System Wide Information Management and Data Security for DECEA

BR&T AOE
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Agenda

- Active Partner in Global SWIM Community
- Boeing’s Past Experience of SWIM (Timeline)
- Selected Programs
  - FAA Global CNS System (GCNSS)
  - FAA Network Enabled Operations (NEO)
    - Civil-Military Information Sharing
  - FAA Collaborative Information Management II (CIM II)
    - Information Security and Data Governance
  - FAA Aircraft Access to SWIM (AAtS)
    - Air-ground information Sharing
  - Boeing’s Contribution to SESAR SWIM Global Demo
  - NASA Airspace Technology Development 1 (ATD-1) Demo Flights
Boeing has been a partner in the global SWIM community (e.g., ICAO ATM IMP, ATM RPP, NextGen Advisory Committee, etc.)

Boeing has supported the development of SWIM in United States and Europe (e.g., FAA Global CNS System, FAA MG Demo, SEAR SWIM Global Demo, etc.)

- In US, Boeing has worked on SWIM with FAA for 15+ years

Boeing has been a partner in supporting civil-military coordination for an enhanced situational awareness - developing standards and best practices for Civil-Military information sharing

Boeing has been a partner with FAA and NASA in developing technologies that enable UAS integration in the National Airspace

- TBO, Detect & Avoid, and Sense & Avoid - key enablers for manned and unmanned aircraft sharing the airspace

Boeing has been a partner with airlines and ANSPs in achieving TBO through using existing SWIM and other NextGen capabilities in the aviation ecosystem (ATN B2 is not required)
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The GCNSS program explores and develops next-generation CNS/ATM concepts and provides for demonstrations that focus on the following areas:

- Global Satellite Based Communications, Navigation and Automatic Dependant Surveillance (ADS)
- Secure Integrated Common Information Network and Surveillance Data Network (CIN/SDN) as part of the FAA’s System Wide Information Management (SWIM) concept
- Secure Satellite Based Broadband and Narrowband Communication linkage between aircraft and the CIN/SDN

- **Live flight demos thr Segment A/B/C:**
  - Transmission of voice/data/video between air and ground using broadband and narrowband satellite links and CIN/SDN
  - Technologies to enable the creation of a fully linked and integrated network of aircraft, airlines, controllers, law enforcement, military, and others—regardless of their geographic location
  - Demonstrated satellite-based direct pilot-controller communications (both voice and data) and Automatic Dependent Surveillance (ADS) that would enable precision (radar like) control in oceanic and remote domains
FAA Network Enabled Operations (NEO)  

- Post Katrina improve information sharing between government agencies
- Using existing legacy systems Demonstrate
  - Interoperability between FAA and systems of other agencies (delivering relief aids using C-17)
  - Ease of securely access to information between agency systems
- Use SWIM and SOA architectures to improve information sharing
- Develop generalized information architecture for global ATM operability
- Ensure information architecture is secure, flexible and extensible
- Advance TBO concepts to support future system capacity
- Simulate and demonstrate operational benefits of use of SWIM

Provide prototype solutions for the sharing and distribution of critical data between agencies and aviation organizations

Civil-Military Information Sharing
NEO Spiral II (2010 – 2012) Shared Situational Awareness -STARS, ERAM, CASP

STARS - Terminal

ERAM - Enroute

- Collaboration with FAA and DoD
- UAS Flights at Warren Grove
- AAI RQ-7 Shadow TUAS
  - Wingspan: 20’ 4”
  - Range: 67.7 mi
  - Top speed: 126 mph
  - Weight: 185.2 lbs

UAS Operations
NEO Spiral II enhancements include pointouts designed to support Unmanned Aircraft operations.

- Several new pointout types have been created

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<th>State</th>
<th>Alert Type</th>
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<tr>
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<tr>
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<td>Suspect</td>
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<tr>
<td>2</td>
<td>Track of Interest</td>
</tr>
<tr>
<td>3</td>
<td>Responding Asset</td>
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- Pointouts can be manually entered by the controller.
- Automatic pointouts (CNF) are generated for the UA when it is not conforming to the published trajectory corridor.
- Automatic pointouts can also be generated for aircraft not authorized to enter corridor.
  - Suspect (SUS) published for aircraft predicted to intrude into the corridor.
  - Track of Interest (TOI) published if enters the trajectory corridor.
• Leverage operational DoD air-to-ground communications to provide information to FAA to enhance flight safety and communication
• Research into enhanced information security between FAA and partner agencies
  + Leverage existing technologies, systems, and data links
  + Use secure credentials between partner agencies and FAA
    • Operational scenario is vetted by DoD’s Air Mobility Command
• Demonstrate interoperability through sharing Flight Object data to maintain operational security
  + Integrate with Mini Global II Environment
  + Utilize DoD C-17 Lab
  + Utilize FAA SWIM Prototype Lab
  + Software vendor interoperability (IBM WebSphere/ Oracle WebLogic/ Red Hat Fuse)

A major enabler of the new global ATM concepts is the ability to securely share information between aircraft and ground systems operations with SWIM.
CIM Program (I/II) Operational Value – an Example

Current FAA/DoD Operation

Only air traffic flight information distributed in automation systems

TACC (Military AOC) Voice Call Secure data AMC Voice Call Secure data FAA Command Center

CIM/MG II Operation

Both air traffic flight information & secure data distributed in automation systems

FIXM ATC FP & Secure data CIM/MG II Systems FIXM ATC FP & Secure data Command Center

Modernizing Interagency Information Exchange
Each agency used independent Data Governance Model (DGM)
FAA SWIM Governance Policies documented
FAA used SWIM Security Profile Specification (SSPS)
Policies aligned with NIST Guide
SSPS defines architectural approaches in SWIM environment
  - Point to point interactions
  - Intermediary interaction including
    - Portal to Service, Chained, Cross Domain, Public ‘demilitarized zone’, Mission support
References other security standards to be followed
Recommends alignment with NIST Guide to Secure Web Services and WS-I

Standards Based SWIM Governance for Information Sharing
Inform the transition to high levels of information security to support trusted civil-military interoperability
An air-ground mechanism for displaying National Airspace System (NAS) originated information on Class 1 Electronic Flight Bag (EFB) devices

Uses the aircraft’s IP data link, weather and aeronautical information can be exchanged during all phases of flight

Enhances Jeppesen’s FliteDeck Pro application by providing SWIM-based information alongside the existing aeronautical charts, flight planning, and rerouting capabilities

Compliant with the emerging FAA and Eurocontrol air transportation information exchange models (i.e., AIXM, WXXM, and FIXM)

Leverages in-flight broadband access and SWIM infrastructure to enable an enhanced information sharing and collaboration between aircrew and ground systems

Live flight demonstrations with United, Virgin America, Flexjet, and flightOptions

And ICAO Provisions Doc. 9750 for Global Air Navigation Plan

- Identifies ASBU B2-SWIM “Enabling Airborne Participation in Collaborative ATM through SWIM”
- Considers the aircraft to be a fully connected information node in SWIM, enabling full participation in collaborative ATM and flight operation processes
Boeing’s Contribution to SESAR Global Demo (2016)

- Boeing participated in the SESAR SWIM Global Demonstration held in Rome, June 2016
- Boeing’s contribution to the demo integrated a 737 FMS, a Jeppesen prototype EFB, the JetPlan flight planning system and a fleet monitoring prototype software
- We simulated flights using SWIM services from Europe and the Middle East, showing flight planning, pre-flight and in-flight scenarios
- Focus on a flight from Dubai to Vienna, from creation to landing, showing interactions with different SWIM services and third party SWIM data providers
NASA ATD-1/Phase II Demo Flights (2015-2017) Airborne Aircraft Spacing Technology

**Interval Management (IM)**

**Controller Managed Spacing (CMS)**

**Traffic Management Advisor with Terminal Metering (TMA-TM)**

**Airborne aircraft spacing technology for Time-Based Flow Management (TBFM)**
Boeing has a global presence and diverse expertise with a specialist for every facet of the ATM infrastructure.

Boeing will continue to partner with the global SWIM community for maximizing SWIM’s operational benefits.

Boeing has worked on SWIM for 15+ years and supported the development of SWIM in US and Europe.

BR&T is set up to reach across Boeing portfolio.

Boeing is ready to work with DECEA for a tailored solution on SWIM implementation.
Questions?

Thank you!