PLCS for data sharing between French MoD and Industry

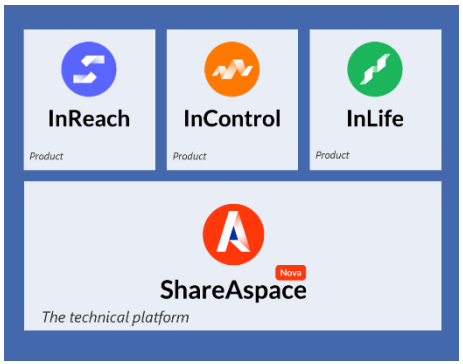
Initial and In-Service Support data

A French lead MoD initiative developed with two industrial partners

Christian GIRAUD
Consultant – **Eurostep** France
Christian.giraud@eurostep.com

Alexandre TOUCHOT
Product Manager – **LGM** Group
Alexandre.touchot@lgm.fr

PLCS platform



Application software

French MoD Organization

DGA

- Modernisation and Quality (SMQ)
- Operations Directorate (DO)
  - UM AERO
  - UM TER
  - UM NAV
  - SMCO
- Technical Directorate (DT)
- Information systems
- Partners Area Team

DTE — Documentation Technique Électronique

EMA

- EMA/MCO
- Air Force — EMAA
- Army — EMAT
- Navy — EMM

- DMAé — Air systems Support
- SIMMT — Land systems Support
- SSF — Sea systems Support
- DIRISI — Information systems Support

1. Needs of standards for ILS/ISS

2. ISS data for Land systems Support

3. Initial support data : Implementation of S3000L

4. Initial and ISS data for other systems Support

5. Prospects

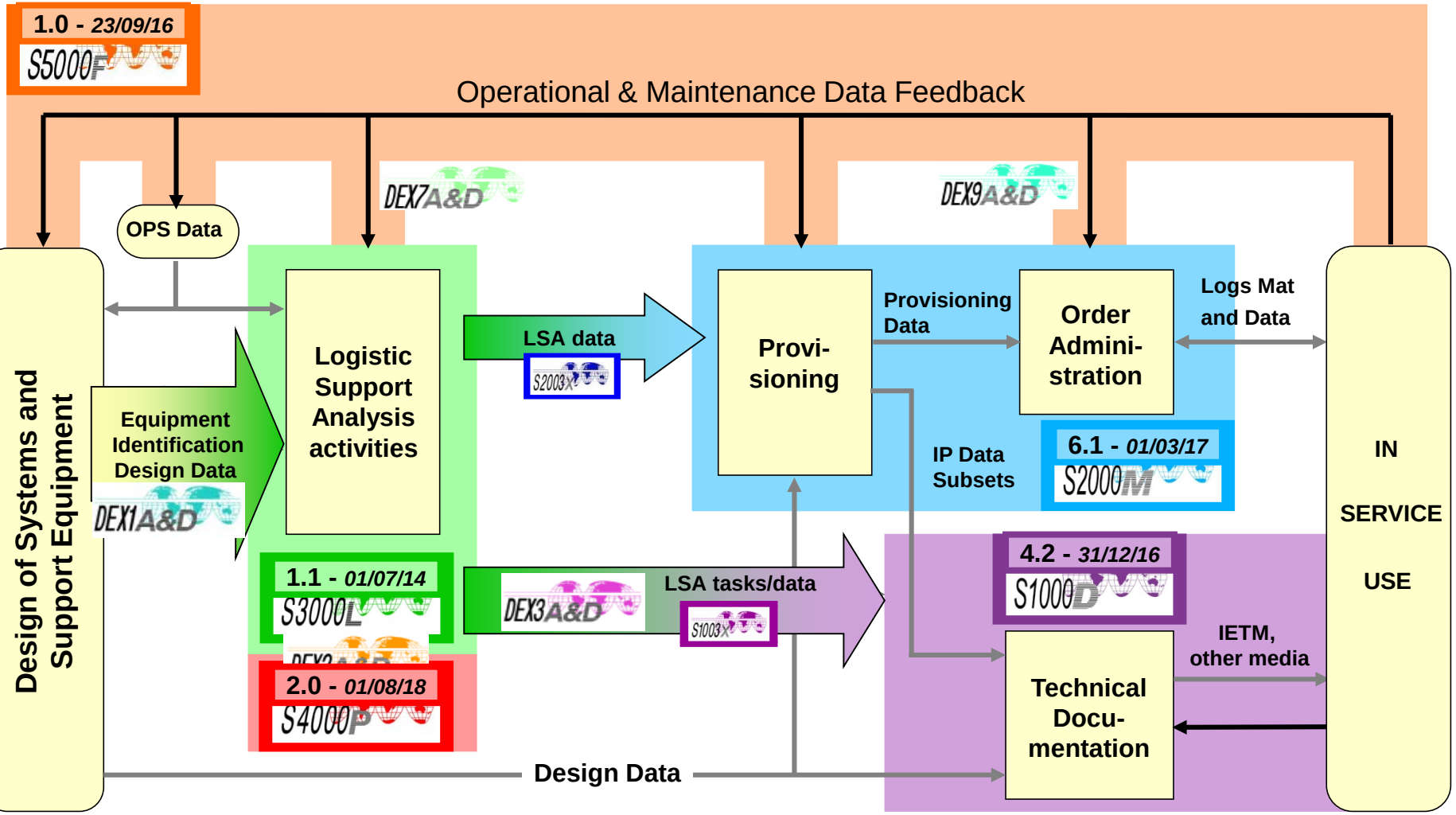
ILS process : Suite of ILS specifications

ASD : AeroSpace and Defence industries association of Europe
AIA : Aerospace Industries Association of America
ATA : Air Transport Association of America

1.1 - *15/07/16* SX000i

SX001G 1.1 - *01/08/15*

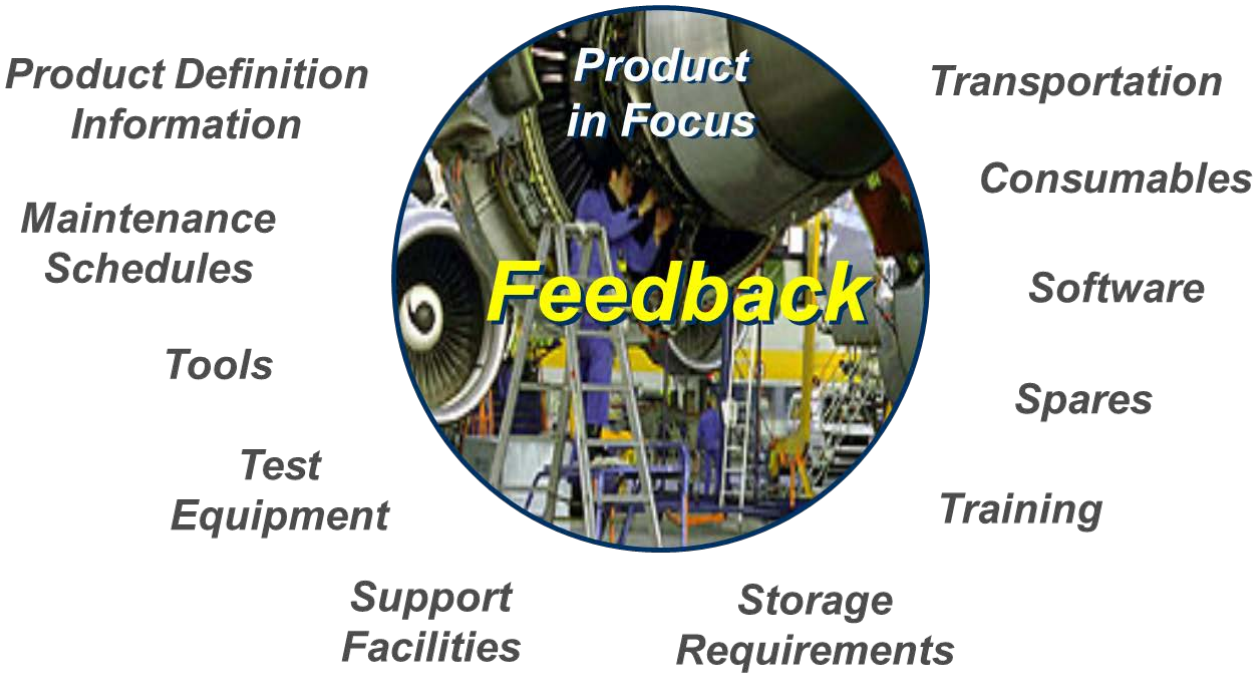
SX002D 1.1 - *01/08/15*



Acquisition Logistics Management in NATO

The key business target :

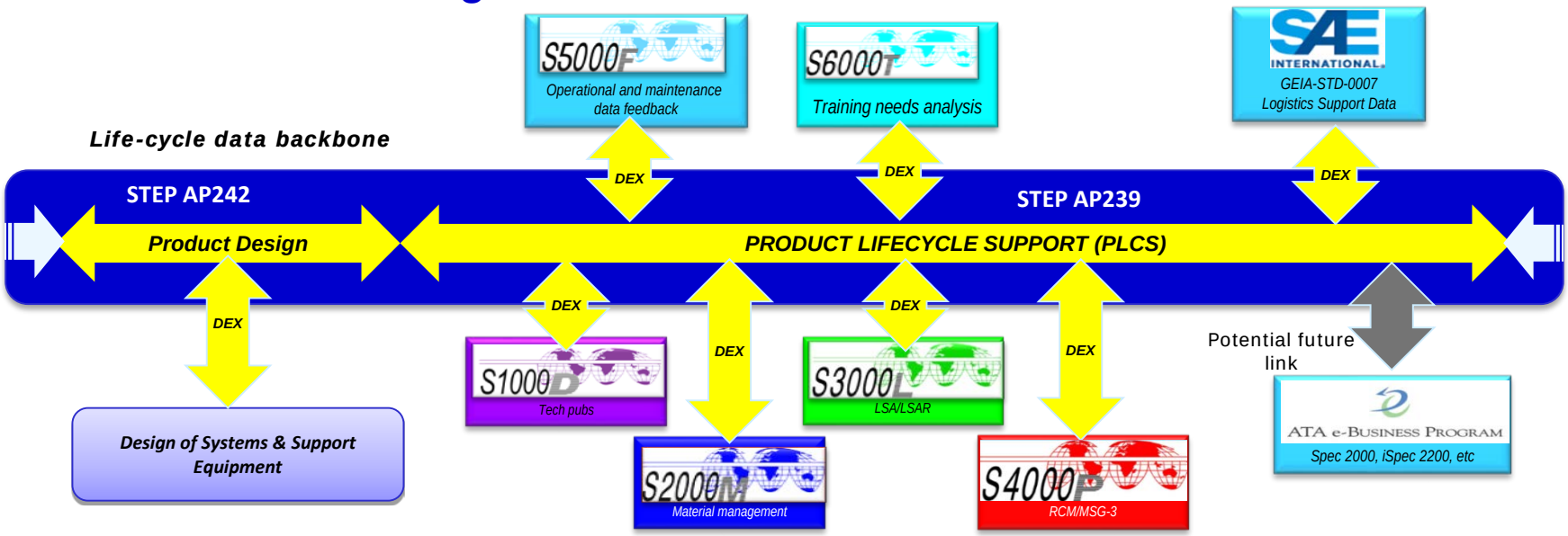
How to keep the information needed to operate and maintain a product aligned with the changing product over its life cycle in a heterogeneous organization, process and system environment?



PLCS and ILS specifications

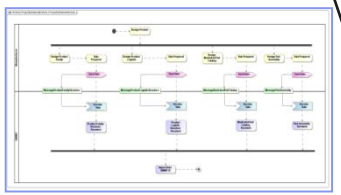
- **PLCS Ed.3 (2020) [launched from White Paper elaborated in *october 2015*]**
  - Convergence between ISO 10303-**242** for the design, and ISO 10303-**239** for In-Service Support
  - Mapping of **S-Series** specifications toward **PLCS**, which will assure data interoperability in ILS specifications

- **A set of DEXs to support data exchanges : Each acts as both contractual and technical frame agreement**

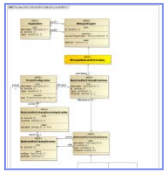


The process to elaborate a DEX

1 Specification of the data exchange messages



2 Specify the Business Model



Customer

Iterations

Expert

3 Translate in PLCS

4 Creat the business templates

5 Create the RDL

6 Generate the publication (HTML)

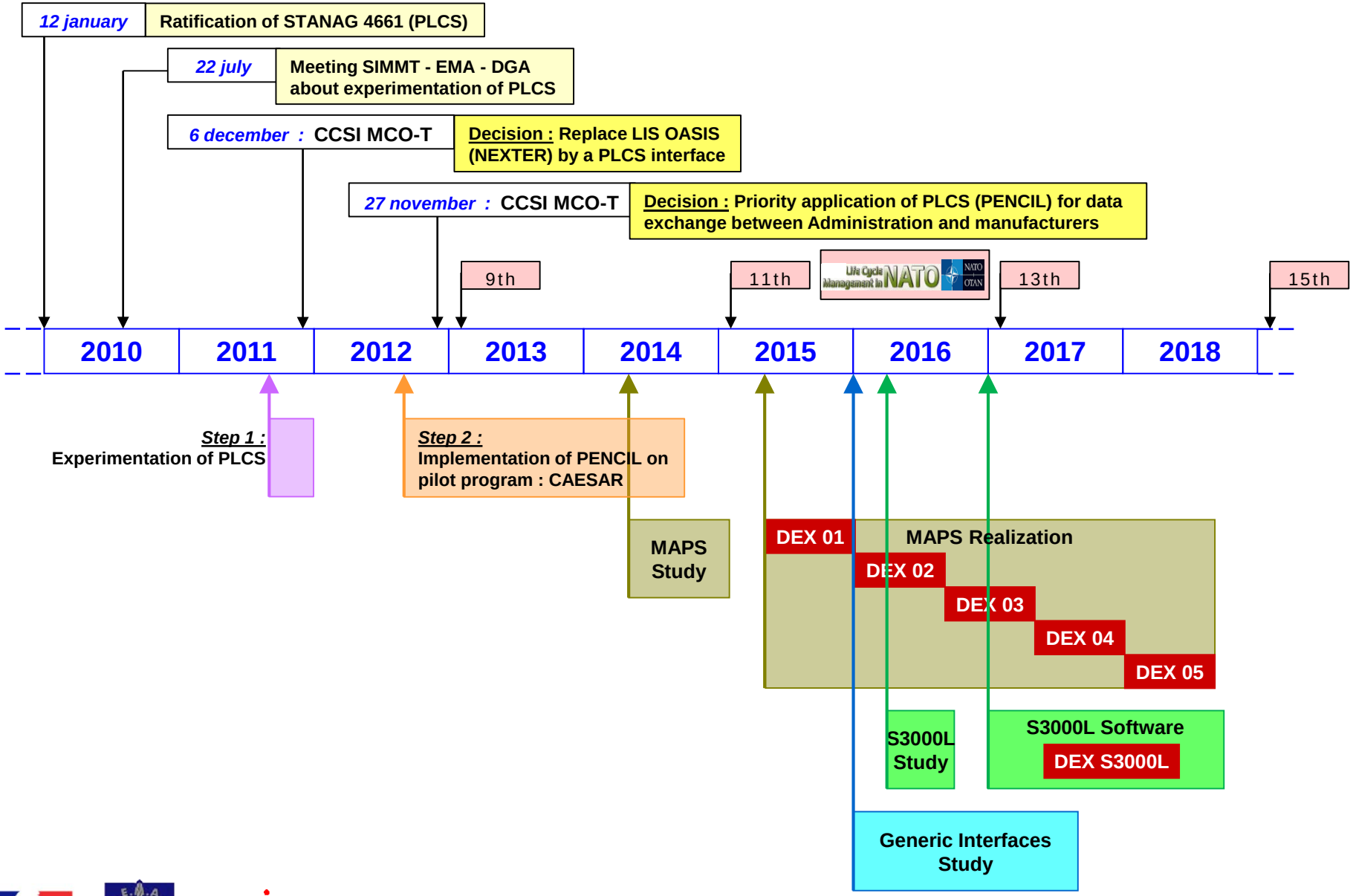
X Specification

X Implementation

SysML Modeler

Editeur OWL

Usage of standards in French MoD



1. Needs of standards for ILS/ISS

2. ISS data for Land systems Support

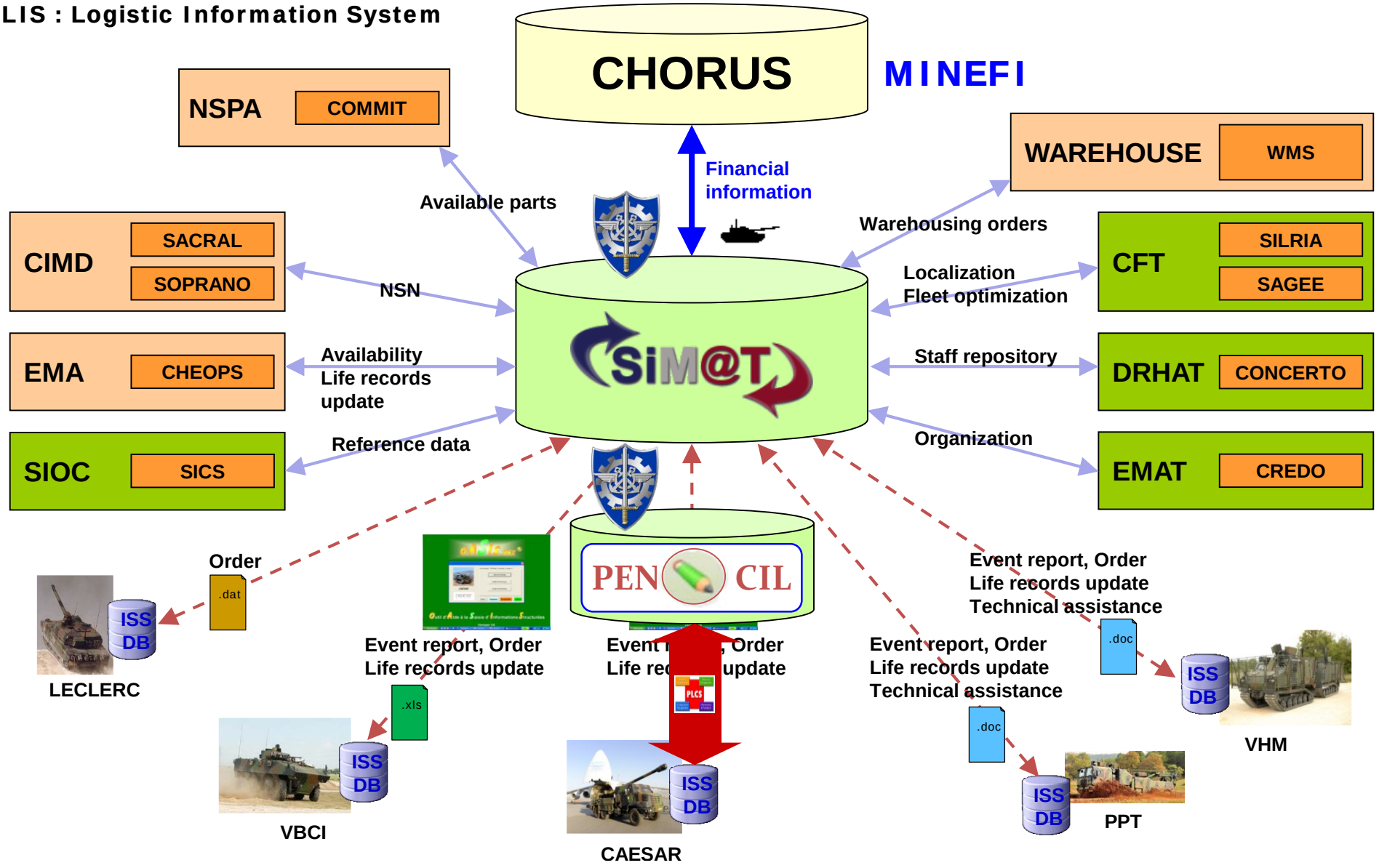
3. Initial support data : Implementation of S3000L

4. Initial and ISS data for other systems Support

5. Prospects

SIM@T : The LIS for Land systems Support

LIS : Logistic Information System



PENCIL : Plateforme d'Echange Normalisée et Centralisée d'Information Logistique

MAPS Project (1 / 2)

MAPS : Marchés avec Achat de Prestations de Soutien

DEX	Title of the DEX & Associated Business EDI Process	Eligible programs
DEX 01	**LogisticBreakdownAsMaintained** • Delivery by the contractor of the applicable configuration • Transfer of the applicable configuration to a service provider	
DEX 02	**DeliveryAndStocks** • Report government stocks initialization to SIMMT • Resource acquisition on behalf of SIMMT • Notification to SIMMT of change of state of an item in stock • Update government stock upon SIMMT request • Exceptional check of an asset out of a government stock • Distribution from SIMMT to contractor • Distribution from contractor to SIMMT	PPB
DEX 03	**Inventory** • Inventory request by SIMMT • Inventory cancellation by SIMMT	FELIN
DEX 04	**InServiceProductFollowUp** • Request by SIMMT of an update on the InService Product Structure • Delivery by the service provider of the InService Product Structure • Transfer by SIMMT of an update on the InService Product Structure • Delivery by SIMMT of an update on the InService Product Structure	VBCI, CAESAR, RTD, COHORTE **SCORPION :** JAGUAR GRIFFON SERVAL
DEX 05	**MaintenanceByServiceProvider** • Event report by SIMMT to partner	

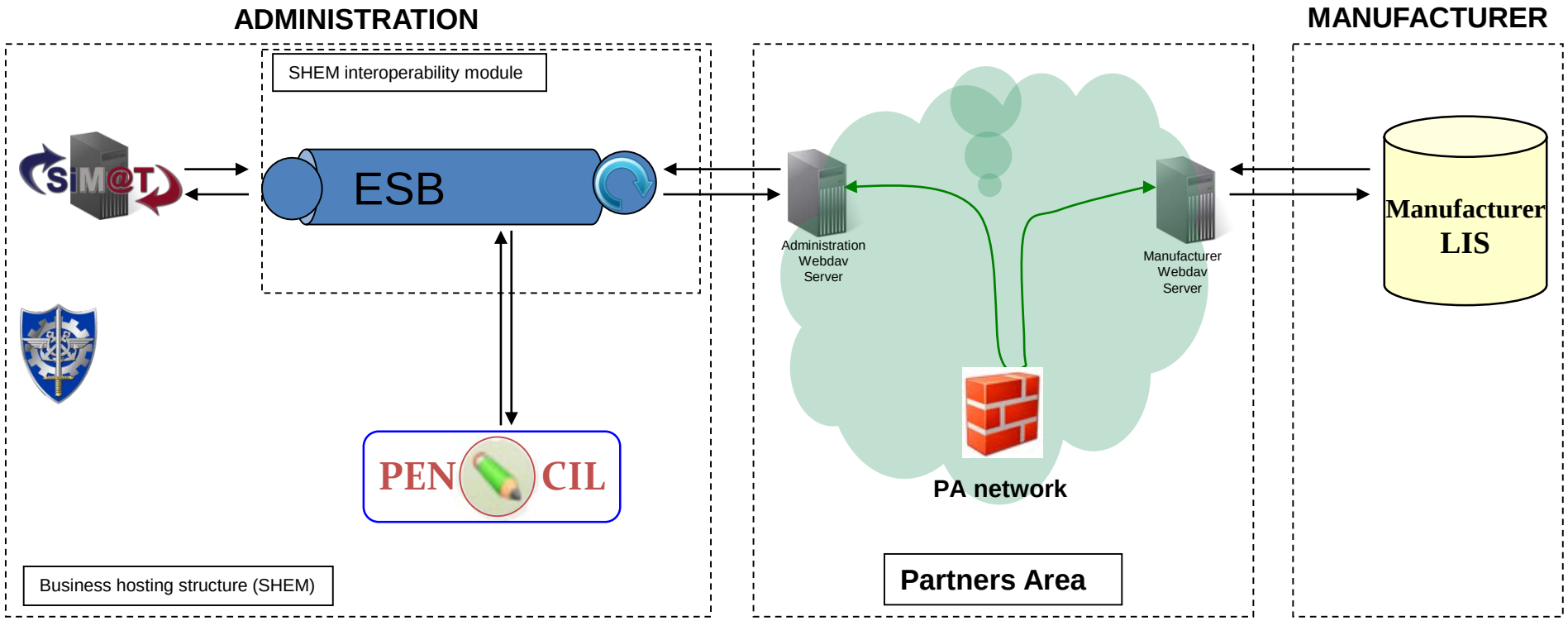
Example of DEXs, Business EDI process, messages and workflow

DEX	Business EDI Process	Message N°	Message Title	OEM	SIMMT
DEX 01	Delivery by the contractor of the applicable configuration	1	MessageLogisticBreakdownAsMaintainedNew	→	
		1b	MessageLogisticBreakdownAsMaintainedUpdate	→	
		2	MessageLogisticBreakdownAsMaintainedApproval	←	←
DEX 05	Event report by SIMMT to partner	1	MessageEventReportInit	←	←
		2	MessageEventReportAnalysis	→	
		3	MessageEventReportAnalysisApproval	←	←
		4	MessageEventReportWorkDoneReport	→	
		5	MessageEventReportWorkDoneReceipt	→	
		6	MessageWorkDoneApproval	←	←

Specification of data exchange in contracts

- Usage of Logistic Description of Markets (LDM)
- Usage of the Handbook MAPS

Network architecture



1. Needs of standards for ILS/ISS

2. ISS data for Land systems Support

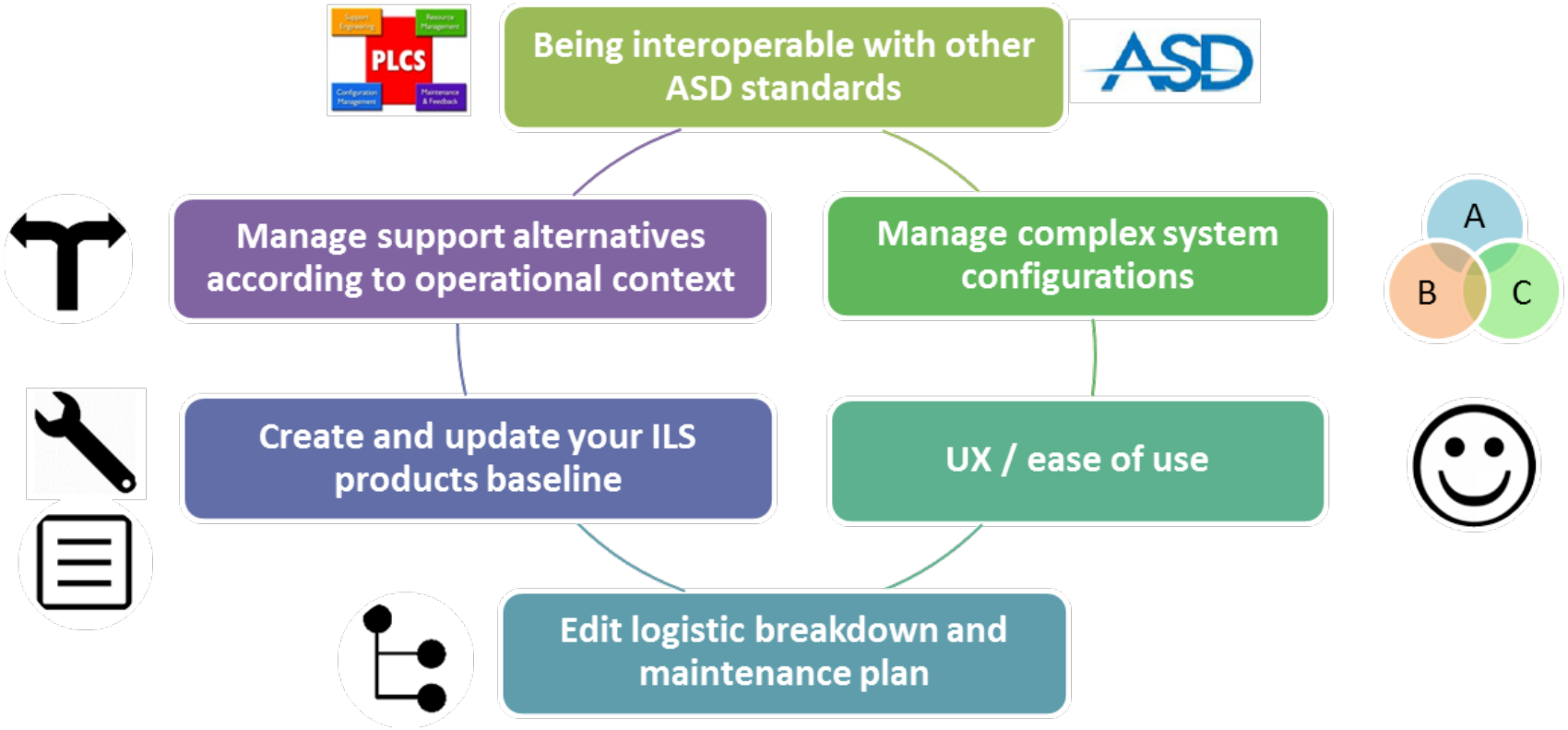
3. Initial support data : Implementation of S3000L

4. Initial and ISS data for other systems Support

5. Prospects

Development goals

Core needs of LSA technical experts

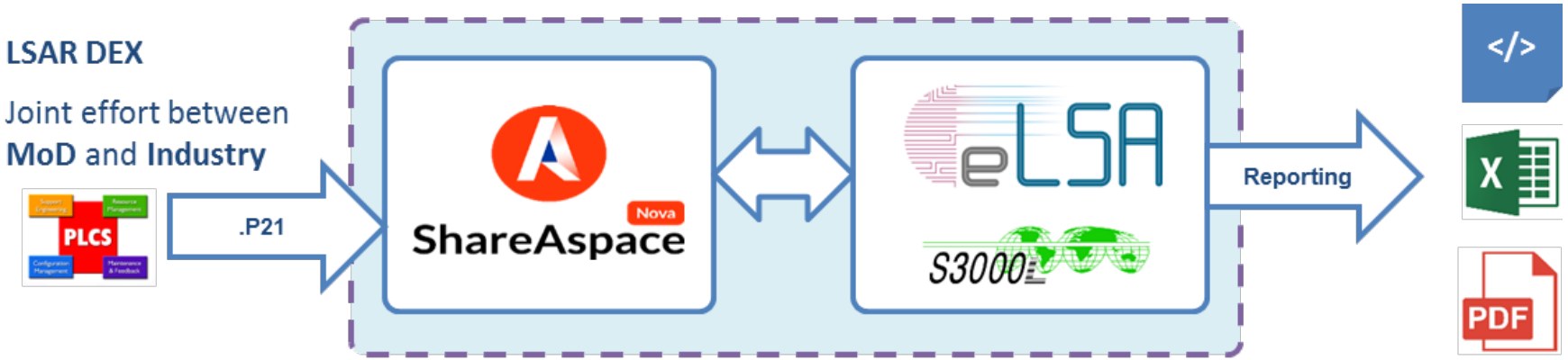


Be non-product & non-contract specific

eLSA software architecture

A proven PLCS platform furthermore integrated in the MAPS contracts flow since its origin

A specialist initiative to meet S3000L recording requirements



- Data Exchange Packaging
- Version and Configuration management
- Data Fusion & Consistency checking
- Track history
- Syntax control of data import

- High level Business Rules enforcement
- Data validation workflow
- User comments management
- Technical reports
- Custom reports

Supported LSA Business process

With eLSA, LSA analysts are guided through the production and review process

Features summary

eLSA is a building tool of support systems AND a decision making enabler for the end-user

Multi-program management	Customization of data dictionnary	Support concept definition	Parts design and support data editing
Analysis activities follow-up	Trace maintenance plan justification	Trace task requirements	Maintenance procedure workbench
Editing of maintenance plan	Applicability management	Remarks management	Standard and custom technical reports

Better conduct of product design impact on maintenance
Assess design variants and view immediately impact on logistic footprint

Reporting capabilities, support KPIs

Provides both standardized and customized reports throughout the life cycle phases, either to industry partners or users organizations

- ❑ Logistics breakdown
- ❑ Summary of LSA analysis performed
- ❑ Support resources : personnel, tools, spare parts, facilities
- ❑ Maintenance plan according to operational scenarii
- ❑ Maintenance workloads

BEI	REV	DESIGNATION	TYPE	QTY	ESSENTIALIT	SIGNIFICANT	INDIC. STUCT	REMPL.	REPARE	TYPE
AERO-00	R01	AERONEF	HW	1	1	MS	SSI	R	N	EQ
21	R01	Air Conditioning	HW	1	1	MS	SSI	R	N	EQ
21-0	R01	Général AC	HW	1	2	MS	SSI	R	N	EQ
21-20	R01	Distribution AC	HW	1	2	MS	SSI	R	N	EQ
21-30	R01	Pressurization Control	HW	1	2	MS	SSI	R	N	EQ
21-40	R01	Heating	HW	1	2	MS	SSI	R	N	EQ
21-50	R01	Air Cooling	HW	1	2	MS	SSI	R	N	EQ
23	R01	Communications	HW	1	1	MS	SSI	R	N	EQ
23-0	R01	Général COM	HW	1	2	MS	SSI	R	N	EQ
23-11	R01	HF System	HW	1	2	MS	SSI	R	N	EQ
23-12	R01	VHF System	HW	1	2	MS	SSI	R	N	EQ
23-20	R01	Data Transmission	HW	1	2	MS	SSI	R	N	EQ
23-28	R01	Satellite Communication	HW	1	2	MS	SSI	R	N	EQ
24	R01	Electrical Power	HW	1	1	MS	SSI	R	N	EQ
24-0	R01	Général ELEC	HW	1	2	MS	SSI	R	N	EQ
24-22	R01	AC Main Generation	HW	1	2	MS	SSI	R	N	EQ
24-32	R01	DC Main Generation	HW	1	2	MS	SSI	R	N	EQ
24-38	R01	Battery Generation	HW	1	2	MS	SSI	R	N	EQ
24-40	R01	External Power	HW	1	2	MS	SSI	R	N	EQ
27	R01	Flight Controls	HW	1	1	MS	SSI	R	N	EQ
27-00-00	R01	Général FC	HW	1	2	MS	SSI	R	N	EQ
27 11 00	R01	Aileron tab control system	HW	1	2	MS	SSI	R	N	EQ

Sample logistic breakdown

Sample GANT view of maintenance task conduct

eLSA

- 2 prominents early adopter on industry side (June 2018 – Airbus DS) and user-side (July 2018 – SIMMT, French MoD)
- Today baseline V1 fully covers all needs of SCORPION program
- Baseline V1 also fully covers all needs of SYRACUSE IV
- Expansion plan foresee :
  - ✓ To adress interoperability with other ASD S-Series specifications
  - ✓ To remain systematically compatible of developing trends in fleet and assets value management

Two implementations of S3000L

- ***« S3000L light »*** : LSA methodology according to S3000L and LSA Data Base according to 1388-2B
- ***« full S3000L »*** : LSA methodology and LSA Data Base according to S3000L

Program	Manufacturer(s)	UM	*« S3000L light »*	*« full S3000L »*
SYRACUSE IV	Airbus Defence & Space Thales Alenia Space	ESIO		**X**
ASMPA-R	MBDA	HORUS		**X**
SDT	Safran Electronics & Defense	AMS		**X**
FTI	DCNS	NAV	**X**	
MMP	MBDA	HMI	**X**	
JAGUAR GRIFFON	Nexter Systems Arquus Defense Thales Communications & Security	TER		**X**
SERVAL	Nexter Systems Texelis			**X**

1. Needs of standards for ILS/ISS

2. ISS data for Land systems Support

3. Initial support data : Implementation of S3000L

4. Initial and ISS data for other systems Support

5. Prospects

Elements of context

- Interoperability problems
- Need to rationalize and improve data exchange

Decision to launch a strategic study about the opportunity to develop automated, shared and generic interfaces

- To control technical and logistic information (reliability, integrity, fluidity)
- Learning lessons from Land systems Support
- Relying on a study focused on Rafale support IS

Study's steps

- ***Step 1 - Elaboration of a cartography*** representing the different IS
- ***Step 2 - Business data exchange requirements collection*** to define the data flows content and characteristics
- ***Step 3 - Analysis of data exchange requirements coverage*** by the use of the appropriate standards
- ***Step 4 - Proposal of recommendations and an associated roadmap***

Step 2 and Step 3 : Use cases

Fleet monitoring IS ⇔ Gov. LIS

1. Managing ageing calculation
2. Ageing calculation
3. Inertial units follow-up/ Structural damages/ Vibratory intensity analysis
4. Engine buckets distribution
5. Technical events
6. Technical intervention
7. Procurement agency loop
8. Aircraft use form & rough flight data
9. Aircraft release check
10. Managing electronic boards

Manufacturer LIS ⇔ Gov. LIS

CROSS-FUNCTIONAL

1. Service request
2. Hardware move — DEX 02

SUPPLY

3. Supply request — DEX 02

GOVERNMENTAL STOCK

4. Governmental stock — DEX 02
5. Inventory — DEX 03

FEEDBACK

9. Feedback

MAINTENANCE

6. Technical intervention
7. Visit form
8. Equipment registering form

REPOSITORY

10. IPL (Initialization)
11. IPL (Sharing)
12. Applicable technical configuration
13. Applicable breakdown structure — DEX 01
14. Applicable document — DEX 01
15. Applied breakdown structure

S1000D S2000M S3000L S5000F PLCS

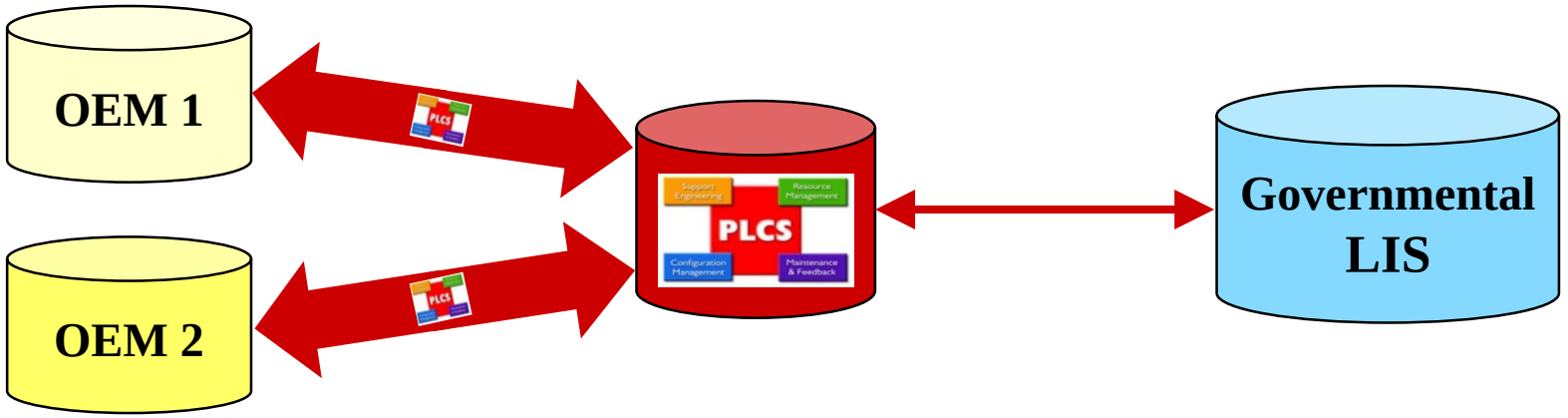
DEX 01 Applicable configuration

DEX 02 Supply and warehousing

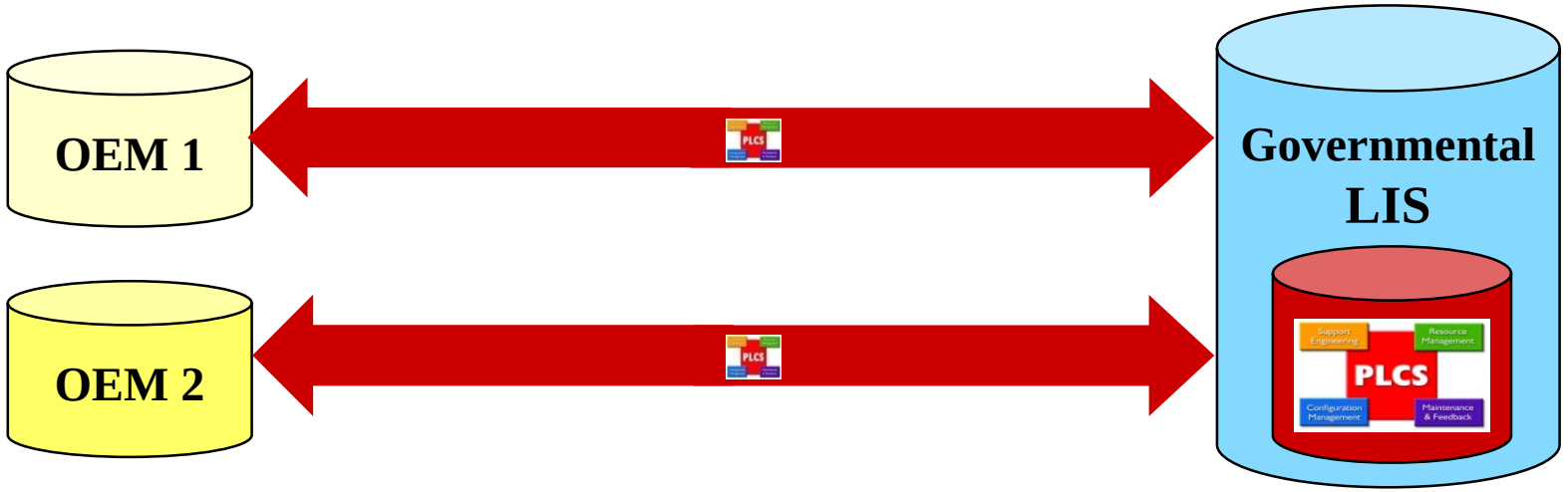
DEX 03 Inventory

Step 4 : Proposal about architecture

- **Case 1 : A Governmental LIS pre-exists → A pivot Hub in PLCS**



- **Case 2 : There is no pre-existing Governmental LIS → Native PLCS core**



The persistent PLCS hub as a SOA platform for ILS/ISS

S1000D | S2000M | S3000L | S5000F

Tech Pub | Mat. mgt | LSA | inService

Engineering PDM

ERP

Refer. Data Legacy data

.....

Upstream applications

COLLABORATION SERVICES

- Collaboration process/orchestration
- Monitoring/Event management
- Secure access & IP protection
- Digital Thread

BASIC DATA SERVICES

- Version and Configuration management
- Data Fusion & Consistancy checking
- Syntactic control of data import

Reports

LOTAR

MRO

.....

External applications Downstream/Upstream

Open modular architecture, Technology & System independent, Extended Enterprise, clear separation information/process, based on standards and explicit governance

eLSA

Leverage acquired know-how to extend the PLCS data hub vision

New business features	• Provisionning solution integration (TEDI) • Life-Cycle Cost Model • Availaibility Model
Interoperability	• Multi-LSA standard support : MIL-STD-1388 2B, DEF STAN 00-60, GEIA-0007
Productivity	• Mass import from Excel • Multi-organization breakdown management • Shared object library

On web client side, enhanced capabilities for reporting and simulation of support system performance

1. Needs of standards for ILS/ISS

2. ISS data for Land systems Support

3. Initial support data : Implementation of S3000L

4. Initial and ISS data for other systems Support

5. Prospects

SIM@T interfaces in the future

CHORUS

MINEFI

NSPA — COMMIT

Financial information

WAREHOUSE — WMS

Available parts

Warehousing orders

CIMD — SACRAL, SOPRANO

NSN

Localization
Fleet optimization

CFT — SILRIA, SAGEE

SiM@T

EMA — CHEOPS

Availability
Life records update

Staff repository

DRHAT — CONCERTO

SIOC — SICS

Reference data

Organization

EMAT — CREDO

PENCIL

DEX 01 | DEX 02 | DEX 03 | DEX 04 | DEX 05

S3000L

eLSA

DEX S3000L

PME Portal

ISS DB

ISS DB

ISS DB

ISS DB

ILS DB

JAGUAR - GRIFON

VBCI

CAESAR

LECLERC

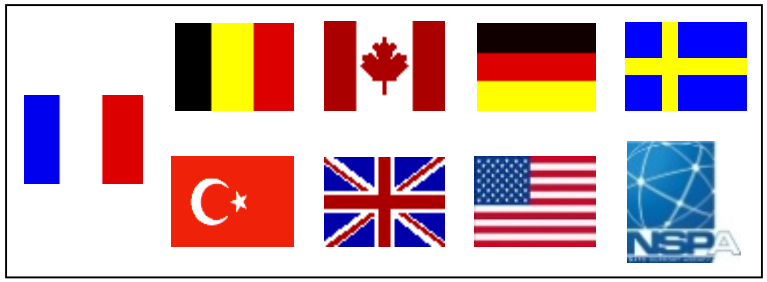
nexter

THALES

ARQUUS

AC/327 - LNA on Data EXchanges

- Participation : Administrations and companies specialised in Standards
- Two meetings per year :
  - ✓ Meeting n°1 : *15th & 16th September 2016*
  - ✓ Meeting n°6 : *5th & 6th February 2019*



Publication of DEX S3000L on :

- PLCSlib web portal
- ASD web portal to initiate the mapping of S-Series specifications toward PLCS