Host (on behalf of ASD):

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

S3000L & S4000P in service support aspects

In-Service Maintenance Optimization (ISMO)
In-Service Support Optimization (ISSO)

Name of presenter: Dipl.-Ing. (Univ.) Peter Eichmüller
Rank/title of presenter: Expert Logistics Support Analysis
Company/organization: Airbus Defence and Space / Germany

ILS Specification Day, London *October 17th, 2019*

The challenge to operate technical complex and long living products

Each long-living and technical complex product requires an optimized support system to guarantee proper operation and the performance of corrective and preventive maintenance throughout the entire life time within adequate costs.

Product support tasks (⇨ support concept) comprise:

- Corrective maintenance (repair)
- Preventive maintenance (e.g. scheduled inspection/overhaul, preventive replacement of components)
- Operational support (e.g. transport, handling, package, storage, servicing)





The challenge to operate technical complex and long living products

- Long living products are **modified** (several times) during life time
- Support system is **modified** during life time
- Operational or support scenario can **change** during life time
- Maintenance/support capabilities on operator side can **change** during life time
- Technology can **change** during life time
- etc… can **change**

Maintenance/support concept of technical complex and long living products should be scrutinized regularly





The ISMO Process in S4000P chapter 3


S4000P-B6865-04000-00

International specification
for developing and continuously
improving preventive maintenance

S4000P-B6865-04000-00
Issue No. 2.0

S4000P

Publisher:
ASD

Applicable to: All S4000P-A-00-00-0000-00A-001A-A

End of data module

DMC-S4000P-A-00-00-0000-00A-001A-A_002-00_EN-US 2018-08-01 Page 1

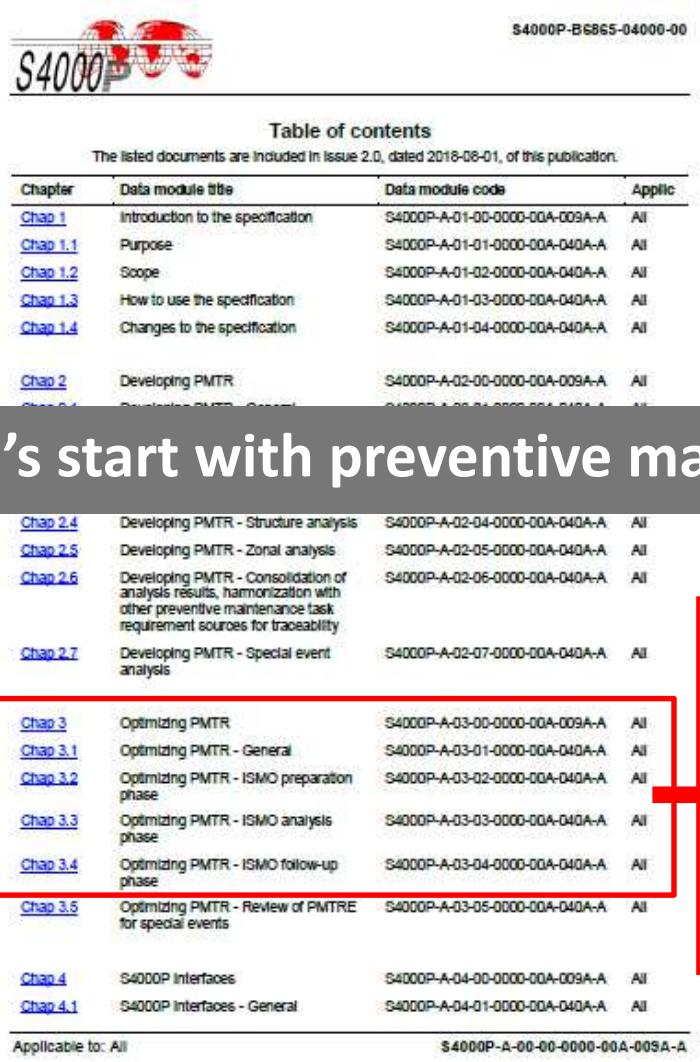

S4000P-B6865-04000-00

Table of contents

The listed documents are included in Issue 2.0, dated 2018-08-01, of this publication.

Chapter	Data module title	Data module code	Applic
Chap 1	Introduction to the specification	S4000P-A-01-00-0000-00A-009A-A	All
Chap 1.1	Purpose	S4000P-A-01-01-0000-00A-040A-A	All
Chap 1.2	Scope	S4000P-A-01-02-0000-00A-040A-A	All
Chap 1.3	How to use the specification	S4000P-A-01-03-0000-00A-040A-A	All
Chap 1.4	Changes to the specification	S4000P-A-01-04-0000-00A-040A-A	All
Chap 2	Developing PMTR	S4000P-A-02-00-0000-00A-009A-A	All
Chap 2.4	Developing PMTR - Structure analysis	S4000P-A-02-04-0000-00A-040A-A	All
Chap 2.5	Developing PMTR - Zonal analysis	S4000P-A-02-05-0000-00A-040A-A	All
Chap 2.6	Developing PMTR - Consolidation of analysis results, harmonization with other preventive maintenance task requirement sources for traceability	S4000P-A-02-06-0000-00A-040A-A	All
Chap 2.7	Developing PMTR - Special event analysis	S4000P-A-02-07-0000-00A-040A-A	All
Chap 3	Optimizing PMTR	S4000P-A-03-00-0000-00A-009A-A	All
Chap 3.1	Optimizing PMTR - General	S4000P-A-03-01-0000-00A-040A-A	All
Chap 3.2	Optimizing PMTR - ISMO preparation phase	S4000P-A-03-02-0000-00A-040A-A	All
Chap 3.3	Optimizing PMTR - ISMO analysis phase	S4000P-A-03-03-0000-00A-040A-A	All
Chap 3.4	Optimizing PMTR - ISMO follow-up phase	S4000P-A-03-04-0000-00A-040A-A	All
Chap 3.5	Optimizing PMTR - Review of PMTRE for special events	S4000P-A-03-05-0000-00A-040A-A	All
Chap 4	S4000P Interfaces	S4000P-A-04-00-0000-00A-009A-A	All
Chap 4.1	S4000P Interfaces - General	S4000P-A-04-01-0000-00A-040A-A	All

Applicable to: All S4000P-A-00-00-0000-00A-009A-A


S4000P

Let's start with preventive maintenance

The **In Service Maintenance**

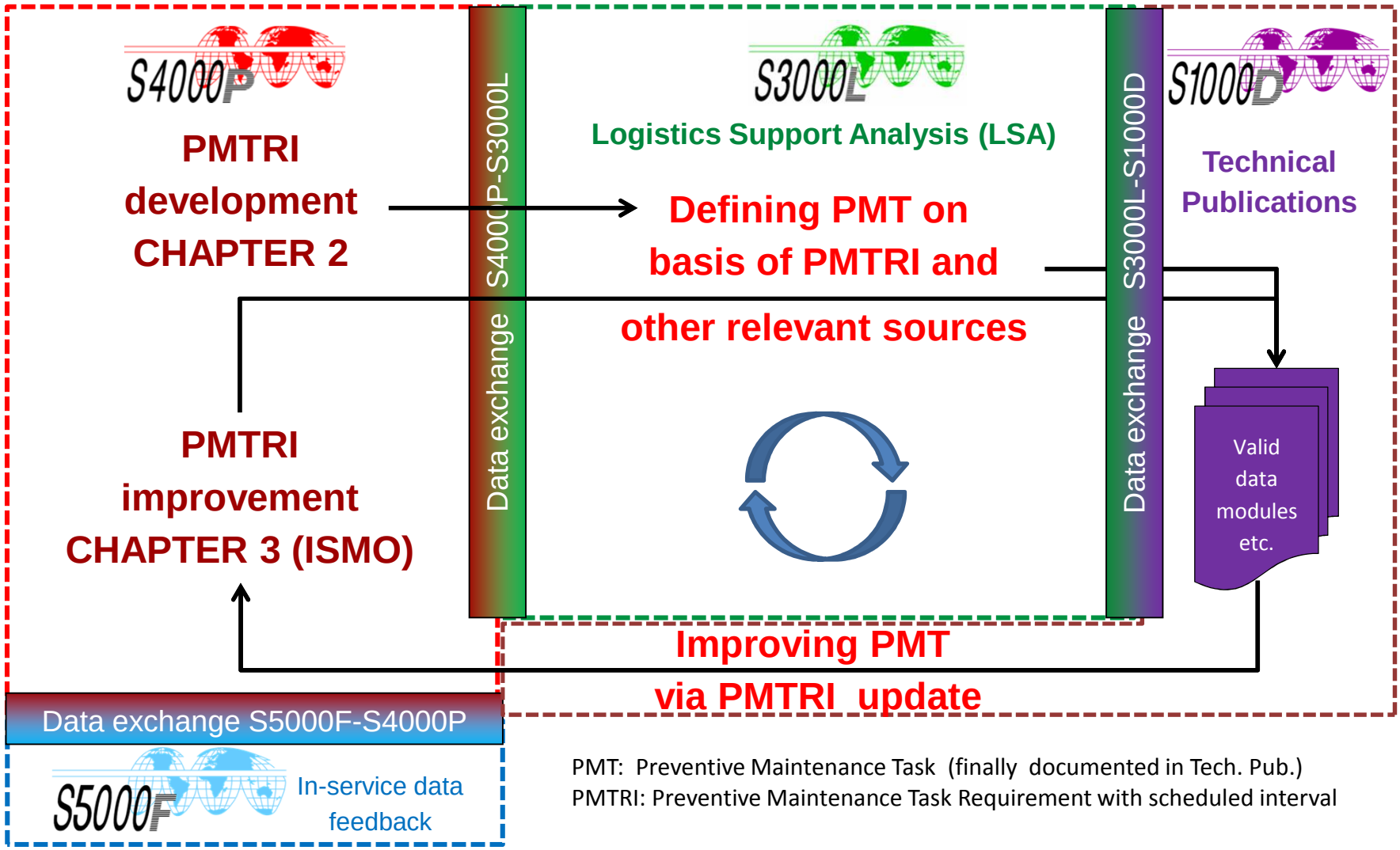
of S4000P Issue 2.0:

Chap 3	Optimizing PMTR
Chap 3.1	Optimizing PMTR - General
Chap 3.2	Optimizing PMTR - ISMO preparation phase
Chap 3.3	Optimizing PMTR - ISMO analysis phase
Chap 3.4	Optimizing PMTR - ISMO follow-up phase

PMTR = Preventive Maintenance Task Requirement

Free download:
www.s4000p.org

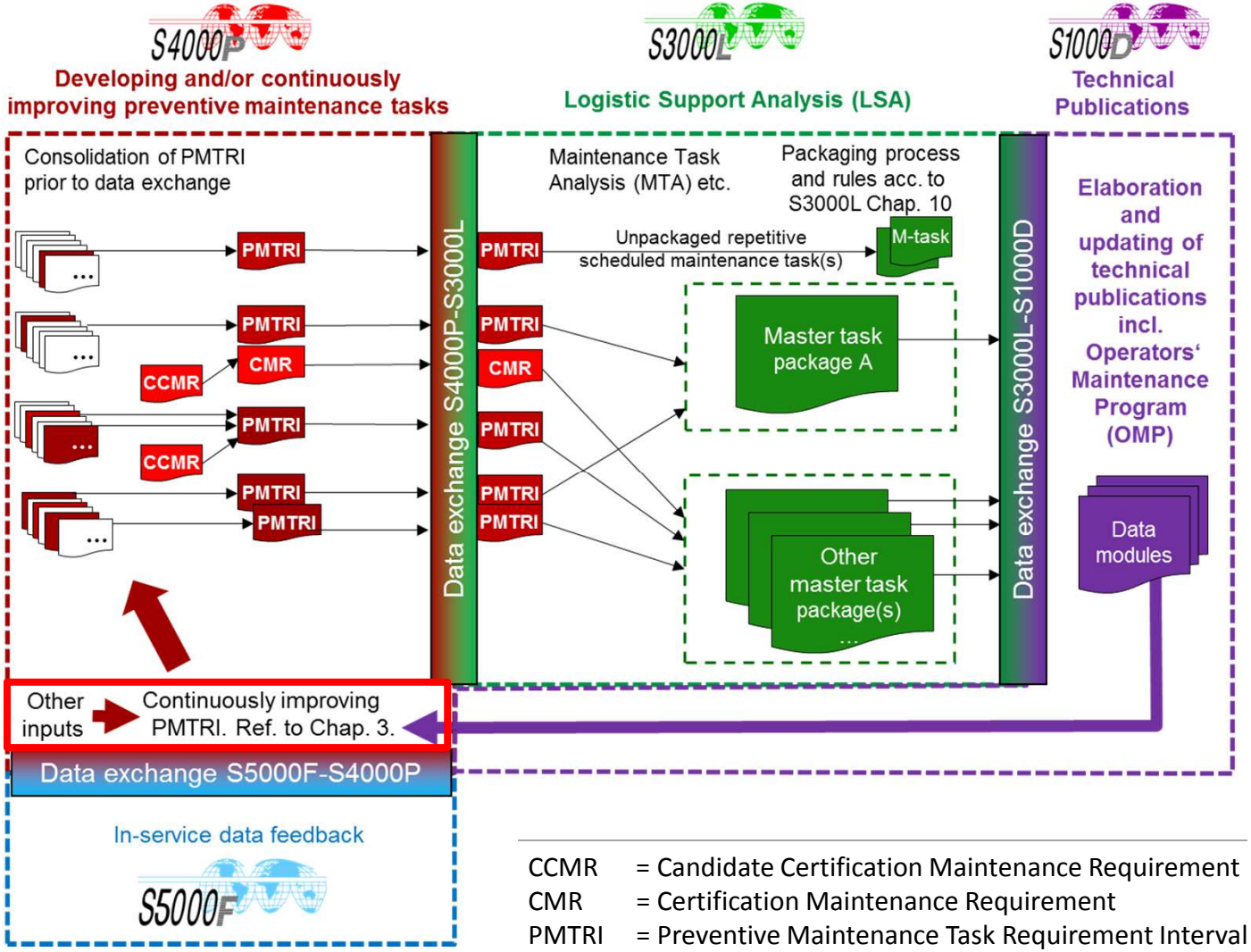
The PMTRI-PMT-PMTRI circle during the Product life cycle



PMT: Preventive Maintenance Task (finally documented in Tech. Pub.)
PMTRI: Preventive Maintenance Task Requirement with scheduled interval

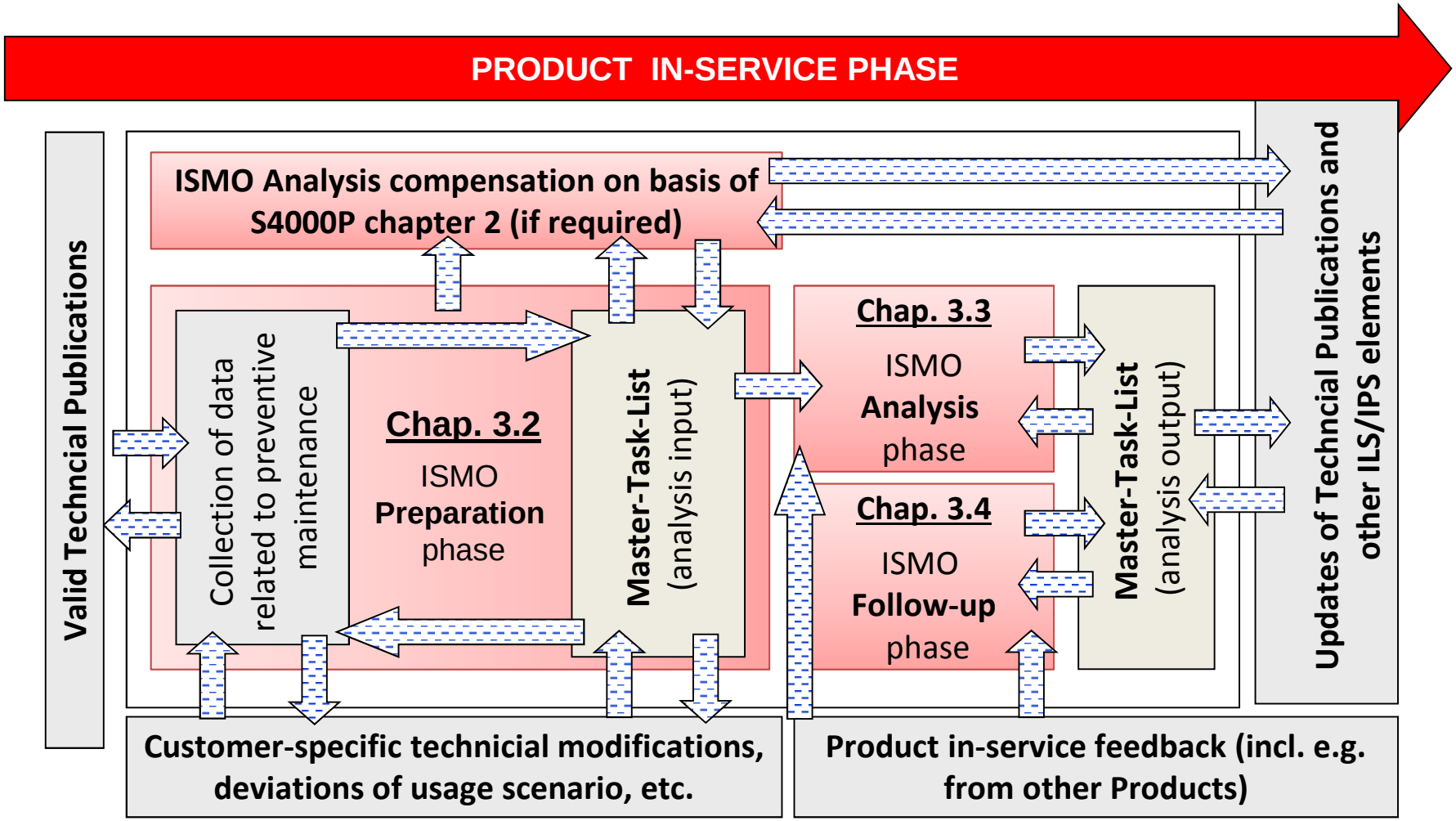
PMTR consolidation and harmonization in S4000P chapter 2.6, Fig. 1

ISMO closes the life cycle loop

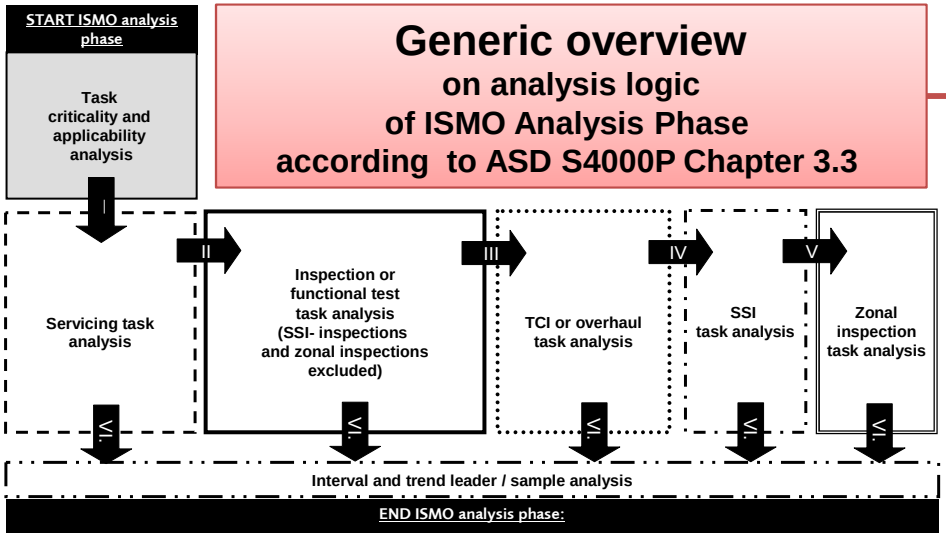


CCMR = Candidate Certification Maintenance Requirement
CMR = Certification Maintenance Requirement
PMTRI = Preventive Maintenance Task Requirement Interval

ISMO process overview



Definition of ISMO analysis logic (1/2)

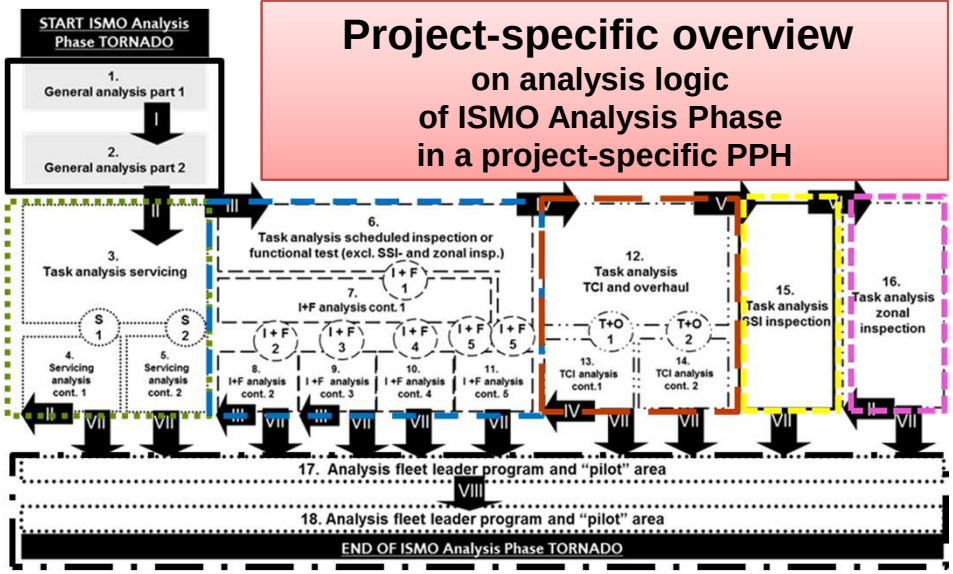


Generic overview
on analysis logic
of ISMO Analysis Phase
according to ASD S4000P Chapter 3.3

What is the difference between generic analysis logic in S4000P and a project specific logic?

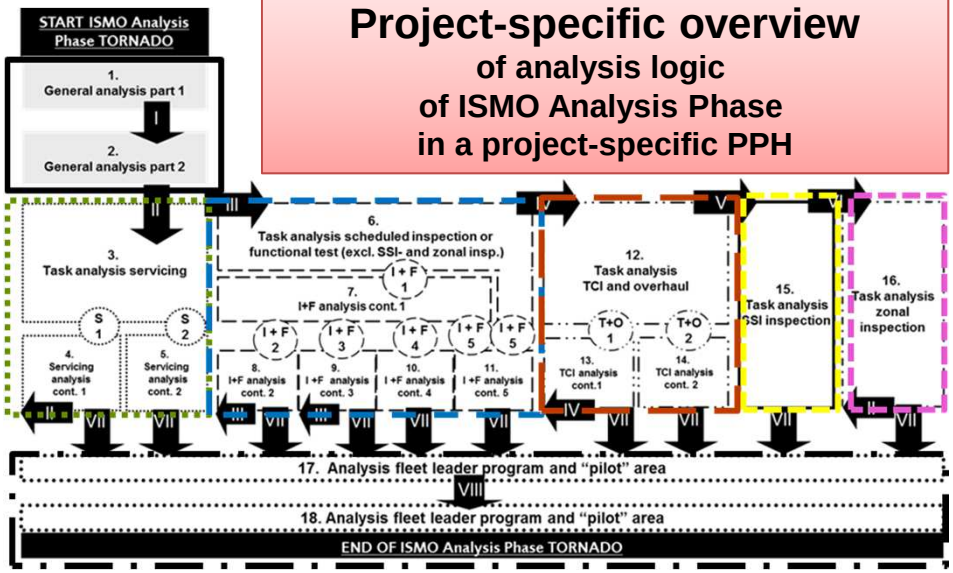
To be defined in a project/product-specific **Policy and Procedure Handbook (PPH)**

Project-specific overview
on analysis logic
of ISMO Analysis Phase
in a project-specific PPH

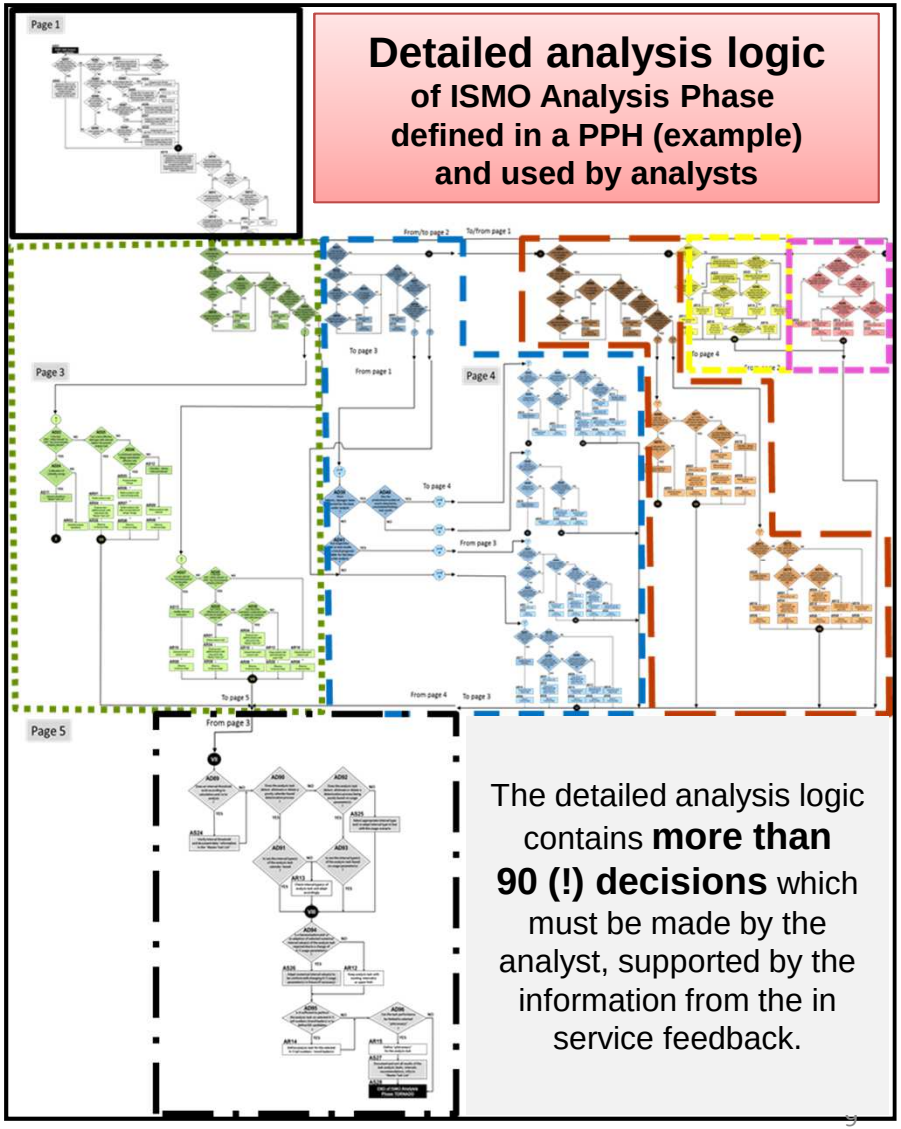


Definition of ISMO analysis logic (2/2)

Project-specific overview
of analysis logic of ISMO Analysis Phase in a project-specific PPH



Detailed analysis logic
of ISMO Analysis Phase defined in a PPH (example) and used by analysts



The detailed analysis logic contains **more than 90 (!) decisions** which must be made by the analyst, supported by the information from the in service feedback.

Preventive done, and now?

- Preventive maintenance **is only one aspect** of the entire support concept!
- To scrutinize the support concept for technical complex and long living products requires to consider **corrective** maintenance and **operational** support, too.
- S3000L offers an option with the upcoming issue 2.0, documented in the

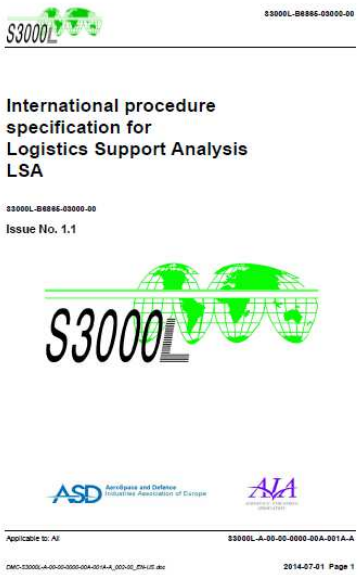
Let's continue with corrective maintenance & operational support

Maintenance/support concept of technical complex and long living products should be scrutinized regularly





S3000L, Issue 2.0, Chapter 17 - In Service LSA


S3000L-B6886-03000-00

International procedure specification for Logistics Support Analysis LSA

S3000L-B6886-03000-00

Issue No. 1.1

S3000L

ASD AeroSpace and Defence Industries Association of Europe AIA

Applicable to: All S3000L-A-00-00-0000-00A-001A-A

DMC-S3000L-A-00-00-0000-004-001A-A_003-00_EN-US.doc 2014-07-01 Page 1

1 **General**

- 1.1 Introduction
- 1.2 Objective
- 1.3 Scope

2 **Core principles to perform in-service LSA**

- 2.1 Product modification requirements
- 2.2 In Service Support Optimization

3 **ISSO process**

- 3.1 General assumptions
- 3.2 ISSO phases
- 3.3 Preparation phase
- 3.4 Analysis phase
- 3.5 ISSO follow-up phase

NEW

Will be chapter 17 in Issue 2.0

Scope of In-service LSA

In-Service LSA comprises:

- Consideration of **Product modification** requirements, like:
  - Requirements coming from the customer for new or improved functionality of the Product
  - Need for equipment or equipment components replacement due to obsolescence
  - Improvement driven by industry due to technological progress
  - Modification of software of an equipment within the Product
  - Modification of structural components (eg, strengthening, modified material)
  - etc…
- In Service Support Optimization (**ISSO**)
  - Optimization requirements induced by operator decisions (e.g. in the context of maintenance concept modification)
  - **Optimization requirements induced by analysis of actual support solution**

In-Service Support Optimization

Optimization requirements induced by analysis of actual support solution

– Preparation phase

Within the preparation phase, the **framework** of the ISSO effort will defined (**ISSO Guidance Document**), including the determination of the ISSO candidates.

– Analysis phase

Within the analysis phase, the **ISSO candidates** will be analyzed in detail and recommendations how to optimize will be developed and proposed to the customer.

– Follow-up phase

Within the follow-up phase, the recommendations from the analysis phase will be **evaluated** together with the customer, **decisions** will be made and documented.

Note:
If required, further activities will defined and specified to support ongoing monitoring of the support solution which will be implemented as a final result of the performed ISSO process.

In-Service Support Optimization (ISSO) overview

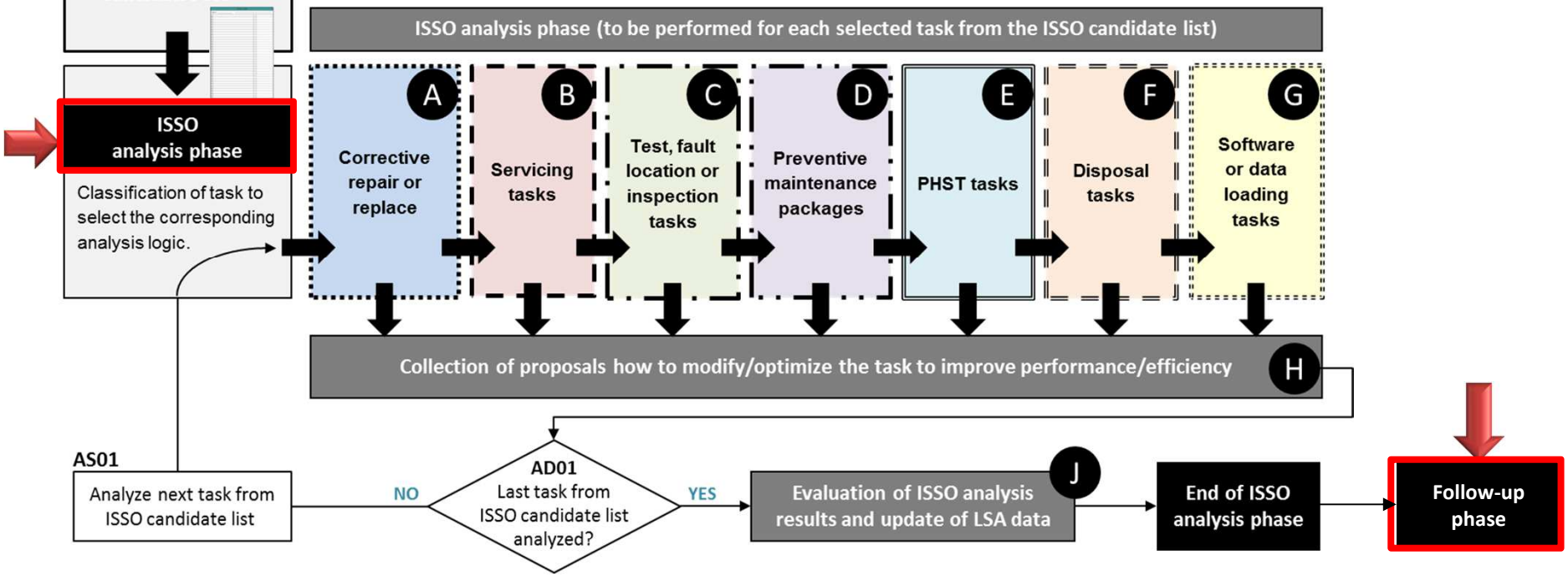
ISSO preparation phase

- Prepare ISSO Guidance Document (**ISSO GD**)
- Analyze **reliability** and **usablity** of feedback data and information from customer/user
- Selection of ISSO candidates and preparation of **ISSO candidates list**

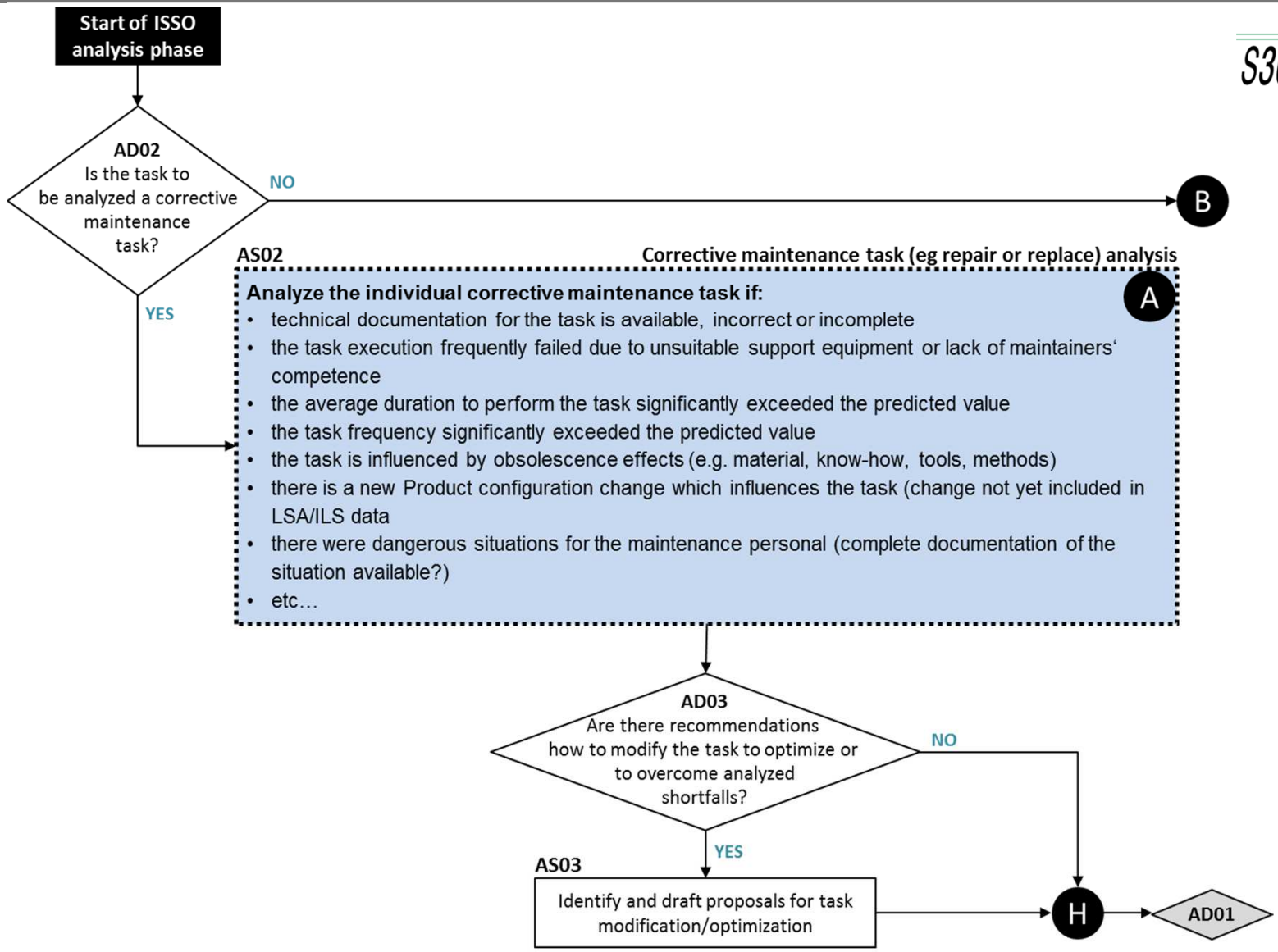
ISSO analysis object / ISSO candidate: the TASK

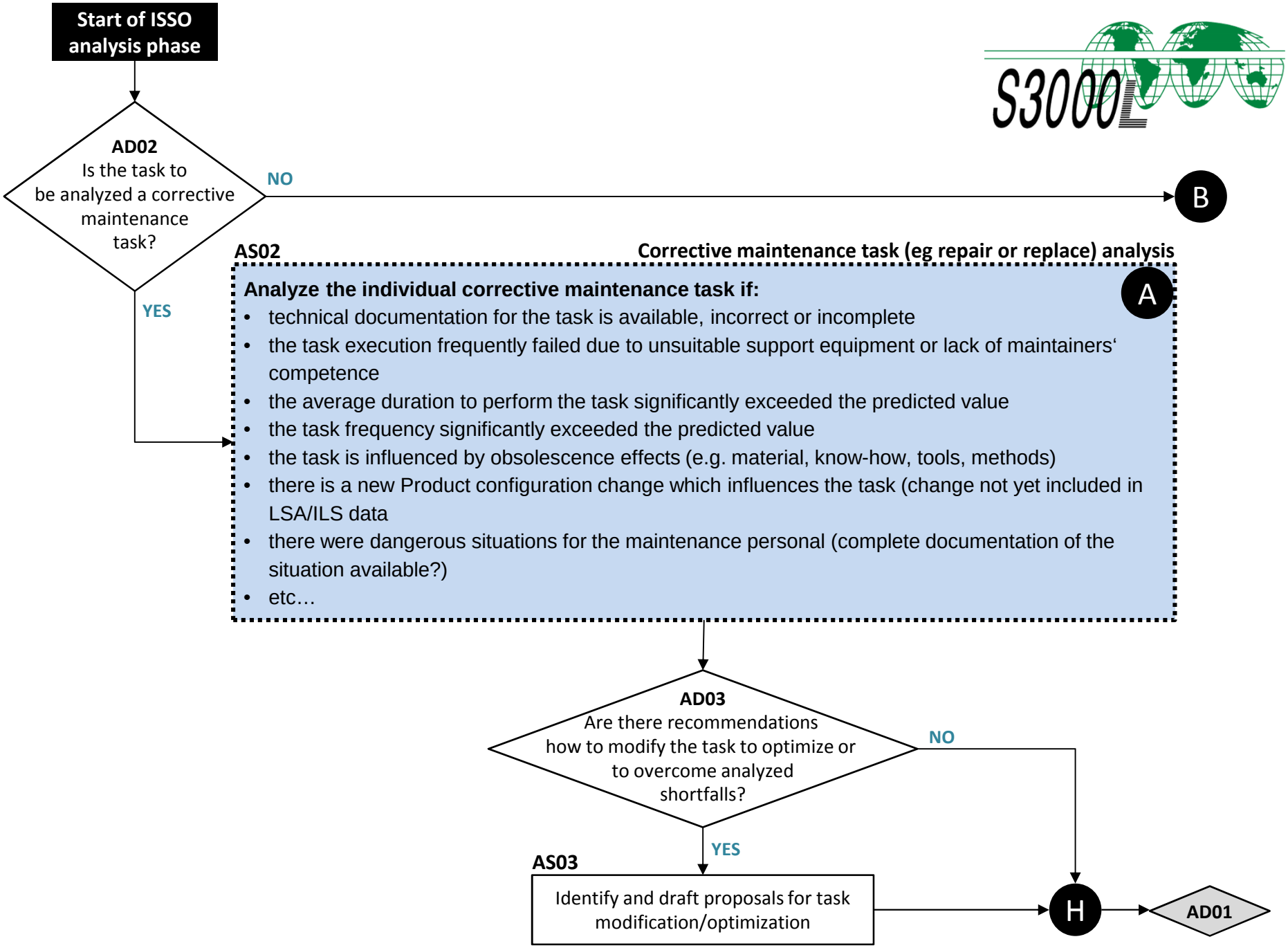
Different types of tasks require different analysis questions and flowcharts, to be defined individually in detail for each ISSO project

⇨ **ISSO Guidance Document**



In-Service Support Optimization (ISSO) example




Start of ISSO analysis phase
AD02
Is the task to be analyzed a corrective maintenance task?
NO
B
YES
AS02
Corrective maintenance task (eg repair or replace) analysis
Analyze the individual corrective maintenance task if:
A
• technical documentation for the task is available, incorrect or incomplete
• the task execution frequently failed due to unsuitable support equipment or lack of maintainers' competence
• the average duration to perform the task significantly exceeded the predicted value
• the task frequency significantly exceeded the predicted value
• the task is influenced by obsolescence effects (e.g. material, know-how, tools, methods)
• there is a new Product configuration change which influences the task (change not yet included in LSA/ILS data
• there were dangerous situations for the maintenance personal (complete documentation of the situation available?)
• etc…
AD03
Are there recommendations how to modify the task to optimize or to overcome analyzed shortfalls?
NO
YES
AS03
Identify and draft proposals for task modification/optimization
H
AD01

AIA AEROSPACE INDUSTRIES ASSOCIATION

ASD AeroSpace and Defence Industries Association of Europe

ILS-Specification-Council council

S4000P

S3000L

ISMO process ⟷ **ISSO process**

ISMO and **ISSO** process are powerful methods to evaluate maintenance and support solutions concerning **effectivity, safe usage, shortcomings and costs**. To be recommended as a standard approach for the operation of technical complex and long living products.





SUMMARY

- Long living and technical complex Products require an ongoing evaluation and optimization of an implemented maintenance and support concept over the entire life cycle to ensure proper operation and support.

- For **preventive** maintenance tasks, the **ASD S4000P**, Issue 2.0, offers a professional optimization process
  ▶ ISMO (In Service Maintenance Optimization)

- For **corrective** maintenance and **operational support** tasks, the **ASD/AIA S3000L**, Issue 2.0, will offer a professional optimization process
  ▶ ISSO (In Service Support Optimization)

- Regular performance of optimization loops to improve the support system of a Product enables to keep control about costs, product availability and safe usage of long living and technical complex Products.

Thank you

for your attention!

Questions?

Dipl.-Ing. (TU) Peter Eichmüller
Vice Chairman of ASD/AIA S3000L Steering Committee
Expert Logistic Support Analysis (LSA)
peter.eichmueller@airbus.com