The aviation maintenance, repair and overhaul (MRO) processes are complex and complicated due to the aircraft’s elaborate design, and the vast updates each new aircraft design brings. With the MRO lifecycle integrated with operators, third-party service providers, OEM maintenance systems, the complexity of the process, as well as the amount of associating technical data, multiplies.

The introduction of technologically advanced aircraft, such as the Boeing 787 and Airbus A380 with extensive sensor capabilities and vast amounts of real-time data, creates the potential for more accurate reliability and enhanced performance. However, the full potential of these new capabilities is hindered by the sheer amount of data, and proprietary and legacy system limitations, ranging from bandwidth to data formats and processing technologies.

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 definition of benefits and approach for data harmonization and sharing for all parties involved across the MRO value chain was the focus of an Oct. 19 Aviation Week Executive Roundtable held at the Gleacher Center (University of Chicago - Booth School of Business) in Chicago, Ill. The goal of the roundtable was to reach a shared view and list of actions/ideas that each person can use to prioritize the business behind data harmonization and improve integration of multiple maintenance systems in the next 12-18 months.

The roundtable was hosted by Jim Keenan, Sr. VP Technical Operations at United Airlines, and Lee Ann Tegtmeier, Editor-in-Chief of Overhaul & Maintenance for Aviation Week. The meeting was sponsored by The Boeing Company.

This was the second MRO IT roundtable. The first meeting in 2010 established that data standardization and enforcement of standards are critical to improve data sharing, cooperation across value chains, data storage and access. With uncertainties in intellectual property and required investments in new systems and technologies, there needs to be an integrated definition of benefits for all parties involved across the value chain.

Organizations participating in the roundtable were AAR Corp, Accenture, AeroTurbine, Inc, Air Canada, Aircraft Inventory Management & Services, AirVault’s Industry Advisory Board, American Airlines, Air Transport Association, CAVOK Group, Delta Air Lines, EgyptAir Maintenance and Engineering, FedEx Express, GE Aviation, Hamilton Sundstrand, IBM, InfoTrust Group, ILFC, JetBlue Airways, Lufthansa Technik Maintenance International, Mesa Airlines, NORDAM, Pratt & Whitney, Rolls-Royce Future Programmes, RW Aviation Advisors, LLC, Seapark Aviation, Southwest Airlines, TAP Maintenance & Engineering, TeamSAI, Technology Solutions, United Airlines, UPS Airlines, and US Airways.
Roundtable participants divided into six work groups that were challenged to respond to a set of questions that focused on three topics:

1) Identify and prioritize business requirements and reasons for IT/data harmonization.
2) Define a concept-of-operations for integration of multiple maintenance IT systems, including legacy systems, OEM platforms and next-generation aircraft capabilities.
3) Identify potential barriers in data sharing and harmonization, and formulate possible solutions to overcoming them.

Participants affirmed the need for data standardization, but industry commitment and motivation continue to be vexing challenges. Safety and reliability data should be the first to be harmonized. Before doing so, a collaborative business case with a defined return on investment must be defined and exactly which data are willing to be shared must be determined.

**KEY FINDINGS:**

- Safety and reliability data should be harmonized first due to time and cost to operators. Safety is the ultimate priority for airlines, so all airlines need the data easily accessible and available to utilize, especially airworthiness directives (AD), service bulletins (SB), and aircraft health monitoring data.

- The first step toward data harmonization is to collaboratively build the business case, involving all parties involved in the MRO value chain, and create a standardized ROI template.

- To drive forward, all parties (airlines, OEMs, MROs, suppliers) must come together and define the minimal, agreed-to “generic” data that they are willing to share.

- Unless data integration becomes an FAA mandate, it will be an evolutionary journey that needs to start with industry-wide immediate commitment (ATA), working groups (e.g. OEM advisory boards), and individual projects.

- A top potential barrier identified was partnership between maintenance and IT. The solution was to develop practical applications for the mechanics as the data is directly fed back to them.

Details of topical conversations in the work groups follow.

**BUSINESS CASE FOR IT/DATA HARMONIZATION**

Participants look at which data should be harmonized first and why, value for stakeholders, top priorities for information technology investment and what happens if no such investment occurs. What is “must-have” information?

- Although data standardization is mutually beneficial to all parties, the industry needs a catalyst to motivate and follow through.

_Which data should be harmonized first? Why?_

- Of the several types of technical data, the first that needs to be harmonized is safety and reliability due to time and cost to the operators.
  - Data is not currently harmonized even within a single company. The complexity and lack of cohesiveness multiplies with the number of manufacturers and suppliers involved.
  - Airlines must have access to safety-related data as the priority to include airworthiness directives and service bulletins.
Ease of access to ALL historical records will reduce costs for OEM, leasing companies, and others as it provides a basis for comparisons, analysis, prognosis and prevention.

**Determine the real value for all parties involved (maintenance, inventory, supply chain, etc.)**

- Valuation is difficult to determine and obtain consensus; until a value is assigned to common data, commitment is difficult.
- Real value to ALL parties reduces cost and enhances safety.

**Where do the top investments of maintenance IT budgets need to be made? Why? What would be the effects in cost and operations if you don’t invest/upgrade (what do you lose)?**

- Current investments are in time/people – it takes more time to identify needed data and cleanse it than is required for analysis.
- Integration of current systems would enable users to leverage existing data in a timely manner.
- Integration and efficient analysis of technical data.

- Impact of non-investment

More comprehensive evaluation of varying data from different sources  

⇒ same AC used different ways

Safety

⇒ Reliability

Cost ⇒ Efficiency

Empowers the Business user to use + adapt

**What is the cost of not harmonizing the data? What is the cost of not integrating systems or migrating to new systems?**

- Unable to calculate cost because each organization uses/reads/values the data differently.
- Costs of not integrating and migrating to new systems.
  - Constantly having to create new process.
  - More resources to analyze data.
  - More skilled resources required.

- 1st priority is the data from regulatory /safety environment.
- 2nd priority is to standardize the data.
- 3rd priority – leveraging the data for efficient analysis.
How soon does it need to take place?
- Yesterday.
- Unless it becomes an FAA mandate, it will have to be an evolutionary journey.
  - Start with industry forums, ATA commitment and resolution, OEM advisory boards.
  - Start small with a few projects.
  - Industry-wide immediate commitment
    - “From this point on, I want to commit to harmonization; the only data I allow from [source] has to be in this format.” As we conduct new businesses, we need commit to only allow certain standards of data. (Ex. Making a certain data format a stipulation in contracts)

For investments to be made, what are the “must have” information needed?
- First, there has to be data standardization that is formatted for data sharing (enabled with security features, format, etc.).
- Airline operational and technical data.
- Cost-benefit analysis – capital justification for safety, labor, reliability, efficiency.

CONCEPTUAL APPROACHES FOR MAINTENANCE SYSTEM INTEGRATION
Table participants conceptualize possible IT architectures for maintenance system integration, implementation timeline and migration path towards harmonization.

If we were able to design the architecture, what would it look like?

- Ownership may be a hybrid of airlines and OEMs. CM has to be maintained by a neutral 3rd party because although it may be mandated in contract, harmonization isn’t enforced.
  - Agnostic platform with 3 layers - analytics/operations, business process/governance, and application.

What would be the specifics of the IT architecture?
- Utilizing the current configurations from OEMs would be an option without heavy cost or time investment.
- Business process management.
- Application of standards.
- Data federation – accessibility from whoever needs it.
- Security.

How fast can we get there? What could be accomplished in the next 6 months to 1 year?
- Organizations without legacy or proprietary systems will be able to move faster because they can start new (Start ups = blank slate to build things brand new).
- Dependant on forced events such as mergers, start-ups, new fleets will force some type of rationalization.
- Evolutionary vs. transformation on system migration through legacy system updates.

Would there be a difference depending on the fleet variation?
- With new fleets, integration is easier.
- Mixed fleets drive up costs due to OEM variation of standards, leading to inefficiencies, data conversion costs, resource inefficiencies (specialized personnel needed).

How do you bridge the gap between legacy/proprietary systems and the new data systems?
- Common data layer – standards are critical for this.
What is the migration path toward harmonization?
- Collaboratively build the business case for the data harmonization.
- Predictable/scheduled standards release.
- Some mandatory enforcement of standard (s1000d v4.1 NLT 2013).
- Start with one agreed digital exchange with recommended in-service configuration.

POTENTIAL BARRIERS AND POSSIBLE SOLUTIONS
Participants define the specific potential limitations for data harmonization, such as bandwidth, intellectual property, training, and technology system level, and brainstorm possible solutions and key motivators for change management and commitment.

Define potential limitations – bandwidth, intellectual property, training, technology system level, etc.
- Data governance – who does it and where does it come from?
- Data security.
- Data sharing costs/benefit/ROI – Data exchange is NOT free.
  • Cost of data transmission – Do I really need that data and need it in real-time? Every decision comes at a cost.
  • Lack of adoption from all involved parties – lots of excuses (e.g. ATA standard – doesn’t change fast enough; aftermarket doesn’t use standards).
- Legacy data migration – the business rationale is not well defined.
- Volume of data – can be a barrier, as well as a benefit.
- Different data types: Sensory, operational, inventory, configuration.
- Technology culture – how fast can technology be adopted; talent set requires a blend of engineering and IT skills.
- Maintenance / IT partnership – Provide data back to the mechanic. Respect and include maintenance personnel; this practical application may alter the original approach/concept saving time, cost, process steps.
- Culture/Change management – Management buy-in; Labor rules; Mergers; intellectual property considerations.
- Data definitions.

Based on these limitations, what can be achieved now? What can be achieved in the next 2-5 years?
- Data governance – minimum data set created.
- Adoption.
- Create methodology for data valuation.

What are the key drivers toward investing in data harmonization?
- Cost and operational benefits –ROI (value to each company).
- Safety and compliance.
- Solving a business problem.
- Mergers.
- Changing the business model (outsourced maintenance, spin off Airline MRO, OEM competition).
- New aircraft platforms.

What needs to occur for organizations to re-design/change/overhaul their IT systems? What is the threshold for that point-of-change?
- Basic architecture.
  • Separate data from applications.
  • Recognize the value of the data (hard vs. soft).
- Determine “What’s in it for me?”
- Make data actionable.
What does it take to get commitment from all parties?
- Define minimum data to “play well with others.” - Share “generic” data.
- Define regulatory data as base.
- ROI Template.
- Shared benefits (win/win).
- Publicity and cheerleader/sponsor.

Possible solutions
- “Planefax” = ‘carfax’ a plane!
  - Example: Aviation working group that leasing community created - a technical sub group that en-
  gaged consultants to streamline aircraft transfers across jurisdictions of one country to another and
  meet regulatory requirements. (Original cost of border transfer in a 20-year period is $7B, and for a
  major European carrier, the administrative cost/manpower to return aircraft 2500 man-hours)
  - Result – created a records “basket” (‘carfax’ spec) that ultimately reduced cost of transfer aircraft to
    a different quality standard, and standardized historical record for aircraft handoffs.
- Social media approach
  - Fact: The aviation industry does not drive IT. Social media applications, such as Twitter, FB, are lead-
    ing the IT drive.
  - Look to pre-existing applications (e.g. Facebook, Flicker, Wikipedia) for examples of data harmony.
    Don’t have to create a whole new system; use one that’s already been created.
  - Information “store front” = the whole concept needs to be built into data infrastructure with in-
    stant communication and attendant data standard.
- Tap into airline alliances (Star, Oneworld, etc.) for maintenance data sharing.
- Share/collaborate on technical data
  - Free the data to a global application/database.
  - Most data could be shared without much intellectual property issue.

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