Flight Information Management System
→ Enables airspace controls
→ Facilitates requests
→ Supports response in emergencies impacting NAS

UAS Service Supplier
→ Federated Structure
→ Cloud-based automated system
→ Supports UAS with services (e.g. separation, weather, flight planning, contingency management, etc.)

Supplemental Data Service Provider
→ Supplies supplemental data to USS and/or UAS Operator to support operations

UAS / UAS Operator
→ Individual Operator
→ Fleet Management
→ On-board capabilities to
UTM Architecture Progression

**2014**
**FUNCTION IDENTIFICATION**

- Multiple customers with diverse mission needs/profiles
- UAS 1, UAS 2, UAS 3
- Range of UAs from disposable to autonomous
- Autonomy:
  - Self Configuration
  - Self Optimization
  - Self Protection
  - Self Healing
  - Operational data recording
- Transition between UTM and ATM airspace
- Constraints based on community needs around noise, sensitive areas, privacy issues, etc.
- 3D Maps: Terrain, human-made structures

**2015**
**FUNCTION DECOMPOSITION**

- Low altitude CNS options such as:
  - Low altitude noise
  - Surveillance coverage (satellite, cells)
  - Navigation
  - Communication
- Autonomy:
  - Airspace design and geo fence definition
  - Weather integration
  - Transition and coordination
  - Sequencing and spacing
  - Trajectory changes
  - Separation management
  - Traffic flow/coordination
  - Safety in the air.
- Airspace Constraints
- Other low-altitude operations

**2016**
**ACTOR DECOMPOSITION**

- NASA UTM CONOPS
- FAA UTM CONOPS v1.0

**2017+**
**SERVICE DECOMPOSITION**

- UAS Workflows (NASA/TM—2014–218299)
- UTM Convention
- FAA UTM Architecture Progression
- Other stakeholders

- Public Safety
- Security
- National Airspace System
- Military
- Pilots
- UAS operators
- UAS providers
- UAS service providers
- Other stakeholders

- Air Traffic Systems (NAS)
- UAS Traffic Management System
- UAS Service Supplier Network
- UAS Operators
- NASA UTM CONOPS
- FAA UTM CONOPS v1.0

- NOAA data
- Other data
- Weather impacts
- Other data
- NAA impacts
- Data requirements
- Real Time Information
- Operating environment information
- Operating environment information
- Operations
- Operating environment information
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- Operating environment information

- Data requirements
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- Operating environment information
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- Operations
Perspectives on Services from CONOPS

Not all services should be treated the same (and are often viewed differently)

ANSP
→ Services that support ANSP functions vs operator functions
→ ANSP responsibilities vs operator responsibilities

Regulator
→ May be necessary to classify services to support oversight
  → E.g. Service required by regulation, service that is an acceptable means of compliance, service that only add value to operator
→ Services that require "approval" and oversight need to clearly establish relationship between UAS operator and service provider
→ Many SDSPs probably will fall in a category that don’t need “approval and oversight”, but the function or scale of the service may require it.
→ UAS Operator responsibilities vs Service Provider Responsibilities

UAS Operator
→ UAS Operator uses services to comply with business needs, mission requirements, and/or safety requirements
→ USS services provide connectivity with FIMS, and interoperability with USS Network
→ SDSP services typically are services that don’t connect to USS Network and FIMS
  → SDSP services can be provided to an operator by a USS

Service Provider
→ Business models vary based on type of service offered (i.e. not every service provider wants to be a USS)
→ Business models may support other entities besides UAS Operator (i.e. Remote ID for Law enforcement)
→ Some companies may provide a full suite of capabilities as a SDSP, USS, and UAS Operator
Concluding Thoughts on SDSPs in UTM

→ Industry has shown interest in establishing standards in SDSP services that support operational requirements
→ Surveillance and Weather Services in ASTM
→ Standards initial focus on interfaces and basic functionality

→ Several services are being developed outside of standards (i.e. flight planning) and many of which are not intended to meet USS network and FIMS requirements

→ To date, service providers have not actively been seeking “approval” from the FAA

→ UTM architecture was intended to be flexible with respect to SDSP rather than requiring all USS and/or UAS Operators to connect to them