Implementation of the „Maintenance Planning and Improvement“ Process in a central and integrated ILS-Repository

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Content and Goal

Maintenance development from the design phase to the in-service support phase is a complex process with many involved procedures, systems and stakeholders. This presentation considers the challenges and provides a solution approach on basis of an Integrated Central IPS/ILS Repository. Implementation of this solution approach will be epitomized with projects of the naval and the aviation industry.
Initial Situation and Problem Description
Approach by ASD Suite of ILS/IPS Specifications

The IPS/ILS process is a highly dynamic process with many data flows and many influencing (external) factors.

Communication
Data Consistency
Traceability

The Maldives Scenario

Supply Support & Provisioning

Technical Data & Document

Training & Training Devices

Product Support Management

Maintenance Planning & Improvement

System Design Interface

Reality

Processes and people are not connected bidirectional. Work packages are created, delivered and forgotten. Data at the end of the process are updated, while forgetting the sources.
The Approach of an Integrated and Central ILS/IPS-Repository

The Maldives Scenario

The Integrated Approach

The integrated approach builds bridges between the different ILS-/IPS processes and people, as they all work with the same data. Bridges allow to "walk" in both directions.
Initial Situation and Problem Description

Approach and Concept of an Integrated Central IPS-Repository
General Definition of an Integrated Central ILS/IPS-Repository

- **System- & Process-Integration**
- **Central Repository** to create and manage all IPS/ILS relevant data
- **Master repository for all IPS-delivery objects**

**IPS Repository**

**Customer Service**
- Technical Services
- Technical Publication-services

**In-Service Domain**

**System Operation Domain**

- **Service Parts Management**
- Maintenance Support

**Customer Service** Feedback

**ERP, CRM**
- Business domain

**PLM, M/ECAD**
- Design & engineering

**Engineering support**

**Enterprise applications**
- eDMS

**Operation Domain**

**In-Service Domain**

**Engineering support**

**Customer Service Feedback**
Definition of an Integrated Central ILS/IPS-Repository in context of the ASD Suite of Specifications

- Product Structure as the central Element of Product Configuration Management

- PMTR System/Structure/Zonal Analysis

- PMTR Product Configuration Management

- S3000L Maintenance Task Analysis

- S6000T Training

- S1000D Authoring & Publication

- S5000F In-Service data feedback

- S5000F In-Service data feedback

- Data Module

- Publication

- S4000P

- BEI BEI BEI

- Engineering

- 2000M Material Supply

- Supplies

- Spare Parts

- S1000D

- S3000L

- S4000P

- S5000F

- S6000T

- S1000D

- S3000L

- S4000P

- S5000F

- S6000T
Important Determination in the Context of Data Models / Standard Compliance

**Determination**

None of the specifications of the ASD Suite of ILS Specifications (besides ASD S1000D) forces the software developing companies to store the data in the data model defined by these specifications. The data model gives guidance for the required elements and attributes.

The objective of the schemas and data modules is the standardization of the data exchange between different software tools and parties. The more important aspect of the ASD Suite of ILS Specifications are the defined processes.

An ILS/IPS Repository can have any database model. Standard compliance in the context of schemas and data models is a requirement for its interfaces.

Freedom to extend or reduce and data relation (especially between the different standards) especially for optimal user guidance and data traceability.
Strengths of an Integrated Central IPS Repository in the context of Maintenance Planning

Data Re-Use and Data Generation

Preventive Maintenance Task Requirements (PMTR) as result of Preventive Maintenance Analysis
ASD S4000P

Preventive & Corrective Maintenance Tasks as result of Maintenance Tasks Analysis (MTA)
ASD S3000L

Procedural Data Modules According ASD S1000D

Spare Parts, tools and consumables
ASD S2000M

Spare Part Catalogs According ASD S1000D

Data Consistency

Traceability (e.g. for In-Service Optimization according ASD S4000P)
Strengths of an Integrated Central IPS Repository in the context of Maintenance Planning

In a Integrated Central IPS Repository:

- **CM**: The System has the possibility to inform the user about changes and required actions.
- **QA**: The System can support the user to improve data quality – Single Source Principle.
- **$:** The System helps to save time as the user has all relevant information at his fingertips.
- **Challenge**: Process Timeline -> Input Data must be available at certain milestones.

**Data Re-Use and Data Generation**

**Data Consistency**

**Traceability (e.g. for In-Service Optimization according ASD S4000P)**
Cross-Program Reusability and Applicability

In an Integrated Central IPS Repository:

- Data can be reused in projects and programs.
- Applicability can be set on S3000L and/or S1000D level.
- Obsolescence can be managed (cross-)program wide.
- Applicability must be planned and often requires a more abstract way of thinking!

Integrated Central IPS Repository

Maintenance Tasks

Product

Program A

Procedure

Product AA

Not Applicable

Program B

Modified Task

Product AA

Applicability:

ASD 3000L

ASD S1000D

Product BA
Interfaces

**Importance of Interfaces**

Interfaces are an important aspect to integrate an IPS Repository into the customers system landscape.

Besides this, although an IPS/ILS-Repository provides many functions to create IPS/ILS-deliverables, the customer may prefer other tools.

Standardized interfaces, like the schemas of the ASD Suite of ILS-Specification make things easier, but are not always available in each tool/software.

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**PLM Interfaces**
e.g. Product Structure & Material Data

**SLM Interfaces**
e.g. FIM, Maintenance Monitoring

**ERM Interfaces**
e.g. procurement planning, shopping.

**Maintenance Interfaces**
e.g. Preventive Maintenance Analysis, In-Service Maintenance Optimization

**Different Data Exchange Standards**
Initial Situation and Problem Description

Customer Scenarios
Maintenance Planning at a German Submarine Construction Company

Central Integrated IPS/ILS-Repository

Material Data (based on ASD S2000M)

Preventive & corrective Maintenance Tasks
ASD S3000L

Preventive Maintenance Task Requirements (PMTR)
ASD S4000P

Spare Part Catalogs
Bases on ASD S1000D

Procedural Data Modules
Based on ASD S1000D

Data Exchange S3000L (S2000M)

Hardware Supplier / ILS/IPS Service Provider

Material Data
Illustrated Parts Data

LogDex App

Maintenance Tasks
Spare Part Recommend.

Use Case: Supplier Integration

MTL: Master Task List

In-Service Maintenance Optimization for Optimization of Supplier Maintenance Tasks

SHZ Tool

MTL

MTL
Use Case: Cross Standard Transformation

Central Integrated IPS/ILS-Repository

Generation of MIL-STD-1388-2B messages specified and proof of concept has been conducted.
Process implementation planned for 2019
Maintenance Planning at a Swiss Helicopter Company

Central Integrated IPS/ILS-Repository

Use Case: PLM / Engineering Integration

Product Structure

Preventive Maintenance Task Requirements (PMTR)

Preventive & corrective Maintenance Tasks
ASD S3000L

Consumables, Standard Tools---

Material Data (based on ASD S2000M)

3D/2D-IPD Data

Spare Part Catalogs Bases on ASD S1000D

Procedural Data Modules Based on ASD S1000D

PTC Windchill

PMTRS

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Thank you for your attention!

Questions?