Facilitating Paperless Operation through the use of Standards

Nov 2017, Ken Jones
Legacy data is sitting on paper (or scanned PDF like documents).
“That’s how we’ve always done it”
Data quality, “cleanliness”
Getting data from this system in our company to that system in their company.

Opportunities but challenges getting data from system A to system B, company C to company D
Multiple personnel, both employees and external contractors or partners
Varied internal and external systems
Plethora of data
ATA e-Business Program

- International standards program for information exchange to support engineering, maintenance, materiel management and flight operations.
- Open membership
  - 120 companies in 33 countries
  - Over 800 active individual participants
- Neutral, consensus-based
- Collaborative web site: [www.ataebiz.org](http://www.ataebiz.org) for documents, balloting, calendars, email
What were are trying to do

- Vision
  - Enable the seamless **exchange** and availability of **digital** information throughout the civil aviation industry.

- Mission
  - Provide the aviation industry with benchmark information standards in support of aircraft maintenance and operations.
  - We are committed to evolving shared standards and promoting implementation to contribute to **increased business agility** and **reduced costs**, while maintaining the highest levels of safety.
General Concepts
- World Airlines and Suppliers Guide
- Information Security / Digital Signatures
- ATA Standard Numbering System
- RFID / Bar Coding on Parts
- Industry Data Dictionary (CSDD)

*Although not depicted, MRO’s often fulfill many additional roles commonly outsourced by the operator.
ATA e-Business Specifications

Common Support Data Dictionary (CSDD)
iSpec 2200 - Information Standards for Aviation Maint.
Spec 1000BR - Civil Aviation S1000D Business Rules
Spec 2000 - Provisioning (ch. 1)
Spec 2000 - Procurement Planning (ch. 2)
Spec 2000 – Procurement 2.0
Spec 2000 - Materiel Management (ch. 3 – 4, 6)
Spec 2000 - Repair Order Administration (ch. 7)
Spec 2000 - Automated ID & Data Capture (ch. 9)
Spec 2000 - Reliability Data Collection and Exch. (ch. 11)
Spec 2000 - Airline Inventory Redistribution System (ch.12)
Spec 2000 - Industry Metrics (ch. 13)
Spec 2000 - Warranty Claims (ch. 14)
Spec 2000 - Aircraft Transfer Parts List (ch. 15)
Spec 2000 - Authorized Release Certificate (ch. 16)
Spec 2000 - Electronic Logbook (ch. 17)
Spec 2000 – Work Packages (ch. 18)
Spec 2300 - Data Exchange Standard for Flight Ops
Spec 2400 – Allowable Configuration Data
Spec 2500 - Aircraft Transfer Records
Spec 42 - Aviation Industry Stds for Digital Info. Security
World Airlines and Suppliers Guide (WASG)
Typical Benefits

- Harmonization between different manufacturers, operators, software providers allowing movement of important business data in common formats
- Cost reduction – fewer manual processes
- Cut cost of receiving parts
- Cut cost of returning / exchanging aircraft
- Improve quality of data
- Facilitate the use of digital maintenance tools
- Enhanced record keeping
Typical ATA e-Biz Standard?

- Describes content for business information exchange
  - Part numbers, dates, procedures, conditions, etc.

- Describes the “business rules” for a function
  - Information that must always be provided
  - Information that must be provided if certain conditions exist
  - Information that may be provided
  - Uses CSDD to define fields to minimize misuse

- Describes the structure/ formats
  - XML, flat file, CSV, etc.
  - Messages (PO), Large Files (Provisioning, IPC, AMM, etc), ID data (bar-code, RFID, etc.)
Why XML?

- XML helps us to separate the structure from the content.
- Separate the formatting from the content
- Make the data application neutral
- Allow additional format validation using parsers, based on Schemas
- Allows hierarchy / relationships to be better depicted
- Easier to support from corporate databases
Some Project Updates
Aircraft Transfer Records (ATR)

Charter:

The Aircraft Transfer Records Working Group (ATRWG) is responsible to identify, evaluate and develop electronic data exchange standards for information associated with the transfer, return and re-delivery of an aircraft. The use of these electronic records is envisioned by lessors, lessees, buyers and sellers, including importing the data into the receiving operator’s systems to reduce errors and rekeying of data.
ATR Status

- Published version 2017.2 in June 2017
  - Crate
  - AD Status
  - SB / Modification / STC Status
  - Last Done / Next Due Maintenance Status
  - Repair / Damage Status
  - Installed Parts Status
  - Top Asset (Aircraft/Engine) Status

- Pilot implementation activities under way
ATR Status

- Reviewing Publication Implementation Activities
  - Identified a few minor changes required based on pilot implementation activities

- Working on next data sets including
  - LLP History Data, which will include data found not only in IATA LLP Tracking Template, put perhaps all data found on disk sheets, allowing electronic transfer of lifetime LLP data
  - Reviewing other existing records to capture requirements from IATA Leasing Guidelines “Typical Redelivery Doc List”
    - Update Asset Status
    - Condition Monitoring Report
    - Flight Log Info
Spec 2500 Excerpt - Crate
Spec 2500 Excerpt - MOC
ATA_AircraftTransferRecordsCrate ...

Schemas\ATA_AircraftTransferRecordsCrate.xsd">
  <CrateID source="Asset Management System">EX3</CrateID>
  <CreateDateTime>2016-09-15T00:00:00Z</CreateDateTime>
  <OrganizationInfo>
    <OrganizationName>ABC Airlines</OrganizationName>
    <OrganizationCode OrganizationCodeType="CAGE">12345</OrganizationCode>
    <OrganizationalRole>Lessee</OrganizationalRole>
    <ContactName Role="Deliveries">
      <Name>John Smith</Name>
      <PostalAddress>
        <AddressLine>ABC House</AddressLine>
        <AddressLine>Gatwick Park</AddressLine>
        <AddressLine>London Road</AddressLine>
        <City>Crawley</City>
        <Municipality>West Sussex</Municipality>
        <State></State>
        <PostalCode>RH10 9UY</PostalCode>
        <Country>United Kingdom</Country>
      </PostalAddress>
      <Email>john.smith@aviation.com</Email>
      <Phone>+441234123123</Phone>
    </ContactName>...
AD Compliance is Open

Ref to Substantiating SB

Due before 60,000 Hours
Same XML rendered in html
The “Logbook” dataset

- Flight Log / Journey Log
- Maintenance Log (Faults/Squawks)
- Maintenance Action
- Maintenance Action Task
- Maintenance Action Part Replacement
- Maintenance Release
- Fuel Log
- Service Log
- Maintenance Log Resource
Spec 2000 Ch. 18 – Work Package

Spawned from the e-Logbook, this project is developing a specification to exchange maintenance information electronically between customer and maintenance provider (operator, MRO, etc.)

Outgoing data:

- WorkScope, Work Package, Ref to Tasks/Steps, Sign Off requirements

Return data:

- Updated Work Package, Findings, Deferrals, Status Requests, including Signed off electronic data sets

Set to publish version 1 early 2018
Spec 2400 – Allowable Configuration

- Spec 2400 Allowable Configuration contains data similar to what’s in an IPC/IPD but designed so a recipient can easily compare actual / as flying configuration to allowable in an electronic manner.
- Publication early 2018
Engine Overhaul Data

- Started from within the Reliability Working Group, but being supplemented to include:
  - Detailed information about engine removals including typical date/time/cycle info as well as reasons
  - Detailed provision of the Engine Shop Findings including all parts off, parts on, information about exchange, etc.
New Procurement Specification

- New specification coming soon
- Enhanced messages for the procurement process
- Addresses business needs that the older specification doesn’t handle well
- Aligns with many newer M&E IT Systems
Summary
So what does it mean?

- Rapid changing environments at the operator – the need to manage change
- New systems / old systems – the need to integrate
- More partners – the need to share
- More information – the need to distill
- Same old cost pressure - the need for reduced cost
- THE NEED TO STANDARDIZE
- THE NEED FOR STANDARDS DEVELOPMENT PARTICIPATION
Questions

ATA e-Business Program

202-626-4039
admin@ataebiz.org
www.ataebiz.org
kjones@airlines.org
Additional Background Info
Visualizing the problem
Simple Component Life

Fault

Install component

Remove component

Receive from shop

Send to shop
Selected Information Flow

- Record Fault in Logbook
- Record situational information (flight, time, altitude, other noticed issues, fault codes, maint codes, etc.)
Selected Information Flow

- Review troubleshooting options
- Review maintenance documentation, configuration documentation
- Remove part and tag unserviceable
- Record part number, serial number, identify reason for removal
- Record flight hours, cycles, etc
- Update logbook appropriately
Selected Information Flow

- Fault
- Install component
- Remove component
- Receive from shop
- Send to shop

- Prepare Purchase Order with appropriate part number, serial number, commercial info
- Prepare Work scope for shop
- Provide shop reason for removal and other info to be confirmed
- Pack part
- Send part shipped notice
- Respond to shop quotes, etc.
Selected Information Flow

- Fault
  - Install component
  - Remove component
  - Receive from shop
  - Send to shop

- Receive shipment information
- Compare part serial number, part number to outgoing order
- Examine part for problems
- Review regulatory forms
- Close out commercial process (e.g. approve for invoice, process warranty)
- Return to shelf
- Update inventory system
Selected Information Flow

- Review configuration
- Review maintenance documentation
- Record part and serial number
- Record flight hours, cycles, etc.
- Update inventory system
- Close logbook entry
Visualizing the Standards with Tagged Data
Spec 2000 - Tagged/Formatted Data

Spec 2000 Receiving Label (data matrix)

ABC Distributor, 123 Main St., Miami, FL, USA 31005

Spec 2000 Legacy EDI order

CAM
S1BOOKED/QF2/81205/USD/1/BNO 3/341/EOI1234567/HLT8100-13-1/1/EA/25.20/15077

Electronic Shipping Notice (XML)

Same Spec 2000 data formats in Purchase Order, Electronic Shipping Notice, Shipping Label, RFID, etc.

MFR 81205*SER AB123
PNR HLT8100-13-91

RFID

Direct Part Mark

Optional area that may be used for company name, address, or additional bar coded data

SPL 81205
BOX 12345
CPO BS56877
PNR HLT8100-13-91
SHQ
UNT EA
PSN PS789254
NSN 1234128679632

Typical 7 3/8" (card stock)
8 1/2" (std paper)
The Specifications
(more detail)
The Specifications
Spec 2000 Standards

- Spec 2000 - Provisioning (ch. 1)
- Spec 2000 - Procurement Planning (ch. 2)
  - Procurement database
  - Quotation process, Inventory Quantity Inquiries
- Spec 2000 – Material Management (ch. 3, 4, 6)
  - Purchase Order Placement & Response
  - Purchase Order Exceptions
  - Shipment Notices
  - Invoicing
- Spec 2000 – Repair Order Administration (ch. 7)
Spec 2000 Standards

- Spec 2000 Auto ID & Data Capture (ch. 9)
  - Bar Coded Shipping/Receiving Labels
  - RFID on Parts
  - Traceability

- Spec 2000 – Reliability Data Collection / Exch. (ch. 11)
  - Hours, Landings, Flight Data, Out of Service Data
  - Event/Interruption, Logbook Data
  - LRU Removals, Shop Findings, Piece Parts
  - Scheduled Maintenance, SB/Mods, QPA
Spec 2000 Standards

- Spec 2000 Industry Metrics (ch. 13)
  - Reliability, Component Repair, Warranty
  - Produce Support, Technical Resolution, Parts Delivery
- Spec 2000 – Warranty Claims (ch. 14)
- Spec 2000 – Delivered Aircraft Transfer Parts (ch. 15)
- Spec 2000 – Authorized Release Certificate (ch. 16)
- Spec 2000 – Electronic Logbook (ch. 17)
Spec 2000 - Tagged/Formatted Data

Spec 2000 Receiving Label (data matrix)

ABC Distributor, 123 Main St., Miami, FL, USA 31005

Spec 2000 Legacy EDI order

CAM
S1BOOKED/QF2/81205/USD/1/BNO 3/
341/EOIJ1234567/HLT8100-13-1/1/EA/25.20/15077

Electronic Shipping Notice (XML)

<ShipNoticeHeader>
  <CIC>CNA</CIC>
  <SPL>81205</SPL>
</ShipNoticeHeader>

<ShipNoticeDetails>
  <CPO>BS56877</CPO>
  <PNR>HLT8100-13-91</PNR>
  <SHQ UNT="EA">10</SHQ>
  <SHT>AMD</SHT>
  <SHD>2004-09-30</SHD>
</ShipNoticeDetails>

Same Spec 2000 data formats in Purchase Order, Electronic Shipping Notice, Shipping Label, RFID, etc.
iSpec 2200

- Provides SGML Document Type Definitions (DTDs) for 18 manuals including:
  - Aircraft and Engine Illustrated Parts Catalogs (AIPC and EIPC)
  - Aircraft and Component Maintenance Manuals (AMM and CMM)
  - Fault Reporting/Fault Isolation Manual (FRM/FIM)
  - Service Bulletin (SB)
  - Structural Repair Manual (SRM)
  - Wiring Manual (WM)

- Home of the ATA Standard Numbering System
Spec 2300

- Industry standard for management, and exchange of digital flight operations technical data
- XML, Data Module Paradigm
- Covers data pertaining to:
  - Flight Crew Operating and Training Data
  - Cabin Crew Operating and Training Data
  - Weight and Balance Data
  - Minimum Equipment List / Dispatch / Deviation Data
  - System Descriptions, Flight Phase Data
Spec 42

- Provides industry standard for:
  - Authenticating the senders and receivers of digital data
  - Verification if data has been altered
  - Traceability of data to their source (non-repudiation)

- Based on Public Key Infrastructure (PKI)

- Includes Certificate Policies – describe the comprehensive procedures and controls for management of digital certificates and signatures:
  - Identity proofing and vetting
  - PKI Key management
  - Credential assurance level recommendations
Collaborative effort between ATA e-Business, AIA, ASD, bringing together defense and commercial requirements.

Technical Data

XML based, data centric rather than document centric

Data centric rather than document centric

Civil Aviation’s requirements are represented by the ATA e-Business Program through the CAWG

ATA e-Business Publishes a “Business Rules” specification helping define implementation details
Spec 2500

- Specification to help support submittal of detailed aircraft or engine data in an electronic format
- Focused on asset return (lease return, sale/purchase) but also can support new deliveries as well as status during the asset life
- Version 2017.2 published June 2017
  - Crate to allow metadata to be applied to any number of documents or data
  - LDND Maintenance Status
  - SB / Mod / STC Status
  - Installed Component Status
  - Repair / Damage Status
  - AD Status
  - Aircraft/Engine/APU (Top Asset) Status
The paper 8130-3

- A representative Use Case (courtesy Airbus, P&W)
## Authorized Release Certificate

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>BLADE</td>
<td>54L732</td>
</tr>
</tbody>
</table>

### Remarks

Page 1 of 1

**ORIGINAL AIRWORTHINESS APPROVAL**

Certifies the items identified above were manufactured in conformity to:

- [ ] Approved design data and are in a condition for safe operation
- [ ] Nonapproved design data specified in Block 13

14. Certified by:

**Name (Typed or Printed):**

Lorrey Hatch

15. Authorized Signature:

**Name (Typed or Printed):**

Lorrey Hatch

16. Approval/Authorization No.:

17. Name (Typed or Printed): LORREY HATCH

18. Date (mm/dd): 01/24/2004

19. Other information specified in Block 13

20. Authorized Signature:

21. Approval/Certificate No.:

22. Name (Typed or Printed):

23. Date (mm/dd):

---

**User/Installer Responsibilities**

It is important to understand that the existence of this document alone does not necessarily constitute authority to install the parts or products.

Where the user/installer performs work in accordance with the national regulations of an airworthiness authority different from the airworthiness authority of the country specified in Block 1, it is essential that the user/installer ensures that the aircraft specifications of the part or product are in compliance with the airworthiness authority of the country specified in Block 1.

Statements in Blocks 14 and 15 do not constitute installation certification, to all cases, aircraft maintenance records must contain installation certification issued in accordance with the national regulations by the user/installer before the aircraft is flown.
North Haven Facility closed in 2003

Description not consistent with other 8130-3 tags for this part number

Did not start using page indicators for single page 8130-3 tags until 5-17-2004.

Mr. Hatch retired on 3-31-99

ARCIs issued when Mr. Hatch was an ODAR stated last name and then first name

This number would include the date contained in Block #18

Date format inconsistent with P&W

Obsolete ODAR number not used since 7-31-98
The electronic 8130-3 using Spec 2000 Chapter 16 XML
XML – doesn’t look friendly

<?xml version="1.0" encoding="UTF-8"?>
<!--Sample XML file generated by XMLSpy v2012 rel. 2 (http://www.altova.com)-->
<ATA_PartCertificationForm version="1.12" id="ID_1" xsi:noNamespaceSchemaLocation="ATA_PartCertificationForm_draft2011_5.xsd" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <Block2>
    <CET FVI="2">EASA Form 1</CET>
  </Block2>
  <Block3>
    <TDN>CERT12345678901</TDN>
  </Block3>
  <Block4>
    <IssuerDetail>
      <SPL>D4296</SPL>
      <WHO>HEAD QUATER AIRBUS</WHO>
      <ADL>1 Rond Point</ADL>
      <ZIP>31707</ZIP>
    </IssuerDetail>
  </Block4>
  <Block5>
    <CIC>SIA</CIC>
    <CPO>PO123456789</CPO>
    <PSN>9998828799</PSN>
    <WON>4711abc</WON>
    <MRN>M1234567890</MRN>
    <BOX>840001</BOX>
  </Block5>
  <Block6>
    <LIN>1</LIN>
  </Block6>
  <Block7>
    <PDT>COMPUTER</PDT>
  </Block7>
  <Block8>
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    <PNR>A12345678901234</PNR>
  </Block8>
  <Block9>
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  </Block9>
  <Block10>
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  </Block10>
  <ManufacturedParts>
    <Block13a>
      <DDA>A</DDA>
    </Block13a>
    <Block13b><DDA>Electronic Signature on File</DDA></Block13b>
    <Block13c>
      <ARN>EASA.21G.0001</ARN>
    </Block13c>
    <Block13d>
      <NME>Klaus Malone</NME>
    </Block13d>
    <Block13e>
      <DAT>2012-06-20</DAT>
    </Block13e>
  </ManufacturedParts>
  <PreviousCertificate previousCertificateFormat="P">
    <SPL>FAPE3</SPL>
    <TDN>Prev12345678901</TDN>
  </PreviousCertificate>
  <REM>This computer has to be configured according to the aircraft documentation AMM4711. This computer has to be configured according to the aircraft documentation AMM4712. This computer has to be configured according to the aircraft documentation AMM4713. This computer has to be configured according to the aircraft documentation AMM4714. This computer has to be configured according to the aircraft documentation AMM4715. This computer has to be configured according to the aircraft documentation AMM4716. This computer has to be configured according to the aircraft documentation AMM4717. This computer has to be configured according to the aircraft documentation AMM4718. This computer has to be configured according to the aircraft documentation AMM4719.</REM>
</ATA_PartCertificationForm>
XML – a closer look

Great for processing by a system, checking against databases, etc.
## Same XML – with Stylesheet

### AUTHORISED RELEASE CERTIFICATE

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Part No.</th>
<th>Quantity</th>
<th>Serial/Mark No.</th>
<th>Status/Work</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>COMPUTER</td>
<td>A123456789</td>
<td>1EA</td>
<td>NEW</td>
<td></td>
</tr>
</tbody>
</table>

**Remarks**

This computer has to be configured according to the aircraft documentation AMD 4711. This computer has to be configured according to the aircraft documentation AMD 4712. This computer has to be configured according to the aircraft documentation AMD 4713. This computer has to be configured according to the aircraft documentation AMD 4714. This computer has to be configured according to the aircraft documentation AMD 4715. This computer has to be configured according to the aircraft documentation AMD 4716. This computer has to be configured according to the aircraft documentation AMD 4717. This computer has to be configured according to the aircraft documentation AMD 4718. This computer has to be configured according to the aircraft documentation AMD 4719.

**Previous Certificate:** EASA Form 1 – PAPR/Rev12/05/08/991

**Exp.:** 2014-02-12

**12a.** Certified that the items above were manufactured in conformity to:
- [ ] approved design data and are in a condition for safe operation
- [ ] non-approved design data specified block 12

**13a.** Approval Auth. Number  EASA: 21G-9901

**13b.** Authorized Signature  
Klaus Malone  
20 JUN 2012

**13c.** Approval Auth. Reference  
EASA: 21G-9901

**13d.** Name  
Klaus Malone  
20 JUN 2012

**13e.** Date (dd mm yyyy)  
20 JUN 2012

**14a.** Part 145 A&P Relates to Service  
Other regulations specified in block 12

This certificate does not automatically constitute authority to install the item(s)

When the user/installer performs work in accordance with the regulations of an airworthiness authority different than the airworthiness authority specified in block 1, it is assumed that the user/installer ensures that higher airworthiness authority accept items from the airworthiness authority specified in block 1.

Statements in blocks 13a and 14a do not constitute installation certification. In all cases aircraft maintenance records must contain an installation certification issued in accordance with the national regulations by the user/installer before the aircraft may be flown.