



Host (on behalf of ASD):



ADS is the Premier Trade Organisation for companies in the UK Aerospace, Defence, Security and Space Sectors.

A400M Program – S1000D & S2000M Data Consistency

In-Service Maintenance

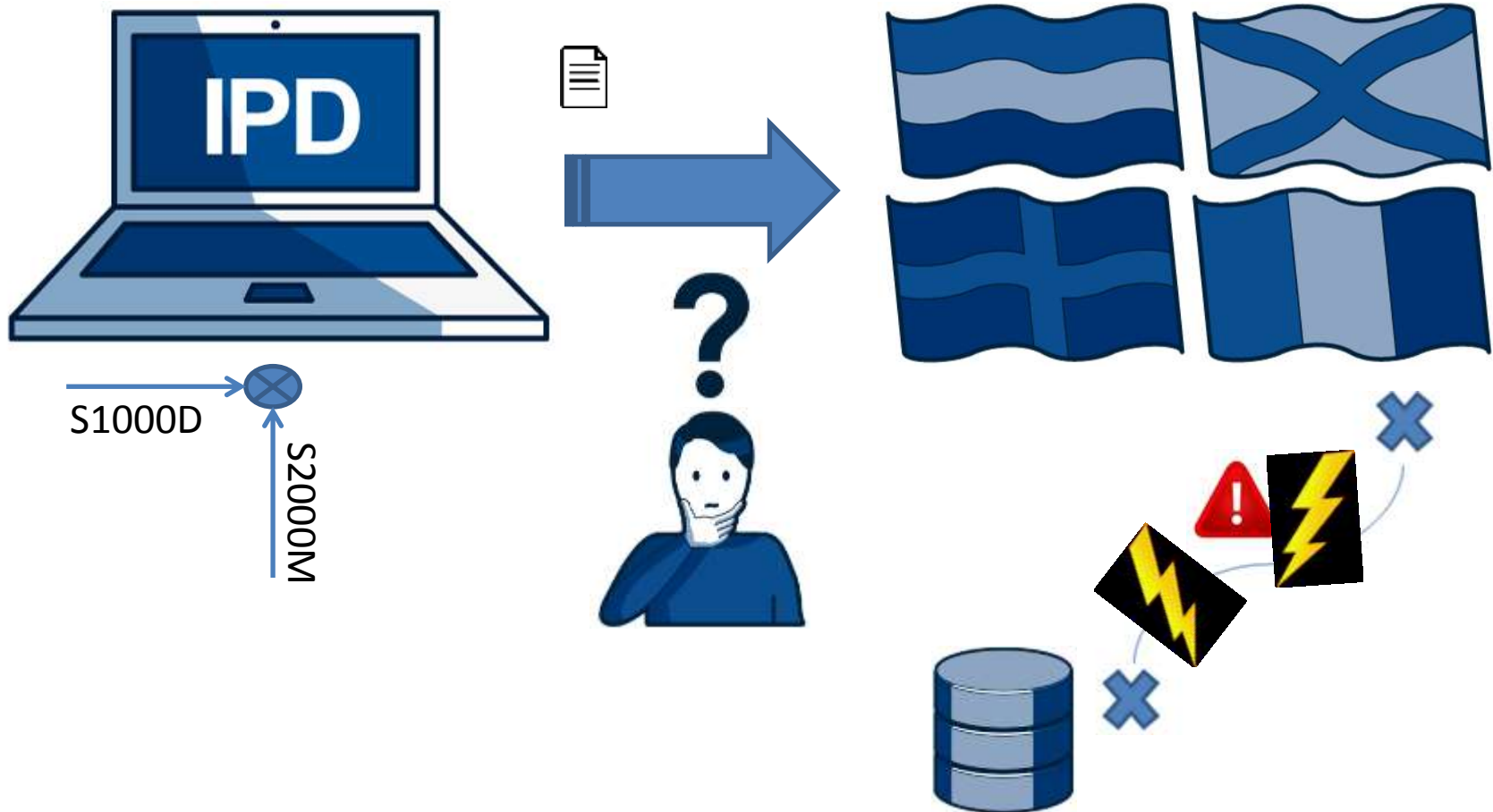
Name of presenter: Manuel Álvarez
Rank/title of presenter: A400M Technical Data PMO
Company/organization: Airbus Defence & Space

S1000D User Forum, London

October 14-16, 2019

A400M – S1000D & S2000M Data Consistency

- Based on a *real in-service* scenario



A400M – S1000D & S2000M Data Consistency

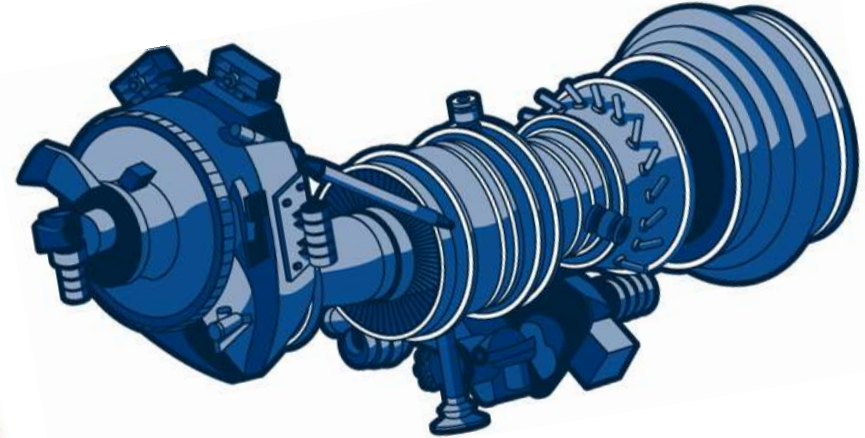
- 1. Introduction: S1000D & Spare Parts inconsistency**
2. S1000D Parser
3. S2000M Parser
4. In-service product integrity / LSA

S1000D & Spare Parts inconsistency

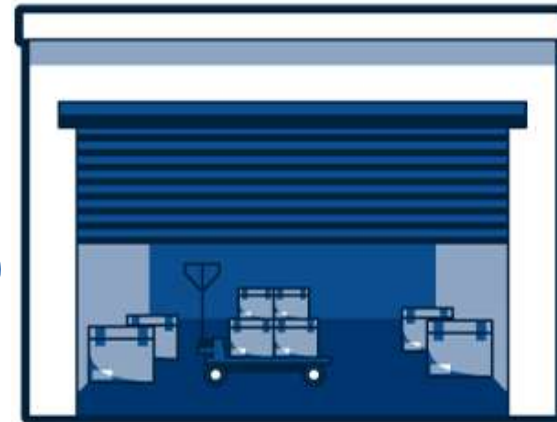
- S1000D technical content supported by spare parts information



S1000D



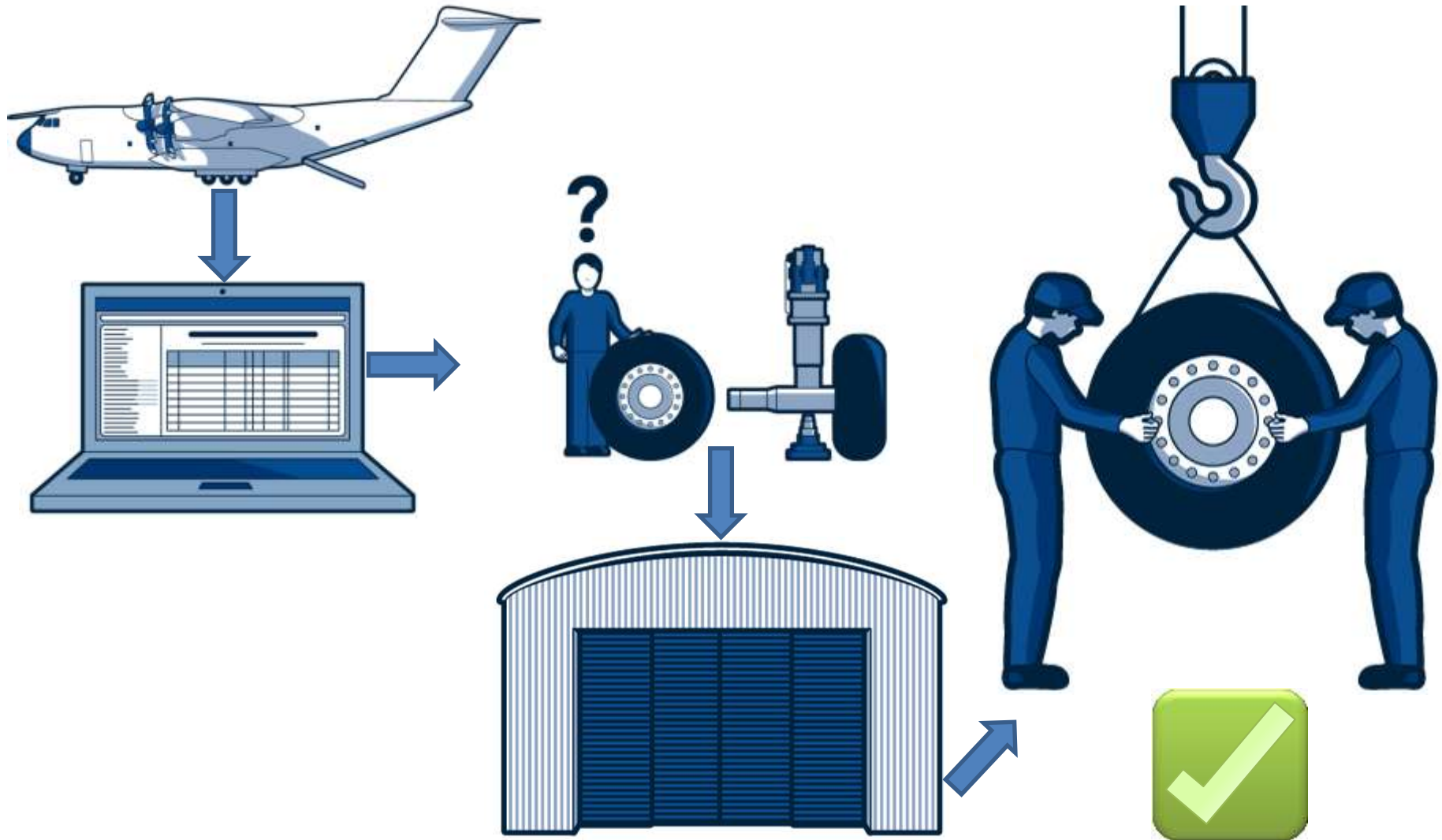
S2000M /
ATA 2000



S1000D & Spare Parts inconsistency



S1000D & Spare Parts inconsistency



S1000D & Spare Parts inconsistency

- Information such as:
 - Shelf Life Code (SLC)
 - Source Maintenance Recoverability Code (SMR)
 - Calibration Marker (CMK)
 - Electrostatic Sensitive Device (ESD)
 - Fitment Code (FTC)
 - Spare Parts Classification (SPC)
 - Special Storage (STR)

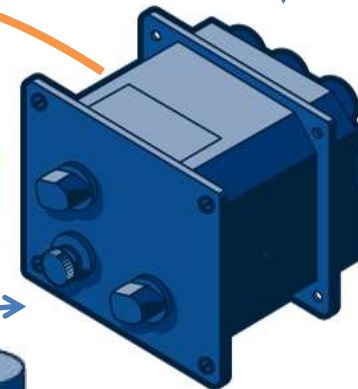


P/N documentation:

- Yellow Tag
- EASA Form 1

S2000M / SPEC 2000

S1000D



A400M – S1000D & S2000M Data Consistency

1. Introduction: S1000D & Spare Parts inconsistency

2. **S1000D Parser**

3. S2000M Parser

4. In-service product integrity / LSA



S1000D Parser

Baseline

Schema

Entities declaration

Content using UTF-8 codification

X-ref to external data modules (different Infosets)

Applic. consistency

References to elements declared in different repositories such as AGEs, consumables, zones or access panels.

Available?

Format?

Designation?

...

BREX. Possibility of using different BREX + BREX manager (editor/generator BREX)

Spares references

IPD figure found / not found (even checking figure variants)

Object figure deleted or not

Item declared or not



S1000D Parser

Technology

Javascript over MSXMLDom/ webCGMDom

Light SW

No installation required – *online access*



PM entries wrt DMRL
Hotspots & Metadata in CGMs
Hotspots consistency between CGMs and XML DM

Errors reported in XML / HTML (XPath)
Data module generation in HTML through XSL

S1000D Parser

Added value – maintenance concept support

Analytics – panel for *global errors visualization*

Using and creating a JSON structure through XML data

Customized *in-service* reports

The screenshot shows a web interface for data analytics. At the top left, there is a 'Data Analytics 2.0' section with a red 'Launch DA 2.0' button. To its right is a 'Custom reports' section with two green buttons: 'AMP Vs AM' and 'ICA REFERENCES'. Below these is a timestamp 'Last modified: 2019-07-15 13:22:32' and a blue 'Display' button. A text instruction reads 'Click on next buttons to download. Files can be easily imported in Excel (as per CSV)'. Below this are two rows of orange buttons: 'GENERAL', 'AGES', 'DOORS', 'ACCPANELS' in the first row, and 'ZONES', 'CONSUMABLES', 'SPARES', 'REFERENCES' in the second row. On the right side of the interface, there is a green logo with a stylized arrow pointing right and the word 'Analytics' in a green font.

S1000D Parser

Added value – maintenance concept support

Customized *in-service* reports

AMP (12 MO tasks) > AM > AGEs required

OMP – A-Checks (6-12-18-36 MO) or C-Checks (24-48-96 MO)

Data Analytics 2.0

Launch DA 2.0

Custom reports

AMP Vs AM

ICA REFERENCES

Toggle column: [Criterion Reference - Description - Interval - Threshold - Applicability - AM Container - Level - Ages - Workflow Information - AM S

Show entries

Crit Reference	Description	Interval	AMContainer	Level	Ages
<input type="text"/>	<input type="text"/>	<input type="text" value="12 MO"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
611000-E4012-01	APPLICATION OF CORROSION PROTECTION TO HUB ARM BORES.	600 EH/12 MO	AJA61100006ZZZ281ZA	1	
611000-E4012-01	APPLICATION OF CORROSION PROTECTION TO HUB ARM BORES.	600 EH/12 MO	AJA00100000ZZZ398ZA	2	AJE10004222000,AJA24243074000,AJE10109517000
611000-E4012-01	APPLICATION OF CORROSION PROTECTION TO HUB ARM BORES.	600 EH/12 MO	AJA00100000ZZZ398ZA	2	AJE10004222000,AJA24243074000,AJE10109517000

S1000D Parser

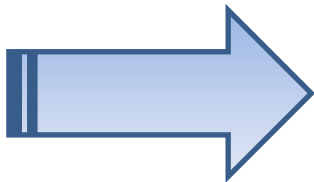
DMC	INFOSET	STATUS	REF L1	STATUS L1	INFOSET L1	ORIG L1
<input type="text"/>	AM	new	<input type="text"/>	changed	EQM(CM)	<input type="text"/>
AJA05511309AAA282AA	AM	new	AJA52316901AAA530AB	changed	EQM(CM)	NCAGE
AJA05511309AAA282AA	AM	new	AJA52316901AAA710AB	changed	EQM(CM)	NCAGE
AJA05511719AAA282AA	AM	new	AJA52316901AAA530AB	changed	EQM(CM)	NCAGE
AJA05511719AAA282AA	AM	new	AJA52316901AAA710AB	changed	EQM(CM)	NCAGE
AJA05514219AAA282AA	AM	new	AJA52316901AAA530AB	changed	EQM(CM)	NCAGE
AJA05514219AAA282AA	AM	new	AJA52316901AAA710AB	changed	EQM(CM)	NCAGE

Showing 1 to 6 of 6 entries (filtered from 5,664 total entries)

New AM Procedures

L1 changes

L2 changes → **NCAGE**



REF L2	STATUS L2	INFOSET L2	ORIG L2
<input type="text"/>	changed	EQM(CM)	<input type="text"/>
AJA52317402AAA530AB	changed	EQM(CM)	NCAGE
AJA52317402AAA710AB	changed	EQM(CM)	NCAGE
AJA52317402AAA530AB	changed	EQM(CM)	NCAGE
AJA52317402AAA710AB	changed	EQM(CM)	NCAGE
AJA52317402AAA530AB	changed	EQM(CM)	NCAGE
AJA52317402AAA710AB	changed	EQM(CM)	NCAGE

Previous Next

S1000D Parser

Extract :

Part 21 – Subpart J – Design Organisation Approval

21.A.265 Obligations of the holder

The holder of a design organisation approval shall:

[...]

(h) designate data and information issued under the authority of the approved design organisation within the scope of its terms of approval as established by EASA with the following statement: 'The technical content of this document is approved under the authority of the DOA ref. EASA. 21J.[XXXX].

End of Extract

**EASA PART 21 – DOA
COMPLIANCE!**



S1000D Parser

Analysis process finished

Zipped Files → Upload Files IE users only Open with explorer

export to csv export to Excel

Files List

Parsing Result

Data Modules: Illustrations

4 errors found

ICN code	Error/Warning description	Element
[ICN-AJ-A-255246-A-81868-10632-A-02-1.CGM	Metafileid does not match with the filename	[ICN-AJ-A-255246-A-81868-10632-A-01-2
[ICN-AJ-A-256283-A-F6101-00008-A-02-1.CGM	Canvas seems not to have the right size.	172.00 x 212.00
[ICN-AJ-A-256283-A-F6101-00008-A-02-1.CGM	Header contains not allowed characters	Fantomes,Zonning gris,Zonings jaunes,Textes,Repères,Lignes de repères,Traits d axes,Sources-Cibles,Dessin,Accolades,Templates,Legend,Cadre 170x210,Hots-spots,Standard layer,Background

SEARCH: use text input to filter results

EXPORT: take a copy of your parsing results

NAVIGATE: results table, contains paging numbers on footer. Also use tabs on left corner to toggle between XML and CGM errors.

plug & play ;)

A400M – S1000D & S2000M Data Consistency

1. Introduction: S1000D & Spare Parts inconsistency
2. S1000D Parser
- 3. S2000M Parser**
4. In-service product integrity / LSA

S2000M Parser

S2000M messages

large text files containing a lot of information but also...

➤ Not human readable

➤ Difficult to detect errors

➤ Time consuming

A400M uses **S2000M**
issue **3.0**, October **2000**

S2000M Parser

First goal to achieve was to get an **XML input** to apply then similar validation methods than with **S1000D** data.

The transformation

We identified some **patterns** in text messages and used them to get our “*XML S2000M data*”:

```
CAS+CHG:N+CSN:75211008 007
+ISN:00F+IND:2+RFS:1+QNA:4+TQL:4+PNR:AS48408+MFC:U14C6+NSN:5306:999949284'
CBS+DFL:(SB PS1002-71-7001)'
CCS+ICY:6-'
CDS+ESC:1'
CES+CHG:N+SRV:BE+SMR:PAFZZ+RMQ:99999'
CJS+CHG:N+MOV:01'
```

- **Key/value** pairs separated by “colon” symbol
- **Sub-elements** separated by “plus” symbol
- **Main elements** starting with each new line

S2000M Parser

With those patterns, we were ready to do the first transformation, from **plain text** to **plain XML**.

The transformation

```
CAS+CHG:N+CSN:75211008 007 +ISN:00F+IND:2+RFS:1+QNA:4+TQL:4+PNR:AS48408+MFC:U14C6+NSN:5306:999949284'
CBS+DFL:(SB PS1002-71-7001)'
CCS+ICY:6-'
CDS+ESC:1'
CES+CHG:N+SRV:BE+SMR:PAFZZ+RMQ:99999'
CJS+CHG:N+MOV:01'
```

```
<ccs>
    <icy>6-</icy>
</ccs>
<cds>
    <esc>1</esc>
</cds>
<ces chg="N">
    <srv>BE</srv><smr>PAFZZ</smr><rmq>99999</rmq>
</ces>
<cjs chg="N">
    <mov>01</mov>
</cjs>
```

what ?

S2000M Parser

Next step is to properly **nest** this information in order to obtain an XML file which really represents the relationship between elements.

The transformation

```

<cas chg="N">
  <csn>75211008 007</csn><isn>00F</isn>
  <ind>2</ind><rfs>1</rfs><qna>4</qna><tql>4</tql>
  <pnr>AS48408</pnr><mfc>U14C6</mfc><nsn>5306:999949284<nsn>
  <pbs>
    <dfi>(SB PS1002-71-7001)</dfi>
  </pbs>
  <ccs>
    <icy>6</icy>
  </ccs>
  <cds>
    <esc>1</esc>
  </cds>
  <ces chg="N">
    <srv>BE</srv><smr>PAFZZ</smr><rmq>99999</rmq>
    <cjs chg="N">
      <mov>01</mov>
    </cjs>
  </ces>
</cas>

```



This logic is applied all over the message

S2000M Parser

```
<?xml version="1.0"?>
<iph line="4">
```

```
<ipp>C9089750C</ipp>
<mtp>UPIPCO</mtp>
<iss>D1</iss>
<tod>C9089</tod>
<add>844BB</add>
<fid>S</fid>
<moi>TP</moi>
<drs>016</drs>
<drd>20180409</drd>
<lge>EN</lge>
<ips>HOT STRUTS COOLING</ips>
<mas chg="n" line="5">
```



```
<iai>Y</iai>
<can>SAPS1002717001</can>
</mas>
<mas chg="n" line="6">
<iai>Y</iai>
<can>SATP250290727001</can>
</mas>
<jas chg="r" line="7">
<csn>75211008 000 </csn>
<jbs chg="d" line="8">
<icn>TPA752110EC908920076A031</icn>
<jcs chg="n" line="9">
<can>SAPS1002717001</can>
</jcs>
<jcs chg="n" line="10">
<can>SATP250290727001</can>
</jcs>
</jbs>
```

The transformation

In the end, we get the desired **XML output** ready to be processed.

As especial remarks, we have considered **CHG** information as a property of each main element so we included it as an **attribute**.

In addition, we have included an extra **attribute**, named **"line"**, to keep the original **position of the element in the message**.

S2000M Parser

The validation process



First validation is against **schema definition**. We have created schemas for each type of message: **CORIPD**, **CSNIPD**, **UIIPCO** and **UIIPCT**



Second validation is against **stored data**. **Location and Part data information**, extracted from **AIMS**, is used to check **CAS** and **PAS** segments.



Third validation is against **BREX rules**. We have translated **Data Dictionary and others** document definitions into a set of rules about how to set each element.



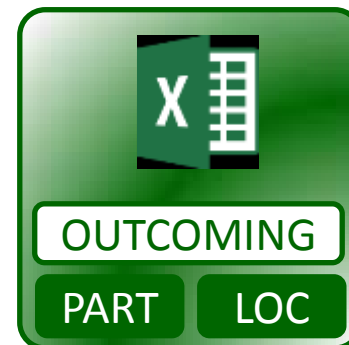
S2000M Parser

Check rules: BREX + DataBase

- S2000M Specification / Data Dictionary
- Potential OBS (experience)
- S1000D interfaces



- ① UPIP [Redacted]
- ② UPIP [Redacted]
- ③ CORI [Redacted]
- ④ CSNIPD [Redacted]



S1000D parser concept applied to the S2000M

S2000M Parser

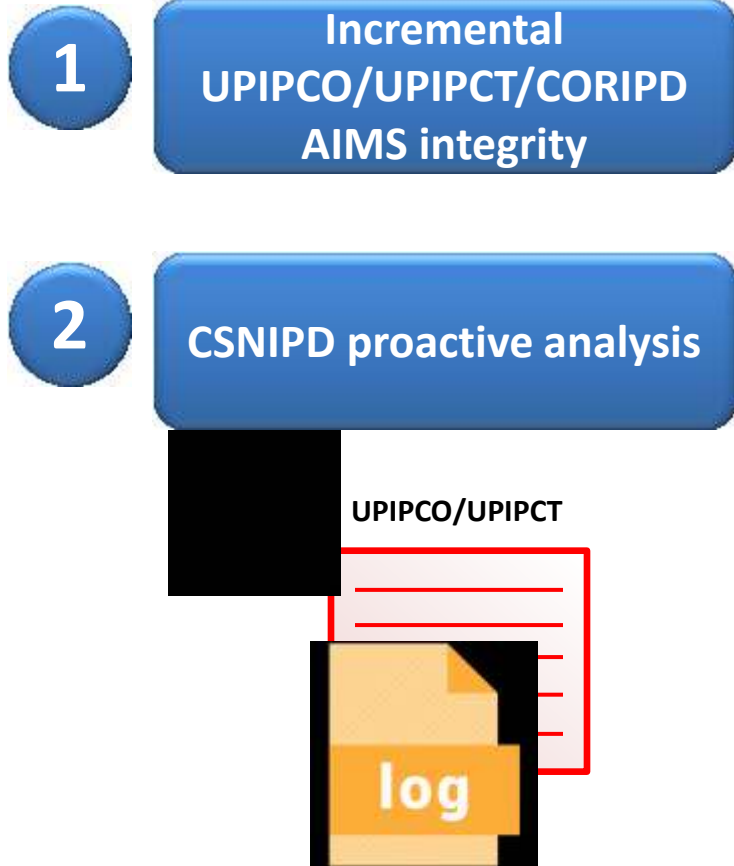
IPH	IPP	F02210017	MTP	UIPCO	DRS	005	IPS	PROPELLER ASSEMBLY
VAS	NEW	SID	F0221FH396000007					
	NEW	SID	F0221FH395000006					
	NEW	SID	F0221FH396000006					
	DEL	SID	F0221FH395000002					
	DEL	SID	F0221FH396000002					

figure 252361A3

ITEM	ISN	PNR	MFC	DFP	IND	RFS	QNA	TQL	DFL
252361A3 000	05A	90002-072-202A	29780	ARMREST,AIRCRAFT	1	1	REF	REF	INCOMPLETE BREAKDOWN/ARMREST ASSY, RH
252361A3 035	05A	90002-074-202A	29780	ARMREST,AIRCRAFT	2	1	1	1	ARMCAP ASSEMBLY, RH
252361A3 060	05A	90002-073-202A	29780	ARMREST,AIRCRAFT	2	1	1	1	ARMBOX ASSEMBLY, RH
252361A3 085	05A	90002-073-2A	29780	ARMREST,AIRCRAFT	3	1	1	1	ARMBOX, RH
252361A3 000	00A	90002-072-201A	29780	ARMREST,AIRCRAFT	1	1	REF	REF	INCOMPLETE BREAKDOWN/ARMREST ASSEMBLY, LH
252361A3 035	00A	90002-074-201A	29780	ARMREST,AIRCRAFT	2	1	1	1	ARMCAP ASSEMBLY, LH
252361A3 060	00A	90002-073-201A	29780	ARMREST,AIRCRAFT	2	1	1	1	ARMBOX ASSY, LH
252361A3 085	00A	90002-073-1A	29780	ARMREST,AIRCRAFT	3	1	1	1	ARMBOX, LH
252361A3 090	00A	9688K251	39428	ARMREST,AIRCRAFT	2	1	2	2	
252361A3 000	00F			ARMREST,AIRCRAFT					
252361A3 035	00F			ARMREST,AIRCRAFT					
252361A3 060	00F			ARMREST,AIRCRAFT					
252361A3 085	00F			ARMREST,AIRCRAFT					

Meaning	
Green	New content
Orange	Updated
Red	Deleted

S2000M Parser



S2000M Parser



S1000D: Select this option for DM, DMRL, PM, DDN and CGM

Analysis

S2000M: Select this option for TXT messages

Input Analysis **Output Analysis**

BREX S2000M: 2019-05-17

File Management **Upload Files** IE users only Open with explorer

Select Brex File **S2000M**

Analysis options | **IPPN Analysis** **Generate**

i Please, load files to start parsing. Follow the requirements

- S2000M Specification Analysis Selected
- Only files of this type could be uploaded
- ZIP or single files can be uploaded, but not both types of files together

1

Incremental UIPCO/UPIPCT/CORIPD AIMS integrity

2

CSNIPD proactive analysis

S2000M Parser

ATA Spec2000

CAM

P1DISUPD/SPL AAAAA/ACC 12345678/

CHG N/PCC P01/CCC CA1/DPC 1500/DED 010197

P1DISUPD/SPL AAAAA/ACC 12345678/

CHG N/PCC P02/CCC CA1/DPC 500/DED 010197

P1DISUPD/SPL AAAAA/ACC 12345678/

CHG N/PCC P03/CCC CA1/DPC 1000/DED 010197

CAM

P1UPDATE/SPL 88277/

CHG R/MFR 88277/PNR 85-501/

CHG D/MFR 88277/PNR 95-501/

S1REJECT//88277/2199/INVALID FORMAT/

P1UPDATE/SPL 88277/

CHG D/MFR 88277

S1REJECT//88277/2105/UNKNOWN TEI MRF/

P1UPDATE/SPL 88277/

CHG D/MRF 88277/PNR 75-1

S2000M Parser

```

<content>
  <ipc>
    <ipp ippn="0117B2492" ips="ELECTRICAL ROUTING" fid="s" lge="en">...</ipp>
    <csn csn="24924301 090 " ind="2" item="000 ">
      <isn isn="00A">
        <rfs value="1"/>
        <qna>REF</qna>
        <mfc>FAPE3</mfc>
        <pnr>ABS0114T6-10</pnr>
        <pas>
          <dfp>BOLT,CLOSE TOLERANCE</dfp>
          <uoi>EA</uoi>
          <str>0</str>
          <psc>U</psc>
        </pas>
        <nsn nsn="5306145729837"/>
        <cbs>
          <nil -></nil>
    
```

S1000D



S2000M

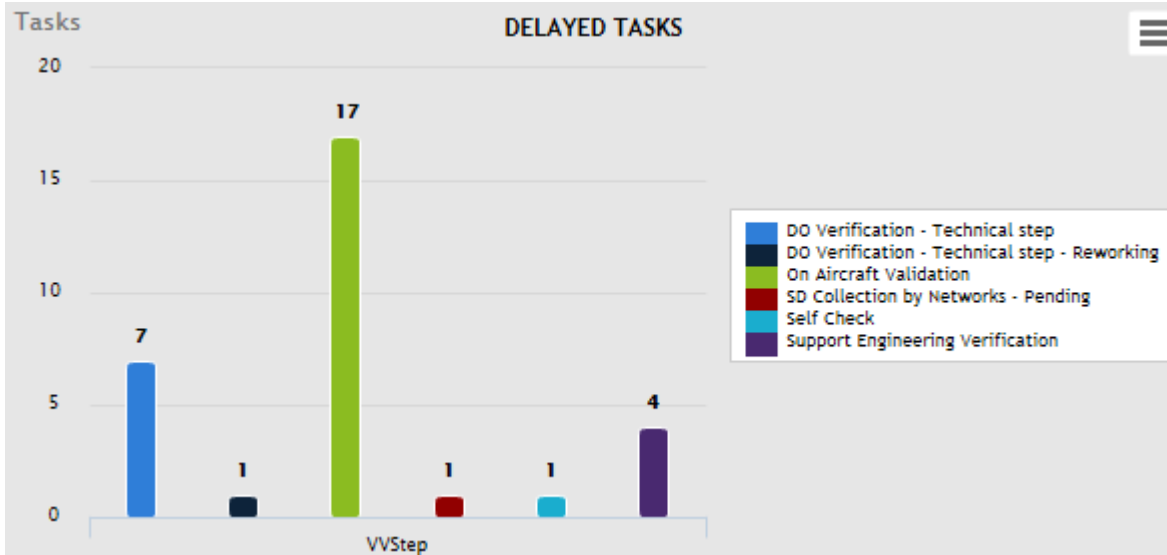
PAS+CHG:N+PNR:ABS0114T6-10+MFC:FAPE3+DFP:BOLT,CLOSE TOLERANCE+INC:27851+NSN:5306:145729837+RNC:1+RVN:2'
 PBS+UOI:EA+SPQ:1+TOP:06+ITY:BD+SPC:1+PLT:2+STR:0+SLC:0+PLC:Z+PCD:AB'
 PDS+UPR:69160+CUN:EUR+MSQ:1'
 PFS+PSC:U'

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In-service product integrity / LSA



In-service product integrity / LSA

IPL – S2000M

MOI	IPPN	PNR	MFC	INC	DFP	NSN	RNC	RNV	RNJ	UOI	SPQ	TOP	ITY	SPC	PLT	STR	SLC	PLC	PCD	UOM	QUT	UPR	CUR	MSQ
AJ	NCAGE 4381	PNR	NCAGE	03570	WPU-1	5831 332114645	5	2		EA 1	06	LR	1	3	0	Q	Z	AB			4557.53	EUR	1	
AJ	NCAGE 4381	PNR	NCAGE	03570	WPU-1	5831 332114645	5	2		EA 1	06	LR	1	3	0	Q	Z	AB			4557.53	EUR	1	

IPL → SLC: Q (36 months, non extendable)



Misalignmet between IPL and EQM



EQM → Storage life: 10 years, extendable

EQM – S1000D

DMC A.I.A. 43-81-18-00AAA-BR0A-D

DM STATUS INFORMATION

NCAGE - For P/N : NNNNNNNN

WPU (Wireless Portable Unit) - Life data of item when in storage

1. General

The life data of the Wireless Portable Unit (WPU) when in storage is 10 years.
If the storage time is more than 10 years the WPU can become damaged, send it to the manufacturer.

In-service product integrity / LSA

ESD (ELECTROSTATIC SENSITIVE DEVICE)

WARNING: OBEY THESE PRECAUTIONS TO PREVENT ELECTROSTATIC DISCHARGE (ESD) DAMAGE TO THE COMPONENTS:

- STAY ON A CONDUCTIVE SURFACE THAT IS ELECTRICALLY GROUNDED.
- USE A CONDUCTIVE WRIST-STRAP THAT IS ELECTRICALLY GROUNDED (CONNECTED TO A BONDING POINT NEAR THE WORK AREA).
- BEFORE YOU USE THE TOOLS, MOMENTARILY HOLD THEM AGAINST AN ELECTRICAL GROUND TO RELEASE STATIC ELECTRICITY.

WUU (WEIGHT OF UNPACKAGED UNIT) – Note / Indication in maintenance

SLC (SHELF LIFE CODE), IF EXTENDABLE → SHELF LIFE EXTENSION PROCEDURE REQUIRED

CMK (CALIBRATION MARKER) → ITE



C. **Scheduled Inspection**

Not applicable

D. **Calibration**

Refer to the commercial handbook [AJ-844BB-28H09-01](#).

E. **Corrective Maintenance**

Not applicable



In-service product integrity / LSA

- *De-briefing...*

- Operators need our IN-SERVICE **SUPPORT** for maintenance operations and any related data involved.
- LOGISTIC SUPPORT **ANALYSIS** considering all changes involved in maintenance & logistic information.

1. DESIGN

2. BUILD

3. MAINTAIN



Thank you

for your attention!

Questions?

AIRBUS

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