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Opportunities and Challenges of CMS Integration with M&E Systems

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“While standards and technologies are key enablers of integration between MRO/M&E and CMS systems, the real challenge is presented from the business processes which have been ingrained and inherited by M&E Systems – designed 30-40 years ago.

*These business processes and Regulations require dramatic overhaul to take advantages of the emerging standards and technologies towards the **Paperless Aircraft Operations (PAO)**”*



1. Memory Lane: Enfant Terrible!



**2. Tenure in industry starting with CMS...
From “Stone age to Cloud Age”**



3. Evolution of standards and systems











4. Lessons learned



5. Manifesto: Ideal CMS/M&E integration



6. AeroSoft: Tomorrow’s product session!

-  From punched cards to smart phone mobility
-  From Mainframe to Cloud 😊
-  From Ergonomics to Computers to Aviation
-  Challenges Chairman of super-Utility ; VP IT major LifeInsurance; Tech team at UoT
-  Gartner Group (Canada) consultant
-  Bombardier 1992: 'aviation maintenance tech doc'
-  Can't work for 'others': had to build AeroSoft since 1997!
-  Now challenging Competition to **Tell it like it is!**

MSG3 through the MRB is the driver of new commercial aircraft and MRO Systems design since 1980 and up to B787 and A350 and C Series

- ❑ Roots in the 1960's and initial B747
- ❑ FAA AC 121-22C issued August 27, 2012
- ❑ Maintenance Significant Items (MSI)
- ❑ Reliability Data
- ❑ Functional Failure Analysis
- ❑ Failure Effect Analysis
 - ❑ *Evident Safety (Category 5).*
 - ❑ *Evident Operational (Category 6).*
 - ❑ *Evident Economic (Category 7).*
 - ❑ *Hidden Safety (Category 8).*
 - ❑ *Hidden Non-Safety (Category 9).*
- ❑ Failure Effect Analysis

All major OEM's and some aftermarket suppliers have introduced technology which records and transmits (CMC) real-time data to be analyzed on the ground for optimally scheduling and performing preventative maintenance


- ❑ Large carriers have been undertaking major initiatives in real-time condition monitoring systems and associated data analysis as well as AI based troubleshooting systems for over 10 years and this activity has intensified in the last couple of years
- ❑ Very large ROI is to be reaped from such advancements in preventative maintenance strategies
- ❑ **HOWEVER only when Regulators acknowledge these approaches as 'replacement rather than complementary' to MSG3 will the total maintenance costs truly be reduced**

Why we need M&E Systems




Proof of compliance to Maintenance Requirements for aircraft built with MSG3 / MRB based Maintenance programs

Their origins and roots



Mainframes
Mini computers
Airlines' IT departments
Financial Systems
Inventory Management Systems
Engine Performance Management Systems
Asset Management in military mobile equipment
BUY, LICENSE, (BEG, BORROW, COPY, TAKE, **STEAL**)



NONE of them were built from scratch per the ATA "Data MODEL" / CMDB etc.
None were built supporting internally "SPEC2000" or S1000D – all such claims are retrofits

YET almost all offer some CMS or attempt to pre-empt the need for CMS

Enter CMS where do they come from?



- ❑ From OEMs (aircraft, engine, major CMM)
- ❑ CMS: from ATA-100/.PDF or iSPEC2200 vs. S1000D
- ❑ From major Technical Document Editors/Publishers
- ❑ Content Indexing Search Engines / Databases (newspaper archives)
- ❑ Initially Relational Database Engines doing Document Management/File Management
- ❑ Some emerged from SGML/XML 'authoring tools'
- ❑ Then XML databases or SQL/XML hybrid databases
- ❑ Now for everything from .PDF or .DOC or XLS...supported
- ❑ NONE were built to INTERNALLY represent iSPEC2200 or S1000D or DITA
- ❑ Unstructured Content Repositories in vogue now; MongoDB; GFS
- ❑ BUY/LICENSE, BEG, (BORROW, COPY, TAKE, **STEAL**)

- ❑ *When you only have a hammer, every problem looks like a nail and you can always hammer a square peg to a round hole...(or use any other tool as a hammer!)*
- ❑ MRO/M&E systems originally were built 50+ years ago on mainframes to migrate the tracking of maintenance and of parts history from CardX systems...to computers!
- ❑ Some things have changed dramatically in **technology, architecture and systems**
- ❑ Other fundamental things **cannot**; you cannot move many pigeons to few(er) pigeonholes and if the pigeons in one coop are organized in one way and differently in the other coop then you can't move them!
 - **(data model and process model 101: you have to match between App1 to App2 to enable proper migration and then you have to implement the new business process model!).**

- ❑ Custom crafted Job Card Systems (outside of M&E): Retyping AMM and/or .PDF 'cut and paste' from IPC and SB's....
- ❑ M&E Systems are transaction based (relational) model intended for record level input and reporting
- ❑ MPD changes by OEM (or airline driven) !
 - Now all the neat work-packages, job cards, EO's have to change!
- ❑ CMS Systems provide 'real time granular content changing/linking'
 - Changing the content in a Task Card, migrating part of an SB to an EO and adding some AMM Subtask and updating a Work Order

- ❑ Effectivity as issued within SGML/XML by OEM cannot be understood by humans even in the subset MSN's for one airline
- ❑ Effectivity is issued 'tail based' by OEM yet it is in fact component based in reality
- ❑ SB/Mod breaks create further Effectivity complexity
- ❑ CMS needs SB accomplishment to show in real-time effective digital content for Tasks / IPC etc
- ❑ There are 'industry leader' M&E systems which cannot generate fleet-wide effectivity reports 'TODAY'!
 - How do airlines using these satisfy their Regulators?

Evolution of M&E and CMS from ATA 100, iSPEC2200, S1000D...



- ❑ Systems in the 1980's
 - Mainframe architecture / expensive dedicated phone lines for 300 bps comms....
 - Photocopy AMM pages or typed JobCards (in plastic cover to improve re-use!)
 - Staple to a cover sheet generated by MRO system
 - Carry Work-Package in the box to the airplane.
 - you know the rest

- ❑ Systems in the 1990's – specialized comms (x.25; SNA; TCP/IP grows)
 - Mini computer Systems
 - Tech Authoring Applications (Interleaf, Framemaker)

- ❑ Systems in 2000's – Internet and TCP/IP comms faster and cheaper

- ❑ Systems in 2017:
 - “Print from XML source to .PDF” and send and I will add the ‘Header’ to job-card” and I will print at printer by mechanic/base/hangar”!!!
 - I will manage MPD
 - I will manage Task-Cards / EO's
 - I will manage ‘everything’ (your CMS is just an appendix!)

- **In other words just replicating the “PAPER STAPLED TO M&E TALLY SHEETS OF 1980's!**

There is an optimum division of business function to be allocated from MRO to CMS



What was coded and captured in M&E that should move to CMS

M&E architectural roots have nothing that suits them for CMS

M&E

- ❑ Job Cards
- ❑ EOs
- ❑ MPD
- ❑ AAMP

Conversion

- ❑ Spreadsheets for import!

WorkPackages

- ❑ Distribution
- ❑ Printing
- ❑ Sign-off
- ❑ Export work packages for 3rd party MRO
- ❑ Import digitally signed off packages from 3rd party MRO

CMS






- ❑ Superior in 'Transforming Content from one structure or format to another
- ❑ Best for PUBLISHING and other Content Delivery (XML 8130 / EASA Form 1)
 - Multiple data types from text to numeric to graphic to Virtual Reality and video objects
 - Best for 'import/export validation'
- ❑ BEST for implementing output to .PDF or XML or HTML or HTML5 or CSS3
- ❑ ABLE to capture 'data' within Content (signoff within a TaskCard/EO)
- ❑ Digital Signature (Spec 42)
- ❑ XML most 'compact' for communications to mobile networks.
- ❑ Able to receive XML transactions from M&E to process
- ❑ Capture of ETL and EFB (Ch 17/Spec2000)

CMS must manage

- ❑ MPD, AAMP in XML
- ❑ Job Cards must be 'derivatives' not distinct documents + COC's (a la Airbus, not Boeing or Bombardier!)
- ❑ EO's in XML in CMS with XML SB input – re use
- ❑ The debate of iSPEC2200 vs S1000D vs DITA is BOGUS: the internal schema of CMS must be optimized to import/export and transform all of these and much more!
- ❑ CMS 'must deliver packages to 'device at production execution' blending the visit specific information from M&E (not the other way around!)
- ❑ PIREPs, MAREPs should be captured in XML schema
- ❑ Work packages need a Standards based Schema so they're interchangeable between Airline/MRO and back to Airline after 'digital sign-off'

INDUSTRY

- ❑ CMMs must be supplied in iSPEC2200 or S1000D content (not .PDF or MSWord!)
- ❑ SORRY BIG ERP: You still ain't got it!
- ❑ Boeing, Airbus: Sorry but you don't have the Customers' interest when you want to offer 'one stop shopping' of Aircraft, Maintenance and ALL SYSTEMS!
- ❑ Check the Roots of your M&E and CMS vendor before making your final decision
- ❑ Check their successes but also the recent 'failures' of your suppliers in early stage projects
- ❑ Don't believe you'll get to Mobile if you're up to your neck in .PDF!
- ❑ Cloud is also bad for .PDF

-  In business for 20 years and remain financially sound and independent
-  *Unique in understanding CMS and M&E with 3 distinct products*
-  Out-lived some illustrious customers:
 - Transaero, Republic/Chatuaqua, Air Jamaica, ZOOM, Styrian, Tyrolean Airways, AeroCalifornia, Schreiner Airways, CHC, Air Alps
 - Several other prominent players have gone in/out of Ch. 11
 - Still over 20 active customers
-  Unparalleled Customer Testimonials from highly respected US carriers
-  **See you tomorrow at the Product Showcase**

AeroSoft goes on and on and on.....



Thank you Miami!



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