S1000D User Forum 2010

September 27-30, 2010, Aerostar hotel, Moscow, Russia

Track1: ILS implementation and experience

S3000L - Overview

by

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(on behalf of the S3000L European chair Peter Eichmueller)

ASD AeroSpace and Defence Industries Association of Europe

AIA AEROSPACE INDUSTRIES ASSOCIATION

Content

- **Introduction**
  Logistic Support Analysis (LSA) in the context of Integrated Logistic Support (ILS)
- S3000L - **Project progress** until today
- S3000L - **Overall content**
- S3000L - Some aspects from **selected chapters**
- S3000L/S1003X - Overview of **data model** and **data exchange**
- **SUMMARY**

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Significance of logistic support

Feedback from customer

(original German citation from KG UKdoLw)
„Wegen des hohen Anstiegs der Materialerhaltungskosten müssen heute logistische Forderungen bezüglich Zuverlässigkeit, Wartbarkeit, Prüfbarkeit und Betriebskosten **gleichwertig** neben den operationellen, technischen und wirtschaftlichen Forderungen stehen“.

„Because of the dramatic increase of support costs we have to consider the **logistic requirements** for reliability, maintainability and in service costs in the same way and **on the same level** as the **operational, technical and economical** requirements“.

LSA - Logistic Support Analysis

Definition

Logistic Support Analysis (LSA) is an extended **process** to analyze carefully all elements of a complex technical system to guarantee optimal logistic support during the in service phase.

During an LSA process **three main working aims** can be identified:

- **Influence on design** to optimize the technical system for proper logistic support
- **Optimization** of the logistic resources (personnel, support equipment, materiel, facilities, software support, training, etc.)
- Establishment of the **basic information** for the subordinated logistic disciplines, which create the logistic end products

LSA is not to be considered an own logistic discipline
(eg like technical documentation, material support or training)

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ILS - Integrated Logistic Support

Definition / position of LSA process

Integrated Logistic Support (ILS) is a **management method** to integrate and manage the elements of logistic support

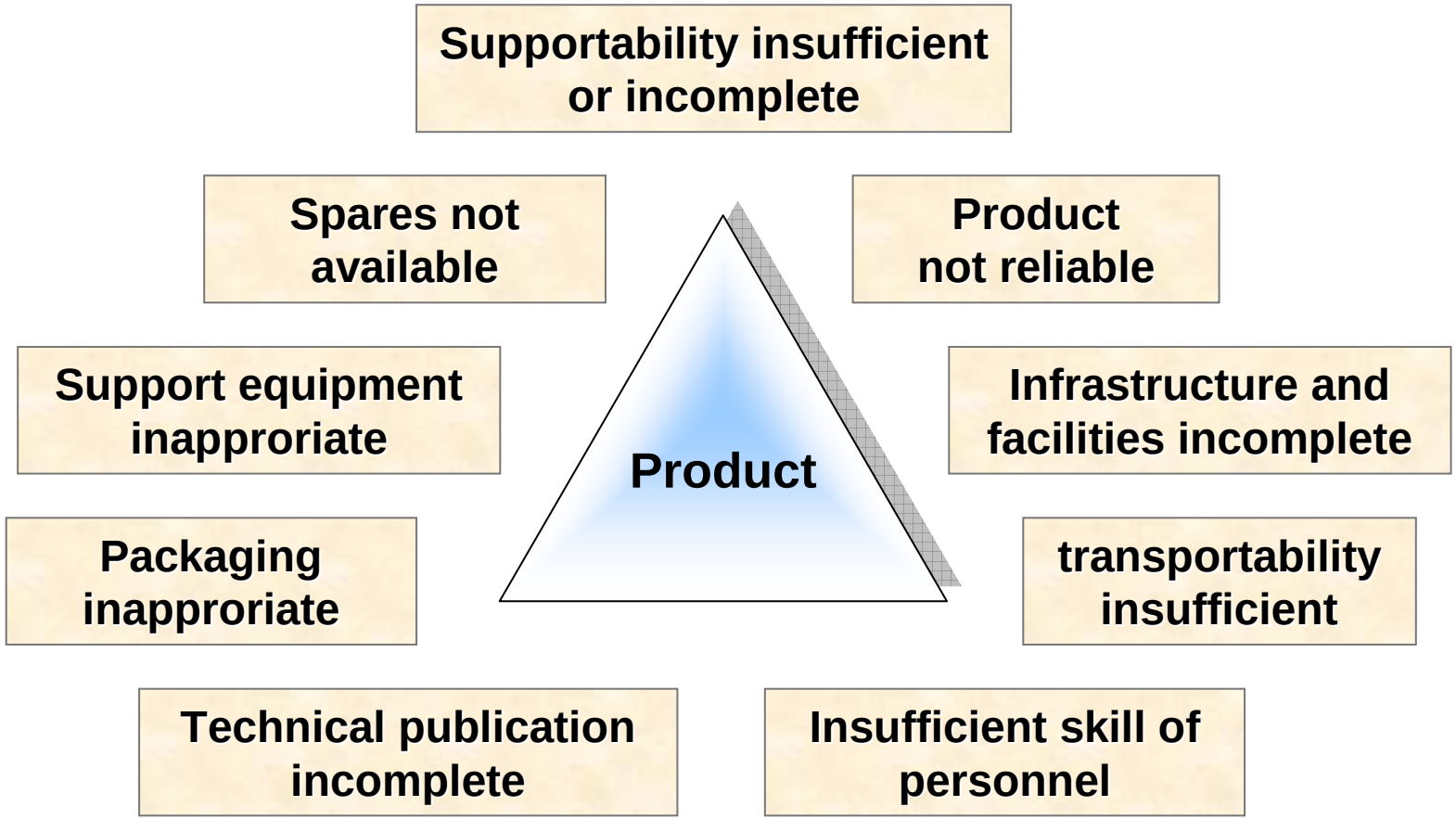
- Logistic analysis tasks to optimize the design from the logistic point of view (product breakdown, maintainability, testability, reliability, scheduled maintenance analysis, etc…)
- Materiel Support (spares, consumables)
- Technical Documentation
- Support Equipment
- Personnel requirements and training / training facilities
- Facilities
- Software Support

during **all phases** of system design & development and in service phase.

The **LSA process** is the powerful management tool to support the achievement of the the aims of Integrated Logistic Support.

ILS - Integrated Logistic Support

Risk of non-integrated approach



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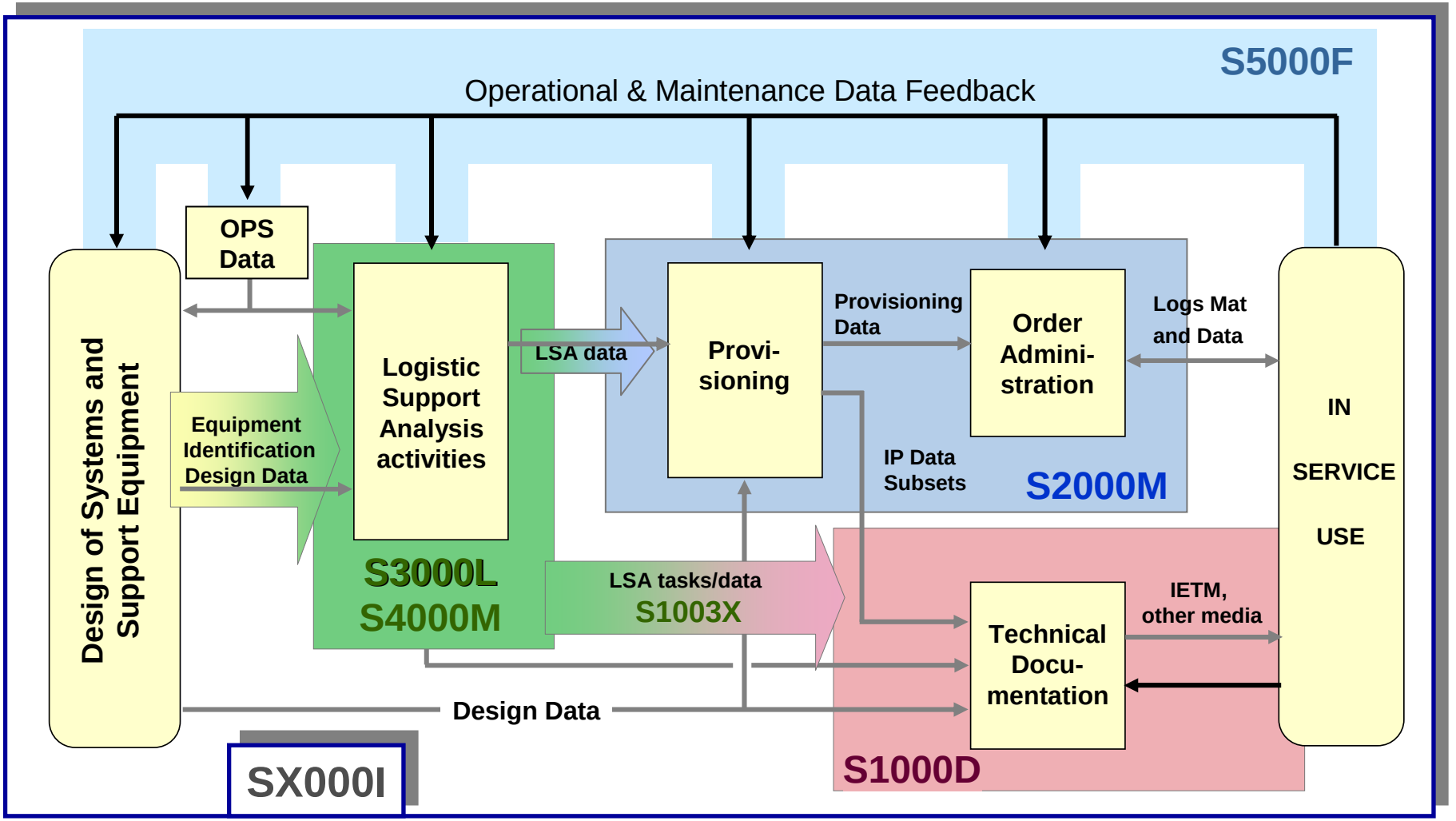
Aquisition Logistics main Business Processes

Relations to the ASD/AIA ILS Specification Suite

... one of the starting points of the S3000L working group 2006 in Munich



S3000L
Logistic Support Analysis

ASD - AIA

The specification S3000L is designed to cover the activities and requirements governing the **establishment of the LSA process**

The concept of this specification was originated **in 2006.**

01/2006	Inaugural meeting in Brussels
2009-06-24	**Publication of S3000L, Issue 0.1, in Brussels**
10/2009	End of official commenting phase for organizations and companies
11/2009	Clarification of comments
04/2010	Finalization of issue 1.0
05/2010	**Publication of S3000L, Issue 1.0**
11/2010	**Establishment of S3000L Steering Committee**

S3000L
Logistic Support Analysis - Project organization

ASD - AIA

US and European Aerospace Industry are represented each by a chairman of the entire working group

Both are supported by **work package managers** within the core team

A common **ASD/AIA Advisory Board** monitors the project

S3000L
Table of content (1)

Nr	Chapter	Responsible
01	Introduction	Cassidian Air Systems
02	General Requirements	BOEING
03	LSA Business Process	Cassidian Air Systems
04	Configuration Management	EADS CASA
05	Influence on Design / RMT Interface	SAAB
06	Human Factors Analysis	BOEING / Cassidian Air Systems
07	LSA FMEA	EUROCOPTER
08	Damage and Event Analysis	DASSAULT
09	Logistics Related Operations Analysis	Cassidian Air Systems
10	Scheduled Maintenance Analysis	Cassidian Air Systems
11	Level of Repair Analysis	LOGSA
12	Maintenance Task Analysis	Cassidian Air Systems

S3000L
Table of content (2)

Nr	Chapter	Responsible
13	Software Support Analysis	Cassidian Air Systems
14	Life Cycle Costs Considerations	EADS CASA
15	Obsolescence Analysis	OCCAR
16	In Service Feedback	BOEING
17	Disposal	DASSAULT
18	Interrelation to other ASD Standards	Cassidian Air Systems / MTDTT
19	Data Model	SAAB
20	Data Exchange	SAAB
21	Terms, definitions and abbreviations	AGUSTA WESTLAND
22	Data element list	SAAB

S3000L
Scope (from Chap 1)

S3000L is designed to cover all processes and requirements governing the performance of the LSA:

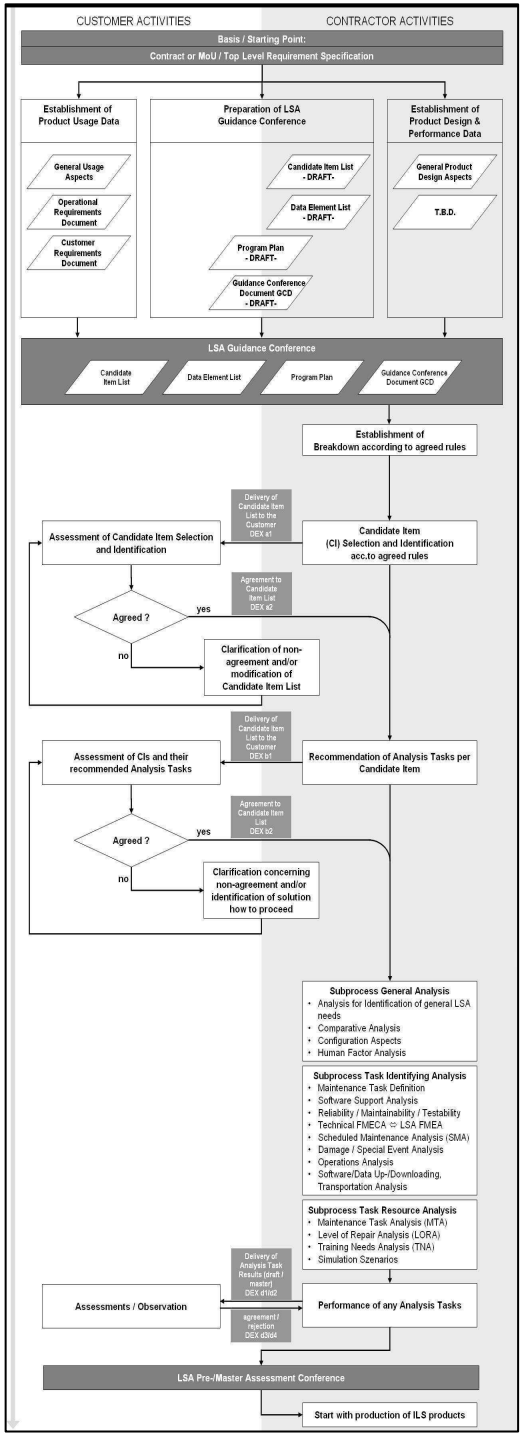
- It provides rules for the **establishment of the product breakdown** and for the **selection of LSA candidate items**.
- It describes type and methodology of **performance of the specified analyses**.
- It gives guidelines on **how to process the results of the analysis tasks**
- It covers the interface between LSA and the **support engineering areas**
- It covers the interface between LSA and the **ILS functional areas**

S3000L

Chapter 3 - LSA Business Process

The business process - The heart of S3000L

- Establishment of **Product Usage Data**
- Establishment of **Product Design & Performance Data**
- LSA **Guidance Conference**
- Establishment of **Breakdown** according to agreed rules
- **Candidate Item Selection**
- **Analysis activities** for candidate items
- **Customer Involvement**
- **LSA Review** / Assessment Conference
- Starting Point / Interface to creation of **ILS products**



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Technical/logistic analysis activities

List of potential analysis activities according to S3000L

- Analysis for identification of general LSA needs
- Comparative Analysis
- Human Factor Analysis

} early analysis activities

- **System breakdown** and Product configuration
- **RAMTS** (Reliability, Availability, Maintainability, Testability and Safety Analysis)

- **LSA FMEA** (Logistic FMEA)
- **Damage** Analysis
- **Special Event** Analysis
- **Scheduled Maintenance Analysis** (S4000M, MSG-3, RCM)
- **Operations** Analysis (PHST)

} event driven maintenance activities

- **Software Support Analysis** (SSA)
- **Level of Repair Analysis** (LORA)
- **Maintenance Task Analysis (MTA)** ⇨ Task requirements

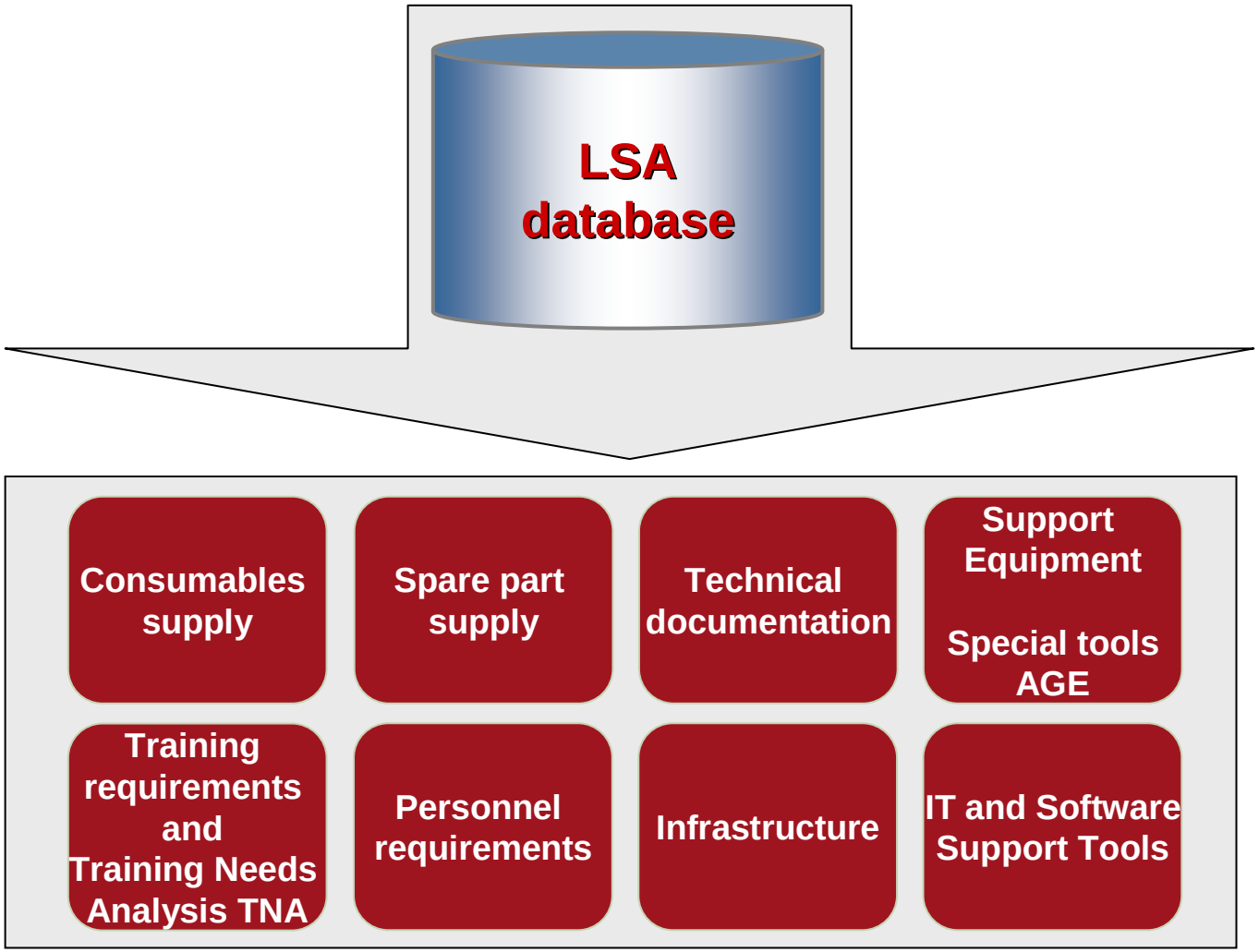
Additionally LSA provides information for:

- Simulation of operational scenarios
- Training Needs Analysis (TNA)

Analysis results are documented in the **LSA database**

Logistic Support Analysis

Logistic disciplines, which receive information from the LSA database



Event driven maintenance
Chapter 7 to 10

All **events** which justify any maintenance activity must be considered. Additionally all relevant operational activities must be analyzed. These are covered in chapter 7 to 10:

Chapter 7: **Failures** ⇨ LSA FMEA

Chapter 8: **Damages** and **special events**

Chapter 9: **Operational** activities

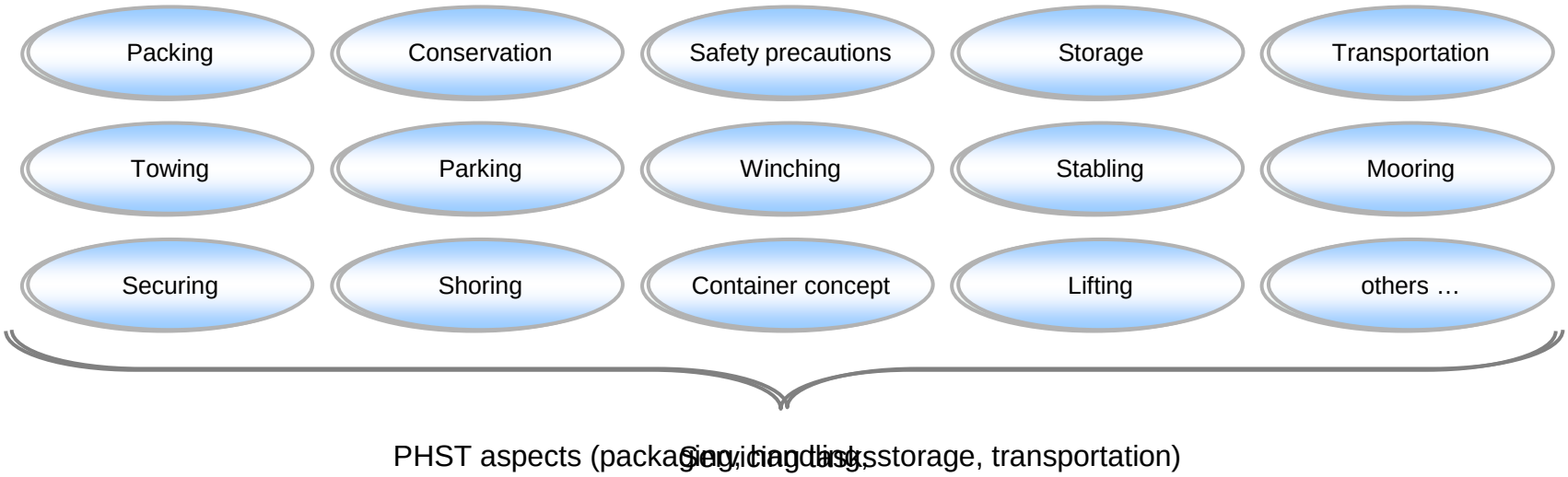
Chapter 10: **Scheduled** Maintenance

Logistics Related Operations Analysis
Chapter 9 - Purpose

Purpose:

Beside the activities concerning maintenance and repair of a product, there are **additional aspects concerning the operation and the handling** to be considered.

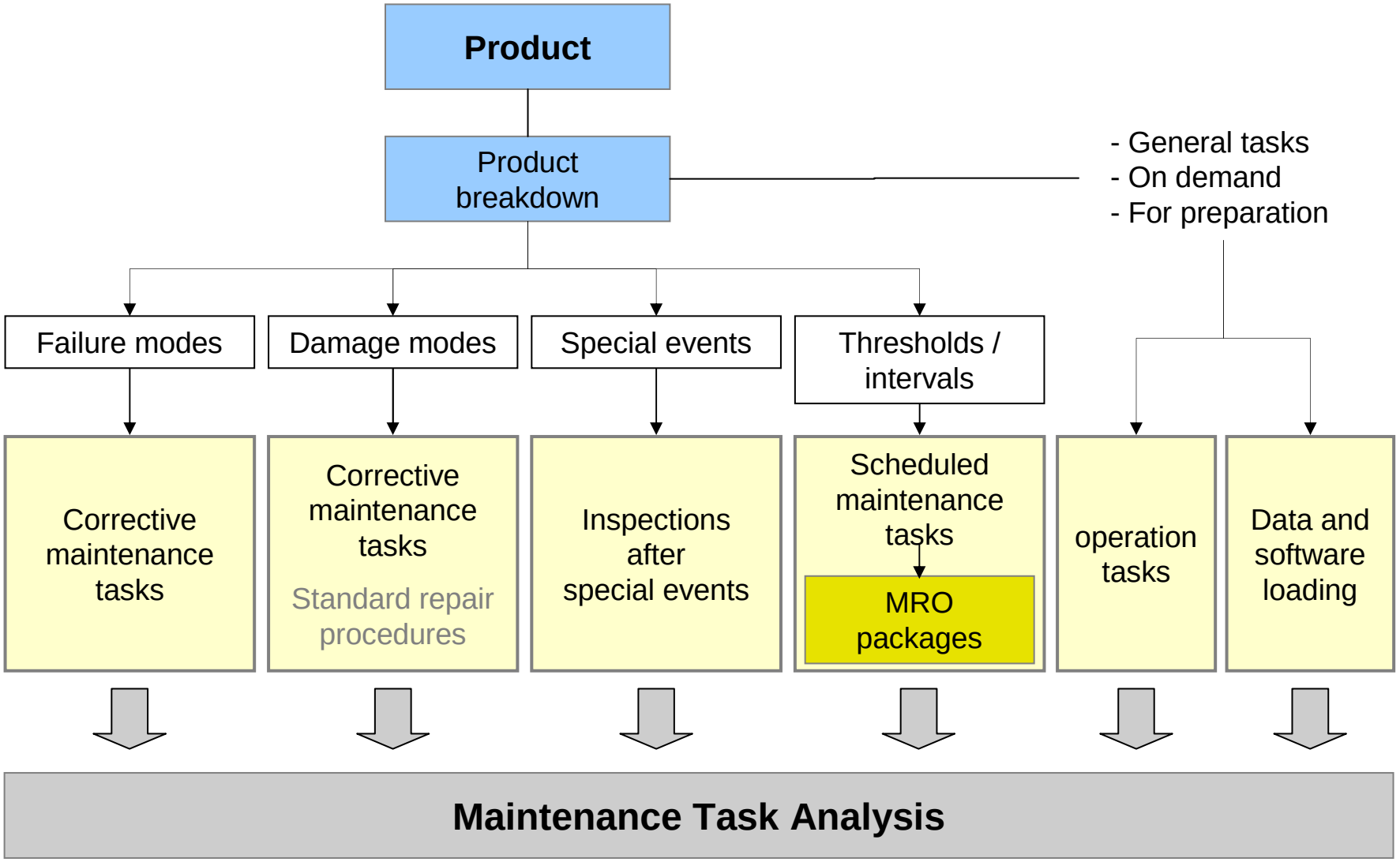
Logistic relevant operations are tasks, which can neither be assigned to the area of direct usage of a product (documented in operating instructions) nor to the area of maintenance (documented in a maintenance manual).



Maintenance Tasks

Chapter 12

Relation between events and tasks



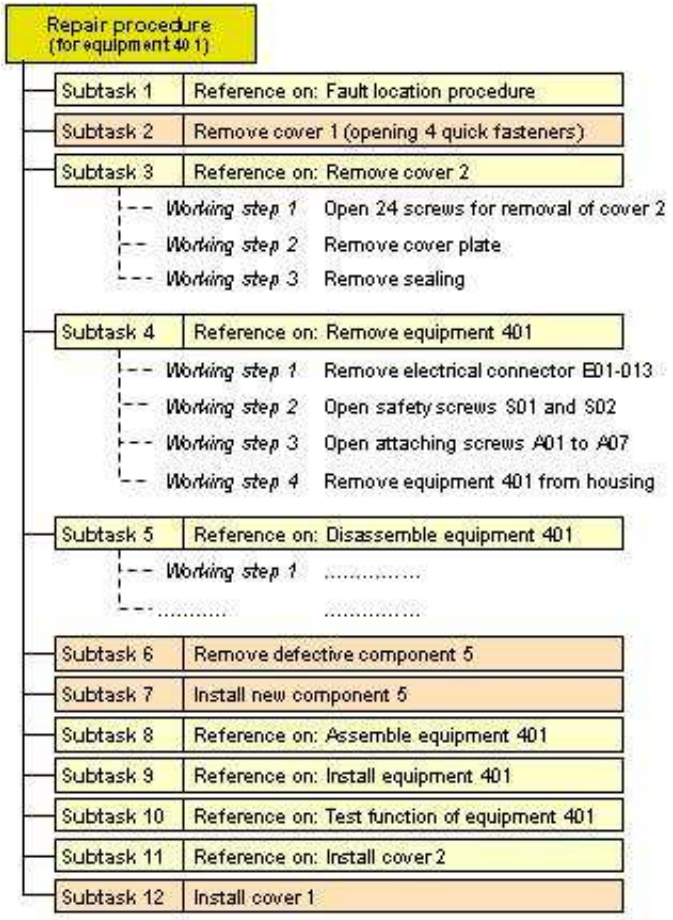
Task structure - How to document a task

Documentation of **supporting tasks** with the help of subtasks/working steps

Documentation of **rectifying tasks** with the help of referenced supporting tasks and additional subtasks / working steps, respectively

Integration of **preconditions, pre-work and post-work**

Brief **narrative description**



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Task resources

The resources necessary to perform a maintenance tasks should be defined **at the appropriate level** within the task itself.

Generally, it should be possible to identify **when a resource should be available** within the sequence of the task. The resources can be (but are not limited to):

- Personnel and required training
- Material (spare parts and consumables)
- Support and test equipment
- Facilities and infrastructure
- Technical documentation
- IT support

Task requirements - Additional aspects

The following aspects concerning the performance of any maintenance task are additionally covered by S3000L:

- **Resources** out of supporting task references
- **Harmonization** of support equipment and spare parts
- Task **location** aspects
- Product and system **availability** during maintenance performance
- Support solutions **(task variants)**
- Task **duration** and **task frequency**
- **Parallel activities** within maintenance tasks

Software Support

Chapter 13

Why to consider software in an LSA process?

Comparison of „flying“ software in active weapon systems:

F4

nearly none (at first introduction)

Tornado

27 KLOC* (at first introduction)

* KLOC = KiloLines of Code
  Measurement base for amount of software

EF 2000

1600 KLOC

82 programmable computers
interconnected via 8 network buses

Data model and data exchange

Chapter 19

Data elements and data model

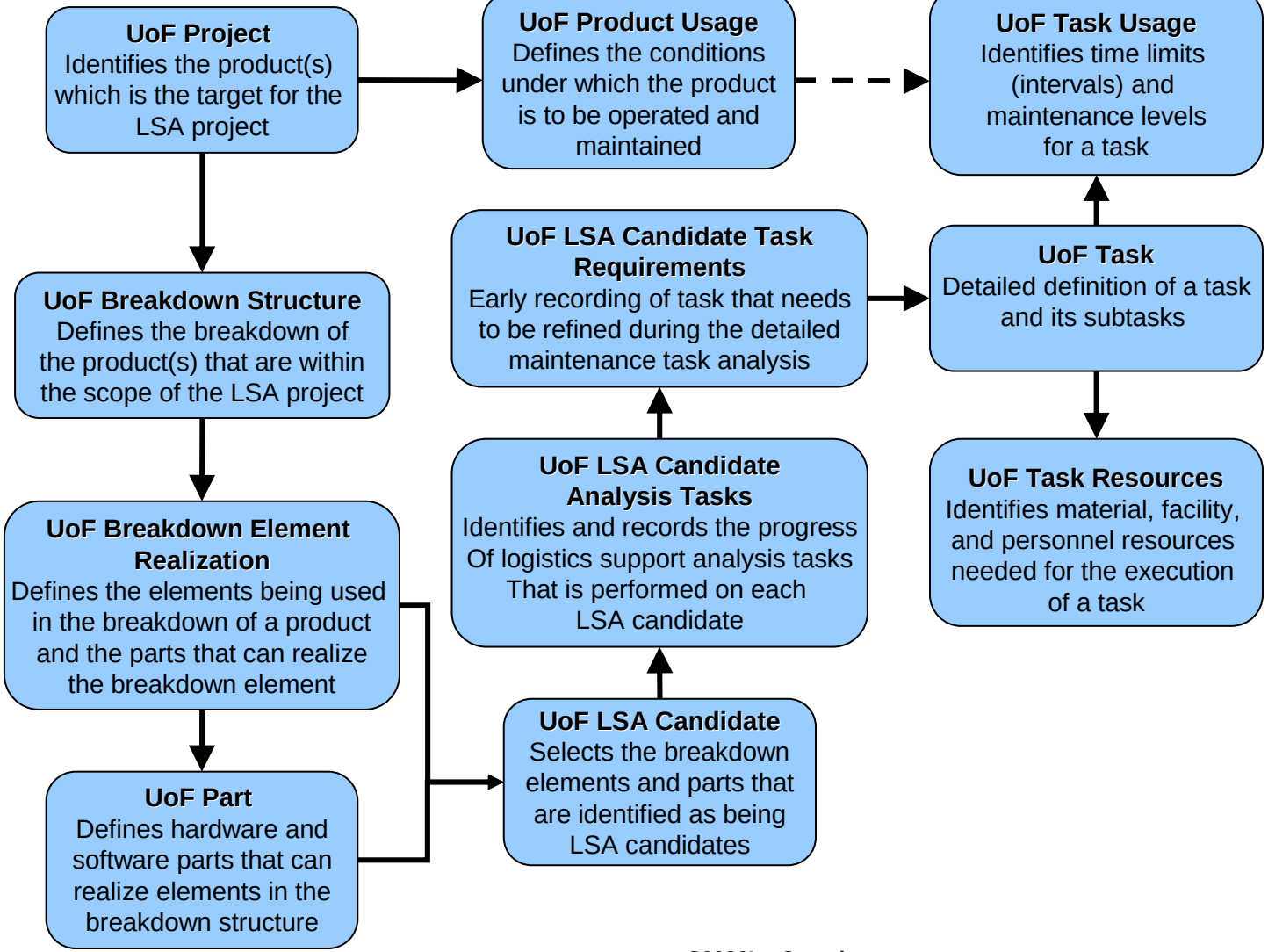
Objective

- Describe a coherent S3000L **data model** and **data element definitions** for exchange of LSA data with related business processes
- Predicated on **ISO 10303 AP239 Product Life Cycle Support (PLCS)** data model
- Documents the data **originated within the S3000L chapters**
- Contains the data required to “build” task **related S1000D data** modules
- Basis for data exchange specifications **DEX1 A&D and DEX3 A&D**

Data model and data exchange

Chapter 19 - Data model overview

Model overview



Data model and data exchange

Chapter 20 - LSA data exchange (DEXs)

Objective

Define a coherent set of Aerospace and Defence Data Exchange Specifications (**DEX**) that supports the S3000L LSA process and its interaction with related business processes.

Scope

Exchange of product related data needed for support

→ DEX1A&D

Aerospace and defence **product breakdown** for support

Exchange of task data needed by eg Technical Publications and Maintenance Management

→ DEX3A&D

Aerospace and defence **task set**

S1003X - S3000L/S1000D interface specification

Issue 0.1 is actually reworked by the S3000L working group, issue 1.0 is planned for 09/2010

Purpose of S1003X:

Specification of the required LSA data **to create S1000D data modules** for the description of the maintenance of the LSA candidates

Content:

Mapping of S3000L data elements to S1000D 4.0 data elements and feedback of the generated data modules (related data module codes to the corresponding maintenance activities)

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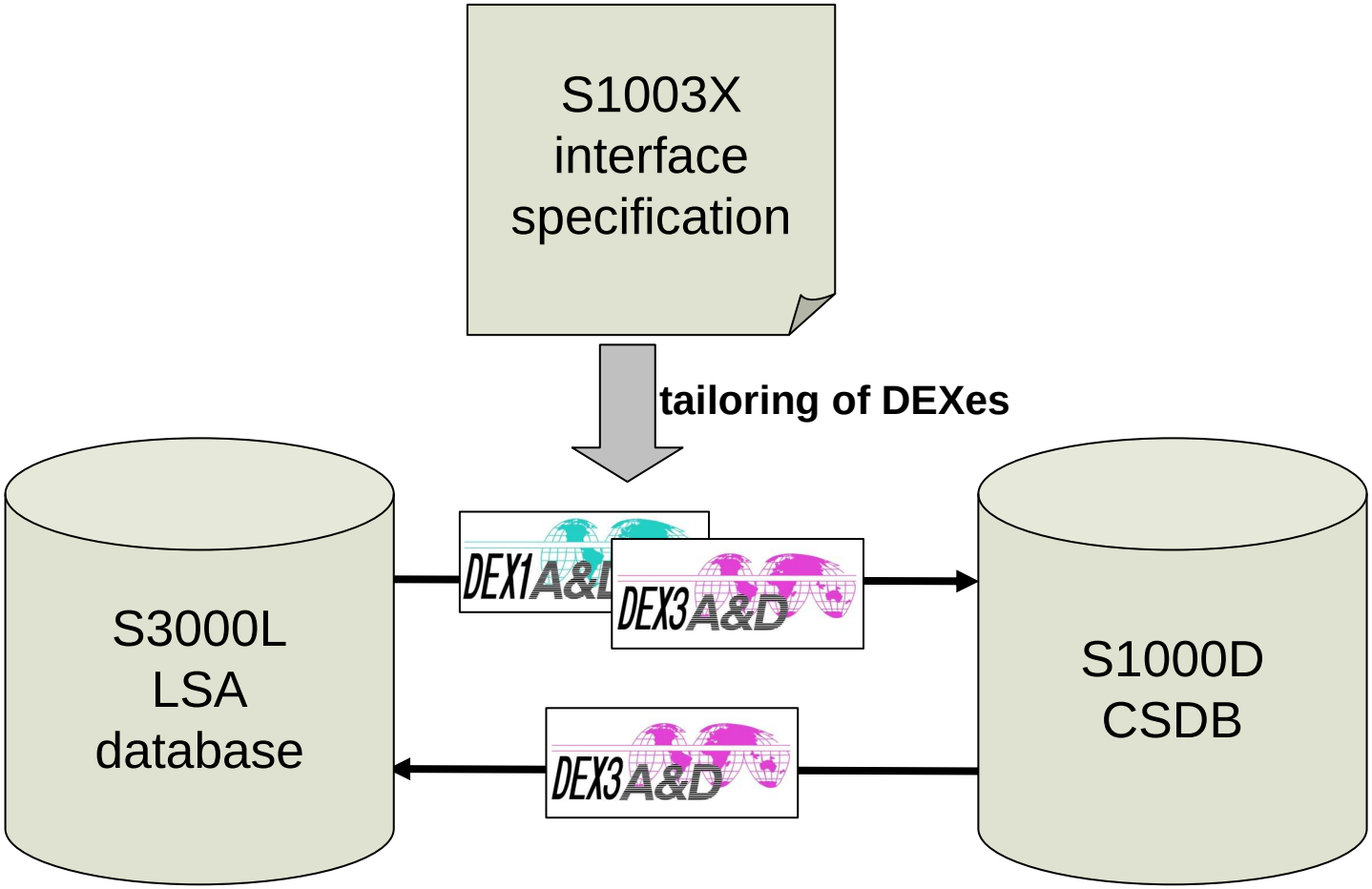
Data exchange
S1003X

Data exchange via DEX1 and DEX3 A&D



S3000L - Overview
Summary

- ✓ S3000L gives a guideline **how to establish a proper LSA process** with special regard to the **involvement of the customer**
- ✓ S3000L describes **the LSA business process** from the very first activities in a conceptual project phase to the recommendation when to start with the production of the logistic end products
- ✓ S3000L gives a guideline **how to create a suitable system breakdown** and how to select the potential LSA candidates
- ✓ S3000L gives an overview of **potential technical/logistic analysis activities** and how the results can be documented within a logistic database (LSA database)
- ✓ S3000L gives a guideline how to document **maintenance or operational tasks** and the **corresponding resources**
- ✓ S3000L offers a data model based on **ISO 10303 AP239 Product Life Cycle Support (PLCS) data model**
- ✓ Additional specification **S1003X** offers data exchange baseline between S3000L and S1000D

S3000L - Overview
Abbreviations

A&D	Aerospace & Defence
AGE	Aerospace Ground Equipment
AIA	Aerospace Industries Association of America
AP	Application Protocol
ASD	AeroSpace and Defence Industries Association of Europe
CSDB	Common Source DataBase
DEX	Data EXchange specification
FMEA	Failure Mode and Effects Analysis
ILS	Integrated Logistic Support
ISO	International Standards Organization
IT	Information Technology
KLOC	KiloLines Of Code
LSA	Logistic Support Analysis
LORA	Level Of Repair Analysis
MRO	Maintenace, Repair & Overhaul
MSG	Maintenance Steering Group

S3000L - Overview
Abbreviations (2)

MTA	Maintenance Task Analysis
MTDTT	Maintenance Task Data Task Team
OPS	Operations
PHST	Packaging, Handling, Storage and Transportation
PLCS	Product Life-Cycle Standard
RAMTS	Reliability, Availability, Maintainability, Testability and Safety analysis
RCM	Reliability Centered Maintenance
SC	Steering Committee
SE	Support Equipment
SSA	Software Support Analysis
TNA	Training Needs Analysis
TT	Task Team
UoF	Unit of Functionality
UML	Unified Modeling Language

Thank you for your staying power!

Questions?

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