



**AVIATION WEEK EXECUTIVE ROUNDTABLE:  
*MRO IT: Extracting MRO Intelligence from a Data-Intensive Aircraft***

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***With the delivery of new, technologically advanced, data-enabled aircraft, enormous volumes of aircraft data will be generated and potentially used more frequently and accurately track reliability and performance. Efficient data management and analytics are critical to maximizing the value of the capabilities and to deploying reliable intelligence to the right maintenance areas to minimize aircraft downtime. Minimal downtime means more efficient and effective asset utilization and greater revenue and profits.***

***The volume and velocity of data has created a daunting challenge to airlines and MRO (Maintenance Repair Overhaul) providers, who must quickly and effectively analyze the data and turn it into real-time insights and actions.***

***Because of complex data access guidelines and policies among airlines, manufacturers and MRO providers, along with significant differences in legacy and proprietary systems, there needs to be a strategic integration and collaboration across the value chain for the flow of data and information to effectively streamline business and maintenance operations.***

***The Aviation Week Executive Roundtable: MRO IT is among roundtables held throughout the world on areas of significant concern and interest to a broad range of aerospace and defense organizations. Aviation Week began holding roundtables in 2004 to bring together multiple stakeholders in a neutral environment to address issues critical to the aerospace and defense communities, with the goal of identifying actions to be taken by individuals or organizations that will benefit the enterprise as a whole.***

An integrated approach to sharing and analyzing aircraft and maintenance data was the focus of a Sept. 28, 2010, Aviation Week Executive Roundtable held at the ExCeL Center in London. The goal of the roundtable was to define processes and tools on effective data management and generate possible strategies and collaborations to maximize aircraft maintenance data capabilities in the next 12-18 months.

The roundtable was hosted by Garry Copeland, Director of Engineering at British Airways, and Frank Jackman, Deputy Managing Editor for Commercial/MRO, Aviation Week. The meeting was sponsored by IBM.



Organizations participating in the roundtable were Abu Dhabi Aircraft Technologies; Aer Lingus; the Aeronautical Repair Station Association; Aircelle – SAFRAN; AirTran Airways; American Airlines; Aveos; Aviation Week; BAE Systems; bmibaby; The Boeing Company; British Airways; Croatia Airlines; Delta Air Lines; easyJet Airlines; EgyptAir Maintenance and Engineering; the Federal Aviation Administration; GE Aviation Services; Hamilton Sundstrand; HEICO Aerospace; HMM Consulting; Honeywell Aerospace; IBM; Iberia Maintenance; Jordan Aviation Group; KLM Engine Services; KLM UK Engineering Limited; Oracle; *Overhaul & Maintenance*; Rolls-Royce Future Programmes; SR Technics; TAP Maintenance & Engineering; Team SAI; Thales; Turkish Technic; Virgin Atlantic Airways; and Volvo Aero Services.

Roundtable participants divided into six work groups that were challenged to respond to a set of questions that focused on one of the following: 1) identification of barriers/enablers to leveraging data for intelligent fact-based decisions and best-in-class business intelligence approaches; 2) change management strategies for effective data utilization and management or 3) definition of the required standards for data sharing throughout the value chain. Following the discussion, participants prioritized industry actions.

EXECUTIVE SUMMARY – The Aviation Week Executive Roundtable: MRO IT on Sept. 28, 2010, confirmed the urgent need for common industry standards for aircraft data to effectively process and utilize the increased volume of data from the new “networked” aircraft. Standardization efforts need international commitment, definition of ownership and access, and must be driven by business/commercial priorities.

#### KEY FINDINGS:

- To improve data sharing and cooperation across the value chain, an international body needs to take a greater role to help drive standardization efforts.
- Building an industry standard for data storage and access is a top enabler for effective data utilization.
- To be fully effective and useful, the information/data flow needs to be in a virtual environment, scale-able and secure with specific capability to allow users access on a restricted or “need-to-know” basis. It should allow for both public and private access to MRO/Aftermarket data, with the ability for interconnection in a secure environment between all elements of information technology, such as servers, storage capabilities and various back-office applications. Before the Cloud concept can be constructed or implemented, the data flow has to be in some form of standard language to make this concept more practical and affordable.
- For effective information/data flow across the value chain, creating a standard is critical. As a team/group, we must adhere to the standard and force the change.
- Uncertainties in intellectual property (IP), such as data ownership and access, are a major barrier and risk to effective data utilization and management.
- Before integrating new and legacy systems with your business management processes, the business requirements, not the data, need to be defined and prioritized first. Questions, such as “What decisions do we want to make? What problems do we want to solve,” need to be asked.

The key findings are based on the details of topical conversations in the work groups, which addressed the following sets of questions:

#### 1. Barrier/Enabler Identification

Identify the top barriers/enablers for effective data utilization? What are the risks associated with these? Where can improvements be made? What are the problems with regard to gaining access to the

needed data? With the increasing volumes of data from networked aircraft, what gaps do you see integrating this with business management processes? What requirements are needed for new and legacy systems to integrate and work with one another?

## **2. Change Management Strategies**

What should the flow of information look like? How can data accuracy be ensured? What are the benefits of more accurate data? How should the information/data flow be presented to be more useful? How long do we have to get these systems mature and our people ready? What is the sort of timeline/critical path to be ready with the mature systems on entry to service? What are the obstacles for this timeline/critical path?

## **3. Standardization for Data Sharing**

What elements require standardization? What are the barriers to standardization? What are the enablers? Where do these standards fit within overall strategies to maximizing the benefits of the networked aircraft? What role can or should regulatory agencies play in enabling better use of data across the value chain? What data and information should be freely available to encourage and accelerate competitive growth? How could different players in the value chain improve sharing and cooperation?

### **WORK GROUP FINDINGS:**

#### **BARRIER / ENABLER IDENTIFICATION**

##### **Top Barriers/Risks to Effective Data Utilization**

- Lack of commonality in data standards
  - Reliance on analysis – some planes with too little data, others give too much. Variation in the amount of data fed into analysis.
  - Sheer volume of data available. (this can be a barrier AND enabler at the same time)
  - Maintenance reliability differentiation – how do you keep quality between my data and everyone else's?
- Intellectual Property (IP) – Who owns data? Who has access to data? (major issue) What can be shared? OEM and airline proprietary data
- Cultural barriers
  - Slowness/time to adapt to new tools and capabilities to share data.
  - Different level of sophistication and proficiency among data handlers (pilots, mechanics, etc.).
- Prioritizing of raw data – Older fleets vs. new fleets, which have more data and managing across these different platforms
  - Structured and unstructured data – especially from varying sources.

##### **Top Enablers to Effective Data Utilization**

- Building an industry standard for data storage and access
- New platforms (787, A380) enabling more collection of data, and help bring industry in data usage (game changers)
- Software tools that link legacy systems – Service-oriented Architecture (SOA), web-based tools
- Predictive and analytic tools
  - New devices – smartphones, iPads, etc.
  - BITE (built-in test equipments) smarter in electronic boxes / sharing airline data with repair organization.
    - Improve access communication – direct data feeds off the aircraft to the right people.

- Key Performance Indicators for effectiveness.
- Industry steering group - Dialogue between OEMs, operators, IT service providers

#### **Problems in gaining access to the needed data / Gaps in data access**

- Integration or migration of data with disparate types of systems
- Actual understanding of aircraft capability
- IP/Security - Disconnect in the information flow between vendor/OEM/airlines
- Justifying investment

#### **Requirements needed for integration of new and legacy systems/business management processes**

- Start with the business problem, not the data – Prioritize
  - Need to define the business requirements – what decisions do we want to make? What problems do we want to solve? (First – Very Important)
  - Must address to be competitive but must also operative in legacy world.
- Establish data standards and conventions by trusted entity – universal data exchange
- Train all users (pilots, mechanics, etc.) on new tools and operations with data
- Enhance data architecture – Data warehouse; SOA

#### **Requirements for improvements**

- Data standards/definitions/specifications/harmonization
- Requirements for business problems upfront
- Transmission standards
- Flexibility and ability to optimize maintenance actions

### **CHANGE MANAGEMENT STRATEGIES**

#### **Information/Data Flow Path**

- Information comes from: (few connectivity between all sources)
  - Aircraft.
  - OEM – Airframer – Component.
  - MRO – Records – Non-routines.
  - Airline records (hard copy) residing in data warehouse.
- Determination of priorities and tiering of data (what do we want to get out of the data)
  - What does an MRO/airline need to know?
  - Critical priorities.
  - Possible industry standard (ex. OEM provide standards).
  - Need to avoid or mitigate too much data.

#### **Assurance of Accurate Data**

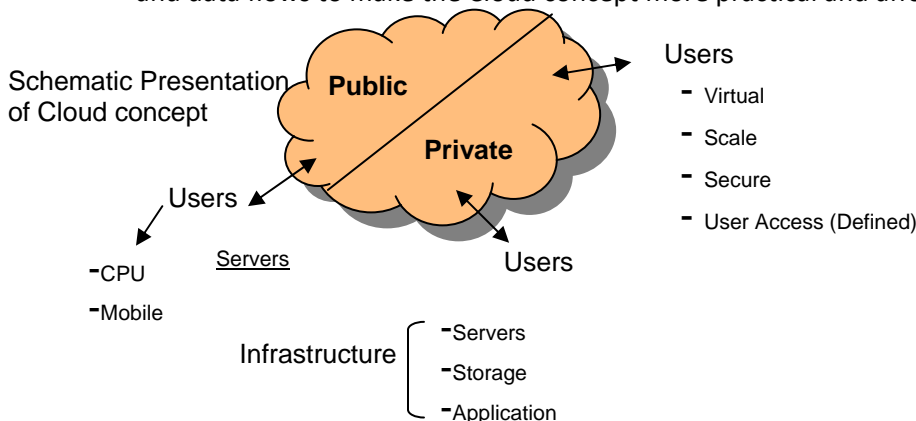
- Has to be a validation process for accuracy → compliance and safety
- Need to reduce human interface (manual entries, mistyped errors etc.)
  - Data automation – limit free fields and using drop down menus; creating common standard.
- Mechanism to ensure that transfer of information errors does not occur - interoperability
- Consider the data source and managing the accuracy of the data. Not only relying on the people capturing the data, but getting the entire situation of data

#### **Useful Presentation of Information/Data Flow**

- User access defined by business requirements
- Data Presentation Model - The Cloud concept
  - Intended to allow for both public and private access to MRO/Aftermarket data, with the ability for interconnection in a secure environment between all elements of information technology - specifically Servers, gateways to Storage capabilities and

archiving as well as various applications in the back-office (SAP, Oracle, home grown architectures, etc.).

- A virtual environment, scale-able and secure with specific capability to allow users access on a restricted or "need-to-know" basis.
- A major condition that precedes the Cloud's construction and implementation is to standardize the data flow to discourage customization and use standard language and data flows to make the Cloud concept more practical and affordable.



- Move toward automation and validation
  - Mistake-proofing of data – “garbage in, garbage out”.
  - Validating at these levels and the process behind it.

#### Timeline of System Preparation and Training

- Varies with operations, company focus/vision, and currently, dictated by OEMs
- Creating a common standard is critical
  - As a team, adhere to the standard – FORCE the change.
- Technology (cloud computing) is already implemented in other industries
  - The challenge is defining the instruction of the system and the security.
- Volunteer pilot projects for operational concepts
- Training and culture change (“teaching old dogs with new tricks”)

#### Critical Path to Implementation into Operations

- Critical path driven by OEM – getting MROs and Operations to same level
  - Compelling business case – benefits outweigh risks.
- Data that comes off the systems is what the OEMs want to present, not what airlines/MROs may want or need
  - Type of data is driven by OEMs, but challenge for MRO and operators are to interpret data that satisfies their own requirements.
- Timeline is driven by the 787 and 380 coming into service
- New platform enterprise information systems (EIS) will drive change
  - Making sure it's operator ready for entry into service.
  - New platforms have driven the way we react to legacy platforms.

#### Obstacles for Timeline/Critical Path

- Capitalization – startup or “change” costs – transition, transmission
- IP – who owns it at the end of the day? Working with network of airframe and components and operators, and defining it collectively cross platform of data systems – key issue
- Adoption of standards (ex. implementation of electronic flight bags (EFB) on different aircrafts and the lack of common standards there)

- Resistance to change – aging workforce, training, management support, regulatory obstacles

## **STANDARDIZATION FOR DATA SHARING**

### **Elements that Require Standardization**

- Data collection methods
- Squawk data and fault data codes – Specific downstream of data for the supply value chain
- Necessity to maintain configuration data – what do we have out there? Inventory control pieces
  - Significant challenge – how do I baseline with all the different parts, materials, fleets, customizations, etc.
- Prognostic data
- Tech logs - getting more info on the maintenance already performed

### **Barriers/Enablers to Standardization**

- Barriers:
  - Varying levels of technologies across various parts of the value chain.
    - Complexity – how does that fit into system and flow directly to the right place? How do we take data from OEM and MROs and feed it into our systems?
  - “Nobody” sees the value in standardization – only cost!
    - Only interested in standardization if it’s a commercial benefit. How do I rationalize one standard from another? How much energy/cost are we willing to invest?
  - Trusting the data – intelligent customers are questioning sources and collection methods.
  - IP and IT security policies.
  - Anti-trust/Legal – Airline legal /anti-competitive – commercial regulatory bodies are against sharing competitive advantage data. Also some countries have their own infrastructure.
    - Large operators or OEMs dominating influence - Where does smaller carrier fit in against the big carriers? Finding balance what they need compared to bigger fishes?
- Enablers:
  - Standards.
  - Cost reduction for appropriate knowledge use.
  - ATA working groups on Spec1000 and Spec2000.

### **Standards to Maximize Benefits of Networked Aircraft**

- Enables “apples to apples” comparison

### **Role of Regulatory Agencies to Enable Data Usage**

- No role needed outside defining the safety standards – including the requirements for the quality/reliability of the data
  - Competitive reliability needs to be separate from regulatory – FAA and other agencies ensure safety of flight. Because this is more commercial side of operations and supply chain, industry needs to set up this side.

### **Available Data/Information for Growth**

- Regulatory-required reports

### **Improving Sharing Across the Value Chain**



- Greater role of an international body, like IATA or ICAO, to drive standardization efforts  
Regulators are not the answer here. At the end of the day, the commercial operators need to take the initiative to drive this forward for efficiency purposes
- Compromises have to be made from ALL parties in the industry (airlines and OEMs; ATA working with IATA/ICAO, etc.)

#### **Data That Should NOT Be Shared**

- Information and knowledge derived from the data is the competitive asset. Is the competitive advantage come from the data, or the analysis of the data?
  - Level of sharing and attribution changes with commercial relationships.
  - Some data should be “pool” shared but not all, such as commercial/pricing data.

#### **BACKGROUND INFORMATION:**

*(Co-written by Garry Copeland, British Airways)*

In the next few years, airline operators will start taking delivery of Boeing 787 aircraft, which will take its place alongside the Airbus A380 and other types as contemporary, 'networked' aircraft, with levels of built-in monitoring that go far beyond that available on older types. The new age of the 'data-intensive' aircraft and sophisticated ground-based technology tools brings a level of maintenance data availability and integration that has never been available before. Many airlines are deploying integrated business management systems which pull together aircraft records, maintenance schedules, maintenance findings data, and inventory information.

For the operator and MRO communities, these innovations offer great promise of more efficient and effective maintenance processes, or the specter of data overload, fragmented maintenance and aircraft records, and potential loss of independence and reliance on dominant suppliers.

New data systems are continually being created and added into with legacy operations, however there is not a defined framework on how data will be formatted and prioritized for aircraft reliability and operational problems. Moving forward, industry operators will need to take global initiatives towards standardization, where compromises will have to be made from all sides. Building an industry standard to improved data sharing and cooperation will maximize the benefits of these fantastic new capabilities, and ensure that they act to result in a vibrant, effective, and competitive MRO industry.

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