

Evolution of Technical Publication

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What's in store..?

- ATA Overview
- History and Evolution of Specs
- iSpec 2200
 - ❑ Introduction & Specification Scope
 - ❑ Data Model
 - ❑ DTD (Document Type Definition)
 - ❑ Product representation
 - ❑ Revision Management
 - ❑ Graphic Management
 - ❑ Functional Areas and Business Requirements
 - ❑ Functional Requirements
 - ❑ Media, Protocols, and Data Packaging
 - ❑ Case Study: Supplier Commodity Data
- Future of Technical documentation
- iSpec 2200 Vs S1000D
- Atoms of S1000D: Data Module
- Benefits-- What S1000D can do?
- Digital Manuals
- Abbreviations

ATA Overview



- Stands for Air Transport Association of America originated in 1936.
- Oldest and largest airline trade association in USA.
- 17 members and affiliates which transport more than 90% of U.S. airline passenger and cargo traffic
- Recognized by Congress, Dept of Transportation, Federal Aviation Administration (FAA), Dept of Homeland Security.
- Guides and assists its members in technical, legal and political matters
- To Foster a business and regulatory environment that ensures safe and secure air transportation.
- Leads industry efforts in crucial policy and supports measures that enhance aviation safety, security and the vitality of aviation system.
- Employs experts representing a wide range of industry disciplines, and provides services to its members in issues related to fuel, airports, engineering and maintenance, environment, training, security, ground safety, international affairs, etc.

History and Evolution of Specs

ATA 100

- Paper-based
- No digital specifications prior to late 80s
- Provides standard for Aircraft System Numbering referred as ATA system or chapter numbers.
- Early 90s digital data appendix added
- Mid 90s Spec 2100 is introduced
- Design work on DTD and lot of participation identified many new requirements.

iSpec 2100

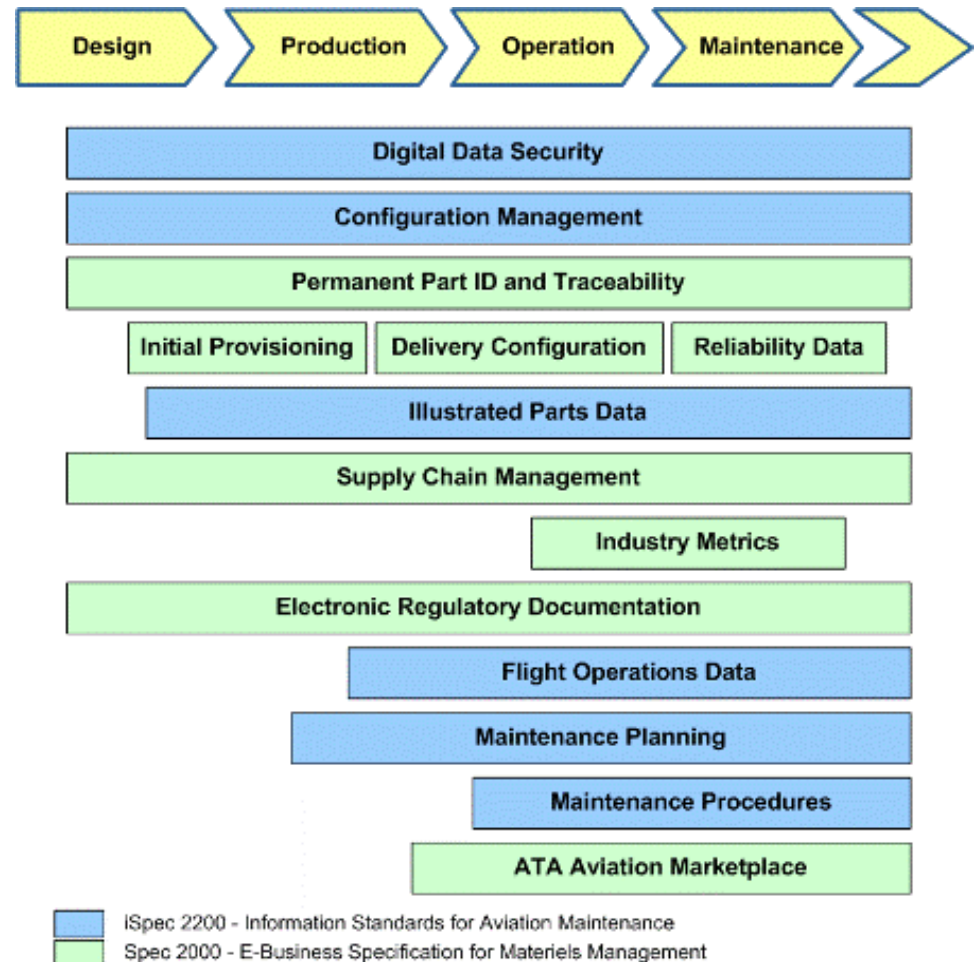
- Digital data separated from ATA 100
- ATA 100 more or less frozen
- In 2000, ATA 100 and Spec 2100 were merged

iSpec 2200

- Supports paper-based requirements
- Monolithic Documents.
- Exposed functional Issues
- Exposed technical Issues
- More Quality
- More Efficiency
- Smaller Costs by Uniformity.

iSpec 2200 -- Introduction & Specification Scope

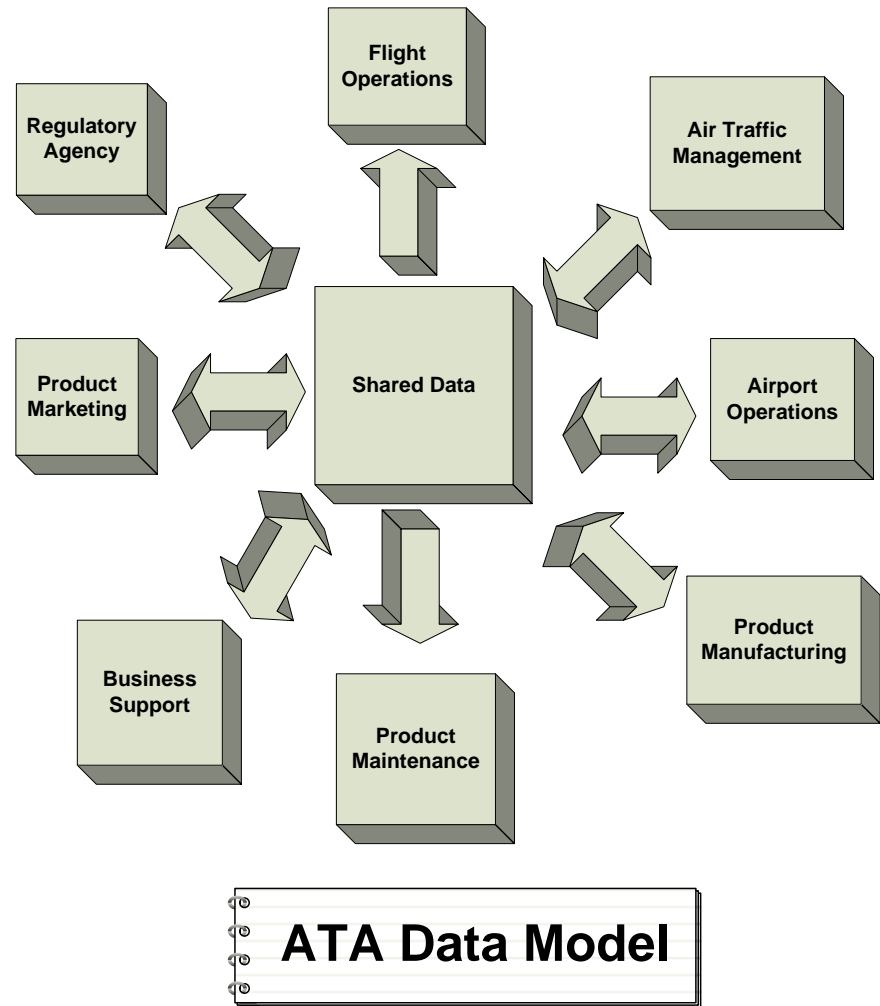
- The global commercial aviation industry collaborated to create standards for information exchange to support engineering, maintenance, material management and flight operations.
- **i-Spec 2200 journey and advantages to airlines**
 - The paper requirements were converted to digital requirements.
 - The supply chain system got improved
 - Value add to the processes
- **Strategy:**
 - Scope spans the entire lifecycle of an aircraft.
 - Achieved predominantly by development and publication of two specifications, i-Spec 2200 and Spec 2000.
 - New functional areas are continually added and refined.



Aircraft Lifecycle

iSpec 2200 -- ATA Data Model

- **The ATA Data Model** is a structured graphical representation of information/data interchanged between the manufacturers/suppliers and operators
- Uses Modeling methodology to provide a standard, consistent, and predictable information/data.
- **Primary Objectives:**
 - Means for completely understanding and analyzing the enterprise data resources
 - Common means of representing and communicating the complexity of data
 - technique for presenting an overall view of the data required to run an enterprise
 - means for defining an application independent view of data which can be validated by users and transformed into a physical database design



iSpec 2200 -- DTD (Document Type Definition)

- The DTD (Document Type Definition) Framework: Common outline for the document, i.e. the minimum SGML structure needed for building a retrieval system based on ATA standards.
 - Used to describe logical structure of document so that different kinds of elements can be found easily which form the text.
- **The DTD defines the document structure including:**
 - All elements and their attributes
 - Element content model
 - Element sequence and occurrence
- 4 levels of DTD:
 - Level 1
 - No options are allowed in the document
 - All tags are contained in the ATA Common Support Data Dictionary [ATA CSDD]
 - Level 2
 - The DTD allows options
 - All options will be included in one standard DTD
 - Level 3
 - DTD defined by the document producer using the DTD framework as defined by ATA specification
 - Level 4
 - The DTD shall use, when practical, DTD structures specified in the ATA DTD Technical Requirements Document

iSpec 2200 -- Product representation in the SGML File

The product like seats, galleys can be described in the SGML or XML file.

The essential elements of the product describe the different characteristics of the product:

- AIPC
- MFMATR
- INTRO
- ILLTECH (optional)
- EFFXREF
- SBLIST
- VENDLIST
- STADIAG (optional)
- EINLST (optional)
- ZONING (optional)
- FMKITLST (optional)
- MAJDWG (optional)
- GLOSSARY (optional)
- CHAPTER (including the chapter number)

Front Matter Data Access: The SGML contains the front matter details. Some of the front matter details include:

- Title Page
- Transmittal Letter
- Introduction Text
- Highlights
- Service Bulletin List
- Effectivity Cross-Reference (Airframe Only)

Example: Front of matter contain the information like vendor details, zone of the product etc.

AIPC	TITLE							
	MFMATR							
	INTRO							
	ILLTECH							
	EFFXREF	TITLE						
		EFFDATA+						
	STADIAG	MODTYPE						
		TITLE						
	ZONING	TITLE						
		ZONDATA						
	VENDLIST	GRAPHIC+						
		SHEET						
	SBLIST	TITLE						
		TITLE						
	MAJDWG	TITLE						
		TITLE						
	DPLIST							
	CHAPTER	TITLE						
		SECTION						
		TITLE						
		UNIT						
		TITLE?						
		FIGURE*						
EFFECT	TITLE							
	GRAPHIC							
PRTLST	SHEET+							
	ITEM+							
PNRFILE								
PNRDATA+								
	DELETED?							

Hierarchy of the Tags

iSpec 2200 -- Revision Management

- In order to ease DTD writing, a “revatt” entity will be used to group all revision attributes at the anchor levels.

```
<!ENTITY % revatt
    "chg (N|R|U|D) #REQUIRED
    key ID #REQUIRED
    revdate NUMBER #REQUIRED" >
<!ATTLIST anchor
    %revatt;
```

- **"Chg" Attribute Characteristics.**

- "N" for new anchor.
- "D" for Deleted which indicates that the anchor designated by the "key" attribute value is deleted.
- "R" for Revised which indicates that the anchor designated by the "key" attribute value is revised. "R" is applicable when anchor content has been changed or when some specific attributes have been changed. Each DTD reference manual must define the list of attributes whose modification causes the CHG attribute to become "R".
- "U" for Unchanged which indicates that the anchor content is unchanged from the last scheduled revision.

Example for a "DELETED" Anchor: Content replaced by element "DELETED"

```
<FIGURE CHAPNBR="11" SECTNBR="11" UNITNBR="00" FIGNBR="90" CHG="D" KEY="K11110090"
REVDATE="19991118">
<DELETED></FIGURE>
```

Example: The Seats data may be published initially without the footrest. In the revised seat data the footrest has been added.



iSpec 2200 -- Graphic Management

- **GRAPHIC element:** composed of one or several SHEET elements. The multiple sheets of the graphic shows the different view of the graphic.
- **SHEET element:**
 - GNBR attribute contains a graphic entity
 - SHEETNBR attribute specifies the graphic sheet number

SGML:

```
<STADATA>  
<GRAPHIC>  
  <SHEET SHEETNBR="001" GNBR="G_00003001_01"  
    CHG="U" KEY="S00003001001"  
    REVDATE="19990818"></SHEET>  
</GRAPHIC>  
<GRAPHIC>  
  <SHEET SHEETNBR="003"  
    GNBR="DELETED_SHEET_NOT_SENT" CHG="D"  
    KEY="S33260308003"  
    REVDATE="19991010"><TITLE>ELECTRICAL INSTL-LAV A  
    (LIGHTS ONLY)</TITLE></SHEET>  
</GRAPHIC>  
</STADATA>
```

- Information Control Number (ICN) is generated for each SHEET in the Graphic Element.
- **Example:** The seat graphic can be represented using different sheet where each sheet shows the different view of the seat. The Graphic and Sheets file format are recommended in tiff format.

Sheet1



Sheet2



iSpec 2200 -- Functional Areas And Business Requirements

Generic Resources

- ATA Numbering System
- Applicability:
- Effectivity:

• Maintenance Requirements

- Operator/Manufacturer Scheduled Maintenance Development (MSG-3)
- Maintenance Planning Document (MPD)
- Maintenance Review Board Report (MRB)

• Maintenance Procedures

- Maintenance Manual
- Aircraft Recovery Manual (ARM)
- Structural Repair Manual (SRM)
- Fault Reporting and Fault Isolation Manual (FRM/FIM)
- Etc.

• Configuration Control of Product Definition

- Aircraft Next Higher Assembly and Next Lower Assembly – Aircraft Illustrated Parts Catalog (AIPC)
- Engine Next Higher Assembly and Next Lower Assembly – Engine Illustrated Parts Catalog (EIPC)
- Engine Parts Configuration – Engine Parts Configuration Management Section (EPCM)
- Wiring Configurations – Wiring Diagram Manual (WM)
- Illustrated Tool and Equipment Manual (ITEM)

• Training

• Flight Operations

- Master minimum equipment list
- Flight crew operating manual

iSpec 2200 -- Functional Requirements

- **Retrieval Functional Requirements**

- Database Interchangeability
 - *The system shall be able to access any ATA technical manual database for advanced retrieval applications*
- Browse/Traversal (Navigation)
 - *The system shall support the direct addressing of the objects in the manual front matter data.*
- Cross-Reference Links
 - *The system shall support links among data. For all manuals, the system shall support links where the original source document indicates a cross-reference (e.g., See Task 21-22-01-004-001). The links shall be able to connect information within a manual (intra manual)*

- **Intelligent Graphics Functional Requirements**

- This specification defines the methods for providing illustrations in digital form. It is assumed that the illustrations are used in conjunction with textual data prepared in accordance with the SGML Based Methodology and Document Type Definitions

- **Direct Access – Security Guide**

- Provides a guidance on major security topics and issues that should be considered when reviewing or implementing any direct access information system. This section of iSpec 2200 can be used as a checklist or review document by an organization.

- **Direct Access – Online Access**

- Defines a subset of World Wide Web standards to allow interoperability within our industry.
- Utilize “open” standards and off-the-shelf products whenever possible
 - *Avoid solutions that are proprietary.*
 - *Adopt de-facto or international standards that have broad support.*
 - *Adopt existing standards instead of developing our own.*
- Support electronic representation of a page-oriented view of the data.
- Support delivery of data in an industry standard compression format
- Applications should be developed with a consideration for users with low speed network connections.

iSpec 2200 -- Media, Protocols, and Data Packaging

- **Media and Labeling**

- Paper
- Microform
- Magnetic Tape
- CD-ROM

- **Interchange**

- provides a description of the packaging of digital data, the auxiliary files associated with text, graphics, and other non-graphic file formats, along with the preferred media format and file layout for interchange of this complex technical data
- Media and Labels
 - *The media types shall be mutually agreed upon between data sender and receiver.*
 - *ANSI/IBM labeled sequential format*
 - *UNIX tar format*
 - *Directory format*
 - *CD-ROM format*
 - *No file compression shall be used unless mutually agreed upon between data sender and receiver.*

- **Presentation**

- Paper
 - *Font, Size, Spacing, Graphics, Margins, Page Nos., Dates.*
- Microform
 - *Layout, Sequence of pages, Reduction ratio, Density, Resolution.*

Case Study: Supplier Commodity Data

- Major Airframe OEM's works on the S1000D standards. But the supplier commodity data follows the ATA Standards
- The supplier commodity data received is in form of SGML and graphics as TIFF files.
- Infosys received the assignment for converting the Supplier Commodity Data into its equivalent S1000D data module.
- Processing of Supplier commodity data is based on ATA iSpec 2200 and Boeing AIPC Technical Guide

Case Study: Supplier Commodity Data

ATA Specification

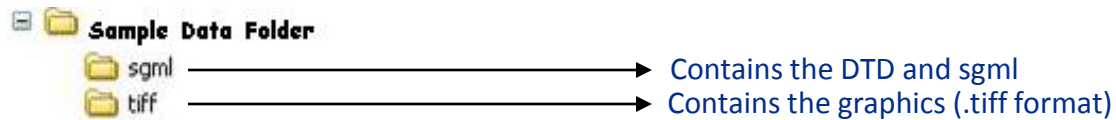
4-2-4. Aircraft Illustration Parts Catalog (AIPC) DTD Requirements

It consists of:

- DTD
- Instructions to develop generated data
- The DTD Structure Charts

A complete digital document will consist of 2 files: a text file and a graphics file.

Sample Data (SGML & TIFF according to ATA spec.)



Case Study: Supplier Commodity Data

ATA Specification

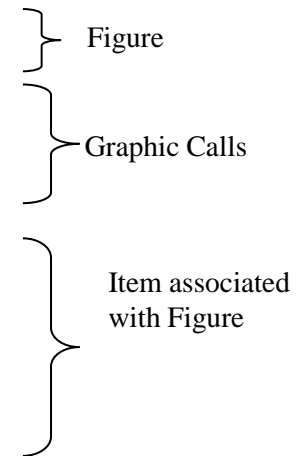
The text file will be provided to define the content of the following:

- Manual front matter material with graphic calls.
- The collection of figures with graphic calls and data description for the figures within the various chapters, sections and units.
- Associated items within the figures with part number and data description for the item.
- The part number file of data description for the part number.

The graphics file will be provided as raster images in accordance with CCITT Group 4 with TIFF headers or sector images in accordance with CGM.

AIPC SGML FILE

```
<CHAPTER CHAPNBR="01" CHG="N" KEY="CHAP01" REVDATE="20100825">
<TITLE>Sample File</TITLE>
<SECTION CHAPNBR="01" SECTNBR="01" CHG="N" KEY="SECT0000" REVDATE="20100825">
<TITLE>Sample Section</TITLE>
<UNIT CHAPNBR="01" SECTNBR="01" UNITNBR="01" CHG="N" KEY="UNIT010101" REVDATE="20100825">
<FIGURE CHAPNBR="01" SECTNBR="01" UNITNBR="01" FIGNBR="01" CHG="N" KEY="K01010101" REVDATE="20100825">
<EFFECT EFFRG="000001">
<TITLE>Figure1</TITLE>
<GRAPHIC>
<SHEET SHEETNBR="001" GNBR="G_0101010101" CHG="N" KEY="S01010101001" REVDATE="20100825">
<TITLE></TITLE>
</SHEET>
<SHEET SHEETNBR="002" GNBR="G_0101010101" CHG="N" KEY="S01010101001" REVDATE="20100825">
<TITLE></TITLE>
</SHEET>
</GRAPHIC>
<PRTLST>
<ITEM CHAPNBR="01" SECTNBR="01" UNITNBR="01" FIGNBR="01" ITEMNBR="001" ILLUSIND="0" INDENT="1" ATTACH="0" CHG="N"
KEY="K01010101001" REVDATE="20100825">
<EFFECT EFFRG="001999">
<PNRMFR>
<PNR>PN1</PNR>
<MFR>MFR1</MFR>
</PNRMFR>
<UPA>3</UPA>
<TQA>4</TQA>
<ADT></ADT>
<LBL></LBL>
<PLD>CTL</PLD>
```



Future of technical documentation: S1000D

- **What?**

- *The International Specification for Technical Publications Utilizing a Common Source Data Base – Specification 1000D*
- *Based on concept of data module (smallest, stand alone unit in a tech. publication)*

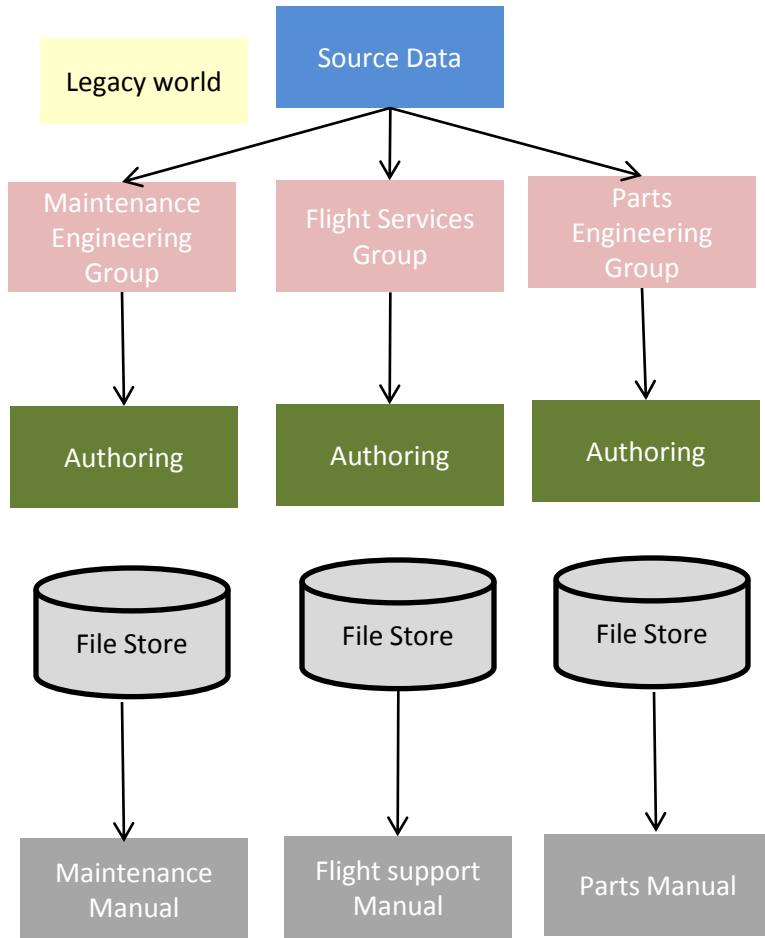
- **Who?**

- *Controlled by the Technical Publications Specification Management Group (TPSMG)*
- *S1000D™ is a trademark owned by ASD*
- *ATA signed a memorandum of understanding with the ASD and AIA*
- *S1000D is currently produced jointly by ASD, ATA and AIA*

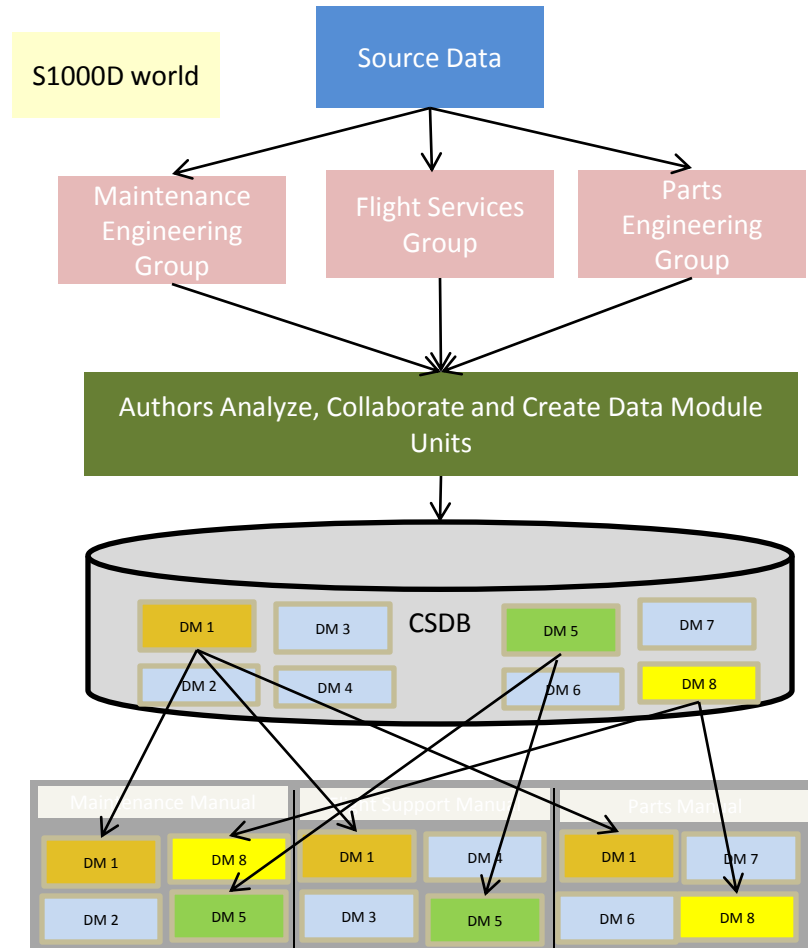
- **Why?**

- *To incorporate commercial aviation requirements into S1000D and establish a single specification for both military and commercial aviation industries worldwide.*
- *Widely used for defense land, sea and air applications, and also in civil aviation*

iSpec 2200 Vs S1000D



Duplicate or outdated information, increased maintenance cost, Error prone



Data created once and used across manuals, Navigation across manuals made simpler

Atoms of S1000: Data Module

Each data module comprises two parts, identification and status section (ID Status) and a contents section.

The Identification and Status section provides information for:

- Managing the Meta-data in CSDB.*
- Applicability of the Data module.*
- Managing the quality assurance process.*

The contents section provides the user with the actual information required to conduct the task or describe the system. It provides information for

- Cross referencing information*
- Figure, Graphic, and Table information*

Benefits: What S1000D can do?

- The single greatest benefit offered by S1000D is the ability to re-use data.
- Specific data modules are created (containing text and/or graphics) and then stored in the Common Source Database (CSDB) can be re-used and redistributed in many other different projects or publications.
- Bring a tremendous amount of time savings to the authoring process, as data modules are simply "plugged in" to any publication or project documentation as needed.
- In short, with S1000D *"define it once and use it everywhere"* goal is achieved.

Some of the other related benefits of using the S1000D specification are:

- ✓ Internationally agreed and acclaimed neutral standards
- ✓ Consistency of data delivered to customers
- ✓ Reuse of information (vs. recreating new information each time)
- ✓ Facilitates complete configuration control (by having a common source database)
- ✓ Reduces maintenance costs for technical information and overall Product Life-Cycle costs
- ✓ Data tailored based on the user need
- ✓ Digitally transmitted data reduces the cost for OEM as well as the end customer
- ✓ Provides a single standard to support communications and data exchange among all participants in a given project
- ✓ Highly reduces the complexity of maintaining different standards in the customer end (on a long run)
- ✓ Makes navigation across various documents simpler for the mechanics and ground engineers

Digital Deliverables (Manuals)

Below are some of the manuals that are delivered digitally

- Aircraft Maintenance Manual (AMM)
- Aircraft Recovery Manual (ARM)
- Component Maintenance Manual (CMM)
- Fault Reporting and Fault Isolation Manual (FRM/FIM)
- Flight Crew Operations Manual (FCOM)
- Maintenance Planning Document (MPD)
- Master Minimum Equipment List (MMEL)
- Non-Destructive Testing Manual (NDT)
- Service Bulletin (SB)
- Structural Repair Manual (SRM)
- System Description Sections (SDS)
- Weight & Balance Manual (WBM)
- Wiring Diagram Manual (WM)
- Illustrated part Manual (IPD)

Abbreviations

- AIA : Aerospace Industries Association of America
- ANSI : American National Standards Institute
- ASD : Aerospace and Defense Industries of Europe
- ATA : Air Transport Association of America
- DTD : Document Type Definition
- FAA : Federal Aviation Administration
- LSIE : Logical Support Integration Environment
- SGML : Standard Generalized Markup Language
- TIFF : Tag Image File Format

Thank You