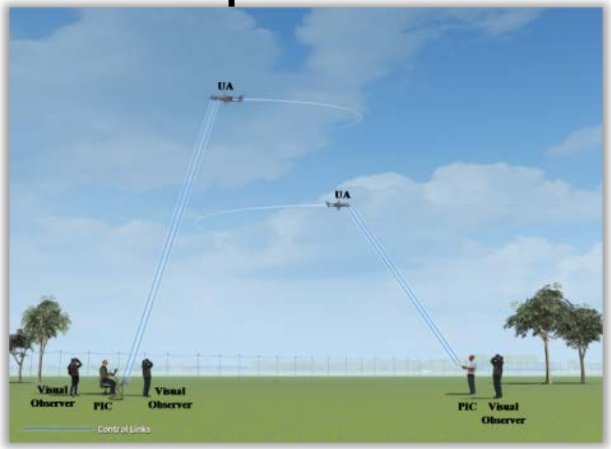
- ***Airspace Integration (AI) Plan – Apr 2011***
  - Outlines DoD's equities in UAS Integration
  - Outlines NAS Access Flight Profiles
  - Defines capabilities and resources needed for current and future operations
  - Update in process
- **AI CONOPS – May 2011**
  - Procedurally implements the AI Plan
  - Outlines "Sense and Avoid" (SAA)-enabled operations & associated standards
  - Develops DoD-standards for:
    - Departure/Transit/Arrival
    - Lost-Comm, Lost-Link, Loss of SAA Procedures and Emergency Procedures





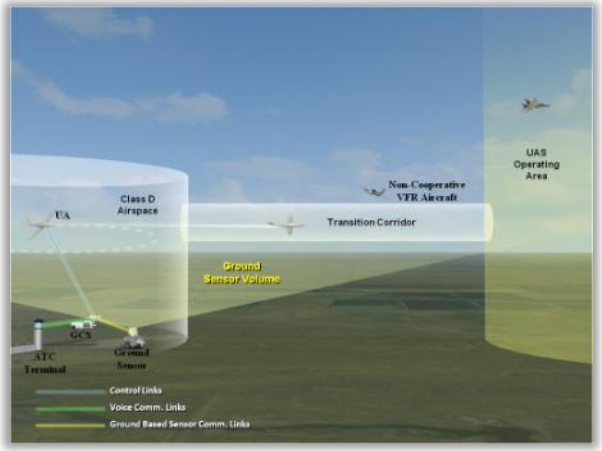
DoD UAS Profiles
Incremental Approach

Visual Line-of-Sight Operations

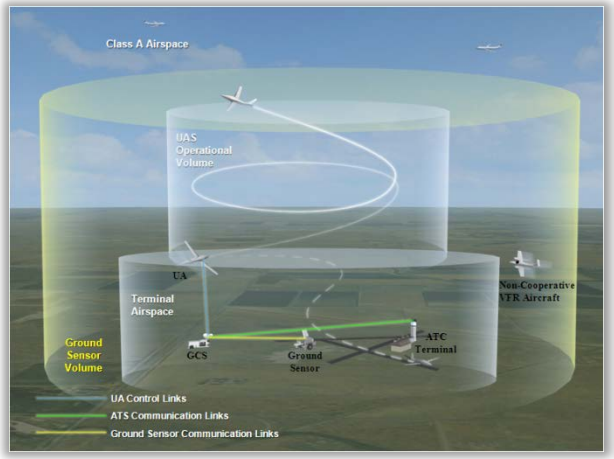


Terminal Area Operations

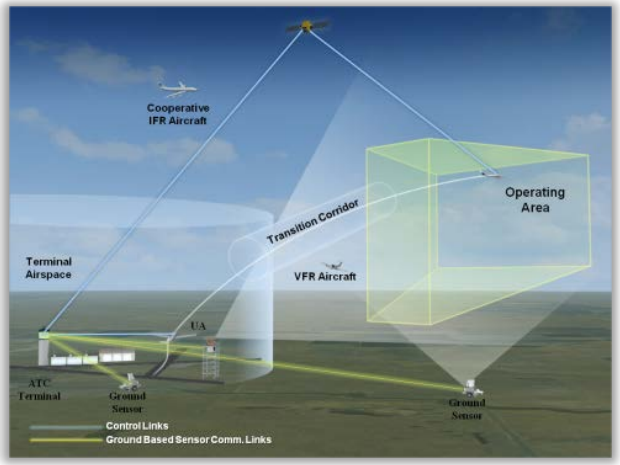
Lateral Transit Operations



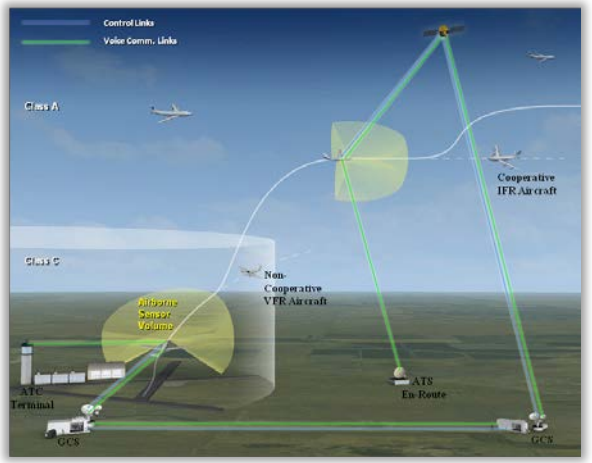
Vertical Transit Operations



Operating Areas



Dynamic Operations



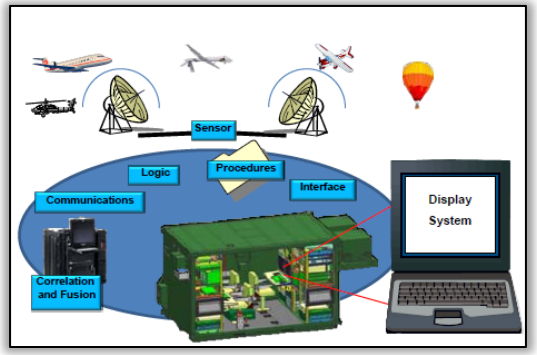
DoD UAS AI Activities

- **Training** - established comprehensive standardized UAS training programs
- **Airworthiness** - updated DoD airworthiness guidance (MIL HDBK 516) to include UAS criteria and means of compliance
- **Policy and Standards** - working with other agencies
  - Worked with FAA to streamline Certificate of Authorization or Waiver (COA) process
  - Sharing DoD standards processes with FAA and RTCA 228
  - Working with FAA Aviation Rulemaking Committee to update FARs to enable UAS operations
  - Working with FAA and NASA to define "well clear" for SAA system
- **Technology –** Developing SAA systems

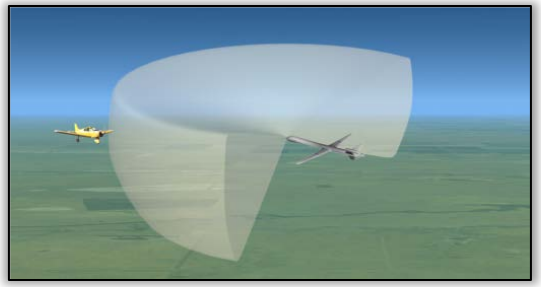
SAA Technology Development

- Incremental and overlapping by design
- Ground Based SAA (GBSAA)
  - Early to mid term solution
  - USAF and Marines have each fielded one system to meet specific needs
  - Army is developing a more robust system to support the Gray Eagle program
- Airborne SAA (ABSAA)
  - Longer term solution in early development
  - Initially for larger UAS (Global Hawk/Triton) but will be scalable to others

GBSAA

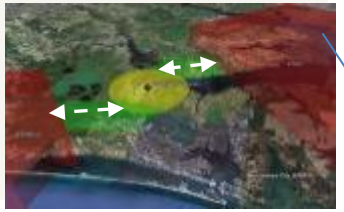


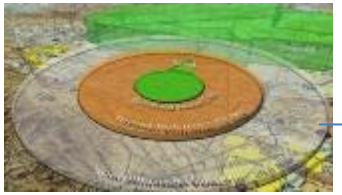
ABSAA

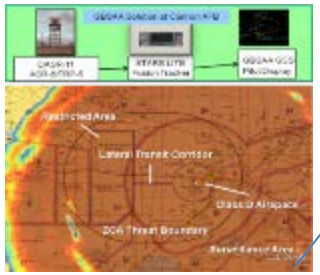


DoD SAA Integration Strategy

Prototype Development
(define and refine phase)







ABSAA

Common GBSAA Requirements

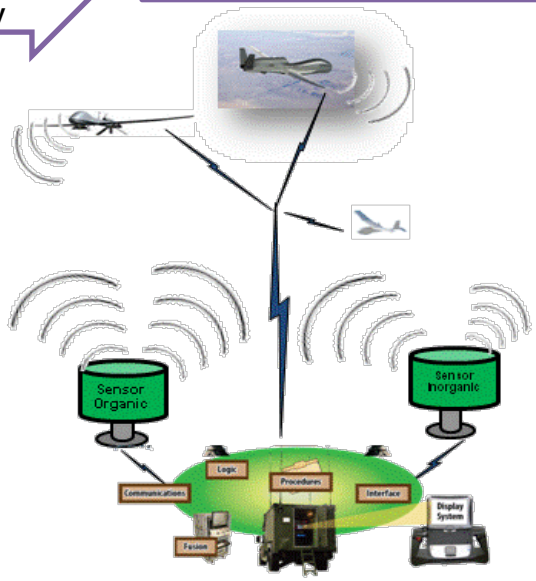
Proofs of Concept

GBSAA

Common Requirements
Common Data Fusion
Common Algorithm
Common Middleware
Common Display

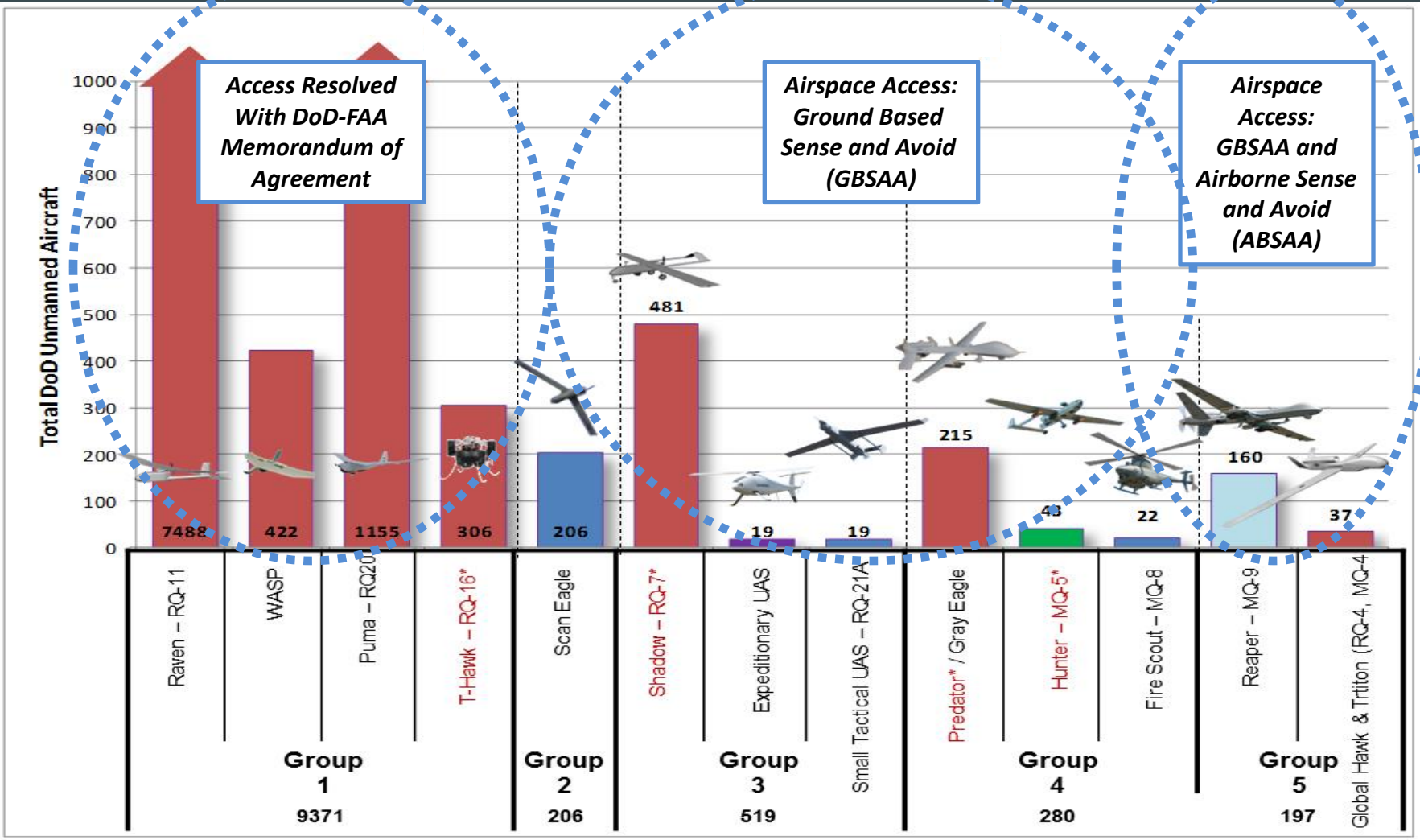
Phase 3
Integrated Solution

Common Requirements
Common Algorithm
Common Display
Common Data Fusion
Common Middleware



All services securing GBSAA solutions
GBSAA likely to integrate with future ABSAA capabilities

DoD Unmanned Aircraft Inventory



KEY: Multi – Service | Army | Air Force | Navy/USMC | SOCOM

As of April 1, 2014

Summary

- DoD has identified near, mid, and far-term UAS access requirements--in a construct that is incrementally achievable
- Programs and standards will continue to be developed to meet DoD requirements
  - SAA Technology
  - Airworthiness
  - Training
- FAA is working with DoD to leverage DoD experience to develop civil standards