



# CDM

Collaborative  
Decision Making

# Future Concepts of Flow Management

= FCT =

2015 Spring CDM Meeting

Mark Holben, FAA ATCSCC

Don Wolford, United Airlines



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# What is FCT?

- formed to address longer term (12-24 months) CDM/ATFM capabilities' integration and an operational concept of using integrated data, procedures and concepts.
- charged with the exploration of combinations of concepts and capabilities identified through the CSG as well as other venues and the development of enhanced CDM tools.



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# FCT Tasking 56: Space Operations and Unmanned Aircraft Systems NAS Study

## Space Operations office at the ATCSCC

- Joint Space Operations Group (JSpOG)

## Office of Commercial Space Transportation (AST)

- One of 4 FAA lines of business



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# Commercial Space Operations



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# Orbital launch vehicles

## Commercial and DoD use

- Payloads include
  - Supplies for the ISS
  - Communication satellites



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# Orbital launch vehicles

## 2014 Launches and Re-entries

25 Launches (14 Non-commercial,  
11 commercial)

3 Reentries (controlled)

## 2015 Launches and Re-entries

26 Launches (12 Non-commercial,  
14 Commercial)

4 Reentries



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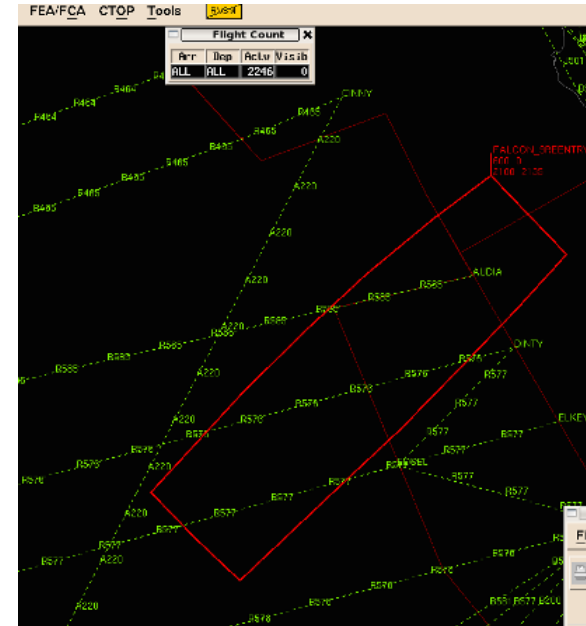
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# Launch/Recovery Operations

## Aircraft Hazard Area

Primarily a manual process that is very time consuming and very restrictive. Involves issuing a NOTAM and segregating air traffic from the impacted area.

Working on automating this process and making it more dynamic / less restrictive.



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# Suborbital Reusable Vehicles

Commercially developed, reusable space vehicles that travel to the edge of space, about 62 miles (100km) above the Earth.

Vertical or Horizontal launch/recovery



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# Suborbital Reusable Vehicle Markets

## COMMERCIAL HUMAN SPACEFLIGHT

*Human spaceflight experiences for tourism or training*

Individuals  
Corporate  
Contests and promotions  
In-space personnel training

## BASIC AND APPLIED RESEARCH

*Basic and applied research in a number of disciplines, leveraging the unique properties of and access to the space environment and microgravity*

Biological and physical research  
Earth science  
Space science  
Human research

## EDUCATION

*Providing opportunities to K-12 schools, colleges, and universities to increase access to and awareness of space*

K-12 education  
University educational missions

## SATELLITE DEPLOYMENT

*The use of SRVs to launch small payloads into orbit*

Very small satellite launch

## AEROSPACE TECHNOLOGY TEST AND DEMONSTRATION

*Aerospace engineering to advance technology maturity or achieve space demonstration, qualification, or certification*

Demonstrations requiring space/launch environment  
Hardware qualification and test

## MEDIA AND PUBLIC RELATIONS

*Using space to promote products, increase brand awareness, or film space-related content*

Film and television  
Media, advertising, and sponsorship  
Public relations and outreach  
Space novelties and memorabilia

## REMOTE SENSING

*Acquisition of imagery of the Earth and Earth systems for commercial, civil government, or military applications*

Commercial Earth imagery  
Civil Earth imagery  
Military surveillance

## POINT-TO-POINT TRANSPORTATION

*Future transportation of cargo or humans between different locations*

Fast package delivery  
High-speed passenger transportation (civil)  
High-speed troop transportation (military)

Source: *Suborbital Reusable Vehicles: A 10-Year Forecast of Market Demand.* - The TAURI Group



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# High Altitude Balloons



# U.S. Spaceports

Commercial/Government/Private Launch Sites



# FCT Tasking 56

## Where do we go from here?

- Make recommendations to the CSG on impact to the NAS
- Seek additional tasking to continue work on this topic and expand into new products and tools.
  - Work with JSpOG on development and validation of new tools.
    - Space data ingested into TFMS and other TM products
    - Prediction tool to minimize NAS impact



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# UNMANNED AIRCRAFT SYSTEMS



Unmanned Aircraft Systems (UAS) continue to be the most dynamic growth sector within the aviation industry. Once enabled, commercial UAS will have the potential to be a significant component of the national airspace system.

*Source: FAA Aerospace Forecast Fiscal Years 2014-2034*

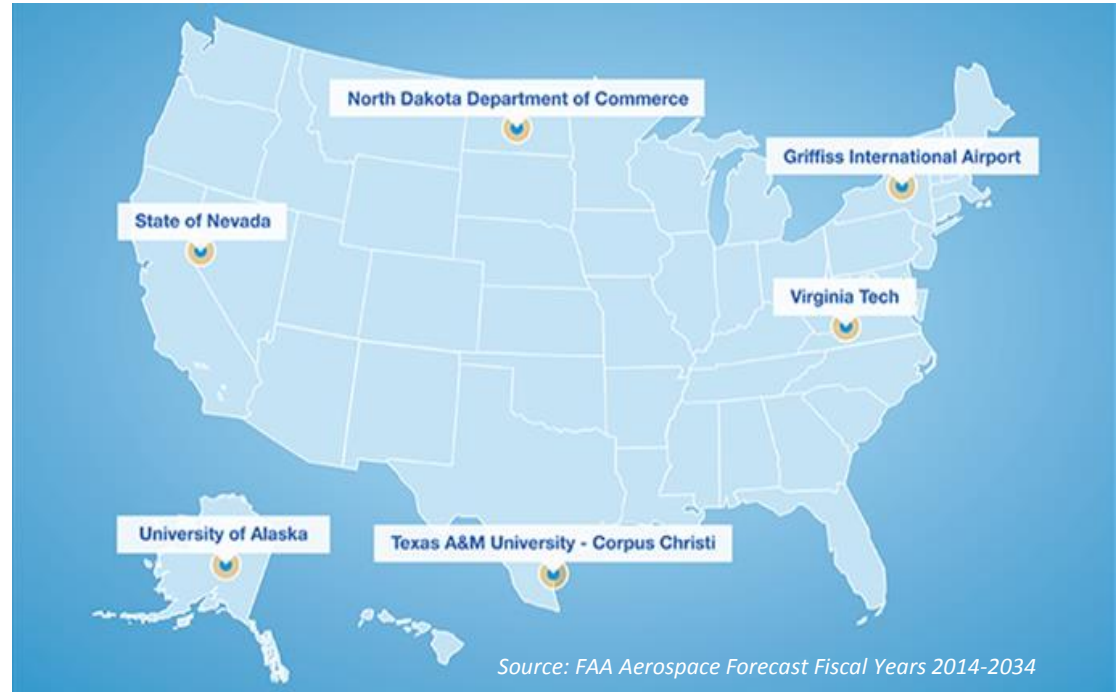


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# Unmanned Aircraft System Test Site Program

On February 14, 2012, Congress mandated the FAA to develop a test site program. Six sites were chosen.

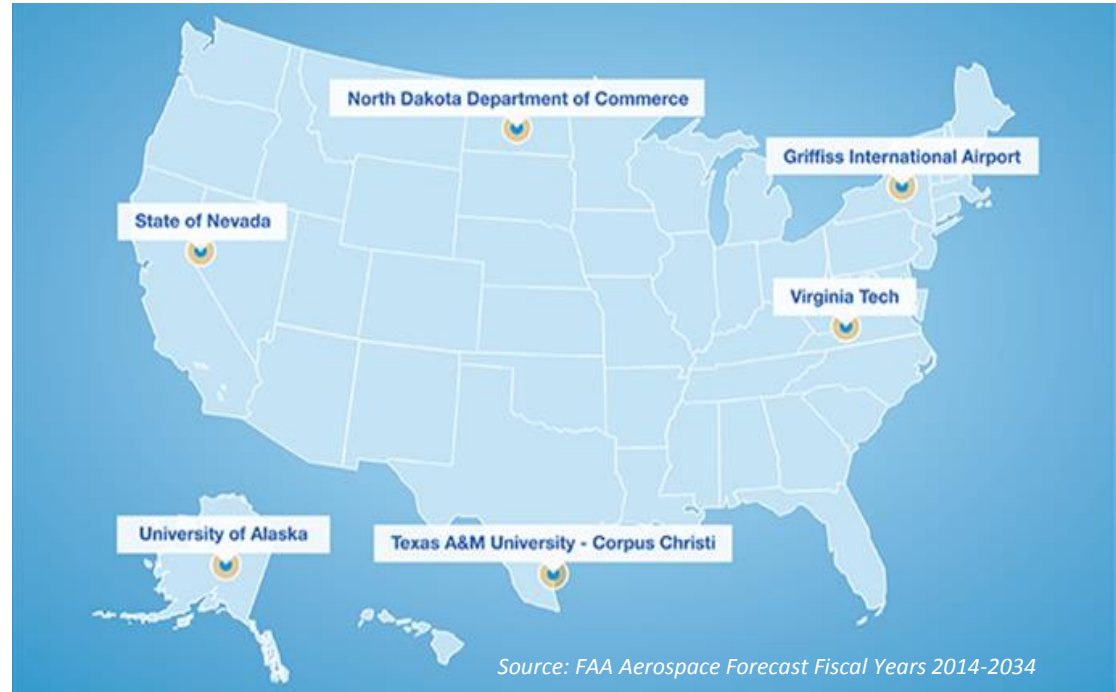


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# Unmanned Aircraft System Test Site Program

The overall purpose of this test site program is to develop a database along with the operational expertise to enable the safe operation of these aircraft in the NAS.



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# UAS CATEGORIES

UAS systems under 55 pounds are inexpensive and economically viable for commercial use. The FAA expects that market demand for UAS will occur within the constraints of the regulatory and airspace requirements.

UAS Category	Maximum Weight (lbs) (MGTOW)	Normal Operating Altitude	Speed (KIAS)	Current/Future Representative UAS
Group 1	0-20	<1,200 AGL	<250	WASP III, BATCAM, Raven, Dragon Eye
Group 2	21-55	<3,500 AGL		Scan Eagle
Group 3	<1320			Silver Fox, Shadow, Neptune,
Group 4	>1320	<18,000 MSL	Any Airspeed	Predator, Sky Warrior, Hunter, Fire Scout
Group 5		>18,000 MSL		Global Hawk, Reaper, BAMS, Global Observer, N-UCAS

Source: FAA Aerospace Forecast Fiscal Years 2014-2034



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# UAS CATEGORIES

Once able to legally operate, the FAA estimates roughly 7,500 commercial small (under 55 lbs) UAS will be operating within five years.

UAS Category	Maximum Weight (lbs) (MGTOV)	Normal Operating Altitude	Speed (KIAS)	Current/Future Representative UAS
Group 1	0-20	<1,200 AGL	<250	WASP III, BATCAM, Raven, Dragon Eye
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Source: FAA Aerospace Forecast Fiscal Years 2014-2034



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# FCT Tasking 56

## Where do we go from here?

- The UAS market could potentially be a significant impact to the NAS
- Smaller/lighter UAS will likely be managed primarily with procedures and restrictions
- Larger/heavier UAS will need to be integrated into the ATC system and managed like other NAS traffic



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# FCT tasking 57- AAtS

- AAtS- Aircraft Access to SWIM



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# FCT tasking 57- AAtS

Aircraft Access to SWIM will enable enhanced two-way information exchanges between flight operators (to/from the aircraft) and FAA operational personnel and data. ConOps developed based on the 2020 timeframe. AAtS would leverage global technologies such as FIXM, WXXM, and AIXM.



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# FCT tasking 57- AAtS

- AAtS would not be used for flight critical command and control information.
- It would not use existing comm systems such as ACARS or DATACOMM, but instead use available commercial broadband installed by the flight operator.



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# FCT tasking 57- AAtS

- AAtS would leverage available bandwidth for two way exchange of information that would promote improved situational awareness and decision making.
- Applicable to all phases of flight.
- Completely voluntary by flight operators.
- Available to all flight operators (121, 91, etc.)



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# FCT tasking 57- AAtS

- AAtS could be made available through third party interfaces to all flight operators, including those not supported by a FOC/dispatcher.
- FCT is on record stating that any interface offered by FAA be available to any and all flight operators and their vendors.



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# FCT tasking 57- AAtS

- AAtS ConOps has developed several use cases.
  - Aircraft transmission of:
    - Non-urgent PIREP data.
    - Updates to flight schedule/ATCFP from operators not supported by a FOC.
    - Transmission and updates to TOS data.
    - Transmission and updates to Flight Object data.



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# FCT tasking 57- AAtS

- AAtS ConOps has developed several use cases.
  - Flight Deck reception of:
    - NAS constraint data including traffic management initiatives and TFRs.
    - Near real-time access to Aeronautical info such as NOTAMs or SAA use.
    - Weather info such as CIWS and PIREPS.



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# FCT tasking 57- AAtS

- AAtS future use cases.
  - As bandwidth increases, significant data could be automatically transmitted from the aircraft:
    - Weather data including wind, temp, and turbulence.
    - Aircraft weather radar data.
    - Interaction with future versions of PDRR/ABRR/CTOP/CACR.
  - Who owns this data, and how is it distributed?
    - Flight operator?
    - Vendor?
    - Agency?



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# FCT tasking 57- AAtS

- AAtS future use cases.
  - As bandwidth increases, significant data could be received by the aircraft:
    - TFDM/ASDE-X Surface Management data.
    - TBFM Metering data.
    - TFMS “total flight path” constraint/delay data.
    - Flight Object user preferences and priorities.



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# FCT tasking 57- AAtS

- How does the governance work when there are potentially massive amounts of data being exchanged to/from SWIM?
- Same potential issue in the future when direct connections might exist between broadband and aircraft systems (FMS).
- Will regulatory changes be required to further delineate flight critical information vs. “nice to have” or optional data exchange?



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