Database Oriented Authoring for Maintenance Planning Information based on S1000D

... from the concept to the tool ...

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- **Introduction**

- **Customized definitions** (for Maintenance Planning Information based on S1000D)

- **Technical concept** (for Database Oriented Authoring in the perimeter of Maintenance Planning Information)

- **Main use cases** (to be considered for Maintenance Planning Information in a Database Oriented Authoring environment)

- **Questions/Answers**

The international specification S1000D provides the general framework for the preparation of information applicable to Maintenance Planning (MP) of a product.

It contains information about the necessary requirements for preventive check and maintenance (scheduled and unscheduled). The MP information contains the following topics:

- Time limits,

- Maintenance/Inspection task list,

- Scheduled and unscheduled checks,
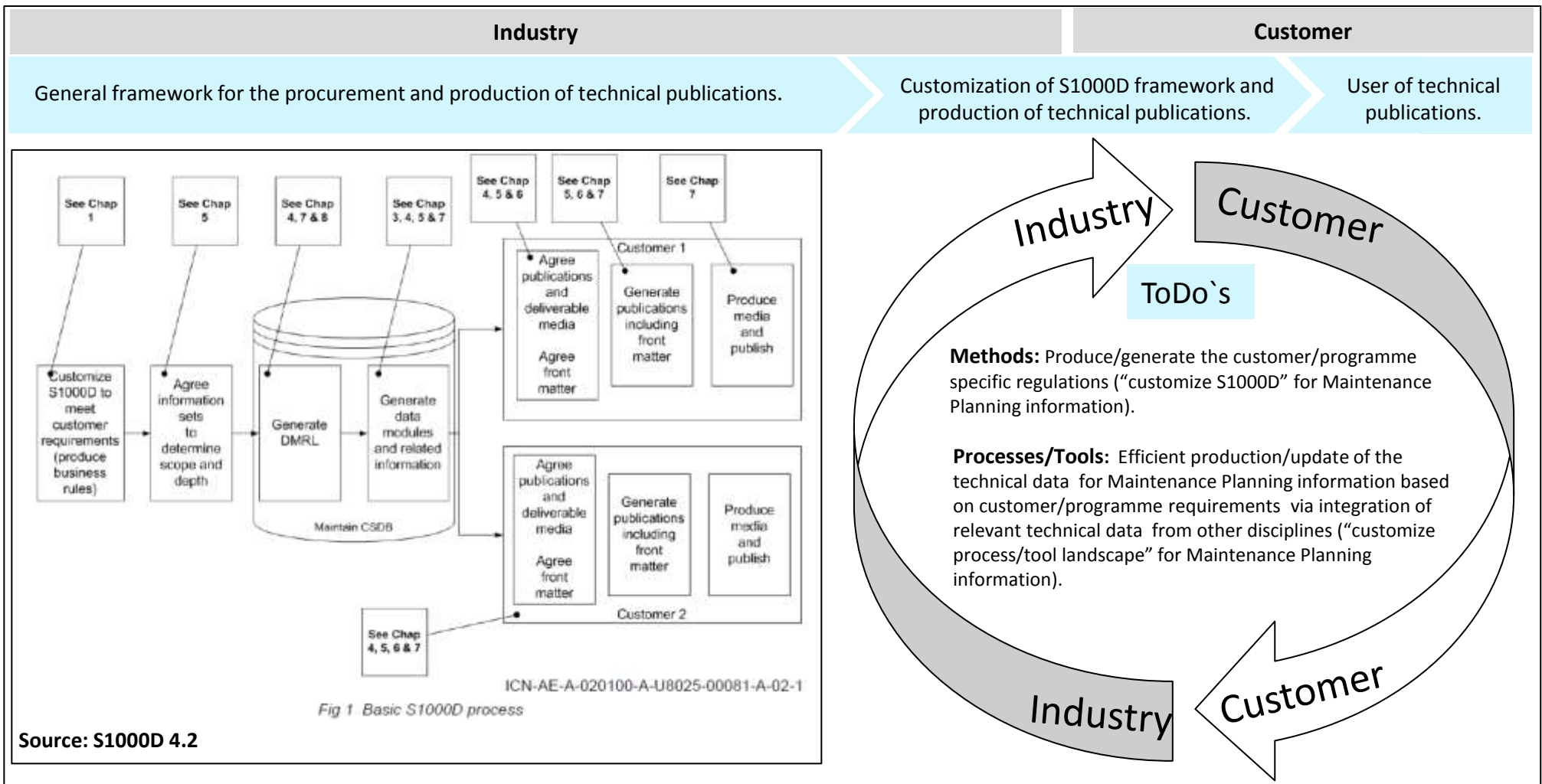
- Acceptance and functional check flight.

The preparation of Technical Documentation applicable to Maintenance Planning (MP) of a product has to be considered in context of …

- … the business landscape for military aviation which already exists and evolved across the years in Airbus Defence and Space in the different departments around the technical publications organization,

- … the specific (logistic) demands in the different military aviation projects as well as in relation to the different customers.

Focus of this presentation is to inform the audience about practical oriented activities and solutions in applying the specification S1000D in the daily work in Airbus Defence and Space, Technical Information and Data - Combat A/C.

Affordable product support by efficient application of the S1000D framework in the _perimeter of Maintenance Planning information_.

Industry	Customer

General framework for the procurement and production of technical publications.

Customization of S1000D framework and production of technical publications.

User of technical publications.

Fig 1 Basic S1000D process

ICN-AE-A-020100-A-U8025-00081-A-02-1

Source: S1000D 4.2

ToDo`s

Methods: Produce/generate the customer/programme specific regulations ("customize S1000D" for Maintenance Planning information).

Processes/Tools: Efficient production/update of the technical data for Maintenance Planning information based on customer/programme requirements via integration of relevant technical data from other disciplines ("customize process/tool landscape" for Maintenance Planning information).

Introduction <framework/way of working principles>

The production/update of Maintenance Planning information by **preparation of single data modules "by hand" is no option**. In Airbus Defence and Space in Manching several key requirements were focused (Examples):

Maximum reduction of formal complexity for all Authoring activities

Formal correctness of data module fully ensured by the authoring system (identification of failure at the first opportunity)

Standardized integration of relevant source data for production/update Maintenance Planning information.

Source data traceability during the whole life cycle of data module / technical publications

Full flexibility in exporting deliverables out of the same source

Assurance of standardization of the technical content (same technical information used in different branches of the XML schema for Maintenance Planning)

Intuitively Graphical User Interface for Technical Authors (knowledge in XML not required for authoring)

Customize S1000D: The following example describes the national methodical approach of the German Air Force (GAF) how to produce project specific regulations (Business Rules for a project / project specific Guidance Document).

Specific national logistic demands (eg, SASPF)

S1000D / S2000M

National Style Guide (NSG)   **DB S2000M**

"Muster Guidance Document" of German Air Force (MGD L)

"project specific Guidance Document" (psGD)

Based on the MGD L each project of German Air Force has to produce its psGD.

The psGD includes the project specific regulations for the production and provision of technical publications and IP data (under consideration of national IETD and SASPF requirements).

Customized definitions <regulations/examples>

Examples for customer specific requirements:

– All tasks in relation to a specific event (eg, after 2000 FH, after heavy landing) shall be listed in a schedule data module per event (branch <inspectionDefinition>).

– All tasks in relation to a specific system/subsystem (eg, hydraulic system, engine) shall be listed in a dedicated data module (branch <taskDefinition>). In this context redundant tasks in data modules using branch <taskDefinition> and data modules using branch <inspectionDefinition> are available.

– For projects (based on practical reasons), very often both categories of data modules [schedule data modules (branch <inspectionDefinition>) and schedule data modules (branch <taskDefinition>)] are expected.

– A schedule data module only contains the tasks itself → the detailed procedure which includes the additional relevant technical information (eg, <preliminaryRqmts>) will be referenced (=hyperlink from the task in the schedule data module to the respective procedural data module).

– etc

```
Technical System
    │
    │  Technical system
    │  structured with a
    │  system breakdown.
    ▼
System breakdown ──── Technical system influenced by events. ──┐
    │                                                           │
    │                                                           ├──► Events (*)
    │                                                           │         │
    │                                                           │         │  Reaction of events by actions.
    │                                                           │         ▼
    │                                                           └──► Actions ──── Actions require information about … ──► Personal
    ▼                                                                     │                                          ──► Support- / Test equipment
Parts Information                                                        │                                          ──► Spares
                                                                         │  Actions (tasks) consist of steps.       ──► Supplies
                                                                         ▼
                                                                       Steps
```
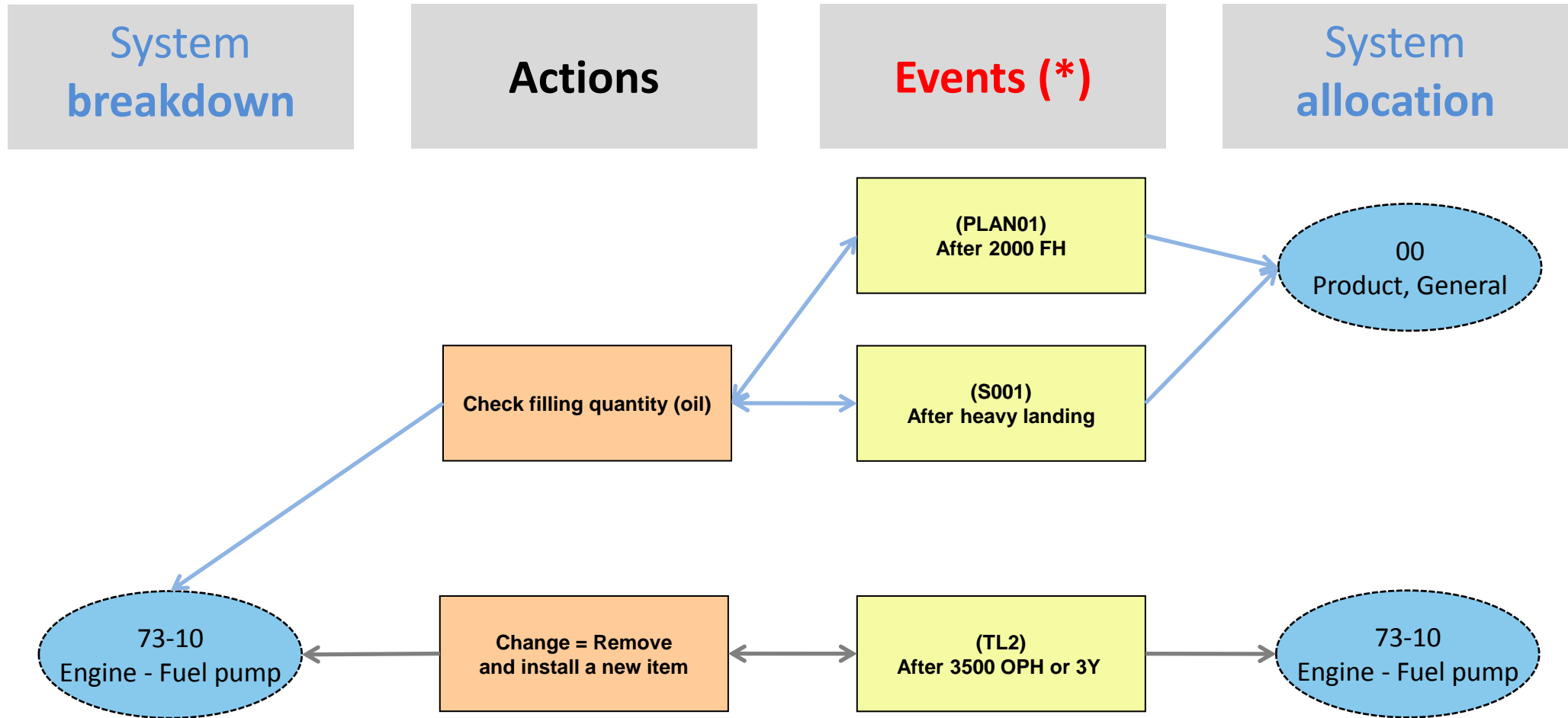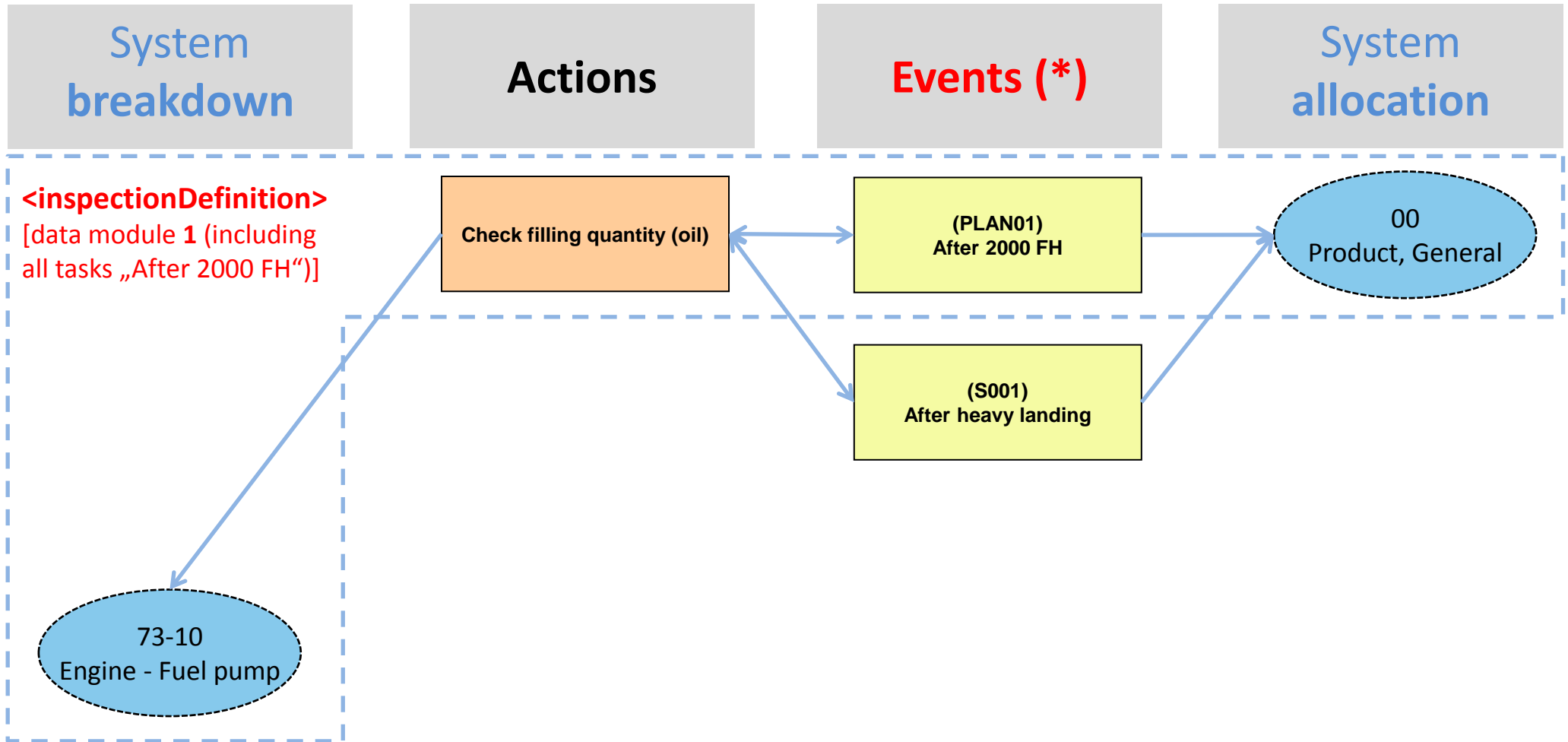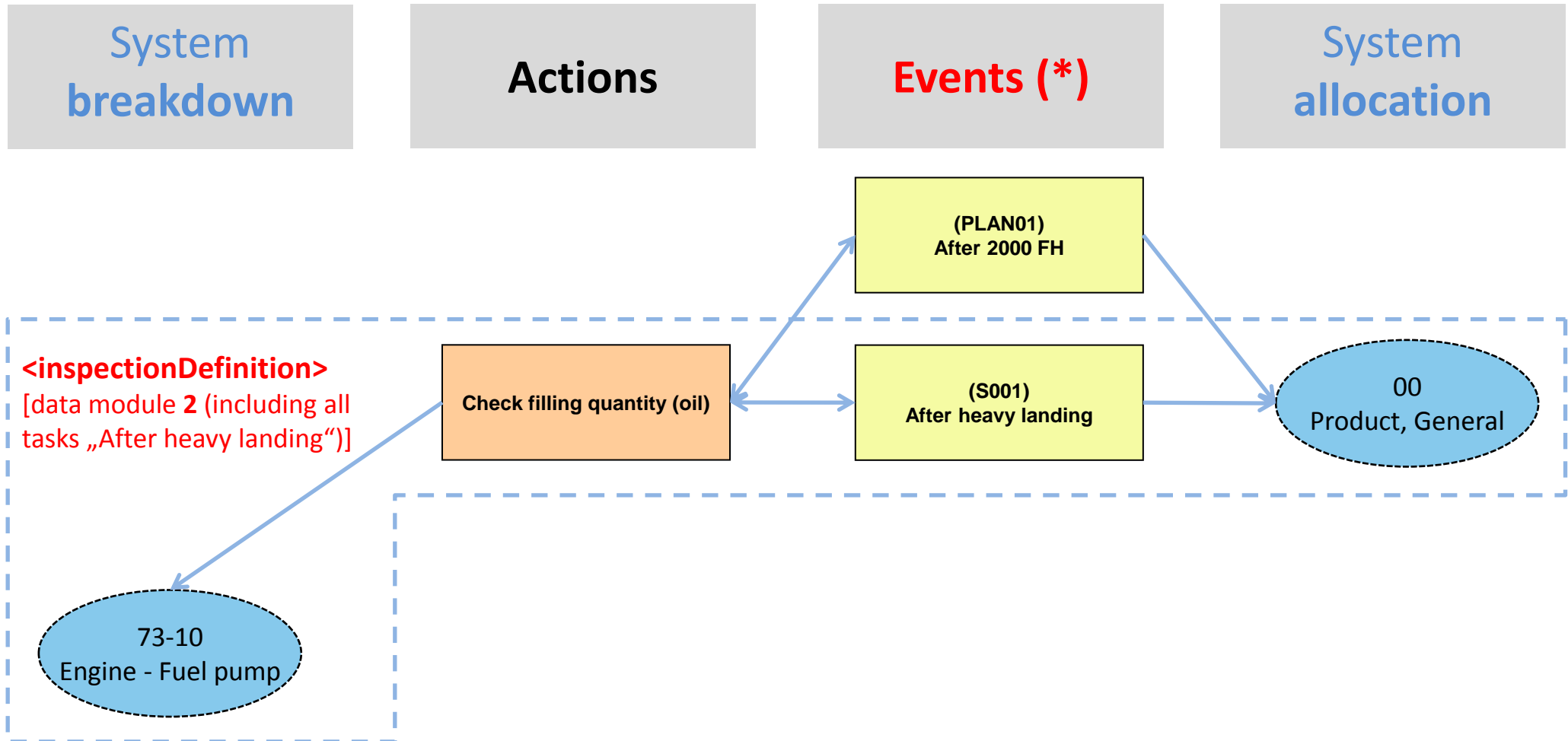
(*) *[see S1000D 4.2, Chapter 5.2.1.6, Para 1.4]*
→ **thresholds/intervals for inspections and maintenance checks**
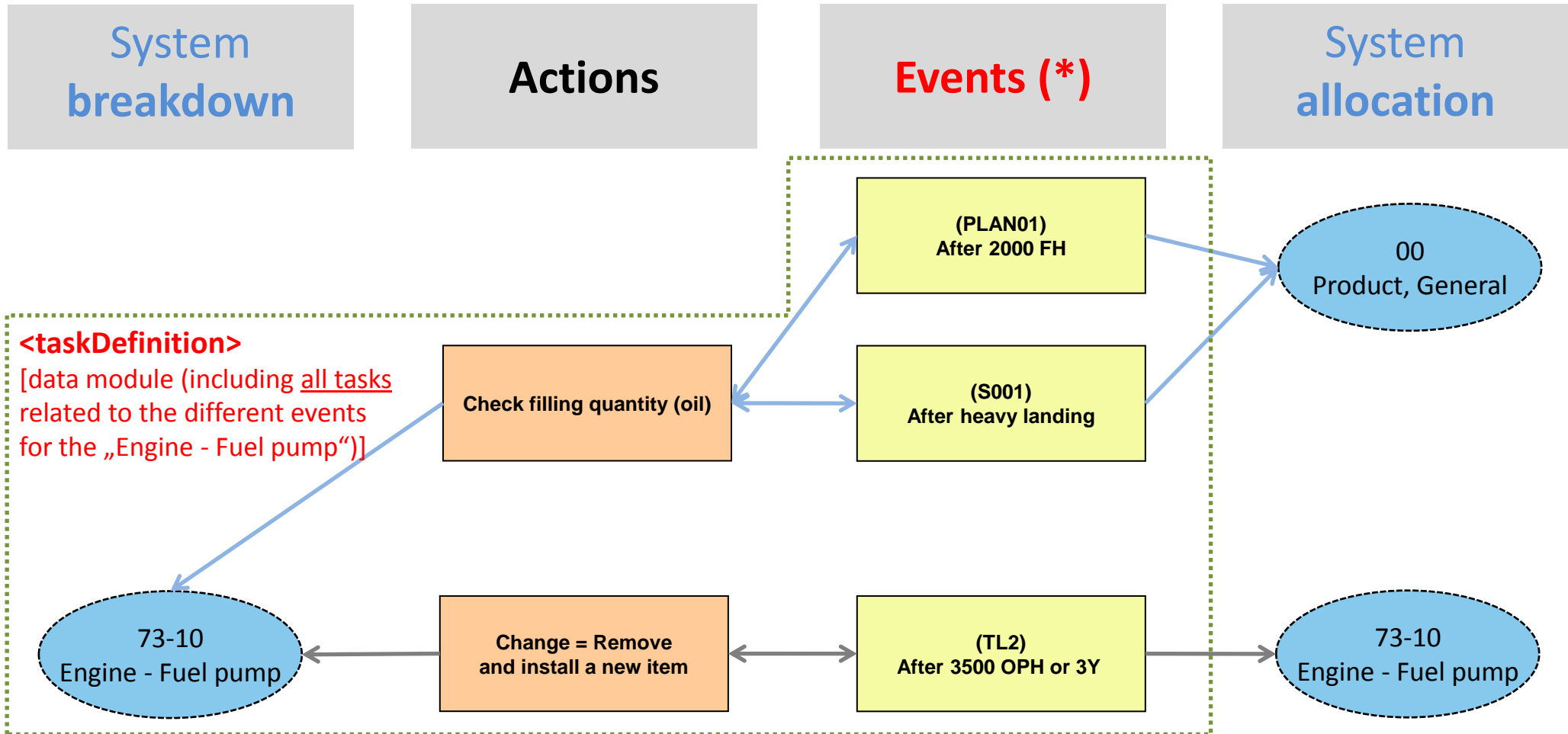→ **Special/unusual conditions not related to a threshold or interval**

INDIRA – **IN**spection **D**ata **I**nput and **R**etrieval **A**pplication

Technical concept <basic information/general> [3/3]

… authoring independently of XML (S1000D schemas) …

IETD

<procedure>

<timeLimitInfo>

<inspectionDefinition>

<taskDefinition>

SASPF

ASSET (*)

+ **Focus on technical content**
+ Consistency of data
+ Interpretability of data
+ Controlled mass processing

(*) **A**daptable **S**ystem **S**upport **E**ngineering **T**ool

System breakdown	Actions	Events (*)	System allocation

(PLAN01)
After 2000 FH

00
Product, General

Check filling quantity (oil)

(S001)
After heavy landing

73-10
Engine - Fuel pump

Change = Remove and install a new item

(TL2)
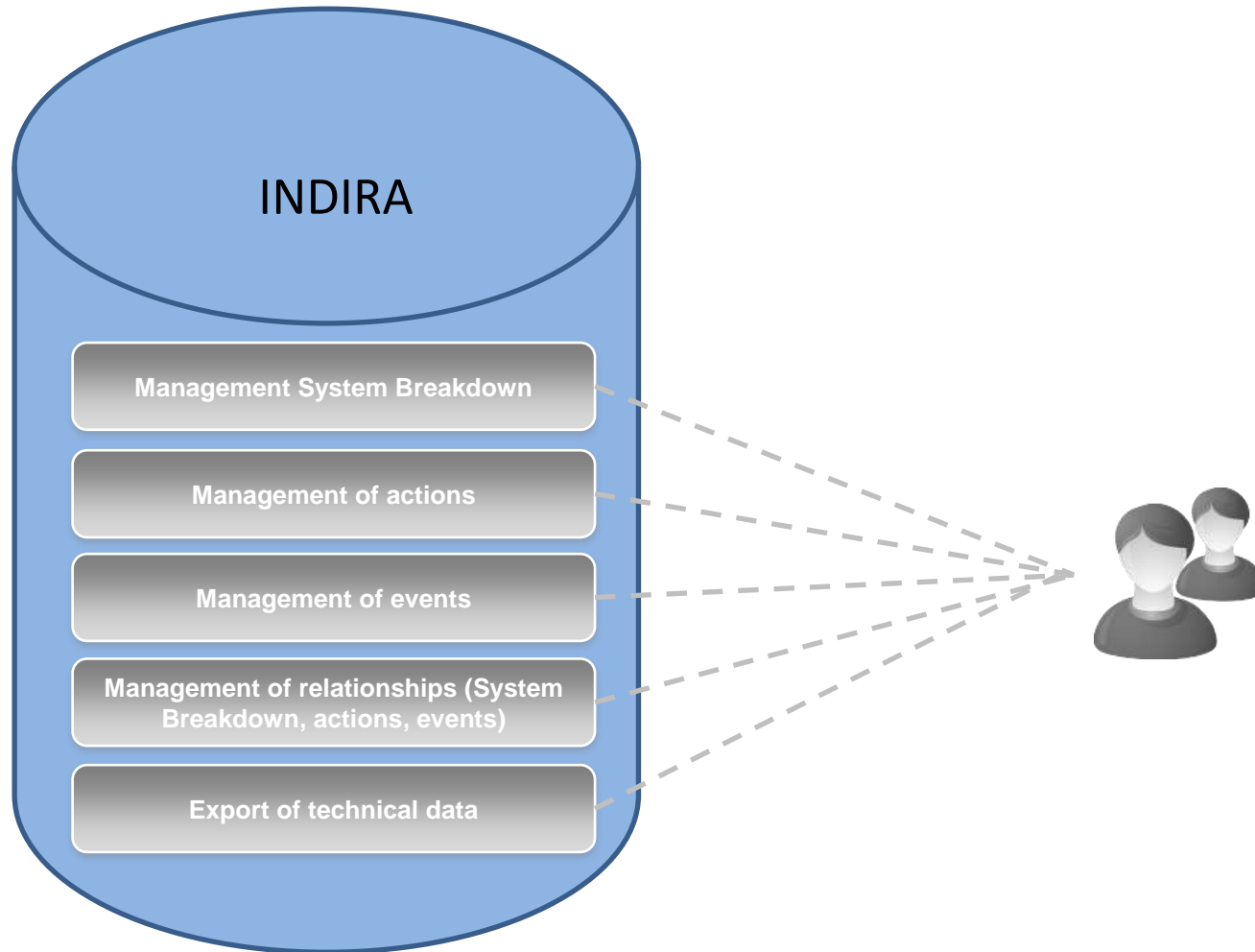**After 3500 OPH or 3Y**

73-10
Engine - Fuel pump

(*) *[see S1000D 4.2, Chapter 5.2.1.6, Para 1.4]*

→ **thresholds/intervals for inspections and maintenance checks**

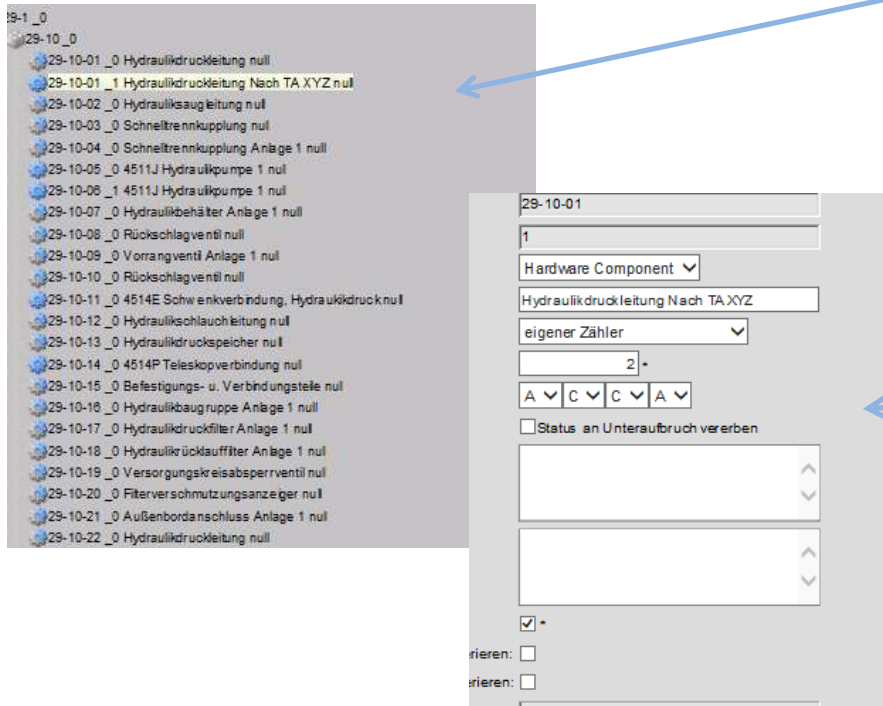→ **Special/unusual conditions not related to a threshold or interval**

System breakdown	Actions	Events (*)	System allocation

<inspectionDefinition>
[data module **1** (including all tasks „After 2000 FH")]

Check filling quantity (oil)

(PLAN01)
After 2000 FH

(S001)
After heavy landing

00
Product, General

73-10
Engine - Fuel pump

(*) *[see S1000D 4.2, Chapter 5.2.1.6, Para 1.4]*

→ **thresholds/intervals for inspections and maintenance checks**

→ **Special/unusual conditions not related to a threshold or interval**

System breakdown

Actions

Events (*)

System allocation

(PLAN01)
After 2000 FH

<inspectionDefinition>
[data module **2** (including all tasks „After heavy landing")]

Check filling quantity (oil)

(S001)
After heavy landing

00
Product, General

73-10
Engine - Fuel pump

(*) *[see S1000D 4.2, Chapter 5.2.1.6, Para 1.4]*

→ **thresholds/intervals for inspections and maintenance checks**

→ **Special/unusual conditions not related to a threshold or interval**

System breakdown	Actions	Events (*)	System allocation

<timeLimitInfo>
[data module (including all TCI tasks
for the „Engine - Fuel pump")]

73-10 Engine - Fuel pump	←	**Change = Remove and install a new item**	↔	**(TL2) After 3500 OPH or 3Y**	→	73-10 Engine - Fuel pump

(*) *[see S1000D 4.2, Chapter 5.2.1.6, Para 1.4]*

→ **thresholds/intervals for inspections and maintenance checks**

→ **Special/unusual conditions not related to a threshold or interval**

TCI = **T**ime **C**hanged **I**tem

System breakdown	Actions	Events (*)	System allocation

<taskDefinition>
[data module (including all tasks related to the different events for the „Engine - Fuel pump")]

(PLAN01)
After 2000 FH

(S001)
After heavy landing

Check filling quantity (oil)

00
Product, General

73-10
Engine - Fuel pump

Change = Remove and install a new item

(TL2)
After 3500 OPH or 3Y

73-10
Engine - Fuel pump

(*) *[see S1000D 4.2, Chapter 5.2.1.6, Para 1.4]*

→ **thresholds/intervals for inspections and maintenance checks**

→ **Special/unusual conditions not related to a threshold or interval**

Main Use Cases (Overview)

INDIRA

Management System Breakdown

Management of actions

Management of events

Management of relationships (System Breakdown, actions, events)

Export of technical data

Use Case 1: Management system breakdown

System breakdown list of the overall system.

Definition of attributes in context of a specific entry in the system breakdown (eg, 29-10-01):

- type of breakdown (eg, hardware related),
- title (name) of breakdown entry,
- definition if breakdown entry is TCI relevant,
- registration of change requests in relation to system breakdown entry,
- etc

Use Case 2: Management of actions in relation to system breakdown

Definition of attributes in context of a specific action in relation to an entry in the system breakdown (eg, 29-10-01):
- title (name) of the action,
- ID of the action,
- type of the action,
- Data Module Code (reference from action in schedule data module to relevant procedural data module),
- definition where to perform the action (eg on A/C, off A/C),
- etc

Display of the action linked to a dedicated system breakdown entry.

Use Case 3: Management of actions in relation to an event

Management (add, modify, delete) of events in relation to the overall system (00-00-00) or a dedicted system (for TCI).

Action linked to a dedicated event on overall system level (eg, event „2000FH inspection").

Use Case 4: Export of deliverables (example for PDF/paper and IETD)

Initiate export of S1000D products

Initiate export of PDF / paper products

Definition of export criteria:
- Categories of data modules (inspectionDefinition / timeLimitInfo / taskDefinition)
- Export of referenced procedural data modules
- etc

Working cards / checklists

Maintenance Planning data modules (CSDB).

Assembly of the publications (IETD).

List of abbreviations

ASSET	Adaptable System Support Engineering Tool
CSDB	Common Source Data Base
ELMASS	Enhanced Logistic MAterial Support System
IETD	Interactive Electronic Technical Documentation
INDIRA	Inspection Data Input and Retrieval Application
IP	Initial Provisioning
MGD L	Muster Guidance Document of German Air Force
MP	Maintenance Planning
MTL	Maintenance Task List
NSG	National Style Guide
psGD	project specific Guidance Document
SASPF	SAP system for material/maintenance planning in German Armed Forces
SGML	Standard Generalized Markup Language
TCI	Time Changed Item
XML	eXtensible Markup Language

Thank you

for your attention!

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