## Safely Enabling Civilian Unmanned Aerial System (UAS) Operations In Low-Altitude Airspace By Unmanned Aerial System Traffic Management (UTM)



National Aeronautics and Space Administration

#### MOTIVATION

- Many UAS will operate at lower altitude (Class G, below 2000 feet)
- There is urgent need for a system for civilian low-altitude airspace and UAS operations
- Stakeholders want to work with NASA to enable safe operations



## PROGRESS

- Developed UTM vision document
- Defined initial UTM design characteristics
- Conducted an all-stakeholder workshop to gather feedback

## UTM WORKSHOP KEY FINDINGS

- Overwhelmingly positive response
- Stakeholders support NASA's leadership and vision
- Many partners are ready to engage
- There is urgency to put a system in place

### **NEXT STEPS**

- Obtain authorization to proceed with further development of UTM
- Refine UTM design, architecture, and use cases
- Explore partnership arrangements to engage traditional and non-traditional partners
- Define a spiral development process to do rapid prototyping and early fielding with regular updates

# CONCEPT OVERVIEW

- UTM System will provide following services:
  - Airspace design and geo-fencing
  - Weather integration
  - Congestion management
  - Separation management
  - Contingency management

# PARTNERSHIPS

- UAS manufacturers
- Online retailers
- Communication/navigation/ surveillance providers
- System integrators
- Emerging UAS operators
- Cargo operators
- FAA, NOAA, DoD
- UAS test sites



opti	ions	including	
but	not	limited to:	

- Low-altitude radar
- Surveillance coverage (cell and satellite)
- Navigation
- Communication

related to automation

#### AUTONOMICITY

- Self-configuration
- Self-optimization
- Self-protection
- Self-healing

Appropriate operational data recording

definition

- Weather integration
- Constraint management
- Sequencing and spacing
- Trajectory changes
- Separation management
- Transit points/coordination with the National Airspace System
- Geo-fencing design and adjustments
- Contingency management

Transition between UTM and Air Traffic Management airspace Constraints based on community needs about noise, sensitive areas, privacy, etc.

3D maps: terrain and human-made structures

Near-term goal: enable low-altitude operations within 5 years Long-term goal: accommodate increased demand 10-15 years www.nasa.gov

Weather

& Wind

Predictions

Airspace

Constraints

Other low-

altitude operations