



Successful Implementation of S1000D for the Canadian Forces

Presented by Marie-Claude Brais
Manager Technical Publications, L-3 MAS

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Briefing Objective

To share the L-3 MAS experience, methodology, tools and lessons learned from practical experience in implementing S1000D-based technical publications for the Canadian Air Force.

Outline

- **Introduction**
 - About L-3 MAS
 - L-3 MAS Technical Publications background
- **The Cyclone (CH148) and Griffon (CH146) requirements**
- **S1000D-specific benefits for both programs**
- **Project implementation approach, as applied for the CH148 and CH146**
 - Project definition
 - Technology and tools
 - Conversion of data
 - Transition to production
 - In-Service Support
- **Summary of pitfalls and lessons learned**

L-3 Communications: In Brief

- ✦ **Founded in 1997**
- ✦ **Hi-tech defence systems & product supplier**
 - **Mostly a military supplier**
 - **Some commercial applications**
- ✦ **2010 sales: \$15.7B USD**
- ✦ **Employees: ≈ 66,000 worldwide**
- ✦ **A top 10 U.S. defence industry supplier**



MAS



4

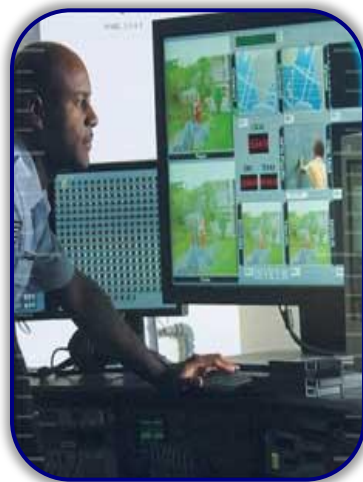
L-3 Communications: Business Segments

C³ISR



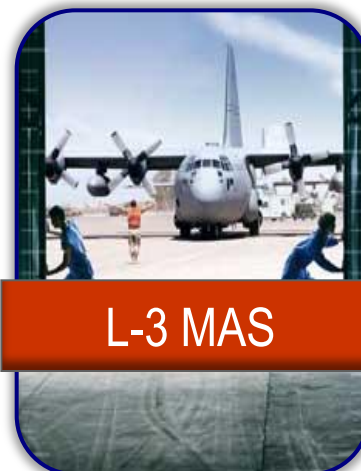
22%
\$3.4B

Government Services



25%
\$4B

AM&M



18%
\$2.8B

Electronic Systems



35%
\$5.5B

Total (2010)= \$15.7B USD

L-3 MAS: In Brief

- ⊕ Top Canadian aerospace & defense industry company;
- ⊕ Situated at the heart of the world's 4th largest aerospace cluster;
- ⊕ Facilities and personnel across Canada, Germany, Italy and Australia;
- ⊕ Known for its outstanding execution of military programs on aircraft:
 - ⊙ In-Service Support,
 - ⊙ Life extension, and
 - ⊙ Modernization programs;
- ⊕ Sought-after commercial aircraft services provider in:
 - ⊙ Aerostructures design to build, and
 - ⊙ Component Repair & Overall (R&O).



Main Facility

L-3 MAS: Two Centres of Excellence



Aircraft Modification & Integration

- Leading contractor for the Department of National Defence
- Services offered: Engineering, aircraft ISS, fleet management, life extension, modernization & missionization, and technical publications
- 25 years of excellence in program delivery



Aerostructures & Aircraft Services

- Experienced aerostructures & components R&O provider
- Services offered: Design, prototyping & manufacturing of aerostructures, component R&O, rig testing & robotic shot peening
- Partner to many different OEMs

L-3 MAS: Successful MHP Delivery

In-service provider for the CH-148 Cyclone Maritime Helicopter fleet

- Established ISS readiness in time for the arrival of the first helicopter
- Complete set-up of an Integrated Information Environment (IIE)
- First Canadian defence company to deliver the S1000D standard for technical publications



L-3 MAS: Delivering Technical Publications

Most advanced Technical Publications group to serve the Canadian Air Force's fleets.



- **Deployed IETM solution on five Canadian Air Force fleets**
- **In-house software capability; developed state-of-the-art solutions**
- **Deliver quality technical publications**
- **Currently have seven important Publication Maintenance Services (PMS) contracts with DND and OEMs**

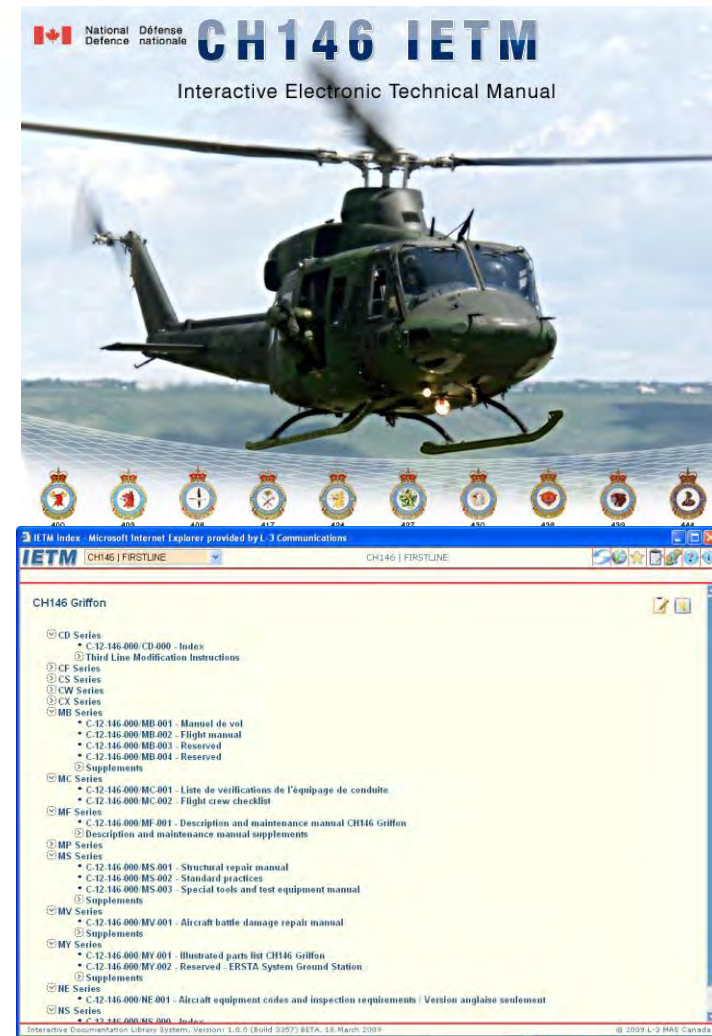
CH148 Cyclone Program Requirements

- Since 2004, L-3 MAS has been involved in the design and deployment of an IETP viewer solution for the Canadian Forces' CH148 Cyclone as a subcontractor to SIOI.
- Project requirements:
 - Establish business rules and authoring style guides
 - Convert the existing S-92A maintenance and operator publication set to S1000D, issue 2.2
 - Select and implement a Common Source Data Base (CSDB)
 - Develop an interactive wiring diagrams solution
 - Design a sound integrated solution (IIE)
 - Service design
 - Enabling Systems (ES) design
 - IETP development and integration



CH146 Griffon Program Requirements

- Since 2007, L-3 MAS has been involved in the conversion and deployment of an IETP viewer solution for the Canadian Forces' CH146 Griffon as a subcontractor to BHTCL.
- Project Requirements:
 - Establish business rules
 - Convert the existing Griffon maintenance and operator publication set from FrameMaker files to S1000D
 - Support to BHTCL in the selection and implementation of a Common Source Data Base (CSDB)
 - Implement an interactive wiring diagrams solution
 - Tailor the IETP to customer-specific needs and requirements
 - Develop conversion, authoring / validation tools;
 - Provide training and customer support on S1000D and IETP to BHTCL
 - Update and synchronize IETP releases



Main Benefits of S1000D on the Two Programs

- Reusability of data resulting in significant cost reductions over life cycle.
- Mature spec as it is derived from the long-term existing ATA specification; it covers both content and container in the management and production of technical content.
- Implementation is greatly facilitated by the guidance and tools provided as part of the spec.
- The spec allows for integration among systems because of its data module concept and structure.
- The spec continuously improves based on evolving industry needs.
- As the spec is XML-based, it renders the data “future proof”.

Project Implementation

- Project definition
 - Requirements
 - Business rules
 - Concept of operation (ConOps)
- Selection/implementation of tools and technology
- Data conversion
 - Analysis
 - Converting legacy files
- Transition to production
- In-Service Support

Project Definition

Defining Requirements

- Provided by a customer
 - Understand system/software engineering specification (Methodology)
 - Establish S1000D target issue
- Allocate requirements
 - Manage requirements (dedicated tool)
 - Understand service requirements
 - Understand tool requirements
 - Understand integration requirements
- Establish specification requirements
 - Consider SOW requirements
 - Consider functionality requirements

ID	Functionality	Traceability to IIE Recs	IETM-Expected Delivery Date	Comments	Control	Final	03	04	02	03	04	05	06	07	08	09	10	11	12
FM_4721	1 General																		
FM_4729	MIL-PRF-37268A, Draft 1 Oct 95 Compliance	* 1701_1800	August 31, 2007																
FM_4716	MIL-STD-1472F UI Standard Compliance	* 1701_2383	August 31, 2007																
FM_4715	Modern, multi-media interactive electronic technical data applications features	* 1701_1735	August 31, 2007																
FM_4714	Test and Graphic Integration	* 1701_1735	August 31, 2007																
FM_1	2 Access																		
FM_20	Suspend and Restart	* 1701_2411	November 30, 2007	Really requires integration - can demo via an interface test page	1														
FM_4730	Login	* 1701_2389	November 30, 2007	Really requires integration - can demo via an interface test page	2														
FM_21	Login	* 1701_2389	November 30, 2007	Really requires integration - can demo via an interface test page	2														
FM_2	3 Language																		
FM_22	Bilingual Graphic User Interfaces (GUI)	* 1701_2393	May 31, 2008	Initial Release															
		* 1701_2395																	
		* 1701_2396																	
		* 1701_2397																	
FM_23	Simultaneous Bilingual Changes	* 1701_2393	May 31, 2008																
FM_24	Bilingual Content	* 1701_2393	May 31, 2008																
		* 1701_2395																	
		* 1701_2396																	
		* 1701_2397																	
FM_25	Untranslated Content	* 1701_2396	May 31, 2008																
FM_26	Bilingual System Help Data	* 1701_2397	May 31, 2008																
FM_3	4 Annotation																		
FM_27	Action Complete Indicator	* 1701_2465	November 30, 2007																
FM_28	Global Data Annotation	* 1701_2465	November 30, 2007	Really requires integration - can demo via an interface test page	2														
FM_31	Local Data Annotation	* 1701_2465	November 30, 2007	Is there a reqt for separate rates?	2														
FM_33	Personal Annotation	* 1701_2465	November 30, 2007																
FM_34	Redefining Graphics	* 1701_790	August 31, 2007	ActiveCOM functionality for local files (remove 790)	3														

i.e.: IETP FM loaded in RM and mapped (linked) to actual requirements

Project Definition

Defining Requirements

- Identify IETP functionality requirements in functionality matrix
 - The FM is an IETP Viewer shopping list for the customer
 - It replaces the IETP class system
 - Allows the mapping of functionalities to specific information types
 - S1000D guidance

- Categories
- Definitions
- Examples

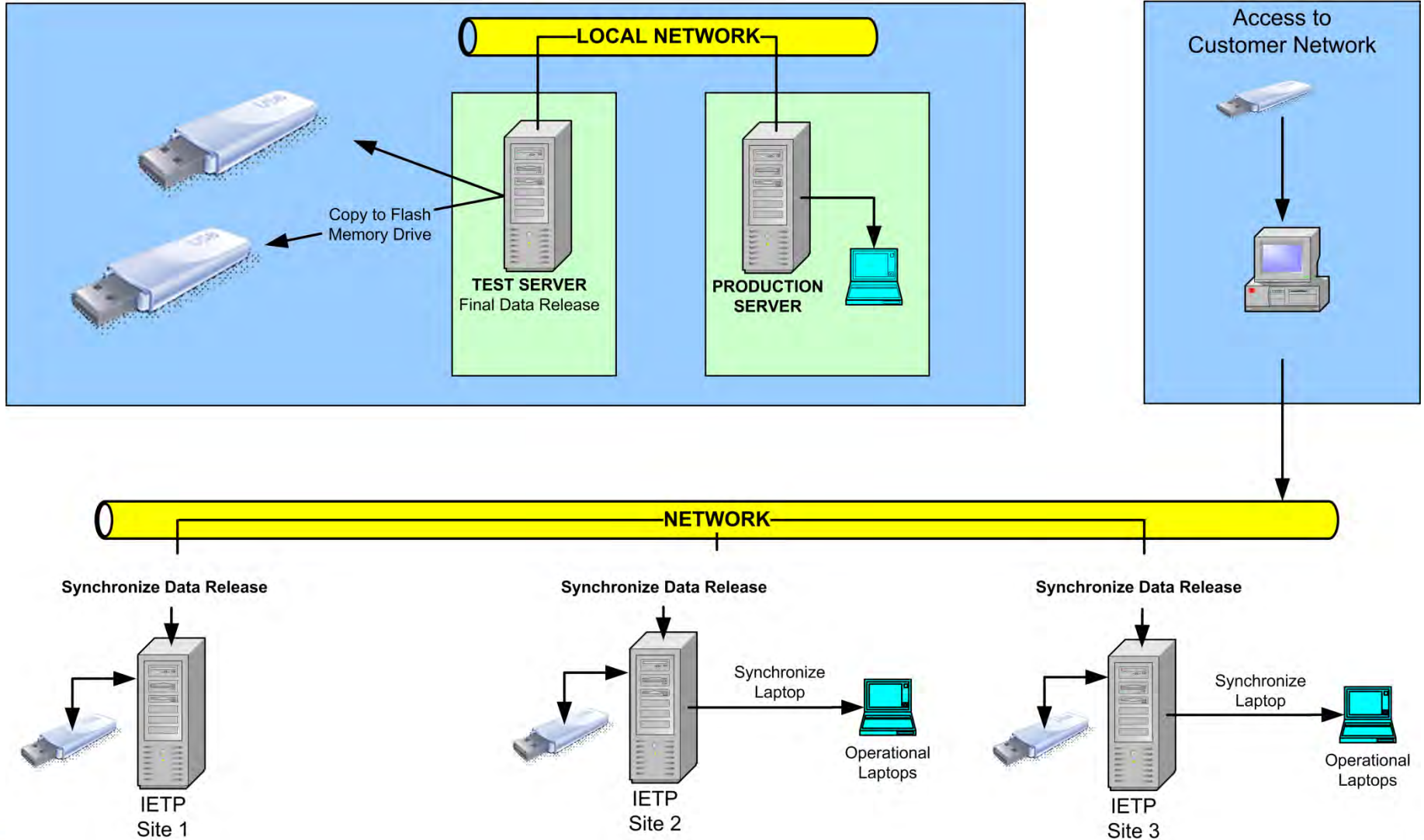
Functionality	Complexity – Page	Complexity – IETP	Requirement	All information sets	Crew / operator	Description and operation	Maintenance procedures	Fault isolation	Non-destructive testing	Corrosion control	Storage	Wiring diagrams	Illustrated parts data	Maintenance planning	Mass and balance	Recovery	Equipment	Weapon loading	Cargo loading	Stores loading	Role change	BDAR	Illustr'd tool & support equip
Data module specific printing	1	2	Y	A		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Print linked data	2	2	Y	A		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Special Content																						
Front matter	1	1	Y	A		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Supporting technical data	2	2	Y	A		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Alerts	1	1	Y	A		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Emergency procedures	2	2	Y	A		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Photos	1	1	Y			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Audio	2	2	Y			X	X	X	X	X	X	X	X	X		X					X		X
Motion video	3	3	Y			X	X	X	X	X	X	X	X	X		X					X		X
Content sensitive help (Tech data)	1	1	Y	A		X	X	X	X	X	X	X	X	X				X				X	X
Context sensitive help (Viewer)	2	2	Y	A		X	X	X	X	X	X	X	X	X		X					X		X
User training	3	3	Y	A		X	X	X	X	X	X	X	X	X		X					X		X
	Updates																						
Passive change indications and markings	1	1	Y	A		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Active change indications and markings	2	2	Y	A		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Full change	1	1	Y	A		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Block cycle and urgent changes	2	2	Y	A		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Near real time updates	2	2	Y	A		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	User operation mode																						

Project Definition

Develop Conops

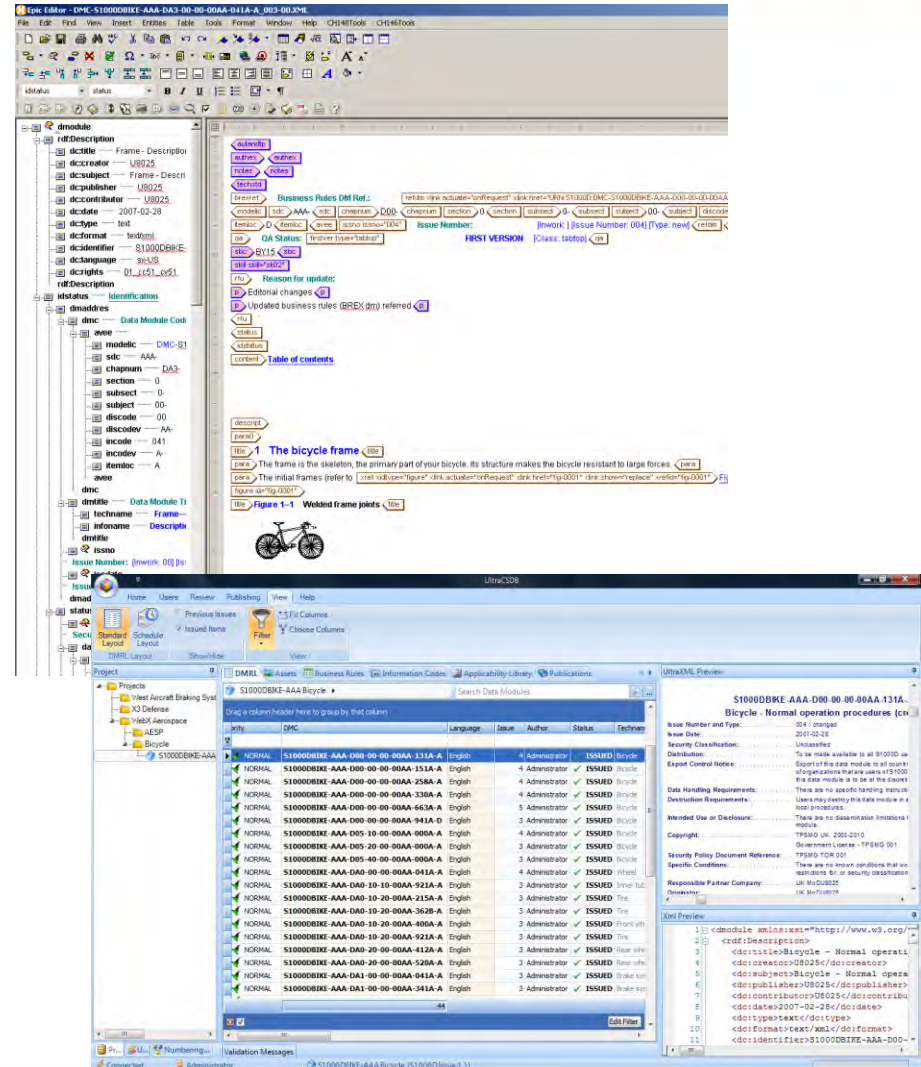
- (Refer to BR Cat. #3)
 - Define/review network infrastructure and intended IETP distribution and paper distribution
 - Define how customer would make use of the IETP; how many user sites
 - Consider classified data requirements
 - Define requirements for deployed (standalone devices) use of the IETP
 - How frequently are the publications updated?
 - Need for urgent messages to be published?
 - Etc.

Example of a Conops for IETP



Select/Implement Technology and Tools

- **Data conversion** (Refer to BR Cat. #8, 9)
 - Manual vs automation
 - Programming languages
- **Authoring** (Refer to BR Cat. #6)
 - XML authoring software
 - Graphic authoring software
- **Translation** (Refer to BR Cat. #6)
 - Translation software
 - Terminology software
- **Publishing and Data Management** (Refer to BR Cat. #8, 9, 10)
 - CSDB software



Select/Implement CSDB

- Executed a market research on CSDB solutions.
- Chose various vendors and sent CSDB functionality matrix requirements.
- Evaluated vendors with established score sheets.
- Procured and implemented a Content Management System.
- Imported Data Modules (DMs) and associated assets.

Develop/Tailor IETP to Customer Requirements

Phases	Activity	Gate
Analysis	Validates the requirements are well defined and understood by all parties and that the analysis phase is complete.	Software Requirements Review (SRR)
Design	Validates that the design phase is complete.	Design Review
Implementation	Validates that the software is complete and ready to be tested.	Test Readiness Review (TRR)
Test	Validates that the testing has been completed successfully and that the software is ready for deployment.	Test Data Review (TDR)

Conversion of Data

- **Analyse legacy/source data** (Refer to BR Cat. #9)

- Structured vs non-structured data
- Graphics, file formats
- Consider granularity and reusability
- Mapping

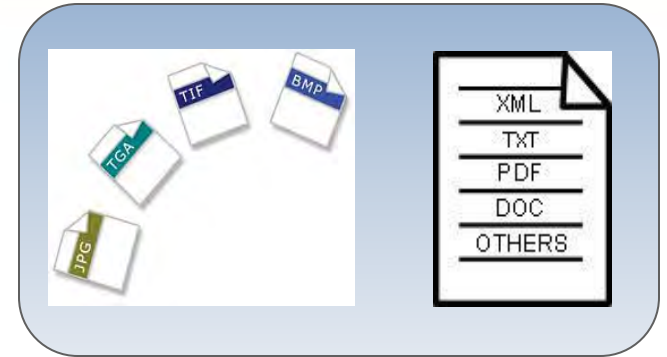
- **Establish conversion approach** (Refer to BR Cat. #8, 9)

- Manual vs automated
- Identify priorities based on ROI vs conversion costs

- **Create conversion specification, develop conversion tools, perform sample test**

- **Data creation** (Refer to BR Cat. #6)

- Convert legacy files to target format/standard (S1000D XML, PDF, or other)
- Ensure parsing against schemas and BRs



```
descript>
para0>
title> 1 The bicycle frame <title>
para> The frame is the skeleton, the primary part of your bicycle. Its structure makes the bicycle resistant to large forces. <para>
para> The initial frames (refer to <xref xidtype="figure" xlink:actuate="onRequest" xlink:href="fig-0001" xlink:show="replace" xrefid="fig-0001"> F
figure id="fig-0001">
title> Figure 1-1 Welded frame joints <title>
```

Transition to Production

- **Transition to production:**
 - Final testing
 - Approvals
 - Finalise training and user documentation
 - Provide training
 - Deploy solution
 - Offer support

In-Service Support

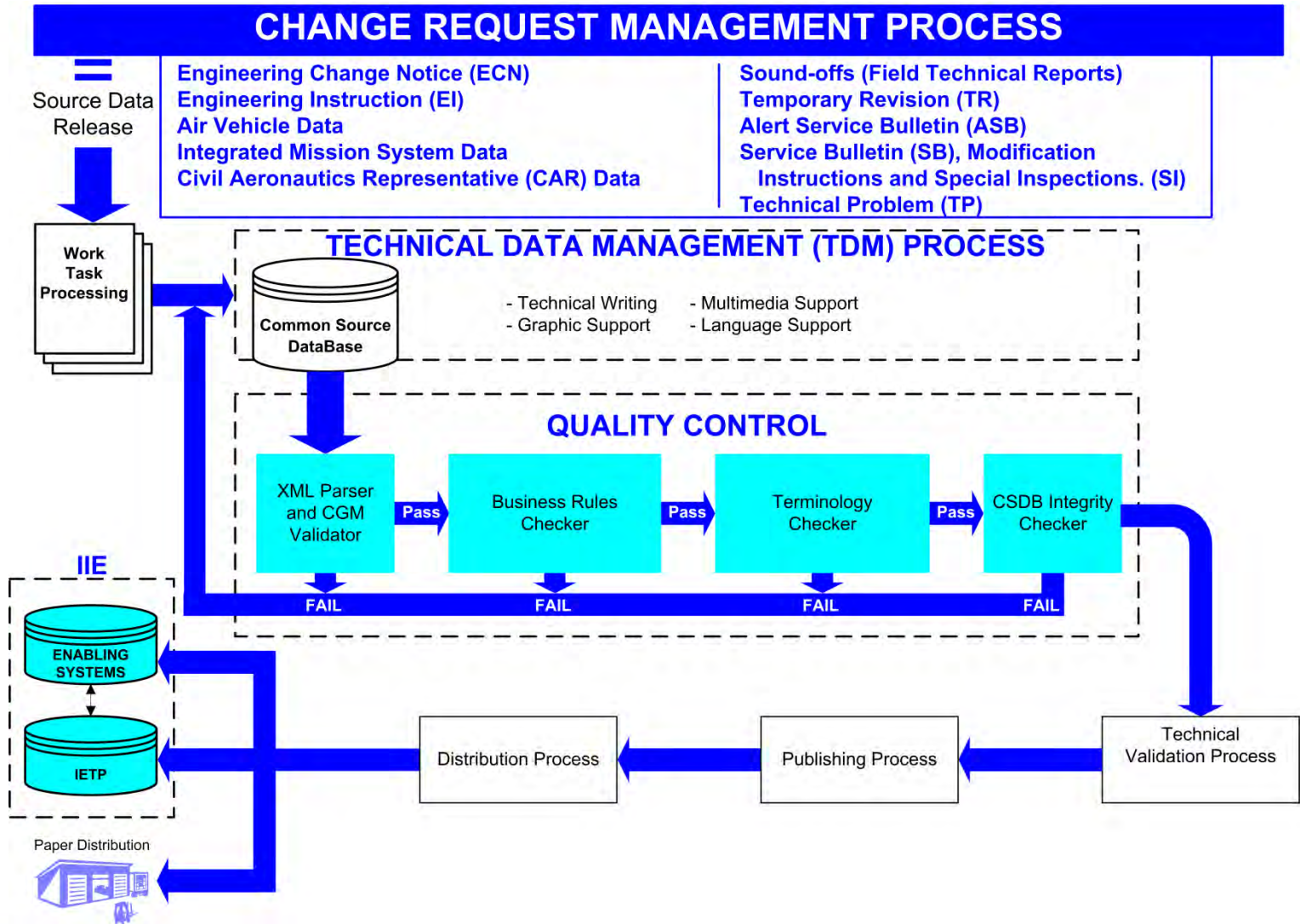
- **Data**

- IETP and paper updates
 - Schedule releases (quarterly, monthly, weekly, other)
- Urgent change management

- **Software**

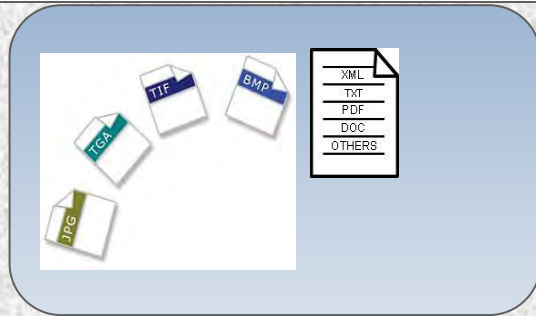
- Help Desk
 - Application change requests
 - Technical support
- Obsolescence management
 - Consider OS and software updates
 - Consider integration impact

ISS – Publication Updates



Project Implementation Approach

Summary



Original source data

Selection

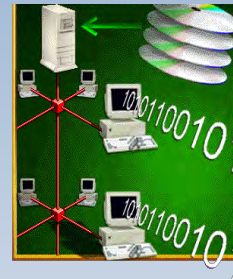
Standard
CALs, ATA, S1000D
IETP/CSDB platform

Data analysis using selected standard

Requirements definitions (define XML business rules, functionality matrix, authoring rules, graphics style guide, etc.)

Define concept of operation (CONOPS)

Development, DATA conversion



Tools creation (SCRIPTS, DTD, stylesheets)

Data validation/verification

Customer technical validation



-Training package
-User documentation



Delivery to Customer



Potential Pitfalls – Common Mistakes

- **Rushing the planning/definition phase – Not understanding your needs**
 - Many large scale document conversions fall victim to poor planning. Planning should include requirements definition, approach, deployment strategy, schedule, cost, and risk analysis.
 - What's critical versus nice to have (e.g.: gradual migration or priority based conversion)?
 - How much source/format data variation is there?
 - What's your budget and estimated cost (considering ROI)?
 - Can there be tradeoffs (e.g.: time, budget, function)?
- **Trying to do too much at once**
 - A phased or staggered approach to implementation will allow you to stay operational, address budget restrictions/allocations, and reduce risk in accordance with your defined strategy.

Potential Pitfalls – Common Mistakes

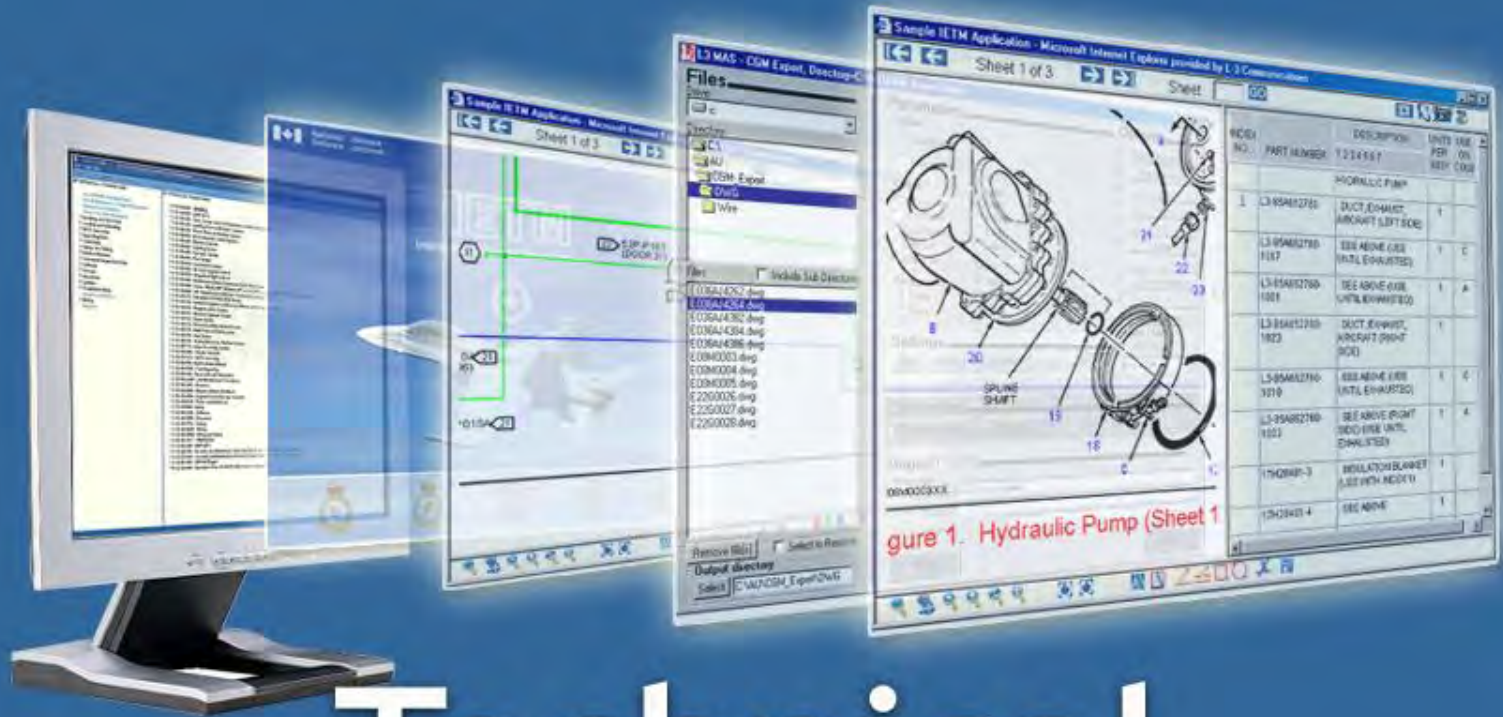
- **Considering a singular solution**
 - There is no magic bullet for large scale conversion or transition to IETP. All of the projects we have successfully deployed have been tailored to meet specific customer needs.
- **Off-the-shelf conversion**
 - Successful conversion requires proper data analysis, capacity to write and modify conversion scripts, implementing quality control mechanisms, etc. Conversions invariably have issues and will require tailoring and support throughout the development and in-service life cycle stages.
- **Testing – Non-existent or poorly focused**
 - You will need to test the planned approach on a limited scale. This will be your opportunity to validate the approach or test out the areas that were identified as being particularly risky.

L-3 MAS Recommendations Based on our Lessons Learned

- Need a commitment to S1000D and involvement of key stakeholders for business rules definition.
- Adhere and commit to the specification and established business rules; S1000D does not work if partially implemented; however, it can be configured.
 - Avoid establishing business rules in a rush, but do not over tailor the project specific decisions; and
 - Harmonize and reuse program specific business rules.
- Follow the guidance of the spec as it is comprehensive but still flexible.
- Properly evaluate and implement a CSDB solution and other supporting tools. Make sure technical support is readily available when you need it!

L-3 MAS Recommendations Based on our Lessons Learned

- Establish the right level of granularity to maximize data reusability while minimizing initial setup cost. Effective reuse and repurpose of information can pay big dividends. Correct application of granularity facilitates a single data module to be used in many places and for different purposes.
- With experience, the core concepts of S1000D are simple and can be applied whatever the size/scope/scale of the project. The development should not deviate from the established functionality matrix or business rules.
- Make sure to involve the customer/end user throughout the project to ensure successful acceptance validation and testing.



Technical Publications



communications

L-3 MAS