Global Information Management

RTCA Overview with Aeronautical Data Chain Insights from SC-217

Presented By: Michael Burski, FAA on behalf of RTCA, Inc
Date: August 25, 2015
RTCA: A Unique Public-Private Partnership

> 490 Members

- Academia
- Airports
- Aviation service providers
- Government organizations
  - FAA, DOD, TSA, NASA
- Manufacturers (OEMs and after-market)
- Operators
  - Airlines, GA, Cargo, DOD
- Suppliers
  - Automation, Infrastructure, Avionics
- Labor
  - Pilots, Controllers, Dispatchers
- R&D organizations

Funded in 1935
Incorporated in 1991

7% U.S Government
32% International
60% Domestic
7% Academic
Purpose of RTCA

Working at the Nexus of Technology, Policy and Operations

Mission Statement

To be the premier Public-Private Partnership venue for developing consensus among diverse and competing interests on resolutions critical to aviation modernization issues in an increasingly global enterprise.

Our recommendations — whether technical, policy, financial or operational — lead to positive, timely, tangible and measurable results, returning value to all who participate.
International Harmonization
Background – FAA Charter RTCA

- FAA charters RTCA to operate federal advisory committees
  - NextGen Advisory Committee (NAC)
  - Program Management Committee (PMC)
  - Special Committees (currently 23)
  - Tactical Operations Committee (TOC)
  - Others as FAA deems necessary
- Two year term – expires April 2017
- Charter approved by the Department of Transportation
- Charter Administered by FAA NextGen Organization
- GSA template & regulation defines scope, duties, recordkeeping, etc
Consensus Process

Diversity → Single Voice

• Consensus is the Essence of the Value that RTCA Brings to the Aviation Community
• Role Of Chairman(s) to Ensure Consensus
  – Consensus is not Always 100% Agreement
• Opportunity for All Voices to Be Heard
• Analytical Basis for Decision
• Transparent Process
  – Documentation captures discussion & resolution
• Members “Can Live With” & Support the Results
Special Committees (23)

- SC-135 - Environmental Testing (WG-14, WG-31)*
- SC-147 – TCAS/ACAS (WG-75)*
- SC-159 – GPS (WG-62, WG-28)*
- SC-186 - ADS-B (WG-51)*
- SC-206 - AIS and MET DataLink Services (WG-76)
- SC-209 - Mode-S Transponders (WG-49 and SC-209 are dormant, monitor ICAO recommendations)*
- SC-214 – Standards for Air Traffic Data Communication Services (WG-78)*
- SC-216 - Aeronautical Systems Security (WG-72)*
- SC-217 - Aeronautical Databases (WG-44)*
- SC-222 – AMS(R)*
- SC-223 - Airport Surface Wireless Communications (WG-82)*
- SC-224 - Airport Security Access Control Systems
- SC-225 - Lithium Batteries & Battery Systems
- SC-227 - Standards of Navigation Performance (WG-85)*
- SC-228 – MOPS for Unmanned Aircraft Systems
- SC-229 – 406 MHz Emergency Locator Transmitters (ELTs) (WG-98)*
- SC-230 – Airborne Weather Detection Systems
- SC-231 – TAWS
- SC-232 - Airborne Selective Calling Equipment
- SC-233 - Addressing Human Factors/Pilot Interface Issues for Avionics
- SC-234 – PEDs (WG-99)*
- SC-235 – MOPS for Small Cell Non-Rechargeable Lithium Batteries
- Wake Vortex Tiger Team

* joint meetings and/or documents

Oversight, Guidance, Integration Provided by Program Management Committee (PMC)
DO-200B/ED-76A Standards for Processing Aeronautical Data
- Top level Standard addresses complete aeronautical data chain

DO-272D/ED-99D, User Requirements for Aerodrome Mapping Information
- Includes requirements for Aerodrome Surface Routing Network (ASRN)
- Addresses incorporation of SWIM service delivery
- Includes UML as normative part of standard, which leads to auto-generated XML schema.

DO-276C/ED-99C, User Requirements for Terrain and Obstacle Data

DO-291C/ED-119C Interchange Standards for Terrain, Obstacle, and Aerodrome Mapping

Pending RTCA Program Management Committee (PMC) Decision to update DO-201A/ED-77, Standards for Aeronautical Information
DO-200B – The Complete Process
Focus – From Data Origination to Use

- Establishes recommended minimum requirements for the processing and quality management of aeronautical data.
- Establishes Data Quality Requirements (DQRs) characteristics:
  - Accuracy, resolution, assurance level, traceability, timeliness, completeness, and format.
- End to End Data Chain includes:
  - Utilization of Master Data Management Principles at origination including:
    - Establishment of Authoritative Sources
    - Identification of Stewards, Custodians, etc.
  - Identification and Development of SOA Information Services Under SWIM
  - Managing Access to SWIM Services
    - Access by Ground Systems
    - Access by Airborne Systems
  - Timely Delivery of Data and Updates to Users
DO-200B – Aeronautical Data Chain

Upstream Data Operations
- Data Originators
  - Multiple sources from public and private entities
  - Aerodrome
  - Survey
  - Airspace/Procedure Design
  - ATS Provider
  - MET Service Provider
  - CNS Provider
  - SAR Service Provider
  - Other...
- Aeronautical Information Service
  - e.g. State AIPs

Data Providers
- e.g. Aeronautical Data Providers/Processors
  - Data originated by non-official sources
    - e.g. AMD

Application Integrators
- e.g. FMS Data Application Integrators

Downstream Data Operations
- End Users
  - Air
    - e.g. Airspace users, Aircraft manufacturers
  - Ground
    - e.g. ANSP, Operational Services

From RTCA SC-217/Eurocae 44 work on updating DO-200A
Applicable Standards

Upstream Data Operations

Data Originators
Multiple sources from public and private entities

AC 150 5300/18C
Etc.

NAS OV-7/AIRM (Logical Model)

Aeronautical Information Service/Portal
e.g. State AIPs

ICAO Annex 4
ICAO Annex 11
ICAO Annex 14
ICAO Annex 15
ICAO Doc 8126
ICAO Doc 9613
ICAO Doc 9674

Application Integrators
e.g. FMS Data Application Integrators
ARINC 816-3
DO-278C

Downstream Data Operations

Data Providers
e.g. Aeronautical Data Providers/Processors

DO-201A
DO-276B
DO-272C

Ground
e.g. ANSP, Operational Services

End Users
Air
e.g. Airspace users, Aircraft manufacturers

Application
Integrators

DO-291C

Data originated by non-official sources
e.g. AMD

AC 20 153A

DO-236C?

AIXM
FIXM
WXXM

Services

Federal Aviation Administration

Air Transportation Information Exchange Conference - Global Information Management

8/25/2015 11 11
End User Requirements !!!!

Chain-links Managing Integrity to Assure Data Received Meets Data Need from Data Acquisition Through Data Exchange

Data Originators
- Multiple sources from public and private entities

Aeronautical Information Service
- e.g. State AIPs

Data Providers
- e.g. Aeronautical Data Providers/Processors

Application Integrators
- e.g. FMS Data Application Integrators

End Users
- Air
  - e.g. Airspace users, Aircraft manufacturers
- Ground
  - e.g. ANSP, Operational Services
The Data Chain by Roles

Custody Chain

Data Originators
Multiple sources from public and private entities

Data Providers
Content Integrity

Application Integrators
E.G. Integrate products for the cockpit

Exchange Models

Information Product (transform and Enrich)

AIXM
WXXM
FIXM
XMs

SWIM Services

Technical Data Chain

End User
Ground (operational Services)
Air (airspace, aircraft manufacturers)

User DQRs must be reflected in originator spec’s and data models

Technical Infrastructure Chain

Physical Models

Logical Model (OV-7/AIRM)

Red lines represent required lineage

Blue lines represent governance

Data Architecture Governance

Data Quality Governance

Data originated by non-official sources e.g. AMD

Governance

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DO-272D and DO-276C – User Requirements

- **DO-272D User Requirements for Aerodrome Mapping Data**
  - Provides minimum requirements for content, origination, publication, and updating aerodrome mapping information.
  - Includes SWIM considerations in use of the standard
    - Identifies characteristics of AMDB information services to enable dynamic exchange of AMDB data in a SWIM environment.
    - References UML model as *normative* part of standard (resides in DO-291).
  - Includes Rules for Associated Aerodrome Surface Routing Network (ASRN):
    - Allows creation of unambiguous taxi route
    - Transmission of taxi routes in format usable to onboard applications
    - Displays taxi route on an aerodrome map

- **DO-276C User Requirements for Terrain and Obstacle Data**
  - Requirements defined for:
    - Area 1 – The State
    - Area 2 – The Terminal Area (vicinity of the aerodrome 2a, 2b, 2c, and 2d)
    - Area 3 – Aerodrome Movement Area (supports aerodrome mapping requirements)
    - Area 4 – The CAT II or III Operation Area
  - Incorporates Needs of the Helicopter Community
DO-291C – Interchange Standards for Terrain and Aerodrome Mapping Data

• Interchange Standards based on ISO 19100 (geographic information) series of standards

• Scope Covers Data Exchange of Features Documented in DO-272D and DO-276C

• Establishes a basis to implement a physical interchange format that supports the required data flow

• Normative parts of the standard represents an intermediate specification level between:
  – The abstract conceptual requirements in DO-272D and DO-276C, and
  – A Compliant Interchange Implementation

• An Informative XML Schema generated from the UML that could be used to generate a compliant information Service
Example: Segmenting the End-End “State” Data Chain into 3 Links

Service Provision

External Users & Systems

FAA Systems

Aeronautical Information Services

Airport Information Service
NOTAM Information Service
Other AI Integrated Information Services

Service Development

Upstream Data Operations

Airport Survey
Airport Data Audit
Airport Data Authoritative Source
Other Data Authoritative Sources

Request/Reply
Subscription

portal

Request/Reply
Subscription

Example with SWIM Highlighted

Upstream Data Operations

SWIM
Mission Services
Aeronautical Information Management
Weather Information Management
Trajectory Management
... etc

Core Services
Publish Subscribe
Request/Response
Message Routing
... etc.

Support Services
Content Discovery
Data Acquisition
Service Adaptation

Security Services
Etc....

Downstream Data Operations

Data Providers
e.g. Aeronautical Data Providers/Processors

DO-201A
DO-276C
DO-272D
DO-291C
AC 20 153A

Data originated by non-official sources
e.g. AMD

AI Service Portal

AIXM
FIXM
WXXM

NAS OV-7/AIRM (Logical Model)
SWIM + Services

- Standards Based Service Oriented Architecture
- Services Registered and Accessible
- Service descriptions include what the service does, who provides the service, where it resides, how to access the service (Standards FAA-STD-065, -070, -073)
- Service Accesses Appropriate authoritative Data in Accordance with Service Definition and the Enterprise Architecture
- SWIM Provides:
  - Subscription based services
  - Request/Reply based services

Aeronautical Information Services

- Airport Information Service
- NOTAM Information Service
- Other AI Integrated Information Services

Airport Data Authoritative Source

Other Data Authoritative Sources
Summary – Closing the Loop

Data Originators
Multiple sources from public and private entities
- SWIM Services
- Aeronautical Information Service/Portal (e.g. State AIPs)
- Data Providers (e.g. Aeronautical Data Providers/Processors)
- Physical Model

Data Providers
- SWIM Services
- AIXM
- FIXM
- WXXM
- ??XM
- Ground (e.g. ANSP, Operational Services)
- End Users Air (e.g. Airspace users, Aircraft manufacturers)
- Application Integrators (e.g. FMS Data Application Integrators)
- DO-201A
- DO-276C
- DO-272D
- DO-291C
- DO-236C?
- AC 150 5300/18C Etc.
- Data originated by non-official sources (e.g. AMD)
- AC 20 153A
- ARINC 816-3
- DO-278C
- NAS OV-7/AIRM (Logical Model)

User DQRs must be reflected in originator spec’s and data models
Summary

• DO-200B covers the complete Aeronautical Data Chain Beginning with Data Quality Standards that drive state data collection

• Data Quality is maintained by using authoritative data and insuring integrity throughout the chain by all users.

• DO-272 and DO-276 Document User requirements that must be reflected in data origination activities.

• DO-291 provision of UML as normative, provides basis for insuring authoritative data is consistent with exchanged data.

• SWIM is a key enterprise-level capability required to support the broader sharing of information required to support the NextGen applications
  • Standard Web Feature Services access authoritative data, maintain integrity, and provide quality data for aggregation into products or delivery.

• The Data Chain points to the need for communities of practice to ensure user data requirements are reflected in data collection and throughout the data chain.

• RTCA is facilitating this entire aeronautical data chain standards development

• **Vive le Tour !!**
Questions
Back Up Slides
RTCA Corporate Structure

RTCA, Inc.
- RTCA Board of Directors
  - RTCA Fiduciary Oversight
- RTCA Policy Board
  - RTCA Policy Oversight
- RTCA President
- Strategy & Programs
- Operations & Administration
- Committee Management
- Business Operations

RTCA Established Federal Advisory Committees
- NextGen Advisory Committee
  - Provides Recommendations on NextGen Implementations
- Program Management Committee
  - Establishes and Manages Special Committees
- Special Committees
  - Develops Performance Standards
- Tactical Operations Committee
  - Provides Recommendations Affecting the Efficiency of the NAS
Board of Directors

Carl Esposito  VP M&PM, Honeywell International, Inc.  
(Chair)

Ed Bolen  President & CEO, NBAA

Mark Baker  President & CEO, AOPA

Nick Calio  President & CEO, Airlines for America

Craig Fuller  President & Owner, The Fuller Company

Margaret Jenny  President, RTCA
FACA Guidelines & Principles

- Promote Openness, Accountability & Balanced Viewpoints
- Membership Balanced Representation from Community
- Competing Interests Welcome
- Potential Conflicts of Interest Must Be Disclosed
- Limit FAA Membership, Serve as Ex-officio Members
- Committee Meetings Open to the Public
- Agendas, Meeting Minutes & Materials Posted on Web
- Parent Committee Not a “Rubber Stamp” of Subcommittee
RTCA Federal Advisory Committees

• Covers gamut from policy to operations to technology

• **Policy** - FAA and Industry investments, priorities and commitments
  – NextGen Advisory Committee (NAC)
  – Tactical Operations Committee (TOC)

• **Technology** - Minimum performance standards, basis for certification, safety & performance
  – Program Management Committee (PMC)
  – >20 Special Committees (SCs)
NextGen Advisory Committee (NAC)

- 30 Executives from all Relevant Stakeholders
- 4 years, 14 meetings, over 30 recommendations
  - NextGen Capability Prioritization/Four Focus Areas
  - NAS Performance Metrics
  - Environmental Review Best-Capable, Best-Served Policy
  - Overcoming Impediments to PBN Implementation
  - Fuel Data Sharing
  - Metroplex
  - Equipage Incentives
  - Prioritization of Locations
Tactical Operations Committee (TOC)

- Notice to Airmen (NOTAM) Modernization
- VOR Minimum Operating Network – GPS/PBN Transition
- Visual Area Surface 20:1 Obstacle Clearance
- National Procedures Assessment
- Regional Airspace Issues
- Class B Airspace
- Airport Construction
- GPS Adjacent Band

Addressing Operational Issues
RTCA – EUROCAE
Memorandum of Cooperation

• Signed on 21st November, 2014 in Brussels
• By Margaret Jenny, RTCA President, and Jean-Paul Platzer, EUROCAE President
RTCA Committee Activities FY2014

• 60 Federal Advisory Committee Meetings
  – 305 Non-FACA meetings, Work Groups, Task groups, etc.
• 2,336 Attendees
• 358 Unique Organizations
• 4 New Special Committees
• 25 New or Updated Documents
• 11 Policy/Technical Recommendations
Aircraft Access to SWIM Harmonization

- Aircraft Access to SWIM Harmonization (AAtS H) Project
  - FAA sponsored this project
    - This was led by the Open Geospatial Consortium (OGC)
    - Significant support from representatives of FAA’s AAtS initiative, RTCA SC-206 AIS / MET Data Link committee, ARINC 830 (AGIE) subcommittee and industry (The Boeing Company, Honeywell, Jeppesen, Teledyne, NorthStar, and Panasonic Avionics Corporation)
  - The purpose of this project was to identifying standards’ efforts relevant to the provision of aircraft connectivity to the FAA’s SWIM infrastructure that shares / communicates aviation data & services, as planned in the FAA’s AAtS initiative.
    - Standard groups represented by SC-206, ARINC 830 and the OGC.
  - AAtS H resulted in two OGC engineering reports (14-073 and 14-086) as well as an ICAO working paper on international AAtS.

- FAA AAtS / IP Connected Aircraft Project
  - The purpose if this project is to develop a strategy for technology transfer & commercialization of the AAtS service.
  - Held workshops as part of the last three SC-206 Plenary meetings.
Need of Standards
Harmonization

• Standards for information (data) exchange
  – AIXM, WXXM, FIXM, RTCA DO-291C (AMXM), ARINC 424 / 816 / 860
• Standards for information quality
  – ICAO Annex15, RTCA DO-201A, RTCA DO-272D, & DO-276C
• Standards for information processing
  – RTCA DO-200B
• Standards for AIS / MET Data Link Services
  – RTCA DO-308/324/339/340
• Recommended practices for display of AIS / MET Information
  – SAE ARPs 5289, 6467.