International specification for in-service data feedback

S5000F-B6865-05000-00

Issue No. 1.0

Publishers:

AeroSpace and Defence Industries Association of Europe

Aerospace Industries Association of America

Table of contents

The listed documents are included in Issue 1.0, dated 2016-08-31, of this publication.

Copyright and user agreement

Table of contents

List of tables

References

Table 1 References

Chap No./Document No.	Title
None	

1 Copyright

All correspondence and queries should be directed to:

ASD
10 Rue Montoyer
B-1000 Brussels
Belgium

2 Agreement for use of the S5000F™ suite of information

2.1 Definitions

S5000F™ suite of information means, but is not limited to:

- the International specification for in-service data feedback - S5000F
- examples (eg, XML instances, PDF files, style sheets) and Schemas
- any other software or information under the heading "**S5000F™ suite of information**", available for download from www.S5000F.org

Copyright holder means AeroSpace and Defense Industries Association of Europe (ASD).

2.2 Notice to user

By using all or any portion of **S5000F™ suite of information** you accept the terms and conditions of this user agreement.

This user agreement is enforceable against you and any legal entity that has obtained **S5000F™ suite of information** or any portion thereof and on whose behalf it is used.

2.3 License to use

As long as you comply with the terms of this user agreement, the copyright holders grant to you a non-exclusive license to use **S5000F™ suite of information.**

2.4 Intellectual property rights

S5000F™ suite of information is the intellectual property of, and is owned by the copyright holder. Except as expressly stated herein, this user agreement does not grant you any intellectual property right in the **S5000F™ suite of information** and all rights not expressly granted are reserved by the copyright holder.

2.5 No modifications

You must not modify or adapt, in whole or in part, **S5000F™ suite of information**. You may however add business rules or tailor it for use on a specific program.

2.6 Translation

You must not translate, in whole or in part, the **S5000F™ suite of information**, except if explicit permission is granted under the terms defined in [SX000i] Chapter 4.

2.7 No warranty

S5000F™ suite of information is being delivered to you "as is". The copyright holder does not warrant the performance or result you may obtain by using **S5000F™ suite of information**. The copyright holder makes no warranties, representations or indemnities, express or implied, whether by statute, common law, custom, usage or otherwise as to any matter including without limitation merchantability, integration, satisfactory quality, fitness for any particular purpose, or non-infringement of third parties rights.

2.8 Limitation of liability

In no event will the copyright holder be liable to you for any damages, claims or costs whatsoever or any consequential, indirect or incidental damages, or any lost profits or lost savings or for any claim by a third party, even if the copyright holder has been advised of the possibility of such damages, claims, costs, lost profits or lost savings.

2.9 Indemnity

You agree to defend, indemnify, and hold harmless the copyright holder and its parents and affiliates and all of their employees, agents, directors, officers, proprietors, partners, representatives, shareholders, servants, attorneys, predecessors, successors, assigns, and

those who have worked in the preparation, publication or distribution of the **S5000F™ suite of information** from and against any and all claims, proceedings, damages, injuries, liabilities, losses, costs, and expenses (including reasonable attorneys' fees and litigation expenses), relating to or arising from your use of the **S5000F™ suite of information** or any breach by you of this user agreement.

2.10 Governing law and arbitration

This user agreement will be governed by and construed in accordance with the laws of the Kingdom of Belgium.

In the event of any dispute, controversy or claim arising out of or in connection with this user agreement, or the breach, termination or invalidity thereof, the parties agree to submit the matter to settlement proceedings under the ICC (International Chamber of Commerce) ADR (Alternative Dispute Resolution) rules. If the dispute has not been settled pursuant to the said rules within 45 days following the filing of a request for ADR or within such other period as the parties may agree in writing, such dispute shall be finally settled under the rules of arbitration of the International Chamber of Commerce by three arbitrators appointed in accordance with the said rules of arbitration. All related proceedings should be at the place of the ICC in Paris, France.

The language to be used in the arbitral proceedings shall be English.

Chapter 1

Introduction to the specification

Table of contents

List of tables

List of figures

References

Table 1 References

Chap No./Document No.	Title
S1000D	International specification for technical publications using a common source database
S2000M	International specification for material management – Integrated data processing for military equipment
S3000L	International procedure specification for Logistics Support Analysis LSA
S4000P	International specification for developing and continuously improving preventive maintenance
SX000i	International guide for the use of the S-Series Integrated Logistics Support (ILS) specifications
SX002D	Common data model for the S-Series ILS specifications
ISO 10303-239 (AP239)	Product Life Cycle Support (PLCS)
Chap 16	Data exchange

1 Purpose

1.1 General

This chapter provides information of the background of the S5000F document and the companies involved in the development of the specification.

1.2 Purpose

Collection of in-service data feedback is one of the most important functions of in-service support. It enables fleet and support managers and technical system manufacturers to perform a thorough analysis of operational and maintenance performance, as well as to improve the global support service.

The results of this analysis can be the basis for

- Enhancement of the maintenance and support concept,
- Improvement of the product by modifications and retrofit activities,
- Sophisticated operational and support planning
- Detailed information regarding to the lifecycle cost (LCC)
- Complex support contract management

The overall aim to be achieved by using in-service data feedback is the increase of product and fleet availability and optimization of effectiveness, as well as improvement of the product life-cycle cost.

In addition feedback information is a firm requirement by industry to agree to and manage complex in-service contracts such as Performance Based Logistics (PBL) and to fulfill their obligations in the regard to product liability.

The purpose of using S5000F alone or together with other S-series ILS specifications is to obtain a structured way to handle the in-service data feedback from or to the operator. The S5000F data model has been built on the common data model for the S-series, SX002D, so as to ensure interoperability with the other S-Series ILS specifications. The S5000F XML schemas will be mapped to [ISO 10303-239 (AP239)] so as to allow that the in-service data feedback can be also used by other domains, such as Engineering.

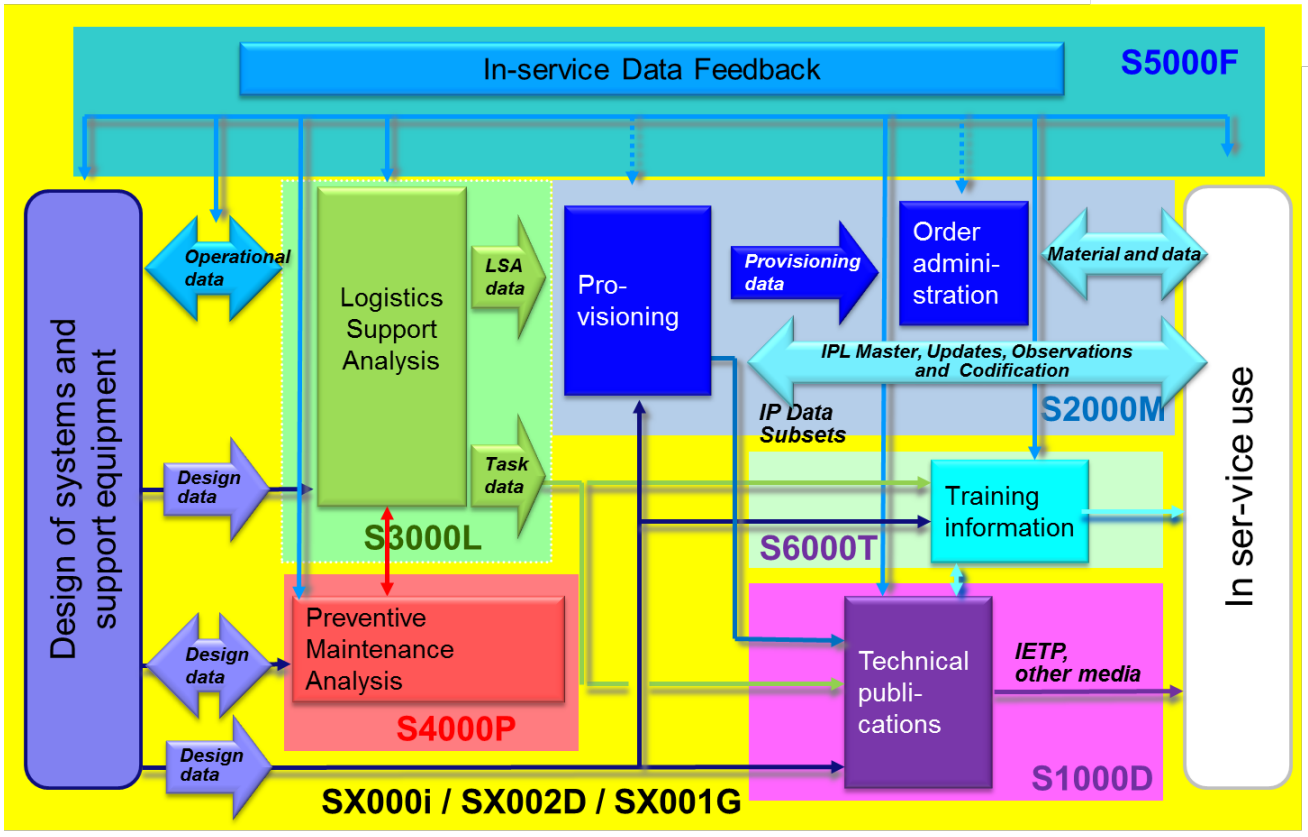
S5000F can be used for any kind of product, whether military or civil, land, sea, air or space.

1.3 Background

During 2008 the plans for developing the S5000F were drawn up within the ASD/AIA organization. At that time, there were already some S-series specifications developed and used for integrated logistic support purposes. These specifications were:

- S1000D for Technical publications
- S2000M for Material management
- S3000L for Logistic Support analysis (LSA)

The ASD/AIA organization noticed that there was a need for a specification handling in-service data feedback from the operational field to the maintainer and/or the original equipment manufacturer (OEM). As shown in Fig 1, the scope of S5000F is to handle in-service data feedback to the other S-series specifications.



ICN-B6865-SX000I30019-002-00

Fig 1 Schematic overview of the S-series specifications

It was decided that the S5000F specification:

- shall take the activity model given by ISO 10303-239 into account and shall support data exchange compatible with PLCS.
- shall include process application guidelines and rules for information exchange,
- shall be tailorable and include guidelines for tailoring,
- shall take current ISO/EN baseline documents into account,
- shall enable online interfaces to the suite of the ASD ILS Specs, ie S1000D, S2000M, S3000L, S4000P.

The kick-off meeting was held in October 2008 in Munich and the purpose and the scope of S5000F was presented for interested industries and organizations (eg armed forces and authorities).

The development work was then allocated to an international team of experts working under the joint chairmanship of AIA and ASD representatives. The following companies/organizations contributed to the work:

- Airbus Defense & Space — Germany & Spain
- Andromeda Systems — United States
- BAE Systems — UK
- Boeing — United States
- Bundeswehr — Germany
- Dassault Aviation — France
- ESG — Germany
- Occar — Europe (based in Germany)
- O'Neil — USA
- Rolls-Royce — UK
- Saab AB — Sweden
- UK MoD — United Kingdom

2 Scope

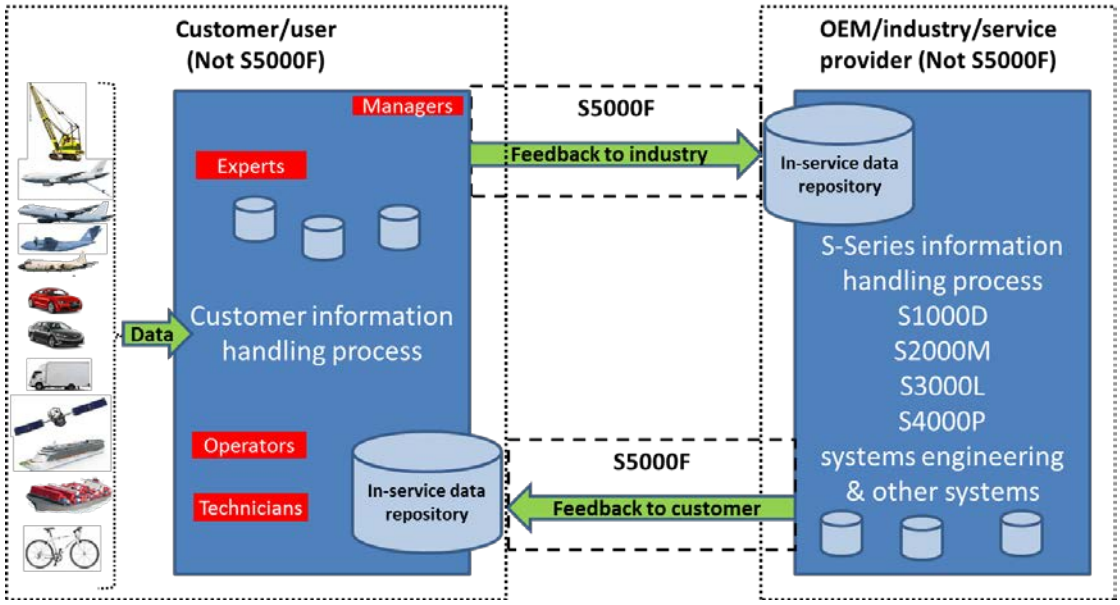
The scope of S5000F is to handle information from the in-service operation of a product (from the operator to the OEM and/or the maintainer and vice-versa). The processes in the specification focus mainly on operational and maintenance feedback information and other activities that take place during the operational phase of the life cycle of the product. As defined by SX000i, the Product life cycle is divided into five phases:

- Preparation
- Development
- Production
- In service
- Disposal

The last two, In service and Disposal, are the phases that mainly are within the scope of S5000F. Nevertheless, the specification can be also used for data exchange at any time during the life cycle of the product. An example of usage during other product phases would be to provide feedback during the development phase when performing tests, field-trials and prototyping. This would allow reusing the same protocols and data processing infrastructure for the in-service phase.

S5000F can be used for exchange of information from the operational site to the OEM or vice versa. The flow of data can be multidirectional, thus allowing for the usage of S5000F in complex in-service contracts. This is illustrated in Fig 2 below.

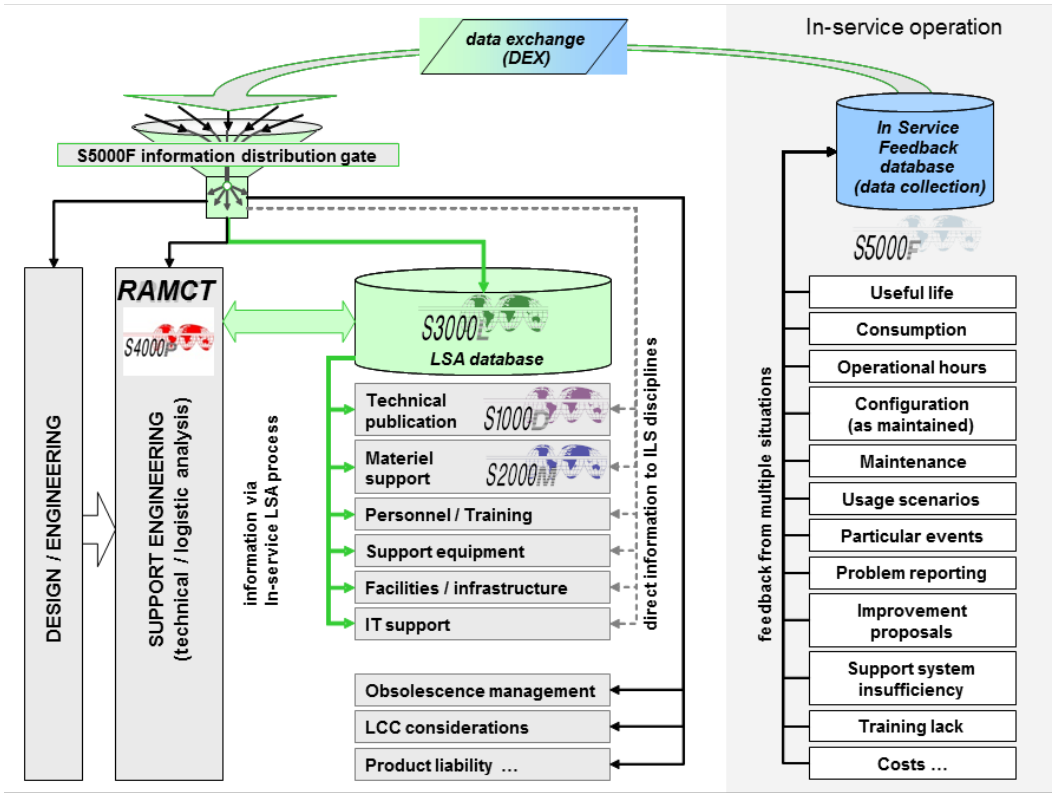
For more information regarding exchange of data and data storage please refer to Chap 16 – data exchange.



ICN-B6865-5000F1602-002-01

Fig 2 Outline of data exchange and in-service databases

Fig 3 shows activities and situations that takes place in the in service phase (to the right) of the system or product that require an activity in the ILS processes (to the left). The feedback data is sent to the organization of interest using either the S5000F XML schema or PLCS.



ICN-B6865-5000F01003-002-01

Fig 3 Activities in the in service use that requires activities in the ILS process

3 How to use the specification

This Para gives an overview of the S5000F chapters and some basic definitions and common acronyms.

3.1 Tailoring of S5000F processes

In order to ensure efficient application, S5000F has been designed to allow users to select functionality that is appropriate to their specific need for feedback or specific projects or applications.

Individual chapters may be included or excluded.

3.2 Acronyms and basic definitions

Throughout the S5000F a set of common acronyms is used to aid in the understanding and to minimize duplication. These acronyms are only explained in the chapter where they are used for the first time. The same abbreviation is used for all tenses, the possessive case and singular and plural forms of a given word. A complete list of abbreviations, acronyms and definitions is given in Chap 20.

Some common acronyms and basic definitions are shown in Table 2.

Table 2 Some common acronyms and definitions

Acronym/definition	Description
AIA	Aerospace Industries Association of America
ASD	AeroSpace and Defense Industries Association of Europe
ATA	Air Transport Association
ILS	Integrated Logistics Support
LRU	Line Replaceable Unit
OEM	Original Equipment Manufacturer
PLCS	Product Life Cycle Support
Product	Any platform, system or equipment (air, sea, land vehicle, equipment or facility, civil or military)
Project	The task to develop, maintain and dispose of the Product
SRU	Shop Replaceable Unit

4 Organization of the specification

The S5000F is organized into chapters.

The nature of the project using S5000F for handling in-service data feedback will determine the range of deliverables that are required and hence the depth to which the S5000F needs to be tailored.

4.1 Chapter 1 – Introduction to the specification

Chap 1 gives a basic overview of the S5000F specification. The chapter also provides information of the background of the document and companies involved.

4.2 Chapter 2 – The in-service data feedback business process

Chap 2 provides an outline of the operational and maintenance feedback process that provides the framework for the ASD S5000F specification. The chapter is directed at fleet managers,

Integrated Logistics Support (ILS) managers, MRO managers and other groups dealing with System optimisation and operations for both the customer and the contractor. It also provides a mapping of the feedback to different support activities and the different specifications. As defined in SX000i.

4.3 Chapter 3 – Feedback data for the purpose of reliability, availability, maintainability, capability and testability analysis

Chap 3 covers the more common activities involved, the basic definitions and basic data fields involved in the gathering of user data for reliability, availability, maintainability, capability and testability (RAMCT) analysis. It should be read by anyone who requires engineering performance indicators to be produced for engineering or operational monitoring, changes to engineering design and the provisioning of spares.

4.4 Chapter 4 – Feedback of data for maintenance analysis

Chap 4 defines the maintenance data feedback process. The chapter provides a guideline on the process and the information to be exchanged in order to provide appropriate data for maintenance analysis.

4.5 Chapter 5 – Feedback of safety data

Chap 5 defines the feedback data for safety analysis. This chapter identifies several use cases about the data to be exchanged for this purpose.

4.6 Chapter 6 – Feedback of data for supply support

Chap 6 complements the exchange of information defined in S2000M, providing additional supply support information required for the management of service contracts that is not covered in the traditional provisioning process.

4.7 Chapter 7 – Feedback for Life Cycle Cost analysis

Chap 7 describes how to identify and how to populate a cost breakdown structure (CBS) with cost elements associated to the in service phase and the disposal phases. The chapter points out that the benefit of using life cycle costing should be considered not as a one off, when developing or purchasing a product or system, but as an on-going activity throughout the life cycle.

4.8 Chapter 8 – Feedback of data for warranty analysis

Chap 8 describes warranty data feedback and how it could be used to provide a set of information in order to analyze the correctness of warranty statements and relative actions to manage defects.

4.9 Chapter 9 – Feedback data for the purpose of product health and usage monitoring

Chap 9 identifies common activities, basic definitions and basic data fields involved in the gathering and feeding back of usage and health monitoring data. It should be read by anyone who requires engineering performance indicators to be produced by usage and health monitoring systems for engineering or operational monitoring, changes to engineering design, condition monitoring and the provisioning of spares.

4.10 Chapter 10 – Feedback of data to support obsolescence management

Chap 10 describes how obsolescence management is used to assure the product is producible and supported for the expected life. The process consists of planned and co-coordinated activities for providing availability of product during its intended life.

4.11 Chapter 11 – Feedback of data for integrated fleet management

Chap 11 provides an outline of the data necessary to carry out the activities associated to the management of a fleet of products.

4.12 Chapter 12 – Feedback for configuration management

Chap 12 provides the necessary information about how to provide different platform configuration aspects, the necessary information that is required for configuration control purposes, the initial configuration information to be provided to the customer, including its updates, and the information that has to be provided to the original OEM or other design authority for logistic, technical and legal (eg, to ensure continuous airworthiness) purposes.

4.13 Chapter 13 – Feedback of data to support the management of in-service contracts

Chap 13 can be used for the construction of generic performance parameters able to manage and measure the progress of in-service contracts, both by the contractor and by the contracting party.

4.14 Chapter 14 – Feedback of non-predefined information

Chap 14 provides the necessary information about how to provide feedback of information from the in-service domains that is not covered elsewhere in the S5000F specification, either because the corresponding data elements have not been defined, or because the information can simply not be mapped to data elements (e.g., unstructured data).

4.15 Chapter 15 – Data model

Chap 15 defines a coherent data model for the data that can be exchanged for the in-service data feedback and related business processes. This data model is based on SX002D, Common Data Model for the S-Series ILS Specifications.

4.16 Chapter 16 – Data exchange

Chap 16 defines a coherent set of guidelines for the implementation of the data exchange required for the operational and maintenance data feedback, including a global process description and recommendations for storage of feedback data.

4.17 Chapter 17 – Data element list

Chap 17 defines all data elements that are used as classes or attributes in the S5000F data model and in the S5000F data exchange (Chapter 16). It also provides the mapping to the S-Series Common Data Model and a cross-reference to the chapters and use cases where these data elements are used.

4.18 Chapter 18 – Tailoring of and contracting against S5000F

Chap 18 contains guidelines for the use of S5000F, including directives for tailoring and how to use it within a contractual framework.

4.19 Chapter 19 – Data required for the different use cases

Chap 19 contains a set of tables that define the data that is required for each individual use case.

4.20 Chapter 20 – Terms, abbreviations and acronyms

Chap 20 contains definitions, abbreviations and acronyms used throughout the document.

5 Maintenance of the specification

At publication of the first issue of S5000F, a maintenance organization will be put in place, comprising representatives from the nations involved in the preparation and use of the specification.

Any proposals relating to changes to the specification are to be managed by the group as change proposals.

5.1 Commenting on the S5000F™ suite of information

The steering committee developing the S5000F would appreciate comments regarding the content of the specification, in order to improve it in future issues. To manage the changes and clarifications proposed by others when reviewing the specification, a web portal will be used. How to access the portal is described in Para 5.2 below. Comments to the specification should be raised by creating an issue against the specification in the aforementioned portal.

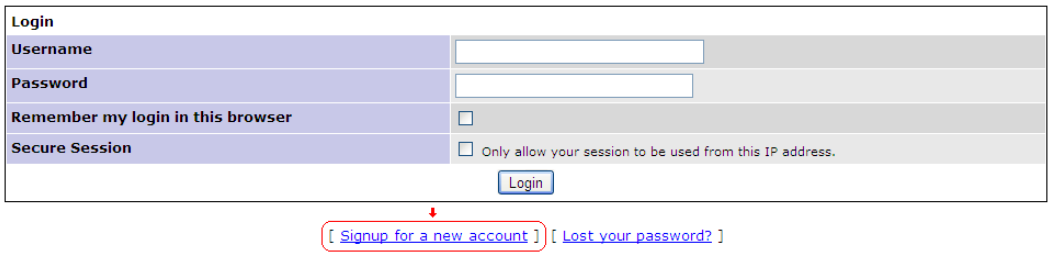
Questions regarding the content in the Issue 1.0 of S5000F™ suite of information or how to suggest changes and clarifications should be raised through either the web portal mentioned in Para 5.2 or directly to:

S5000F European Chair - Ramón Somoza, ramon.somoza@airbus.com

5.2 Web portal

A common process for change proposals and requests for clarification has been implemented for all specifications within the ASD/AIA ILS Specification Suite. This process is realized by an interactive web portal. The link to access the portal is www.SX000i.org/CPF.

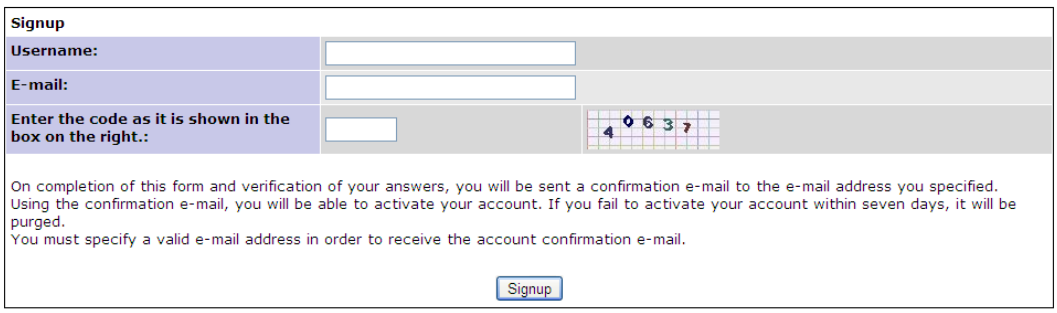
At the first access to the web portal the signup for a login username is required. For this purpose, the function "*Signup for a new account*" must be used. Refer to Fig 4.



ICN-B6865-5000F0104-001-01

Fig 4 Login screen for ASD/AIA specification maintenance web portal

To create a user account, please follow the instructions on the screen after selecting "*Signup for a new account*". Enter your favored user name and your email address, confirm the control code and click on the "Signup" button. For easy user identification (especially if you have to be assigned to one of the specification groups), it is suggested that you use a meaningful user name. Refer to Fig 5 for the signup screen.



ICN-B6865-5000F01005-001-01

Fig 5 Sign up for an account

The signup will be confirmed automatically by email and the creation of a password is requested. To complete the signup process, the password must be assigned to the new user account; the provided email contains a corresponding link for this purpose. After the successful password assignment, the login to the web portal is enabled and change proposals or requests for clarification can be reported as “issues” to the ASD/AIA ILS community.

5.3 Change process

The change process of S5000F will be as defined in [SX000i] Chapter 4, so as to maintain the interoperability with the other S-Series ILS specifications.

Chapter 2

The in-service data feedback business process

Table of contents

List of tables

List of figures

References

Table 1 References

Chap No./Document No.	Title
Chap 16	Data exchange
Chap 18	Tailoring and contracting against S5000F

1 Introduction

The introduction of a new System or Product usually requires product surveillance in order to fulfil the product liability regulations and to ensure a proper and optimal exploitation of the product capabilities. This requires a process for information feedback so as to ensure cost-efficient and optimised operation of the product. Over the life cycle of a complex technical system or product, support costs are much higher than acquisition costs. Therefore this Standard is a prerequisite for cost saving and optimized product exploitation. It describes the relevant data flow for the involved parties and information feedback when the data is analysed and turned into recommendations.

2 Scope

This chapter provides an outline of the in-service data feedback process that provides the framework for S5000F. This chapter is directed at fleet managers, Integrated Logistics Support (ILS) managers, MRO managers and other groups dealing with System optimisation and operations for both the customer and the contractor. Operational and maintenance feedback enables the implementation of efficient and powerful system improvements as well as valuable support in the usage of products with respect to availability, affordability and maintainability. Additionally, monitoring and control functions can be achieved and decision-making support improved by using the feedback process. With the incorporation of various analysis results, it can be assured that customer needs for operability, supportability and readiness can be achieved.

The in-service data feedback process document provides a guideline on how the following chapters are structured to define the data feedback for the different tasks. Since all chapters follow the described guideline, it is a handy reference for users of the specification, helping them to find the rules and requirements for the data feedback task they are looking for.

It is stipulated that users of this specification know the tasks they have to work on, and they will find the required data and descriptions for their tasks on the basis of the corresponding data in S5000F. Therefore the process description in this chapter enables the user to obtain a clear overview of the structure and of how to use S5000F.

3 Feedback sources

Throughout the existence and usage of defence systems, several sources will need different information and data. There are a variety of reasons for requesting data. With respect to the focus and tasks, the user has to look at structured and detailed feedback on various data, and the data requester needs information in order to carry out their daily business. S5000F is basically focused on the operational and maintenance data which are derived from the following main aspects of system usage:

– Existence of systems and products	existence
– Usage of system and products	operation
– Conservation of value (scheduled)	maintenance
– Maintenance (un-scheduled)	maintenance
– Upgrades	maintenance
– Integration	operation

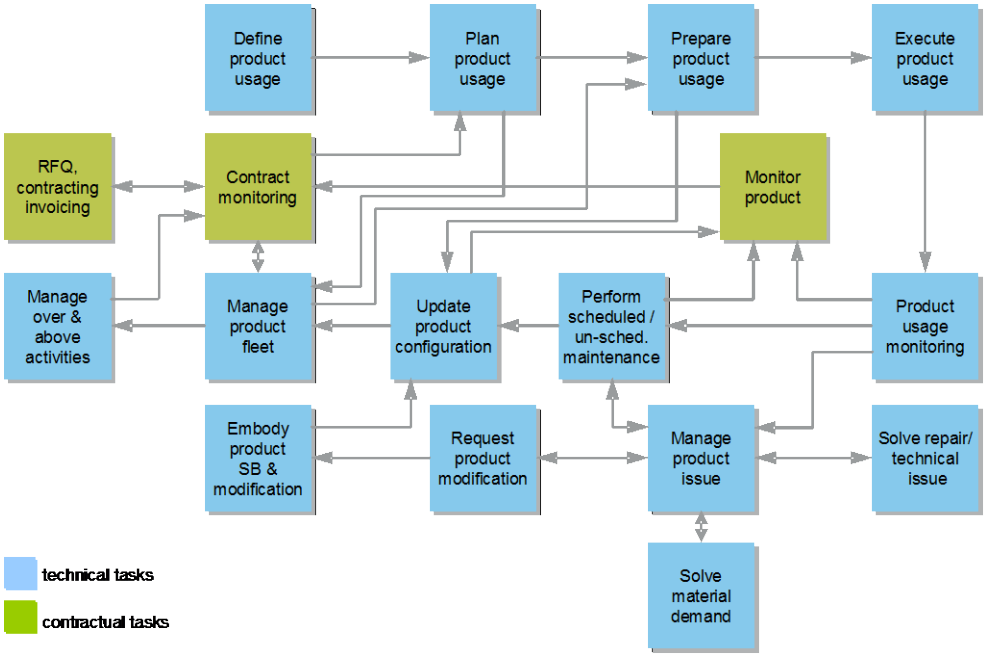
4 In-service data feedback process

The in-service data feedback process is described by means of the top-level diagram below. The blue boxes represent the technical activities, which, depending on the contractual basis, may be performed by the customer, by the OEM or by a third party. The green boxes represent contractual activities. Normally, each of the boxes holds its own process. Since the detailed processes differ from system to system and from user to user, they are not explained in this chapter. It is not the intention of this document to describe the different processes which are used during the in-service phase of a system. However, the specification will provide the necessary instructions on how to support the applied processes with the relevant data in an efficient and standardised way. It is up to the user to apply the specified rules and definitions from S5000F to their own and individual process. The main goal is to provide the relevant data/information and to receive data from the different operators for analytical or planning purposes. S5000F is the specification which allows global distribution of data with the purpose of enabling all participating users to undertake comparisons or detailed analyses. Even if users only hold a subset of a system's data, this specification will enable them to complete the required data set to perform the investigations they need to. Furthermore, it will be possible to share the results of the analysis and compare them in cases where the complete data set cannot be sent to all parties due to security reasons or in case the investigations are split up among design responsibilities and different owners of the system.

S5000F allows the applying users to share data and reports, exchange experiences and analysis results of products and systems. Furthermore, the specification is intended to support contractual needs by delivering the relevant data and information for the different parties.

Corresponding to the process which has to be applied during the in-service phase, the user has to decide which data set he needs to support that process. For a better understanding, Table 3 lists some activities which are considered in S5000F at present. The table clearly shows overlapping of the relevant data set across all in-service activities. Therefore, users of the specification should go to the chapter they want to use, where they will find a detailed description of the information they need to send.

Finally, a data model will support the whole process and will ease the usage of the data set.



ICN-B6865-5000F02001-001-00

Fig 1 Working process

The working process as it is shown explains the main tasks of operating a product. Together with the activity list, it helps the user of the document to define the necessary data feedback for the required investigations or planning.

5 Feedback for the global ILS process

The in-service data are used for multiple activities as part of the global ILS process, as defined in SX000i. Table 2 provides the mapping of the individual chapters to the different S-Series ILS specifications and all the ILS activities defined as part of the global ILS process.

Table 2 Mapping of S5000F chapters to the S-Series ILS specifications and global ILS process from SX000i.

ILS Element	Activities	ASD Specifications coverage									
		S1000D	S2000M	S3000L	S4000P	S5000F	S6000T	SX000i	SX001G	SX002D	STE-100
Computer Resources	Perform Computer Resource Analysis			P		10,12,13		T			
	Provide Computer Resources							T			
Design Influence	Perform Reliability, Availability, Maintainability Analysis			I	I	3		T			
	Perform LSA		S	F	I	3,4,8,9,10,12		T		S	
	Perform LCC (Affordability) Analysis			P		7,8		T			
Facilities and Infrastructure	Perform F&I Analysis			P		13		T			
	Provide Facilities and Infrastructure					13		T			
Maintenance	Develop Maintenance Concept			F	S			T			
	Perform Level of Repair Analysis			F		3,7		T			
	Develop Maintenance Plan		S	F	I	3,4		T			
	Execute Maintenance Tasks	S	S			3,4,9		T			
	Perform Supportability Safety Analysis					5		T			
	Develop and continuously improve preventive maintenance			I	F	3,4,9		T			
	Perform Scheduled Maintenance Analysis				F	3,4		T			
	Perform Diagnostics, Prognostics and Health Management (D&PHM) Analysis					9		T			
	Perform Software Maintenance Analysis			F				T			
Manpower & Personnel	Perform Manpower & Personnel Analysis			P		4,13		T			
Packaging, Handling, Storage & Transport (PHS&T)	Analyse PHS&T Requirements		S	I		3,9		T			
Product Support Management	Manage contract					13		T			
	Capture product support requirement		S	P				T			
	Develop ILS plan		S			13		P			
	Perform obsolescence management		S	F		10		T			
Supply Support	Provide provisioning data		F			3,8		T		S	
	Perform Material Supply		F			3,8,11,12,13		T			
Support Equipment	Analyse Support Equipment Requirements			P		13		T			
	Provide Support Equipment		I					T			
Sustaining Engineering	Perform engineering technical analysis			P		3,3,9,19,12		T		S	
	Develop & provide engineering disposition & recommend design changes	S	S	P	P	3,4,5,9,10,12		T			
Technical Data	Develop Technical Data Package		I			12		T		S	
	Produce Technical Publications	F	I			3,4,14		T			S
Training and Training Support	Perform Training Need Analysis (TNA)						F	T			
	Develop Training PLan	S					F	T			
	Perform Training Development	F					I	T			
	Deploy Training	S						T			
Other activities (not covered in first SX000i issue)	Manage In-service ILS activities		S			13					
	Perform in-service maintenance optimization (ISMO)				F	8,4,9,12					
	Operational suitability evaluation					3,4,6,9,11					
	Fleet management					F (11)					
	Manage stocks / stores		I			6					
	Manage warranty		I	P		8					
	Disposal		S	P							

LEGEND

F	FULL IN-DEPTH COVERAGE
P	PARTIAL IN-DEPTH COVERAGE
I	NO COVERAGE BUT INFORMATION IS SUPPLIED BY THE SPECIFICATION
S	SUPPORT
T	TOP-LEVEL COVERAGE
	NO COVERAGE

Note that a separate mapping is provided for in-services activities, as the current SX000i issue does not cover in-service activities.

6 Support of in-service activities

All in-service activities considered in this document correspond to one chapter or another described in S5000F. Note that these in-service activities are currently not included in SX000i, hence that they have been listed in a separate Para.

Table 3 lists a selection of activities which are considered in the different chapters of this document, as well as the fact that the data sets of different chapters often overlaps. This fact has to be considered in data modelling, which makes it rather complex. Derived from the activities, the data elements are defined in the following chapters to enable users of the specification to identify the right data cluster and element when they wish to support one of the listed activities.

Table 3 Overview of considered activities

Main-activity	Sub-activity	Chap 3 – RMCT analysis	Chap 4 – Maintenance analysis	Chap 5 - Safety analysis	Chap 6 – Supply Support	Chap 7 - Life Cycle Cost	Chap 8 - settlement of warranty issues	Chap 9 - Platform Health & Usage Monitoring	Chap 10 - Obsolescence Management	Chap 11 - integrated fleet management data	Chap 12 - Product Configuration	Chap 13 - Management of in-service Contracts	Chap 14 - non-predefined information
Buy commercially	Perform RFQ, contracting & invoicing				X	X		X				X	
	Monitor contract	X			X	X	X	X	X			X	
	Purchase	X			X	X	X		X			X	
Engineering design	Studies		X	X		X	X	X	X	X	X		
	Simulation	X	X	X	X	X		X		X	X		
	Design & Development Engineering	X	X	X		X		X	X		X		
	Design Changes	X	X	X	X	X		X	X		X	X	X
	Human Factors Interfacing	X	X	X		X		X			X		X
	design intent		X	X		X		X	X		X		
	design the product	X	X	X		X		X	X	X	X	X	
	environmental protection		X	X		X					X		
Engineering disposal	Perform disposal		X	X	X	X			X	X	X		
Engineering Management	Manage over & above activities		X			X		X				X	
	Business strategy & planning		X		V	X		X		X			
	performance & risk management	X	X		X	X	X	X	X	X	X	X	

Main-activity	Sub-activity	Chap 3 – RMCT analysis	Chap 4 – Maintenance analysis	Chap 5 - Safety analysis	Chap 6 – Supply Support	Chap 7 - Life Cycle Cost	Chap 8 - settlement of warranty issues	Chap 9 - Platform Health & Usage Monitoring	Chap 10 - Obsolescence Management	Chap 11 - integrated fleet management data	Chap 12 - Product Configuration	Chap 13 - Management of in-service Contracts	Chap 14 - non-predefined information
Engineering monitor	Performance monitoring	X	X	X	X	X	X	X	X	X	X	X	X
	information management	X	X		X	X	X	X		X	X	X	
Engineering obsolescence	Obsolescence Management		X	X	X	X	X	X	X	X	X	X	
Engineering safety	Manage product safety			X		X		X		X	X		X
Engineering sustain Support	Technical Support Services		X	X	X	X	X	X	X	X	X	X	X
	sustain engineering support	X	X		X	X	X	X	X	X	X	X	X
	finance recording				X	X							
Engineering test	Assess and Acceptance Test	X	X			X	X	X			X		X
	Demonstration and evaluation trials	X			X	X	X	X				X	
	operational environment assessment	X	X	X	X	X	X	X		X	X		X
	event recording	X	X	X		X	X	X		X	X	X	X

Main-activity	Sub-activity	Chap 3 – RMCT analysis	Chap 4 – Maintenance analysis	Chap 5 - Safety analysis	Chap 6 – Supply Support	Chap 7 - Life Cycle Cost	Chap 8 - settlement of warranty issues	Chap 9 - Platform Health & Usage Monitoring	Chap 10 - Obsolescence Management	Chap 11 - integrated fleet management data	Chap 12 - Product Configuration	Chap 13 - Management of in-service Contracts	Chap 14 - non-predefined information
Fleet and Asset management	Update& manage product configuration / system integration		X	X	X	X		X	X	X	X	X	
Fleet and Asset management	Manage product fleet	X	X	X	X	X		X	X	X	X	X	
	Configuration Management		X	X	X	X		X	X	X	X	X	
	System Integration			X		X		X	X		X		
	Installation	X	X	X	X	X	X				X		
	Asset Management	X	X	X	X	X	X	X	X	X			
	defence strategy & planning		X		X	X		X	X	X			
	engineering governance		X	X		X					X		
	role change		X	X		X		X	X		X		
	Health and usage Monitoring					X		X					X
	Analysis	X	X	X	X	X	X	X	X	X	X		
	Perform maintenance	X	X	X	X	X	X	X	X		X	X	X
Manufacture	Maintenance Management	X	X	X	X	X	X	X	X	X	X	X	X
	Restoration		X		X	X	X	X	X	X	X	X	X
	plan customer maintenance program	X	X	X	X	X	X	X	X		X	X	

Main-activity	Sub-activity	Chap 3 – RMCT analysis	Chap 4 – Maintenance analysis	Chap 5 - Safety analysis	Chap 6 – Supply Support	Chap 7 - Life Cycle Cost	Chap 8 - settlement of warranty issues	Chap 9 - Platform Health & Usage Monitoring	Chap 10 - Obsolescence Management	Chap 11 - integrated fleet management data	Chap 12 - Product Configuration	Chap 13 - Management of in-service Contracts	Chap 14 - non-predefined information
	operator maintenance program	X	X	X	X	X	X	X	X		X	X	
	perform scheduled maintenance	X	X	X	X	X	X	X	X		X	X	
	perform unscheduled maintenance	X	X	X	X	X	X	X	X		X	X	X
	Manufacturing			X	X	X	X		X		X		
	Define Product Mission	X				X				X			
	Plan Product Mission					X		X		X	X		
	Prepare Product Mission		X			X		X		X	X		
	Product mission debriefing	X				X		X		X			
	Perform Operation	X	X	X		X	X	X			X		
	Perform deployment	X	X			X		X	X	X	X		
	operator profile		X			X		X					
	Identify operational requirement					X							
	Supply Support Management	X	X		X	X	X		X	X	X	X	
	Replenishment of consumables	X	X		X	X	X		X	X			
	supply spares	X	X		X	X	X	X	X	X	X	X	
Security	security		X		X	X		X		X			
Sell	selling commercially				X	X	X		X				

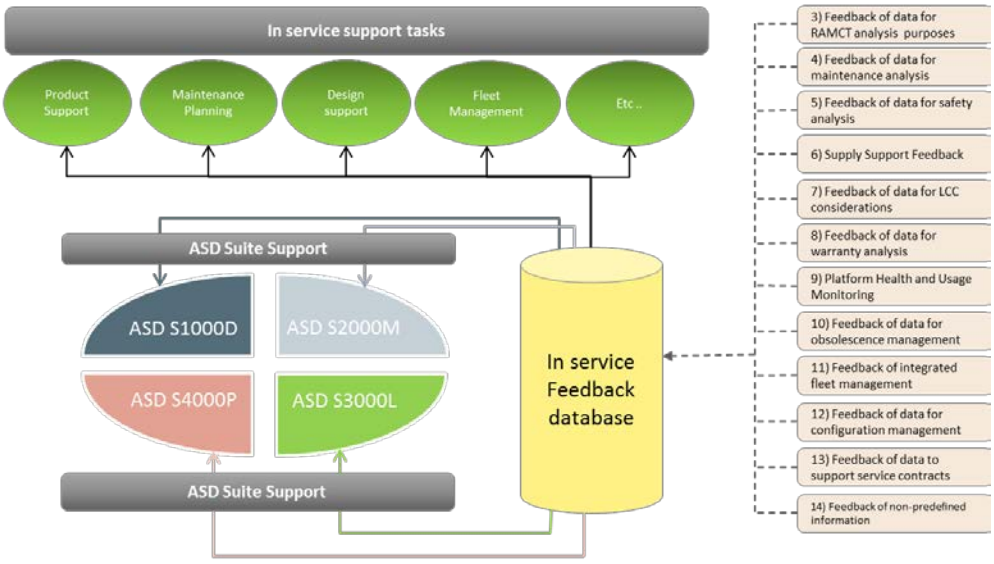
Main-activity	Sub-activity	Chap 3 – RMCT analysis	Chap 4 – Maintenance analysis	Chap 5 - Safety analysis	Chap 6 – Supply Support	Chap 7 - Life Cycle Cost	Chap 8 - settlement of warranty issues	Chap 9 - Platform Health & Usage Monitoring	Chap 10 - Obsolescence Management	Chap 11 - integrated fleet management data	Chap 12 - Product Configuration	Chap 13 - Management of in-service Contracts	Chap 14 - non-predefined information
Sustain Engineering Support	Manage & update technical publications			X		X		X	X		X	X	X
	Technical Publication Management			X		X		X	X		X	X	
	Tooling		X		X	X							
	Facilities management		X		X	X				X			
	PHST	X		X	X	X	X					X	
	Modification kit procurement & installation		X	X	X	X	X		X	X		X	
	software maintenance support	X	X		X	X		X	X	X		X	
	design through-life support	X	X	X		X	X	X	X	X			
	manage repair shops	X	X	X	X	X	X	X	X				
Sustain Engineering Support technical issues	Manage product issue	X	X	X	X	X	X	X	X	X		X	
	Solve/repair technical issue	X	X	X	X	X	X	X	X			X	
	Request product modification	X	X	X	X	X	X	X	X			X	
	Embody product modification		X	X	X	X		X	X	X		X	
Sustain Engineering Support transport	Training Management		X	X		X		X	X			X	
	Movement				X	X	X	X		X			

7 Data flow

The entire data flow principles are shown in the Fig 2 Data flow principles below. The filling process describes the dataflow from the originator to the In Service Feedback database, whereas the data demanding process is either the data request from the ASD suite or from other partners or main tasks explains.

The data will be automatically transferred, according to the defined schedule from the Guidance Conference on a regular basis to the In Service database. The data model for this information will be based on the PLCS format, which will be also the format used for data exchange.

In case one of the stakeholders intends to perform analysis on the In Service data he will request the relevant data from the In Service database. The data exchange process, explained on an example in Para 10.1 will provide the requested data in the DEX format. These data sets can be used for analysis of in service figures and comparison to design figures. In coordination with the ASD/AIA S-Series of ILS specifications, it is clearly defined which data has to be delivered for the requested analysis (Ref Chap 18). In case of analysis defined outside of the ASD/AIA environment the datasets will be defined in the other chapters of S5000F.



ICN-B6865-5000F02002-001-00

Fig 2 Data flow principles

8 Use cases

Each chapter of this document defines the relevant information which has to be transferred to support the required process. Therefore, the chapters are responsible for defining the data sets. For a better understanding, the chapters describe content on the basis of use cases. The use cases can differ from chapter to chapter and depend on the major activities involved in the outlined process.

Table 4 Use Case Overview (example use case for each chapter)

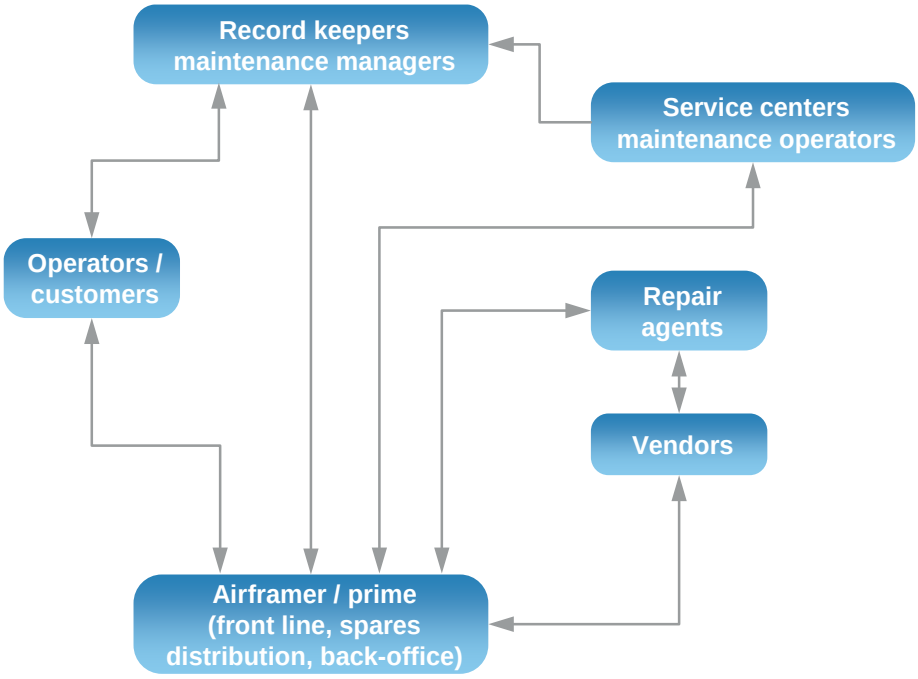
Chap No	Feedback for (short name)	Example Use case(s)
3	RAMCT	Monitoring the performance of equipment
4	Maintenance analysis	Manufacturer maintenance schedule
5	Safety	Report safety Issue
6	Supply support	Stock in warehouses
7	LCC	Estimating cost and effect of modifications or upgrades
8	Warranty issues	Evaluate maintenance impact on warranty
9	Health and usage monitoring	Vibration monitoring of rotating parts
10	Obsolescence management	Determine obsolescence candidates Perform obsolescence risk assessment
11	Fleet management	Produce & update fleet plan Perform fleet tasking
12	Configuration management	Feedback of an "as operated" product configuration Feedback of updated "as allowed" configuration
13	Management of service contracts	Provide work breakdown structure Report key performance indicators
14	Non pre-defined data	Feedback of photograph of a crack Feedback of project-specific information

9 Stakeholders

Each chapter of this document defines the relevant information which has to be transferred to support the required process. Therefore, the chapters are responsible for supplying the demanding stakeholders with the necessary information. The stakeholders may vary between chapters, subjects, in-service activities (see Para 5), countries and branches. Therefore, the stakeholders involved have to be defined at the start of a project.

In principle, stakeholders may differ depending on the activity. Furthermore, the data flow required for the pre-analysis process is different from that needed for the post-analysis process. Since it is not obvious for S5000F community which analysis will be prepared and which results will be sent back via the feedback process, it has been agreed that, for the first step, only the pre-analysis data feedback specified in this document will be provided.

Fig 3 shows a typical inter-correlation of data and tasks in the feedback before the data are computed and the required information and recommendation are generated on the basis of the algorithm and/or logic. Depending on the activities, the stakeholders vary. It is assumed that the major feedback data will be gathered by the operator and distributed to the different activities or stakeholders.



ICN-B6865-5000F02003-001-00

Fig 3 Process dependencies for maintenance (example)

The example above shows a selection of data responsibilities and data sources. In principle, there are various different main data sources:

- Supplier
- OEM
- Customer / operator of the system and
- Maintenance agent

The data required for the different types of analysis have to be transferred from the originating data source to the contractor of the analysis. Since the OEM is the developer of the system, the greatest part of the data should be transferred via them because of the necessary plausibility checks. The OEM distributes the requested data to the analysis performing community. This may be either a process or a company. The detailed delivery process has to be defined at the beginning of the analysis project in the Guidance Conference (Para 11.1).

To illustrate the process, various use cases are defined. A general overview of the RM&T process explains, as an example, what the breakdown should look like. Furthermore, the example shows the data requested for the calculation of some relevant Key Performance Indicators to generate RM&T feedback which enables the user to compare systems and products. One of the goals for this standard is to set up a process which allows the operator, OEM to compare the operation world with the design world and systems with one another.

10 Process description

This paragraph describes the applied process. The process is built up as an ICOR process which is divided into different levels.
ICOR level 0 shows the global view of the process and describes the:

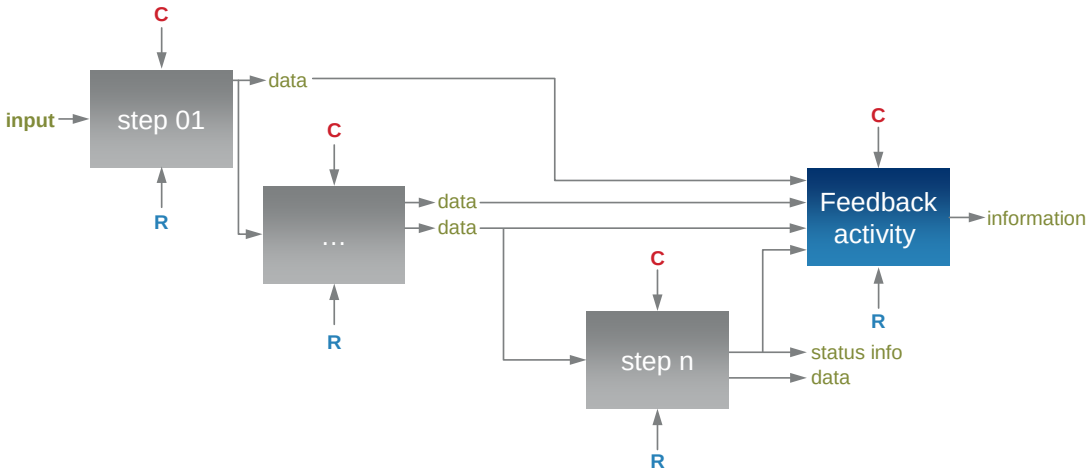
- Inputs (I)
- Constraints (C)
- Outputs and (O)

– Resources (R)

The overall data process is split into two sub-processes, namely the activity process and the feedback process. S5000F supports the feedback process and therefore the activity process is mentioned just for the sake of completeness and will not be described in detail in this document.

Level 0 shows the front end of the data process. It reflects the activity but not yet the feedback process. The Input for the activity process deals with the data acquisition on the operational site, at the end where the raw data are generated and gathered. The Output side provides the data which will be required for the feedback process as an input.

Fig 4 illustrates the lower levels of the ICOR process which are related to the feedback process.

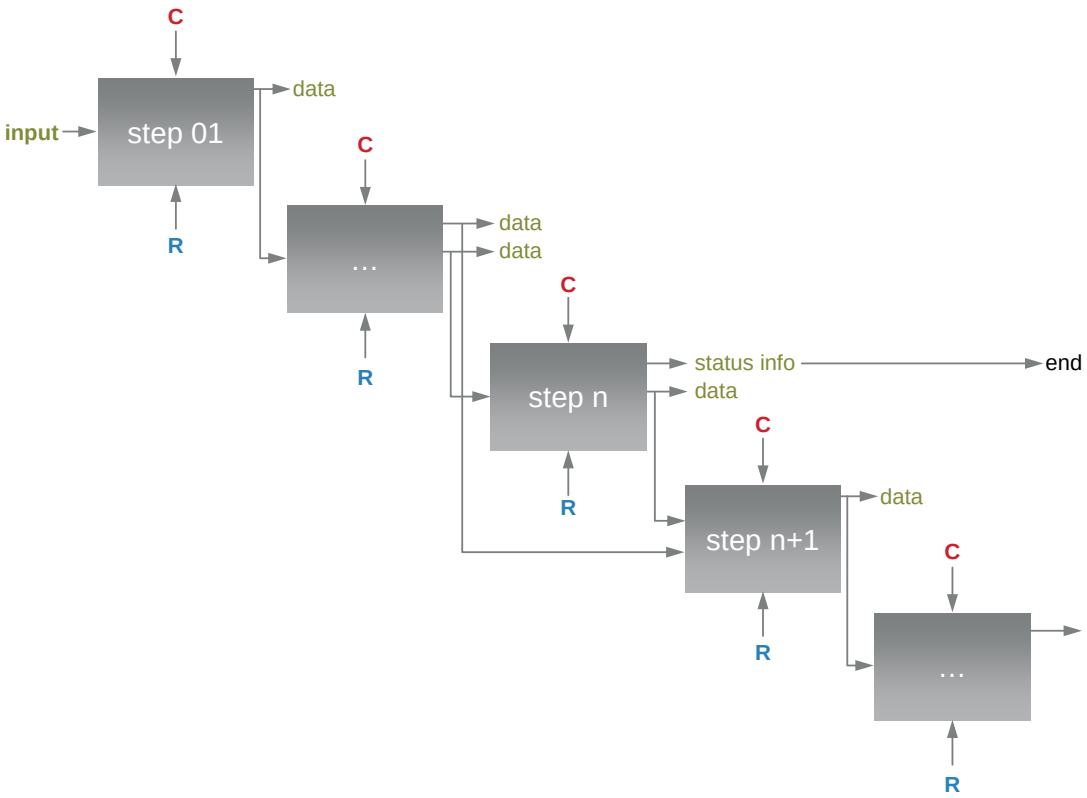


ICN-B6865-5000F02004-001-00

Fig 4 ICOR levels with feedback activity

Fig 5 explains how the different levels contribute to the feedback process. All requested information will become part of the feedback and is dependent on the activity which has to be supported. The following chapters will describe the activity and the necessary data information.

Each level of the ICOR process describes a sub-process (child process) of the parent process. It is not intended to build up the complete process loop within S5000F. Fig 5 shows the process steps of the data feedback within the different levels. This data communication is not part of this specification. Furthermore, the process of calculating e.g. Key Performance Indicators (KPI) is also not a subject of S5000F. These processes do not reflect a closed control loop and purely describe a straightforward data flow from data generation to data delivery. The calculation of e.g. relevant RMT figures will be described in the corresponding data analysis specification or dedicated S-Series ILS specifications. E.g. the calculation of an in-service MTBF will be carried out with the in-service data provided by S5000F. The algorithm however, will be defined in the S3000L or by the task which requires the in-service MTBF figure.



ICN-B6865-5000F02005-001-00

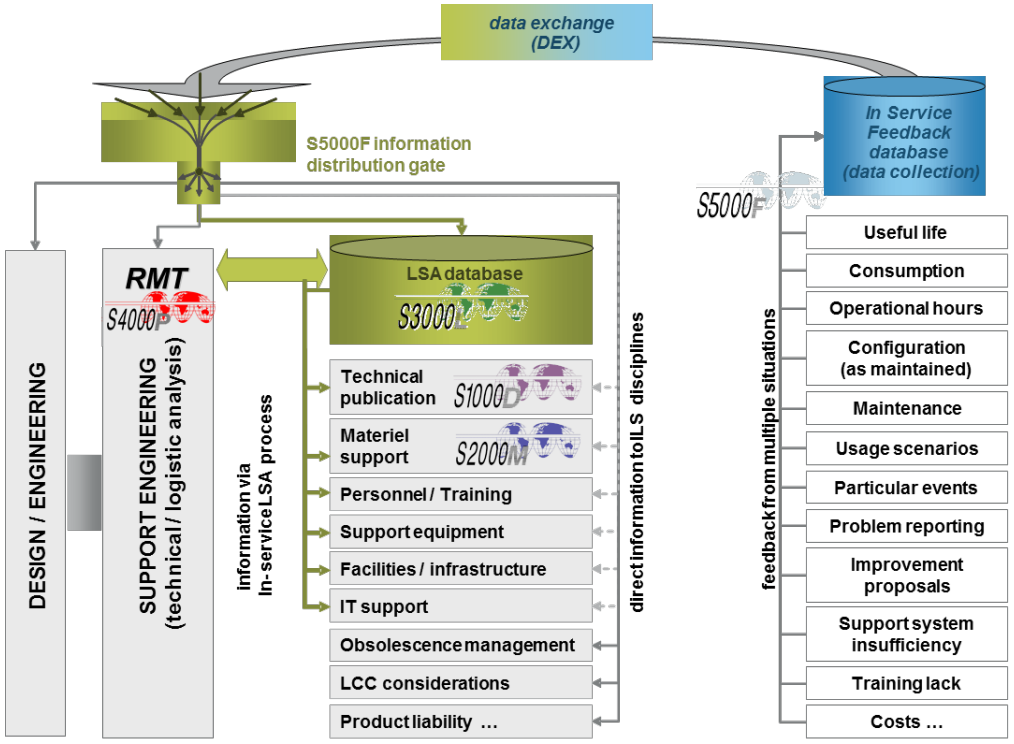
Fig 5 ICOR Level 1and lower

10.1 Example Use case RMT

For illustration purposes, the following sub-paragraph gives an example of an applied process. The description of a subset of RMT activities explains the process and contributes to the evaluation and analysis by preparing and providing the relevant data set.

In Fig 6 a typical interaction of different disciplines and stakeholders based on the RMT activities is shown. The necessary data set will be provided by the involvement of different stakeholders and usage scenarios. The requesting RMT task manager receives the relevant data set from the in-service feedback database in DEX format. The LSA process (e.g. initiated by S3000L) uses the input data for the LSA analysis and distributes the result to the corresponding ASD standards or relevant processes. Since S3000L was in this case the initiater of the in-service LSA task the S3000L is responsible for the distribution of the results to the different stakeholders. ASD S5000L is not aware of the intention behind this activity and therefore the result of the calculation will not be transferred by the S5000L – the distribution of the result is under the responsibility of the data requester.

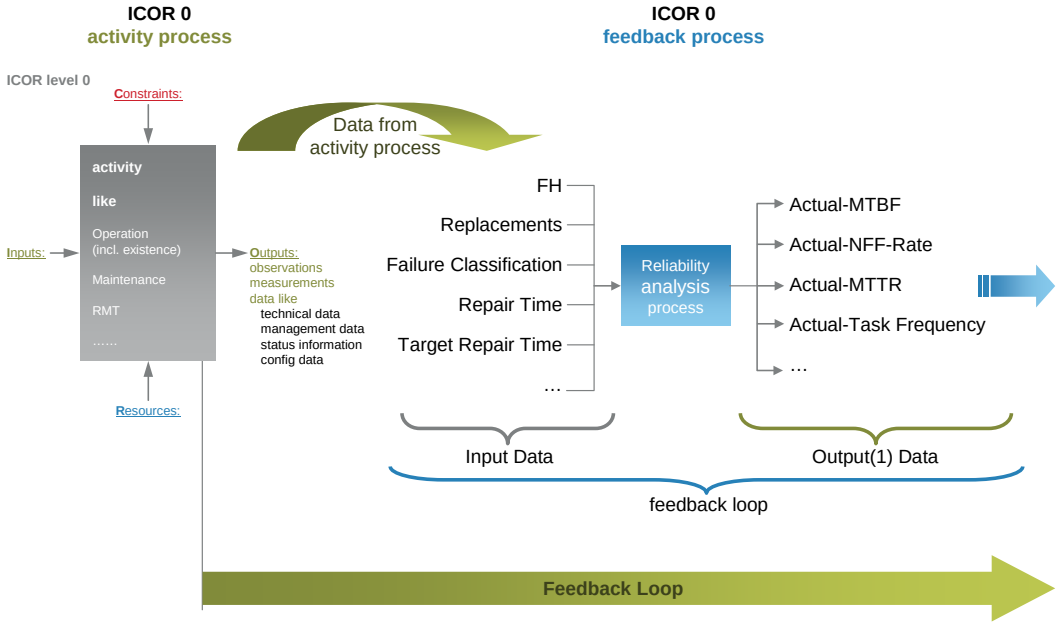
For the time being, it is not foreseen to define post analysis data feedback to the in-service database for storage. This may become a requirement at a later stage. For such result storage, a clearly identified format and information content must be defined. Since this is not intended to be a major subject at the beginning of S5000F phase, it will not be considered for the moment.



ICN-B6865-5000F02006-001-00

Fig 6 In-service data analysis process as an example of S3000L feedback

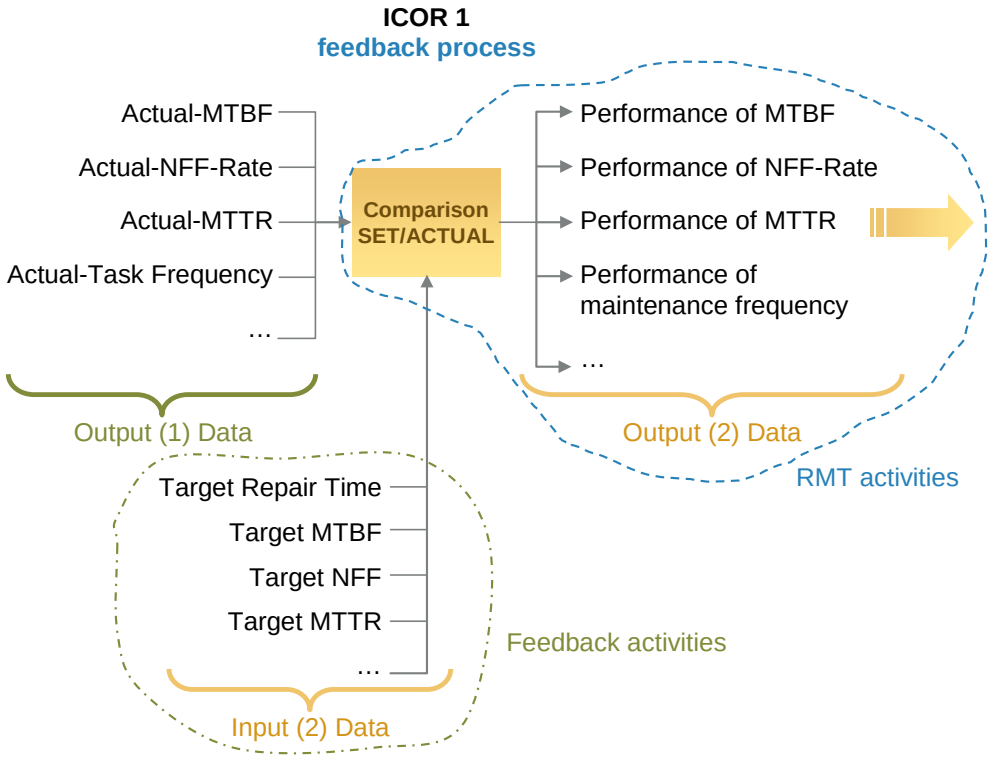
The data feedback for the initial request is shown in the next figures. The ICOR 0 level represents the data generation (raw data) and the first processing of the data. This level is mostly embedded in the environment of the system operator. S5000F process starts with the ICOR 1 level.



ICN-B6865-5000F02007-001-00

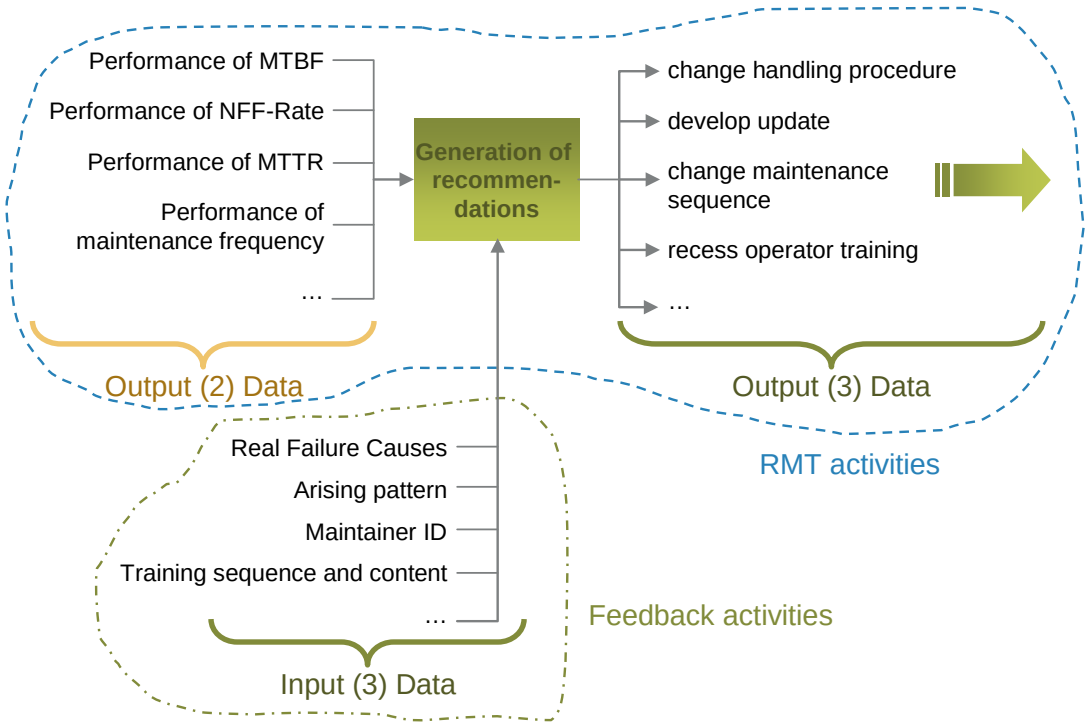
Fig 7 Data feedback (Step 1)

To explain the ICOR principles an example for a RMT analysis is drawn in various levels below



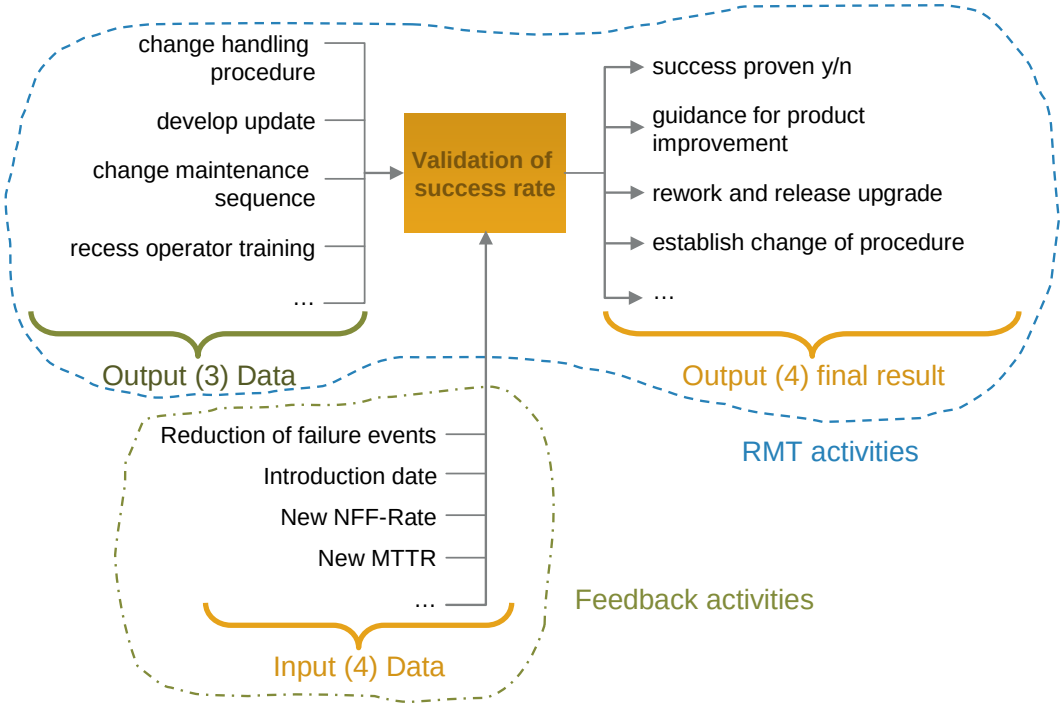
ICN-B6865-5000F02008-001-00

Fig 8 Data feedback with RMT comparison (Step 2)



ICN-B6865-5000F02009-001-00

Fig 9 Data feedback with generation of RMT recommendations (Step 3)



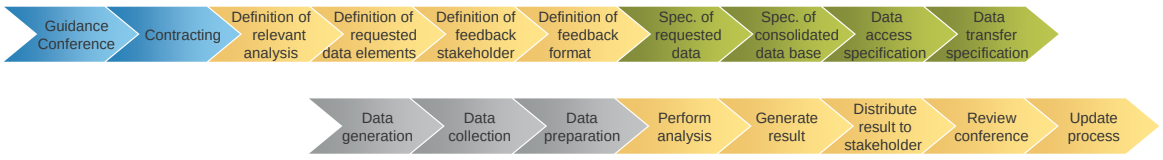
ICN-B6865-5000F02010-001-00

Fig 10 Data feedback with validation of RMT recommendations (Step 4)

11 Business process

The entire Business process is split into 5 phases. These are:

- Kick off phase
- Definition phase
- Specification phase
- Data handling phase and
- Analysis phase



ICN-B6865-5000F02011-001-00

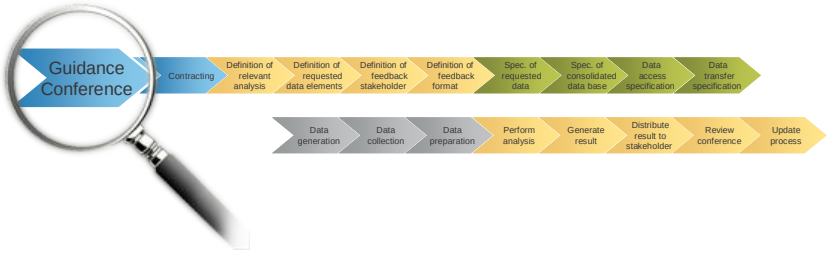
Fig 11 Business Process Steps

The Business process, shown in Fig 11, starts with a Guidance Conference (GC) which is a kind of kick off meeting where all relevant decisions have to be made to initialize the data feedback as specified. Before entering in the Definition Phase the GC, as the launching meeting, is followed by the contracting. Before all necessary specifications will be generated the definitions of the required analyses, the purpose and involved companies have to be done. After the data are generated and collected the analysis phase can be started. The details of the different process steps are described in the following paragraphs.

11.1 Guidance Conference

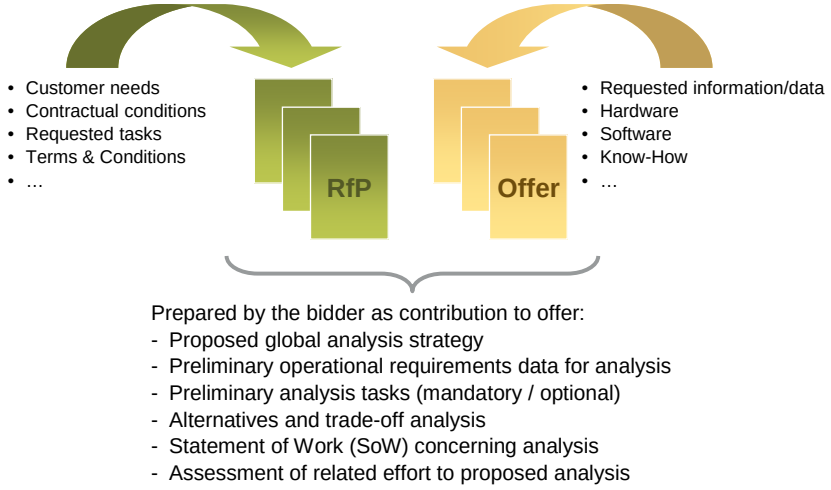
Before a contract is concluded, a Guidance Conference (GC) should be held. The GC should be a central event with participation of management staff and specialists on sites, customer and contractor. At this conference, the binding agreements for the performance of the work

process must be established. To ensure the best possible outcome of this conference, it is necessary to have prepared inputs and to have clear expectations of the results and final agreements. It is strongly recommended to have checklists for the GC preparations and expectations.



ICN-B6865-5000F02012-001-00

Fig 12 Guidance Conference step of the business process



ICN-B6865-5000F02013-001-00

Fig 13 Preparation of request for proposal and offer

It should be clearly pointed out that the majority of essential decisions influencing the feedback effort have to be negotiated before the GC. Usually, the feedback process begins while an offer is created and will be similar to the final version contained in the corresponding contract. This applies to any feedback-relevant aspect within the contract (e.g. related Statement of Work) as well as to contractual details such as deliverable items, indispensable specified values or major milestones. This implies a series of investigations to be carried out prior to the contractual offer (e.g. identification of activities including feedback considered as mandatory, recommended or voluntary, depending on early strategy judgment and/or the kind of data, systems and equipment to be handed over and assessed). By defining the requested analysis the necessary data will be defined usually by the use cases. In case the data quality and the data completeness is not as it is requested the GC should define the necessary consequences and actions to be installed to improve both, quality and completeness. In addition to the data itself, the data storage, the data transfer (media, frequency, etc.) and the data access rights has to be defined in the GC.

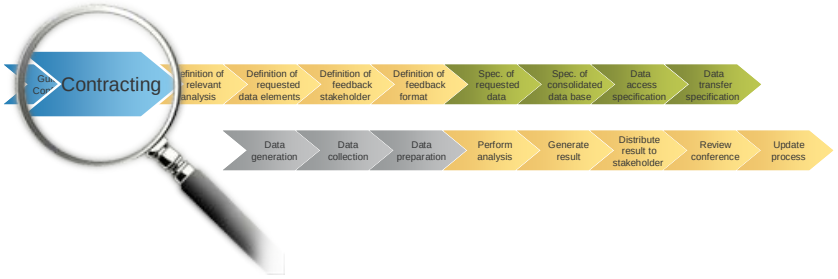
The GC serves as a means for communicating to the customer the work that will be done in detail, along with the associated rules and time schedules, based on the contractual requirements and further agreements as noted above. The GC also clarifies any questions the customer might have regarding effort and feedback. Nevertheless, changes to the work effort must be allowed to a certain extent during the GC without the need for contract changes and

changes in the cost of the effort. Considering the iterative nature of contracted activities, customisation (tuning) must be possible in order to be flexible.

According to the Working Process described in Para 4 the GC must identify each relevant process step. Since the projects will have different goals and prospects not all of the drawn main tasks of the Working Process has to be considered generally. Once the main tasks of the Working Process are identified the Activity List of Para 5 will show all of the tasks which are supported by S5000F. The selected activities together with the corresponding Key Performance Indicators will guide the user of this specification to the relevant chapter and the data set he will need for the desired in-service data analysis.

11.2 Contracting

The contracting follows the Guidance Conference where all relevant definitions were established. The contract itself reflects and summarizes the decisions and definitions from the Guidance Conference. The contract describes the content of the activities which have to be supported and indicates the stakeholders concerned. In addition, it defines the time frame and the sequence of data delivery. Furthermore, the contract provides details of the data transfer in terms of data provision responsibility.



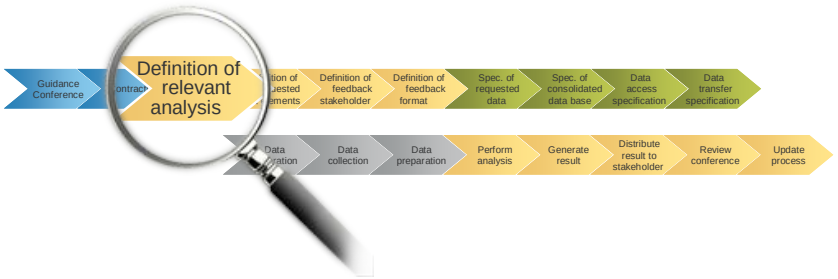
ICN-B6865-5000F02014-001-00

Fig 14 Contracting step

More details on how to contract for S5000Fcan be found in Chap 18.

11.3 Definition of relevant analysis

In order to support the required analysis with the necessary data, the requested analysis has to be identified. Based on the defined analysis, this specification describes which data have to be transferred by the process. The defined activities belong to a specific chapter which defines the data set that has to be provided. Therefore, it is necessary for the contractor to define the activities/analysis as detailed as possible.



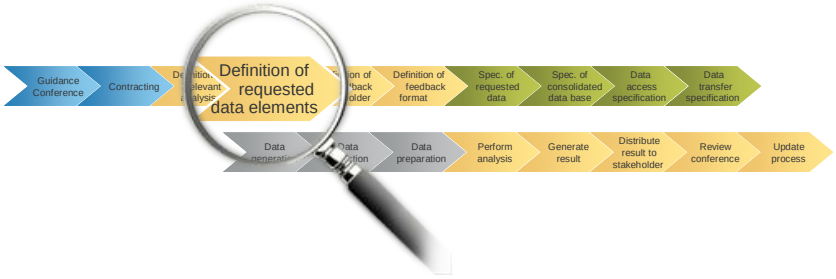
ICN-B6865-5000F02015-001-00

Fig 15 The definition of relevant analysis step

Since the specific analyses define the data set needed the stakeholders have to define the required analyses at the beginning of the feedback process. Therefore it must be known which investigations have to be supported by this specification. It is recommended to check the activities in Para 5 to find out if the required analysis can be supported by S5000F. If the requested analysis is listed in the overview, the necessary data elements and data set are defined in the corresponding chapter and appendix of this document

11.4 Definition of requested data elements

This task defines the data elements based on the activities defined in the Guidance Conference. Either the documentation of the Guidance Conference contains the required analysis or the contract describes all activities which have to be supported.

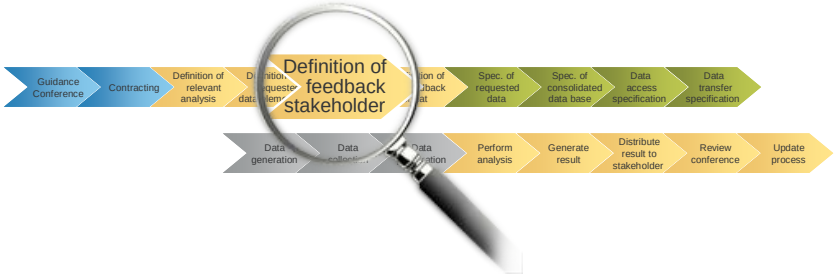


ICN-B6865-5000F02016-001-00

Fig 16 The definition of requested data elements step

11.5 Definition of feedback to stakeholders

Since there are two kinds of data delivery process involved, the different stakeholders must be defined in advance. According to the process description in this chapter, a data gathering process and a data providing process must be established.



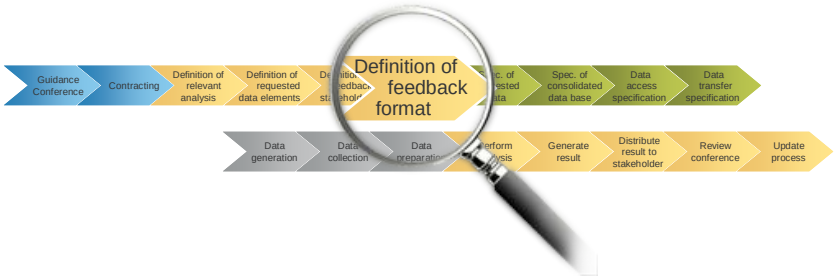
ICN-B6865-5000F02017-001-00

Fig 17 Definition of feedback to stakeholder step

The data gathering process is responsible for the collection of data from different data sources such as the supplier, OEM, operator, etc. The stakeholders may vary depending on the data providing process. In this case, the stakeholders are the different S-series standards such as S3000L, S1000D, etc., and the community dealing with in-service data analysis in general. The different stakeholders are clearly defined by the overall ILS process as documented in SX000i. With regard to analysis, the stakeholders differ from case to case and must be clearly identified in the Guidance Conference. Furthermore, the frequency of the data transfer has to be defined. Usually, the in-service data analysis is a standing task. Based on this, it is important to define the time period in which the data set has to be delivered in a continuous way.

11.6 Definition of feedback format

Another important definition which has to be established during the Guidance Conference is that of the feedback format. It must be defined in which form the data have to be transferred. Since the data is based on a PLCS data model, it is recommended to transfer the data set in the same format using published DEX templates. In the event that the analyst requires the data in a different format from the one recommended, this has to be requested in advance. Ideally, this will be announced in the Guidance Conference.

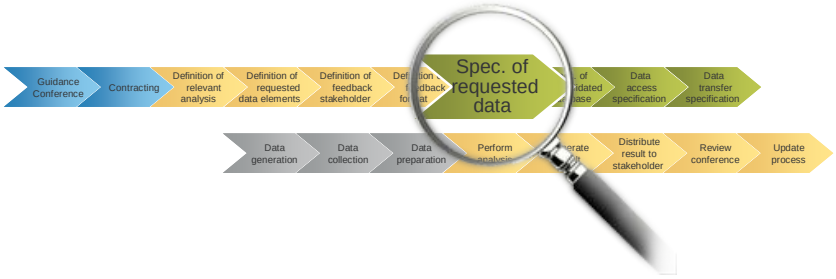


ICN-B6865-5000F02018-001-00

Fig 18 Definition of feedback format

11.7 Specification of requested data

The data elements that are required in addition to those identified in this specification have to be specified to contribute to the requested analysis. In this case, the data format, data source and data transfer have to be described in a specification. The in-service data base has to be enhanced to provide the relevant data needed for the required analysis.



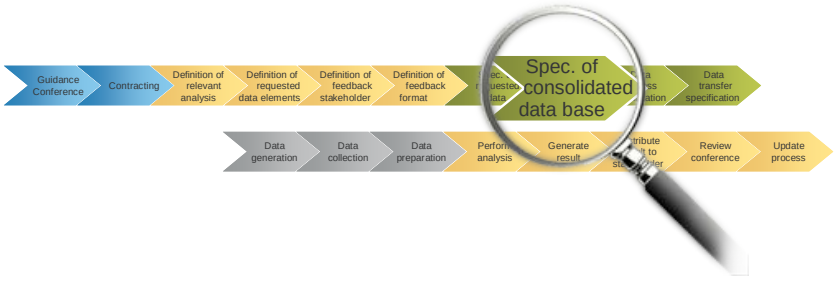
ICN-B6865-5000F02019-001-00

Fig 19 Specification of requested data

The additional data either have to be provided by a separate data set which does not belong to this standard, or it has to be added. The responsible S-series community has to decide whether these data elements will be added to that document later on. If so, the concerned chapters also have to be updated. If these data belong to an unconsidered activity, the activity itself has to be described in one of the following chapters.

11.8 Specification of consolidated data base

The gathered data must be consolidated before they are loaded into the in-service Database. Each stakeholder in the data gathering process has to make sure that the data elements are consolidated and checked with regard to duplicates, uniqueness, correctness, etc. All data stored in the in-service DB will have their status validated and proved so that the data requesting party can rely on the data received.



ICN-B6865-5000F02020-001-00

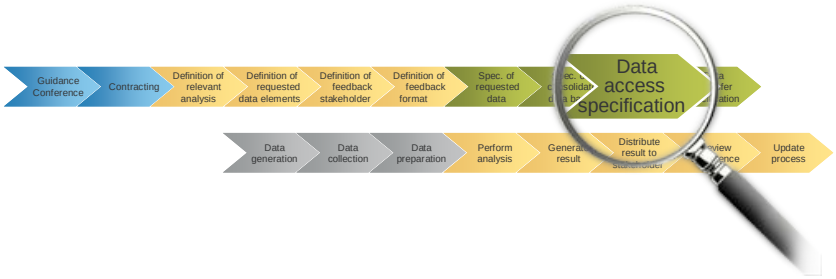
Fig 20 Specification of consolidated data base

The chapters within this specification together with the corresponding attachments define the format and availability of the data elements. The incoming data will be consolidated by the parties responsible for data sources. Before the data is uploaded to the in-service DB they have to be consolidated once more because the data set will not be delivered by one stakeholder only. The data set will be fragmented and therefore it is necessary to consolidate the data before storage in the data base.

11.9 Data access specification

Usually the data access must be restricted to a certain group of persons or at least to defined companies and/or departments. Due to this requirement it is necessary to implement a certain security level to avoid any access of un-certified people. Since the cleared people will depend on the project and the security request from the data owner the applied security concept has to be discussed and defined in the Guidance Conference. In principal there are 3 different groups of access rights to be defined.

- data delivery
- data storage and administration
- data demand



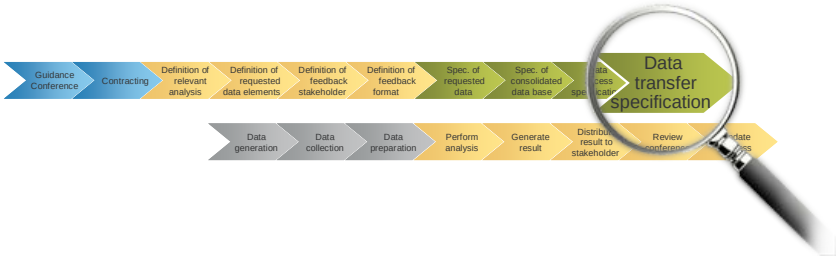
ICN-B6865-5000F02021-001-00

Fig 21 Data access specification

The group of data delivery are sending permanently the data updates to the designed common database. To avoid irrelevant or wrong data sets the deliverer has to be announced and will be equipped with certain access rights. For the data checks and the storage of the data into the common database there is a data administrator necessary who needs full access rights to the data. The third group is special because this group is allowed to receive the consolidated data from the common data base for evaluation and analysis purposes. Therefore the Guidance Conference has to assign the persons and their rights to demand and receive data. The clearance of each designated person has to be described in detail to fulfil the data security requirements. The appointed software and architecture has to be decided by the participating companies and owner of data. The data security has to be ensured for the entire process and beyond by a separate IT-concept.

11.10 Data transfer specification

The data transfer has to be defined when the process is launched. The quality of the in-service data analysis is very much dependent on the completeness and the quality of the data transferred. The data transfer specification ensures that the data is contributed at the right time and in the right format via the defined medium and secure delivery mechanism. All participating stakeholders must agree on the data delivery specifications to ensure a complete data set and the necessary data quality.

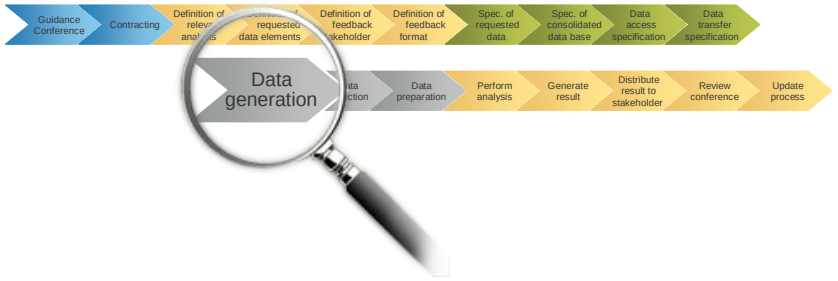


ICN-B6865-5000F02022-001-00

Fig 22 Data transfer specification

11.11 Data generation

The definition of how the data will be generated is not part of this specification. In most cases it is described in the relevant ASD documents or in the analysis documentation. This document describes the data transfer from the different data sources via the in-service data base to the user of the data set but not how the data are generated. In principle, these data are generated by the used systems or applied processes and vary greatly from system to system.

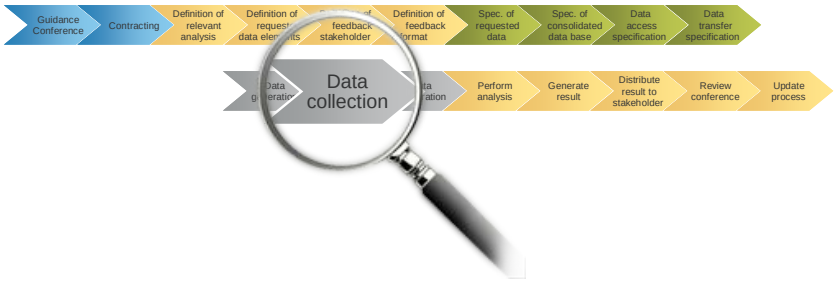


ICN-B6865-5000F02023-001-00

Fig 23 Data generation

11.12 Data collection

The relevant data elements described in the following chapters will be collected in an in-service data base. Considering the data format, transfer and consolidation process, the data will be stored in the data base. At the beginning of the process, a wide range of settings and definitions have to be agreed on before the data can be collected in the in-service data base. The data will be provided by different stakeholders and data sources. The data elements required depend on the analysis requested.



ICN-B6865-5000F02024-001-00

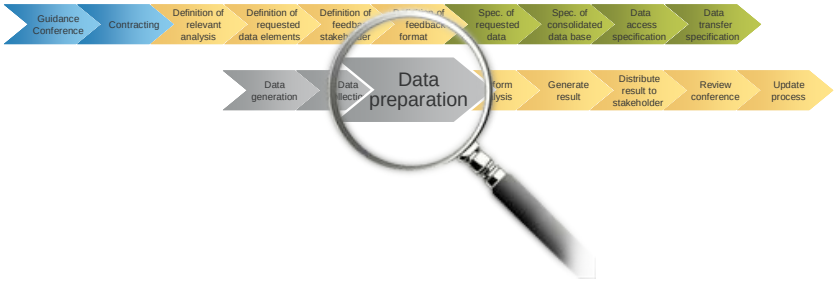
Fig 24 Data collection step

The envisaged data base is not part of S5000F. Since the data scheme is highly dependent on the system and the in-service data required, it cannot be part of this document.

11.13 Data preparation

The raw data have to be converted to provide the requested information for the analysis. Therefore, some of the data have to be prepared and converted before being stored in the in-

service DB. For example, it may be the case that the data are not available in the PLCS format. In this case, the data element has to be re-formatted in the appropriate way in order to ensure format consistency.



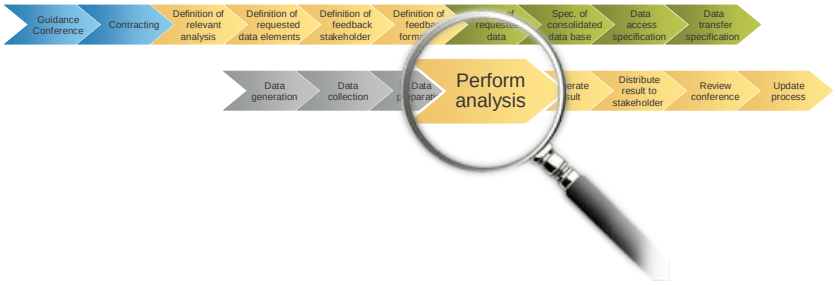
ICN-B6865-5000F02025-001-00

Fig 25 Data preparation step

The data preparation will be performed either by the party responsible for the source data or the responsible in-service data base group, before the data are stored in the in-service data base. In any case, a quality check has to be performed before loading into the in-service data base. Note that data quality issues have to be considered, as explained in Chap 16.

11.14 Perform analysis

The description on which analysis has to be performed, and how, is not part of S5000F and therefore not explained this document. The analysis itself is described in the relevant S-Series documentation, eg S3000L, etc. or the in-service date requestor. For further analysis tasks, see the corresponding specification or documentation.

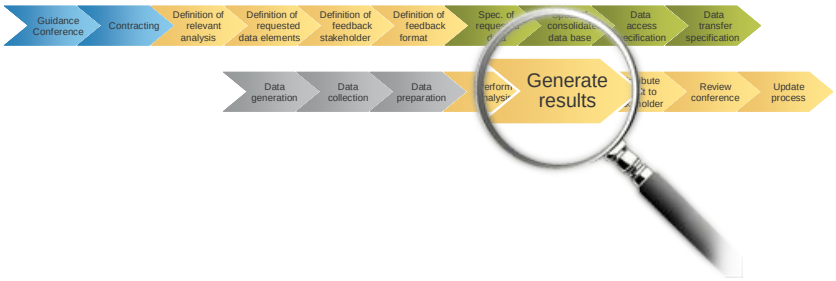


ICN-B6865-5000F02026-001-00

Fig 26 The perform analysis step

11.15 Generate results

The results of the above-mentioned analysis tasks are not described in this document. It depends very strongly on the analysis task which result can be expected. Describing the relevant output of the different analyses is therefore a task of the initiating ASD standards or other applied analysis specifications.



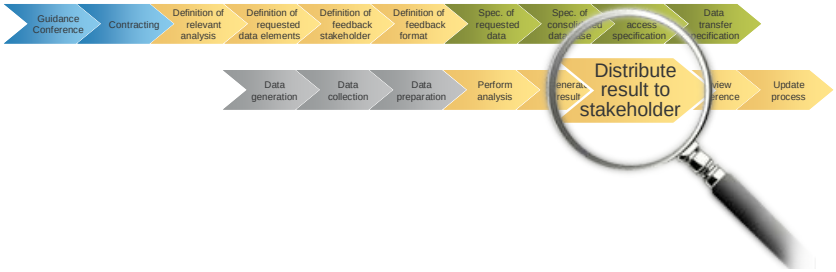
ICN-B6865-5000F02027-001-00

Fig 27 Generate results step

The available ASD standards dealing with analysis are listed in the individual chapters. The reflection of the available standards and specifications does not require completeness. There are certainly some specifications and analysis descriptions published which are not mentioned in S5000F. Nevertheless, the requirement regarding the data distribution can be applied to that document as well.

11.16 Distribute results according to definition

The results of the in-service analysis are generated by the different S-series standards and other applied specifications. The relevance of the data for other standards is described in each individual specification. Therefore, it is useful that each specification describes the relevance of the results to the corresponding specifications. Due to this fact, the distribution is not included in this specification. The distribution of the outcome of the performed analysis must be looked up in the document in which the analysis is specified.

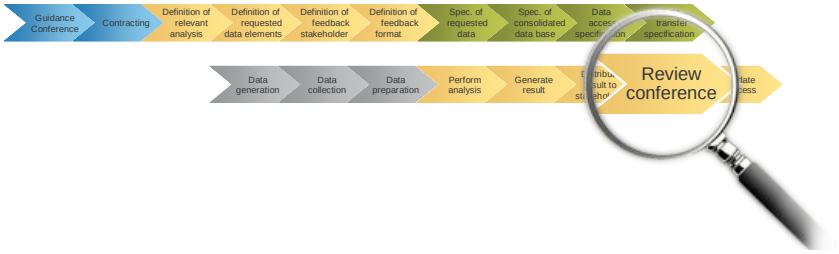


ICN-B6865-5000F02028-001-00

Fig 28 The distribute results according to definition step

11.17 Review conference

The described process is intended to be a standing process for the complete in-service period of the systems. It is recommended to set up review conferences which reflect the definitions of the Guidance Conference according to the experience and results gained. Usually, the in-service phase of the considered systems in the defence business is very long. Thus it can be expected that there will be some changes in data gathering and data set provisioning. The review conference is the right place to discuss and agree on the required changes with all participating stakeholders. In the case of changes, the process described in this document has to be reviewed from Para 11.3 onwards. If the contract is affected by the changes, the review process starts from Para 5.

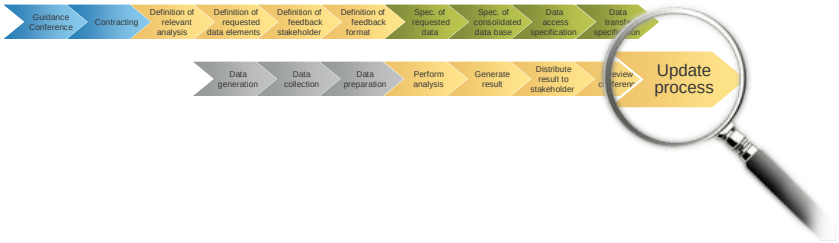


ICN-B6865-5000F02029-001-00

Fig 29 The review conference step

11.18 Update process accordingly

The process of in-service data feedback is a living process and has to be updated from time to time. It is obvious that the data elements and the process itself are strongly dependent on the analysis and even on the systems which should be investigated and observed during the in-service phase.



ICN-B6865-5000F02030-001-00

Fig 30 The update process accordingly step

Chapter 3

Feedback data for the purpose of reliability, availability, maintainability, capability and testability analysis

Table of contents

List of tables

List of figures

References

Table 1 References

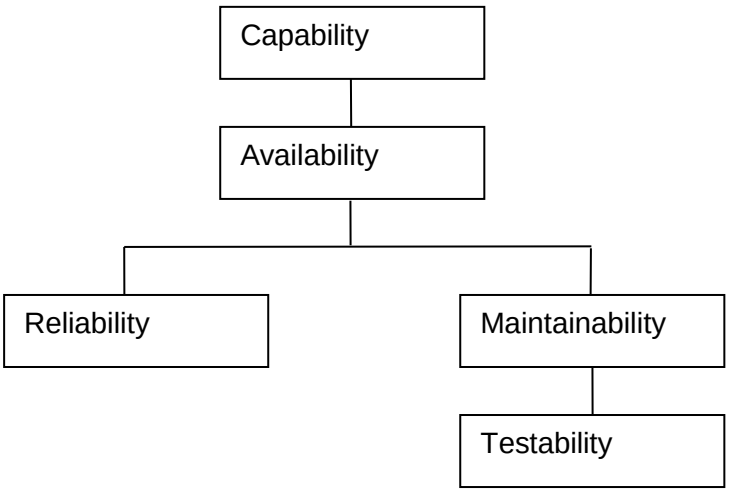
Chap No./Document No.	Title
Chap 19	Data required for the different use cases
Chap 20	Terms, abbreviations and acronyms

1 Definitions

The field of Dependability covers system Reliability (R), Availability (A), Maintainability (M), Capability (C) and Testability (T). The definitions of these terms and other terms derived from them are listed in Chap 20.

2 Introduction

The five system performance characteristics: Reliability, Availability, Maintainability, Capability and Testability should be monitored by an operator or owner, as their impact the effectiveness of a system, its safety, its supportability, the way the operator executes the mission and the morale of the operator. Effective monitoring requires relevant data to be gathered: sufficient range of data elements and sufficient quality/quantity of data gathered. This should allow a good analysis, allowing possible engineering changes to be identified, that could be implemented if deemed necessary. The aim of this chapter is to provide a baseline to allow this to happen.



ICN-B6865-5000F03001-001-01

Fig 1 RAMCT Relationship

3 Scope

This chapter covers the more common activities involved, the basic definitions and basic data fields involved in the gathering of user data for RAMCT analysis. It should be read by anyone who requires engineering performance indicators to be produced for engineering or operational monitoring, changes to engineering design and the provisioning of spares.

4 Using the RAMCT terms

Using RAMCT terms especially in contracts should be done with great care as there are many variations in use. Some products are special or are used in specific ways which could require amendment to contract terms or addition to the data elements quoted in this chapter. However, it is important that if other variations of the terms are used then they are clearly understood by all stakeholders and should be done in line with data format definitions. The following paragraphs explain this further.

4.1 The term reliability

The term Reliability covers: what constitutes a failure to perform as required (a failure), how it affects the mission (mission reliability) and whether it affects the logistic system (basic failure). Other reliability terms such as: Failure Rate and Mean Time Between Failure (MTBF) may be further amplified according to user and product requirements by reference to more specific definitions listed in any appropriate domain or system specific standard. Consequently, definitions such as intrinsic or inherent reliability, primary and secondary failures, time to failure and time between failures will all vary according to circumstances and must be selected with care.

4.2 The term availability

There are many variations of the term Availability, stemming from the applicable definitions of up time and down time. While the basic definition of availability of a product or fleet of products is normally quoted as the ability to be in a state to perform as required under given conditions at a given instance or over a given interval, definitions such as Operational Availability, Inherent Availability (intrinsic availability), Instantaneous Availability (point availability), Average Availability, Steady State Availability, Achieved Availability, Standby Availability, Effective

Availability and Availability of Service may all be used. Definitions should be selected with care in line with requirements and circumstances.

4.3 The term maintainability

The term maintainability is used when the user wants to refer to how easy it is to return an item to its serviceable condition. Associated definitions are: Preventative Maintenance (Scheduled Maintenance), Corrective Maintenance, Software Maintenance, Maintenance Time, Repair Time and Mean Time to Restore. These generic definitions need to be further amplified by the use of other domain or system specific standards such as used to describe: fault detection time, maintenance man-hours, lines and levels of maintenance.

4.4 The term capability

A products capability is defined as its ability to perform a specified task in a given environmental or operational context. Terms associated include Combat Capability, Operational Readiness, System Effectiveness, Durability and Supportability. It can be measured by the time that a piece of equipment or system is fully capable or partly mission capable and can perform all its tasks without endangering the lives of crew or operators. It is difficult to measure as the products performance must be very clearly identified in circumstances that may frequently change. It should not be confused with the term mission success.

4.5 The term testability

Testability is the capability of an equipment or system to be tested under stated conditions. It is most frequently used in a context of Built in Test (BIT) but can also be used with test and evaluation, prognostics etc.

5 Reliability

The objectives of reliability monitoring must first be determined and from these objectives, the necessary activities are derived. The definition oft he activities tob e performed allows the indentification oft he required fundamental data classes and related data elements.

5.1 Reliability objectives

The objectives of reliability data gathering are to:

- Monitor the performance of the equipment.
- Predict trends.
- Identify problem areas that may result in damage and hence minimize unscheduled repair and the need for support.
- Identify failure modes, their causes and failure mechanisms.
- Gather evidence for root cause investigation.
- Issue warnings and report increased risk.
- Influence future designs.

This is not a comprehensive list of objectives.

5.2 Reliability activities

The principal activities involved in reliability monitoring are:

- Validating the reliability specified.
- Reporting the reliability achieved.
- Predicting future reliability.
- Investigating anomalies and defects.
- Identify risks including those to the environment and those involving safety.
- Produce anomaly/defect/failure reports including those caused by software and packaging, handling, storage and transport (PHST).
- Provide information for engineering change requirements including changes to publications.

This is not a comprehensive list of activities.

5.3 Reliability metrics

There are many different types of reliability analysis, such as monitoring growth, simulations, Pareto, Fault Tree, FMECA or Markov analysis. Hence the metrics used in any performance analysis will depend to a large extent on which best suit the stakeholder's requirements. The metrics can be calculated at individual item level, system level or fleet level.

A summary of the metrics that can be derived from obtaining relevant reliability data fields are:

- Failure rate i.e. the total number of failures/ total use.
- Mean Time Between Failures (MTBF).

5.4 Reliability data classes and elements

The data classes and elements for reliability derived from the objectives, activities and metrics required are listed at Chap 19. Although the list is as complete as possible, other data elements could be required depending on the system or domain (Land, Sea, Air and Space) specific operating requirements.

The data classes and elements should, as a minimum, cover:

- Clear identification of the product.
- The start state of the product (configuration).
- The operating conditions such as might be provided by Usage and Health Monitoring Systems.
- The usage e.g. time, distance, operating time / cycles etc.
- The environmental conditions in which the mission was carried out.
- The number of failures and their effects.
- Details of provision of any external resources such as maintenance support.

Note: The environmental conditions in which a platform is used, form critical limiting factors and must be considered and recorded whenever possible. They will have a major impact on the reliability availability and performance. Details may cover for example: vibration, terrain, altitude, temperature, dust and humidity and include other factors such as biological hazards, atmospheric electricity, radiation, legislation, skill sets etc.

5.5 Reliability use cases (1-3)

The use cases provide an indication of the data required to determine achieved reliability. The data obtained might need to be compared against the design or performance specifications and the operational requirements.

For a detailed definition of the data to be used for each of these individual use cases, please refer to Chap 19.

5.5.1 Use case 1: Monitor the performance of equipment

This use case covers the exchange of data between those groups that could have an interest in the achieved reliability. Equipment performance can be obtained by comparing the equipment specification against the following:

- Configuration – operational and as designed
- Reliability characteristics
- Equipment issues
- Operational history
- Operation undertaken
- Performance characteristics
- Safety issues
- Product status

- Product information

5.5.2 Use case 2: Influencing future designs

This use case covers the exchange of data between those groups that could have an interest in changing the current design. The information required for this use case includes the following:

- Clear identification of the product
- Operational history
- Equipment Issues
- Operational issues
- Support Equipment / Documentation Issues
- Operational Configuration
- Safety Issues
- Warranty Issues
- Operational Costs
- Support Costs
- Product Changes
- Product information

5.5.3 Use case 3: Trends, Failure Mode, Effects and Criticality Analysis (FMECA), Root Cause Analysis, Damage and Event Analysis and Issue Warnings

This use case covers the exchange of data between those groups that could have an interest in monitoring the reliability of the product or product range. Trends etc. can be obtained by comparing the equipment specification against the following:

- Operational Role
- Investigations
- Configuration (operational, role and as-maintained configurations)
- Product Issues
- Product Changes
- Operational Costs
- Product Information
- Operator competence
- Safety Issues

6 Availability

The objectives of availability monitoring must first be determined and from these objectives, the necessary activities are derived. The definition oft he activities tob e performed allows the indentification oft he required fundamental data classes and related data elements.

6.1 Availability objectives

The objectives of availability data gathering are to:

- Improve performance and increase the availability of equipment.
- Provide the basis of Contracting for Availability.
- Provide information for fleet and asset management.
- Assist in Maintenance Management.
- Improve operations and deployment activity.
- Improve through-life support.

Availability indicates the usability of a product provided the basis upon which it is calculated is fully understood. It is frequently used as a measure of contractor efficiency.

The availability must be that perceived by the user.

Availability can be measured in different ways. The following provides a cautionary example:

A system is required to operate 3 hours every day but fails to start up and takes 3 hours to fix missing the task.

This could be perceived as a 0% (0/3) or 87.5% (21/24) availability.

6.2 Availability activities

The principal activities involved in availability performance monitoring are:

- Identifying the availability requirement.
- Predicting future availability.
- Reporting the availability achieved.

This is not a comprehensive list of availability activities.

6.3 Availability metrics

A summary of the availability metrics that can be derived from obtaining relevant availability data fields are:

- Inherent Availability, note this excludes logistic delays – (Mean Time Between Failure) / (Mean Time Between Failure + Mean Time To Repair)
- Operational Availability in the required operating period – (operating time + standby time) / (operating time + standby time + total corrective maintenance time + total preventative maintenance time + administrative and logistic delay time)

6.4 Availability data classes and elements

The data classes and elements for availability derived from the objectives, activities and metrics required are listed at Chap 19. Although the list is as complete as possible, other data elements could be required depending on the system or domain (Land, Sea, Air and Space) specific operating requirements.

The data classes and elements for availability should as a minimum, cover:

- The original status of the product.
- Mean Up Time – operating time and standby time.
- Mean Down Time – The time the product is not available – Total corrective maintenance time, preventative maintenance time, waiting time and administrative and logistic delay time.
- The number of failures occurring.
- The effects of failures on the availability achieved of the end item.
- The environmental conditions.

It is particularly important for availability to ensure the data can be synchronized and will arrive in time to be useful. Reports and performance indicators will therefore require their own time scale to be set according to whether they are incident, demand, usage or time based.

6.5 Availability use cases (4+5)

The use cases provide an indication of the data required to determine achieved availability. The data obtained might need to be compared against the design or performance specifications and the operational requirements.

For a detailed definition of the data to be used for each of these individual use cases, please refer to Chap 19.

6.5.1 Use case 4: Operations and deployment support, through-life support and equipment availability

This use case covers the exchange of data between those groups that could have an interest in monitoring the availability of the product. Operations information etc. can be obtained by comparing the equipment specification against the following:

- Maintenance support – facilities, staff and equipment
- Operational role
- Equipment and support issues
- Maintenance requirements
- Operation undertaken
- Support issues
- Costs
- Configuration operational
- Operational environment
- Usage and scrap rates
- Safety issues
- Product ID
- Product quantity – suitable for operation or not
- Consumed support – equipment, staff time, shipping and storage

6.5.2 Use case 5: Maintenance management and contracting for availability

This use case covers the exchange of data between those groups that could have an interest in monitoring maintenance management and effectiveness of the contract. The effectiveness of maintenance or the contract can be obtained by comparing the equipment specification against the following:

- Maintenance support – facilities, staff and equipment
- Operational role
- Maintenance requirements
- Operational activity
- Support issues
- Costs
- Configuration
- Operational environment
- Product ID
- Product Status – suitable for operation or not

7 Maintainability

The objectives of maintainability monitoring must first be determined and from these objectives, the necessary activities are derived. The definition oft he activities tob e performed allows the indentification oft he required fundamental data classes and related data elements.

7.1 Maintainability objectives

The objectives of maintainability data gathering are to:

- Improve maintenance activities including scheduled maintenance and the relationship to Human factors.
- Improve the cost effectiveness of repair.
- Assist software maintainability.
- Predict trends and identify areas that are unacceptable and need to be improved.

This is not comprehensive list of maintainability objectives.

7.2 Maintainability activities

The principal activities associated with maintainability are:

- Validating specified maintenance periods.
- Reporting maintenance carried out.
- Predicting the future maintenance required.
- Identifying maintenance costs.

- Sustaining engineering support associated with maintenance.
- Reporting findings from scheduled and non-scheduled inspections.

This is not a comprehensive list of maintainability activities.

7.3 Maintainability metrics

A summary of the maintainability metrics that can be derived from obtaining relevant maintainability data fields are:

- Maintenance Man-Hours (MMH).
- Mean Repair Time (MRT) or Mean Active Corrective Maintenance Time.
- Mean Time Between Preventive Maintenance (MTBPM).
- Time to upload software.
- Mean Time To Repair (MTTR) where:

MTTR = Average preparation time + average fault isolation time + average disassembly time + average interchangeable time + average reassemble time + average alignment time + average checkout time + average start up time.

7.4 Maintainability data classes and elements

The data classes and elements for maintainability derived from the objectives, activities and metrics required are listed at Chap 19.

The data classes and elements should as a minimum cover:

The maintenance (scheduled and un-scheduled) tasks and procedures along with their corresponding interval or threshold as listed in the technical documents.

- The maintenance time taken broken down into its constituent elements.
- The resources used and the training / skills required.
- The conditions experienced e.g. the environment and the level of repair.
- Software maintenance details.

7.5 Maintainability use cases (6+7)

The use cases provide an indication of the data required to determine achieved maintainability. The data obtained might need to be compared against the design or performance specifications, technical instructions and the operational requirements.

For a detailed definition of the data to be used for each of these individual use cases, please refer to Chap 19.

7.5.1 Use case 6: Maintenance Activities, Effectiveness of repairs, Specified maintenance, Predict maintenance periods, product status

This use case covers the exchange of data between those groups that could have an interest in monitoring maintenance and repairs. The information required for this use case includes the following:

- Maintenance instructions
- Spares availability
- Appropriate equipment and facilities
- Configuration – Role, As Maintained, Operational and Current Design Standard
- Competent and capable staff
- Maintenance schedule
- Product status – suitable for operation or not
- Warranty
- Environment
- Usage Information

- Product operational issues
- Maintenance costs – time, spares, staff etc.

7.5.2 Use case 7: Retaining Performance, Support Manuals and Support Infrastructure

This use case covers the exchange of data between those groups that could have an interest in the supporting infrastructure and on-going performance. The information required for this use case includes the following:

- Product performance
- Maintenance instructions – technical documentation
- Spares availability
- Product issues
- Maintenance environment
- Time to undertake maintenance – obtaining spares, suitable staff and equipment

8 Capability

The objectives of capability monitoring must first be determined and from these objectives the necessary activities are derived. The definition oft he activities tob e performed allows the indentification oft he required fundamental data classes and related data elements.

8.1 Capability objectives

The objectives of capability data gathering are to:

- To monitor the performance of a product against its specification.
- To identify capability shortfalls.
- To improve the time a product is mission capable.
- To improve cost efficiency

This is not a comprehensive list of capability objectives.

8.2 Capability activities

The principal activities associated with capability monitoring are:

- Validating the specified capability.
- Monitoring products performance against specification.
- Feedback of performance into engineering design.
- Predicting the performance possible.
- Reporting Life Cycle Costs (LCC).
- Predicting the LCC to sustain that capability.

This is not a comprehensive list of capability activities.

8.3 Capability metrics

A summary of the capability metrics that can be derived from obtaining relevant capability data fields are:

- Percentage of performance specification met.

Special techniques often used to make the output clear: include maturity models, go/no go indicators and traffic light systems.

8.4 Capability data classes and elements

The data classes and elements for capability are listed at Chap 19. Although the list is as complete as possible, other data elements could be required depending on the system or domain (Land, Sea, Air and Space) specific operating requirements.

In principle however the data classes and elements should as a minimum cover:

- Detailed description of the capability required (performance specification) and the mission to be performed including the expected environment.
- The performance achieved.
- The environment experienced.
- A definition of a capability (performance) loss.
- The expected response when capability is lost and how the performance can be restored.
- Mission to be performed and details of any unusual events.

8.5 Capability use cases (8+9)

The use cases provide an indication of the data required to determine capability. The data obtained might need to be compared against the design or performance specifications, technical instructions and the operational requirements.

For a detailed definition of the data to be used for each of these individual use cases, please refer to Chap 19.

8.5.1 Use case 8: Mission capable, capability shortfalls

This use case covers the exchange of data between those groups that could have an interest in determining product capability. The information required for this use case includes the following:

- Maintenance infrastructure – facilities, staff, equipment, documentation
- Operational role
- Operational status
- Mission issues
- Achieved performance
- Error detection
- Support cost – logistics, staff, parts, infrastructure
- Environmental conditions
- Maintenance support required – time, staff, parts
- Configuration operational
- Staff – quantity, ability
- Usage – Issues, experienced

8.5.2 Use case 9: Efficiency, performance against specification

This use case covers the exchange of data between those groups that could have an interest in knowing the effectiveness of the product. The information required for this use case includes the following:

- Activity – assessed
- Operation – achieved
- Maintenance – achieved
- Reliability – achieved
- Error reports
- Costs
- Support documentation
- Fault detection and isolation
- Product ID
- Usage - Operations undertaken, Operations failed, Operations not started
- Repairs undertaken

9 Testability

The objectives of testability monitoring must first be determined and from these objectives the necessary activities are derived. The definition oft he activities tob e performed allows the indentification oft he required fundamental data classes and related data elements.

9.1 Testability objectives

The objectives of testability data gathering are to:

- Provide reports and information that confirm how best to test a product.
- Confirm the test equipment requirements, the level and cost effectiveness of testing.
- Confirm confidence in the test results.
- Determine whether automatic test equipment can be utilized.
- Determine if faults are being diagnosed correctly.
- Determine if faults are identified in a reasonable period.

This is not a comprehensive list of testability objectives.

9.2 Testability activities

The principal activities associated with testability are:

- Identifying that product functions can be tested.
- Gather information on items that are difficult to test.
- Test recording and reporting.
- Validating the testability specified.

This is not a comprehensive list of testability activities.

9.3 Testability Metrics

The ability to test a product can change as technology develops or as access becomes limited.

A summary of the testability metrics that can be derived from obtaining relevant testability data fields are:

- Time to undertake test.
- Ease of access.
- Ability to locate fault.
- Ease of understanding test results.

9.4 Testability data classes and elements

There is no precise minimum data class for testability other than product state, as the proposed testing process should be evaluated carefully and a judgment based on risk before starting to determine what product criteria to test.

The choice will be affected by:

- The dominant failure modes and the resulting severity if they are not tested.
- The environment.
- The time taken and the ease of testing.

A selection of data classes and elements is shown at Chap 19.

9.5 Testability use cases (10+11)

The use cases provide an indication of the data required to determine testability. The data obtained might need to be compared against the design or performance specifications, technical instructions and the operational requirements.

For a detailed definition of the data to be used for each of these individual use cases, please refer to Chap 19.

9.5.1 Use case 10: Can product be tested

This use case covers the exchange of data between those groups that could have an interest in how easy it is to gain access and test the product. The information required for this use case includes the following:

- Environment for conducting test
- Error reports
- Availability - suitable staff, test equipment, support equipment
- Location of product and device to be tested
- Period for undertaking test – achieved
- Test equipment – operational issues
- Product ID – unit to be tested, product
- Configuration – test equipment, device to be tested, product
- Safety issues – access, working conditions

9.5.2 Use case 11: Fault diagnosis, fault identification

This use case covers the exchange of data between those groups that could have an interest in ease of functionally testing the product. The information required for this use case includes the following:

- Issues – time to find, issue, relevance, cause
- Time – duration of test
- Configuration – test equipment, device to be tested, product
- Achieved performance – time to find fault

Chapter 4

Feedback of data for maintenance analysis

Table of contents

List of tables

References

Table 1 References

Chap No./Document No.	Title
S3000L	Logistic Support Analysis
S4000P	International specification for developing and continuously improving preventive maintenance

1 Introduction

Regular maintenance is critical to ensure the safety, reliability, comfort and longevity of a product or sub-system and includes all actions which have the objective of retaining or restoring an item in or to a state in which it can perform its required function. There are two types of maintenance in use:

- Scheduled and preventive maintenance.
- Corrective maintenance.

Maintenance data is basic information necessary to analyze and maintain product performance during its life cycle. Through this information, affected organizations will improve safety, reliability, availability of the product and maintenance practices carried out on it. Maintenance data will be collected, analysed and resulting conclusions may be embodied optimizing the maintenance applied to each specific product.

2 Scope

This chapter defines the maintenance data feedback process. This chapter provides a guideline on the process and the information to be exchanged in order to provide appropriate data for maintenance analysis or maintenance control of the affected product.

The aim of this chapter is not to provide analysis of collected data, it is to provide a way of exchanging information to improve product maintenance.

3 Use cases

Following table will provide relation about use cases developed under this chapter and who will provide the data to whom (Industry to Product user; Product user to Industry; Maintenance Organization to Product User):

Table 2 Use Cases

USE CASE	DEFINITION	INDUSTRY TO PRODUCT USER	PRODUCT USER TO INDUSTRY	MAINTENANCE ORGANIZATION TO PRODUCT USER
1	Manufacturer maintenance schedule	X		
2	Product user maintenance program		X	

USE CASE	DEFINITION	INDUSTRY TO PRODUCT USER	PRODUCT USER TO INDUSTRY	MAINTENANCE ORGANIZATION TO PRODUCT USER
3	Maintenance performed		X	X
4	Product performance		X	
5	New modifications for product	X		
6	Technical queries (questions and answers)	X	X	X

3.1 Manufacturer Scheduled Maintenance

It is the manufacturer's responsibility to identify the minimum scheduled maintenance tasks that form part of the initial instructions recommended to maintain the product to a required level of safety and availability. Maintenance schedule development is based on design requirements, maintainability analysis and experience during the in service phase of the product. [S4000P] (In-Service maintenance optimization (ISMO)) identifies the recommendations for developing scheduled maintenance programs.

Each affected organization should establish and maintain a system for monitoring the effectiveness of their recommended maintenance schedules.

Affected organizations will analyze in service information provided by the product user and will amend the maintenance schedule if necessary (Feedback data from manufacturer to product user).

In service information related to scheduled maintenance is recorded by product users and shall be provided to the affected organization in order to optimize the scheduled maintenance document (feedback data from product user to manufacturer).

Revisions to the scheduled maintenance must be periodically raised by the Manufacturer. Revisions will come from in service experience data provided by Product users, and/or Maintenance organizations.

The scheduled maintenance must align with applicable regulatory requirements.

For more information related to manufacturer scheduled maintenance development, refer to [S3000L] Chap 10 (scheduled maintenance analysis), [S3000L] Chap 12 (maintenance task analysis) and [S4000P] Chap 3 (In-Service maintenance optimization (ISMO)).

This use case identify the useful information to assure all schedule maintenance requirements defined by the industry are performed as per the correct procedures and when required. Additionally identify the information that should be provided to improve and help the product user to plan and perform those maintenance activities

3.2 Product user Maintenance Program

The manufacturer scheduled maintenance is developed to be applied to a product family in different environments or usage profiles. If a product is going to be used outside of the manufacturers' identified usage profiles, adjustment to the scheduled maintenance may be required.

The product user maintenance program should include the requirements applicable to their specific product, considering each specific configuration of each product. It should contain the information from the different source issued by product manufacturer or sub-product, the authorities and the in-service experience the product user has collected.

Additionally the schedule maintenance program of each product user may be adapted considering the specific operation of the product, environment and maintenance capacity.

The product user maintenance program is a living document. From first day working, the product user maintenance program must be reviewed and amended with in service experience inputs from product usage.

Product user maintenance program shall provide information to [S3000L] Chap 10 (Development of a scheduled maintenance program) and Chap 12 (Maintenance task analysis) and [S4000P] (In-Service maintenance optimization (ISMO)) among any other analysis performed by S5000F users.

The purpose of this use case is to exchange information about schedule maintenance requirements performed by the product user that differ from those initially recommended by the manufacturer, considering the specific conditions of product use and the in service experience of the user.

3.3 Maintenance performed

Product user or a contracted maintenance organization performs maintenance on request due to product fail (corrective maintenance) or carry out preventive maintenance. This use case establishes the feedback data for any scheduled or unscheduled maintenance event performed in the product. For more information related to methodology and decision logic for corrective maintenance tasks analysis refer to [S3000L] Chap 7 (Results of FMEA/FMECA in LSA), [S3000L] Chap 8 (Damage and special event analysis) and [S4000P] Chap 3 (In-Service maintenance optimization (ISMO)).

3.4 Product performance

In order to follow product evolution and performance, this use case will provide information about product performance (time consumption, product availability).

This use case covers information about product performance and operational environment and profile data that may impact in product performance and maintenance and systems degradations.

3.5 New modifications for in-service products

In order to perform new modifications in the product, industry will provide the product user with a set of instructions to evaluate and to perform modifications in the product. For maintenance purposes, such information will provide enough data to implement it in the product. For more information related to in service changes, refer to [S3000L] Chap 4 (Configuration management in LSA).

3.6 Technical queries

In some cases, product user will perform technical queries to industry in order to solve maintenance related questions. Industry will answer related questions. The current chapter will provide data elements to be provided by product user and/or maintenance organizations and industry for interchange of technical queries.

4 Data required for use cases

The following Paras indicate the data to be used for each use case (UC).

Chap 17 includes the list of all data elements identified in S5000F. Chap 19 includes the list of data elements defined per use cases. Refer to these chapters for details.

4.1 UC 1: Manufacturer scheduled maintenance

Product manufacturer shall provide the necessary information to maintain the product. It is responsible to provide the preventive and scheduled maintenance recommendation to be performed in the product. Information to be provided by manufacturer related to this use case is included in Para 5.1 of this chapter.

4.2 UC 2: Product user maintenance program

Data to be provided is the differences with the schedule maintenance program defined by the manufacturer and considering the data defined by the manufacturer in Para 5.1 of this chapter.

4.3 UC 3: Maintenance performed

Product user maintenance reports (e.g. operator reports) are all maintenance reports recorded by the product user into a product logbook, either in electronic or paper format. It is not restricted to product failures. It also can be information for maintenance, about system status or in usage product data (e.g. engine monitoring, damage assessment).

One of the potential results of this data will be the reported defect number and type per operating time (e.g. Engine Cycles).

Analysis of data feedback will allow establishment of the defect rate per usage rate and deviations in performance against product from the same family. The following subChaps identify some of the types of scheduled and unscheduled maintenance data that could be fed back to a data base. The manufacturer can analyze this data and will be able to determine if maintenance schedule assumptions are as established (e.g. maintenance programs, intervals for scheduled maintenance, thresholds could be checked through removals and installations reports, unscheduled findings and/or scheduled task findings).

Work order / package data

Work requested to a Maintenance Organization to perform preventive or corrective maintenance activities on a product (for maintenance on and off product) will be performed under Work Order / Package instruction. The product user must release a Work Order / Package in order to inform the Maintenance Organization about the maintenance tasks that must be performed on the product at an identified time and product maintenance manual revision to be used. Once maintenance tasks have been carried out they should be registered in the Product Logbook. All discrepancies or defect must be recorded in the Work Order / Package report (sometimes also in product maintenance Logbook), including all information necessary to identify which maintenance tasks detected such discrepancy, components changes, and reference to the instruction used. It is assumed that the product user will perform (or subcontract) product maintenance activities. The product user will be able to collect all information from product maintenance activities.

Details of data that should be interchange with the industry by the product user is included in Para 5.3 and Para 5.4. For component off product maintenance, repair and overhaul activities refer to Para 5.5.

4.4 UC 4: Product performance

4.4.1 Product operational environment data

Product operational environment data will include the time in which the product has been working in a specific environment (e.g. desert, saline, continental, ice).

Product actual and past environment usage will help the manufacturer to understand specific degradations in systems and components due to operation in identified environments. Also

defects reported when a maintenance task is carried out happen due to product operation environment.

Analysis for different environments will improve the maintenance program and it will allow the customization of the maintenance program for each product user intending operating in these specific environments.

4.4.2 Operational profile data

Usage profile data will include each different profile used by an operator (military misions profile, civil profile, training profile)

Product actual and past usage profile will help the manufacturer to understand specific degradations on systems and components. Also inputs from maintenance task discrepancies, considering discrepancies as a finding of a defect, will appear due to product specific usage.

Analysis for different usage profiles will improve the maintenance program and it will allow customization of the maintenance program for each product user, intending to use a specific usage profile.

Additional details of data that should be interchange with the industry by the product user are included in Para 5.3.

4.5 UC 5: New Modifications for in-service products

Data required to perform a modification in a product that is in service is included in Para 5.1.

4.6 UC 6: Technical queries

Technical queries are questions raised during in service support phase from product user and /or any maintenance organization supporting the product to the Manufacturer or operator. The scope of these queries will depend of each situation. Mainly, it will be covered by the following groups:

- Queries for issues not included in the manufacturer's manual. For example repairs not included in the structural manual, figures not included in manuals, procedures not included in manuals.
- Queries for issues included in manufacturer's manuals but not clear to the product user.
- Queries for issues included in manufacturer's manuals, clear but not fully understood by product user.
- Queries for issues related to reliability analysis (eg. mismatch between manufacturer reliability and product user reliability).
- Queries for issues related to additional modifications issued by manufacturer or for issues related to additional modifications requested by product user.

It is fundamental to establish a good communication channel between Product User-Manufacturer and Maintenance Organizations-Manufacturer in order to understand each query. If not, misunderstanding will affect the quick solution of each problem and hence product availability. Through a deep analysis of each query and group of queries for the same issue, the manufacturer manuals and processes will be amended and improved.

It is very important that the Product Manufacturer keeps that information in a good technical query database, allowing to quickly finding similar or related queries from the same of different product user (s) or maintenance organization (s). Same implication has the way as each product user collect and manage the information of technical queries raised by them. It will impact in the time required to solve a query.

5 Inputs and outputs of data for use cases

Main owners and users for maintenance data will be located within the following groups:

- Manufacturers (Systems as product, subsystems as engines and lower levels as LRUs)
- Product users
- Maintenance organizations (either full product and/or lower level Maintenanance -Repair Shops)
- Regulatory Authorities (eg. NATO-North Atlantic Treaty Organization, FAA-Federal Aviation Authority, EASA-European Aviation Safety Agency, UK CAA –UK Civil Aviation Authority, DGAC-F French Direction générale de l'aviation civile , etc)
- Inputs and outputs from these groups will be mainly directed to:
- Manufacturer scheduled maintenance
- Product user maintenance programs
- Special requirements by authorities

Table 3 shows who the owner of the information is and who the user of such information is. As related before in this Para, there are documents owners and documents users. For example, manufacturer is the owner of the Manufacturer Scheduled Maintenance. Product user will have inputs from Manufacturer Scheduled Maintenance to perform its Product user Maintenance program. Also Maintenance Organization will have inputs from Manufacturer Scheduled Maintenance to perform his maintenance. Finally, Authority will receive inputs from Manufacturer Scheduled Maintenance to approve product maintenance program.

Table 3 Owner/provider information

Owner Deliverable	**Manufacturer**	**Product user**	**Maintenance organization**	**Authority**
Manufacturer Scheduled Maintenance	Owner	Inputs<-> Outputs (Findings)	Outputs (Findings)	Inputs<-> Outputs (approval)
Product user Maintenance Program	Inputs	Owner	Inputs<-> Outputs (Findings)	Inputs<-> Outputs (approval)
Authorities special requirements	Input <-> Output	Input <-> Output	Input <-> Output	Owner

Any maintenance analysis may be done in various ways depending on the product user and manufacturer requirements and depending on collected data available. Following Paras give an example of data that can be provided by affected organizations.

5.1 Data required from Manufacturer

5.1.1 Related to Use Case 1 – Manufacturer schedule maintenance:

Product manufacturer shall provide the necessary information to maintain the product. It is responsible to provide the preventive and scheduled maintenance recommendation to be performed in the product. This information shall include, at least:

- The Maintenance Program to be performed, with tasks number reference, task description, task due interval counter metrics (time, product usage), reference to the detailed instructions to perform the task. It shall include maintenance policies for specific products (e.g, overhaul, life limits).
- In addition, it should be provided the information about expected task duration (MET), expected working time of the personnel (MMH), expected number of technicians, skills required to perform the tasks in order to facilitate planning of the activities.

- If it is not provided as part of the maintenance program at least it has to be included in the maintenance instructions the material (components + consumable + expendable + special tools) required and identification of any specific skill.
- The manufacturer shall provide product manuals with the instructions to perform the maintenance activities, troubleshooting, diagnostic information (call outs/codes):
- Amendment to maintenance programs.
- Specific instructions.
- Technical information with impact on maintenance.
- Product MTBUR and MTBF.
- Product user / maintainer should be able to follow the maintenance planning with this information.

5.1.2 Related to Use Case 5 New modifications for in-service products:
Identification of the products the new modification is applicable to, identifying the impact in configuration data, provide instructions to perform the modification, identify impact in interchangeability or mixability of components, provide information of material and tools required to perform the work. Provide information about expected task duration and skills required.

5.1.3 Related to Use Case 6 Technical queries:
Provide answers to Technical queries from customer.

5.2 Data required from the Authorities

Regulations and specific instructions (e.g. national specific requirements)

5.3 Data required from Product user

5.3.1 Related to use case 2 – Product user maintenance program
Related to the information identified in point 5.1, the product user may provide to the industry the differences it has introduce in the maintenance program of its product compared with the one proposed by the manufacturer.

5.3.2 Related to use case 3 – Maintenance performed
Product user may collect data related to the operation and maintenance performed on the product. Improvement in the product use and maintenance practices will depend on the collected data.

Data provided by the product user to the manufacturer should be filtered to avoid wrong data is shared with the industry. Pre analysis of rough data by the product user would avoid misunderstanding and assure highest level of effectivity in the analysis performed by the manufacturer.

Reports provided by the users should include the information related to:

- Unscheduled Maintenance
- Scheduled Maintenance
- Operation Data Reports

Unscheduled Maintenance Reports should include:

- source of failure (e.g. Pilot report, Maintenance Report),
- failure description,
- date of failure, actual product and/or component usage when failure occurred (working time, and product usage time),
- product family and product registration,

- reference of maintenance task used to solve the failure, if applicable identification of troubleshooting performed,
- component removed and installed with reference to manufacturer and P/N and, if applicable, S/N, component life (if applicable),
- measured task duration and measured working time of the personal used to solve the failure,
- if possible, information of diagnostics call outs performed,
- information about component repairs: cause of failure, parts impacted by the repair, cost of repair if possible.
- Working time
- Working cycles
- Working age (time)

Scheduled Maintenance Reports should include Work orders / Work package findings/data not included in unscheduled maintenance reports

- task data (reference, description),
- Measured task duration (MET) and measured working time of the personnel (MMH) required to perform the task (if possible),
- Product metrics and date when task has been performed, task date when it was due and product metrics when task due,
- Associated discrepancies when task has been performed (open action, close action and/or deferred action, troubleshooting and diagnostic call outs performed),
- Associated information of component changed as part of maintenance actions (P/N and S/N if applicable), material requirements (if applicable), material consumption (as forecast for each work package).

Specific data (e.g. oil consumption, hydraulic consumption, fuel consumption).

Feedback on trouble-shooting, procedures and technical manuals.

Also modifications will be included in this Para (e.g. Service Bulletin embodiment, Modification embodiment, etc, in order to allow manufacturer to know aircraft configuration)

5.3.3 Related to use case 4 – Product performance

Product working environmental conditions.

Product working profiles.

Product dispatch availability when a failure appears. It will be:

- No impact in product usage,
- Some impact in product usage but still product can perform its planned work,
- Product cannot perform its planned work as a consequence of the failure,
- Product planned usage is delayed as a consequence of the failure,
- Product cannot be used for planned work as a consequence of the failure,

5.3.4 Related to use case 6 – Technical Queries

Technical queries to manufacturer.

5.4 Data required from Maintenance organizations

5.4.1 Related to Use case 3 – Maintenance performed

Maintenance reports should be recorded by maintenance personnel into product maintenance Logbook, either in electronic or paper format.

Maintenance reports will be used to identify actions to solve product user reports, all deferred defects, scheduled and unscheduled maintenance performed for maintenance level on product, component removal and installation (and reason) with P/N and S/N in and out if applicable.

Product user will update product configuration with this information, with configuration status and modification status information and analyses the effectivity of the maintenance program,

Maintenance reports to inform about any issue related to maintenance instructions must be provided to the product user and product manufacturer. This point is related to technical queries too.

Maintenance Organizations, when different to the product user, shall provide maintenance reports to the product user with the information described in Para 5.3 related to Unscheduled Maintenance Reports and Scheduled Maintenance Reports,

5.5 Data required from Repair Shop

5.5.1 Related to Use case 3 – Maintenance performed

In off product maintenance, repair and overhaul activities, repair shops must issue reports per each component, which has been maintained, repaired and/or overhauled in its facilities. All activities performed by repair shop on the product, including the information that identify the product (part number, serial number or batch number, as applicable) must be recorded in this report.

Either findings or No Fault Found reports from repair shops will help the product user and manufacturer to understand failure patterns in components and/or wrong maintenance patterns for trouble shooting.

Requirement of improvements issued to component manufacturers will be speedy if component manufacturers have all fault information. Improvements in trouble shooting manuals will also be speedy if it is detected through no fault found reports from manufacturers. Also product user wrong usage patterns could be detected and improved.

Shop reports shall include information about work performed, defect or No Fault Found information, parts used, elapsed time required for repair, workload, cost.

Maintenance information of parts used (life limit part installed with its consumed life or remaining potential or any other parameter required to track the maintenance requirements of that part or subpart installed).

Information on the availability of the parts to perform the maintenance activity or repair and, if applicable, the time spent waiting for the parts to perform the repair is useful information to be included on the report to be used internally by the Repair Shop. That information will permit to improve their internal process of material management that will have an impact in the elapsed time required to perform the maintenance activity on the product.

5.6 Other data to be required but not included in data set

From Manufacturer: Product manuals and other engineering documentation with the instructions to perform the maintenance activities will be required to be provided to the product user or maintainer.

From Product/Maintainers users: additional information than described above, as photos of defects found during maintenance activities are value added information.

Chapter 5

Feedback of safety data

Table of contents

List of tables

List of figures

References

Table 1 References

Chap No./Document No.	Title
None	

1 Introduction

Safety covers all activities aimed at prevention of accidents and incidents, trying to reduce risks in the operation of a product and its environment, through the analysis of events occurred at any stage of its life (from conceptual design through its service life) or others deemed to constitute a potential hazard. Activities addressed to analyze, define, develop, review, produce and control modifications to overcome or mitigate the problems identified in the product and its systems that

could cause or have caused incidents or accidents related to Safety constitute the concept of product safety.

The use of a product during its service life by the operators is a valuable source of information for capturing events affecting safety. S5000F as standard means to feed information back from the field about maintenance and operational aspects provides data about events potentially affecting the product safety.

2 Scope

The events that may affect the Product Safety may come from very different areas and activities as well as other external agents related to operations. These events can provide valuable information for the prevention of incidents or accidents and everyone should be reported. This chapter provides information about capture of events in In-Service phase affecting the product safety. On the other hand the feedback from industry side to the operators and/or maintenance organizations in order to inform about limitations due to safety issues and/or provide instructions to solve safety issues is also covered.

3 Purpose of safety data feedback

3.1 Objectives

Safety Data Feedback supports the product safety process. Basically the main objectives to be ensured can be summarized as:

- All events that may impact on the safety of a product are captured and analyzed, regardless of where and when they occurred.
- All lessons learned from previous events are identified and taken into account for the product in service, developing and future projects, ensuring the application of the continuous legal regulated principles and the review of legal regulations of design if required.
- All significant improvements in the various processes involved in the product life (from conceptual design to its service life) which contribute to the prevention of accidents are identified and valued.
- All Safety related issues are adequately addressed in a multidisciplinary way among all the basic functions of the organization, making decisions collectively through committees established for that purpose.
- All decisions and actions taken are properly registered, providing the required traceability at any stage.

In this context, tasks like:

- Capture and identification of events.
- Keep traceability between safety events and the corresponding decisions and actions taken.
- Spread of safety-related data to the corresponding organizations in industry and customer sides.
- Report about safety issues, operational limitations associated and/or instructions and procedures to address and solve safety problems.

take part of safety data feedback process.

3.2 Activities to Support Objectives

3.2.1 Capture and identification of events

The objective of this stage is to ensure the capture of all events (anomalies, occurrences, incidents and accidents) from which lessons can be learned that will result in Safety improvements.

The events that may affect the Product Safety may come from very different areas and activities (Design, Engineering, Manufacturing, Operation, Maintenance, Training, etc) as well as other external agents related to operations.

Safety issues raised by operators need to be registered in order to be identified and analyzed. S5000F develops a data model where the operator feedback is downloaded and this information can be exchanged with other business processes.

3.2.2 Traceability

Traceability is required for:

- Initial register and closure of events and improvements.
- Actions register and management.
- Support product safety process at industry and/or customer sides.

At data management level, traceability is required between:

- Product configuration data.
- Maintenance events data.
- Usage data.

In order to support traceability, safety data feedback is in charge of registering safety events during in-service phase and integrating configuration, maintenance and usage data feedback. In that sense, traceability between safety issues raised by operators, safety instructions to solve safety problems raised and operational limitations found are possible between industry and customer sides.

S5000F data model and data exchange developed in the standard provide the backbone to let third-parties achieve the required traceability.

3.2.3 Spread of safety-related data

Safety data feedback is required to communicate safety issues to the corresponding organizations at industry and customer sides: safety issues from operational side as well as safety warnings, operational limitations and solutions to issues previously raised need to be exchanged.

A repository based on ASD S5000F data model and data exchange mechanism provided support the communication of safety-related data. This communication ensures traceability, consistency and integrity of safety related data between parties involved.

3.2.4 Reporting

Reporting is basically a communication mean to cover:

- Instructions: document describing and enabling an action affecting the systems or structure parts of a product or affecting the product operations.
- Information: document helping customers to operate or maintain their fleet more efficiently. Any recommendation leading to a change of product configuration or maintenance task/interval should refer to the proper instruction document.

Purpose:

- For transmitting general information.
- For transmitting maintenance information, maintenance instructions or for an urgent transmission of information or instructions dealing with a legal regulations related in-service issue.
- For an urgent action to be performed on a fleet by the operator and with a potential impact on the legal regulations of the product.

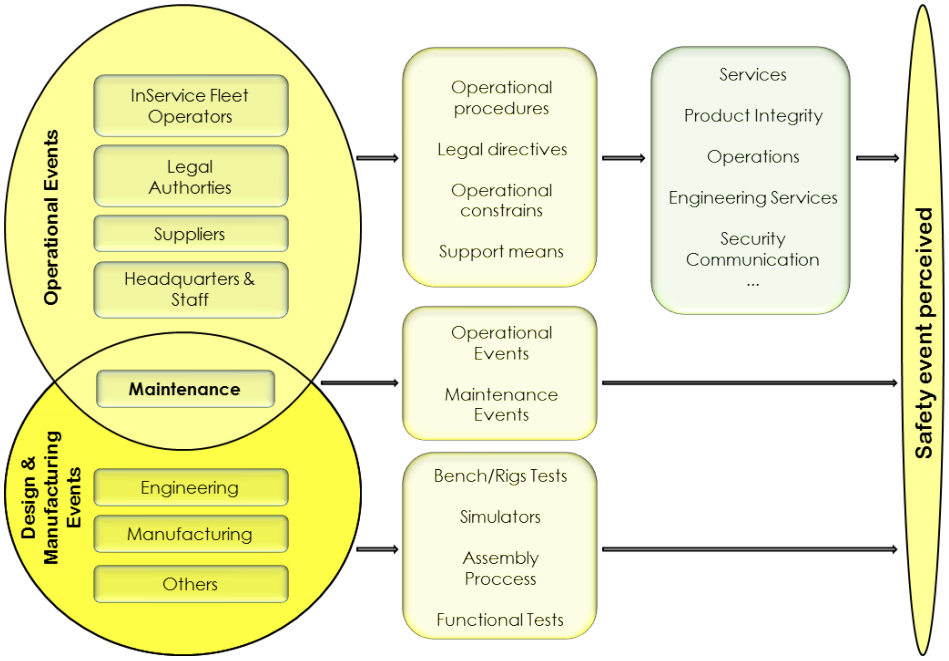
4 Reporting of Safety Information

Safety related data might be exchanged between industry and customer sides in both directions:

- Reporting about safety warnings and/or safety limitations need to be sent to the operators of the affected product(s).
- Safety events raised in operation need to be communicated to industry.

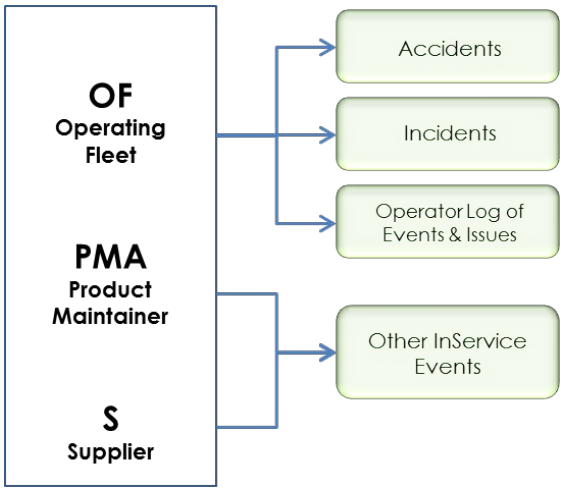
Basically, safety related data reported consists of:

- Reporting type: refers to the report category: general communication, advice, operational recommendation, legal regulations, etc.
- Organization data: data related with reporter and distribution list for the report including information such as: organization, department, telephone, fax, addresses, dates, etc.
- Operational environment and location data: refers to where the event took place and information about environmental conditions under which the product(s) were operated. Place, incident/event location and operational phase are examples of this kind of data.
- Operating conditions data: refers to data such as weight, number of equipment installed, etc.
- Maintenance data: data related with the transmission of maintenance information or maintenance instructions that are part of recommendations or technical answers to an operator or a product maintainer organization (PMA) request. In many cases a technical document such as a service bulletin is attached in order to enable operators or PMA to perform modifications, substitution of parts, special inspections/checks, reduction of existing life limits, etc.
- Product Data: refers to data such as affected product type, applicability, manufacturer serial number, etc.
- Configuration Data: data related with parts affected by the safety event such as part-name, part-number, serial-number, etc.
- Event Data: refers to data related with a safety event such as:
  - Event description
  - Event type
  - Event severity
  - Event frequency
  - Event condition of detection.
  - Narrative for event causes
  - Determining and contributing event factors.



ICN-B6865-5000F05001-001-01

Fig 1: Major organizations and sources reporting safety events



ICN-B6865-5000F05002-001-01

Fig 2: Main actors of In-Service Safety data process

5 Use Cases

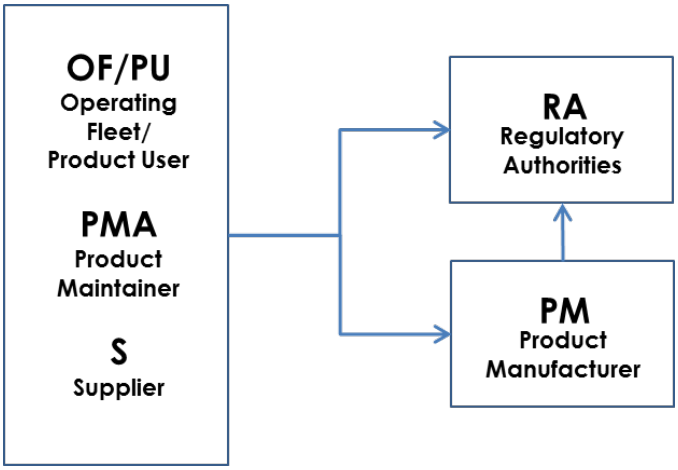
Three use cases have been defined for the exchange of safety data. The first one consists of a feedback from operational side to industry side; the last two correspond with a feedback from industry side to operational side.

The data and documentation reported in these uses cases correspond with the safety data categories listed above.

5.1 Use Case 1: Report safety issue

The aim of this use case is to compile information regarding any incidence affecting safety from operational side. The fundamental aim is to provide a rapid means of transmitting details of

occurrences among operators and between operators and industry. Operators can include PMA organizations.



ICN-B6865-5000F05003-001-00

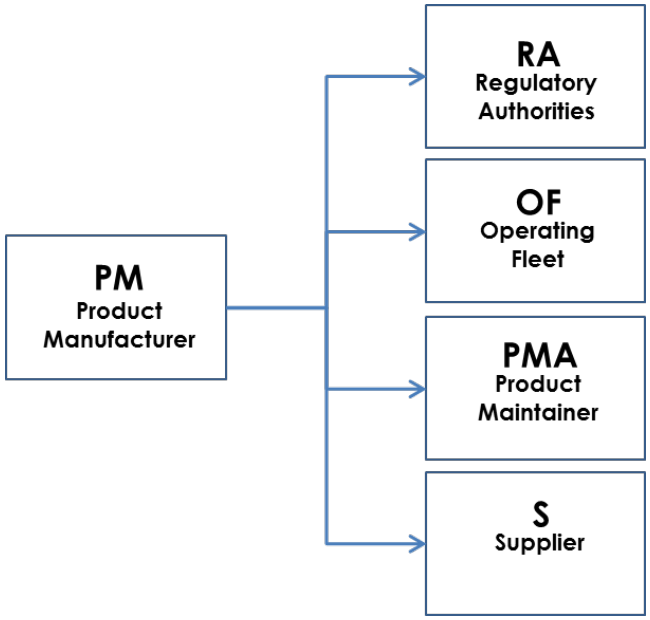
Fig 3: Report Safety Issue interfaces

5.2 Use Case 2: Report safety warning with recommendations

The aim of this use case is to inform operators about operational limitations due to safety issues until a solution for those issues is found. Warnings are to advise others of deficiencies that seriously threaten safety and require immediate attention. To assist other operators a technical warning report should detail any action considered necessary to reduce the risk. Refer to figure Fig 4.

5.3 Use Case 3: Provide special safety instructions

The aim of this use case is to provide special safety instructions to be carried out by the operator so as to address and solve a safety issue. Special Instructions are to advice of potential safety failures which require a change and are to be dealt with as immediate demands. Refer to figure Fig 4.



ICN-B6865-5000F05004-001-01

Fig 4: Report Safety Warning with Recommendations & Provide Safety Special Instructions interfaces

Chapter 6

Feedback of data for supply support

Table of contents

List of tables

References

Table 1 References

Chap No./Document No.	Title
S2000M	International specification for material management – Integrated data processing for military equipment

1 Introduction

The objective of Supply Support as one of the ILS elements for Product Support strategy is to plan for the procurement of forecasted repair parts, spares, and all classes of supply to ensure the best equipment/capability is available to support the product and the maintainer when it is needed while also minimizing the Total Ownership Cost (TOC) to sustain the product over its life.

2 Objective and scope

The objective and scope of the Supply Support feedback chapter within the S5000F specification to ensure that all aspects of the supply support strategy is properly accounted for within the feedback loop to ensure that any changes made to the deployed assets, initial forecast for consumption of spares/consumables, supply chain and inventory management remain optimized for maximum asset availability while minimizing the cost to sustain the same assets.

The scope and intent of this chapter shall not include the activities that overlap with S2000M as well as aspects covered under the other chapters within this specification.

3 Supply Support description

Supply support consists of the management actions, procedures and techniques necessary to acquire, catalogue, receive, store, transfer, issue and dispose of spares, repair parts, and supplies. Supply support includes provisioning for initial support, as well as acquiring, distributing, and replenishing inventories as reflected in the supply chain management strategy. Proper supply support management results in having all the right spares, repair parts, and all classes of supplies available, in the right quantities, at the right place, at the right time and at the right price.

Some of the key activities of supply support include:

- Global Spares Pool Visibility and management
- Routine replenishment management, including buffer and safety stock management
- Logistics Response Time
- Demand forecasting and Readiness Based Sparing (RBS)
- Bills of Material management and maintenance
- Cataloguing (SM&R Codes, NSN)
- Transportation, Receiving and storage
- Repair Management
- Shelf Life Management
- Warranty Management
- Supply Chain Assurance
- Supply Chain Management (SCM)

4 Use cases

The intent of this section is to enumerate the use cases not covered in other chapters as activities within Supply Support overlap other chapters in this specification. Table 2 summarizes the relevant use cases and their reference to other specifications, those that are addressed in other chapters or enumerated in this chapter.

Table 2 Use case summary

Activity	Reference
Spares Ordering	S2000M
Invoicing	S2000M
Cataloguing	S2000M
Obsolescence	S5000F Chap 10
Warranty	S5000F Chap 8
Inventory Management	Use Case 1 (Ref Para 4.1)
Shelf Life Management	Use Case 2 (Ref. Para 4.2)
Spares & SE Pool Management	Use Case 3 (Ref. Para 4.3)
Logistics Response Time	Use Case 4 (Ref. Para 4.4)
Facilities Management & Maintenance	Use Case 5 (Ref. Para 4.5)

4.1 Use Case 1: Inventory management

One of the key objectives of the OEM developed maintenance program is to successfully maintain an optimal stockage of spares and consumables. Note that the actual ordering and invoicing of spare parts are in accordance with S2000M and hence not covered in S5000F.

This use case models the continuous optimization needed from the initial provisioning effort. The entities required for this use case model are as follows:

- Fleet Data
  - # of Products
  - Usage Data
  - Configuration
  - # of locations
  - Availability
- Part Usage
  - Part Number
  - Manufacturer ID
  - Serial Number
  - Consumption over time period
  - Mean Time Between Unscheduled Removals (MTBUR)
  - Failure locations
- Inventory
  - Part Number
  - Manufacturer ID
  - # of Spares on hand
  - Price last purchased
  - Purchase lead time
  - Transfer data
  - Disposal information

4.2 Use case 2: Shelf life management

Shelf life is defined as part of initial provisioning. However, changes in environmental conditions, packaging, and material condition can alter the expected design shelf life, can impact warranty and hence, information related to this needs to be updated for continued procurement of same parts.

- Warehouse
  - Average Part Storage time
  - Average Humidity
  - Average Temperature
  - Air Quality if applicable
- Parts in Warehouse
  - Part Number
  - Manufacturer ID
  - Serial Number
  - Expiry Date
  - Shelf life
  - Batch/Lot Number

4.3 Use case 3: Spares & SE pool management

Products that have global customers and deployed locations may have a global spare and/or Support Equipment (SE) pool model where multiple countries/customers procure and manage the spares and support equipment but still allow the parts to be moved as demand fluctuates

between customer nations. Continuously monitoring the these parts movement and procurement can help reduce the overall sustainment cost of the product. Data that can be tracked for this use case include but is not limited to the following:

- # of countries in the global spare and SE pool
- # of warehouses and operational bases in each country
- Part information and procurement data
- # of times a part is moved within the spare and SE pool

4.4 Use case 4: Logistics response time

Information regarding total Logistics response time is a critical factor in ensuring the product availability targets are met. This time is defined from when a failure is recorded till when it is fixed and the product is operational again. Feedback of this data can influence location of supply centers, purchase cycles and even the maintenance time recorded to perform the repair.

- Warehouse Parts Data
  - Part Number
  - Manufacturer ID
  - Serial Number
  - Transportation Time from supply centre
  - Repair Time
  - Purchase Price

4.5 Use case 5: Facilities management and maintenance

The objective of the Facility Use case is to update and maintain the facility infrastructure details including environmental and security requirements, equipment condition, space usage, location effectiveness and feedback to improve the tracked attributes. The data model of use cases for Facilities shall use the following elements:

- Warehouse/Facility
  - Utility usage
  - Facility expenses over time
  - Security incidents
  - Storage utilization
  - Equipment usage
  - Equipment Maintenance costs
  - Environmental data

Chapter 7

Feedback for Life Cycle Cost analysis

Table of contents

List of tables

List of figures

References

Table 1 References

Chap No./Document No.	Title
S3000L	International procedure specification for Logistics Support Analysis LSA
Chap 13	Feedback of data to support the management of in-service contracts
Chap 20	Terms, abbreviations and acronyms

1 Definitions

For acronyms and definitions please refer to Chap 20.

2 Introduction

Approaching the cost evaluation for a specific system the boundaries of the analysis must be clearly defined. Different kinds of cost can be associated with a system as, for example, Life Cycle Cost (LCC), Total Ownership Cost (TOC) and Whole Life Cost (WLC). Each one of the previous definition can contain different costs elements (see the definition chapter of this ASD standard).

Life Cycle Cost (LCC) is the cumulative cost of a product over its life cycle from concept to retirement as determined by a process of economic analysis that allows for the assessment of the total cost of acquisition, ownership and disposal of the product. It consists of all direct costs plus indirect-variable costs associated with the procurement, operation and support (O&S) and disposal of the system.

The LCC Estimation Process consists of a set of activities aiming mainly at the estimation of the LCC for a System of Interest. This process is influenced by the nature and complexity of the System of Interest, the Scope of the cost estimation, the availability of cost data and the phase of the Life Cycle. The Life Cycle of a system is generally divided into five phases:

- Definition
- Preparation
- Development
- In service
- Disposal

The LCC estimation process consists of a clear definition of aims and objectives, the establishment of the program content, costing boundaries and assumptions of the cost estimation, and the development of the structure of the life cycle cost framework.

A LCC estimate gives an insight into the major cost factors and it may also help to compare alternative solutions. It highlights the magnitude of the costs and identifies areas for potential cost savings as well as areas for technical and organizational improvements.

LCC is more precisely defined in each project by the list of all the cost elements to be considered in its calculation. This list is usually described by a cost breakdown structure (CBS). The content in a CBS can often be different between organizations or sometimes even between programs in the same organization.

For more information about the five phases mentioned above regarding how to perform LCC, the LCC process, different methods to calculate LCC, etc. the reader shall refer to the ASD S3000L Chap 14 Life Cycle Cost Considerations.

3 Scope

Life cycle costing should be considered as an on-going activity throughout the project life cycle.

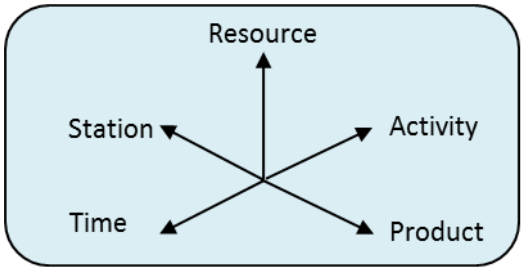
The LCC estimation consists of the following major activities:

- Cost element definition (S3000L Chap 14)
- Identification of cost elements for each life cycle phase of the product
- Population of the identified cost elements within the cost breakdown structure
- Calculation of LCC based on cost elements and CBS

The scope of this chapter is the identification and population of cost elements associated to the in service phase and the disposal phases.

4 Objectives

A cost element is always associated to a “resource” used by an “activity” performed on a “product” in a certain “time” located to a certain “station”. These characteristics can be considered five dimensions (see Fig 1). Each dimension can be broken down into different “domains” that can be specific for the single system phase (e.g. design domain can be considered specific for the development phase stage) or common to different phases (e.g. the training domain).



ICN-B6865-5000F07001-001-00

Fig 1 The five dimensions of LCC for a cost element

The objectives of this chapter are to define all possible domains inside the five dimensions (resources, activities, products, time and stations) during the in service phase and the disposal phase aimed to the identification of cost elements.

The large variety of activities to be performed during the operational phase represents an obstacle against rapid identification and population of cost elements. Consequently the broad range of real activities will be replaced by a narrower range of generic activities which covers all real activities with the advantage of grouping based on similarity. In order to perform the generic activity, specific resources need to be used as result of a specific product.

5 Typical applications

In the in service phase the product will operate at the intended operational sites to deliver the required capability to fulfill the requirements of the customer regarding both cost effectiveness and support services (including maintenance). By continuously monitoring the product it can be optimized regarding effectiveness and costs.

The need for a major modification or upgrade of the product may arise from a change in operating environment, a deficiency identified in the product, a recommendation from the operators or an opportunity to reduce costs. When modifications or changes for upgrade are identified as necessary, the product may re-enter the definition phase or the development phase.

During the in service phase the support concept will be refined and validated. A key role in this process is the optimization of costs.

6 Typical cost data usage

The list below shows some examples of use cases when it could be useful to do life cycle cost analysis during the in service phase.

- Estimating maintenance costs. To evaluate maintenance alternatives and support system redesign if replacing a unit or support equipment.
- Monitoring operational requirements on a cost basis. Carried out to analyze how changes in requirements regarding operational profiles or mission capability will affect LCC.
- Estimating cost and effect of modifications or upgrades. To analyze the effect that a suggested modification will have on the system as a whole.
- Optimize costs for in service support. Evaluation and comparison of different approaches for replacement, rehabilitation/life extension or disposal of systems/products.

7 Input

In order to pursue a cost effective operation of the system or product, input data is required.

This data can consist of information from the earlier phases, e.g. the development stage or a use study made earlier in the definition phase. Other information needed are operational requirements, information of how to support the system or product. Also information related to costs for support personnel, training of the support personnel, infrastructure and facilities, spare and repair parts, documentation, test and support equipment and tools, packaging, handling, storage and transportation (PHST) or contract data is required.

Furthermore, assumptions and data related to deployment are required.

Finally, during the in service phase information from users, e.g. user satisfaction, operating and supporting experience and other in use feedback data will be gathered.

8 Output

The main output of cost analyses in the in service phase is the costs related to operation and support of the product. The output will support decision makers to forecast future costs, manage existing budgets and undertake options analysis where necessary.

The forecasting of future expenditure requires a sound knowledge of the actual operational profiles. Actual costs can also be compared with earlier estimates. By analysing the result of the analysis (the output) together with the user will form a base for a cost effective operation of the product.

9 Cost Breakdown Structure

A generic cost breakdown structure (CBS) is described in the S-series specification for LSA S3000L chapter 14.

The role of the CBS in the LCC process is twofold: it must support the overall scope of the cost estimation process and it must facilitate the calculation and estimation of the relevant costs. In addition, the CBS will also have a practical administrative function as a checklist of the costs that must be estimated. To be useful for these purposes, the LCC must be broken down in a structured way into individual cost elements.

The CBS includes all cost elements defined through the five dimensions (activity, resource, product, time and station). Inside each dimension different “domains” related to different system phases can be defined.

In order to identify the cost elements specific to in service phase and the disposal phase, the current chapter will describe the main “domains” inside the five dimensions for these phases in detail.

During the in service phase it is possible to perform LCC analysis for the entire system (or a system of systems) or sub-system or a certain unit or sub-unit.

The following subparagraphs provide lists of domains for each of the five dimensions identified: activity, product, resource, time and station. For each one of the domains there are also proposed associated data that populate the dimensions of cost elements.

9.1 Dimension activity in the operational phase

Table 2 below proposes a list of the main domains and associated data that can be considered as part of activity dimension during the operational and retirement stages.

Table 2 Domains and data elements for dimension activity

Dimension & Reference	Domain	Associated data	Comments
Activity A1	Operation	Annual Operating Rate (Differentiate rates for training, testing or operating) Skill levels to operate the system	
Activity A2	Mission Support	Management and supervision (global and organizational leads) Administration (administrative lead) Control of operation (operational lead) Planning and scheduling of activities Safety (operational and non-operational) Quality control Security and relative skill levels Logistics Energy (electricity – fuel – gas …) Additional handling support (ammunitions for defense systems, radioactive substance for nuclear plants, any substance / subsystems required) Simulator operations (training) Communications (post, media) Personnel services (life support, leisure, medical care…) Defense and economical intelligences	Costs that are taken into account must fit to the system considered in the analysis
Activity A3	Maintenance	Preventive maintenance of the primary system (all levels) Corrective maintenance of the primary system (all levels) Fault detection and relative equipment Test and calibration of system and relative equipment	Maintenance levels include maintenance made: by end user, by specialist repair personnel,

Dimension & Reference	Domain	Associated data	Comments
		Functional and / or physical inspection Trouble shooting Prevention Overhaul Usage of the associated support equipment Replacement of Spare Parts and / or components Maintain the associated support equipment and relative training	by a depot or agency and industry (interim or continuous.
Activity A4	Replenishment	Re-provisioning to maintain an acceptable stock level Provisioning new spares / components after introduction of a new equipment (initial provisioning) Adaptation to new rules (new annual operating rate, new maintenance skills or change of maintenance levels)	
Activity A5	Training	Initial training for new users Operational training Maintenance training for maintainers Training for trainers Recurrent training Continuous training	This domain includes training of the trainers and other initial training courses through which personnel will learn to operate and maintain the system.
Activity A6	PHST	Packaging: type, volume, water resistance, shock resistance, wet resistance Handling Storing Transporting (type, duration, transfers, etc.)	For primary mission and support equipment, repair parts, secondary items, POL, and ammunition to and from operation and training areas. It may also include transportation of items procured or shipped by the unit. Excluded are PHST costs for repairable items acquired through stock fund reimbursements.
Activity A7	Sustaining Engineering Support	Continued engineering and program management oversight to: Maintain the integrity of the system Maintain system reliability Allow high level for operational availability	This may include (but are not limited to) government and/or contract engineering services, technical advice, and training for

Dimension & Reference	Domain	Associated data	Comments
		Approve design changes Ensure conformance with established specifications and standards	component or system installation, operation, maintenance, and support
Activity A8	Modification kit procurement and installation	Procurement for modifications Installation of modification kits Initial spares for modification after production related support Related training equipment	This includes only those modification kits needed to achieve acceptable safety levels, overcome mission capability deficiencies, improve reliability, or reduce maintenance costs. It excludes modifications undertaken to provide additional operational capability not called for in the original design or performance specifications
Activity A9	Software Maintenance Support	Update or upgrade Maintain Modification Integration Configuration management Operational availability Diagnostic Training equipment Support equipment	Excluded are major redesigns, new development of large interfacing software, or modifications that change functionality
Activity A10	Restoration	Restoration or renovation at midlife or after incident Modifications to improve: Reliability Operational availability Capability Performance specifications Life duration of the system	It could be considered as a new procurement occurring during the in-service stage of the system
Activity A11	Disposal	Ranking of forbidden substances/products Detoxification Long term storage Specific training Use or reuse of part of the system	

Dimension & Reference	Domain	Associated data	Comments
Activity A12	Design Change	It concerns the possible evolutions of the system design appearing both before and after the initial deployment	
Activity A13	Performance Monitoring	Collection of metrics to provide numerical gauges to be evaluated and monitored logistics support activities for: Planning purposes Scheduling purposes Develop award fee criteria Evaluate support solutions	
Activity A14	Facilities	Procurement management New building or facilities New site Conversion or expansion Maintenance management Operational management real estate for: developing producing testing (operation and support)	This includes facilities to handle or store hazardous materials or waste including underground storage tanks
Activity A15	Other	Any significant sustaining support not otherwise accounted for	Examples might include follow-on operational tests and evaluation, such as test range use, test support, data reduction, and test reporting. This includes any activities not otherwise accounted for

9.2 Dimension product in the operational phase

Table 3 proposes a list of the main domains and associated that can be considered as part of the product dimension during the operational and retirement stages.

Table 3 Domains and data elements for dimension product

Dimension & Reference	Domain	Associated data	Comments
Product P1	The main system	Hardware as deliverable end item Software as deliverable end item	It is very different for air, land and sea equipment. It therefore cannot be described in a generic document
Product P2	The support elements	Data: all deliverable data and publications, e.g., manuals, engineering data, management data, logistic data (LSAR) and maintenance plan Spare parts: components, assemblies, and subassemblies used for replacement purposes during maintenance Support equipment: Equipment and computer software required to maintaining, testing or operating a product or facility in its intended environment (Built-in equipment is not included, this is generally considered part of the main system) Training equipment and material: all training equipment (simulators, etc.) and devices (course materials …), accessories and aides used to facilitate instruction for the operation and the maintenance of the system. This does not include training activities PHST means: all means needed for packaging (for example containers), handling, storage and transportation of the main system and other support systems Facilities and infrastructure: industrial or government furnished facilities necessary for the operation and maintenance of the main system and its support systems	Whatever the main system, the different categories of support elements are broadly common for all kinds of systems
Product P3	The specific means	Elements designed, developed, manufactured, modified for the system that may be used for the procurement or support of the system: Tools of simulation and relative support elements Assembly facilities and relative support elements Test and trial facilities and relative support elements	Specific means may be provided by Government or Contractor. In the first case, they are usually referred to as GFF (Government Furnished Facilities)

9.3 Dimension resource in the operational phase

The dimension resource can be broken down into the domains as shown in Table 4.

Table 4 Domains and data elements for dimension resource

Dimension & Reference	Domain	Associated data	Comments
Resource R1	Personnel	Operator Maintainer or personnel that support discrete operational system Personnel necessary to meet readiness for the system (training, administrative requirements) For each data set, the following data may be included: – Basic salary – Social security contributions – Retired pay accrual – Allowances for housing, clothing, duty travels, foreign station – bonuses	The costs identified by this domain are: Direct costs: costs usually associated to operators and maintainers of the system. For personnel that operate or maintain more than one type of system, costs are allocated on a relative (pro rata) workload basis indirect costs: costs usually associated with personnel required for unit command, administration, supervision, operation control, planning, scheduling, safety, fuel energy ammunitions handling for defense systems, etc. and are not so easily allocated to a specific system
Resource R2	Equipment	Means (usually) support equipment that are used to operate or maintain the system but are not considered as a product of the program because they are shared between several systems	For example, a piece of test equipment developed in the framework of a program and used only for the acquired system is considered as a product of this program. But a piece of test equipment already in use for other existing systems and used by the new one is considered as a resource for the new system. Of course in both cases, the test

Dimension & Reference	Domain	Associated data	Comments
			equipment will be considered as a resource by the maintainer
Resource R3	Consumables	Consumables are all resources that are not considered as a product of the program and that are consumed in order to operate or to support the main system. They include: Petroleum, oil and lubricants (POL) Energy Ammunitions Non repairable parts that are not included in initial spare parts and are usually included in replenishment Raw materials and standard tools Water food clothing	
Resource R4	Infrastructure and facilities	This resource refers to installations and facilities that are not considered as a product of the program, and that are used to support the systems throughout its life cycle: Permanent assets: buildings, roads Quasi-permanent assets Temporary assets Mobile assets: naval bases	
Resource R5	Services	Assistance by contractors Assistance by sub-contractors Transportation (if not included in PHST)	
Resource R6	Information	Copyright information for which a fee is required or GFI	
Resource R7	The Public And The Private Sectors	There may be a difference between activities performed by the public (personnel in various categories, consumables, services, etc.) and private sectors (financial aspect is the more important)	

9.4 Dimension time in the operational phase

The dimension time can be broken down into the domains shown in Table 5.

Table 5 Domains and data elements for dimension time

Dimension& Ref.	Domain	Data element	Comments
Time T1	Calendar duration	Hours Week Months Years Mission duration Flying hours	
Time T2	Operational duration	Number of operating cycles	

9.5 Dimension Station in the operational phase

The list of generic stations that could be applied to a cost-element during its life cycle is given in Table 6 below:

Table 6 Domains and data elements for dimension station

Dimension& Ref.	Domain	Data element	Comments
Station S1	Station	Unit Depot Workshop Industry Organization Nation Organizational unit Cost center Account Cost object	

10 Identification and population of cost elements

The identification of cost elements or data from the field has been carried out considering the list of activities defined in the previous paragraphs combined with applicable resources and then applying them to the three branches of the product tree:

- the main system (which can be divided into hardware (HW) and software (SW))
- the support elements
- the specific means

If the list of operational activities and resources is correct and comprehensive, the list of all possible cost elements can be derived by applying each generic activity to each product element. Each cost element has to be completed by the specification of the two dimensions time (e.g. year 20YY, month MM, etc.) and station (e.g. Nation X, operating base Y, etc.).

The cost breakdown structure can include cost element referred to different system stages or different phase in the same stage (ie any design change has considered on 2020). These cost

elements can be left as “dormant” (empty cell) and populated when the data feedback become available (ie design change happens on 2021). It is strongly suggested to leave these cost elements on the CBS and use them as “remind” when the cost is generated,

The cost breakdown structure must be customized according to the system type (e.g. airplane, ship, car, etc.), the contractual requirement, cost boundaries definition (i.e. customer specific activity not included in the previous list) etc.

11 Data exchange use cases

The following use cases have been defined for the feedback of cost data for different LCC analysis purposes:

11.1 Use case 1: Provide cost breakdown structure

This use case consists in the exchange of a cost breakdown structure between two parties, usually for cost monitoring or contractual purposes, or for a better categorization of LCC data. Note that this use case is shared with the use case of the same name in Chap 13.

11.2 Use case 2: Estimate maintenance costs

This use case covers the need to receive maintenance cost information (manpower, material, etc.) so as to be able to perform estimations of maintenance costs.

11.3 Use case 3: Costs due to operational requirements

This use case covers the provision of the necessary information so as to identify the costs associated to operational requirements.

11.4 Use case 4: Cost of modifications or upgrades

This use case covers the provision of the required information to identify the cost associated to modifications or upgrades.

11.5 Use case 5: Costs of in-service support

This use case covers the reporting of costs incurred during in-service support.

Chapter 8

Feedback of data for warranty analysis

Table of contents

List of tables

List of figures

References

Table 1 References

Chap No./Document No.	Title
Chap 20	Terms, abbreviations and acronyms

1 Definitions

For acronyms and definitions please refer to Chap 20.

2 Introduction

For all transactions, if any, warranty is one assurance by contractor to the customer that information, requirements, conditions of use are truly respected or that they will be. The warranty details the rights that the customer may have in the event that the system is partially or fully damaged or does not work. There is no standard clause for warranty but rather a large range of options to be agreed between contractor in order to define scope of warranty, duration, applicability to hardware and software.

Contractual warranties that may be adopted are:

- No Warranty
- Limited Warranty
- Implied Warranty
- Lifetime Warranty
- Media Warranty
- Repair Warranty

An example of warranty can be the following one:

- Warranty for "operating and resilience" which takes into account each equipment of the delivered system,
- The storing warranty which includes the delivery and relative packaging and handling,
- Warranty for provisioning and assembly which takes care of building the system with equipment and subsystems by a contractor,
- Warranty for conformity with contractual requirements, and conformity with standard rules for assembling, qualifying and testing the equipment and system.

3 Objectives and Use Cases

The purpose of warranty data feedback is to provide a set of information in order to analyze the correctness of warranty statements and relative actions to manage defects. The main objectives linked to Warranty data feedback are:

- To provide means to evaluate maintenance actions (are they in scope of warranty, are they efficient, are they done in acceptable time, do they require spare parts and are these ones available on time, etc),
- To provide a means of collecting cost of warranty from actions required to recover availability to additional actions necessary to make corrective actions possible (repairs, packaging, handling, etc),
- To provide means of determining misuse of warranty,
- To identify items causing risk to warranty program,
- To get experienced and improve standard warranty rules and process for next programs.

Table 2 lists the relative activities for each of these objectives.

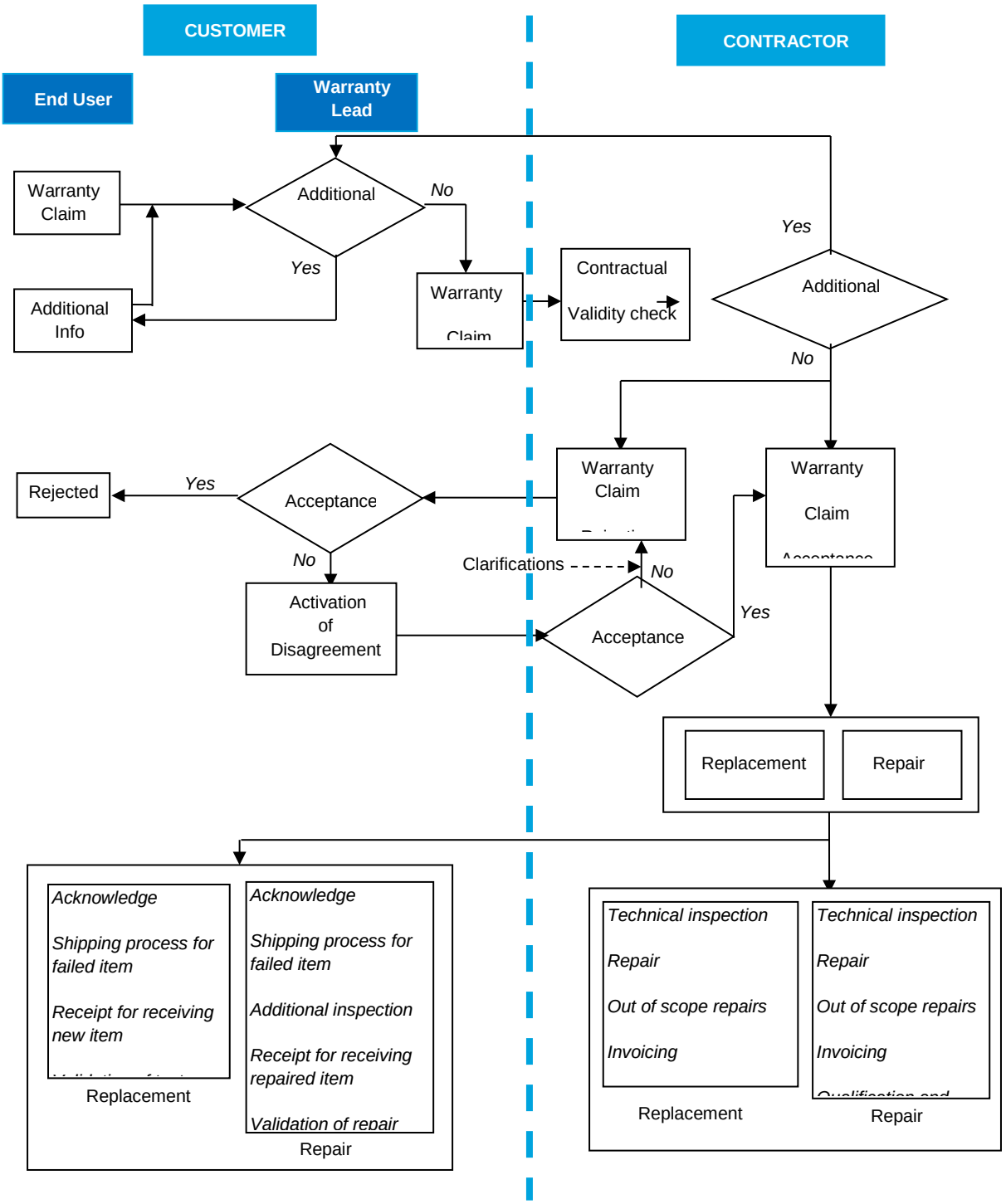
Table 2 Activities relative to Support warranty data feedback Objectives

Objectives	Activities
Provide means to evaluate maintenance actions	Document the register of failures of system
	Isolate faulty equipment(s) and determine the relative corrective actions
	Collect facts associated with failure to determine whether fault is within scope of a warranty provision

Objectives	Activities
Provide a means of collecting cost	Perform corrective actions tracking actual costs for material and labor
	Document actual costs for reimbursement
	Transmit cost data with failure data supporting warranty claim
Provide means of determining misuse of warranty	Document faults and / or failures out of the scope of the warranty
	Identify and register misuse cases and relative reasons
Identify Items causing risk to warranty program	Register risky items (component data assess if failure rate of component exceeds budgeted loss rate)
	Trace where in the warranty process such risky items create a risk
Improve standard warranty rules and process	Identify lack of warranty process and define relative improvements
	Organize and register feedback
	Manage communications between stakeholders

3.1 Warranty Data Feedback

The following process figure illustrates which data can be produced by both customer and contractor within a warranty process. Please note that official communications are usually considered necessary for such a process, given that dates, technical and legal decisions may have an impact on the warranty duration.



ICN-B6865-5000F08001-001-01

Fig 1 Use Case of Warranty Data Feedback

3.2 Warranty analysis feedback data for defined Use Cases

The following tables identify one use case for each objectives and related activities, as well as the feedback data that is required for this purpose

3.2.1 Use case 1: Evaluate maintenance actions

Table 3 Objective 1: Provide means to evaluate maintenance actions.

Group	Data Group Name	Data Element Name	Data Supplier
4.1.1	Registering Failures of System during Warranty	Date Time claiming	Customer
		Type of failure (functional, physical)	
		Hardware, Software, other	
		Origin: by human, within operating conditions, external sourcing damage (shock, virus, etc)	
		Duration of warranty claim from first claim to total recovery of availability	
4.1.2	Identify Fault and Active Warranty Actions	Duration for identifying defaults location	Contractor
		Additional technical inspections required or not	
		Defining actions to be taken (repair, standard exchange, change of configuration, evolution of subsystem or equipment, etc)	
		Line Replaceable Unit	
		Part Number	
		Configuration ID	
		Serial Number	
4.1.3	Acceptance of Warranty Claim	Claim in contractual scope	Customer
		Claim timely expressed	Contractor

3.2.2 Use case 2: Collect warranty costs

Table 4 Objective 2: Provide means to collect costs.

Group	Data Group Name	Data Element Name	Data Supplier
4.2.1	Costs for Warranty Maintenance Actions	Labor hours	Customer
		Labor rates	
		Spare parts required	
		Consumables required	
4.2.2	Document Actual Costs for Reimbursement	Cost “out of scope” in comparison with global cost	Customer and Contractor

Group	Data Group Name	Data Element Name	Data Supplier
4.2.3	Cost and Failure Data	Numbers of operating hours/cycles since acceptance or last failure	Customer and Contractor
		Level of impact on system availability (Nil – Low – Medium – High – Very High)	

3.2.3 Use case 3: Determine misuse of warranty

Table 5 Objective 3: Provide means of determining misuse of warranty.

Group	Data Group Name	Data Element Name	Data Supplier
4.3.1	Items out of Scope of Warranty	Number of items/equipments or subsystems that are not taken into account for warranty	Contractor
		Total number of items/equipments and subsystems that compose the system	
4.3.2	Failures out of Scope of Warranty	Number of warranty claims	Customer
		Number of warranty claims rejected	
4.3.3	Identify Misuse Cases of Warranty	Classification within list:	Customer and Contractor
		Out of material scope	
		Out of commercial/legal scope	
		Out of warranty period	

3.2.4 Use case 4: Identify items causing risk to warranty program

Table 6 Objective 4: Identify Items causing risk to warranty program.

Group	Data Group Name	Data Element Name	Data Supplier
4.4.1	Risky Items for Warranty	Failure rate of item	Customer
		Level of impact on system availability (Nil – Low – Medium – High – Very High) see 4.2.3	
		Price of item	
		Mean Time Between Failure	
4.4.2	Specific Risk for Warranty	It must be identified if the item requires specific actions as:	Contractor
		Conditioning (chemical or radioactive components, non water proof…)	
		Mean Time To Repair	
		Mean Time to Replace	

Group	Data Group Name	Data Element Name	Data Supplier
		Provisioning Time	

3.2.5 Use case 5: Improve standard warranty rules and process

Table 7 Objective 5: Improve standard warranty rules and process..

Group	Data Group Name	Data Element Name	Data Supplier
4.5.1	Efficiency of Warranty Chain	Duration of warranty claim Duration of repair / replacement of faulty item / equipment	Customer
4.5.2	Initiate Warranty Claim	Duration of validation for Warranty Claim within customer's organization: Day when the end user initiates the warranty claim Day when the warranty claim is received by contractor	Customer
4.5.3	Initial Care for Warranty Claim	Day when the warranty claim is received by contractor Day when final acceptance or final reject is pronounced	Contractor
4.5.4	Feedback for Warranty	Number of warranty claims accepted Average duration for warranty claim Average duration for repairs	Contractor or Customer
4.5.5	Warranty Information Exchange	Number of warranty claims accepted after initial reject Number of warranty claims rejected after 2 rounds	Customer
4.5.6	Means of Transmission for Warranty	Email Fax Letter	Customer or Contractor

Chapter 9

Feedback data for the purpose of product health and usage monitoring

Table of contents

List of tables

List of figures

References

Table 1 References

Chap No./Document No.	Title
Chap 1	Introduction to the specification

1 Introduction

Health and usage monitoring systems can offer data that could assist with the following:

- Prognostics
- Diagnostics
- Self-Diagnosis
- Product Monitoring
- Reducing Maintenance Costs
- Improving Safety
- Identifying Logistics Requirements
- Recording Actual Usage Data
- Useful life

Health and usage may be reported, as required, but for coherency the data should be standardized and contain a minimum data set which has a baseline for configuration control and analysis. Data and information logged should be of sufficient quality to allow transfer from one system to another for analysis.

Health and usage monitoring systems can provide:

- Real Time Reporting (to operator or fleet manager)
- Data Storage
- Data Transmission
- Data Entry

Any maintenance that could affect what is being monitored should be recorded; this could involve manual data entry onto the Health and usage Monitoring System. Due consideration should be given to the transfer of manual data onto the logging system.

Health and usage Monitoring Systems can; identify characteristics that allow a product to self-diagnose, increase recording rate, automatically report through integrated systems or log data for processing by non-integrated systems.

The analyzed output from the health and usage monitoring systems can impact on the logistics requirement of the product by offering data relating to:

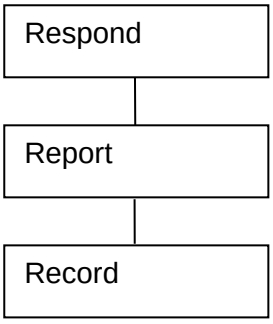
- Condition monitoring
- Running cost
- Planned maintenance
- Usage
- Usage of consumables
- Fitness to operate
- Performance

Management decisions: The product owner, operator or maintainer needs to identify:

- What parts of the product need to be monitored
- How parts are going to be monitored
- How data is to be gathered and synchronized
- How data is to be reported
- How data is to be verified
- How data is to be entered into a system for analysis or transmission
- Where and who should undertake analysis of the data
- Where and how data will be retained
- How data or information will be accessed

Health and usage monitoring systems could detect false alarms and this concept is considered; a false alarm being the false detection of an anomaly that does not exist.

The functions of Health and usage monitoring are; record, report and respond. Figure 1 depicts the relationship between them:



ICN-B6865-5000F09001-001-01

Figure 1 RRR Relationship

2 Definitions

Product Health and usage monitoring are terms given to systems that utilize data collection and analysis techniques to help ensure and improve availability, reliability, performance and safety of products. Health and usage Monitoring activities could be integrated or be an integral part of the products. Some health and usage monitoring systems self-diagnose and amend operating characteristics to protect the product by reducing defined functionality. Self-diagnosis systems could highlight how an anomaly might affect the ability of the product to complete a task and how this anomaly would affect the logistic system.

3 Scope

This chapter identifies common activities, basic definitions and basic data fields involved in the gathering and feeding back of health and usage monitoring data. It should be read by anyone who requires engineering performance indicators to be produced by health and usage monitoring systems for engineering or operational monitoring, changes to engineering design, condition monitoring and the provisioning of spares.

While it is impossible for this chapter to list the complete necessary user information to report Health and usage it aims to define the baseline data sets required: It does not cover those actions that normally take place off the product or any specific stakeholders requirements such as detailed alarm settings to monitor their product for warranty or logistic support reasons.

Security implications are outside the scope of this document.

4 Components of a health and usage monitoring system

The aim of health and usage monitoring is to capture appropriate data that will allow either parts of or an entire system to be monitored for analysis and action if required at the time of occurrence or for retrospective analysis and subsequent action if required.

This chapter takes the fundamental functions of health and usage monitoring as being:

- Record
- Report
- Respond

These fundamental functions are described in greater detail within the next sections of this chapter. A health and usage monitoring system could consist of one or all of these fundamental functions.

5 Health and usage monitoring systems elements

The basic elements of a health and usage monitoring system are;

- A network of sensors
- Onboard storage or processing (integrated)
- Off board analysis (non-integrated)

6 Record

The objective of recording data is to retain information for the purpose of analysis. In order to identify the data to be recorded for analysis by the user, the objectives of recording the data must be determined. From these the means to achieving the objectives can be derived. Then, from these activities, the fundamental data classes and elements can be developed.

6.1 Record objectives

The objectives of monitoring and recording data are to:

- Allow analysis
- Allow analysis to identify an issue
- Allow analysis to determine performance

6.2 Record activities

The principal activities involved in recording are:

- Determining the amount of data to be recorded
- Determining what to record
- Determining the frequency of data recording
- Identifying the storage medium
- Identifying the method of accessing the data
- Identifying the method for analyzing the data
- Identifying data retention periods
- Identifying a data back-up process

6.3 Record metrics

There are various attributes that can contribute to assuring activities associated with data being recorded, these could be:

- Ease of recording
- Ease of access to recorded data
- Detected error rate
- Suitability of storage
- Update and transfer
- Accuracy and consistency

6.4 Record data classes and elements

The data classes and elements for recording / recorded information derived from the objectives, activities and metrics are available in Chap. 17. Although this list is as complete as possible, other data elements could be required depending on the system or domain (Land, Sea, Air and Space) specific operating requirements.

The data classes and elements should, as a minimum, cover:

- Configuration
- Environment Parameters
- Error or Fault codes and descriptions
- Component functional status
- System functional status
- Usage profile
- System operating parameters

The data recorded could be used to assist assessment of (Reliability, Availability, Maintainability, Capability, and Testability) RAMCT and logistics support analysis.

A summary of the information that could be derived from obtaining relevant data fields are:

- Storage Conditions – temp, humidity, vibration, shock, specified storage conditions, conditions seen that are outside of limits, time stored in appropriate conditions, total time stored, wind speed,
- Use of product – wear rates, usage of consumables and usage of material
- Fitness to operate

6.5 Use case 1: Record Usage and Health Data

The use case provides an indication of the data required to determine operational characteristics. The data obtained might need to be compared against the design or performance specifications and the operational requirements.

1 Recording the performance of equipment.

This use case covers the recording of data that could be used to support RAMCT, logistics support analysis and safety issues. The information required for this use case includes the following:

- Configuration – operational and as designed
- Achieved reliability including equipment issues
- Operational history
- Performance achieved
- Product status
- Product information
- Equipment availability

7 Report

The objective of reporting data is to inform users or other parts of a system of how the system is operating, the status of the system and whether there is a requirement for spares. In order to define the reports that are required from the integral or non-integral system, the objectives of reporting data must be determined and from these objectives, the activities necessary are derived. From these activities the fundamental data elements required by the user from the reports can be developed.

7.1 Report objectives

The objectives of reporting data are to:

- Identify recommendations
- Provide analyzed data
- Identify areas of concern
- Provide usable information
- Provide a record
- Provide an understandable output
- To provide the current system status
- To indicate system or subsystem life

7.2 Report activities

The principal activities involved in reporting are:

- Identifying how the report will be used
- Identifying who will use the report
- Identifying what the report will be used for
- Providing factual information
- Providing information on what has happened
- Providing output for use by other systems

7.3 Report metrics

There are various attributes that can contribute to assuring activities associated with the data being collated and output as a report, some of these could be:

- Time to generate report
- Accuracy of the report
- Usability of the information
- Number of reports generated

7.4 Report data classes and elements

The data classes and elements for reporting information derived from the objectives, activities and metrics are available in Chap. 17. Although this list is as complete as possible, other data elements could be required depending on the system or domain (Land, Sea, Air and Space) specific operating requirements.

The data classes and elements should, as a minimum, cover:

- Configuration
- Environment Parameters
- Error or Fault codes and descriptions
- Component functional status
- System functional status
- System operating parameters

The data recorded could be used to assist assessment of RAMCT and logistics support analysis.

A summary of the information that could be derived from obtaining relevant data fields are:

- Environmental – temperature, humidity, pressure, shock, vibration, particulates (corrosive dust, sand, acidity, alkalinity)
- Maintenance – maintenance state, operational state, configuration state, next scheduled service, time in maintenance
- Product Overload – Operating outside normal parameters, vibration, shock, temperature

7.5 Use case 2: Report usage information

The use case provides an indication of the data required to determine the operational performance characteristics. The data obtained might need to be compared against the design or performance specifications and the operational requirements.

- Reporting the performance of equipment to operators or other parts of the system. The data reported might already have had analysis performed on it by the system. The use case could be seen as supporting a warning for an operator or a sub-system identifying to a parent system that it is not functioning correctly: however these reports are generated they need to be recorded and available should further analysis be required.

This use case covers the recording and reporting of data that could be used to support RAMCT, logistics support analysis and safety issues. The information required for this use case includes the following:

- Configuration – operational and as designed
- Achieved reliability including equipment issues
- Operational history
- Performance achieved
- Product status
- Product ID
- Location information
- Environment
- Operational events
- Equipment availability

8 Respond

The objective of responding is to alert other parts of or the whole system of any issues that may be about to arise or have already arisen. In order to define the responses that are required from the integral or non-integral system, the objectives of being able to analyze and respond to data must be determined and from these objectives, the necessary activities are derived. From these activities the fundamental data elements and activities required by the user from the analysis responses can be developed.

8.1 Respond objectives

The objectives of analyzing and responding to data are:

- To be able to self-determine if a fault is present
- To take appropriate action in the presence of a fault
- To reduce the chance of product damage
- To reduce the chance of a product failure
- To alert the user that a fault has been detected
- To alert the user that action has been taken to reduce the impact of a fault
- To alert the user of any degradation in performance
- To alert the user to any changes in product performance
- To provide the current system status
- To indicate system or subsystem life

In some instances an analyzed or non-analyzed response that results in a reduction of product performance might not be an appropriate response. In these instances the user should be alerted and able to make an informed decision.

8.2 Respond activities

The main activities involved in responding are:

- Identifying the responses required
- Identifying what the responses can do
- Identifying what the response will be used for
- Ensuring response is factual
- Determining the interface with other system components
- Determining how to notify the user
- Determining how to notify other systems
- The recording of all response activities
- The storage of response activities
- Identify issues to other systems or operators
- Retention of data that led to the response action

8.3 Respond metrics

There are various attributes that can contribute to assuring activities associated with responding to operational issues, some of these could be:

- Time to respond to an issue
- Usability of the information
- Number of valid responses
- Number of erroneous responses
- Number of responses
- Time to ship a part "Mean Logistic Delay Time" (MLDT)

8.4 Respond data classes and elements

The data classes and elements for respond information derived from the objectives, activities and metrics are available in Chap. 17. Although this list is as complete as possible, other data elements could be required depending on the system or domain (Land, Sea, Air and Space) specific operating requirements.

The data classes and elements should, as a minimum, cover:

- Error Resolution
- Configuration
- System status
- Error or Fault codes
- Error or Fault description
- Alarm Indication
- System functional status
- System operating parameters

The data recorded could be used to assist assessment of RAMCT and logistics support analysis.

A summary of the information that could be derived from obtaining relevant data fields are:

- Functional condition – operations undertaken, alignment of operating outputs with specification, number of operating cycles, number of operating cycles allowed, configuration, maintenance state
- Use of product – usage of consumables, kilometers per litre, hours per litre, quantity of product used (oil, fuel, rounds, filters, tyres etc.),
- Reduced effectiveness – reduced power output, reduced fuel flow (air, fuel or water), bearing vibration, change of operating environment (altitude, dust, temperature), excess use of other on-board systems BIT – BITE, increased operating temperature
- RAMCT information - Mean Time Between Failures (MTBF), Failure rate

8.5 Use case 3: Respond to usage information

The use case provides an indication of how a set of conditions were responded to and a means of determining the operational performance characteristics. The data obtained might need to be compared against the design or performance specifications and the operational requirements.

- Responding to the current performance of equipment and identifying issues to operators or other parts of the system. The response might already have been determined or implemented from the analysis performed on the system. The use case could be seen as providing an action that has been taken in response to a set of defined circumstances: these responses need to be recorded and available should further analysis be required.

This use case covers the responding and reporting of data that could be used to support RAMCT, logistics support analysis and safety issues. The information required for this use case includes the following:

- Configuration – operational and as designed
- Achieved reliability including equipment issues
- Operational history
- Performance achieved
- Product status
- Product ID
- Location information
- Environment
- Operational events
- Issue reports
- Action to issues
- Equipment availability

Chapter 10

Feedback of data to support obsolescence management

Table of contents

List of tables

List of figures

References

Table 1 References

Chap No./Document No.	Title
DIN EN 62402	Guidance of Obsolescence Management
IEC 62402Ed. 1.0	Guide to managing obsolescence
STANAG 4597	Obsolescence Management
STANAG 4598	Guidance on the use of Commercial Off the Shelf (COTS) Technology
IEC 56/874/NP (UK)	Guide to managing obsolescence
ARMP-6 (Edition 3)/Annex I	Obsolescence Management
ASD SpecificationS3000L/ Chapter. 15	Obsolescence Analysis
US DoD Guidebook SD-22	Diminishing Manufacturing Sources and Material Shortages A Guidebook of Best Practices and Tools for Implementing a DMSMS Management Program

1 Introduction

Obsolescence is caused by technological progress and the gradual introduction of more capable products, to fulfill the same or new functions. The rate at which materiel becomes obsolete usually depends on industry and is particularly prevalent in electronics/avionics. Obsolescence affects all equipment, software, tools, processes, support products, training, standards and specifications. It impacts upon all stages of the life of equipment at system, sub-system, assembly or component level. It is inevitable, may be expensive and cannot be ignored, but its impact and costs can be minimized by forethought and careful planning. Commercial of The Shelf (COTS) products, project specific parts, new design tools and production processes tend to have much shorter life than those traditionally used before. With the increased use of commercial materiel (HW and SW) it has become essential to include obsolescence management within program plans from the earliest stages and to consider obsolescence contractually already in the procurement contract.

Obsolescence management is the process of assuring the product is manufacturable and supported for the expected life. The process consists of planned and co-coordinated activities for providing availability of product during its intended life, by the economic and practicable provision of replacement parts and support activities. The management of obsolescence is essential to achieve optimum cost effectiveness throughout the whole product life cycle.

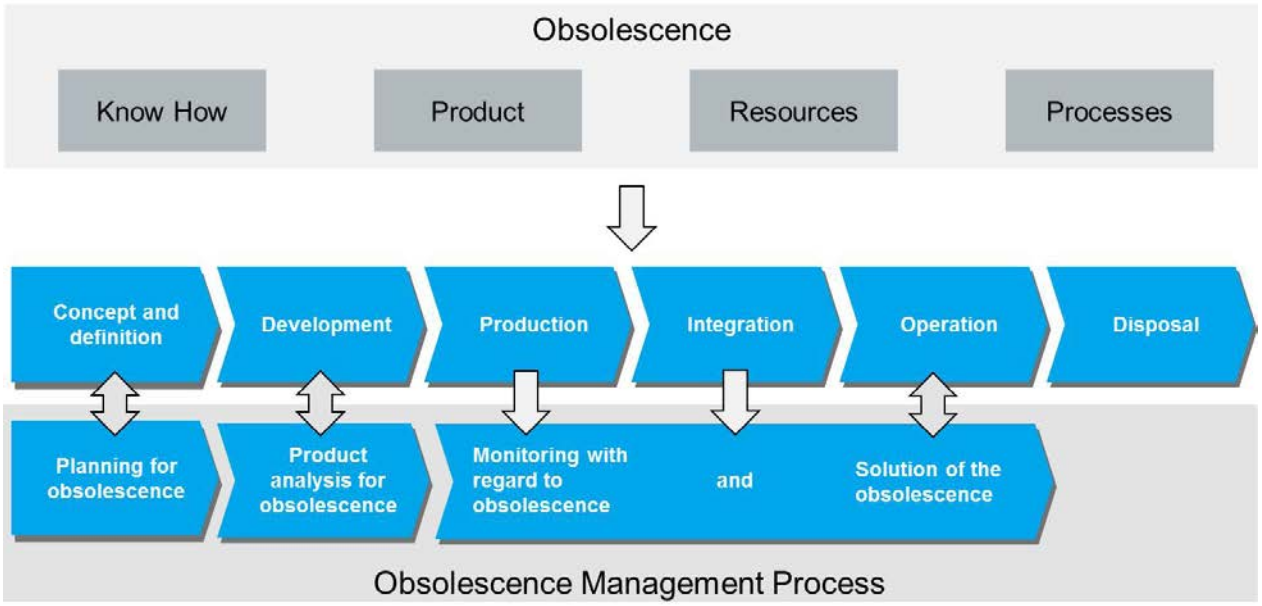
2 Obsolescence Management

2.1 General

The objective of obsolescence management is to ensure that obsolescence is managed as an integral part of design, development, production and in-service support in order to minimize its cost and impact throughout the product life cycle. Where necessary, special requirements for qualification and certification (eg aircraft, ships, land-vehicles) are to be taken into account.

In order to minimize the cost and impact of Obsolescence on a product, throughout its life cycle, it is essential to establish a formal process for Obsolescence Management. Detailed planning

and activities must take place during Procurement, to ensure that an effective process is established before equipment enters service.



ICN-B6865-5000F10001-001-01

Fig 1 Obsolescence management process - generic

This generic management process, starting already in the earliest phase of a product, can be used as a basis for the in-service phase/phase of operation.

This document is applicable to the Obsolescence Management during the in-service support and the data feedback necessary for the responsible/contracted organization to manage obsolescence in a cost effective manner for the customer.

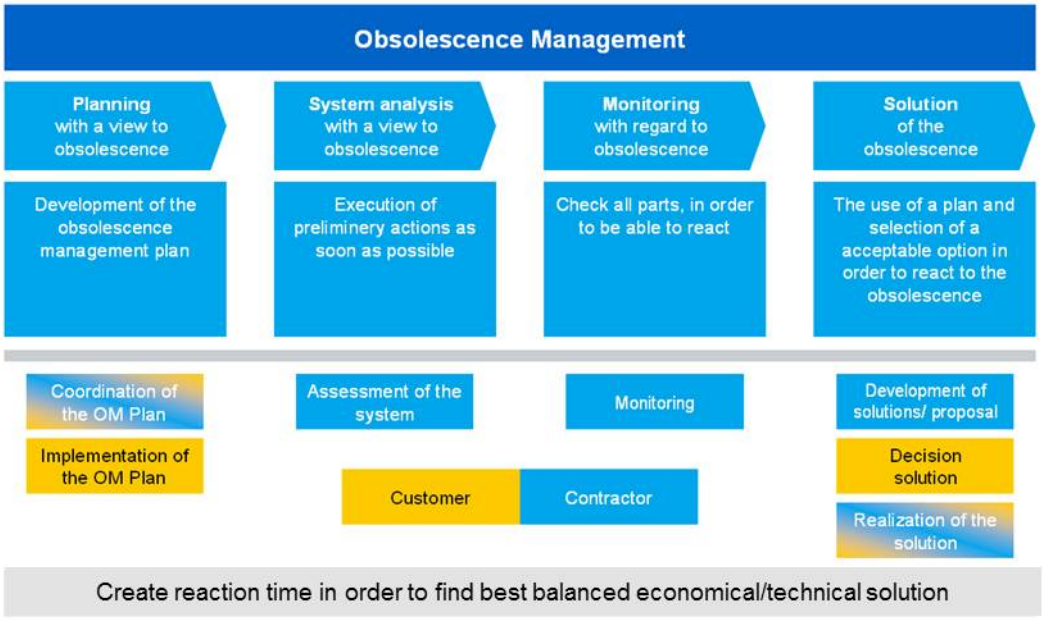
2.2 Obsolescence management during in-service phase

Affected organizations shall be pro-active in managing obsolescence since its increasing incidence is likely to be a significant factor in cost, supportability and product life cycle.

Judgments are required on how obsolescence might interact with the support strategy of the project. The obsolescence manager shall analyze the equipment and support arrangements already decided and in place. Based on experience and the analysis, the manager shall consider the operational risks over the life of the equipment associated with obsolescence:

The general steps of activities are as follows:

- Planning
- System analysis
- Monitoring
- Solutions/proposals to solve obsolescence



ICN-B6865-5000F10002-001-01

Fig 2 Obsolescence management during in-service phase

3 Business Process

For a better understanding which feedback data is necessary to support obsolescence management during the in-service phase and to understand the use-cases a short description of the obsolescence management process is described in the following:

3.1 Obsolescence management planning

In the framework of the in-service management, an obsolescence management plan should be used to ensure adequate selection and timely implementation of relevant obsolescence activities. The objective of obsolescence management plan should be to describe strategies for identification and mitigation of the effects of obsolescence. The aim of the plan is to:

- Achieve the optimum compromise between life cycle cost, performance and availability of a product
- Include all materiel regardless of whether it has been developed specifically for a customer or whether it is a COTS product
- Be compatible with the customer's current support arrangements
- Describe the choice of strategy
- Describe the implementation of obsolescence management

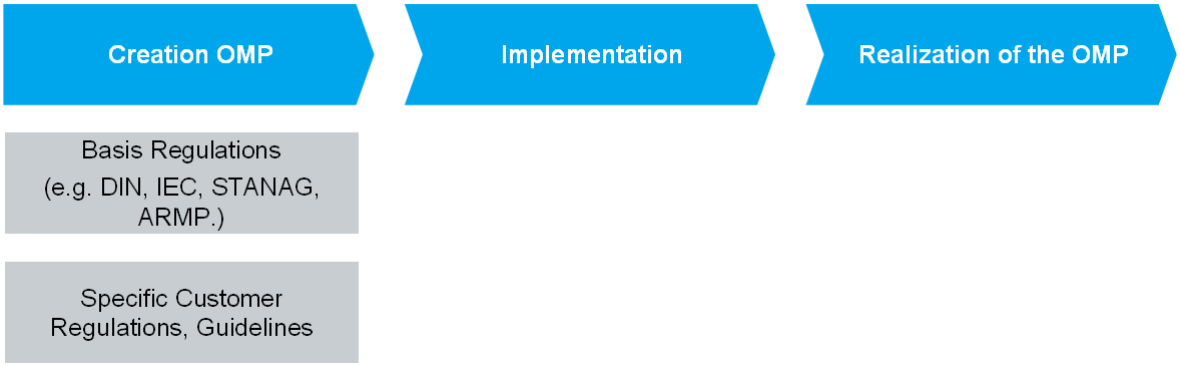
The plan should further identify the following aspects/Information:

- The scope
- Objectives of all obsolescence activities
- The obsolescence management roles and responsibilities of the affected organizations
- The periodicity of reviews, obsolescence monitoring and reporting

For each item under consideration:

- item name, identifiers from the customer, original component manufacturer (OCM) and original equipment manufacturer (OEM)
- OCM, OEM and reference to further information about them

- Product, equipment the item is used in
- Customers and relevant contractual arrangements
- Risk evaluation for strategies
- Selection of strategies e.g. reactive (do nothing until the need arises) or proactive (develop an obsolescence management plan/program for the case that obsolescence will happen)

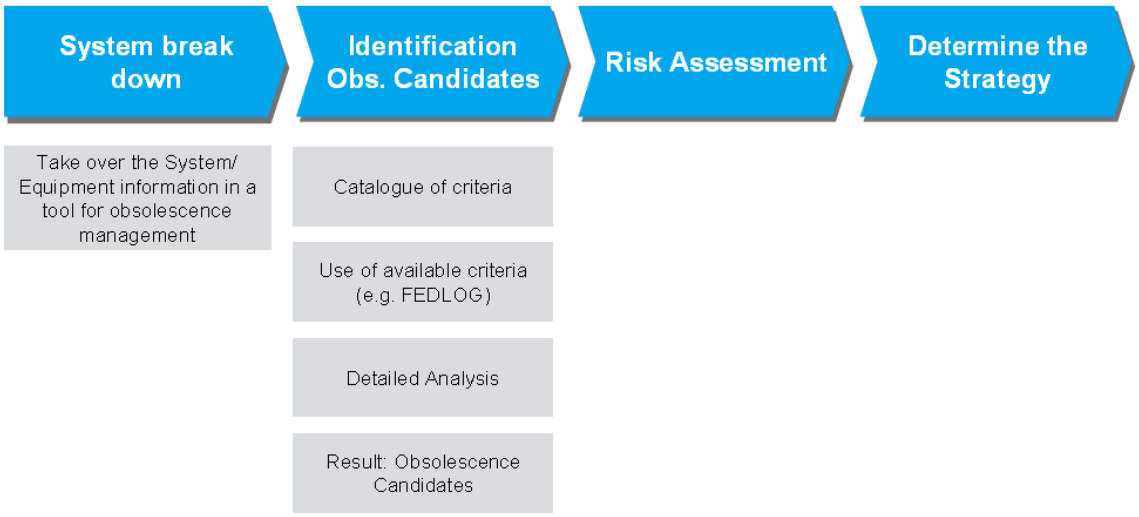


ICN-B6865-5000F10003-001-01

Fig 3 Obsolescence management planning

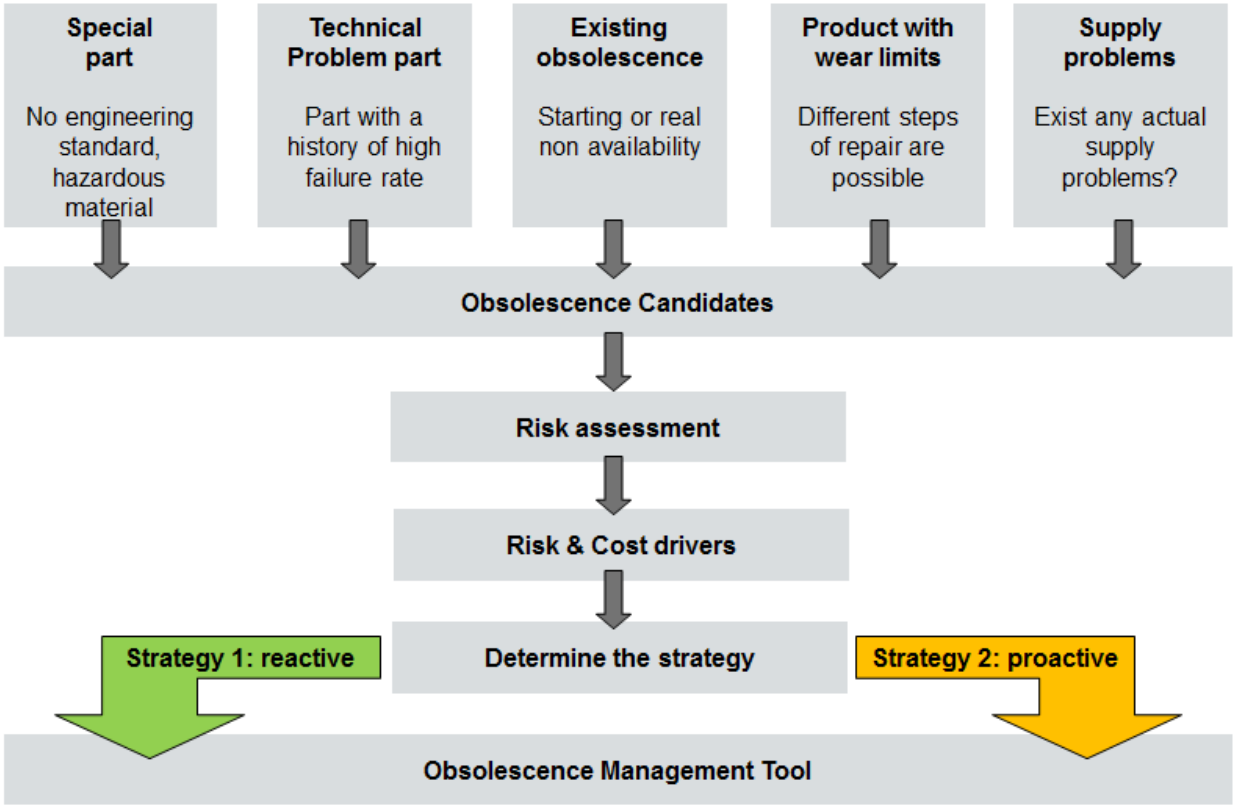
3.2 Determine obsolescence candidates / perform risk assessment

In a first step it is necessary to take over all data and information for the product as described in the scope of the OMP in a structured manner (product break down) and store this information in an obsolescence data base. Based on a set of criteria and information on the items under consideration, obsolescence candidates are identified. The risk (impact, costs and probability) of these candidates is assessed and a strategy of obsolescence management for each one determined.



ICN-B6865-5000F10004-001-01

Fig 4 Obsolescence analysis steps

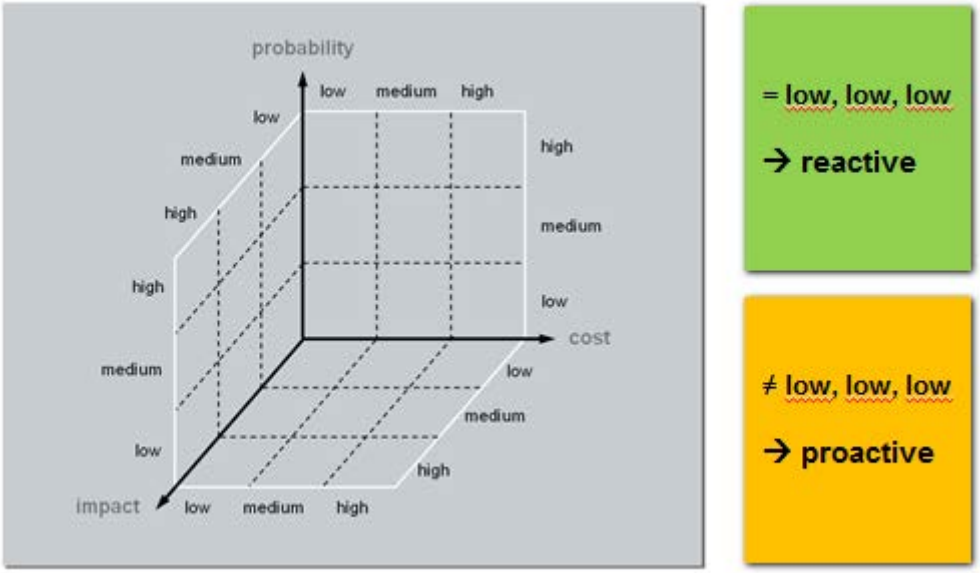


ICN-B6865-5000F10005-001-01

Fig 5 Obsolescence analysis process

3.3 Determine the obsolescence strategy

For the obsolescence candidates a risk assessment concerning impact, cost and probability has to be carried out. Each has to be classified into three levels of severity (low, medium and high) and a strategy (reactive, proactive) and the related obsolescence management activity for the in service phase has to be developed.



ICN-B6865-5000F10006-001-01

Fig 6 Obsolescence strategy

The two main strategy options that should be considered on candidate component level are:

- Reactive strategy means to react to problems of obsolescence as and when they occur.
- Proactive strategy means to provide forecasts of obsolescence events and dates. These are needed to develop / adapt the overall strategy.
- The forecast of obsolescence events provides the basis to develop / adapt the overall obsolescence strategy. The aim of the overall strategy is to prevent or mitigate the risk of unavailability, end of support and high cost. An example is the scheduling of design refreshes before an obsolescence event occurs.

3.3.1 Reactive strategy

When the triplet impact, cost and probability indicates small risk, this option might be selected. A reactive strategy might be chosen in one or more of the following situations:

- The product has been procured to satisfy an operational need, has a finite duration of in-service life and no further purchase is planned
- The probability of obsolescence is very low, e.g. low technology products
- The product has a high reliability and can be supported throughout its service life from available spares
- There are reliable OCM guarantees

3.3.2 Proactive strategy

In contrast to the reactive strategy the proactive strategy provides forecasts of obsolescence events: These might be a stop of sale of hardware components or the end of service / technical support for software.

For products comprising of hardware and software, the functional dependencies between hardware and software force the product management to examine the coupled hardware and software elements together rather than independently. Constraints like hardware / software compatibility have to be observed and addressed when providing the forecast.

3.3.3 Overall strategy

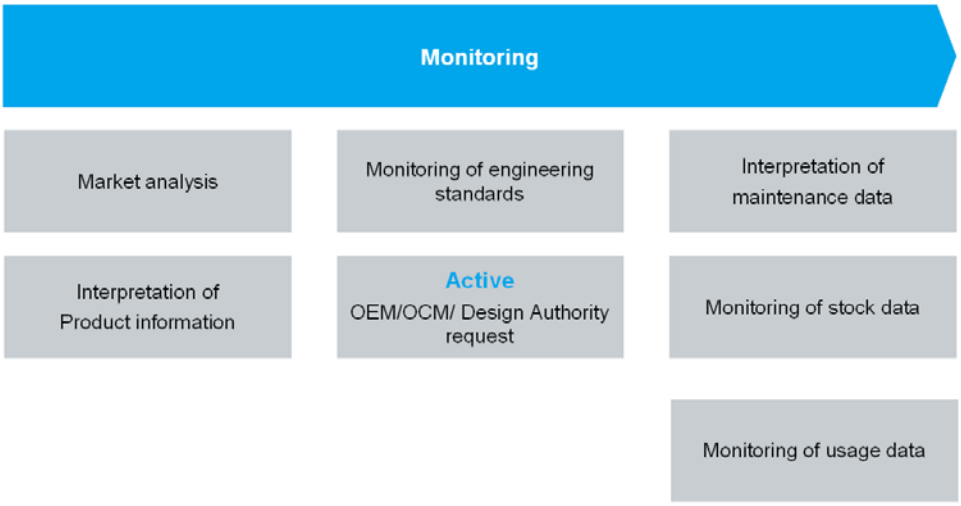
This strategy considers the overall integrated picture on top level (not component level) including expected lifetime, operating hours, upgrade strategy in combination with reactive and

proactive strategies. Contractual considerations are also part of the overall strategy. A strategic management approach considers e.g.

- Requirements for availability and cost
- Inherent design characteristics like reliability, maintainability
- Functional dependencies between hardware and software
- Design refreshes / product upgrades
- Last time buys
- Combinations of last time buys and design refreshes
- Collaborative procurement
- Support policy

3.4 Monitoring of obsolescence

Obsolescence monitoring is a further step in the obsolescence management process and it is essential if a proactive strategy is adopted. Obsolescence monitoring involves tracking the processes, materials and components used in a design. It involves taking action to provide alternatives when any of them approaches or reaches obsolescence, especially if that would prejudice the support of the product.

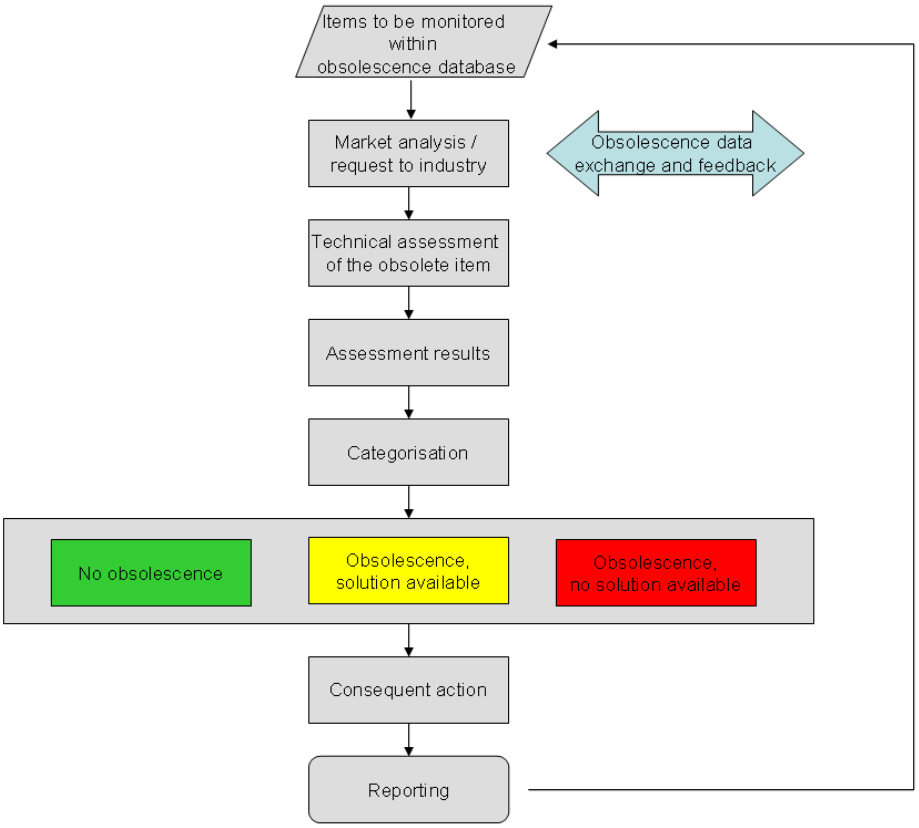


ICN-B6865-5000F10007-001-01

Fig 7 Monitoring of obsolescence

Obsolescence monitoring should be considered

- for products where the cost of obsolescence is expected to be high relative to the support budget
- where there is a single source
- when the use of scarce skills is involved
- where the component / part performs a safety critical function
- when there is a large number of a particular product to be maintained in service.

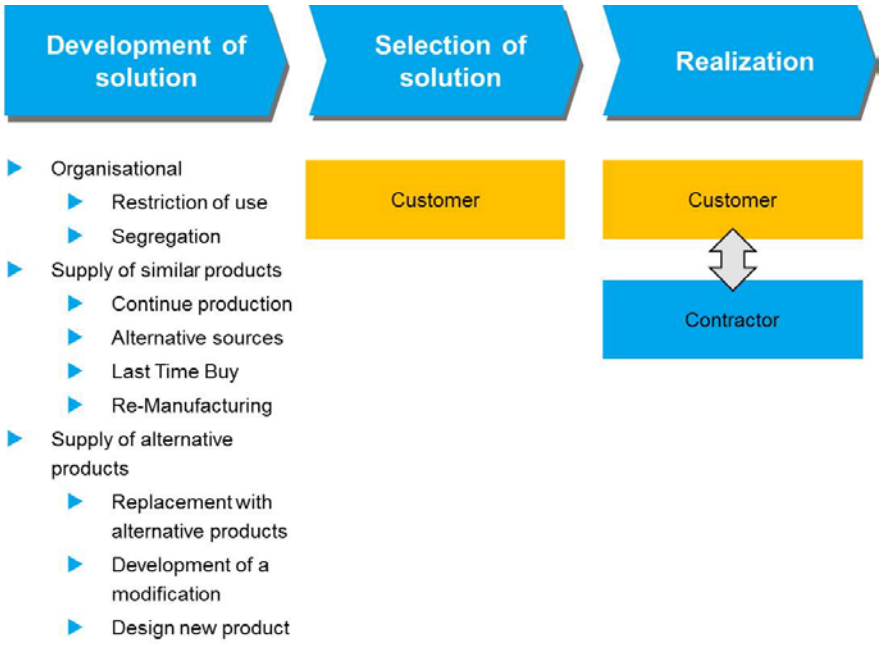


ICN-B6865-5000F10008-001-01

Fig 8 Monitoring and status accounting of obsolescence

3.5 Solutions/proposals to solve obsolescence

Based on the analysis of obsolescence and the strategy taken, manifold activities can be chosen to minimize the risk of obsolescence or to soften the impact when obsolescence occurs. These activities should be clearly defined and should lead after a life-cycle cost analysis and a trade-off analysis to a cost-effective proposal to the customer. The selection and realization of the proposals rests with the customer.



ICN-B6865-5000F10009-001-01

Fig 9 Development of solutions, selection and realization

4 Use Cases

4.1 Use Case1: Create basis for obsolescence management planning

This Use Case belongs to Para 3.1 and provides the breakdown structure / operational configuration of the product for which obsolescence management is performed. This is needed to identify the extent of the task.

4.2 Use Case 2: Determine obsolescence candidates / perform risk assessment

This Use Case belongs to Para 3.2 and provides information necessary to determine the obsolescence candidates and perform the risk assessment for these candidates. Items which can be procured quickly and from many sources and which are very reliable might not be considered an obsolescence candidate. Therefore the set of criteria to determine the obsolescence candidates and risk assessment is based on the following information for each item:

- Reliability data provides the probability of failures.
- Maintainability data is indicating how often and which maintenance activities are required for the item.
- Information up to which point of time an item can be produced e.g. LTB (Last Time Buy).
- Information at which point of time a technical support stops e.g. EOSL (End Of Service Life).
- Time period how long an item may be stored with conditions for storage e.g. shelf life.
- Purchase and repair costs for the components allowing cost based decisions.
- Lead times indicating how quickly an item can be procured in conjunction with minimum order quantities.

4.3 Use Case 3: Determine obsolescence strategy

This Use Case belongs to Para 3.3 and provides information necessary to determine the obsolescence strategy. For a decision between reactive strategy and proactive strategy, the reliability and cost data described for use case 2 can be used. A source of information concerning the impact can be the FMECA.

For the overall strategy the start- and the end point of time of the useful life of a product has to be known. If a long term sustainment for a product is envisaged, a last time buy strategy might be very expensive and inefficient, whereas for a short term sustainment it might be a very good decision. Further useful data is start and end dates for product upgrades in conjunction with information on the items which are affected by these product upgrades. Planning of a mixture between last time buys and upgrades might be cost effective. Knowing the planned upgrade schedule is providing a calculation basis for last time buys.

As the overall strategy is depending on a target, this target has to be known. Such a target can be an availability figure, a mean waiting time or any other target figure, which can be measured and verified. Therefore requirements or changes of requirements influencing the obsolescence strategy have to be known. Obsolescence strategy has to be in accordance with these requirements e.g. the quantities purchased during a last time buy are depending on the desired product availability.

4.4 Use Case 4: Monitoring

Monitoring is essential if a proactive strategy is chosen. Monitoring has the aim to provide forecasts of obsolescence events and dates. Therefore this monitoring includes:

- Monitoring of usage data by collecting the time points of usage start and end for each serialized product.
- Monitoring of stock data by collecting the time points and quantities of stock removals and adds in combination with item identification.
- Monitoring of maintenance processes by collecting the time points of repair/replace starts and endings and collecting the time points of discards in combination with item identification.

4.5 Use Case 5: Solutions / proposals to solve obsolescence

In order to harmonize product activity and obsolescence activity it is useful to know the time point when product down time starts and ends for each serialized product in order to implement a solution accordingly e.g. use the down time of a major check for an airplane to implement an obsolescence solution.

Chapter 11

Feedback of data for Integrated Fleet Management

Table of contents

List of tables

List of figures

References

Table 1 References

Chap No./Document No.	Title
Chap 2	The in-service data feedback process
Chap 4	Feedback of data for maintenance analysis
Chap 9	Feedback data for the purpose of product health and usage monitoring
Chap 20	Terms, abbreviations and acronyms

1 Introduction

Integrated Fleet Management (IFM) includes all the necessary tasks to plan and schedule the operation of the product fleet and individual products, taking into account the necessary maintenance, product configuration and all availability factors to meet operational needs.

IFM has not been previously described within the S-series specifications. The reason for this is that fleet management occurs only in service. As a consequence, this chapter includes descriptions of the IFM process.

2 Scope

This chapter provides an outline of the data necessary to carry out the Integrated Fleet Management activity; it covers the different types of fleet that can exist:

- Single operator – with single type of products all operating within the same scenario.
- Single operator – with multiple products all operating within the same scenario.
- Single operator – with multiple products operating in a number of different scenarios.
- Single operator – with single type of products operating in a number of different scenarios.
- Support Provider / OEM – providing support to a single operator.
- Support Provider / OEM – providing support to multiple operators.

3 Objectives of Integrated Fleet Management

The principal objective of Integrated Fleet Management is to guarantee the availability and capabilities of the Product to satisfy the Client's needs. IFM allows to fully utilize the products in the fleet and operate them efficiently. By storing the results data and developing trend methods, unusual behaviour can be detected and errors corrected.

One of the key aspects of Integrated Fleet Management (IFM) is communication. IFM interfaces with all other disciplines involved in delivering Product Availability (Client, Operator, OEM, Maintainer, etc) to coordinate & integrate their service deliveries to achieve the Client/Operator's requirements within agreed service level agreements (by contract).

4 Processes of Integrated Fleet Management

Integrated Fleet Management involves several activities mainly centered on operations and product management. It is important to remark that some of them can be carried out by different actors.

The following sections aim to describe the minimum processes that IFM shall include for a correct performance of the Fleet along with the data to be exchanged.

The activities performed by the Client and Maintenance are not described in detail since it is not the scope of this chapter but are mentioned since they are necessary.

- **Product Requirements Management**

  This process is carried out by the Client and it implies the establishment of what he needs to accomplish a task. This will later be translated into product characteristics and availability that match the Client's needs. It is usual that the service has already been defined in a contract previously signed with the IFM provider, so the requirements will be included in it. This contract can evolve in time.

- **Product Usage**

  It is the use of the product itself by the Client/Operator. In terms of operations monitoring, there is the possibility of doing it in real-time (using on board tools connected to ground equipment) or when the product is disposed, perform an evaluation. Some products may even include a Usage and Health Monitoring System that allows to gather more accurate information on the product performance, life usage and failures occurred during its operation. In any case, feedback from the Operator is always needed to have a clearer view of the situation and perform a more exact troubleshooting process. The Usage and Health Monitoring System process is not described in this chapter but in Chap 9.

- **Operations Management**

  It comprises all operational activities that revolve around the product, such as operations planning and monitoring: updating product availability, assigning a product to a task taking into account the Client's feedback, establishing the preparation of the product to carry out a task (filling the gas tank, providing tools for a deployment, etc.) and gathering data from the usage of the product.

- **Product Management**

  It comprises all the activities related to the product itself and the modifications needed to have it ready to use. It also includes the disposal of the product and the inspections carried out to know its status (a logbook can be used for this purpose).

- **Product Maintenance**

  It covers the definition and updating of the maintenance plan of the product, maintenance tasks to be performed (scheduled and un-scheduled) and modifications to be done. For more information on product maintenance see Chap 4.

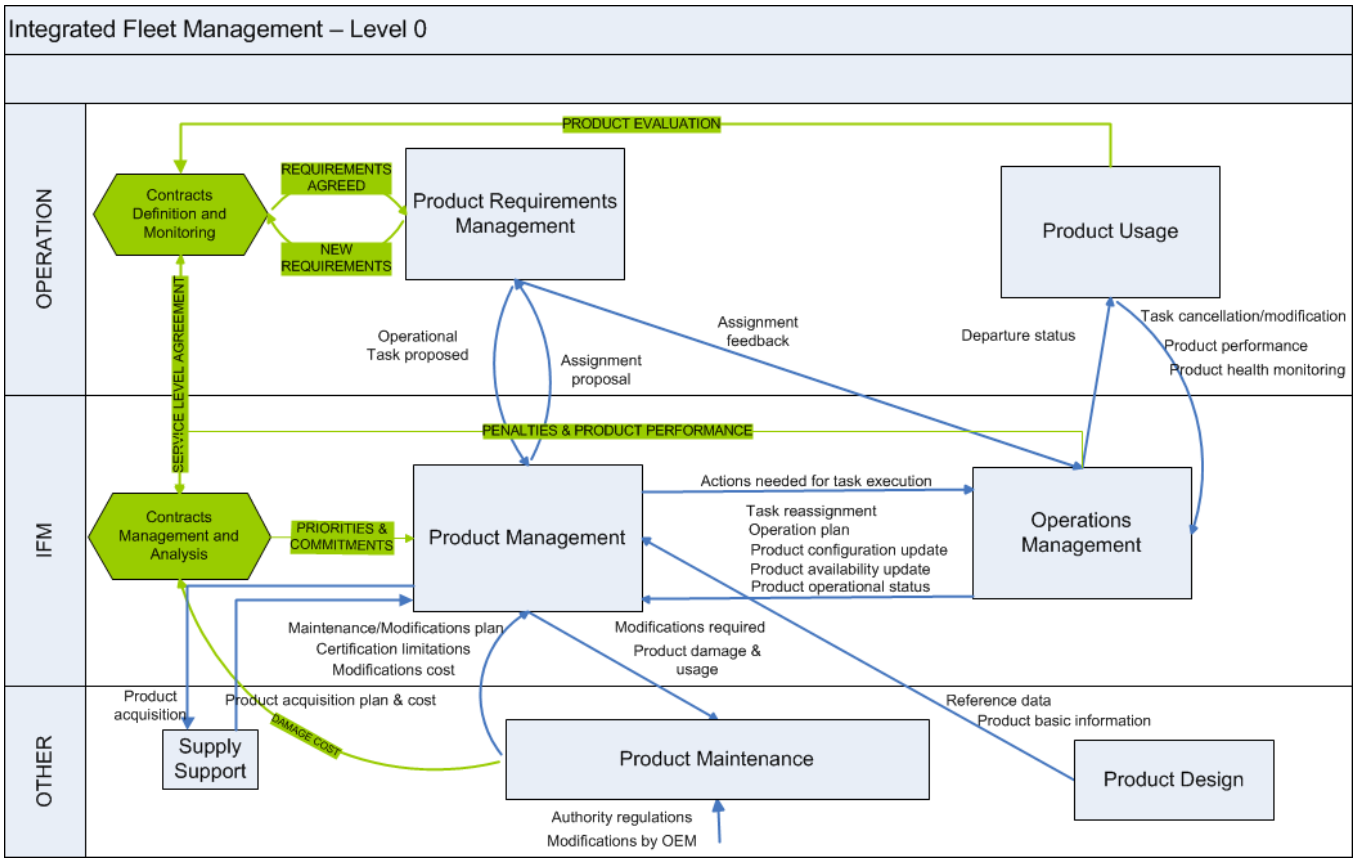
- **Product Design**

  Product design involves all processes and activities carried out before the creation of a product and during its improvement and support period. The Manufacturer is in charge of these activities and provides the necessary data, mainly reference data, to do a monitoring of the product and ensure it is well maintained.

- **Contracts**

  A high level description of contract management is added in the diagrams (green boxes) just to highlight the importance of having a service level agreement, but it is not compulsory to include it.

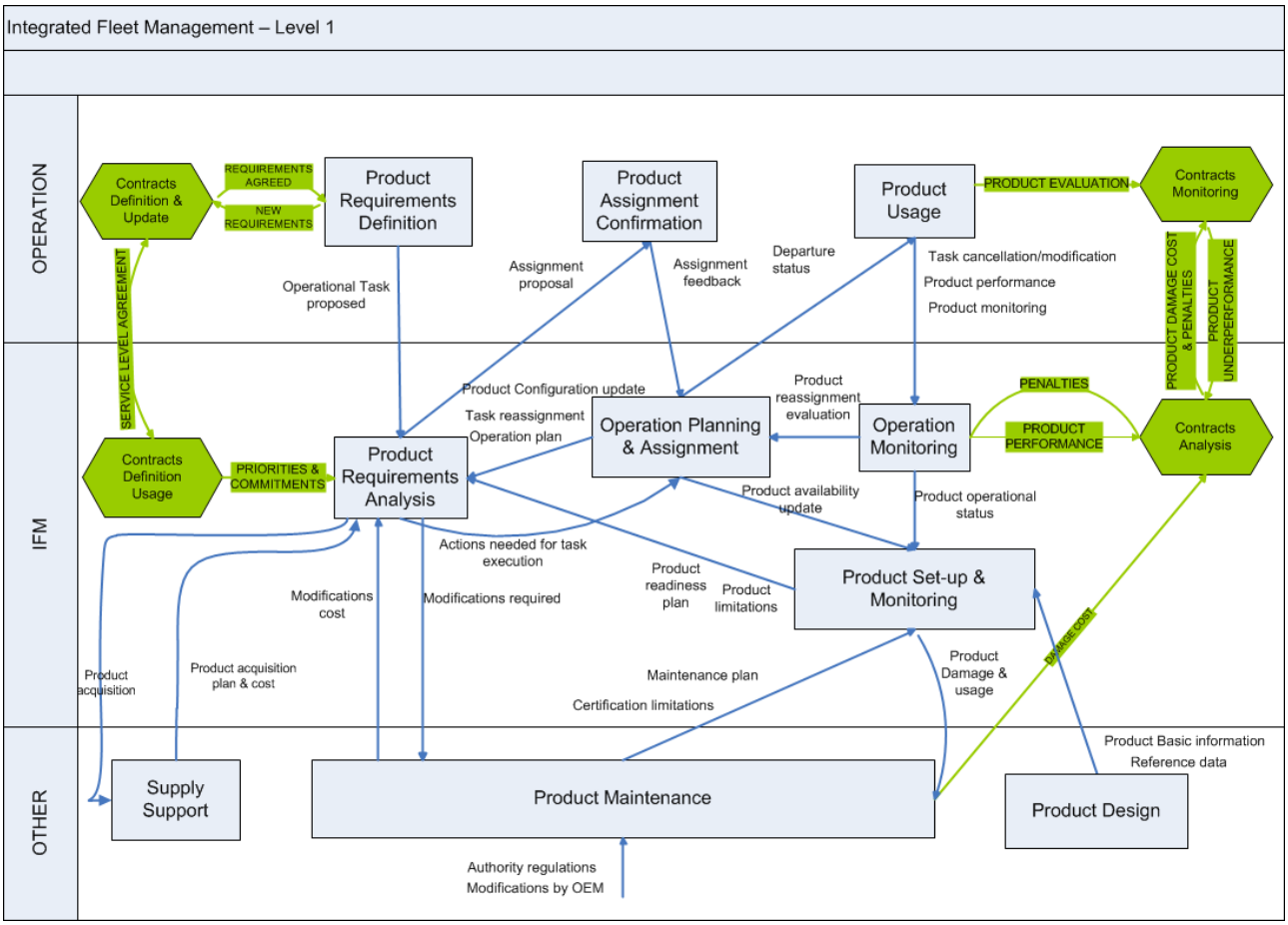
Fig 1 shows a high level IFM process diagram:



ICN-B6865-5000F13001-001-00

Fig 1 Integrated Fleet Management - Level 0

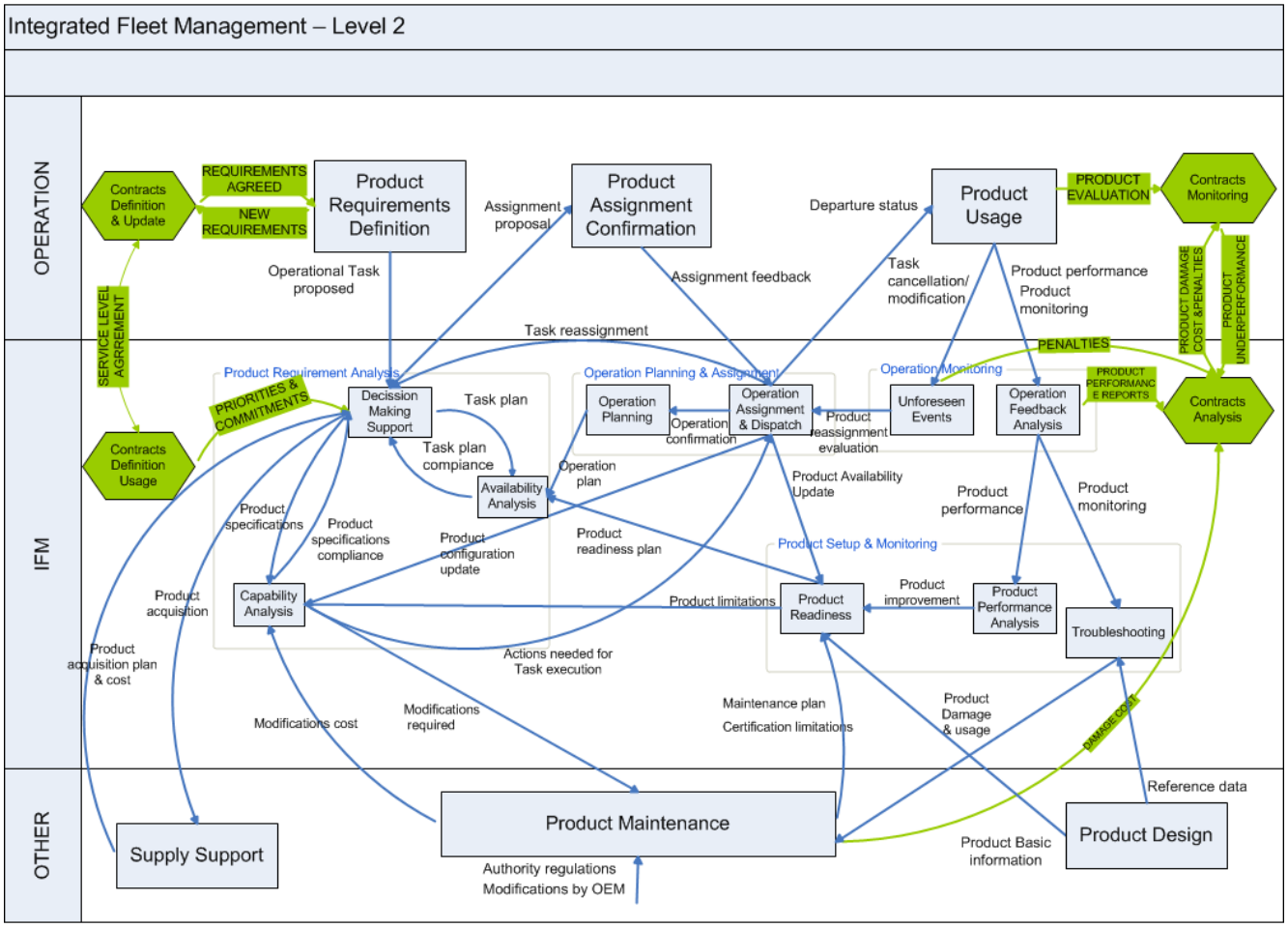
Operation and Maintenance activities are not described in this chapter, but they are mentioned due to the fact that information is transferred from/to them.



ICN-B6865-5000F13002-001-00

Fig 2 Detail of Integrated Fleet Management main processes – Level 1

Fig 2 provides a more detailed diagram of how IFM processes could be subdivided. Nevertheless, this chapter focuses on the main processes of the IFM and Operation rows.



ICN-B6865-5000F13003-001-00

Fig 3 Detailing of Integrated Fleet Management main processes- Level 2

If we take the example of a car rental company, a client (and operator) enters the office, asks for a vehicle with given characteristics (manual/automatic, size, diesel/gas/electric, air conditioning, GPS, etc.) during a certain quantity of days (weeks, months); and the employer offers him the available cars that fit those requirements, along with their prices. Added to that, the client can also contract an insurance service and other add-ons.

The following step will be the acceptance of a car and its initial inspection. If the client agrees with the status of the product, it is assigned and prepared (tank is filled, car is cleaned). The client uses the product and, normally, at the conclusion of the contract period, he will come back with the car to the rental company.

The employee would then check the car and depending if it has been damaged or not, apply the contract and the insurance penalties. If the car has been damaged, the employee will have to take it to a repair shop, or, if it is only a scratch and the car is completely operational, defer the maintenance task to the next check.

The car rental company has to analyze, depending on the quantity and types of clients received, how to adapt its car fleet to have always a car available.

4.1 Product Requirements Management

4.1.1 Product Requirements Definition

This activity is entirely done by the Client. He is in charge of defining his necessities and transmitting them to IFM.

An output of this process would be “Operational Task”. This information includes the type of task the Client is going to perform, dates, duration, etc. In brief, all information relevant to complete the task.

4.1.2 Product Assignment Confirmation

Once the Client has defined his requirements, IFM will elaborate an “Assignment proposal” containing the product or products that best comply with them. The Client will then reply to this proposal, stating if he agrees or not, giving as an output “Assignment feedback”. This can lead to a negotiation process between Client and IFM until an agreement is reached.

4.2 Product Usage

This process implies the execution of the task defined by the Client resulting in the product usage. Several situations can happen here.

If the Task is cancelled/modified due to product problems, there is the possibility of a product substitution (“Product reassignment evaluation”). However, the Client can cancel the task by any other reason. In this case, there might be a clause in the contract regarding this type of events that results in “Penalties” to the Client.

When the task is executed, IFM receives information on product performance. This information can be gathered in real time or at the end of the task, when the product is returned. Any Usage and Health Monitoring System information is described in Chap 9.

Additionally, the Client could perform an evaluation on the product to update the contracts terms.

4.3 Operations Management

4.3.1 Operations Planning & Assignment

This process centres on planning the different operations carried out by the fleet and optimising it. It can be subdivided in two activities.

“Operation planning” focuses on optimising the schedule of the operations to be carried out by the Product Fleet taking into account all Client’s operations and Service Level Agreements (SLAs, service requirements IFM has to fulfil, normally related to availability). For any more information on SLA please refer to the Definitions and the Business chapters.

“Operation Assignment & Dispatch” includes all the necessary activities related to the preparation of the Product to carry out an Operational task effectively. For example, in the case of a car rental company, it would include filling the gas tank of the car, if the contract agreement states so.

4.3.2 Operations Monitoring

The outputs of the “Product Usage” process go directly to the “Operation monitoring” process carried out by IFM. Situations can be grouped in these two types:

- Task is cancelled or modified
- Task is performed

In the case the Task is performed, an evaluation of the product arrival status and its performance will be carried out.

If the product has undergone any damage, its repairing cost will be estimated and if it applies, passed to the Client. Any other way, its performance will be evaluated to assess a possible improvement or replacement.

In the case of Task modification or cancellation, the status or the product should be updated and if necessary, assign a new product to the modified Task. Depending on the contract terms, a penalty may apply.

4.4 Product Management

4.4.1 Product Requirements Analysis

This process analyses the Client's requirements to find the product that best fits them. It can provide decision-making support based on terms such as availability and requirements compliance. In order to do that, it will take into consideration the Service Level Agreements established with the Client in the contract in terms of requirements agreed.

It can happen that there is no product that fits exactly the Client's requirements; therefore some modifications could be needed. These modifications have a cost associated. Additionally and related to this fact, an affordability analysis can be carried out, if the Client establishes a given budget per Operational Task.

In terms of availability, this process integrates the operation and the product readiness plans to create a "Fleet availability plan".

As a result of the "Decision Making Support" a list with all product candidates for each task will be produced and given to the Client in an "Assignment proposal". Along with it, a quotation may be proposed.

This process also performs an analysis in case a "Task reassignment" is needed.

4.4.2 Product Set-up & Monitoring

This process is centred on "Product Readiness"; that is, it aims to ensure product is ready to be completely functional at a given moment in time.

It also includes the evaluation of the current fleet and the analysis to decide whether or not to acquire new products to improve it.

It communicates with "Product Maintenance" process to obtain the latest maintenance related information, such as upgrades and maintenance plan, airworthiness limitations and time limits.

It is in charge of maintaining the "Product readiness plan" and to communicate the "Product limitations" (for example if the actual product configuration provides the product with certain capabilities but a recent damage makes it not fully operative) to the "Capability Analysis" process.

4.5 Contractual processes

These processes exist to support all agreements reached prior to a Task execution. They involve both Client and IFM; first to reach a SLA, then to evaluate the product performance based on metrics previously defined. They also support tasks cancellations/modifications and damage to the product.

4.6 Product Maintenance

This process is described in other chapters of this standard, so it will not be detailed here. Nevertheless it appears due to the information interchange with IFM.

5 Use Cases

5.1 Use case 1: Assignment proposal elaboration

Integrated Fleet Management (IFM) shall be able to receive, integrate and manage Operator Tasks requirements; either punctual or periodic. The Operator shall provide all available and required information on planned tasks so IFM can elaborate an assignment that best fits the Operator's needs.

Once IFM has all the information required, a process of analysis is performed. This analysis involves checking if Product availability coincides with the period of the Planned Tasks. Other aspects to take into account are the capability and configuration of the Product. It shall be able to perform the Task by complying with its requirements. For example, if a fisherman wants to go

sea fishing, the boat/ship must be configured to do so, and include, among other items, a fishnet.

If there is a previous contract/SLA signed with the Operator, the analysis must include this factor into the process, given the economical and level of service restrictions this can imply.

If necessary, the Budget factor can be added to the analysis equation.

Once the suitable Products have been found, IFM prepares a draft Product-Task assignment to give it to the Operator.

5.1.1 Assignment proposal feedback OK

In case the Operator agrees with the Assignment proposed, the Products availability must be updated as “unavailable”.

5.1.2 Assignment proposal feedback not OK

In this case, the procedure would be the same as in 5.1. The analysis would be performed again to elaborate another Assignment proposal. If the result is not satisfying, the process can be ended and Operator and IFM would not reach an agreement. The Operator shall include the reasons for the proposal rejection.

5.2 Use case 2: Task cancellation

Once a Product has been assigned, the Operator can still cancel the Tasks. Depending on the contract this may have consequences. A task can also be cancelled due to product problems; in this case, a new product can be assigned or, if it is not possible, penalties may be applied to IFM depending on the contract.

5.3 Use case 3: Task modification

There are many reasons for which the Client can decide to modify a Task. For example, if it has to be delayed, if the Product finally does not fit for the Task, if it needs to be re-planned due to cost or availability reasons. In any of these cases, as happens with Task cancellation, the modification of a Task can imply a certain kind of penalty.

5.4 Use case 4: Fleet availability plan elaboration

This is the main advantage of using IFM. Disposing of an integrated fleet plan will allow to know when a product is available or not and even its forecast usage. To prepare this plan, the fleet manager needs to collate the different activities a product is going to undertake (operational and maintenance) and always have its latest status and capabilities:

- Operational Plan
- Maintenance Plan
- Current status
  - Remaining life
  - Configuration
  - Capabilities

5.5 Use case 5: Task evaluation

After having performed a task, depending on the contract previously established with the Client/Operator, it can be necessary to evaluate it to deduce if it has been successful or not.

This activity is also carried out to improve the assignment process and the route calculation.

5.6 Use case 6: Product Preparation

Before performing a Task, a Product must be ready to ensure a successful performance. This includes the pertaining maintenance checks to look for any problem on the Product.

Sometimes the Product will not have the specific configuration needed for the Task, so it has to be changed. This is part of the Product preparation, along with the activities.

5.7 Use case 7: Product Recovery

When the Task is finished, the Product needs to be inspected. The objective is to find any failure. All the feedback received from the onboard systems and the Operator and Maintenance crew is used during the Troubleshooting process.

6 Metrics of Integrated Fleet Management

The main metrics used in Integrated Fleet Management are related to the following topics:

- Forecast Product Availability
- Actual Product Availability
- Specification Meeting Requirements
- Product Performance

S5000F has to provide the information needed to calculate these metrics, but it does not include the calculation itself.

7 Example: Travel & Leisure Bus Services

This example demonstrates that Integrated Fleet Management can be used with any kind of vehicle or product. It will illustrate the different requirements a Client can have and the wide range of products the operator and/or owner have to satisfy them.

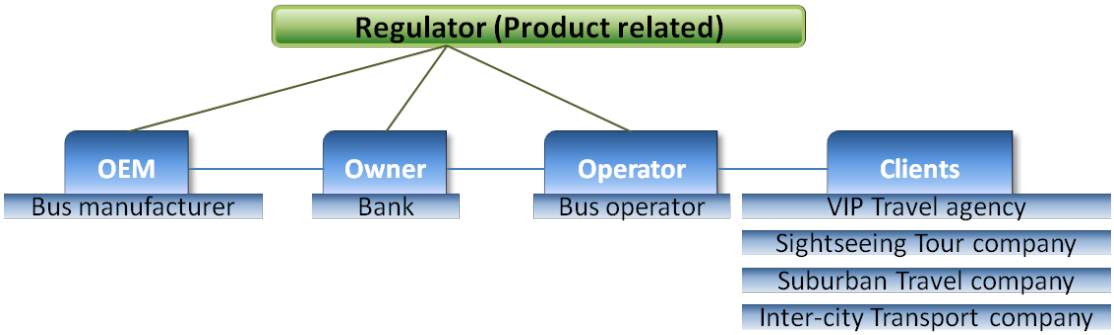
The main actors identified in this case are:

- Operator. The Operator has drivers and operates the products.
- Owner. Buses owned by a bank and leased to the Operator.
- OEM. Maintenance provided by the OEM.
- Regulator. We are only taking into account the regulations related to the product and not the client.
- Clients. We have identified four different types of client:
  - VIP travel agency
  - Sightseeing tour company
  - Suburban travel company
  - Inter-city travel agency

The relationship between these actors is depicted in Fig 4.

The vehicles owned by the bank are of four different types (all maintained by the OEM):

- Buses for sightseeing
- Buses for suburban transport
- Buses for inter-city transport
- VIP buses



ICN-B6865-5000F13004-001-00

Fig 4 Relationship between different actors

Some use cases derived from these products and clients are the following:

- **Sightseeing Tour scheduled.** Open-topped with tour guide (guide provided by Client). Customers hop on and off, no booking but pre-pay.
- **Scheduled suburban transport.** Utilitarian and can accommodate handicapped customers. Customers hop on and off and pay on entry.
- **Scheduled inter-city transport.** Customers pre-book and pre-pay. Bus has TV, toilet, air conditioning and space for baggage etc.
- **VIP Transport random/casual/corporate etc.** Specification changes depending on the customer, completely customizable. All pre-paid.

Applying IFM to the suburban transport use case, we would need on one hand information about the suburban buses , such as how many of them are available, how many under maintenance, fuel status, type of bus (brand, automatic or manual, etc) to find drivers that can drive that specific bus, etc. On the other hand, we will receive requirements from the client. In this case, it can perfectly be the time schedule of the buses and their routes.

After having all this information IFM would be able to assign one or several buses, with its driver, to a route. Examples of task monitoring would be to be in contact with drivers to be updated about any works or accidents along the road to be able to react and change somehow the route to complete the task on time. Also, we could know if there are more buses needed for a given route (more people, bus break down…). After the service, the information retrieved can be analyzed to incorporate modifications and improvements to the service.

8 Data required for Integrated Fleet Management

This section aims to enumerate the information needed to manage the entire fleet of one or more types of product, whether it is an input or an output. In the next table, the inflows and outflows of information between processes are listed.

Table 2 Fleet Management Source of the inputs and Recipient of outputs for Fleet Management

Process	Sub-process	I/O	Information exchanged
Product Requirements Management	Product Requirements Definition	I	**Requirements agreed**
		O	**New requirements**
			Operational Task Proposed
	Product Assignment Confirmation	I	Assignment proposal
		O	Assignment feedback
Product Usage	Product Usage	I	Departure Status
		O	Task cancellation/ modification
			Product monitoring
			Product performance
			Product Evaluation
Operations Management	Operation Planning & Assignment	I	Assignment feedback
			Actions needed for task execution
			Product Reassignment evaluation
		O	Departure Status
			Product Availability Update
			Product Configuration Update
			Operation Plan
			Task reassignment
	Operation Monitoring	I	Task cancellation/ modification
			Product performance
			Product monitoring
		O	Product Reassignment evaluation
			Product Operational Status
			Product Performance reports
			Penalties
Product Management	Product Requirements Analysis	I	Operational Task Proposed
			Product configuration update
			Task reassignment
			Operation Plan
			Product readiness plan
			Product Limitations
			Modifications cost
			Product acquisition plan & cost
			Priorities & Commitments
		O	Assignment proposal
			Modifications required

Process	Sub-process	I/O	Information exchanged
			Product acquisition
			Actions needed for task execution
	Product Setup & Monitoring	I	Product Operational Status
			Reference data
			Product Availability Update
			Maintenance plan
			Certification limitations
			Product basic information
		O	Product damage & usage
			Product limitations
			Product readiness plan
Supply Support	Supply Support	I	Product acquisition
		O	Product acquisition plan & cost
Product Maintenance	Product Maintenance	I	Product damage & usage
			Modifications required
		O	Maintenance plan
			Certification limitations
			Modifications cost
			Damage cost
Product Design	Product Design	O	Product basic information
			Reference data
Contracts Definition & Monitoring	Contracts Definition & Update	I	**New requirements**
			Service Level Agreement
		O	**Service Level Agreement**
			Requirements agreed
	Contracts Monitoring	I	**Product evaluation**
			Product Damage cost & Penalties
		O	**Product underperformance**
Contracts Management & Analysis	Contracts Definition Usage	I	**Service Level Agreement**
		O	**Service Level Agreement**
			Priorities & Commitments
	Contracts Analysis	I	**Penalties**
			Product underperformance
			Damage cost
			Product performance
		O	**Product Damage cost & Penalties**

Chapter 12

Feedback of data for Configuration Management

Table of contents

List of tables

List of figures

References

Table 1 References

Chap No./Document No.	Title
S1000D	International specification for technical publications using a common source database
S3000L	International procedure for Logistics Support Analysis

1 Introduction

The configuration in service for a given product is one of the most important elements that affect the product operation, not only for operational reasons but also to ensure the product safety and to comply with the regulations affecting that particular product (e.g., airworthiness regulations).

This chapter is more detailed than other chapters within this specification because of the peculiarities of in-service configuration that are not explained elsewhere in the S-Series suite of ILS specifications. This need for explanation also implies a somewhat different structure.

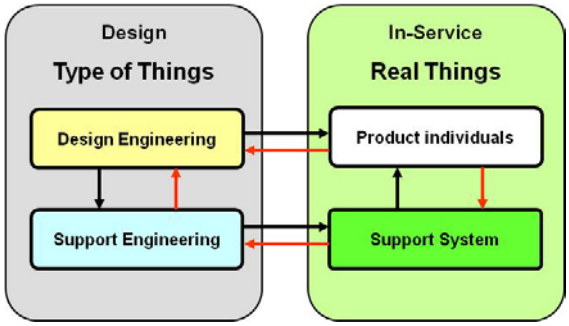
2 Scope

This chapter provides the necessary information about how to provide the different product configuration aspects, the necessary information that is required for configuration control purposes, the initial configuration information to be provided to the customer, including its updates, and the information that has to be provided to the original equipment manufacturer (OEM) or other design authority for logistics, technical and legal (e.g., to ensure continuous airworthiness) purposes.

3 Peculiarities of the in-service configuration

The in-service configuration is characterized by the fact that, contrary to the design phase, we are not talking about generic abstractions or functional items, but rather about individualized physical configurations. While during the design phase a product has a generic configuration, and parts are considered only generically (e.g., by means of a part number), during the in-service each product is unique, and individual parts may require their separate identification

(e.g., a serial number) so as to be able to control them separately due to limited life, need to control their individual reliability, high cost and control of ownership or even due to legal reasons. Given that the individual parts change often due to maintenance tasks, the in-service configuration needs to be flexible and maintained in real time.



ICN-B6865-5000F12001-001-01

Fig 1 Difference between Design and In-Service

Though the physical configuration control might be also performed during manufacturing phase, the elements that are considered at that time are not usually the same as the ones used during the in-service. During manufacturing the “building blocks” used for configuration are “constituent assemblies”, meaning a set of physical elements that are manipulated as a single entity for the final assembly, such as a wing, an engine, a chassis or a rack of equipment. It is very exceptional that such constituent assemblies are used for the usual maintenance tasks, which are usually structured around components associated to individual systems. And even when one of these constituent assemblies does correspond to a maintenance item (e.g., an engine), very often this maintenance item is further decomposed in lower-level elements (e.g., a valve, a sensor, a pipe, etc), which may require their separate maintenance actions and are basically ignored during the assembly process because they arrive already assembled.

The purpose of the in-service configuration is therefore to ensure:

- Sufficient information so that the operator can manage, control, operate and maintain the product during its operational phase in an adequate manner, also complying with potential legal requirements.
- Sufficient information so as to enable the manufacturer to know whether the product in-service behavior is the expected one or requires post-manufacturing changes. It will be the base to propose improvements so as to improve the capacity, effectively and maintainability of the product, and even a reduction of the operating and maintenance costs.

Keeping in mind these two objectives, it is necessary to have a common language on both the operator and manufacturer side. Similarly, as the manufactured product is the beginning of the in-service, and the operational configuration needs to be mapped back to the design by the manufacturer to ensure his support capability and continuous improvement, it is necessary to ensure the traceability between the Design, Manufacturing and Operation phases, or at least between the operator and the manufacturer.

Given that the frontier between the product OEM and the operator is the ILS discipline, which ensures a coherent infrastructure, the identification of the in-service configuration item needs to be linked to the one established in S3000L, so as to achieve a common link for the in-service data exchange.

4 Configuration principles

Configuration Management is a discipline that:

- Identifies and documents the physical and functional characteristics of a product which, due to its high cost, complexity, operational essentiality, safety reasons, maintainability causes (life limit, periodic checks, etc.) and/or any other reason may require a specific control and an adequate logistic support.
- It controls the changes applied to the individual elements, so as to determine their impact and to control their implementation.
- It allows optimizing the information flows, facilitating the correction of errors, enabling to obtain all the information contained in it, ensuring traceability and enabling the user to know at any moment the current product configuration.
- It is used for contractual verification purposes, namely to verify that the Client gets what he ordered.

Though referencing a product, in accordance with the basic purpose of configuration management of a system, when we talk about configuration control we will do that based on a model, so as to avoid information redundancy.

That is, the Configuration Identification is mostly common for the set of items that a manufacturer builds and presents as a model. Though different versions of this model may exist, they will have sufficient common elements so as to establish a single configuration, and this configuration will reflect the specificities by means of the applicability or effectivity of the configuration items.

4.1 Configuration tree

The configuration tree is the representation of a product configuration. It is formed by blocks and structured hierarchically. Each block represents a configuration element.

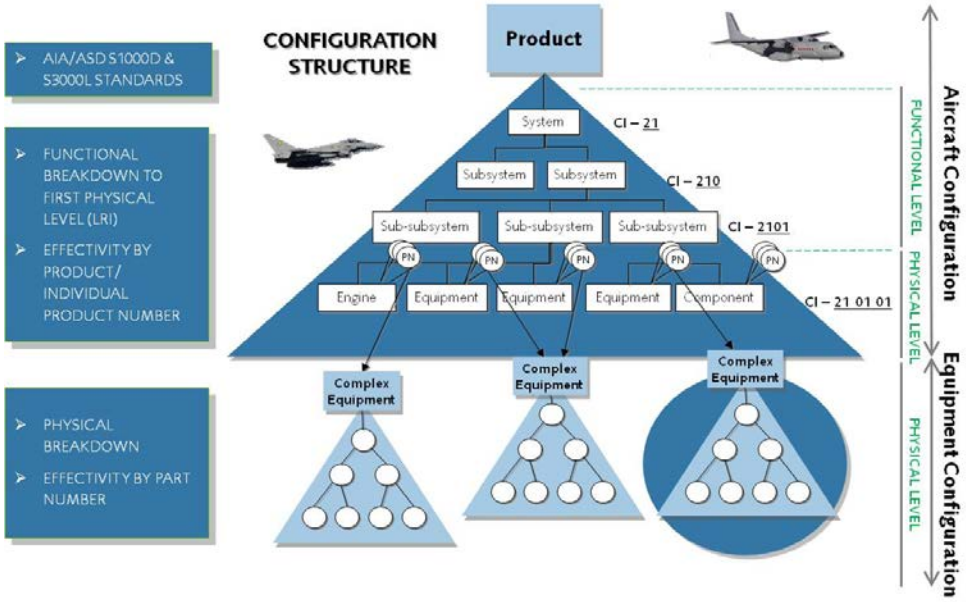
The configuration tree hierarchy has usually two levels, a functional level with no more than three levels that depicts the system, subsystem and sub-subsystem configurations, and a physical level below it corresponding to equipments and components. Equipment (e.g., an engine) might actually have no functional level, and the hierarchy reflects then its actual physical breakdown. Functional items might exist in this configuration tree, for example to indicate a hardware-software combination (see Para 7).

A configuration item reflects a function within a product. This may or not correspond to a single physical item. For the physical items performing a function, it may occur that the same individual item performs more than one function; in this context, the configuration system must understand that a same part may perform functions for more than one system.

A classic approach to create the configuration tree is to use the configuration items for the first two levels, as indicated in [S1000D], and for the remaining levels use the information supplied by the manufacturer (e.g., i.a.w. [S3000L]) and, if not available, any other that can assist in performing a reasonable breakdown. For the purpose of this specification, we will assume that such breakdown is performed in accordance with [S3000L].

The first configuration item of the functional/physical level will be the one where the function specified for the item is performed by a part that can be physically identified, and that can be directly disassembled from the product. This kind of item is often called Line Replaceable Item (LRI) or Line Replaceable Unit (LRU).

For simplicity, the Configuration Tree of a product will only cover those parts that can be directly disassembled as a final element (which may be considered as a product by its own right). It may occur that certain parts may require to be subjected to Configuration Control, but if their disassembly requires the prior disassembly of the item to which they belong, then these parts will form part of the physical tree of the sub-product to which they belong. This implies that if a sub-product is disassembled, it takes with it its own internal configuration tree.



ICN-B6865-5000F12002-001-01

Fig 2 Abstract Configuration Tree Breakdown

Each configuration item will have its own identifier, with a structure and coding based on S1000D (for the first two configuration levels) and the Breakdown Element Identifier (BEI) of S3000L.

Note that the configuration tree distinguishes not only between the different elements, but also their positions.

For this reason, the item code identifying any item within a product, apart from identifying its function, needs to include in its coding the:

- Hierarchy level within the tree where it is located
- Item position

Given that the configuration tree is based on a specific model, it is necessary to keep in mind the exceptions at all levels and positions. That is, it is necessary to differentiate those parts or items that are only applicable to some products of a same model. This concept is called effectivity. All configuration items must have specified the products to which they are applicable. At the physical-functional level, the effectivity must be assigned to the concept position-part, given that the part may be different in different positions for each individual product.

The physical configuration identifies a breakdown of a specific part. Contrary to the breakdown performed in design or manufacturing, the in-service structure breakdown only needs to contain the necessary information to operate or maintain the part. It is essential to have a minimum recommended breakdown, including at least the LRI or LRU parts requiring a specific life control, that are subject to periodic inspections or life limits. The rest of components are usually agreed between the manufacturer and the customer, depending on the type of maintenance that is going to be performed on the product. Items whose reliability will be monitored should also be included in this breakdown.

The physical configuration is represented as a structure of father-child relationships, as at this level the items cannot be associated to a specific function.

4.2 Configuration item identification

The configuration item identification is an identification code of an element or set of elements, hardware, software or a combination of both, or any of their discrete parts, which perform a final

function and which are subject to configuration control. It is one of the blocks forming the configuration tree.

There are many ways to generate this identification code; most of them will depend on the project requirements, but the ASD specifications do not mandate a specific one. The ASD specifications allow any kind of identifier to be used, whether project-specific or not.

One method that has been used in the past in order to reflect the first three concepts (level, hierarchy and dependency), was to use a numeric identifier, with a maximum of eight characters, in such a way that a code identified:

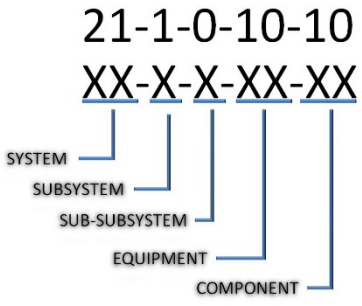
- Two positions: a system,
- Three positions: a sub-system,
- Four positions: a sub-sub-system,
- Six positions: an equipment, and
- Eight positions: a component.

The relationship between elements of intermediate level is in this example obtained from the own item structure and coding, given that the immediately upper identifier of an item will be the one matching the identifying characters of the immediately upper level, that is, the one obtained when removing the item-specific characters. The lower (child) items will be those that contain in their root the identifier of the item in question and additional digits identifying their level within the hierarchy.

It is **not** advised to use the 8-position code (component) if using the product functional and physical breakdown structure. As explained in Para 4.1, the physical structure represents the part breakdown of a sub-product, and would imply a redundancy of the first equipment level breakdown, as it would be represented in both structures.

Any characteristic associated to the item function should be identified at this level.

In some cases, parts are mounted on other parts that do not belong to the function of the main part (sub-product). For example, the temperature controllers of an engine, which i.a.w. an example of S3000L belong to chapter 78, are installed in the propulsion system, which is identified as belonging to chapter 38. In this case, we should code the controllers as part of chapter 72 when creating the structure. This will allow using it during maintenance, and to disassemble them at the same time as the engine itself, but an item referencing system needs to be created so as not to lose their original coding, as there are other functions or support elements (e.g., documentation) that use that other reference.



ICN-B6865-5000F12003-001-01

Fig 3 Example configuration item codification

This configuration item identification is generated usually as part of the LSA work, and in that case this should refer to the configuration identification rules used within S3000L. However, if no LSA is performed on a specific program, it becomes necessary that such identification is

performed by the OEM, so as to be able to map back the data feedback to its own design. Note that S3000L does not mandate a specific identifier format.

In any case, independent of the coding mechanism or methodology, it is essential that all parties exchanging data share the same identifiers.

4.3 Configuration item position

A configuration item, in addition to indicate a function, must in the functional/physical cases also indicate clearly the slot (position) in the product (a ground vehicle, ship, aircraft, etc.) that the part performing that function occupies.

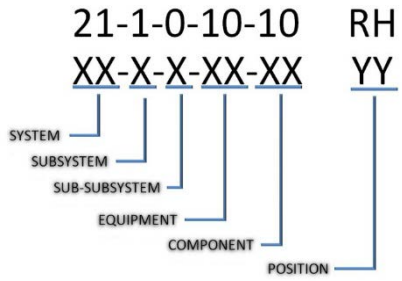
A configuration item in a generic product may exist more than once if the same function is performed by several parts. For example, a head-up display (HUD) may exist twice in a same vehicle, performing the same function for a pilot and a co-pilot. In this case, it is necessary to identify unambiguously which item is specifically mentioned within a specific configuration slot (e.g., right/left, forward/aft, top/bottom, etc).

For this reason, and so as to consider the items that have multiple installations though performing a same function, we can completely identify a slot by adding a code identifying the different possible positions.

The most used codes are:

- Geometric codes, such as for example: left or right, or top and down, etc. This approach is the default one provided the symmetry is represented always from a clearly identified point.
- Color coding, when geometry cannot unambiguously identify an item. An example is the identification of propeller blades, as their exact position at a given moment is unknown, as it will depend on where the engine stops.

Each gap in a product, identified by the configuration item and position code, will have the different identifications of the items that can perform the corresponding function. These identifications will be generally the part number and manufacturer code. The individual item filling that gap will also be identified by the serial number, if applicable.



ICN-B6865-5000F12004-001-01

Fig 4 Sample configuration item position

The advantage of using this structure, if provided by the OEM i.a.w. S3000L, is that it will allow an unambiguous identification of an item, including its position on the product. This is important not only for reliability studies (a same sub-product, when installed in different locations, may fail very differently), but also to assist the OEM in providing more adequate support and to allow him to better focus on the product improvement as he will have a direct traceability to the original design.

Note that none of the coding provided here as examples is mandatory; any other agreed coding that unambiguously identifies an item and its position is perfectly usable for data feedback. The only requirement is that these are the same codes used by both the entity providing feedback and the one receiving it.

4.4 Effectivity management

The concept of effectivity refers to the restrictions of the applicability of a configuration item or a part assigned to a configuration item within a product; that is, it is not applicable to all products of a same model.

When a functional type configuration item or a part associated to a functional/physical item is not applicable to all products, the effectivity will be recorded by indicating the identifiers of the products to which it is applicable as follows:

- If applicable to one or several models, but not all, it will identify those to which it is applicable.
- If within one model a configuration item or part should not be applicable to all individual products of that model, in addition to the model it will also include the range of individual product identifiers for which it applicable (with initial and last identifier), the use of multiple ranges being allowed.

For example, an effectivity (A7, 30-40) of an item could mean that it is can only be installed on the serial number 7 of model A and serial numbers 30 to 40 for all models of a specific product.

For functional level configuration items, the effectivity is directly linked to the configuration item. For functional/physical configuration items, the effectivity is associated to the identification of the parts assigned to the configuration item, and the effectivity of the configuration item will be therefore the sum of the effectivity of the parts it has assigned.

Example: A configuration item C has two items C1 and C2, with C1 having an effectivity (10-50) and C2 having an effectivity (7,15, 30-60). The effectivity for C will be therefore (15, 30-50).

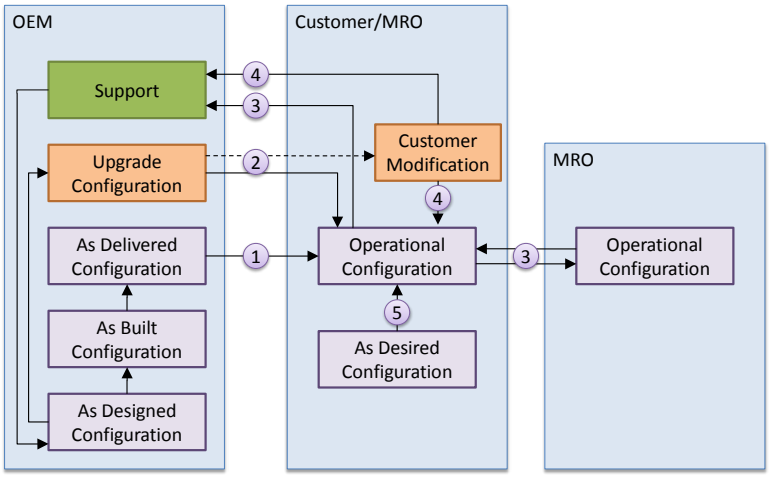
Another important aspect to be considered regarding the effectivity is when it is affected by a modification performed on the item configurations. In this case, it will be necessary to consider the applicability based on whether the modification has or not been embodied. The final update of the configuration structure will be then performed when the modification has been embodied on all items for which it was applicable.

This handling of the effectivity also allows recording any peculiarity in the generic configuration of a model, and therefore obtaining the configuration tree at any level, from the most general one for the whole model down to the most particular one for a specific reference identifier.

5 Configuration information feedback

The figure indicated below provides an overview of the configuration information that flows between the different in-service actors. These actors are as follows:

- OEM: This actor is responsible (sometimes even legally) for the allowed configuration of the product.
- Customer / Operator: This actor is responsible for the operation of the product, and hence also responsible for the operational.
- MRO: This actor reflects those cases where the customer / operator transfers his product to a third party, either to embody a modification or perform some major maintenance.



ICN-B6865-5000F12005-001-01

Fig 5 Configuration Information flows

The configuration flows within the OEM have been identified, but do not form part of this specification and appear in Fig 5 only for completeness. The flows that do form part of this specification have been numbered in the figure and are discussed in the paragraphs below.

There are basically 5 configuration information flows, which are described in the successive sections of this Chapter:

1 As-delivered configuration (see Para 5.1)

2 Upgraded configuration (see Para 5.2)

3 Operational configuration (see Para 5.3)

4 Customer modification information (see Para 6.3)

5 As-desired configuration (see Para 5.4)

5.1 As-delivered configuration

The as-delivered configuration (marked as ① in Fig 5) is the configuration of the end product at the moment that it is handed over to the customer. The as-delivered configuration must be sufficient for the operator to manage his product without any further problems. The level of detail should be agreed with the customer, as an excess of information can be as inefficient as a lack of information. The minimum level of information to be provided must cover at least the items referenced in the Maintenance plan.

Independently of the level of detail, the type of information to be supplied to the customer is however always the same. The as-delivered configuration consists basically of following information sets:

– **Allowed configuration**. It consists of the configuration items that completely define the product, represented by their item breakdown. This must include:
  - List of configuration items conforming the product in its different configurations. At configuration item level, it must include:
    – The different basic configurations that the product can adopt and that provide it with different capacities.

  - All the possible operational configurations of the product, representing different roles or missions that the product can carry out (e.g. aircraft in transport or tanker configuration, ship in passenger transport or medevac role).

- All interchangeable parts that have been defined at configuration item level.
  - All positive (necessity) or negative (incompatibility) compatibility rules that have been defined.
  - Any other data that may indicate differences between multi-applicable or multi-installation parts at configuration item level, such as life correction factors.

– **Actual configuration.** This is the list of items with their corresponding serial numbers installed on a specific final product, and associated to the corresponding slot in accordance with the defined allowed configuration structure. The actual configuration will be complemented with additional information that describes each serialized item, which on delivery will include:
  - Life consumption or overhaul potential (due to industrial tests)
  - Concessions, if any, and the limit, if established, for the use or rework of the part. These will be due to the fact that the manufactured product does not correspond to the agreed specifications (waivers or deviations).

– **Industrial Modification.** List of modifications introduced during the product manufacturing. These will include at least those that have been requested by the customer and have been introduced before the product delivery (customization). These normally would be handled post-delivery as Service Bulletins, but do not follow the usual post-delivery process because they are embodied before the product delivery.
– **Concessions.** Deviations or outstanding work on the delivered product that must be accompanied by an action and a limited period for execution.
– **Delivery configuration of additional sub-products or items** that can be fitted to the end product (usually called “loosed items”) but are not installed at the time of delivery (e.g., medevac kit).

The as-delivered configuration is very important to the customer because:

– It provides a contractual listing of everything that is fitted on the product
– It provides a contractual listing of potential waivers and deviations to the approved design
– It is the starting point (T0) of the operational configuration.

5.1.1 Allowed configuration

The allowed configuration is the basic product configuration approved by Design. It will be delivered to the customer down to the agreed level of detail, based both on the Maintenance Plan applied to the product and to the maintenance level(s) that the operator wants to carry out. All items identified here will have a specific monitoring treatment during the whole product life. The allowed configuration includes all allowed operational configurations.

The allowed configuration will not only represent a product breakdown; in this structure, the items will have sufficient information to define the level of usage restrictions, authorization, limitations or any other useful data required for the operation, maintenance or logistics.

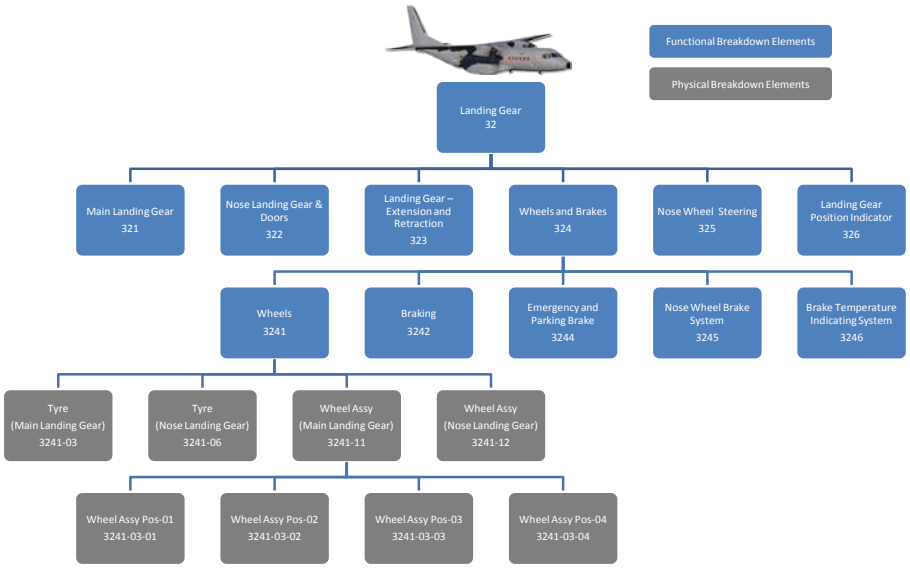
The allowed configuration is the generic configuration that is applicable to all products of a same model, and it will contain, as explained in section 4, a functional and a physical section.

The first thing that needs to be kept in mind for its creation is that, within the physical level of the structure, all parts must be identified as “serialized control”. This will be the template on which the actual configuration will be constructed, and where any event along the whole product life will be tracked. It implies to perform all annotations that will be later considered in the Operational Configuration flow (see Para 5.3).

We will use the item essentiality type in order to identify within the structure those items that form part of a basic configuration structure and that are necessary to perform its main function, as opposed to those required for an operational configuration (used for a specific task or mission). For operational purposes we will use the mission or operation type. This classification will be used for the Operational Configuration (see Para 5.3).

Thus, at the item configuration level it is necessary to provide:

- Identifier
- Essentiality type, in the case of mission or operational mode it will include the mission or operation type.
- Amount; if greater than 1 it must specify the position.



ICN-B6865-5000F12006-001-01

Fig 6 Configuration tree example

The essentiality indicates the degree to which a failure or fault in a configuration item affects the operating capability of the product to which it belongs. Six basic cases can be identified:

1 Does not affect the product capability (it can perform all missions or tasks for which it has been configured).

6 Does not affect the product capability but affects safety.

7 Does not affect the product capability but does affect specific requirements for operation (legal, environmental, etc.).

8 Affects partially the product capability (the product cannot perform at least one of the missions or tasks for which it has been configured).

9 It is necessary to perform a physical action (other than the item repair) to restore the product capability.

10 There is no product capability at all (the product cannot perform any of the missions or tasks for which it has been configured).

The essentiality information is provided by the OEM and provides the necessary rules to be able to unambiguously identify the product operating capability by the end user.

Once the set of configuration items forming the generic configuration tree has been defined, it is necessary to associate the configuration items of the functional/physical type to the parts performing the function of the configuration item.

In reality the parts are associated to the gap, meaning the configuration item plus the position code. Each part that is applicable to a gap is usually identified by a part number, together with the manufacturer code, so as to be able to identify uniquely and without any possible error the different articles. Sometimes the manufacturer code is implicit.

All items that the manufacturer specifies as being able to perform the function will be identified, independently of the interchangeability, effectivity, etc., which will be documented separately.

The concept of effectivity refers to applicability restrictions to a configuration item or a part assigned to a configuration item; that is, it is not applicable to all items of a product.

When a functional configuration item, or a part associated to an item of functional/physical type, is not applicable to all products, the numbers or the range(s) to which it is applicable will be recorded. See also Para 4.4.

The effectivity of the functional configuration items is directly linked to the configuration item, while in the case of the functional/physical configuration items the effectivity is associated to the identification of the parts assigned to a configuration item. In this latter case, the effectivity of the configuration item is the sum of the effectivities of the parts assigned to it.

Another important aspect to be considered in the effectivity is when this is affected by a modification performed to the product configuration, as it will be necessary to consider the applicability based on whether the modification has been or not embodied. It is also necessary to perform the final update of the configuration structure when the configuration has been embodied on the items to which it was applicable. This aspect is considered in Para 5.2, *Upgraded configuration*.

This handling of the effectivity allows also recording any peculiarity in the generic product configuration, and therefore obtaining the configuration tree at any level, from the most general one to the most particular one for a specific item.

5.1.2 Baseline configuration

The baseline configuration is the basic allowed configuration to which all potential operational configurations need to refer, so as to be able to change from one configuration to another. This baseline configuration cannot be changed, except by means of a service bulletin (Refer to Para 5.3.2).

5.1.3 Operational configuration

It is necessary to record the operational configurations separately from the ones that are specific for each configuration item.

The recorded information will allow determining the configuration items that must appear in a product so as to be in a specific operational configuration and to be able to carry out the corresponding product task or mission.

A configuration item (CI) that has no operational configuration associated to it is understood to be valid for all of them, and the associated essentiality class will determine the level of essentiality.

It is however important to realize that even if a configuration item is valid for a specific operational configuration, there are relationships with other items that will disallow the use of this configuration item in a specific operational configuration.

There are basically two configuration relationships:

- **Interchangeability**: Interchangeable are those physical items that without having the same identification as the item that they are going to replace have been homologated by the manufacturer to comply with the required functional specifications.
  The interchangeability will be recorded as the relationship between all parts that are applicable to a same gap.

  The interchangeability is not specific information of the CI, but rather a relationship between two or more parts to be installed in a same gap identified by its CI, including their position if necessary.

  The interchangeability codes indicate the type of interchangeability relationship between pairs of parts occupying a same gap.

  Should no interchangeability code be indicated, then it will be assumed that all parts are totally interchangeable because they are associated to the same gap.

  These codes are as follows:

  - Not interchangeable or interchangeability not studied.
  - Totally interchangeable, but the first one being preferred (possibly because the second is obsolete).
  - The interchangeability relationship is only in one direction, in such a way that the part appearing in the first position of the relationship may be replaced by the second one, but not the other way round.
  - When the interchangeability is total between two items, but these are not completely identical.
  - If the interchangeability is qualified, that is, there are conditions to it, and the interchangeability condition must be specified.
  - Totally interchangeable

- **Compatibility**: The compatibility reflects the relationships of specific interfaces between two configuration items.
  The compatibility relationships will be recorded in those cases where the installation of a part is conditioned by the need of one or more other ones, or the impossibility to have them together. Therefore, in addition to the elements affected by the compatibility, a code will be associated that indicates whether the compatibility relationship implies that the items need to be necessarily go together or, on the contrary, the items may not be installed simultaneously on the same product. The compatibility relationship is not understood as the existing relationship of items belonging to the same configuration branch.

  The compatibility can be recorded on three levels:

  - Between configuration items, which will indicate the compatibility relationship at configuration item level, and that will include all parts associated to all gaps of the configuration items and the CIs below them, if any.
  - If there is a compatibility relationship between gaps, their compatibility relationship will be indicated, covering all parts that are applicable to them.
  - The compatibility between parts will be recorded between the part numbers-manufacturer associated to the different gaps.

  The compatibility may be:

  - **positive**, requiring additional configuration items to be installed to enable the interchangeability, or
  - **negative** (also called **incompatibility**), prohibiting the installation of the configuration item with certain other configuration items.

    Example of positive compatibility:

"A_2 may replace A_1 if C is installed" (e.g., C is required because it is a special controller for A_2).

Example of negative compatibility (incompatibility):

"A_2 may replace A_1 if B_1 is not installed" (e.g., because B_1 will cause A_2 to work incorrectly).

Complex conditional rules can be broken down into elementary aggregated positive and negative conditional interchangeability rules:

"A_2 may replace A_1 if B_1 is not installed and C is installed" could be broken down into the two above examples.

Note that the positive compatibility is unidirectional, meaning that the fact that one configuration item requires a second one does not mean that this latter requires the former (in the first example, C may not necessarily require A_2).

On the other hand, the incompatibility (negative compatibility) is **always** bidirectional (in the second example, B_1 and A_2 should never be installed simultaneously, independently from which one was installed first).

The term compatibility is also sometimes referred to as "mixability", to highlight how different items can be mixed.

5.1.4 Actual configuration

The actual configuration is made up of the allowed configuration as applied to a specific item at a specific moment, indicating in each position the serial number occupying it.

In addition to this particularized representation, each serialized item number will have an associated set of information that will define it. This is called the item logbook.

At the moment of delivery, or immediately after being manufactured, it will only have information about:

- Consumed life, if controlled, due to any functional test if this was performed before delivery.
- Concessions, in the event that the manufacturing process has suffered deviations to the original design or has pending work to be performed on the item so as to finish its complete manufacturing process.
- Should these concession mandate limitations of use of the item, then these must be specified, as well as their expiration date or the condition for these to disappear.

5.1.5 Industrial Modifications

This refers to the list of the modifications that will define the final product, either regarding the capacity or the definition of a model in respect to another one.

This list will be information only for reference purposes; as such definition or capacities are part of the product.

5.1.6 Concessions

These are deviations of the manufacturing process in respect to the original design or pending work to the item so as to finish its manufacturing process.

Should such concessions imply limitations to the use of the item, it is necessary to specify these, as well as their expiration date or condition that will imply the end of such concessions.

5.1.7 Loose items

The configuration of the loose items covers the delivery configuration of all elements which, though they could be potentially fitted on the product and form part of the basic product configuration, cannot be physically installed on the product with the configuration that is actually delivered to the customer.

Loose items are usually mission or role equipment that are delivered simultaneously with the product but cannot be fitted on it because the mission configuration that the customer requests on delivery prevents this. It is however perfectly possible that the customer changes the role during the product acceptance, or shortly after accepting the product, and hence needs the associated configuration information to be delivered at the same time as that of the product itself.

For example, a military transport could potentially be used for paratrooper launch and medevac missions. If the delivery is performed with the paratrooper seats installed, the medical equipment (stretchers, etc.) would have to be delivered as loose items because of the incompatibility of both roles. Note however that the next aircraft could have the roles reversed and provide the paratrooper seats as loose items.

5.2 Upgraded configuration

The upgraded configuration is the evolution of the allowed configuration as supplied by the OEM due basically to the introduction of product improvements.

It will be made up of the same information as indicated in Para 5.1.1 and the proposed modification.

5.2.1 Evolution of allowed configuration

Once the baseline configuration has been established, modifications to the record may appear so as to correct anomalies, include new configuration items or to implement changes performed on the actual configuration, such as new interchangeability relationships, issue of modifications affecting the configuration structure, etc.

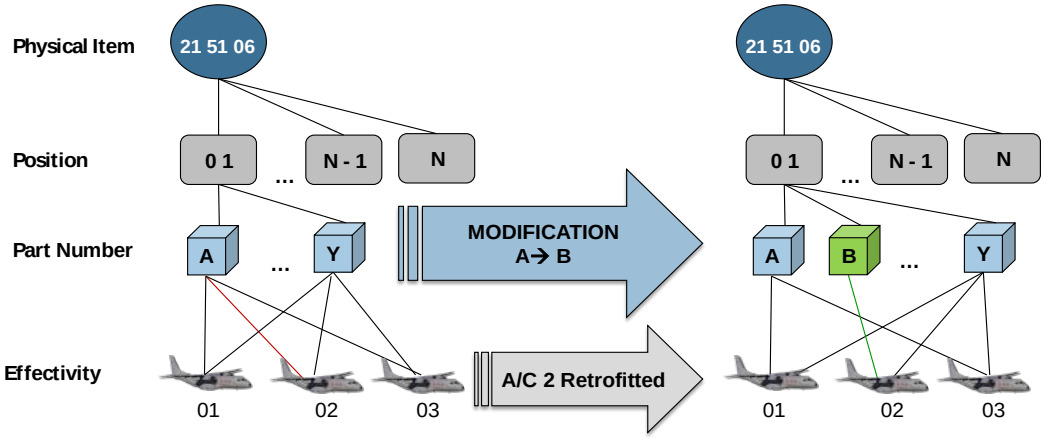
For this reason, the identification of the configuration in effect will be the one approved initially, plus all changes introduced into the configuration structure during the product operating life.

As explained, a change in the configuration identification may be cause for two different reasons:

- Due to the issue of a modification by the OEM, either because of legal requirements or product improvements (e.g. Airworthiness Directives or service bulletins for aerospace products).
- So as to perform a correction or improvement to the existing configuration.

In addition of considering the change, the system must control at any moment the information flow, from the moment that the need for change is generated until it is rejected or approved and implemented.

Given that the configuration structure is core information for others, it is essential that the study and incorporation of any change in the structure is performed in such a way that it allows ensuring the information integrity.



ICN-B6865-5000F12007-001-01

Fig 7 Configuration Changes

Within the changes that are caused due to a request for embodiment, it is possible to distinguish the following cases:

1 Those cases where the modification embodiment status will depend on whether a specific part is or not applicable; in these cases, a provisional structure will be created that will be in effect while the modification is not embodied into all affected products.

The provisional structure will have the following form:

Outgoing part:

Associated to the part identification in the gap where it is applicable, it will be necessary to record the effectivity, the identification of the modification and with the “Before/After the modification” it is necessary to indicate the code corresponding to “before”. This indicates that the part is applicable if the individual product where it is to be installed has the modification not yet embodied.

Incoming part:

The part identification will be entered in the corresponding gap with the associated effectivity, the identification of the modification and with the “Before/After the modification” it is necessary to indicate the code corresponding to “after”. This indicates that the part is applicable if the individual product where it is to be installed has the modification already embodied.

11 The changes caused by a modification that do not change the configuration structure itself, such as for example changes in the relationships of interchangeability, compatibility, effectivity, etc.

The former will cause a change in the configuration identification at the moment of emitting the modification, which is when the provisional structure is generated, and another when it is fully embodied and the provisional structure becomes definitive. The changes of the second type will usually only affect the structure at the moment it is created.

The embodiment of a modification must be reported by the operator, updating as necessary the provisional structures that the manufacturer reported when the modification was launched.

5.2.2 Modifications

It is necessary to perform the global tracking of the modifications so as to determine the ones that have been embodied or pending for each product.

In addition of the identification, each modification must specify whether it is:

- It is a non-recurrent modification.
- A recurrent modification. In this case, it is necessary to document the type of embodiment interval and the indicator (e.g., every 50 operating hours), as well as the action that will close the modification.

In addition, it will be necessary to clearly specify the obsolescence or cancellation of the materials affected by the modification, as well as the affected documentation and the modification kit required to perform the modification.

Note that non-standard information such as drawings or CAD files may have to be distributed together with the modification.

5.3 Operational configuration

The operational configuration, often called as-maintained configuration (marked as ③ in Fig 5), is a snapshot of the product configuration at one given moment. The operational configuration is continuously changing due to the fact that there are product role changes that require removal and installation of specific equipment, that specific configuration items are replaced by other ones due to failure, scheduled maintenance or overhaul, that service bulletins are embodied, or that specific elements have been removed due to the need for cannibalization so as to make another product operational.

The basis for the operational configuration is an allowed configuration called “baseline configuration”. This baseline configuration is the common denominator of all allowed configurations, and one operational configuration will always include the baseline configuration. Often changing from one operational configuration to another implies returning the product to the baseline configuration, and then adding configuration items to achieve the operational configuration.

The trigger for a change in the operational configuration is a work order. The operational configuration needs to be reported to the product owner (if performed by a third party), the operational command and usually also to the OEM, either to obtain specific support or for legal reasons. The operational configuration is also provided with the product when it is sold or handed over for a major overhaul or returns from it. In this case, it is provided in a similar way as the as-delivered configuration described in section 5.1.

5.3.1 Removal / installation of equipment without replacement

The removal/addition of a product in a next-higher assembly (e.g. equipment that is installed on or removed from a product) is in principle not affected by the interchangeability requirements, as it is not exchanged for another item.

However, it must be kept in mind that the installation/removal of such product has to comply with the compatibility rules of the next-higher product:

1 In the event of **removal**, a positive compatibility may be violated (another product may not remain installed because it requires the removed product to be present).

12 In the event of **installation**, it may violate an incompatibility rule (the installed product may not be installed simultaneously with another product that is already installed).

Thus, the removal or installation of equipment without a replacement action requires compliance with the compatibility rules outlined in section 5.1.2.

5.3.2 Embodiment of service bulletin

The embodiment of a service bulletin is the execution of a modification on an item that is already in service. The service bulletin is associated to one or more design changes that define a new baseline configuration. The service bulletin contains the necessary instructions about

how to carry out such modification on an existing item and usually also the material (and possibly also the tools) required.

Once a service bulletin has been embodied, the affected part(s) change their part number so as to reflect the modification that has been `performed on them. If the parts are installed on a product, the product operational configuration needs to be updated so as to reflect that it now contains new parts. See also Para 6.2.

5.3.3 Actions or performed work

The list of actions performed on an item. These are classified into:

– Unscheduled maintenance:

  This is the work that has been performed to correct a failure or problem. These are not predictable and sometimes the failure is not documented in the technical documentation of the manufacturer. For this reason, it is necessary to document:

  - Failure definition (symptom, when it occurred, etc).
  - The possible system that is failing or the part, if it is possible to isolate at this level. Note that in this case it is important to document the CI identification, including the location.
  - The corrective action that has been performed and has corrected the failure or made the problem disappear.
  - If such action implies replacement of components, these must be specified, and the actual configuration must be updated to reflect these replacements if such items are under configuration control.
  - The date and any other reference of interest.

– Scheduled maintenance:

  These tasks are the ones recommended by the manufacturer's manual. Usually these tasks are grouped into sets of tasks called inspections or checks. It is necessary to document that these have been carried out following the manufacturer's instructions:

  - Definition of the check (list of tasks making it up).
  - Possible findings found during the inspection.
  - In case that this action implies the replacement of components not listed in the instructions of the manual, then these must be specified.
  - The date and any other reference of interest.

5.3.4 Concessions

Usage limitations may appear during the usage of an item, or the wear may change physical characteristics that must be studied. This is called operational concession.

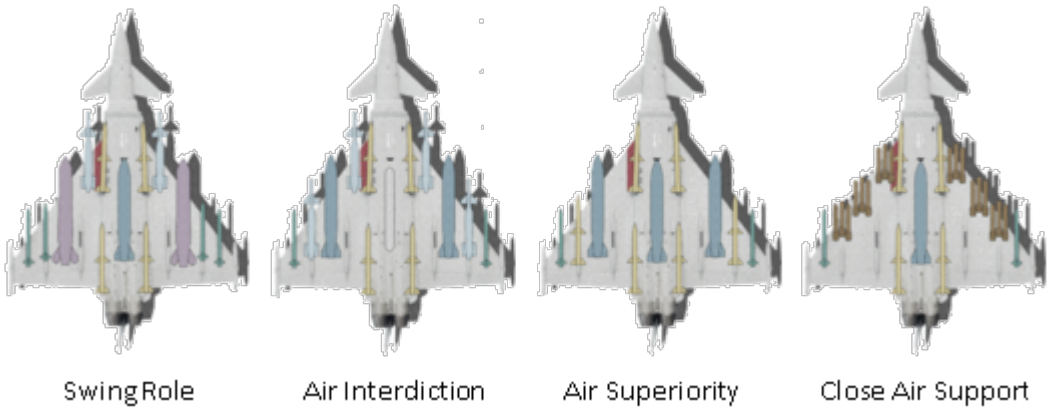
Once it has been studied, the result may be:

– The item is still fully operational (e.g., changes of color of metallic elements that, when studied, it is determined that the operating capacity is not affected).
– Item usage limitations may be established; these limitations must be specified and the possibility that these may disappear.
– There is no solution to the problem, and an expiration date for the item must be established, after which the item must be either replaced or redesigned.

5.4 As desired configuration

The as desired configuration (marked as ⑤ in Fig 5) is the configuration that the operator wants to have at a certain moment in time so as to perform a certain mission with the product. Thus, the as desired configuration is (one of) the allowed configuration(s) that allow to perform a

specific mission. The purpose of any action to be taken by the maintenance organization is to ensure that the operational configuration matches the as desired configuration, so that the mission can be performed.



ICN-B6865-5000F12008-001-01

Fig 8 Example of as-desired configurations

The challenge in this case is that the product is usually in a different role configuration, and needs to be brought to the desired role configuration. Even in those cases where the product is in the operational configuration baseline, changes have to be made to obtain the desired role configuration.

Though in theory to perform the role change basically consists in bringing back the product to the operational configuration baseline, and then performing the necessary maintenance actions by removing or adding items so as to obtain the desired role configuration, in practice this might imply a duplication of work, as some of the disassembled products might later have to be installed again as they co-exist in both configurations.

A role change matrix is used for this purpose, which identifies the differences between the two role configurations, and therefore identifies which individual products should be removed or fitted onto the final product. Note that the role change matrix should be generated automatically at the moment of performing this as desired configuration, given that both the original and desired role configurations might have variants (e.g. due to the use of interchangeable equipment, and the consequent application of interchangeability and compatibility rules), and it is therefore not possible to generate all possible combinations beforehand.

6 Configuration changes

6.1 Changes to allowed configurations

The operational configuration baseline is updated by the product OEM engineering department. The allowed configuration is unique to an individual product due to its individual history.

6.1.1 Modifications to the baseline configuration

Any modification to the baseline configuration may be only performed by means of a service bulletin, which includes the authorization of the OEM Engineering to modify the product.

The critical changes to the baseline configuration are characterized by the fact that they:

1 Affect the product type certificate

13 Are mandatory (eg, due to an Airworthiness Directive)

14 Are non-reversible (it is not possible to return to a previous operational configuration baseline)

The baseline configuration must be updated with the embodied service bulletins, so as to reduce the complexity of the calculation of the allowable configurations, but this requires that a feedback is provided to the OEM about which service bulletins have been embodied into which product.

Note that any modification to the baseline configuration also implies that all operational configurations based on this baseline configuration will be affected.

6.2 Service bulletins

Service bulletins (also known as “Technical Orders”) are changes approved by the OEM Engineering that can be embodied into a Product that is in service. Service bulletins can be either mandatory or optional. The main characteristic of a service bulletin is that it represents a modification to the baseline configuration of an individual product. Service bulletins typically consist of a documentation set (explaining how to embody the change), necessary parts or material, and sometimes also the necessary tools to carry out the modification.

Mandatory service bulletins are usually generated due to safety-critical issues associated to the product, and define a timeframe for their implementation. Optional service bulletins usually are design improvements to the product that the operator may or not wish to implement.

The implementation of the change outlined in the service bulletin on a product is called embodiment of the service bulletin. This is usually performed as part as the standard maintenance activities, when the product is not due to operate. Once such embodiment has been performed, the baseline configuration will have changed, and all maintenance will have to refer to the new baseline configuration.

The embodiment of a service bulletin should be reported back to the OEM (marked as ③ in Fig 5). The reason for this is that the baseline configuration of the product has changed and, apart from issues such as delivering inadequate spares, any support from the OEM could lead to serious mistakes or even accidents if the OEM is not aware of such configuration change.

6.3 Customer modifications

Once the product has been released to the customer, it may occur that the customer performs modifications to the product, either himself or through a third party. This, obviously, modifies the configuration and the product maintenance, and might also impact the support provided by the OEM (e.g. there might be an incompatibility with other configuration items, or interference with the maintenance tasks defined by the OEM). This data set (marked as ⑤ in Fig 5) needs therefore to be reported to both the maintainer and OEM.

6.4 Maintenance changes

Many maintenance actions, such as cleaning, greasing, etc, do not have any impact on the product configuration. However, the replacement of parts can imply a configuration change. This does not means that every replacement action affects the configuration: the replacement of an O-ring obviously does not imply a configuration change. This is because though every item has been defined in the design configuration, the operational configuration usually manages only specific items, called in-service configuration controlled items. These items are defined by Design.

Lesser items (such as O-rings) are checked for compliance with the design configuration (as defined in the maintenance manuals), but their configuration is not managed any further. However, changes to the in-service configuration controlled items must be documented, as usually these items present special challenges. Typically, all in-service configuration controlled items have a serial number, so as to be able to track them individually.

The change of these in-service configuration controlled items is managed as part of the operational configuration (Ref. Para 5.3). This includes the change of part numbers, but also the change of serial numbers for a same part number, so as to obtain the traditional “as maintained” configuration for the configuration status accounting.

7 Handling of software

Traditionally, software has been considered an anomaly within the operational configuration. This is mainly due to the fact that software changes more often than hardware, and no specific rules have been established about how to address this particular aspect.

An additional disturbance factor is that documents such as [RTCA/DO-178] identify software to be “executable code, data and associated documentation”. Though this is perfectly reasonable for software design, the rules are different during the in-service, and the management of software can be greatly simplified.

The present section explains how to incorporate software into the global in-service configuration process, so as to handle it just like “another” configuration item.

7.1 Executable code

Three basic rules need to be considered:

1 Software is part of the product functionality; hence a software change also changes the product configuration.

15 In order to simplify the configuration propagation, software must be considered a configuration item of the next-higher assembly where it is loaded.

16 Software has a part number, but not a serial number.

The rules have the following consequences:

1 Each software version must have its own part number, as its functionality has changed (however slightly).

2 If software is installed in a non-final product (meaning a product -such as equipment that is later installed in another product (e.g., a bicycle, car, tank, aircraft) before it is installed in the next-higher assembly, then the part number of the non-final product should also change, as its functionality has changed. In this case, the software is a "physical” item that is part of the non-final product and will be part of its own configuration tree.

3 So-called field-loadable software (i.e., software that is loaded in a final product and not in the non-final product where it operates) must be considered a product by its own right, and be a configuration item of the final product. In this case, software must be considered as a functional/physical configuration item within the final product configuration tree that is different from the functional/physical configuration item where it might reside or execute.

Example:

If the software for airborne equipment is loaded into the equipment off-aircraft, then it should be considered a shop-replaceable item, and a change of this software should also imply a change in the equipment P/N. This is because the software is contained within the equipment and thus forms part of its inherent functionality, and such functionality cannot be altered once the equipment is fitted on the aircraft. The software forms part of the physical equipment breakdown.

If the same software for the same equipment is loaded on-aircraft (field-loadable software), then that software should be considered a line-replaceable item and thus a configuration item of the aircraft by its own right, as it will change the configuration of the next-higher assembly. In this case, the hardware P/N would **not** change due to a software load.

If the software can be loaded both on and off-aircraft, then it still should be considered an aircraft configuration item, as in service it could never be guaranteed that the hardware has a specific software loaded into it, apart from the fact that it is not feasible to re-identify the hardware with a new P/N every time a new software version is loaded on-aircraft.

7.2 Data

There is an on-going debate whether data (e.g., configuration files, mission data, databases, etc.) should or not be part of the product configuration itself.

From a pragmatic point of view, the identification of such data is necessary as part of the logistics process (S3000L) so as to be able to identify the necessary resources to generate, load/unload it and if necessary post-process it.

From the operational point of view, it is convenient to include data in the configuration, so as to be able to associate maintenance, operational and/or role change tasks to them. This is especially important if a specific mission requires loading of a special data set, or a role change implies changing a parameter file. In this latter case –especially if safety is involved- the identification of this element as a configuration item should be mandatory.

An additional benefit of including data in the configuration is that data format changes can be easily managed by assigning such data a different part number – that will easily prevent loading incompatible data formats in systems where the software may change with a certain frequency.

The difference regarding executable software is that data changes are not infrequent –data changes almost continuously. The assignment of a part number to every single data set becomes both unrealistic and economically unfeasible, apart from the fact that it does not provide any additional value.

One approach that has worked well in the past is to identify data sets (say, a role-specific configuration file) by a “dummy” part number. The same dataset used for different purposes would then receive different part numbers, as well as different data formats. Assigning interchangeability and compatibility rules to these dummy part numbers would ensure that the proper data set would be used on each occasion. The content of the data would change, but not its purpose or format.

This allows on one side to associate data to a specific variant configuration and also to ensure that the necessary tasks that need to be performed to switch to that particular variant configuration are carried out, thus preventing to forget updating a set of data which might be in some cases even safety-critical.

The only exception to this method is that of a “fixed” data set that is associated to a specific configuration and that does not require modification, so that it could be assigned a permanent part number.

Data placed under configuration —whether using dummy part numbers or not— should be then managed in a similar way as software.

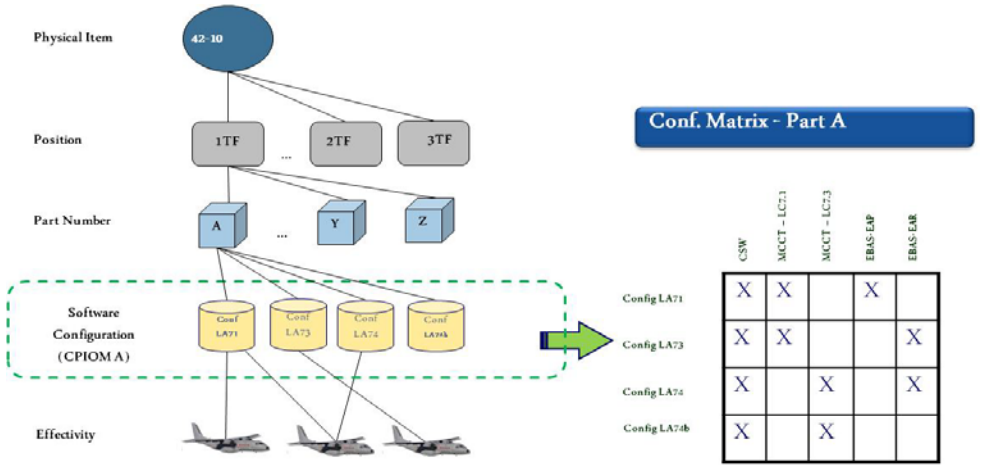
7.3 Software compatibility matrix

A software compatibility matrix was used in the past to indicate the allowable software-software and software-hardware combinations. While useful, this method becomes unmanageable when the number of software items installed on the product grows significantly.

However, with the approach indicated in Para 7.1 the software-compatibility matrix becomes unnecessary as such compatibility is automatically derived from the interchangeability and compatibility rules indicated in Para 5.1.2.

Nevertheless, for backwards compatibility purposes, such compatibility matrix may be generated from the above rules and, vice-versa, positive compatibility rules may be generated from existing software compatibility matrices.

Note that in order to simplify the overall matrix, it is convenient to group the different allowable software combinations as “software configurations”, with the compatibility matrix mapping these software configurations against specific hardware.



ICN-B6865-5000F12009-001-01

Fig 9 Example sample hardware-software compatibility matrix

8 Configuration status accounting

Note that for the purpose of configuration accounting, and in particular for the use by organizations such as CAMO (Continuous Airworthiness Management Organization), a configuration is allowed if:

- It is possible to come back to the operational configuration baseline exclusively by exchanging, adding and/or removing equipment while complying with all the exchangeability and compatibility rules.
- It is possible to achieve this configuration from the operational configuration baseline exclusively by exchanging, adding and/or removing equipment while complying with all the exchangeability and compatibility rules.

Note that the fact that a configuration is allowed does NOT necessarily imply that it is fit to perform a specific role or mission.

9 Configuration Feedback Use Cases

The Configuration feedback use cases become evident from Fig 5. The use cases basically consist in the need to provide the necessary information for the five identified configuration information flows, though in some cases the same information exchange is performed between different actors.

9.1 Use Case 1: Deliver as-delivered configuration to customer

This use case covers the transfer of the configuration of a product at the moment it is delivered to the customer. The information required for this use case includes the following:

- Allowed configuration identification
- Delivered installed configuration: Serial numbers (for all serialized items) and potentials

- Modifications
- Waivers
- Product-related supplied equipment (loose items)

9.2 Use Case 2: Deliver allowed configuration to customer

This use case covers the delivery of the allowed configuration of a product to the customer. The information required for this use case includes the following:

- Full configuration tree structure, including applicability
- Operational configuration baseline
- Alternative configurations
- Rule set to identify item position(s)
- Interchangeability rules
- Compatibility/mixability rules
- Essentiality rules

9.3 Use Case 3: Exchange operational configuration

This use case covers the exchange of the operational configuration of a product between different actors involved in the maintenance (e.g., from a customer to an MRO when the product is sent for overhaul, and from the MRO to the customer when the product is returned after the overhaul). The information required for this use case includes the following:

- Structure of the delivered product
- Config. Changes, including:
  - Item replacement by another with the same part number.
  - Item replacement by another with a different part number
  - Removal / installation of equipment without replacement
  - Embodiment of service bulletin
  - Dates for all changes

9.4 Use Case 4: Deliver Customer modification

This use case covers the delivery of customer modifications to the maintainers and the product OEM so as to ensure that future OEM modifications keep in mind these customer changes. The information required for this use case includes the following:

- Customer modification description
- Operational configuration baseline
- Alternative configurations
- Rule set to identify item position(s)
- Interchangeability rules
- Compatibility/mixability rules

9.5 Use Case 5: Deliver as-desired configuration to maintainer

This use case covers the delivery of the as-desired configuration of a product to the maintenance organization, so as to indicate the status of the product that is desired for a required task. The information required for this use case includes the following:

- Specific configuration that is requested for a specific mission
- Dates when the as-desired configuration is required, and period during which this configuration needs to be maintained.

Chapter 13

Feedback of data to support the management of in-service contracts

Table of contents

List of tables

References

Table 1 References

Chap No./Document No.	Title
MIL-HDBK-502	Department of Defense Handbook – Acquisition Logistics, May 1997, Section 5.1 and 6.
MIL-STD-881	Work Breakdown Structures (WBS) for Defense material items

Chap 7	Feedback for Life Cycle Cost analysis
Chap 18	Tailoring and contracting against S5000F

1 Introduction

The Performance Based Logistics (PBL) was instituted by the U.S. Department of Defence (DoD) to optimize system readiness and meet performance goals of individual systems. Currently it has been adopted worldwide by industries as well as by military organizations.

PBL consists of long term partner agreements between the customer (eg, government) and supplier (eg, industry) based on logistics metrics. PBL performance metrics focus on the needs of the customer to have a system that is operationally available, reliable end effective while having a minimal logistics footprint at a reasonable cost.

PBL-type contracts are usually very demanding, but there are other types of in-service contracts which might be even more demanding, such as service contracts where the contractor provides a full service of duties that were traditionally performed by the customer. This kind of service contracts can range from managing a canteen to transport cargo or even perform airborne aircraft refuelling. In these latter kinds of contracts, the measure is often not performance, but “mission success”.

The effectiveness and compliance of these complex in-service contracts can only be measured by establishing quantitative measures that provide numerical gauges and evidence by which one can evaluate and monitor in-service activities for planning and scheduling purposes, develop award fee criteria, evaluate alternative support solutions and many other reasons.

These measurements allow both the customer and the contractor to implement their most efficient practices whatever the field they operate. Maintenance, reliability and sustainment improvements accrue monetary returns for both contractor and customer.

The management of in-service contracts, however, is not restricted to the collection of metrics. Organisational aspects, planning, management of resources, control of costs and non-contractual work is also key for the success of any in-service contract and the necessary information to the in-service contract management is critical fr the contract success.

1.1 Scope

The scope of this chapter is the definition of the necessary data to be exchanged between the different involved actors in an in-service contract so as to be able to properly manage such contract on behalf of the customer or contractor.

This chapter does not define specific contractual metrics, which will vary from contract to contract; it only provides the means to be able to exchange such metrics.

2 Objectives

The main objective is to furnish the bases, in terms of data feedback, for the management of in-service contracts.

In order to achieve this objective it is necessary to describe the performance based approach, due to the fact that this topic is not described in any ASD standard. Once the in-service contract approach has been defined, it will be possible to proceed with the definition of metrics (data feedback) that allow the in-service contract application and management.

2.1 Description of performance-based approach

The “performance” in Performed Based Logistics and similar contracts is defined in terms of objectives established using criteria as reliability, mission success, availability and so on. According to a top-down approach, when the appropriate performance requirements have been

specified for the system, these requirements may then be allocated to the various logistic support elements. Through the PBL approach the provider is incentivized and empowered to meet objectives or performance requirements to improve the support effectiveness while reducing total ownership costs.

Given the requirements for the support system, the logistic algorithms will be necessary to establish the appropriate design-to requirements for various elements of logistics. In other words, the first step in using logistics algorithms is to establish a baseline or starting point from which each metric, performance measure, or figure of merit will be compared and linked to the highest level of support system requirements.

This approach, to specify Performance Based Logistics, is currently being emphasised in the defence sector. As [MIL-HDBK-502] states: “supportability factors are integrated elements of program performance specifications. However, support requirements are not to be stated as distinct logistics elements, but instead as performance requirements that relate to a system’s operational effectiveness, operational and life cycle cost reduction”.

It should be noted that all specified requirements must be tailored to the program, measurable and traceable back to the system-level requirement.

2.2 Definition of in-service contract metrics

Metrics are calculated values that measure the level of success of an activity or contractual commitment. Metrics are only valid within a specific program and program context. A metric that is excellent in one context might imply a bad result in a different context.

The metrics represent the lowest measurable data, needed to evaluate the logistic performance parameters or service level agreements. Such metrics used for the performance parameters definition must be meaningful to all users (contractually defined). Values must be presented in a way that is understandable and similarly interpreted by everyone involved.

Metrics should be controllable and linked to existing contractor and customer logistics performance reporting system(s).

Due to the fact that the collection of feedback data (metrics) represents a cost for the provider as well as for the customer, every metric must be justified by the need to measure the achievement of an objective or compliance of an agreed service level.

Metrics should be either defined and agreed during the contractual negotiations or during the guidance conference mentioned in Chap 18.

S5000F itself does not define any kind of metrics for contractual or service level compliance, as these widely vary from contract to contract as they usually depend on customer needs. It provides, however, the means to feed back such data to either the contractor or customer.

3 Management of in-service contracts

Management in businesses and organizations is the function that coordinates the efforts of people to accomplish goals and objectives using available resources efficiently and effectively.

Thus, the management of in-service contracts implies the need to provide the necessary information so as to manage the people performing the tasks associated to a contract and the necessary resources to be able to perform it in an efficient and cost-effective manner,

Traditionally, management operates through five basic functions: planning, organizing, coordinating, commanding, and controlling. These can be described as follows:

- Planning: Deciding what needs to happen in the future and generating plans for action (deciding in advance).
- Organizing: Making sure the human and nonhuman resources are put into place

- Coordinating: Creating a structure through which an organization's goals can be accomplished.
- Commanding: Determining what must be done in a situation and getting people to do it.
- Controlling: Checking progress against plans.

These functions can be grouped into two broad categories, which are preparation and execution. Preparation covers the functions and planning, organizing and coordinating and Execution covers commanding and controlling. Note also that in order to execute these functions, there is first a need for something to happen, which usually is the fulfilment of a contract. This contract sets the requirements for what needs to be done.

The information required for the management of in-service contracts needs therefore to address the following aspects:

- Contractual requirements
- Contractual framework preparation
- Contract execution

The information required for these is described in the following Paras.

3.1 Contractual requirements

The contractual requirements include all the information associated to the contract itself, and what the contractor is supposed to do. This information needs to be exchanged between multiple involved parties, so that everybody knows what he needs to do and when. Traditionally, contracts have been written on paper and could therefore not be processed or associated to other information, so that management was mainly a manual activity with little information support, as the verification of compliance with the contractual requirements was basically a manual activity.

In order to allow for the proper management of the feedback of in-service contracts, it is necessary to have the following information available:

- Contract and contract duration
- Contracting parties
- Contract terms and service level agreement (SLA)
- Relationship with other contracts
- Work items (activities to be performed), work breakdown structure (WBS)
- Location(s) of where the contract has to be executed
- Contract volume

This information can later be mapped to the preparation and execution aspects for a proper contract implementation and execution in line with the contractual requirements. It should be noted that contracts may evolve over time, so it is necessary to maintain this information accurate.

The information for this function is covered by use cases 1, 2 and 9.

3.2 Contract preparation

As stated in Para 3, the contract preparation consists of the following main functions:

- Planning
- Organizing
- Coordinating

The information required for each of these individual functions is described in the following Paras. Note that the three functions are not necessarily sequential and very often overlap.

3.2.1 Contract planning

Contract planning requires knowing what has to be provided and when, so as to ensure that all elements are in place in accordance with the program timescales and generate the proper action plans. The main information required for contract planning is:

- Contract and contract duration
- Contracting parties
- Relationship with other contracts
- Work items (activities to be performed), work breakdown structure (WBS)
- Activity planning

The information for this function is covered by use cases 1, 2, 5 and 9.

3.2.2 Contract organizing

In order to organize a contract, it is necessary to make sure that the human and material resources are in place. The main information required for contract organizing is:

- Contract and contract duration
- Contracting parties
- Relationship with other contracts
- Organizational breakdown structure (OBS)
- Cost breakdown structure (CBS)
- Location(s) of where the contract has to be executed
- Security classification

The information for this function is covered by use cases 1, 3, 4, 9 and 12.

3.2.3 Contract coordinating

The contract coordination implies creating a structure through which an organization's goals can be accomplished. The main information required for contract coordinating is:

- Contract duration
- Contract terms and service level agreement (SLA)
- Relationship with other contracts
- Work items (activities to be performed), work breakdown structure (WBS)
- Organizational breakdown structure (OBS)
- Contract planning
- Location(s) of where the contract has to be executed
- Information about infrastructure to be used for the contract.
- Security classification

The information for this function is covered by use cases 1, 2, 4, 5, 9 and 12.

3.3 Contract execution

As stated in Para 3, the contract execution consists of the following main functions:

- Commanding
- Controlling

The information required for each of these individual functions is described in the following Paras. Note that the two functions are not necessarily sequential and very often overlap. Controlling is usually carried out as the result of the commanding function, but this latter may be also triggered by detecting an anomaly during the controlling function.

3.3.1 Contract commanding

Contract commanding implies evaluating the contractual situation and taking the necessary actions to ensure that all necessary steps to ensure contract compliance are taken. The main information required for contract commanding is:

- Contracting parties
- Contract terms and service level agreement (SLA)
- Relationship with other contracts
- Work breakdown structure (WBS)
- Activity planning
- Organizational breakdown structure (OBS)
- SLA compliance
- Incurred contract costs
- Service requests
- Usage of existing infrastructure or resources from/by third parties
- Status reports
- Location(s) of where the contract is executed

The information for this function is covered by use cases 1, 2, 4, 5, 6, 7, 8, 9, 10 and 11.

3.3.2 Contract controlling

Contract controlling implies monitoring progress against the plans. This controlling considers not only the timing, but also the budget spent, compliance with SLAs, penalizations, etc. The main information required for contract controlling is:

- Contract terms and service level agreement (SLA)
- Work items (activities to be performed), work breakdown structure (WBS)
- Planning
- Activities performed
- Cost breakdown structure (CBS)
- Incurred contract costs
- Service request
- Usage of existing infrastructure or resources from/by third parties
- Security classification

The information for this aspect is covered by use cases 2, 3, 5, 6, 7, 10, 11 and 12.

4 Use cases

The following use cases have been defined in order to cover the activities defined in Para 3:

- Provide contractual information
- Provide work breakdown structure (WBS)
- Provide cost breakdown structure (CBS)
- Provide organisational breakdown structure (OBS)
- Provide/update activity planning
- Report service level agreement compliance
- Provide incurred contract costs
- Provide contract status report
- Provide information about locations and infrastructure
- Manage service request
- Request/grant/deny usage of resource
- Assign security classification

These individual use cases are described below.

4.1 Use case 1: Provide contractual information

This use case covers the exchange of contract-specific information, including contract dates, parties involved, relationship with other contracts and associated contract clauses, as well as the relationship with a project and the subject/purpose of a contract.

4.2 Use case 2: Provide work breakdown structure (WBS)

This use case covers the exchange of a work breakdown structure between two or more parties, so as to clearly define the work that has to be performed by each party. This WBS can be in accordance with MIL-STD-881 or equivalent.

4.3 Use case 3: Provide cost breakdown structure (CBS)

This use case covers the exchange of a cost breakdown structure between two or more parties, so as to clearly identify the concepts for incurring contract costs. Note that this use case is shared with the use case of the same name in Chap 7.

4.4 Use case 4: Provide organisational breakdown structure (OBS)

This use case covers the exchange of an organisational breakdown structure between two or more parties involved in a contract, so as to document the relationships between such parties.

4.5 Use case 5: Provide/update activity planning

This use case covers the provision and/or update of the planning of a set of activities that have to be carried out as part of a contract.

4.6 Use case 6: Report service level agreement compliance

This use case covers the provision of information about the compliance or non-compliance with a service level agreement and associated claim for a bonus or penalty.

4.7 Use case 7: Provide incurred contract costs

This use case covers the collection of cost data to control and manage contractual costs.

4.8 Use case 8: Provide status report

This use case covers the exchange of status data against a contract or specific activity, as might be required by a contract or internal management guidelines.

4.9 Use case 9: Provide information about contract locations and infrastructure

This use case covers the exchange of necessary information about contract locations and necessary infrastructure, so as to be able to plan their support as part of the contractual obligations.

4.10 Use case 10: Manage service request

This use case covers the request of one party to another party to perform a service and the necessary information that is necessary to proceed with that service.

4.11 Use case 11: Request/grant/deny usage of resource

This use case covers the request of one party to another party to be able to use a specific resource, or the grant/denial of the usage of such resource (eg, workshop, hangar, simulator).

4.12 Use case 12: Assign security classification

This use case covers the assignment and management of security aspects at the project level by allowing the assignment of security classifications to documents, services, infrastructure, items and other elements used on a project.

Chapter 14

Feedback of non-predefined information

Table of contents

List of tables

List of figures

References

Table 1 References

Chap No./Document No.	Title
Chap 18	Tailoring and contracting against S5000F
ASD-SSG-001	Technical Data Package (TDP) Message
ISO 10303-239 PLCS	Product Life-Cycle Support (PLCS)
MIL-STD-31000	Standard practice, Technical Data Packages

1 Introduction

S5000F specifies a standard means to feed information back from the field about maintenance and operational aspects. As such, it defines a set of data elements that can be selected for different purposes (eg, LCC, reliability studies, maintenance improvement, PBL contract management, etc). However, being realistic, no standard can cover the wide variety of information and its many aspects (binary files, photos, scanned paper documents, etc) that can be required to provide feedback or to request support from another organization.

2 Scope

This chapter provides the necessary information about how to provide feedback of information from the operational or maintenance domains that is not covered elsewhere in this specification, either because the corresponding data elements have not been defined, or because the information can simply not be mapped to data elements.

3 Non-predefined feedback information

No specification can cover all potential feedback, as there are always aspects that cannot be subject to standardization. Examples of these can be for example binary built-in-test files (peculiar to a specific product), or structured data that is currently not covered by this specification. Two broad categories of feedback information have been identified that might require to be sent as feedback, either as data by their own right or as supplements/attachments to other feedback information: structured and non-structured data.

3.1 Non-predefined structured data

Non-predefined structured data refers to data constructs covering data elements that do not form part of this specification but are related to the in-service data feedback process. Typically, this is information is peculiar to a specific project or product. This set of information might include elements such as:

- Product-specific data (eg, engine parameters)
- Process-specific information (eg, sequencing information of activities)
- Contract-specific data (eg, contract status information)
- General technical data (eg, test results)
- Data generated based on a non-S-Series specification (eg, IEEE 1636 for test data)
- Other data (eg, geo-location information)

The characteristic of non-predefined structured data is that they will have a data structure that corresponds to a data model of their own (which may or not be compatible with the S5000F data model). These non-predefined structured data may have a variety of formats, ranging from flat files to XML schemas, and may be delivered in one or multiple (related) files.

There are two different cases of non-predefined structured data:

- Individual values that can be associated to the S5000F data model
- Structured data that do not follow the S5000F data model

3.1.1 Individual values that can be associated to the S5000F data model

In order to allow for the simple extension of the S5000F data model without the need to misuse existing data model constructs and attributes, this specification allows defining project-specific

data by means of the *UoF Project-specific extensions*. This UoF allows basically the extension of any class by providing:

- The class name to be extended
- The name of the additional project-specific value
- The identifier of a specific class instance to which the data needs to be associated
- The value itself

Note that if the project-specific extensions are defined during the Guidance Conference and incorporated in the technical data exchange document as defined in Chap 18, these become automatically "defined" data and can be therefore processed like any other S5000F data. However, as these data are also clearly marked as being "project-specific", they will not interfere with the data consolidation across different projects. This ensures data consistency across multiple projects, while still allowing to include specific project needs.

Should a specific data set appear across multiple projects, then it is recommended that a change request is raised against S5000F so as to ensure its inclusion in the data model, as highlighted in Chap 1.

3.1.2 Structured data that do not follow the S5000F data model

By their own definition, these data cannot be processed by the S5000F data model. Thus, if the exchange of such data is required, it is recommended to exchange such data in file format and process these files in the same way as indicated for non-predefined unstructured data in Para 3.2.

These data may (or not) be associated to data defined elsewhere in this specification. If such association with S5000F data exists, this association should be embedded in the non-predefined structured data itself (eg, engine parameters should include a field that identifies the engine to which they correspond, using the corresponding S5000F identifier for that engine), or externally to the data itself, in the same way as for non-predefined unstructured data.

3.2 Non-predefined unstructured data

Non-predefined unstructured data refers to information related to operational and maintenance data feedback that because of its own nature cannot be structured as a set of data elements. This set of information might include elements such as:

- Multimedia files (eg, photograph of cracks, video of malfunction)
- Documents (eg, scanned handwritten paper, PDF reports, word processor documents)
- Drawings (eg, graphics, CAD files)
- Binary data (eg, BIT and diagnostic information, SHM files)
- Other information (eg, application log files, spectrometer data)

The characteristic of non-predefined unstructured data is that they do not have a data structure of their own, that their format and size cannot be determined in advance and that they may come from a great variety of data sources, some of which may not have even been designed on publication of this specification. This kind of data, due to its great variety, must be in principle considered a "black box" whose content is in principle unknown by this specification and that tools implementing this specification will unlikely be able to understand.

These data may (or not) be associated to data defined elsewhere in this specification. If such association with S5000F data exists, this association cannot be included in the unstructured data itself because of its unknown nature. Such association must be therefore performed outside such data, "tagging" such data externally in such a way that the internal tools (or people) of the receiving organization can reconstruct such association. Thus, while the data itself would not adhere to the S5000F specification, it could be however processed in a similar way as an attached file to an e-mail can be processed by an e-mail program, independently of whether the e-mail program knows what it is or not.

4 Provision of non-predefined feedback information

4.1 Problem statement

The delivery of non-predefined feedback information encounters several issues that must be tackled so as to ensure that this information integrates seamlessly with the rest of the S5000F specification, but also to ensure that this information can be properly processed.

It is beyond the scope of S5000F to cover all potential non-predefined information that might be required to be fed back during operation and maintenance, as the list is potentially infinite.

Given that the non-predefined feedback information is by its own nature unknown to implementations of this specification, it is necessary to create a “wrapper” around this information that is compatible with S5000F. It is irrelevant whether this information contains one or multiple files, as well as the nature of such files, provided the wrapper can be properly understood by S5000F data-processing tools. And given that the S5000F information should be also be able to be exchanged by means of ISO 10303-239 PLCS (AP239), this means that the wrapper must be also interoperable with PLCS.

In addition, as the contained (“wrapped”) information is in principle a black box, the wrapper must contain information about who sent the information, what it is, for whom it is intended, routing instructions (if necessary) and –given that the information that is sent within the wrapper does not adhere to the standard data exchange rules– security rules that prevent an inadequate use (eg, by means of encryption).

For this reason, S5000F recommends the usage of the ASD-SSG TDP Message specification to transfer such non-predefined information in such a way that it is compatible with the rest of S5000F and can be also mapped back to such information. Note that this method also allows mapping non-predefined information also to data of the other S-Series specifications.

4.2 Technical Data Package (TDP)

According to the classic definition, a TDP is a technical description of an item adequate to exchange information during development, manufacturing development, production, engineering, and support throughout an item's lifecycle. Such technical description defines the required design configuration and procedures required to ensure adequacy of item performance.

A TDP is comprised of a variety of data that will define the item. The categories of data that may be included in a TDP are, but not limited to:

- Product Definition Data
- Engineering Drawings
- Associated Lists
- Specifications
- Standards
- Performance Requirements
- Quality Assurance Provisions
- Reliability Data
- Packaging Details
- Modeling Data
- Other information

The basic TDP is therefore a set of combined product data that is submitted in one single package. The TDP concept has been extensively used in Engineering. A specification defining the TDP that is commonly used is [MIL-STD-31000].

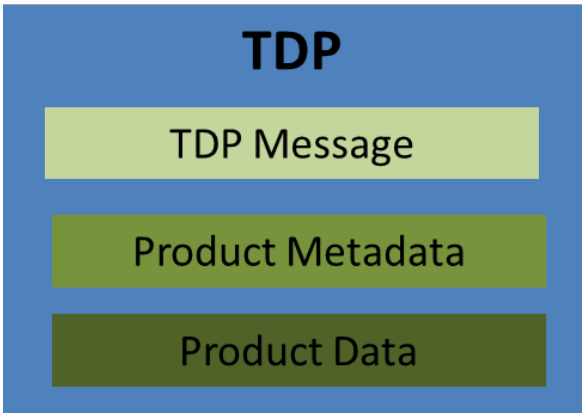
4.3 TDP message

ASD is currently promoting for a similar purpose the Technical Data Package (TDP) Message standard as defined by the ASD SSG. Though in principle the TDP Message was originally

designed for the transport of Product Data Management (PDM) data, it is similarly well suited for the transport of non-predefined support information. The TDP Message purpose is to collect information for secured transportation of Technical Data Package files between different organizations and their applications, and is therefore well suited for non-predefined data feedback.

A Technical Data Package can be regarded as a "container/carrier file", which collects all relevant data for file transmission. The Technical Data Package consists of:

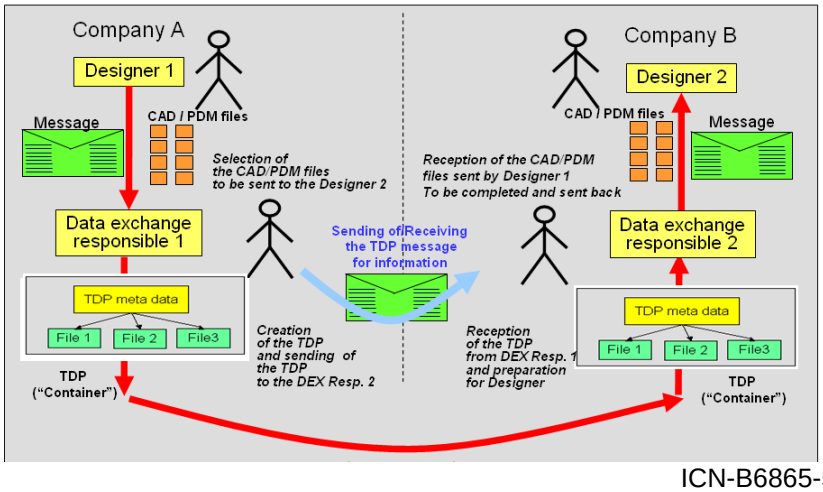
- A data dispatch note (TDP Message)
- Product metadata
- Product data files (1 to n digital files to be securely transported to the corresponding destination systems). These files will be encrypted in a compressed file.



ICN-B6865-5000F14001-001-01

Fig 1 Structure of the Technical Data Package with TDP Message

In essence, the TDP message is part of a package whose header includes a message that allows a hub system to identify the destination to which the corresponding file should be sent. The content of the TDP is to be securely transported, and the complementary metadata file describes all the files of the TDP, sender and receiver plus complementary security related information. This is described in Fig 2.



ICN-B6865-5000F14001-002-01

Fig 2 Overview of the Technical Data Package Message

Therefore, the applications involved are the customer, which acts as TDP producer application; the destination systems, which act as TDP consumer applications, and the Integration Platform, which act as a hub system providing secured transportation capability for the content of the TDP, and associated traceability.

4.3.1 TDP Message data

The data within the TDP Message would then include amongst others:

- Sender
- Receiver
- List of non-predefined data files
- Nature of those files
- Data routing
- Acknowledgement of receipt
- Validation of transportation and its content
- Encryption information

4.3.2 Product metadata

The product metadata within the TDP would therefore contain:

- Link to S-series information (eg, data elements that are used as keys for association)

4.3.3 Product data

The product data would be the files corresponding to the information listed in Para 3.1.2 and Para 3.2.

Note that the TDP message does not make any kind of assumption about the actual content of the product files that are contained in the TDP, nor the standard that it adheres to.

5 S5000F Chapters requiring non-predefined information

Table 2 lists the main S5000F chapters that might require the transfer of non-predefined information. This list is not exclusive and is provided for information purposes only.

Table 2 Example of chapters in S5000F that might require non-predefined information

Chapter	Title	Examples of non-predefined information
4	Feedback for maintenance analysis	BIT data, SHM files, drawings
5	Feedback of data for safety analysis	Event video, event location maps, CAD files, drawings, scanned reports, audio files
8	Feedback of data to support the settlement of warranty issues	Damage photographs
9	Feedback for the purpose of product health and usage monitoring	Binary health monitoring system files
13	Feedback of data to support the management of service contracts	Contracts, reports, certificates, scanned documents
Other uses	Systems Engineering data feedback	SHM files, test data, BIT data

6 Use Cases

Two use cases have been defined for the exchange of non-predefined data:

- Exchange of project-specific values
- Exchange of non-predefined information

6.1 Use Case 1: Provide project-specific values

This use case covers the exchange of values to additional fields that have been added by a specific project to one of the S5000F data classes. This information corresponds to the one listed in Para 3.1.1.

6.2 Use Case 2: Provide non-predefined information

This use case covers the exchange of data that is not included in S5000F and cannot be added to existing classes as project-specific values or by its own nature cannot be included in a data model. This information corresponds to the one listed in Para 3.1.2 and Para 3.2.

Chapter 15

Data Model

Table of content

Document

Chapter 15.1

General

Table of contents

List of tables

References

Table 1 References

Chap No./Document No.	Title
ISO 10303-239 (AP239)	Product Life Cycle Support (PLCS)
S2000M	International specification for material management – Integrated data processing for military equipment
S3000L	International procedure specification for Logistic Support Analysis (LSA)
SX000i	International guide for the use of the S-Series Integrated Logistics Support (ILS) specifications
SX002D	Common Data Model for the S-Series ILS specifications
SX004G	Unified Modeling Language (UML) model readers' guidance
Chap 16	Data exchange
Chap 17	Data element list
http://www.uml.org	Unified Modeling Language (UML)

1 General

1.1 Introduction

This chapter defines a coherent data model for the data that can be exchanged for the operational and maintenance data feedback and related business processes. These business processes can be either processes related to the feedback itself, in-service processes that

generate the operational and maintenance information to be fed back, or processes used to exploit the data that is provided as part of this specification.

This data model can be also used to create a coherent in-service data repository.

The data model is described using the UML (Unified Modeling Language) version 2 class model (http://www.uml.org). It is beyond the scope of this document to provide a description of UML. Please refer to [SX004G] for guidance on how to read the S5000F UML data model.

Each attribute in the UML class model is defined in Chap 17, Data element list.

The data model itself is based on the Common Data Model (CDM) defined in [SX002D]. It will be mapped to ISO 10303-239 Product Life Cycle Support (PLCS), in order to simplify the use of PLCS for the actual data exchanges (Refer to Chap 16).

The data model defined in this chapter has been defined on the basis of Use Cases. These Use Cases define the main uses of data in the different chapters of this specification. This allows the selection of a subset of the data required by this specification for specific purposes, using both the chapters (domains of information) and use cases (usage of the data for specific activities). The mapping of the individual Use Cases to the different model sections is provided in Chap 15.5.

1.2 Objective

The objective of this chapter is to define a coherent data model for the data that can be exchanged as part of the operational and maintenance data feedback by its related business processes.

1.3 Scope

The scope of the data model includes all data related to the operational and maintenance data feedback outlined in this specification, as well as necessary related master data that are required to place this operational and maintenance information into context.

1.4 Out of scope

The data model does not cover all data required to perform all in-service activities; it simply covers the information that is likely to be exchanged between different in-service actors. Thus, any implementation of the data model into a software package that aims to cover all or at least a sub-set of in-service activities will require that the data model is complemented with additional information, and implement an application model to support these activities.

1.5 Interoperability

This data model is fully compatible with the Common Data Model (CDM) that has been defined in [SX002D], so as to ensure the interoperability of S5000F with the other S-Series specifications. It has also considered for its development the existing S3000L data model as defined in [S3000L]. Issue 1.0 of S5000F should be therefore be fully interoperable with S2000M Issue 6.0, S3000L Issue 1.1 and the SX002D Issue 1.1.

For details on how the interoperability between the specifications will be maintained, please refer to [SX000i].

Chapter 15.2

Data Model overview

Table of contents

List of tables

List of figures

References

Table 1 References

Chap No./Document No.	Title
ISO 10303-239 (AP239)	Product Life Cycle Support (PLCS)
S3000L	International procedure specification for Logistic Support Analysis (LSA)
SX000i	International guide for the use of the S-Series Integrated Logistics Support (ILS) specifications
SX001G	Glossary for the S-Series ILS specifications
SX002D	Common data model for the S-Series ILS specifications
SX004G	Unified Modeling Language (UML) model readers' guidance
Chap 15.5	Mapping of the use cases to the data model

1 Model overview

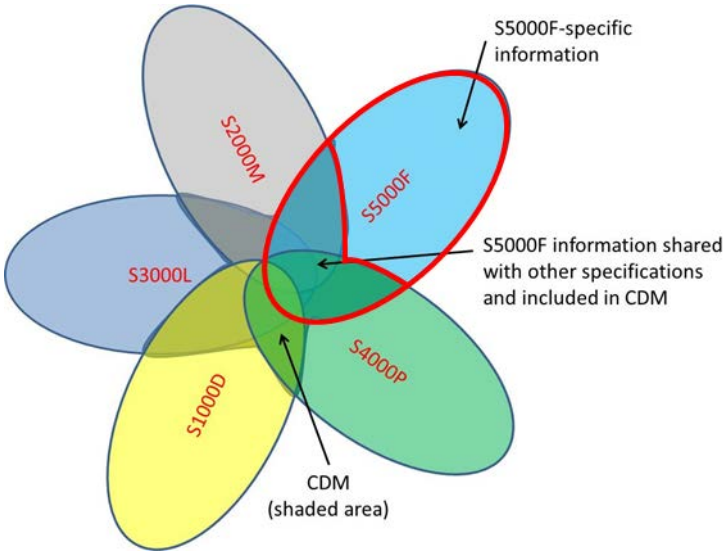
The S5000F data model has been defined using the Unified Modeling Language (UML). It consists of two major segments:

- A segment that is common to other ILS S-Series specifications, also called the Common Data Model (CDM).
- A segment that is specific to the S5000F.

The CDM is a model that does not belong to any specific ILS S-Series specification, because it covers all elements that are used by two or more specifications. Individual specifications do not necessarily use the full CDM, but only a part of it. However, the CDM is the core of the ILS S-Series specifications, as it provides the means for interoperability between all the specifications.

As defined in [SX000i], the CDM is developed and maintained by the Data Modeling and Exchange Working Group (DMEWG) and is published as SX002D. The dictionary of the CDM can be found in [SX001G]. All specification data modelers are members of the DMEWG, so that all the DMEWG is coordinated across all ILS S-Series specifications.

S5000F also uses some S3000L classes that have not yet been included within the CDM, so as to ensure interoperability with the rest of the ILS elements. These classes have been identified and reported to the DMEWG, so as to include them in future issues of the CDM.



ICN-I9005-S500015001-001-01

Fig 1 Overview of CDM scope

The Change Process for the CDM and for the S5000F data model follow the rules established in SX000i, ILS Guide, Chap 4, which is common to all specifications, so as to ensure that interoperability across the specifications is maintained.

The S5000F data model is organized into a set of Units of Functionality (UoF), which splits the overall data model into a set of smaller data models. The purpose of this is to present small and coherent portions of the data model, and to gradually give the reader an understanding of the complete data model without overwhelming him with all the associated complexity.

There are two types of UoFs:

- Generic UoFs that depict a specific functionality group
- UoFs that have been created specifically to cover a particular chapter use case

The reason for this dual approach is the need to be able to contract against S5000F use cases. It was found that in some cases using the generic functionality groups would require providing far more information than would be required for a specific use case. Unfortunately, this also means that in some cases there is an overlap between two UoFs. The advantage to be able to contract to a specific list of UoFs was considered to justify this minor inconvenience. For the mapping of the use cases against the individual UoFs, please refer to Chap 15.5.

Chapter 15.3

Common Data Model (CDM) units of functionality

Table of contents

List of tables

References

Table 1 References

Chap No./Document No.	Title
SX001G	Glossary for the S-Series specifications
SX002D	Common Data Model for the S-Series ILS specifications
SX004G	Unified Modeling Language (UML) model readers' guidance
Chap 15.4	S5000F-specific units of functionality

1 Introduction

This section describes the UoFs of the Common Data Model (CDM) for the S-Series suite of ILS Specifications used in S5000F, as well as the primitives defined in the CDM and reused in this specification. Note that all CDM UoFs start with "CDM_".

In order not to duplicate information and prevent misalignment of the descriptions, please refer to [SX001G] and [SX002D] for the detailed description of the used CDM elements.

The basis for S5000F Issue 1.0 has been Issue 1.1 of the CDM, considering also the latest draft that is available for Issue 2.0. Refer to Para 5 for the deviations to the CDM.

2 CDM S-Series Primitives

The common data model (CDM) primitives used in the S5000F specification are as follows:

- ClassificationType
- DateTimeType

- DateType
- DescriptorType
- IdentifierType

3 CDM S-Series Compound Attributes

The common data model (CDM) compound attributes used in the S5000F specification are as follows:

- DatedClassification

4 CDM Units of functionality

The S5000F currently uses the following CDM UoFs (in alphabetic order) unchanged:

- CDM UoF Applicability Statement
- CDM UoF Breakdown Structure
- CDM UoF Change Information
- CDM UoF Hardware Element
- CDM UoF Part Definition
- CDM UoF Product Design Configuration
- CDM UoF Remark
- CDM UoF Zone Element

In order to prevent duplication, these CDMs are not described in this document; refer to [SX001G] and [SX002D]. The CDM classes and data elements used by the different use cases have been however been included here for completeness.

CDM UoFs that have been extended or reduced in scope are described in Chap 15.4. None of the relationships defined in the CDM have been changed, so as to maintain the full interoperability with other specifications.

5 Modifications to the CDM

None of the UoFs of the CDM have been modified and S5000F is fully compatible with them.

However, due to the need that certain ProperyTypes need a more precise recording, the valueRecordingDate attribute of PropertyType in [SX002D] has been changed to valueRecordingDateTime. A change request has been raised to SX002D, which has approved this and will include it in Issue 2.0 of the CDM.

The primitives affected by this change in the attribute precision are:

- NumericalPropertyType
- PropertyType
- SingleValuePropertyType
- TextPropertyType
- ValueRangePropertyType

S5000F is fully compliant with CDM Issue 1.1, with the exception of the attribute precision above.

Any references in the S5000F model to these types refer to the modified version. This change should not affect the interoperability with the S-Series specifications, as S5000F data could be used “as is” simply by dropping the time data and retaining the date. Information forwarded to S5000F should by default include a time “00:00:00”. Any specification compliant with CDM Issue 2.0 will not be affected by this deviation.

The modified diagram for the primitives can be found in Chap 15.4.

Chapter 15.4

S5000F-specific units of functionality

Table of contents

List of tables

List of figures

References

Table 1 References

Chap No./Document No.	Title
SX002D	Common data model for the S-Series ILS specifications
SX004G	Unified Modeling Language (UML) model readers' guidance
Chap 15.3	Common Data Model (CDM) units of functionality

1 Introduction

This section describes the Units of Functionality (UoFs) that are specific to S5000F. The UoFs that are shared with other specifications are listed in Chap 15.3.

The basis for S5000F Issue 1.0 has been Issue 1.1 of the CDM. With the exception indicated in Chap 15.3, the current data model is fully compatible with [SX002D] Issue 1.1.

The conventions used for this data model are described in [SX004G].

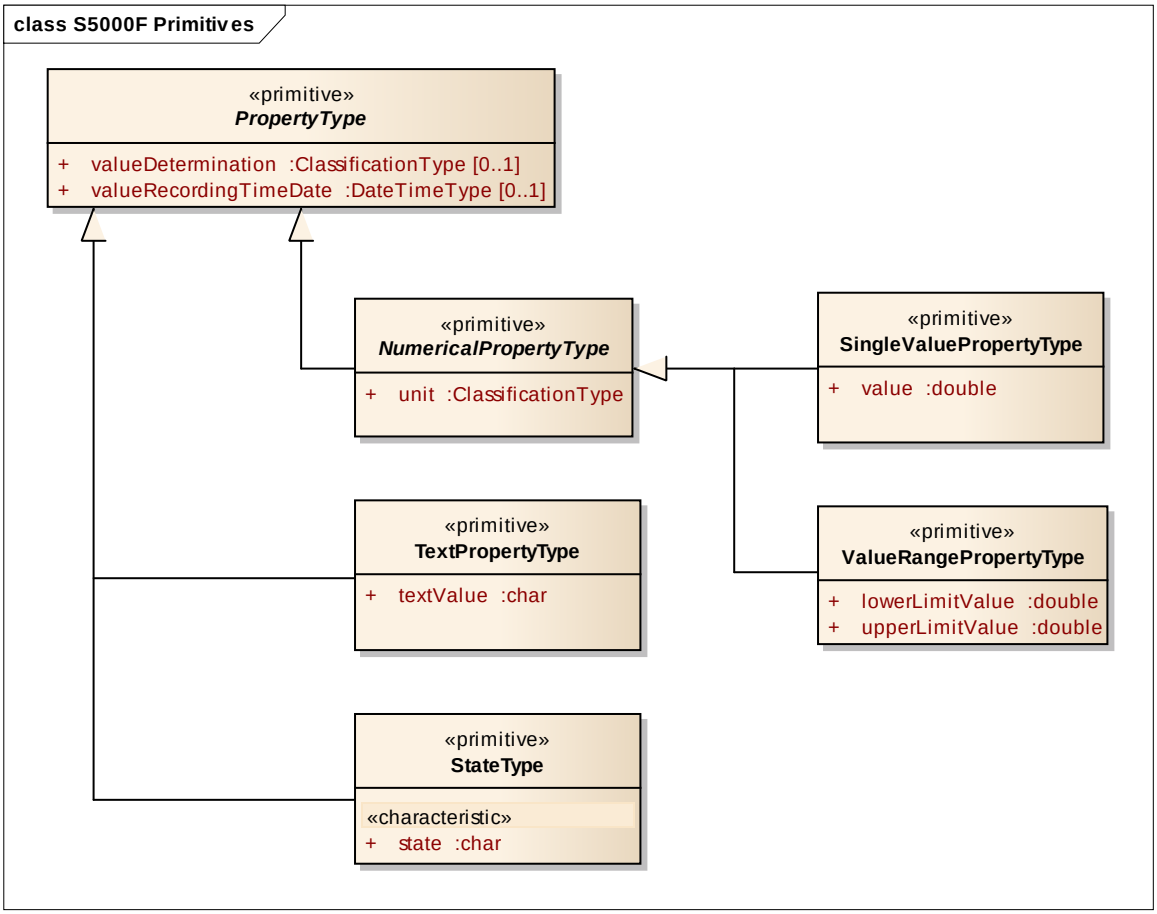
The UoF are listed in alphabetic order, though the primitives and compound attributes used throughout the model are described first, so that the reader has a full understanding of the attributes used for the different classes. Specializations of classes defined in SX002D are defined after the compound attributes in order not to confuse the reader who is already familiar with SX002D and so as to provide visibility of the extensions added by S5000F to those base classes.

2 S5000F UoF Primitives

2.1 Overall description

S5000F Primitives UoF provides the capability to define the primitives used by the S5000F specification.

2.2 Graphical representation



ICN-B6865-S5000F15044-002-00

Fig 1 S5000F Primitives – class model

2.3 S5000F Primitives - New class and interface definitions

2.3.1 NumericalPropertyType

The NumericalPropertyType is a <<primitive>> of PropertyType which is used to represent a physical quantity by its numerical value(s) together with the unit in which the value(s) is given.

NumericalPropertyType attributes:

- unit
- valueDetermination (inherited from PropertyType)
- valueRecordingTimeDate (inherited from PropertyType)

NumericalPropertyType implements the following <<interface>>:

- AttributeTypeSelect (inherited from PropertyType)

2.3.2 PropertyType

The PropertyType <<primitive>> is used for representing a measurable characteristic.

PropertyType attributes:

- valueDetermination
- valueRecordingTimeDate

PropertyType implements the following <<interface>>:

- AttributeTypeSelect

2.3.3 SingleValuePropertyType

The SingleValuePropertyType is a <<primitive>> of NumericalPropertyType that specifies a single value and its unit.

SingleValuePropertyType attributes:

- unit (inherited from NumericalPropertyType)
- value
- valueDetermination (inherited from PropertyType)
- valueRecordingTimeDate (inherited from PropertyType)

SingleValuePropertyType implements the following <<interface>>:

- AttributeTypeSelect (inherited from PropertyType)

2.3.4 StateType

StateType is a <<primitive>> class that is used to represent a state.

StateType attributes:

- state
- valueDetermination (inherited from PropertyType)
- valueRecordingTimeDate (inherited from PropertyType)

StateType implements the following <<interface>>:

- AttributeTypeSelect (inherited from PropertyType)

2.3.5 TextPropertyType

The TextPropertyType is a <<primitive>> of PropertyType which is used to represent a physical quantity as string.

TextPropertyType attributes:

- textValue
- valueDetermination (inherited from PropertyType)
- valueRecordingTimeDate (inherited from PropertyType)

TextPropertyType implements the following <<interface>>:

- AttributeTypeSelect (inherited from PropertyType)

2.3.6 ValueRangePropertyType

The ValueRangePropertyType is a <<primitive>> of NumericalPropertyType that specifies a pair of numbers representing the range in which the value shall lie.

ValueRangePropertyType attributes:

- lowerLimitValue
- unit (inherited from NumericalPropertyType)
- upperLimitValue
- valueDetermination (inherited from PropertyType)

– valueRecordingTimeDate (inherited from PropertyType)

ValueRangePropertyType implements the following <<interface>>:

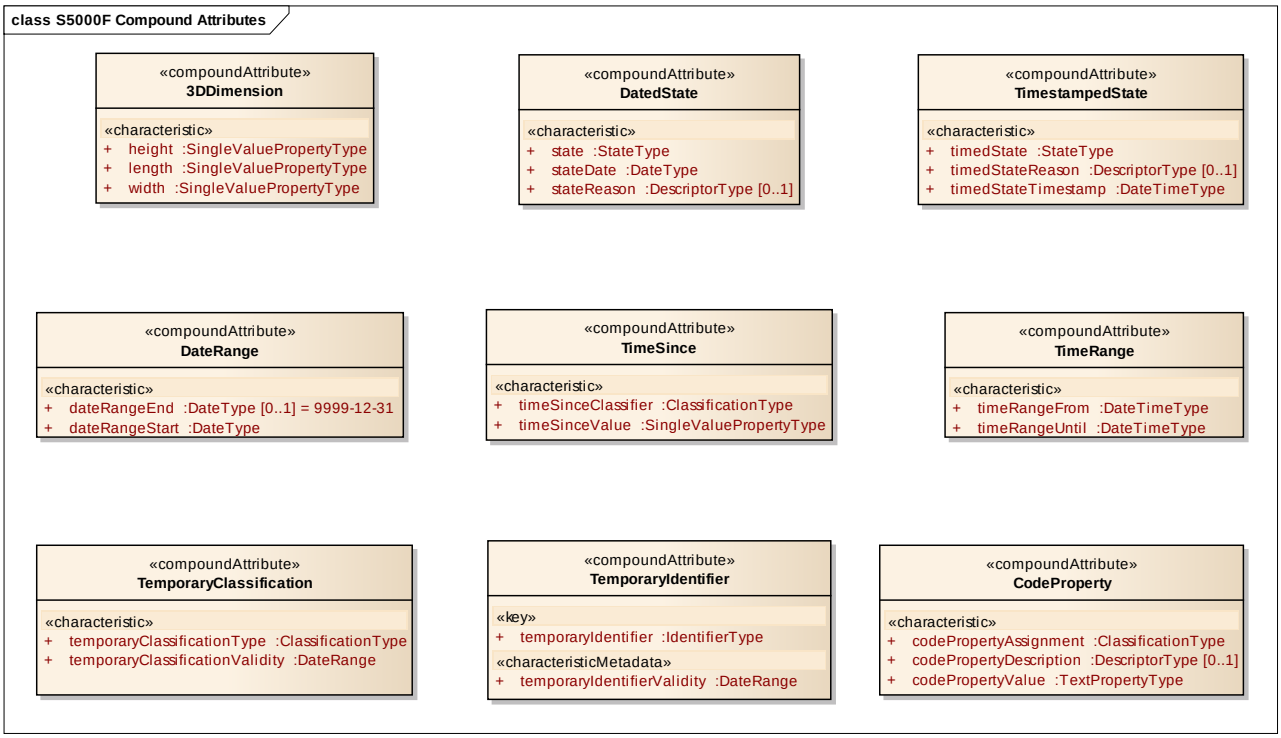
– AttributeTypeSelect (inherited from PropertyType)

3 S5000F UoF Compound Attributes

3.1 Overall description

S5000F Compound Attributes UoF provides the capability to define the compound attributes that are used throughout the S5000F specification.

3.2 Graphical representation



ICN-B6865-S5000F15043-002-00

Fig 2 S5000F Compound attributes – class model

3.3 S5000F Compound Attributes - New class and interface definitions

3.3.1 3DDimension

3DDimension is a compoundAttribute that defines three dimensions (length, width, height) of an item.

3DDimension attributes:

– height
– length
– width

3DDimension implements the following <<interface>>:

– AttributeTypeSelect

3.3.2 CodeProperty

CodeProperty is a compoundAttribute representing an alphanumeric code with the classification of the assigning specification.

Example:
- '.es' (IANA internet toplevel domain code),
- '+34' (ITUT E.164), 'SP' (FIPS104)

CodeProperty attributes:

- codePropertyAssignment
- codePropertyDescription
- codePropertyValue

CodeProperty implements the following <<interface>>:

- AttributeTypeSelect

3.3.3 DatedState

DatedState is a compoundAttribute used to represent the state of an item at a specific data and the date at which this state was entered.

DatedState attributes:

- state
- stateDate
- stateReason

DatedState implements the following <<interface>>:

- AttributeTypeSelect

3.3.4 DateRange

The DateRange is a compoundAttribute that defines a range of dates starting from a start date and ending with an end date.

DateRange attributes:

- dateRangeEnd
- dateRangeStart

DateRange implements the following <<interface>>:

- AttributeTypeSelect

3.3.5 TemporaryClassification

TemporaryClassification is a compoundAttribute which provides a classification together with the dates during which the classification is or was valid.

TemporaryClassification attributes:

- temporaryClassificationType
- temporaryClassificationValidity

TemporaryClassification implements the following <<interface>>:

- AttributeTypeSelect

3.3.6 TemporaryIdentifier

TemporaryIdentifier is a unique string that is used to uniquely identify an item and is only valid for a certain period of time and contains the dates during which the identifier is or was valid.

TemporaryIdentifier attributes:

- temporaryIdentifier
- temporaryIdentifierValidity

TemporaryIdentifier implements the following <<interface>>:

- AttributeTypeSelect

3.3.7 TimeRange

TimeRange is a compoundAttribute that represents a period of time since an initial date and time until a final date and time.

TimeRange attributes:

- timeRangeFrom
- timeRangeUntil

TimeRange implements the following <<interface>>:

- AttributeTypeSelect

3.3.8 TimeSince

TimeSince is a compoundAttribute that represents an elapsed period, and includes the type of period.

Example:
- Time since overhaul, time since repair,etc.

TimeSince attributes:

- timeSinceClassifier
- timeSinceValue

TimeSince implements the following <<interface>>:

- AttributeTypeSelect

3.3.9 TimestampedState

TimeStampedState is a compoundAttribute that represents a specific state of an item and the DateTime at which the item entered that state.

TimestampedState attributes:

- timedState
- timedStateReason
- timedStateTimestamp

TimestampedState implements the following <<interface>>:

- AttributeTypeSelect

3.4 S5000F Compound Attributes - Referenced classes and interfaces

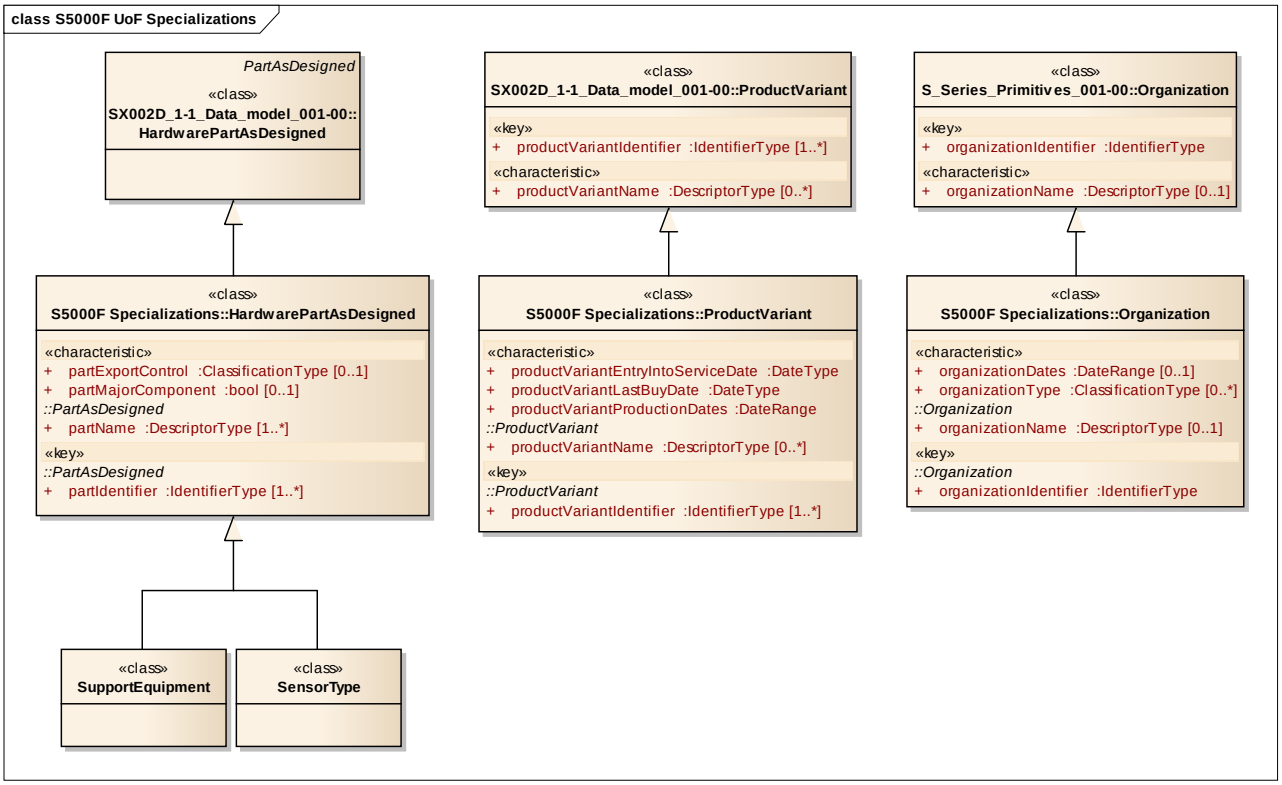
No classes or references have been identified.

4 S5000F UoFSpecializations

4.1 Overall description

S5000F specializations UoF provides the specializations of classes from other ASD specifications (mainly SX002D) for the purpose of S5000F. This UoF is shown before other UoFs in order to prevent confusion with UoFs from other specifications.

4.2 Graphical representation



ICN-B6865-S5000F15045-002-00

Fig 3 S5000F UoF Specializations – class model

4.3 S5000F UoF Specializations - New class and interface definitions

4.3.1 HardwarePartAsDesigned

HardwarePartAsDesigned is a PartAsDesigned that is to be realized as physical items (hardware) including noncountable material.

Example of noncountable materials:

- oil
- sealant
- paint

HardwarePartAsDesigned attributes:

- partExportControl
- partIdentifier (inherited from PartAsDesigned)
- partMajorComponent
- partName (inherited from PartAsDesigned)

HardwarePartAsDesigned implements the following <<interface>>:

- AllowedProductConfigurationItem

- AllowedProductOperationalConfigurationItem
- ApplicabilityAssignmentItem
- ChangeControlledItem
- CommentItem
- ContractItem
- CostEntryRelatedTo
- DetectionMean
- DetectionMean (inherited from PartAsDesigned)
- Detector (inherited from PartAsDesigned)
- DocumentAssignmentItem
- ResourceItem
- SecurityClassificationItem (inherited from PartAsDesigned)
- ServiceItem
- SupplyItem
- TrackablePart

HardwarePartAsDesigned associations:

- Each HardwarePartAsDesigned can have zero or one HardwarePartAsDesignedCommerceData <<attributeGroup>>.
- (child) The PartAsDesigned instance that is related to a PartAsDesignedPartsList. (inherited from PartAsDesigned)
- (related) The HardwarePartAsDesigned instance that must be stocked in the Pool.
- (related) The HardwarePartAsDesigned that is related to a SerializedHardwarepart. (inherited from HardwarePartAsDesigned)
- A HardwarePartAsDesigned can have zero, one or many individual NonSerializedHardwareParts associated to it. (inherited from
- HardwarePartAsDesigned)

4.3.2 ProductVariant

ProductVariant is a member of a Product family that is configured for a specific purpose and is offered to customers.

Example:
- Boeing 787-800 versus 787-900
- Ford Fusion S versus SE versus SEL

Note:
A product variant is often known as a model.

ProductVariant attributes:

- productVariantEntryIntoServiceDate
- productVariantIdentifier (inherited from ProductVariant)
- productVariantLastBuyDate
- productVariantName (inherited from ProductVariant)
- productVariantProductionDates

ProductVariant implements the following <<interface>>:

- ApplicabilityAssertItem (inherited from ProductVariant)
- ApplicabilityAssignmentItem
- BreakdownItem (inherited from ProductVariant)
- ChangeControlledItem
- CommentItem
- ContractItem
- CostEntryRelatedTo

- DocumentAssignmentItem
- MessageContextItemSelect
- MessageContextItemSelect (inherited from ProductVariant)
- ProductUsagePhaseItem
- ResourceItem
- SecurityClassificationItem
- SecurityClassificationItem (inherited from ProductVariant)
- ServiceItem
- SubjectOfPoliciesAndRegulations

ProductVariant associations:

- A ProductVariant can have zero, one or many ProductVariantCapabilities.
- (isAuthorizedToWorkOn) The ProductVariant on which a MaintenancePerson is allowed tro work on.
- The ProductVariant that an OperatorOrganization is approved to operate.
- The ProductVariant that can operate at the OperatingBase.
- The ProductVariant that a Person is authorized to operate.
- A ProductVariant has a single association to the Organization instance that defines its master maintenance program.
- A ProductVariant can have one or many MaintenancePrograms.
- (relating) The ProductVariant that relates to a MaintenanceFacilitySlot.
- (relating) The ProductVariant that is supported by the Pool.
- (related) The ProductVariant that can be maintained by a MaintenanceOrganization.
- (related) The ProductVariant to which a SerializedProductVariant is associated (through the SerializedProductDesignAssociation
- A ProductVariant can have zero, one or many AllowedProductConfigurations.

4.3.3 SoftwarePartAsReleased

SoftwarePartAsReleased is a SoftwareElement representing an executable code that is realized as a software part.

SoftwarePartAsReleased attributes:

- partIdentifier
- softwarePartAsReleasedChecksum
- softwarePartAsReleasedDateTime
- softwarePartAsReleasedSize
- softwareReleaseIdentifier

SoftwarePartAsReleased implements the following <<interface>>:

- AllowedProductConfigurationItem
- AllowedProductOperationalConfigurationItem
- ApplicabilityAssignmentItem
- ChangeControlledItem
- CommentItem
- CostEntryRelatedTo
- DetectionMean
- DocumentAssignmentItem
- TrackablePart

SoftwarePartAsReleased associations:

- Each SoftwarePartAsReleased belongs to a single SoftwarePartAsDesigned instance.

4.4 S5000F UoF Specializations - Referenced classes and interfaces

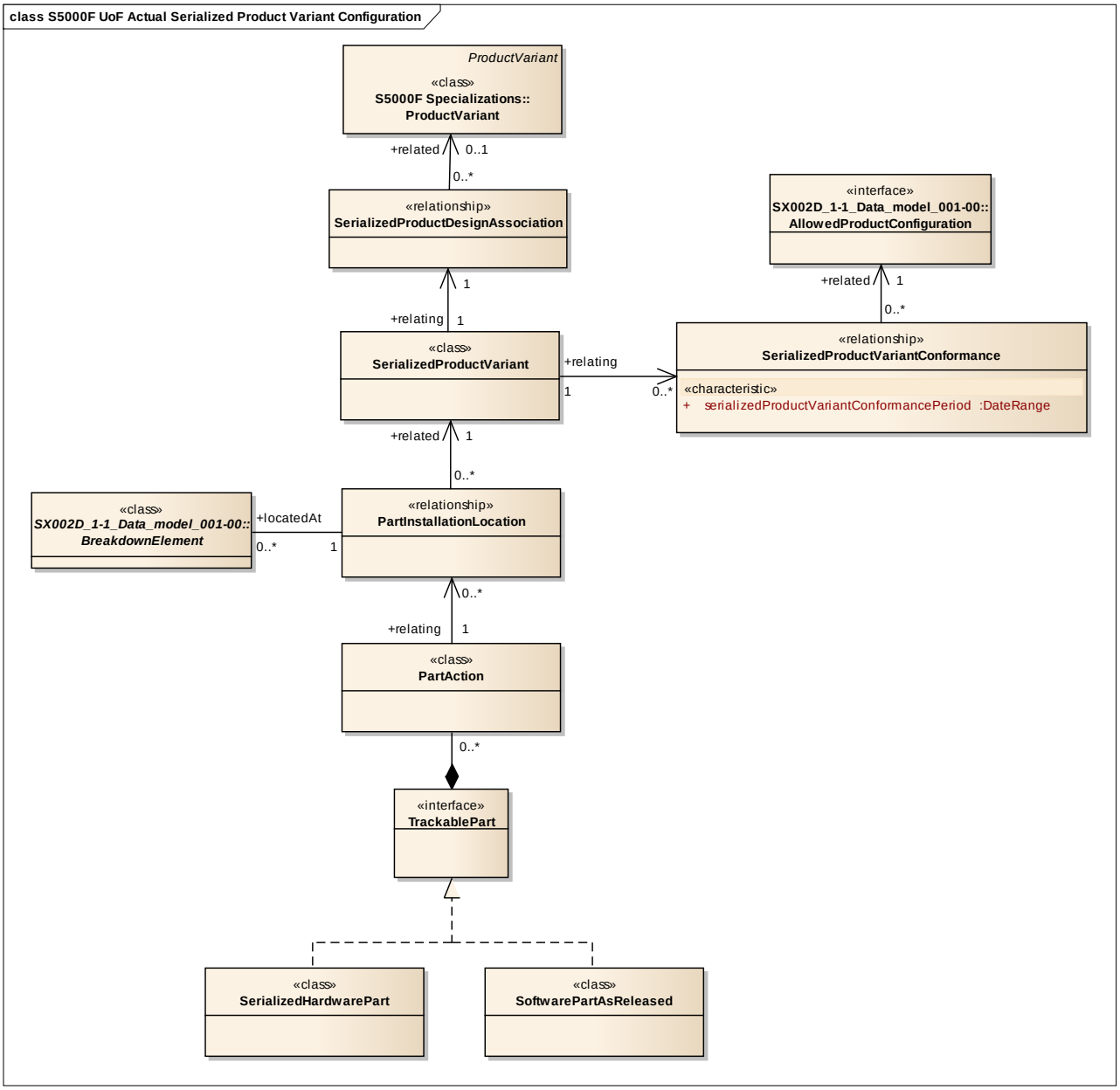
- HardwarePartAsDesigned
- Organization
- Organization
- ProductVariant
- SensorType
- SupportEquipment

5 S5000F UoFActual Serialized Product Variant Configuration

5.1 Overall description

Actual Serialized Product Variant Configuration UoF provides the necessary information about the actual configuration of a SerializedProductVariant at a given moment in time.

5.2 Graphical representation



ICN-B6865-S5000F15049-002-00

Fig 4 S5000F UoF Actual Serialized Product Variant Configuration – class model

5.3 S5000F UoF Actual Serialized Product Variant Configuration - New class and interface definitions

5.3.1 PartInstallationLocation

PartInstallationLocation is the <<relationship>> that indicates where a specific HardwarePart is installed for a specific SerializedProductVariant.

PartInstallationLocation associations:

- The SerializedProductVariant to which a PartAction is related through the PartInstallationLocation <<relationship>>.
- A PartInstallationLocation is always associated to exactly one BreadkownElement.

- Each PartAction can relate to zero, one or many SerializedProductVariants (via the PartInstallationLocation <<relationship>>).

5.4 S5000F UoF Actual Serialized Product Variant Configuration - Referenced classes and interfaces

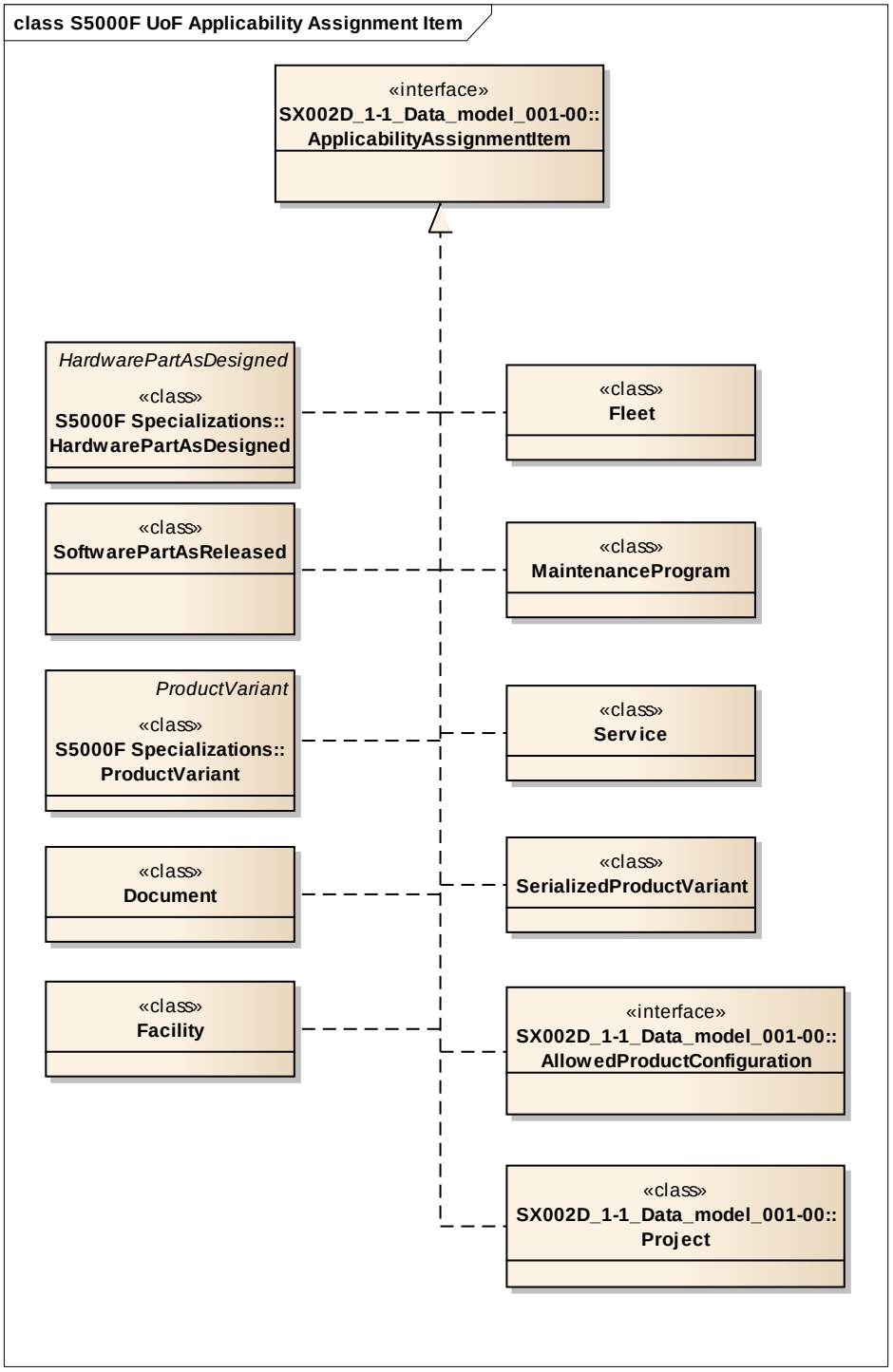
- AllowedProductConfiguration
- BreakdownElement
- PartAction
- ProductVariant
- SerializedHardwarePart
- SerializedProductDesignAssociation
- SerializedProductVariant
- SerializedProductVariantConformance
- SoftwarePartAsReleased
- TrackablePart

6 S5000F UoFApplicability Assignment Item

6.1 Overall description

Applicability Assignment Item provides the capability to specify which items implement the ApplicabilityAssignmentItem <<interface>>.

6.2 Graphical representation



ICN-B6865-S5000F15002-001-00

Fig 5 S5000F UoF Applicability Assignment Item – class model

6.3 S5000F UoF Applicability Assignment Item - New class and interface definitions

None defined.

6.4 S5000F UoF Applicability Assignment Item - Referenced classes and interfaces

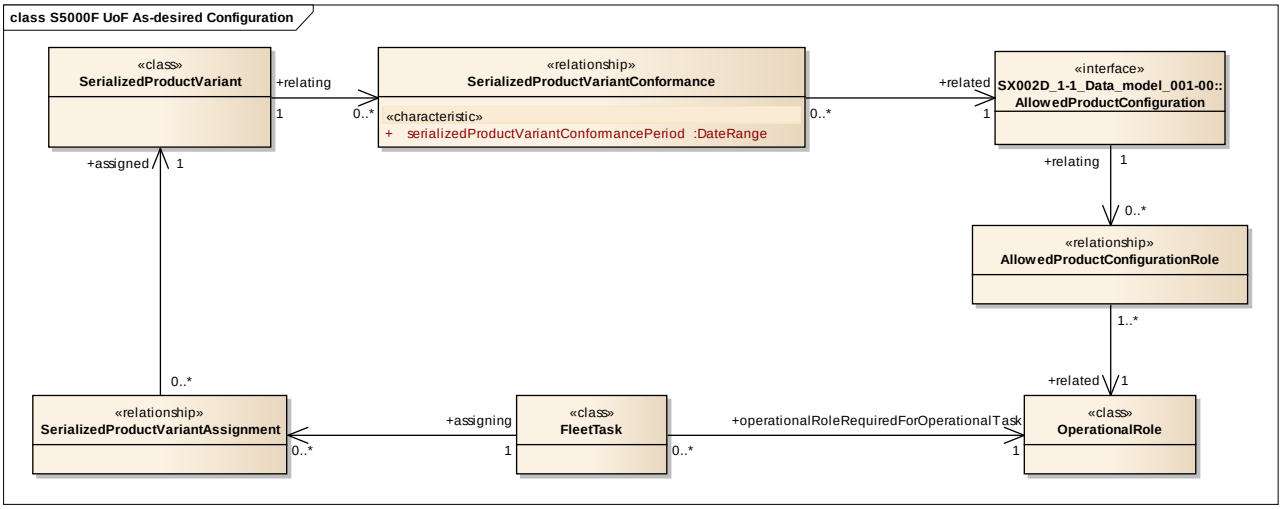
- AllowedProductConfiguration
- ApplicabilityAssignmentItem
- Document
- Facility
- Fleet
- HardwarePartAsDesigned
- MaintenanceProgram
- ProductVariant
- Project
- SerializedProductVariant
- Service
- SoftwarePartAsReleased

7 S5000F UoFAs-desired Configuration

7.1 Overall description

As-desired Configuration UoF establishes the relationship between the current operational role of a SerializedProductVariant and the operational role that is required to perform an assigned operational task.

7.2 Graphical representation



ICN-B6865-S5000F15003-002-00

Fig 6 S5000F UoF As-desired Configuration – class model

7.3 S5000F UoF As-desired Configuration - New class and interface definitions

7.3.1 SerializedProductVariantConformance

SerializedProductVariantConformance is a <<relationship>> that indicates the conformance of a SerializedProductVariance to a specific allowed configuration.

SerializedProductVariantConformance attributes:

- serializedProductVariantConformancePeriod

SerializedProductVariantConformance associations:

- Each SerializedProductVariant canrelate to zero, one or many AllowedProductVariants through the SerializedProductVariantConformance <<relationship>>.

7.4 S5000F UoF As-desired Configuration - Referenced classes and interfaces

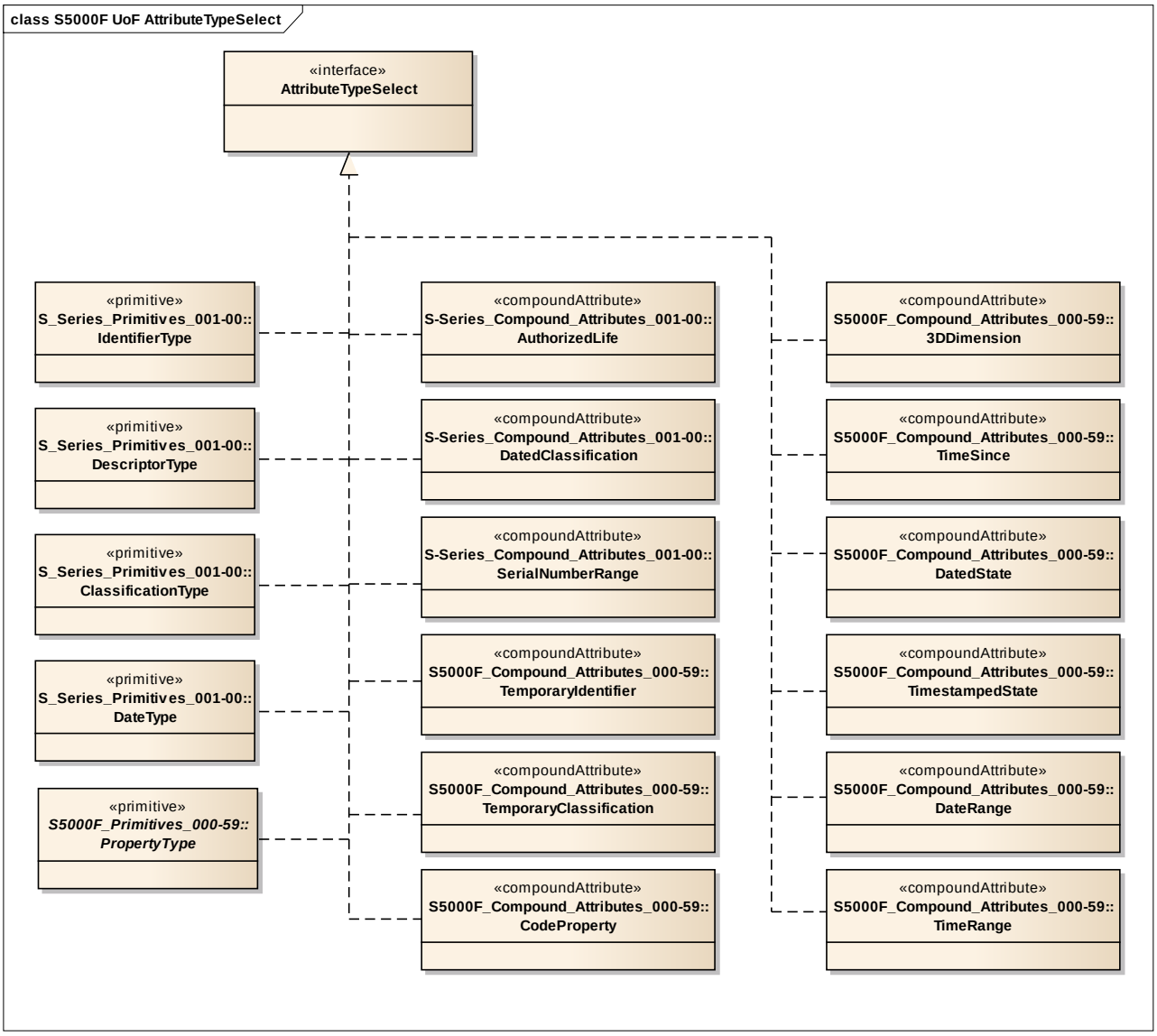
- AllowedProductConfiguration
- AllowedProductConfigurationRole
- FleetTask
- OperationalRole
- SerializedProductVariant
- SerializedProductVariantAssignment

8 S5000F UoFAttributeTypeSelect

8.1 Overall description

UoF AttributeTypeSelect provides to select any attribute in order to associate it to any class instance.

8.2 Graphical representation



ICN-B6865-S5000F15060-001-00

Fig 7 S5000F UoF AttributeTypeSelect – class model

8.3 S5000F UoF AttributeTypeSelect - New class and interface definitions

No new classes defined.

8.4 S5000F UoF AttributeTypeSelect - Referenced classes and interfaces

- 3DDimension
- AttributeTypeSelect
- AuthorizedLife
- ClassificationType
- CodeProperty
- DatedClassification
- DatedState
- DateRange
- DateType

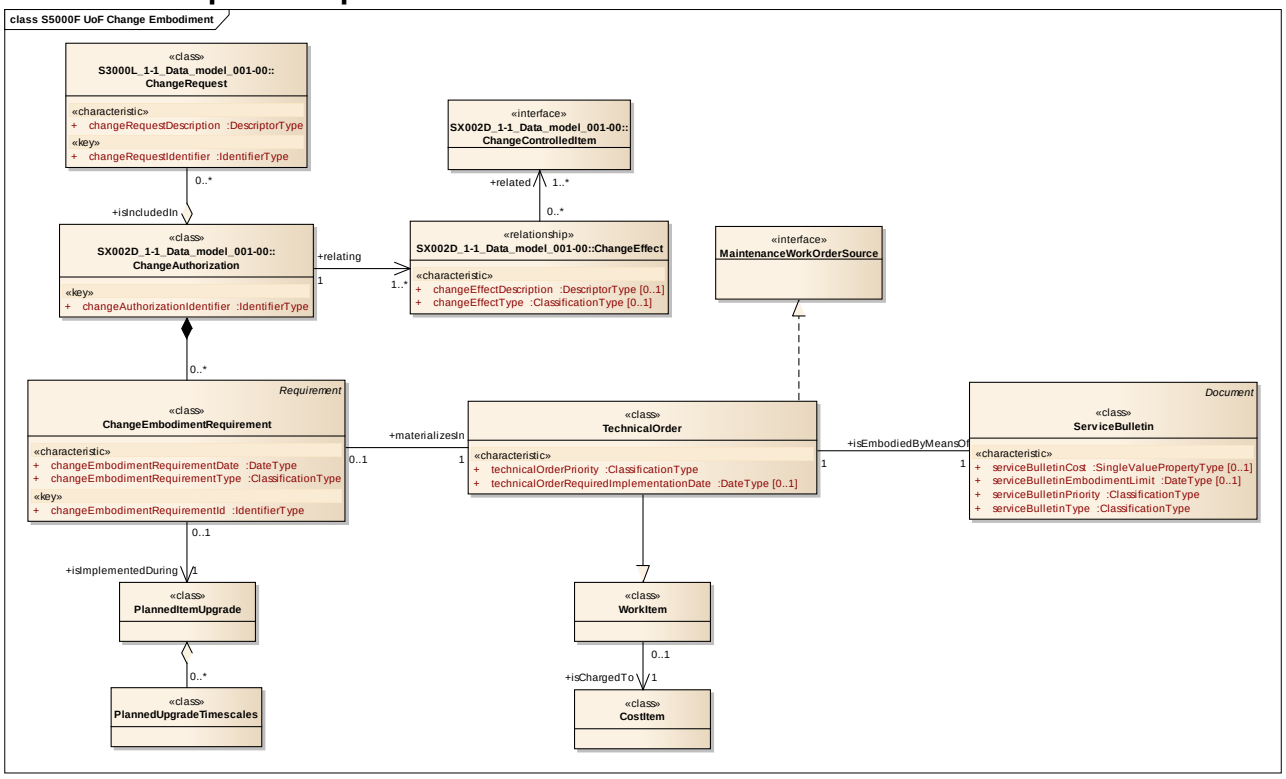
- DescriptorType
- IdentifierType
- PropertyType
- SerialNumberRange
- TemporaryClassification
- TemporaryIdentifier
- TimeRange
- TimeSince
- TimestampedState

9 S5000F UoFChange Embodiment

9.1 Overall description

Change Embodiment UoF provides all the necessary information to plan and report the embodiment of a modification into a serialized item.

9.2 Graphical representation



ICN-B6865-S5000F15004-002-00

Fig 8 S5000F UoF Change Embodiment – class model

9.3 S5000F UoF Change Embodiment - New class and interface definitions

9.3.1 ChangeControlledItem

A ChangeControlledItem represents the common behavior of those items (class instances) that can be affected by a ChangeAuthorization.

Classes that implement the ChangeControlledItem (inherited from HardwarePartAsDesigned) <<interface>> are:

- Accelerometer
- AggregatedElementRevision
- AlternatePartAsDesignedRelationship

- ApplicabilityAssignment
- BreakdownElementRevision
- BreakdownElementUsageInBreakdown
- BreakdownRevision
- HardwareElementPartRealization
- HardwareElementRevision
- HardwarePartAsDesigned
- ItemInAllowedProductConfiguration
- ItemInProductVariant
- PartAsDesignedPartsList
- PartAsDesignedPartsListEntry
- PressureSensor
- Product
- ProductVariant
- SensorType
- SerializedHardwarePart
- SerializedProductVariant
- SoftwareElementPartRealization
- SoftwareElementRevision
- SoftwarePartAsReleased
- StrainGauge
- SupportEquipment
- Tachometer
- TemperatureSensor
- ZoneElementRevision

ChangeControlledItem associations:

- (related) The ChangeControlledItem associated to an ObsolescenceParameter.
- (relating) The ChangeControlItem to which an UpgradeRequirement relates (via the ChangedItemtAvailabilityRequirement
- PlannedUpgradeTimescales can be associated to a ChangeControlledItem where the upgrade is supposed to be performed.
- The ChangedControlledItem that is related to a ChangeAuthorization (via the ChangeEffect <<relationship>>).

9.3.2 ChangeEffect

ChangeEffect is an association between a ChangeAuthorization (the relating) and the items (the related) that have been affected due to that ChangeAuthorization.

ChangeEffect attributes:

- changeEffectDescription
- changeEffectType

ChangeEffect associations:

- A ChangeAuthorization must be associated to to one or many ChangeControlledItems (via the ChangeEffect <<relationship>>).

9.3.3 ChangeEmbodimentRequirement

ChangeEmbodimentRequirement is a class representing the requirement to embody an authorized modification into one or several serialized product variants.

Example:

- Embody change within 6 months after change approval.

ChangeEmbodimentRequirement attributes:

- changeEmbodimentRequirementDate
- changeEmbodimentRequirementId
- changeEmbodimentRequirementType
- requirementDescription (inherited from Requirement)
- requirementId (inherited from Requirement)
- requirementName (inherited from Requirement)
- requirementRaisedBy (inherited from Requirement)
- requirementType (inherited from Requirement)

ChangeEmbodimentRequirement implements the following <<interface>>:

- CostEntryRelatedTo
- DocumentAssignmentItem (inherited from Requirement)
- SecurityClassificationItem (inherited from Requirement)

ChangeEmbodimentRequirement associations:

- Each ChangeEmbodimentRequirement must be of a defined ChangeAuthorization.
- ChangeEmbodimentRequirement can be optionally associated to a TechnicalOrder.
- A ChangeEmbodimentRequirement can be optionally associated to a PlannedItemUpgrade.
- A Requirement can be associated to a defined ServiceRequest. (inherited from Requirement)

9.3.4 ChangeRequest

The ChangeRequest class supports the recording of needed changes to the product design.

ChangeRequest attributes:

- changeRequestDescription
- changeRequestIdentifier

ChangeRequest implements the following <<interface>>:

- CommentItem
- CostEntryRelatedTo
- DocumentAssignmentItem
- OrganizationAssignmentItem
- RemarkAssignmentItem

ChangeRequest associations:

- Each ChangeRequest can be associated to the ChangeAuthorization in which it is included.

9.3.5 ServiceBulletin

ServiceBulletin is a class representing a set of documentation, material, spares and possibly other resources required to embody a change embodiment requirement into a serialized product variant.

ServiceBulletin attributes:

- documentCreationDate (inherited from Document)
- documentDescription (inherited from Document)
- documentIdentifier (inherited from Document)
- documentStatus (inherited from Document)
- documentTitle (inherited from Document)
- documentType (inherited from Document)

- serviceBulletinCost
- serviceBulletinEmbodimentLimit
- serviceBulletinPriority
- serviceBulletinType

ServiceBulletin implements the following <<interface>>:

- ApplicabilityAssignmentItem (inherited from Document)
- CommentItem
- CommentItem (inherited from Document)
- CostEntryRelatedTo
- DocumentAssignmentItem
- DocumentAssignmentItem (inherited from Document)
- DocumentItem (inherited from Document)
- SecurityClassificationItem (inherited from Document)

ServiceBulletin associations:

- (relating) The Document that relates to a MaintenanceActivity. (inherited from Document)
- (relating) The Document that relates to any class implemnting the SubjectOfPoliciesAndRegulations <<interface>>. (inherited from
- A TechnicalOrder is associated to a ServiceBulletin.
- An optional association with its DocumentIssues (inherited from Document)
- Each Document can relate to zero, one or many Documents (via the DocumentAssociation <<relationship>> class) (inherited from Document)

9.3.6 TechnicalOrder

TechnicalOrder is a WorkItem raised by Maintenance Engineering to carry out a change or maintenance on a SerializedItem.

TechnicalOrder attributes:

- technicalOrderPriority
- technicalOrderRequiredImplementationDate
- workItemDescription (inherited from WorkItem)
- workItemIdentifier (inherited from WorkItem)
- workItemPeriod (inherited from WorkItem)
- workItemStatus (inherited from WorkItem)
- workItemType (inherited from WorkItem)

TechnicalOrder implements the following <<interface>>:

- CommentItem (inherited from WorkItem)
- DocumentAssignmentItem (inherited from WorkItem)
- MaintenanceWorkOrderSource
- SecurityClassificationItem (inherited from WorkItem)

TechnicalOrder associations:

- A WorkItem can have zero, one or many ReportableActivities associated to it. (inherited from WorkItem)
- Each WorktItem can relate to zero, one or many other WorkItems (via the WorkItemRelationship <<relationship>> class) (inherited from
- WorkItem)
- A WorkItem has always a CostItem associated to it. (inherited from WorkItem)
- A WorkItem can be associated to a WorkBreakdownRevision. (inherited from WorkItem)

- A WorkItem can be associated to a single Person or Organization (via the Party <<interface>>). (inherited from WorkItem)
- A TechnicalOrder is associated to a ServiceBulletin.
- ChangeEmbodimentRequirement can be optionally associated to a TechnicalOrder.
- A WorkItem can have zero, one or many Budgets associated to it. (inherited from WorkItem)

9.4 S5000F UoF Change Embodiment - Referenced classes and interfaces

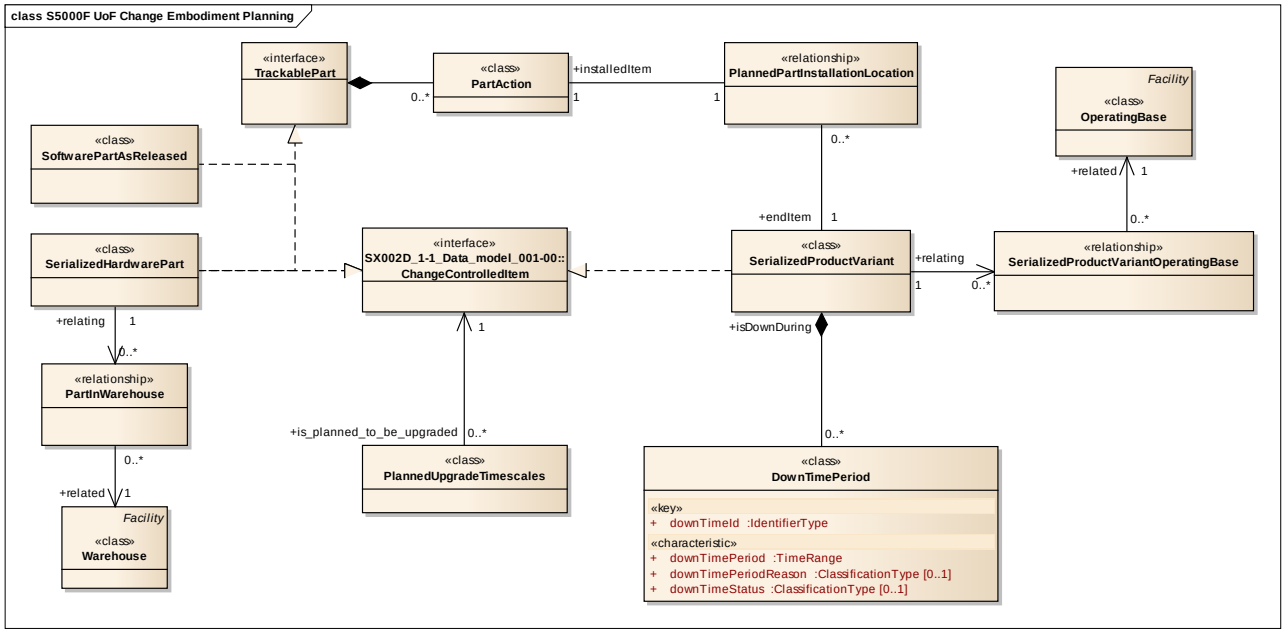
- ChangeAuthorization
- CostItem
- MaintenanceWorkOrderSource
- PlannedItemUpgrade
- PlannedUpgradeTimescales
- WorkItem

10 S5000F UoFChange Embodiment Planning

10.1 Overall description

Change Embodiment Planning UoF provides the capability to embody changes and resolution of obsolescence.

10.2 Graphical representation



ICN-B6865-S5000F15005-002-00

Fig 9 S5000F UoF Change Embodiment Planning – class model

10.3 S5000F UoF Change Embodiment Planning - New class and interface definitions

10.3.1 DownTimePeriod

DownTimePeriod is a class representing a planned or actual downtime for a SerializedProductVariant.

Example:

- Overhaul period
- Nonworking hours

DownTimePeriod attributes:

- downTimeId
- downTimePeriod
- downTimePeriodReason
- downTimeStatus

DownTimePeriod associations:

- A DownTimePeriod has an optional association with an Event that might be the cause for the down time.
- A DownTimePeriod must be of a defined SerializedProductVariant.

10.3.2 PlannedPartInstallationLocation

PlannedPartInstallationLocation is a <<relationship>> that allows to indicate which Part was installed or uninstalled at which location on a specific SerializedProductVariant.

10.4 S5000F UoF Change Embodiment Planning - Referenced classes and interfaces

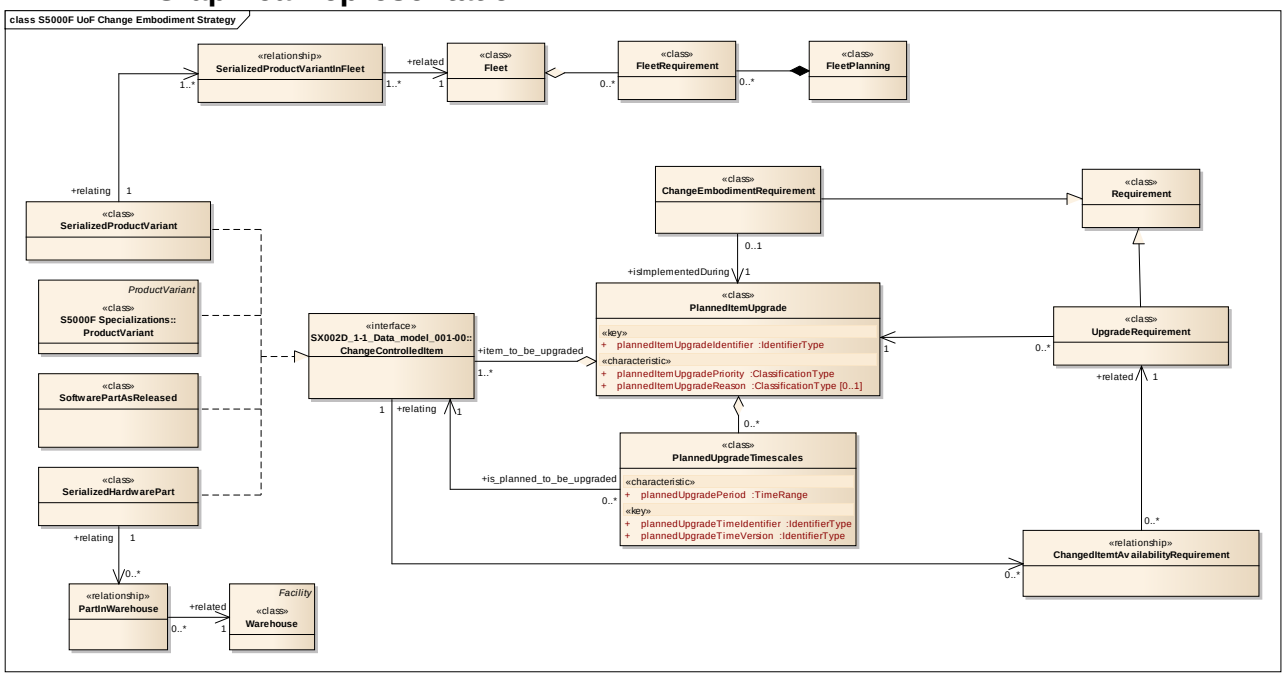
- ChangeControlledItem
- OperatingBase
- PartAction
- PartInWarehouse
- PlannedUpgradeTimescales
- SerializedHardwarePart
- SerializedProductVariant
- SerializedProductVariantOperatingBase
- SoftwarePartAsReleased
- TrackablePart
- Warehouse

11 S5000F UoFChange Embodiment Strategy

11.1 Overall description

Change Embodiment Strategy Definition UoF provides all the necessary information to be able to define the strategy to embody a change on inservice items.

11.2 Graphical representation



ICN-B6865-S5000F15006-002-00

Fig 10 S5000F UoF Change Embodiment Strategy – class model

11.3 S5000F UoF Change Embodiment Strategy - New class and interface definitions

11.3.1 ChangedItemtAvailabilityRequirement

ChangedItemAvailabilityRequirement is a <<relationship>> that defines the required availability of the SerializedProductVariant or ProductVariant fleet into which the item to be upgraded has to be embodied during the product upgrade.

ChangedItemtAvailabilityRequirement associations:

- A ChangedControlledItem can be associates tozero, one or many UpgradeRequirements (via the ChangedItemtAvailabilityRequirement <<relationship>>).

11.3.2 PlannedItemUpgrade

PlannedUpgrade is a class that defines the planning for the upgrade for a ChangeEmbodimentRequirement for one or several items.

PlannedItemUpgrade attributes:

- plannedItemUpgradeIdentifier
- plannedItemUpgradePriority
- plannedItemUpgradeReason

PlannedItemUpgrade implements the following <<interface>>:

- DocumentAssignmentItem

PlannedItemUpgrade associations:

- A ChangeEmbodimentRequirement can be optionally associated to a PlannedItemUpgrade.
- A PlannedItemUpgrade can have zero, one or many PlannedItemUpgradeScales associated to it.

- A PlannedItemUpgrade can have zero, one or many UpgradeRequirements associated to it.
- A PlannedItemUpgrade must be associated to one or many ChangeControlledItems.

11.3.3 PlannedUpgradeTimescales

PlannedUpgradeTimescales is a class that defines the planned periods of times during which a PlannedUpgrade will be performed on specific items.

PlannedUpgradeTimescales attributes:

- plannedUpgradePeriod
- plannedUpgradeTimeIdentifier
- plannedUpgradeTimeVersion

PlannedUpgradeTimescales associations:

- Each PlannedItemUpgradeScales can be associated to a PlannedItemUpgrade.
- PlannedUpgradeTimescales can be associated to a ChangeControlledItem where the upgrade is supposed to be performed.

11.3.4 UpgradeRequirement

UpgradeRequirement is a Requirement that has to be applied during the embodiment of a change (upgrade).

Example:

- The modification may be only embodied when the vehicle is defueled.
- Upgrade to be performed during maintenance period extending for more than 3 days, so as not to impact fleet operations.
- The individual ProductVariant downtime for the upgrade may not exceed 3 hours.

UpgradeRequirement attributes:

- requirementDescription (inherited from Requirement)
- requirementId (inherited from Requirement)
- requirementName (inherited from Requirement)
- requirementRaisedBy (inherited from Requirement)
- requirementType (inherited from Requirement)

UpgradeRequirement implements the following <<interface>>:

- DocumentAssignmentItem
- DocumentAssignmentItem (inherited from Requirement)
- SecurityClassificationItem (inherited from Requirement)

UpgradeRequirement associations:

- (related) The UpgradeRequirement to which the ChangeControlledItem is related.
- A Requirement can be associated to a defined ServiceRequest. (inherited from Requirement)
- An UpgradeRequirement can be optionally associated to a PlannedItemUpgrade.

11.4 S5000F UoF Change Embodiment Strategy - Referenced classes and interfaces

- ChangeControlledItem
- ChangeEmbodimentRequirement
- Fleet
- FleetPlanning
- FleetRequirement

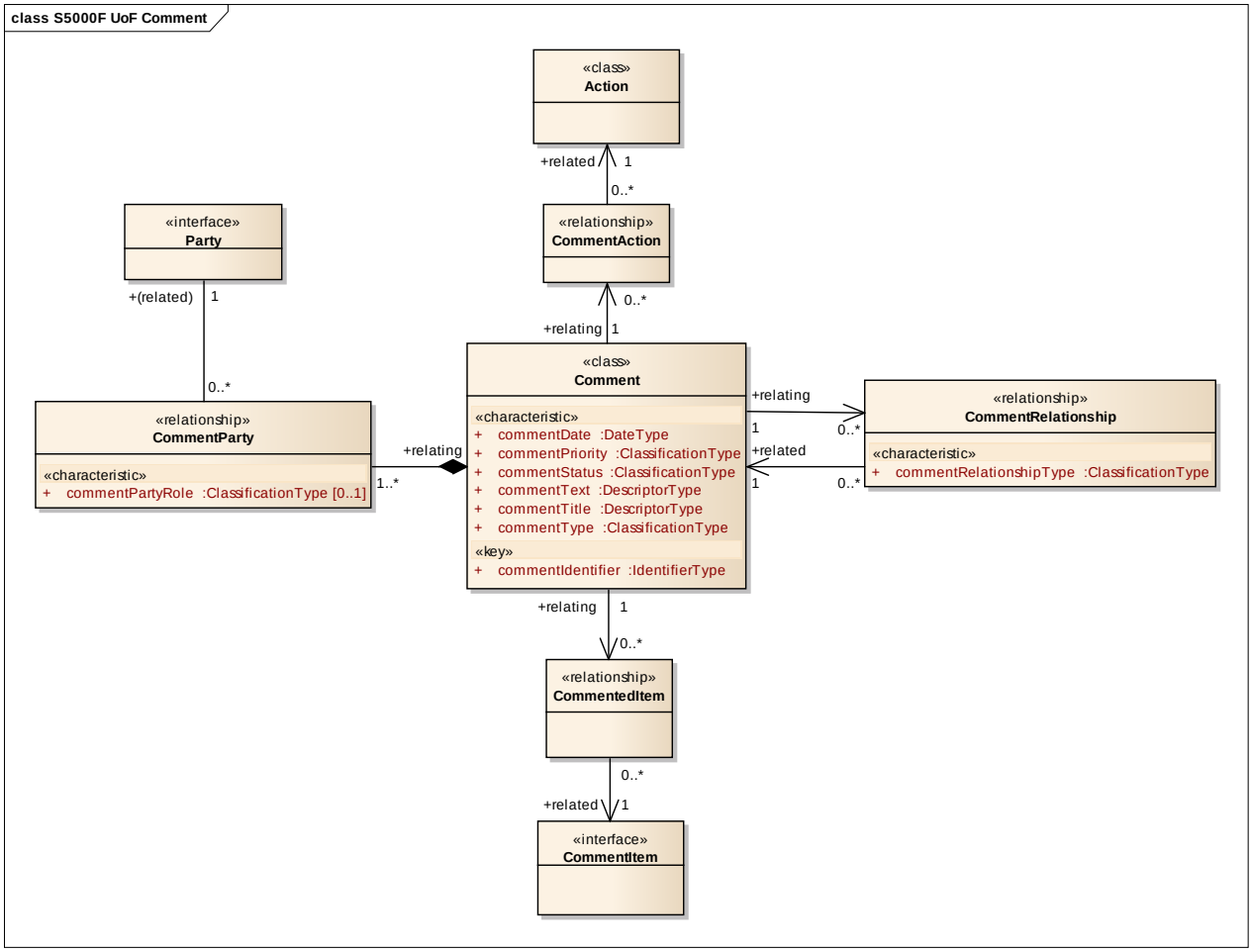
- PartInWarehouse
- ProductVariant
- Requirement
- SerializedHardwarePart
- SerializedProductVariant
- SerializedProductVariantInFleet
- SoftwarePartAsReleased
- Warehouse

12 S5000F UoFComment

12.1 Overall description

Comment UoF defines the capability to provide comments on any feedback class.

12.2 Graphical representation



ICN-B6865-S5000F15007-002-00

Fig 11 S5000F UoF Comment – class model

12.3 S5000F UoF Comment - New class and interface definitions

12.3.1 Comment

Comment is a textual statement about a related item that deals with an issue associated to that item that needs to be addressed.

Comment attributes:

- commentDate
- commentIdentifier
- commentPriority
- commentStatus
- commentText
- commentTitle
- commentType

Comment implements the following <<interface>>:

- CommentItem
- SecurityClassificationItem

Comment associations:

- (relating) The Comment to which the Classes implementing the CommentItem <<interface>> relate (through the CommentedItem <<relationship>>).
- Each Comment can relate to zero, one or many Comments (via dhe CommentRelationship <<relationship>> class.
- (relating) A Comment to which the Action is related.
- (relating) The Comment to which a Party relates.

12.3.2 CommentAction

CommentAction is a <<relationship>> that allows to associate a Comment to one or several Actions performed in response to the comment.

CommentAction associations:

- A Comment can relate to zero, one or many Actions (via the CommentAction <<relationship>>).

12.3.3 CommentedItem

CommentedItem is a <<relationship> that allows to associate a Comment to the item(s) to which the Comment applies.

12.3.4 CommentParty

CommentParty is a <<relationship>> defining the association between a Comment and a Party.

Example:
- Comment raised by organization XYZ.

CommentParty attributes:

- commentPartyRole

CommentParty associations:

- A Comment must be associated to one or many Parties (through the CommentParty <<relationship>>)

12.3.5 CommentRelationship

CommentRelationship is a <<relationship>> that defines the association between two different Comments.

CommentRelationship attributes:

- commentRelationshipType

CommentRelationship associations:

- (related) The Comment that is related to another Comment.
- (relating) The Comment that relates to another Comment

12.3.6 EventAffectedBreakdownElement

EventAffectedBreakdownElement is a <<relationship>> that allows to associate an Event to the BreakdownElements affected by it.

EventAffectedBreakdownElement associations:

- An Event must be related to one or many BreakdownElements (via the EventAffectedBreakdownElement <<relationship>>.

12.3.7 EventExplanation

EventExplanation is a <<relationship>> that allows to associate an Event to the ExplanatoryFactors that explain it.

EventExplanation associations:

- An Event can be associated to zero, one or many ExplanatoryFactors.

12.4 S5000F UoF Comment - Referenced classes and interfaces

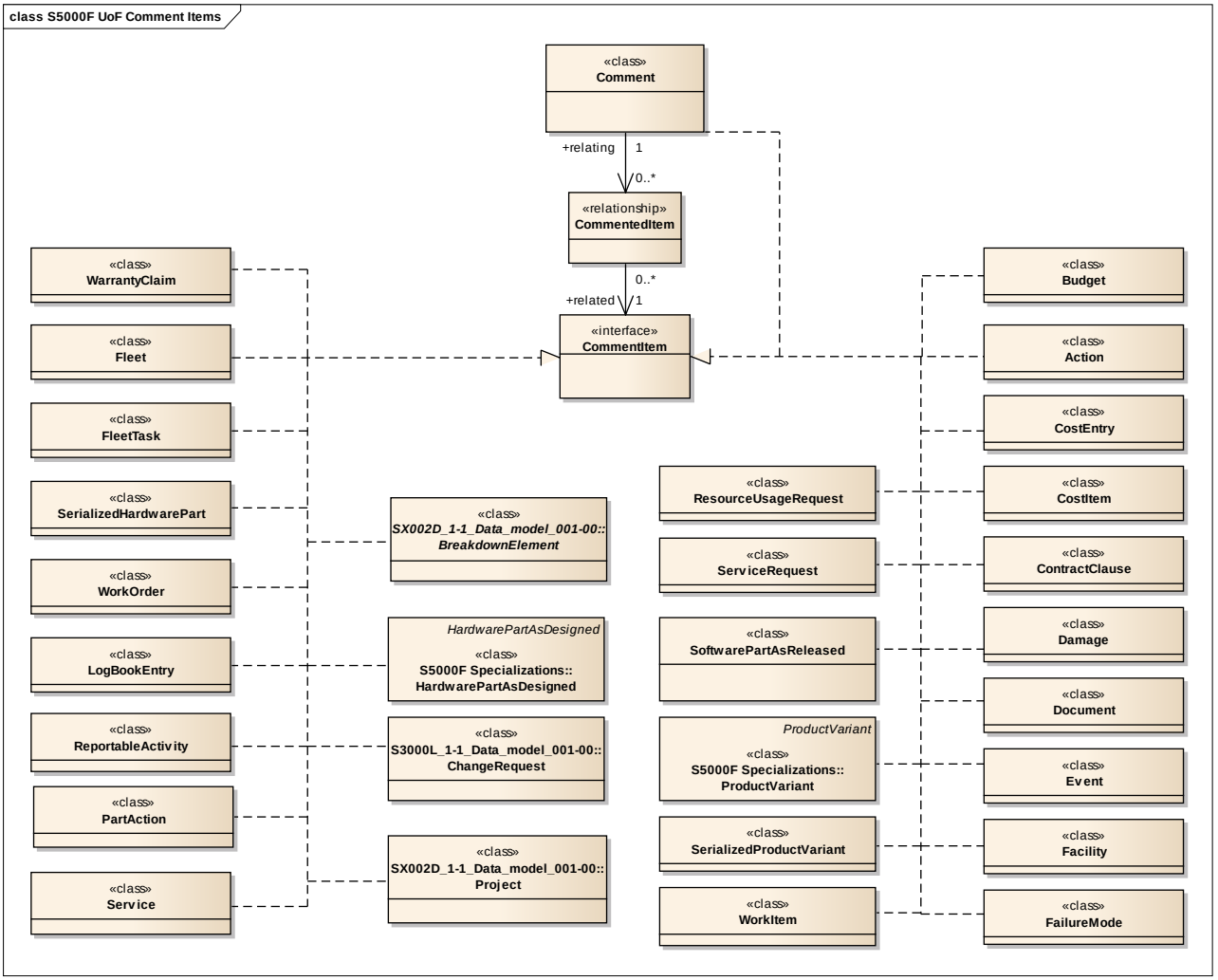
- Action
- CommentItem
- Party

13 S5000F UoFComment Items

13.1 Overall description

Comment Items UoF describes the items against which a Comment can be raised and that therefore interface it.

13.2 Graphical representation



ICN-B6865-S5000F15008-002-00

Fig 12 S5000F UoF Comment Items – class model

13.3 S5000F UoF Comment Items - New class and interface definitions

13.3.1 CommentItem

CommentItem is an <<interface>> allowing to establish an association between a comment and a set of classes to which the comment applies.

Classes that implement the CommentItem (inherited from HardwarePartAsDesigned) <<interface>> are:

- Accelerometer
- Action
- AggregatedElement
- BreakdownElement
- Budget
- ChangeRequest
- Comment
- Contract
- ContractClause
- CostEntry

- CostItem
- Damage
- Document
- Event
- ExternalDocument
- Facility
- FailureMode
- Fleet
- FleetTask
- FleetTaskCancellationNotice
- HardwareElement
- HardwarePartAsDesigned
- InventoryActivity
- LogBookEntry
- MaintenanceActivity
- MaintenanceEvent
- MaintenanceFacility
- MaintenanceProgram
- OperatingBase
- OperationalActivity
- OperationalEvent
- PartAction
- PressureSensor
- ProductVariant
- Project
- Report
- ReportableActivity
- ResourceUsageRequest
- S1000DDataModule
- S1000DDataModule
- S1000DLearningDataModule
- S1000DPublicationModule
- SafetyDocument
- SafetyIssue
- SafetyWarning
- SCORMContentPackage
- SensorType
- SerializedHardwarePart
- SerializedProductVariant
- Service
- ServiceBulletin
- ServiceBulletin
- ServiceLevelAgreementClause
- ServiceRequest
- SoftwareElement
- SoftwarePartAsReleased
- SpecialSafetyInstruction
- StrainGauge
- SupportEquipment
- Tachometer
- TechnicalOrder
- TemperatureSensor
- Warehouse

- WarrantyClaim
- WarrantyEvent
- WorkItem
- WorkOrder
- ZoneElement

CommentItem associations:

- (related) The class implementing the CommentItem <<interface>> that is related to the Comment.

13.4 S5000F UoF Comment Items - Referenced classes and interfaces

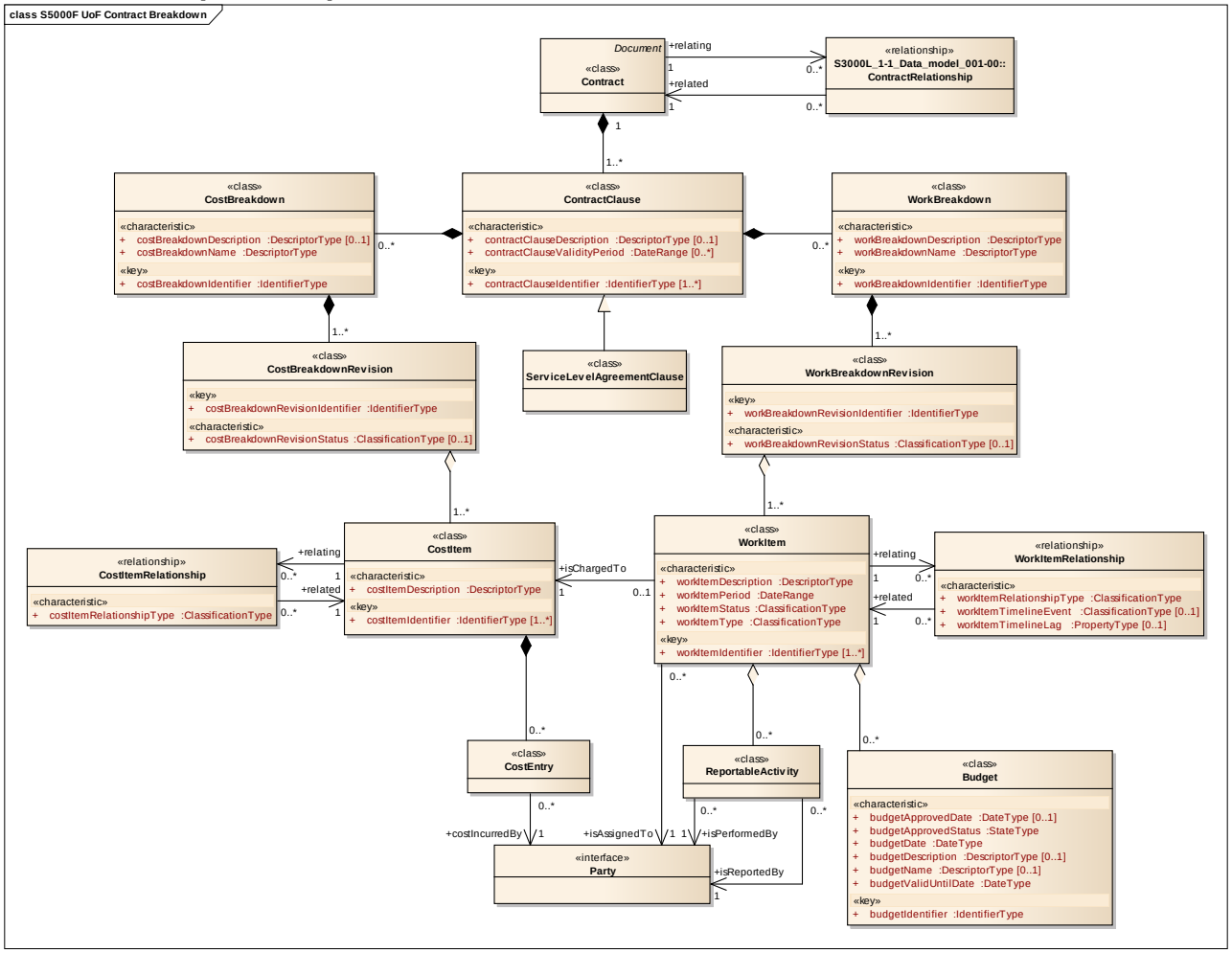
- Action
- BreakdownElement
- Budget
- ChangeRequest
- Comment
- CommentedItem
- ContractClause
- CostEntry
- CostItem
- Damage
- Document
- Event
- Facility
- FailureMode
- Fleet
- FleetTask
- HardwarePartAsDesigned
- LogBookEntry
- PartAction
- ProductVariant
- Project
- ReportableActivity
- ResourceUsageRequest
- SerializedHardwarePart
- SerializedProductVariant
- Service
- ServiceRequest
- SoftwarePartAsReleased
- WarrantyClaim
- WorkItem
- WorkOrder

14 S5000F UoFContract Breakdown

14.1 Overall description

Contract Breakdown UoF provides the capability to specify a Work Breakdown Structure (WBS) and a Cost Breakdown structure (CBS) for a contract.

14.2 Graphical representation



ICN-B6865-S5000F15008-002-00

Fig 13 S5000F UoF Contract Breakdown – class model

14.3 S5000F UoF Contract Breakdown - New class and interface definitions

14.3.1 Budget

Budget is a class representing a cost proposal to perform a specific service or provide a certain item.

Budget attributes:

- budgetApprovedDate
- budgetApprovedStatus
- budgetDate
- budgetDescription
- budgetIdentifier
- budgetName
- budgetValidUntilDate

Budget implements the following <<interface>>:

- CommentItem

Budget associations:

- A Budget can be associated to zero, one or many ResourceUsageRequests.
- A Budget can have aero, one or many ServiceRequests associated to it.
- Each budget can be associated to a WorkItem.

14.3.2 ContractClause

ContractClause is a specific provision included in a Contract.

Note:
A ContractClause will address a specific aspect of the Contract between the Parties, detailing the agreement to ensure all Parties understand what is expected of the other.

A ContractClause therefore allows for a finer granularity of a Contract. However, if this granularity is not available or desirable, a ContractClause can be defined which is the whole Contract.

ContractClause attributes:

- contractClauseDescription
- contractClauseIdentifier
- contractClauseValidityPeriod

ContractClause implements the following <<interface>>:

- CommentItem

ContractClause associations:

- A ContractClause can have zero, one or many WorkBreakdowns associated to it.
- Each ContractClause must be of a defined Contract.
- A ContractClause can have zero, one or many WarrantyClaims associated to it.
- A ContractClause can have zero, one or many CostBreakdowns associated to it.
- (relating) The ContractClause covering the warranty of a class instance that implements the SerializedItem <<interface>>.

14.3.3 CostBreakdown

CostBreakdown is a class used to group all the different cost concepts associated to a particular purpose.

CostBreakdown attributes:

- costBreakdownDescription
- costBreakdownIdentifier
- costBreakdownName

CostBreakdown associations:

- Each CostBreakdown can have one or many ContractBreakdownRevisions.
- A CostBreakdown is always associated to a defined ContractClause.

14.3.4 CostBreakdownRevision

CostBreakdownRevision is an iteration that is applied to a CostItem.

CostBreakdownRevision attributes:

- costBreakdownRevisionIdentifier
- costBreakdownRevisionStatus

CostBreakdownRevision associations:

- A CostBreakdwonRevision can have zero, one or many CostItems associated to it.

- Each CostBreakdownRevision must belong to a defined CostBreakdown.

14.3.5 CostItem

A CostItem is a generic concept to group individual expenses for accounting or program management purposes.

Note:
A same CostItem may be associated to several CostBrekadownRevisions.

CostItem attributes:

- costItemDescription
- costItemIdentifier

CostItem implements the following <<interface>>:

- CommentItem
- DocumentAssignmentItem
- SecurityClassificationItem

CostItem associations:

- A CostItem can have zero, one or many CostEntries.
- A CostItem may have zero or one WorkItems associated to it.
- Each CostItem can be associated to a CostBreakdownRevision.
- Each CostItem can relate to zero, one or many other CostItems (via the CostItemRelationship <<relationship>> class)
- A CostItem can be associated to zero, one or many ResourceUsageRequests.

14.3.6 CostItemRelationship

CostItemRelationship is a <<relationship>> that establishes the association between two different CostItems.

CostItemRelationship attributes:

- costItemRelationshipType

CostItemRelationship associations:

- (related) The CostItem that is related to from the relating CostItem
- (relating) The CostItem that relates to another CostItem

14.3.7 WorkBreakdown

WorkBreakdown is a class used to group all the different activities associated to a particular purpose.

WorkBreakdown attributes:

- workBreakdownDescription
- workBreakdownIdentifier
- workBreakdownName

WorkBreakdown associations:

- A WorkBreakdown can have one or many WorkBreakdownRevisions.
- A Workbreakdown is always associated to a ContractClause.

14.3.8 WorkBreakdownRevision

WorkBreakdownRevision is an iteration that is applied to a WorkBreakdown.

WorkBreakdownRevision attributes:

- workBreakdownRevisionIdentifier
- workBreakdownRevisionStatus

WorkBreakdownRevision associations:

- A WorkBreakdownRevision can have zero, one or many WorkItems associated to it.
- Each WorkBreakdownRevision must be of a defined WorkBreakdown.

14.3.9 WorkItem

A WorkItem is a generic concept defined to group individual activities for planning, costing or program management purposes.

Note:
A same WorkItem may be associated to several WorkBreakdownRevisions.

WorkItem attributes:

- workItemDescription
- workItemIdentifier
- workItemPeriod
- workItemStatus
- workItemType

WorkItem implements the following <<interface>>:

- CommentItem
- DocumentAssignmentItem
- SecurityClassificationItem

WorkItem associations:

- A WorkItem can be associated to a single Person or Organization (via the Party <<interface>>).
- Each WorktItem can relate to zero, one or many other WorkItems (via the WorkItemRelationship <<relationship>> class)
- A WorkItem has always a CostItem associated to it.
- A WorkItem can have zero, one or many ReportableActivities associated to it.
- A WorkItem can be associated to a WorkBreakdownRevision.
- A WorkItem can have zero, one or many Budgets associated to it.

14.3.10 WorkItemRelationship

WorkItemRelationship is a <<relationship>> that establishes the association between two instances of WorkItem. The class allows to define both hierarchical associations and timedependent associations. For hierarchical associations, it defines the parentchild relationships. For time-dependent relationships, the WorkItemRelationship class defines the event to which relating (successor)

WorkItems refers, eg, start or end of the related (predecessor) WorkItem. It also defines a possible lag, ie, duration from the time the related event occurs and the time when the relating WorkItem can be initiated (started).

WorkItemRelationship attributes:

- workItemRelationshipType
- workItemTimelineEvent
- workItemTimelineLag

WorkItemRelationship associations:

- (related) The WorkItem that is related to another WorkItem
- (relating) The WorkItem that relates to another WorkItem

14.4 S5000F UoF Contract Breakdown - Referenced classes and interfaces

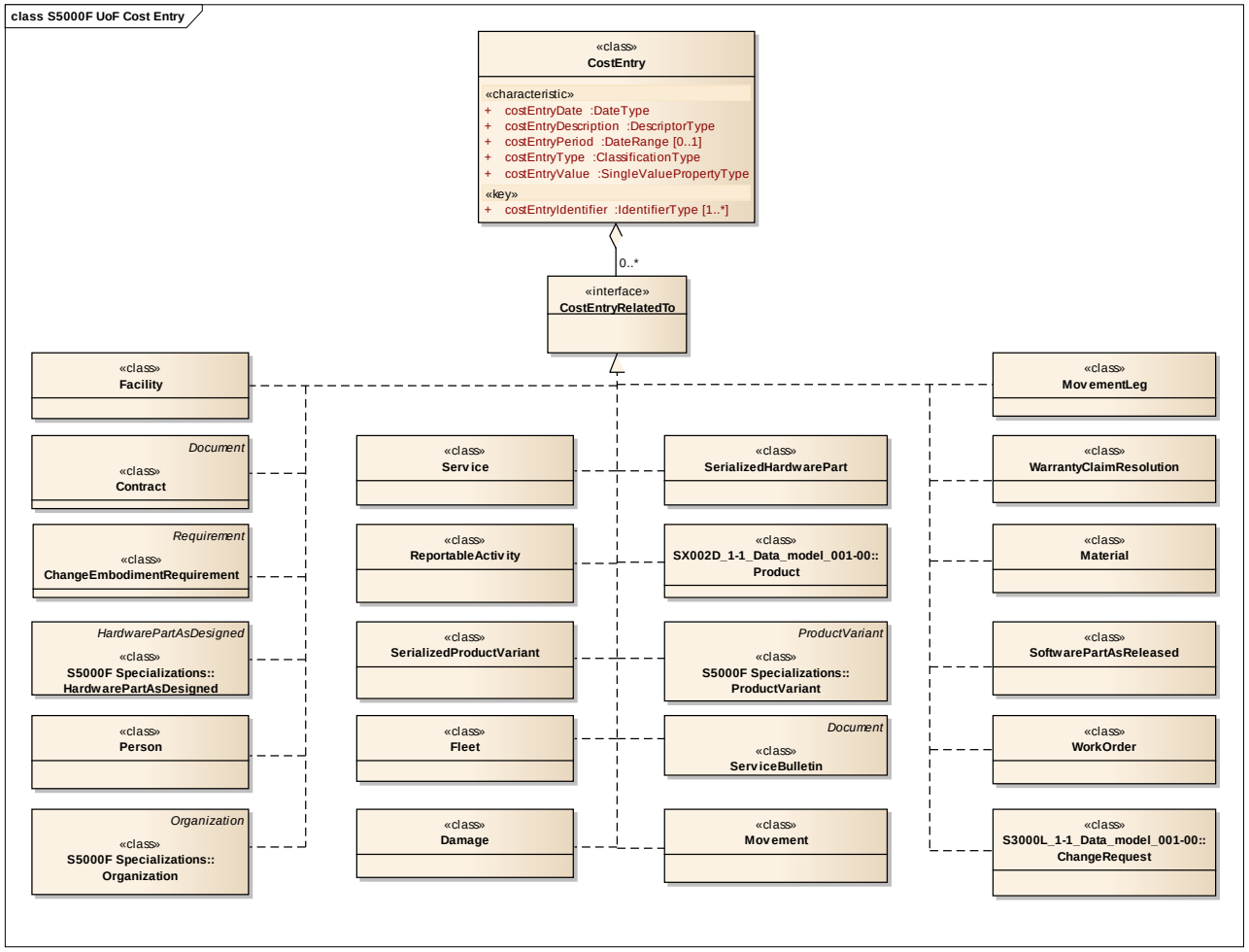
- Contract
- ContractRelationship
- CostEntry
- Party
- ReportableActivity
- ServiceLevelAgreementClause

15 S5000F UoFCost Entry

15.1 Overall description

Cost Entry UoF defines the interface to associate a cost entry with the item that has caused such cost.

15.2 Graphical representation



ICN-B6865-S5000F15010-002-00

Fig 14 S5000F UoF Cost Entry – class model

15.3 S5000F UoF Cost Entry - New class and interface definitions

15.3.1 CostEntry

A CostEntry is an individual expense made at a specific date for a specific amount that needs to be recorded for accounting purposes.

CostEntry attributes:

- costEntryDate
- costEntryDescription
- costEntryIdentifier
- costEntryPeriod
- costEntryType
- costEntryValue

CostEntry implements the following <<interface>>:

- CommentItem
- DocumentAssignmentItem
- ReportableItem
- SecurityClassificationItem

CostEntry associations:

- A CostEntry is always associated to a defined CostItem.
- A CostEntry is always incurred by a single Organization or Person instance (through the Party <<interface>>).
- Each CostEntry can have zero, one or many CostEntryRelatedTo items.

15.3.2 CostEntryRelatedTo

A CostEntryRelatedTo is an <<interface>> that associates a CostEntry to the item whose cost has to be incurred.

Classes that implement the CostEntryRelatedTo (inherited from HardwarePartAsDesigned) <<interface>> are:

- Accelerometer
- ChangeEmbodimentRequirement
- ChangeRequest
- Contract
- Damage
- Facility
- Fleet
- HardwarePartAsDesigned
- InventoryActivity
- MaintenanceActivity
- MaintenanceFacility
- MaintenanceOrganization
- MaintenancePerson
- Material
- Movement
- MovementLeg
- OperatingBase
- OperationalActivity
- OperatorOrganization
- OperatorPerson
- Organization

- Person
- PressureSensor
- Product
- ProductVariant
- ReportableActivity
- SensorType
- SerializedHardwarePart
- SerializedProductVariant
- Service
- ServiceBulletin
- ServiceRequest
- SoftwarePartAsReleased
- StrainGauge
- SupportEquipment
- Tachometer
- TemperatureSensor
- Warehouse
- WarrantyClaimResolution
- WorkOrder

CostEntryRelatedTo associations:

- Each CostEntryRelatedTo item must be associated to a defined CostEntry.

15.4 S5000F UoF Cost Entry - Referenced classes and interfaces

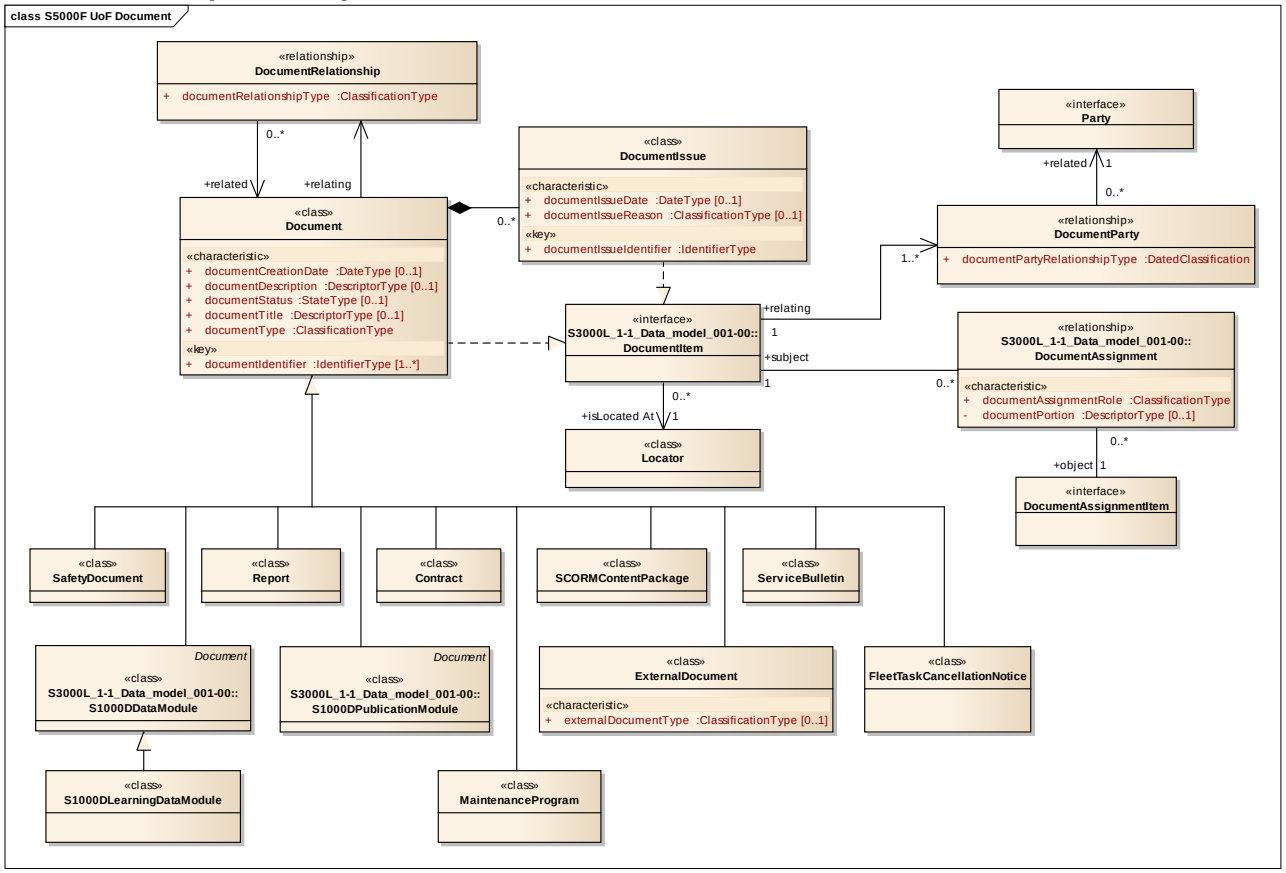
- ChangeEmbodimentRequirement
- ChangeRequest
- Contract
- Damage
- Facility
- Fleet
- HardwarePartAsDesigned
- Material
- Movement
- MovementLeg
- Organization
- Person
- Product
- ProductVariant
- ReportableActivity
- SerializedHardwarePart
- SerializedProductVariant
- Service
- ServiceBulletin
- SoftwarePartAsReleased
- WarrantyClaimResolution
- WorkOrder

16 S5000F UoFDocument

16.1 Overall description

Document UoF defines the types of documents and the relationships that such documents typically establish.

16.2 Graphical representation



ICN-B6865-S5000F15011-002-00

Fig 15 S5000F UoF Document – class model

16.3 S5000F UoF Document - New class and interface definitions

16.3.1 Document

Document is an electronic, written or printed paper that bears the original, official, or legal form of something and can be used to furnish decisive evidence or information.

Example:

- manual
- contract
- drawing
- report

Note:

Document is an abstract class, ie, an instantiation of Document must be either a SafetyDocument, Report, Contract, SCORMContentPackage, ServiceBulletin, S1000DDataModule, S1000DLearningDataModule, S1000DPublicationModule or ExternalDocument.

Document attributes:

- documentCreationDate
- documentDescription
- documentIdentifier
- documentStatus
- documentTitle

- documentType

Document implements the following <<interface>>:

- ApplicabilityAssignmentItem
- CommentItem
- DocumentAssignmentItem
- DocumentItem
- SecurityClassificationItem

Document associations:

- (relating) The Document that relates to a MaintenanceActivity.
- (relating) The Document that relates to any class implemnting the SubjectOfPoliciesAndRegulations <<interface>>.
- An optional association with its DocumentIssues
- Each Document can relate to zero, one or many Documents (via the DocumentAssociation <<relationship>> class)

16.3.2 DocumentIssue

The DocumentIssue class represents a specific document issue which is of relevance for inservice data feedback.

DocumentIssue attributes:

- documentIssueDate
- documentIssueIdentifier
- documentIssueReason

DocumentIssue implements the following <<interface>>:

- DocumentAssignmentItem
- DocumentItem

DocumentIssue implements the following <<interface>>:

- DocumentItem

DocumentIssue associations:

- An association with the Document of which the DocumentIssue is a revision

16.3.3 DocumentItem

The DocumentItem <<interface>> is implemented by classes that represent documents.

Classes that implement the DocumentItem (inherited from Document) <<interface>> are:

- Contract
- Document
- Document
- DocumentIssue
- DocumentIssue
- ExternalDocument
- ExternalDocument
- ExternalDocumentIssue
- FleetTaskCancellationNotice
- MaintenanceProgram
- MaintenanceProgramRevision
- Report

- S1000DDataModule
- S1000DDataModule
- S1000DDataModuleIssue
- S1000DLearningDataModule
- S1000DPublicationModule
- S1000DPublicationModuleIssue
- SafetyDocument
- SafetyIssue
- SafetyWarning
- SCORMContentPackage
- ServiceBulletin
- SpecialSafetyInstruction

Classes that implement the DocumentItem are:

- Contract
- ExternalDocument
- Report
- S1000DDataModule
- S1000D LearningDataModule
- S1000DPublicationModule
- SafetyDocument
- SCORMContentPackage
- ServiceBulletin

Classes that implement the DocumentItem <<interface>> must implement the following association:

- An optional association with zero, one or many instances of classes that implements the DocumentAssignmentItem <<interface>> (via the DocumentAssignment <<relationship>> class).

DocumentItem associations:

- (subject) The specific Document or DocumentIssue being assigned to an object (instance of any class that implements the DocumentAssignmentItem <<interface>>).
- A DocumentItem may be optionally assigned a Locator to indicate where it can be found.
- Each instance of a DocumentItem must have at least one associated Party (via) the DocumentParty <<relationship>> class, typically the Author.

16.3.4 DocumentParty

DocumentParty is a <<relationship>> class that defines the association of a document with a specific Party.

Example:

- prepared by
- reported to
- approved by

DocumentParty attributes:

- documentPartyRelationshipType

DocumentParty associations:

- (related) The Party related to the Document
- (relating) The DocumentItem that relates to a Party

16.3.5 DocumentRelationship

DocumentRelationship is a <<relationship>> that identifies how two different documents are associated with each other.

DocumentRelationship attributes:

- documentRelationshipType

DocumentRelationship associations:

- (relating) The Document that relates to another Document.
- (related) The Document that is related to another Document

16.3.6 ExternalDocument

ExternalDocument is a specialization of class Document, and represents all documents that do not have a specialied class.

ExternalDocument attributes:

- documentCreationDate (inherited from Document)
- documentDescription (inherited from Document)
- documentIdentifier (inherited from Document)
- documentStatus (inherited from Document)
- documentTitle (inherited from Document)
- documentType (inherited from Document)
- externalDocumentType

ExternalDocument implements the following <<interface>>:

- ApplicabilityAssignmentItem (inherited from Document)
- CommentItem (inherited from Document)
- DocumentAssignmentItem (inherited from Document)
- DocumentItem (inherited from Document)
- SecurityClassificationItem (inherited from Document)

ExternalDocument associations:

- (relating) The Document that relates to a MaintenanceActivity. (inherited from Document)
- Each Document can relate to zero, one or many Documents (via the DocumentAssociation <<relationship>> class) (inherited from Document)
- An optional association with its DocumentIssues (inherited from Document)
- (relating) The Document that relates to any class implemnting the SubjectOfPoliciesAndRegulations <<interface>> (inherited from Document).

16.3.7 S1000DDataModule

S1000DDataModule is a specialization of class Document and is used to represent documents written in accordance with an S1000D schema.

Note:
S1000DDataModule has been taken from S3000L.

S1000DDataModule attributes:

- dataModuleCode
- dataModuleInfoname
- documentCreationDate (inherited from Document)
- documentDescription (inherited from Document)
- documentIdentifier (inherited from Document)
- documentStatus (inherited from Document)

- documentTitle (inherited from Document)
- documentType (inherited from Document)

S1000DDataModule implements the following <<interface>>:

- ApplicabilityAssignmentItem (inherited from Document)
- CommentItem (inherited from Document)
- DocumentAssignmentItem (inherited from Document)
- DocumentItem (inherited from Document)
- OrganizationAssignmentItem (inherited from Document)
- RemarkAssignmentItem (inherited from Document)
- SecurityClassificationItem (inherited from Document)
- S1000DDataModule associations:
- (relating) The Document that relates to a MaintenanceActivity. (inherited from Document)
- (relating) The Document that relates to any class implemnting the SubjectOfPoliciesAndRegulations <<interface>>. (inherited from
- An optional association with its DocumentIssues (inherited from Document)
- Each Document can relate to zero, one or many Documents (via the DocumentAssociation <<relationship>> class) (inherited from Document)

16.3.8 S1000DLearningDataModule

S1000DLearningDataModule is a specialization of class Document and represents a learning data module as per S1000D.

S1000DLearningDataModule attributes:

- dataModuleCode (inherited from S1000DDataModule)
- dataModuleInfoname (inherited from S1000DDataModule)
- documentCreationDate (inherited from Document)
- documentDescription (inherited from Document)
- documentIdentifier (inherited from Document)
- documentStatus (inherited from Document)
- documentTitle (inherited from Document)
- documentType (inherited from Document)

S1000DLearningDataModule implements the following <<interface>>:

- ApplicabilityAssignmentItem (inherited from Document)
- CommentItem (inherited from Document)
- DocumentAssignmentItem (inherited from Document)
- DocumentItem (inherited from Document)
- OrganizationAssignmentItem (inherited from Document)
- RemarkAssignmentItem (inherited from Document)
- SecurityClassificationItem (inherited from Document)

S1000DLearningDataModule associations:

- (relating) The Document that relates to a MaintenanceActivity. (inherited from Document)
- (relating) The Document that relates to any class implemnting the SubjectOfPoliciesAndRegulations <<interface>>. (inherited from
- An optional association with its DocumentIssues (inherited from Document)
- Each Document can relate to zero, one or many Documents (via the DocumentAssociation <<relationship>> class) (inherited from Document)

16.3.9 S1000DPublicationModule

S1000DPublicationModule is a specialization of class Document and is used to represents a S1000D publication module.

Note:
S1000DPublicationModule has been taken from S3000L.

S1000DPublicationModule attributes:

- documentCreationDate (inherited from Document)
- documentDescription (inherited from Document)
- documentIdentifier (inherited from Document)
- documentStatus (inherited from Document)
- documentTitle (inherited from Document)
- documentType (inherited from Document)
- publicationModuleCode
- publicationModuleTitle

S1000DPublicationModule implements the following <<interface>>:

- ApplicabilityAssignmentItem (inherited from Document)
- CommentItem (inherited from Document)
- DocumentAssignmentItem (inherited from Document)
- DocumentItem (inherited from Document)
- OrganizationAssignmentItem (inherited from Document)
- RemarkAssignmentItem (inherited from Document)
- SecurityClassificationItem (inherited from Document)

S1000DPublicationModule implements the following <<interface>>:

DocumentItem (inherited from Document)

- S1000DPublicationModule associations:
- (relating) The Document that relates to a MaintenanceActivity. (inherited from Document)
- Each Document can relate to zero, one or many Documents (via the DocumentAssociation <<relationship>> class) (inherited from Document)
- (relating) The Document that relates to any class implemnting the SubjectOfPoliciesAndRegulations <<interface>>. (inherited from
- An optional association with its DocumentIssues (inherited from Document)

16.3.10 SCORMContentPackage

SCORMContentPackage is a specialization of class Document and represents a SCORM content package.

SCORMContentPackage attributes:

- documentCreationDate (inherited from Document)
- documentDescription (inherited from Document)
- documentIdentifier (inherited from Document)
- documentStatus (inherited from Document)
- documentTitle (inherited from Document)
- documentType (inherited from Document)

SCORMContentPackage implements the following <<interface>>:

- ApplicabilityAssignmentItem (inherited from Document)
- CommentItem (inherited from Document)
- DocumentAssignmentItem (inherited from Document)
- DocumentItem (inherited from Document)
- SecurityClassificationItem (inherited from Document)

SCORMContentPackage associations:

- (relating) The Document that relates to a MaintenanceActivity. (inherited from Document)
- (relating) The Document that relates to any class implemnting the SubjectOfPoliciesAndRegulations <<interface>>. (inherited from
- An optional association with its DocumentIssues (inherited from Document)
- Each Document can relate to zero, one or many Documents (via the DocumentAssociation <<relationship>> class) (inherited from Document)

16.4 S5000F UoF Document - Referenced classes and interfaces

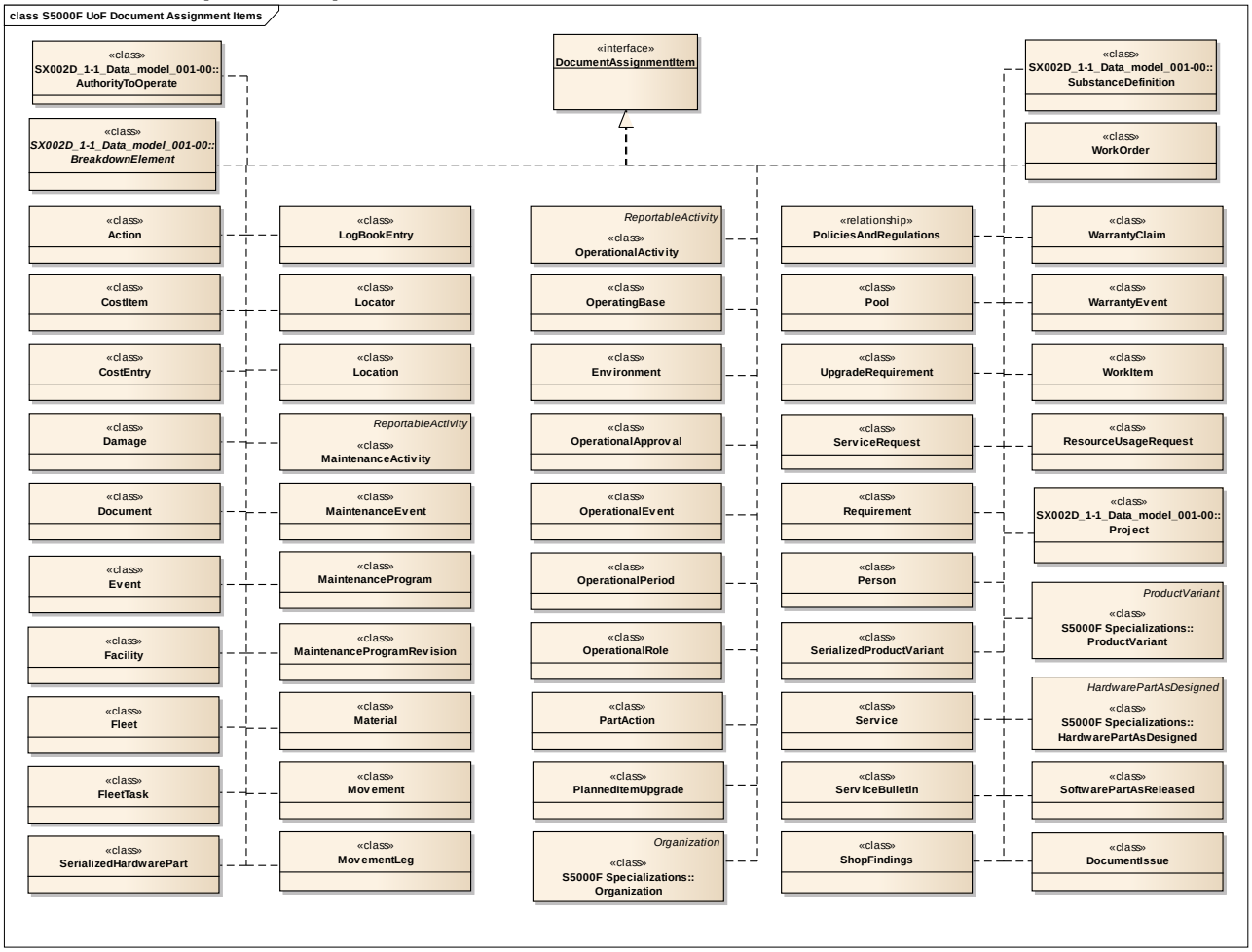
- Contract
- DocumentAssignment
- DocumentAssignmentItem
- FleetTaskCancellationNotice
- Locator
- MaintenanceProgram
- Party
- Report
- SafetyDocument
- ServiceBulletin

17 S5000F UoFDocument Assignment Items

17.1 Overall description

Document Assignment Items UoF represents the classes to which documents can be assigned.

17.2 Graphical representation



ICN-B6865-S5000F15012-002-00

Fig 16 S5000F Document Assignment Items – class model

17.3 S5000F UoF Document Assignment Items - New class and interface definitions

17.3.1 DocumentAssignmentItem

DocumentAssignmentItem is an<interface> that is implemented by classes that can be associated with additional document information.

DocumentAssignmentItem implements the following <<interface>>:

- SubtaskByExternalReference

Classes that implement the DocumentAssignmentItem <<interface>> are:

- ChangeRequest
- MaintenanceLevel
- OperationalTask
- RectifyingTask
- Skill
- SkillLevel
- Subtask
- SubtaskByDefinition

- SubtaskByExternalReference
- SubtaskByTaskReference
- SubtaskTimeline
- SupportingTask
- Task
- TaskRevision
- Trade

17.3.2 DocumentAssignmentItem

DocumentAssignmentItem is an <<interface>> that is implemented by classes that can be associated with additional document Classes that implement the DocumentAssignmentItem (inherited from HardwarePartAsDesigned) <<interface>> are:

- Accelerometer
- Action
- Address
- AggregatedElement
- AuthorityToOperate
- BreakdownElement
- ChangeEmbodimentRequirement
- Contract
- CostEntry
- CostItem
- Country
- Damage
- Document
- DocumentIssue
- Environment
- Event
- ExternalDocument
- Facility
- Fleet
- FleetRequirement
- FleetTask
- FleetTaskCancellationNotice
- GeographicalArea
- HardwareElement
- HardwarePartAsDesigned
- Location
- Locator
- LogBookEntry
- MaintenanceActivity
- MaintenanceEvent
- MaintenanceEvent
- MaintenanceFacility
- MaintenanceOrganization
- MaintenancePerson
- MaintenanceProgram
- MaintenanceProgram
- MaintenanceProgramRevision
- MaintenanceProgramRevision
- Material
- Movement
- MovementLeg

- ObsolescenceRequirement
- OperatingBase
- OperatingBase
- OperationalActivity
- OperationalApproval
- OperationalEvent
- OperationalEvent
- OperationalPeriod
- OperationalRequirement
- OperationalRole
- OperatorOrganization
- OperatorPerson
- Organization
- PartAction
- Party
- Person
- PlannedItemUpgrade
- PoliciesAndRegulations
- Pool
- PressureSensor
- ProductVariant
- Project
- Report
- Requirement
- ResourceItem
- ResourceUsageRequest
- S1000DDataModule
- S1000DDataModule
- S1000DLearningDataModule
- S1000DPublicationModule
- SafetyDocument
- SafetyIssue
- SafetyWarning
- SCORMContentPackage
- SensorType
- SerializedHardwarePart
- SerializedProductVariant
- Service
- ServiceBulletin
- ServiceBulletin
- ServiceRequest
- ShopFindings
- SoftwareElement
- SoftwarePartAsReleased
- SpecialSafetyInstruction
- StrainGauge
- SubstanceDefinition
- SupportEquipment
- Tachometer
- TechnicalOrder
- TemperatureSensor
- UpgradeRequirement
- UpgradeRequirement

- Warehouse
- WarrantyClaim
- WarrantyEvent
- WarrantyEvent
- WorkItem
- WorkOrder
- ZoneElement

DocumentAssignmentItem associations:

- (object) The object to which the Document or DocumentIssue is assigned.

17.4 S5000F UoF Document Assignment Items - Referenced classes and interfaces

- Action
- AuthorityToOperate
- BreakdownElement
- CostEntry
- CostItem
- Damage
- Document
- DocumentIssue
- Environment
- Event
- Facility
- Fleet
- FleetTask
- HardwarePartAsDesigned
- Location
- Locator
- LogBookEntry
- MaintenanceActivity
- MaintenanceEvent
- MaintenanceProgram
- MaintenanceProgramRevision
- Material
- Movement
- MovementLeg
- OperatingBase
- OperationalActivity
- OperationalApproval
- OperationalEvent
- OperationalPeriod
- OperationalRole
- Organization
- PartAction
- Person
- PlannedItemUpgrade
- PoliciesAndRegulations
- Pool
- ProductVariant
- Project
- Requirement
- ResourceUsageRequest

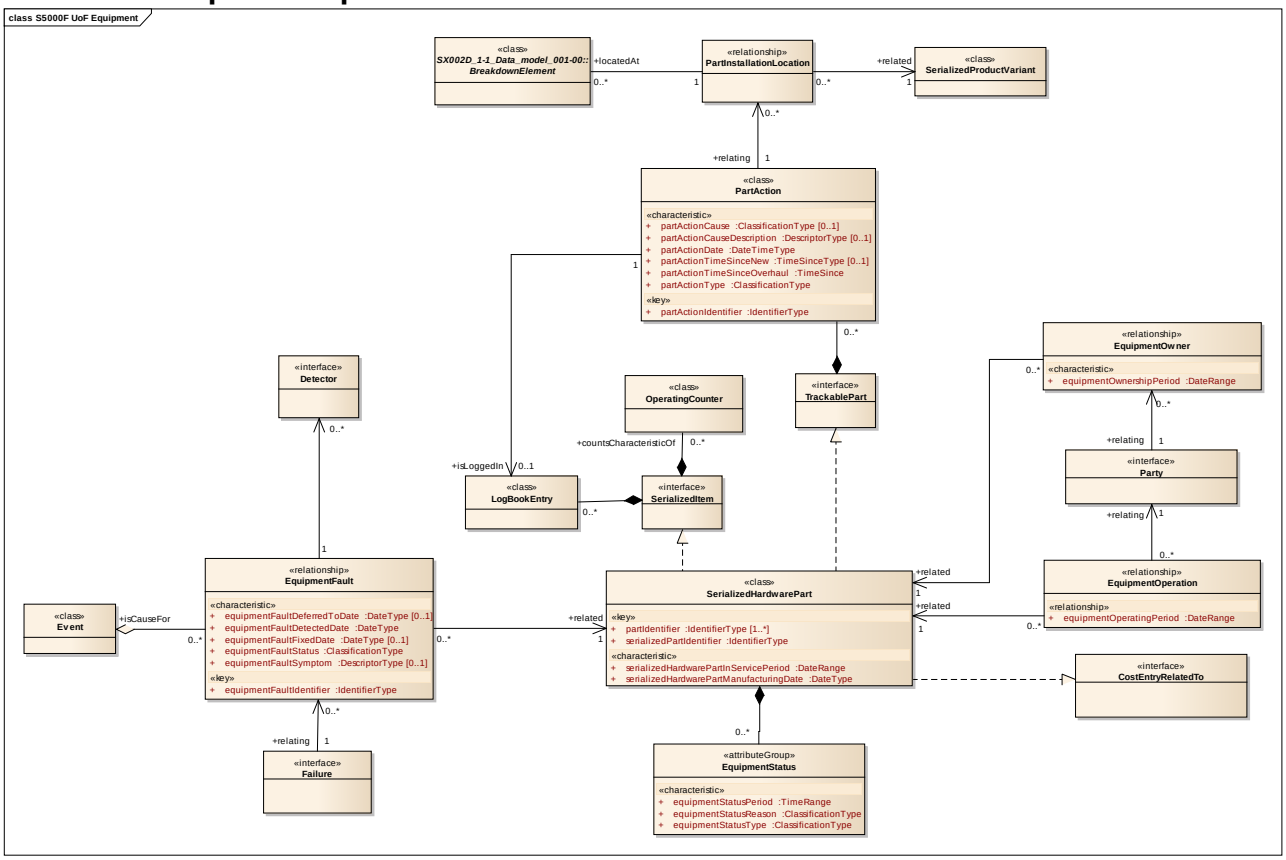
- SerializedHardwarePart
- SerializedProductVariant
- Service
- ServiceBulletin
- ServiceRequest
- ShopFindings
- SoftwarePartAsReleased
- SubstanceDefinition
- UpgradeRequirement
- WarrantyClaim
- WarrantyEvent
- WorkItem
- WorkOrder

18 S5000F UoFEquipment

18.1 Overall description

Equipment UoF defines all the information associated to a HardwarePartAsSerialized (also known as Equipment).

18.2 Graphical representation



ICN-B6865-S5000F15013-002-00

Fig 17 S5000F UoF Equipment – class model

18.3 S5000F UoF Equipment - New class and interface definitions

18.3.1 EquipmentFault

EquipmentFault is a <<relationship>> that associates an unidentified anomalous behavior (fault) that occurred on a specific HardwarePartAsSerialized at a specific date and the detector that detected the fault.

EquipmentFault attributes:

- equipmentFaultDeferredToDate
- equipmentFaultDetectedDate
- equipmentFaultFixedDate
- equipmentFaultIdentifier
- equipmentFaultStatus
- equipmentFaultSymptom

EquipmentFault associations:

- A Failure can be associated tto zero, one or many SerializedHardwareParts.
- Each EquipmentFault can be associated to an Event which it might have caused.
- An EquipmentFault must be associated to a ShopFindings instance.
- An EquipomentFault can be associated to zero, one or many Detectors.

18.3.2 EquipmentOperation

EquipmentOperation is a <<relationship>> that defines which Party has operated a HardwarePartAsSerialized during a specific time period.

EquipmentOperation attributes:

- equipmentOperatingPeriod

EquipmentOperation associations:

- (relating) The Party that relates to operates) a SerializedHardwarePart.

18.3.3 EquipmentOwner

EquipmentOwner is a <<relationship>> defining who and to what extent is the equipment owner during a specific period of time.

EquipmentOwner attributes:

- equipmentOwnershipPeriod

EquipmentOwner associations:

- (relating) The Party that relates to (owns) a SerializedHardwarePart.

18.3.4 EquipmentStatus

EquipmentStatus is an <<attributeGroup>> that represents the status of a HardwarePartAsSerialized during a specific period of time and the reason for such status.

EquipmentStatus attributes:

- equipmentStatusPeriod
- equipmentStatusReason
- equipmentStatusType

EquipmentStatus associations:

- Each EquipmentStatus must be of a defined SerialziedHardwarePart.

18.3.5 PartAction

PartAction is an action performed on a part as a result of a MaintenanceActivity.

Example:

- Install
- Remove
- Cleanse
- Load (software or data)
- Erase (software or data)

PartAction attributes:

- partActionCause
- partActionCauseDescription
- partActionDate
- partActionIdentifier
- partActionTimeSinceNew
- partActionTimeSinceOverhaul
- partActionType

PartAction implements the following <<interface>>:

- CommentItem
- DocumentAssignmentItem
- RequiredSafetyActionImplementation

PartAction associations:

- Each PartAction must be of a defined SerializedHardwarePart or SoftwarePartAsReleased (through the TrackablePart <>interface>>).
- (relating) The PartAction to which a SerializedProductVariant is related.
- A PartAction can be associated to a MaintenanceActivity.
- A PartAction has an association to the SerializedProductVariant (via the PlannedPartInstallationLocation <<relationship>>) where the
- PartAction is planned to be performed.
- A PartAction must be associated to a LogBookEntry instance that logs such PartAction.

18.3.6 SerializedHardwarePart

SerializedHardwarePart is an individual HardwareElement that can be uniquely identified among other HardwareElements of the same type.

Note:
A SerializedHardwarePart is usually referred to as "Equipment". This name has not been used in the data model so as to distinguish between the generic equipment and the individual ones.

Note that a SerializedHardwarePart may evolve due to modifications. The actual build standard at a given moment is defined through the relationship SerializedPartDesignAssociation.

SerializedHardwarePart attributes:

- partIdentifier
- serializedHardwarePartInServicePeriod
- serializedHardwarePartManufacturingDate
- serializedPartIdentifier

SerializedHardwarePart implements the following <<interface>>:

- ChangeControlledItem

- CommentItem
- ContractItem
- CostEntryRelatedTo
- DocumentAssignmentItem
- ResourceItem
- SerializedItem
- ServiceItem
- TrackablePart

SerializedHardwarePart associations:

- (relating) The SerializedHwardwarePart that forms part of the Pool.
- Each instance of a SerializedHardwarePart must have at least one associated Warehouse via the ParInWarehouse <<relationship>> class.
- A SerializedHardwarePart can have zero, one or many ShopFindings associated to it.
- (relating) The SerializedHardwarePart that relates to a HardwarePartAsdesigned.
- (related) The SerializedHardwarePart which is a major component of a SerializedProductVariant.
- (related) The SerializedHardwarePart that is related to (owned by) the Party
- (related) The SerializedHardwarePart that is related to (operated by) the Party
- (related) The SerializedHardwarePart related to an EquipmentFault.
- A SerializedHardwarePart can have zero, one or many EquipmentStatus.

18.3.7 TrackablePart

TrackablePart is an <<interface>> for those items against which actions performed need to be recorded.

Example:

- A serialized item or a software part, but not things lika a washer.

Classes that implement the TrackablePart (inherited from HardwarePartAsDesigned) <<interface>> are:

- Accelerometer
- HardwarePartAsDesigned
- PressureSensor
- SensorType
- SerializedHardwarePart
- SoftwarePartAsReleased
- StrainGauge
- SupportEquipment
- Tachometer
- TemperatureSensor

TrackablePart associations:

- Each class implementing the TrackablePart <<interface>> can have zero, one or many PartActions associated to it.

18.4 S5000F UoF Equipment - Referenced classes and interfaces

- BreakdownElement
- CostEntryRelatedTo
- Detector
- Event
- Failure
- LogBookEntry

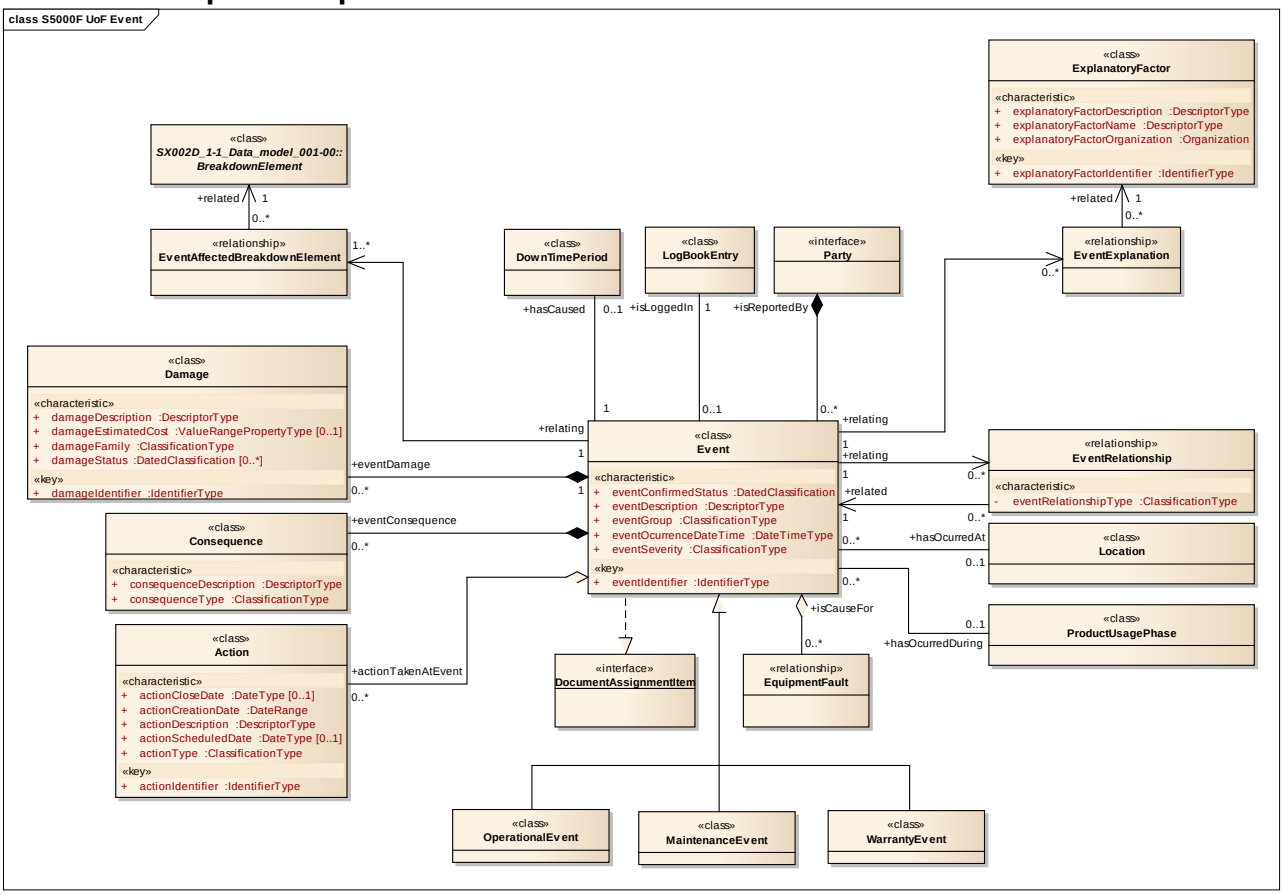
- OperatingCounter
- PartInstallationLocation
- Party
- SerializedItem
- SerializedProductVariant

19 S5000F UoFEvent

19.1 Overall description

Event UoF defines all the types of Events and the relationships with each other.

19.2 Graphical representation



ICN-B6865-S5000F15014-002-00

Fig 18 S5000F UoF Event – class model

19.3 S5000F UoF Event - New class and interface definitions

19.3.1 Action

Action is a fact or process of doing something, typically to achieve an aim.

Action attributes:

- actionCloseDate
- actionCreationDate
- actionDescription
- actionIdentifier
- actionScheduledDate
- actionType

Action implements the following <<interface>>:

- CommentItem
- DocumentAssignmentItem
- RequiredSafetyActionImplementation

Action associations:

- Each Action can be associated to an Event.
- As Action can be associated to a WarrantyClaim.
- (related) The Action that is related to a Comment.

19.3.2 Consequence

Consequence is a class providing information about the consequences of an Event.

Consequence attributes:

- consequenceDescription
- consequenceType

Consequence associations:

- Each Consequence must be of a defined Event.

19.3.3 Damage

Damage is a harm to an item resulting in loss of value or the impairment of usefulness.

Damage attributes:

- damageDescription
- damageEstimatedCost
- damageFamily
- damageIdentifier
- damageStatus

Damage implements the following <<interface>>:

- CommentItem
- CostEntryRelatedTo
- DocumentAssignmentItem

Damage associations:

- Each Damage must be associated to a defined Event.

19.3.4 Event

Event is an important happening or occurrence at a specific point in time that requires to be documented or recorded.

Event attributes:

- eventConfirmedStatus
- eventDescription
- eventGroup
- eventIdentifier
- eventOcurrenceDateTime
- eventSeverity

Event implements the following <<interface>>:

- CommentItem
- DocumentAssignmentItem
- SecurityClassificationItem

Event associations:

- Each Event can have zero, one or many Damages.
- (related) The Event that is related to another Event.
- (related) The Event that is related to the SafetyIssue.
- (relating) The Event that relates to a BreakdownElement.
- (relating) The Event that relates to another Event.
- (relating) The Event that relates to the ExplanatoryFactor.
- An Event can be optionally associated to a Location.
- An Event can be optionally associated to a ProductusagePhase.
- An Event can have zero, one or many Actions associated to it.
- An Event can have zero, one or many EquipmentFaults associated to it.
- An Event has an optional association with a DownTimePeriod that has resulted as a consequence of the Event.
- An Event instance can be optionally logged in a LogBookEntry instance.
- An Event must be reported by a defined Party.
- Each Event can have zero, one or many Consequences.

19.3.5 EventRelationship

EventRelationship is a <<relationship>> describing the association between two different events.

EventRelationship attributes:

- eventRelationshipType

EventRelationship associations:

- An Event can be related zero, one or many times to another Event.

19.3.6 ExplanatoryFactor

ExplanatoryFactor is a class that provides information about the factor that caused an Event.

Example:

- explosion
- strong lateral wind
- human error

ExplanatoryFactor attributes:

- explanatoryFactorDescription
- explanatoryFactorIdentifier
- explanatoryFactorName
- explanatoryFactorOrganization

ExplanatoryFactor associations:

- (related) The ExplanatoryFactor that is related to an Event.

19.4 S5000F UoF Event - Referenced classes and interfaces

- BreakdownElement
- DocumentAssignmentItem
- DownTimePeriod
- EquipmentFault

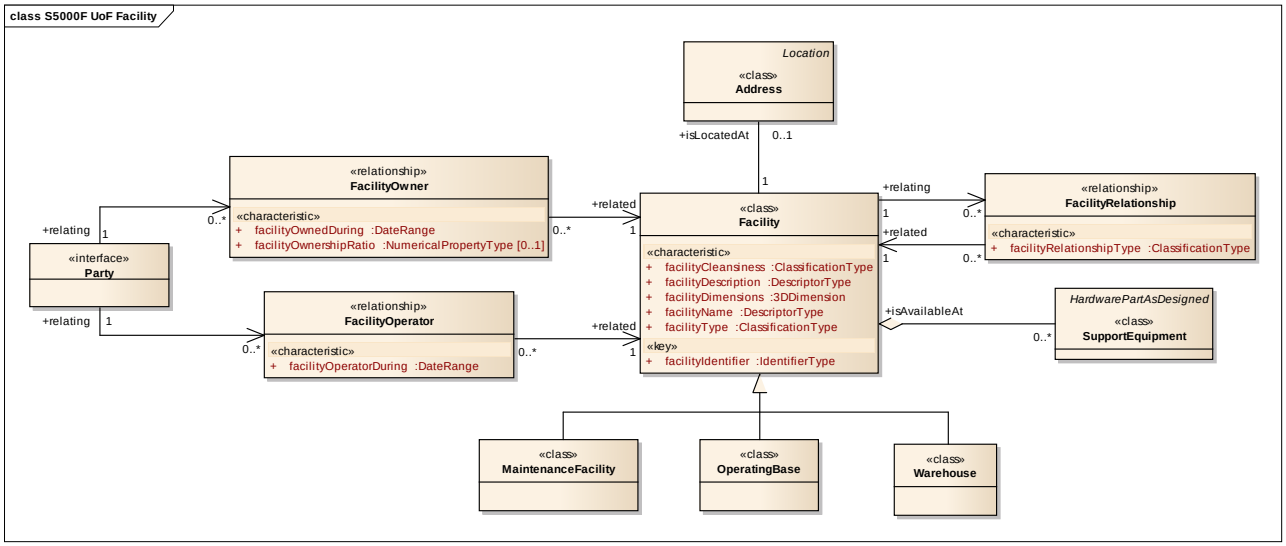
- EventAffectedBreakdownElement
- EventExplanation
- Location
- LogBookEntry
- MaintenanceEvent
- OperationalEvent
- Party
- ProductUsagePhase
- WarrantyEvent

20 S5000F UoFFacility

20.1 Overall description

Facility UoF defines the basic information related to a facility.

20.2 Graphical representation



ICN-B6865-S5000F15015-002-00

Fig 19 S5000F UoF Facility – class model

20.3 S5000F UoF Facility - New class and interface definitions

20.3.1 Facility

Facility is a building, installation or infrastructure that can be used for operation or maintenance purposes.

Facility attributes:

- facilityCleansiness
- facilityDescription
- facilityDimensions
- facilityIdentifier
- facilityName
- facilityType

Facility implements the following <<interface>>:

- ApplicabilityAssignmentItem
- CommentItem
- ContractItem

- CostEntryRelatedTo
- DocumentAssignmentItem
- ResourceItem
- SecurityClassificationItem
- ServiceItem
- SubjectOfPoliciesAndRegulations

Facility associations:

- A Facility can be associated to zero, one or many Environments.
- Each Facility can be related to from zero, one or many other Facilities (via the FacilityRelationship <<relationship>> class)
- A Facility can have zero, one or many SupportEquipments associated to it.
- A Facility can be optionally associated to an Address.
- A Facility can be associated to zero, one or many ShopFindings.

20.3.2 FacilityOperator

FacilityOperator is a <<relationship>> that defines the operator of a facility during a specific period of time.

Example:

- The FacilityOperator has leased the Facility from the FacilityOwner.

FacilityOperator attributes:

- facilityOperatorDuring

FacilityOperator associations:

- (related) The Facility that is related to (operated by) the Party
- (relating) The Party that relates to (operates) a Facility

20.3.3 FacilityOwner

FacilityOwner is a <<relationship>> that defines the total or partial ownership of a facility by a specific party during a specific period of time.

FacilityOwner attributes:

- facilityOwnedDuring
- facilityOwnershipRatio

FacilityOwner associations:

- (related) The Facility that is related to (owned by) the Party
- (relating) The Party that relates to (owns) a Facility

20.3.4 FacilityRelationship

FacilityRelationship is a <<relationship>> that defines how two Facilities are related with each other.

FacilityRelationship attributes:

- facilityRelationshipType

FacilityRelationship associations:

- (relating) The Facility that relates to another Facility
- (related) The Facility that is related to another Facility.

20.3.5 Warehouse

Warehouse is a Facility used to store parts.

Warehouse attributes:

- facilityCleansiness (inherited from Facility)
- facilityDescription (inherited from Facility)
- facilityDimensions (inherited from Facility)
- facilityIdentifier (inherited from Facility)
- facilityName (inherited from Facility)
- facilityType (inherited from Facility)

Warehouse implements the following <<interface>>:

- ApplicabilityAssignmentItem (inherited from Facility)
- CommentItem (inherited from Facility)
- ContractItem (inherited from Facility)
- CostEntryRelatedTo (inherited from Facility)
- DocumentAssignmentItem (inherited from Facility)
- ResourceItem (inherited from Facility)
- SecurityClassificationItem (inherited from Facility)
- ServiceItem (inherited from Facility)
- SubjectOfPoliciesAndRegulations (inherited from Facility)

Warehouse associations:

- (related) The Warehouse where the part Pool is stcoked.
- A Facility can be associated to zero, one or many Environments. (inherited from Facility)
- A Facility can be associated to zero, one or many ShopFindings. (inherited from Facility)
- A Facility can be optionally associated to an Address. (inherited from Facility)
- A Facility can have zero, one or many SupportEquipments associated to it. (inherited from Facility)
- An optional relationship with zero, one or many SerializedHardwareParts (via the PartInWarehouse <<relationship>> class)
- Each Facility can be related to from zero, one or many other Facilities (via the FacilityRelationship <<relationship>> class) (inherited from

20.4 S5000F UoF Facility - Referenced classes and interfaces

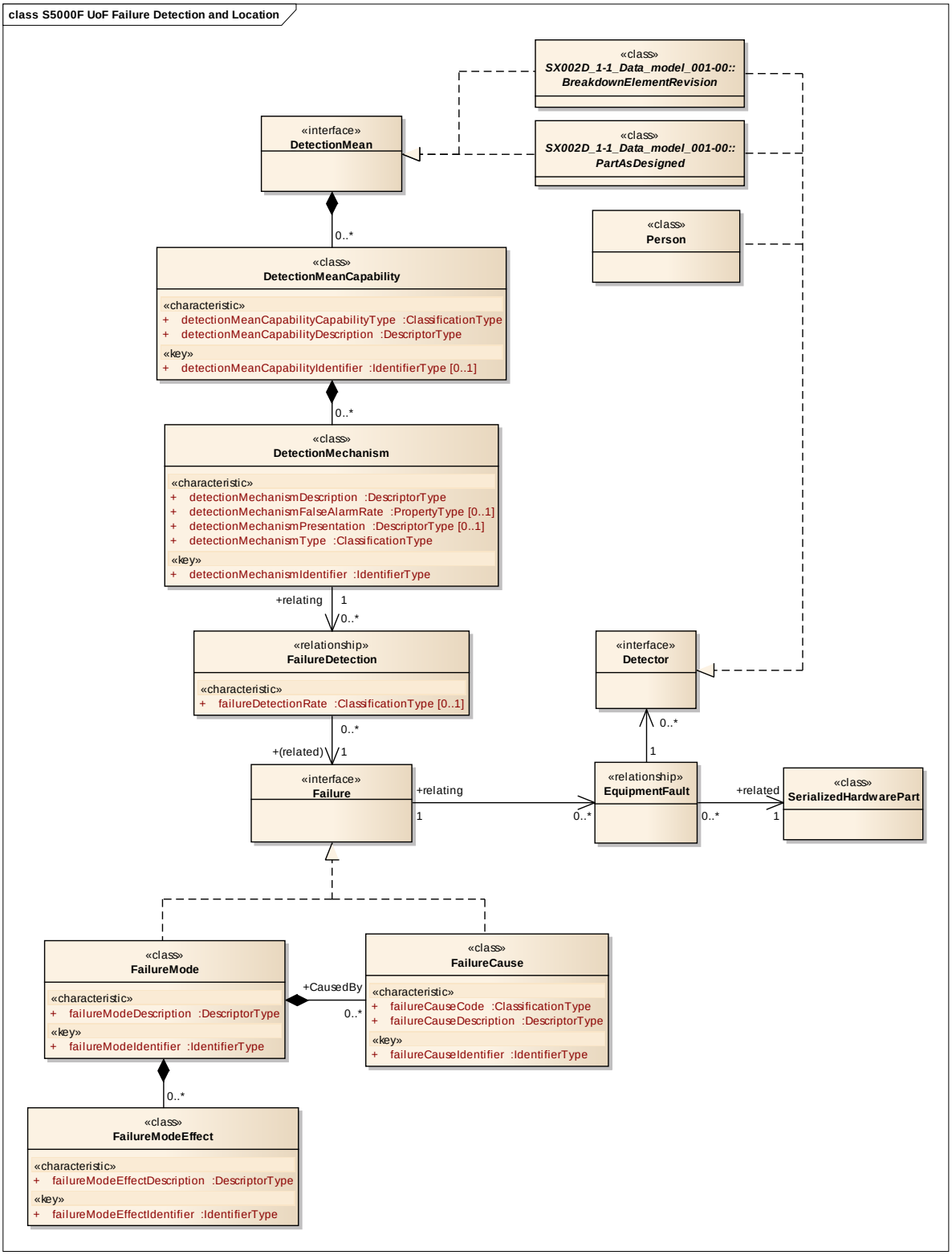
- Address
- MaintenanceFacility
- OperatingBase
- Party
- SupportEquipment

21 S5000F UoFFailure Detection and Location

21.1 Overall description

Failure Detection and Location UoF provides the capability to specify the failures than can be detected by equipment (including test equipment) or software.

21.2 Graphical representation



ICN-B6865-S5000F15016-002-00

Fig 20 S5000F UoF Failure Detection and Location – class model

21.3 S5000F UoF Failure Detection and Location - New class and interface definitions

21.3.1 DetectionMean

DetectionMean is an <<interface>> that allows to associate DetectionMeanCapabilities to the elements that allowed for detection of a failure.

Classes that implement the DetectionMean (inherited from HardwarePartAsDesigned) <<interface>> are:

- Accelerometer
- Accelerometer
- AggregatedElementRevision
- AllowedProductConfigurationHardwarePartAsDesigned
- BreakdownElementRevision
- HardwareElementRevision
- HardwarePartAsDesigned
- HardwarePartAsDesigned
- HardwarePartAsDesigned
- PartAsDesigned
- PressureSensor
- PressureSensor
- SensorType
- SensorType
- SoftwareElementRevision
- SoftwarePartAsDesigned
- SoftwarePartAsReleased
- StrainGauge
- StrainGauge
- SupportEquipment
- SupportEquipment
- Tachometer
- Tachometer
- TemperatureSensor
- TemperatureSensor
- ZoneElementRevision

DetectionMean associations:

- (related) The DetectionMean that determined the ShopFindings.
- Any class implementing the DetectionMean <<interface>> can have zero, one or many DetectionMeanCapabilities.

21.3.2 DetectionMeanCapability

DetectionMeanCapability is a class that identifies tha capability to detect a failure.

DetectionMeanCapability attributes:

- detectionMeanCapabilityCapabilityType
- detectionMeanCapabilityDescription
- detectionMeanCapabilityIdentifier

DetectionMeanCapability associations:

- A DetectionMeanCapability can have zero, one or many DetectionMechanisms associated to it.

- A DetectionMeanCapability must be of a defined class implementing teh DetectionMean <<interface>>.

21.3.3 DetectionMechanism

DetectionMechanism is a class that allows to define the mechanism by means of which a failure is detected.

DetectionMechanism attributes:

- detectionMechanismDescription
- detectionMechanismFalseAlarmRate
- detectionMechanismIdentifier
- detectionMechanismPresentation
- detectionMechanismType

DetectionMechanism associations:

- (relating) The DetectionMechanism that can detect a Failure.
- Each DetectionMechanism must be of a defined DetectionMeanCapability.

21.3.4 Detector

Detector is an <<interface>>representing the elements that can detect or have detected an anomalous behaviour (fault) in a SerializedHardwarePart.

Classes that implement the Detector (inherited from PartAsDesigned) <<interface>> are:

- Accelerometer
- AggregatedElementRevision
- AllowedProductConfigurationHardwarePartAsDesigned
- BreakdownElementRevision
- HardwareElementRevision
- HardwarePartAsDesigned
- HardwarePartAsDesigned
- MaintenancePerson
- OperatorPerson
- PartAsDesigned
- Person
- PressureSensor
- SensorType
- SoftwareElementRevision
- SoftwarePartAsDesigned
- StrainGauge
- SupportEquipment
- Tachometer
- TemperatureSensor
- ZoneElementRevision

Detector associations:

- An EquipomentFault can be associated to zero, one or many Detectors.

21.3.5 Failure

Failure is an <<interface>> that allows to identify the reason for an EquipmentFault.

Classes that implement the Failure <<interface>> are:

- FailureCause
- FailureMode

Failure associations:

- (relating) The Failure that relates to a SerializedHardwarePart.
- A Failure can be optionally associated to one instance of ShopFindings.
- The Failure FailureMode or FailureCause implementing the Failure <<interface>>) that is related to a DetectionMechanism.

21.3.6 FailureCause

The FailureCause class represents an unacceptable reduction of functionality of an item where the item cannot continue its intended use.

Note:
A failure occurs during proper usage of an item.

FailureCause attributes:

- failureCauseCode
- failureCauseDescription
- failureCauseIdentifier

FailureCause implements the following <<interface>>:

- Failure

FailureCause associations:

- Each FailureCause must be of a defined FailureMode.

21.3.7 FailureDetection

FailureDetection is a <<relationship>> that allows to define which DetectionMechanism is capable of detecting a specific Failure.

FailureDetection attributes:

- failureDetectionRate

FailureDetection associations:

- A DetectionMechanism can detect zero, one or many failures (via the FailureDetection <<relationship>>).

21.3.8 FailureMode

FailureMode represents an identifiable condition in which one element of a redundant system has failed (no longer available) and impacts on the required function output of the system.

FailureMode attributes:

- failureModeDescription
- failureModeIdentifier

FailureMode implements the following <<interface>>:

- CommentItem
- Failure

FailureMode associations:

- A FailureMode can have zero, one or many FailureCauses.
- A FailureMode can have zero, one or many FailureModeEffects.

21.3.9 FailureModeEffect

The FailureModeEffect class defines the consequences of an identified failure mode and its effect on the local/next higher/end item operation, function or status.

Note:
An instance of class FailureModeEffect has no meaning by itself, but only in context of an identified FailureMode.

FailureModeEffect attributes:

- failureModeEffectDescription
- failureModeEffectIdentifier

FailureModeEffect associations:

- Each FailureModeEffect must be of a defined FailureMode.

21.4 S5000F UoF Failure Detection and Location - Referenced classes and interfaces

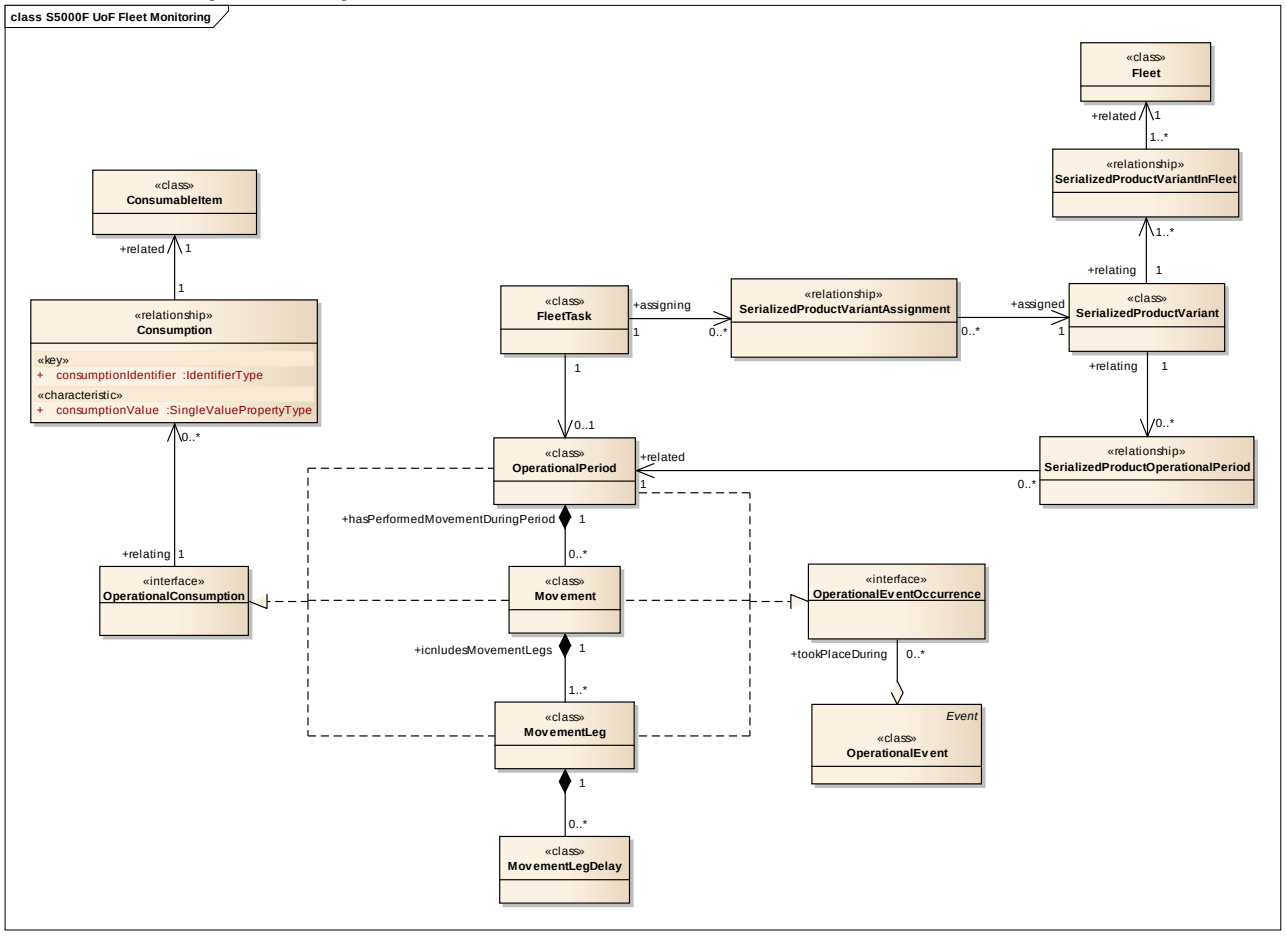
- BreakdownElementRevision
- EquipmentFault
- PartAsDesigned
- Person
- SerializedHardwarePart

22 S5000F UoFFleet Monitoring

22.1 Overall description

Fleet Monitoring UoF provides the capability to monitor the operational periods of a fleet.

22.2 Graphical representation



ICN-B6865-S5000F15017-002-00

Fig 21 S5000F UoF Fleet Monitoring – class model

22.3 S5000F UoF Fleet Monitoring - New class and interface definitions

22.3.1 Consumption

Consumption is a <<relationship>> that defines the product(s) that have been consumed by a SerializedProductVariant as part of an operational period, movement or movement leg.

Example:

- fuel consumption
- oil consumption

Consumption attributes:

- consumptionIdentifier
- consumptionValue

Consumption associations:

- The Consumption <<relationship>> associates the consumption during an OperationalPeriod, Movement or MovementLeg implementing the OperationalConsumption <<interface>> to the ConsumableItem that is being consumed.

22.3.2 OperationalConsumption

OperationalConsumption is an <<interface>> that allows to associate a product consumption to an operational period, movement or movement leg.

Classes that implement the OperationalConsumption <<interface>> are:

- Movement
- MovementLeg
- OperationalPeriod

OperationalConsumption associations:

- (relating) The OperationalPeriod, Movement or MovementLeg implementing the OperationalConsumption <<interface>> to which the Consumption applies.

22.4 S5000F UoF Fleet Monitoring - Referenced classes and interfaces

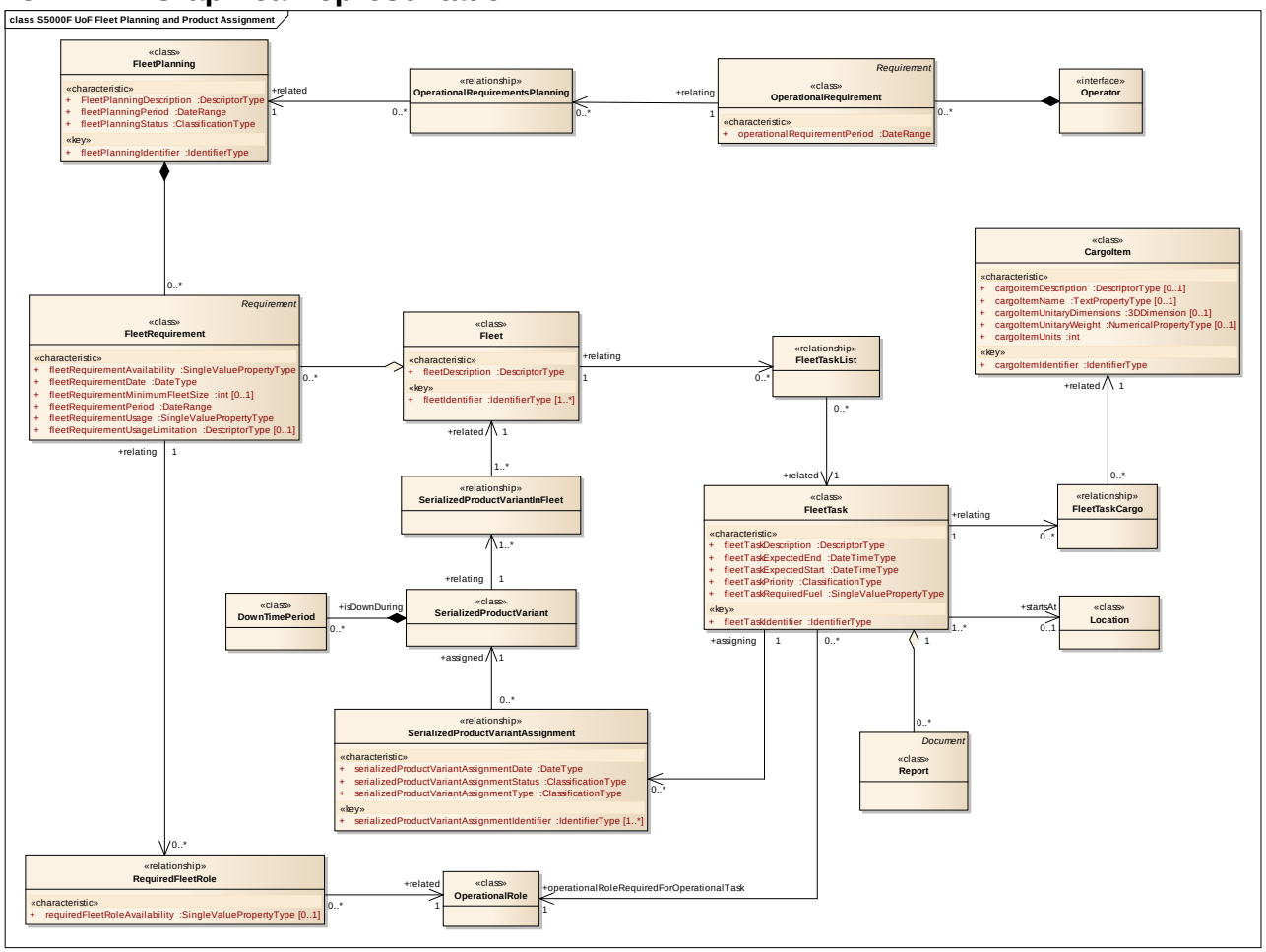
- ConsumableItem
- Fleet
- FleetTask
- Movement
- MovementLeg
- MovementLegDelay
- OperationalEvent
- OperationalEventOccurrence
- OperationalPeriod
- SerializedProductOperationalPeriod
- SerializedProductVariant
- SerializedProductVariantAssignment
- SerializedProductVariantInFleet

23 S5000F UoFFleet Planning and Product Assignment

23.1 Overall description

Fleet Planning and Product Assignment UoF provides the capability to plan the tasks to be carried out by a fleet of products and assign the most adequate product to carry out each task.

23.2 Graphical representation



ICN-B6865-S5000F15018-002-00

Fig 22 S5000F UoF Fleet Planning and Product – class model

23.3 S5000F UoF Fleet Planning and Product Assignment - New class and interface definitions

23.3.1 CargoItem

CargoItem is a class representing one or several items that need to be transported as part of a FleetTask.

Example:

- container(s)
- passenger(s)
- pallet(s)

Note:

CargoItem can be used to designate several entities of a same type, such as 50 passengers for a bus, or 2 pallets to be loaded on a truck.

The total weight of the CargoItem must be calculated by multiplying the unitary weight by the number of units.

The total dimensions of the CargoItem cannot be determined in case it consists of several items, as the final dimensions will depend on the arrangement of the different items; only the total volumne can be determined by summing up the volume of the different units.

CargoItem attributes:

- cargoItemDescription
- cargoItemIdentifier
- cargoItemName
- cargoItemUnitaryDimensions
- cargoItemUnitaryWeight
- cargoItemUnits

CargoItem associations:

- (related) The CargoItem that is associated to a FleetTask.

23.3.2 Fleet

The Fleet class represents a group of SerializedProductVariants, representing vehicles that move together, are engaged in the same activity, belong to a same owner or are operated by a same organization.

Example:

- aircraft of one airline
- warships of several countries performing joint exercises
- bicycles or cars of one hire company
- municipal buses of one town

Note:

Though Fleet is typically used for vehicles, the concept can be extended, for example to group all robots in a same manufacturing line.

Fleet attributes:

- fleetDescription
- fleetIdentifier

Fleet implements the following <<interface>>:

- ApplicabilityAssignmentItem
- CommentItem
- ContractItem
- CostEntryRelatedTo
- DocumentAssignmentItem
- SecurityClassificationItem
- ServiceItem

Fleet associations:

- A Fleet can be associated to zero, one or many FleetAvailabilities.
- Each Fleet can have zero, one or many FleetRequirements associated to it.
- (relating) The Fleet that has a set of related FleetTasks.
- (related) The Fleet to which a SerialiedProductVariant is related.

23.3.3 FleetPlanning

FleetPlanning is a class representing the planned usage of a fleet during a specified period of time.

FleetPlanning attributes:

- FleetPlanningDescription
- fleetPlanningIdentifier
- fleetPlanningPeriod

- fleetPlanningStatus

FleetPlanning associations:

- (related) The Fleetplanning that is related to an OpertaionalRequirement.
- A Fleetplanning can have zero, one or many FleetRequirements associated to it.

23.3.4 FleetRequirement

FleetRequirement is a Requirement (need) that a fleet must comply with.

Example:
- Two A/C in MedEvac role need to be available Monday thru Thursday.

FleetRequirement attributes:

- fleetRequirementAvailability
- fleetRequirementDate
- fleetRequirementMinimumFleetSize
- fleetRequirementPeriod
- fleetRequirementUsage
- fleetRequirementUsageLimitation
- requirementDescription (inherited from Requirement)
- requirementId (inherited from Requirement)
- requirementName (inherited from Requirement)
- requirementRaisedBy (inherited from Requirement)
- requirementType (inherited from Requirement)

FleetRequirement implements the following <<interface>>:

- DocumentAssignmentItem (inherited from Requirement)
- SecurityClassificationItem
- SecurityClassificationItem (inherited from Requirement)

FleetRequirement associations:

- A Requirement can be associated to a defined ServiceRequest. (inherited from Requirement)
- Each FleetRequirement can be associated to a Fleet.
- Each FleetRequirement must be associated to a defined FleetPlanning.
- The FleetRequirement that establishes a necessary OperationalRole.

23.3.5 FleetTask

The FleetTask class represents a planned activity to be carried out by a SerializedProductVariant as part of the activities that the fleet has to perform.

FleetTask attributes:

- fleetTaskDescription
- fleetTaskExpectedEnd
- fleetTaskExpectedStart
- fleetTaskIdentifier
- fleetTaskPriority
- fleetTaskRequiredFuel

FleetTask implements the following <<interface>>:

- CommentItem
- DocumentAssignmentItem

FleetTask associations:

- (related) The FleetTasks that are related to a Fleet.
- (relating) The FleetTask that relates to a CargoItem.
- A FleetTask can be associated to zero or one OperationalPeriods.
- A FleetTask can have zero, one or many Reports associated to it.
- A FleetTask may have zero or one FleetTaskCancellationNotices associated to it.
- A FleetTask must be associated with exactly one OperationalRole.
- A FleetTask must start at a single Location instance.
- Each SerializedProductVariant can be assigned to zero, one or many FleetTasks (via the SerializedProductVariantAssignment

23.3.6 FleetTaskCargo

FleetTaskCargo is a <<relationship>> that allows to associate a CargoItem to a FleetTask.

FleetTaskCargo associations:

- A FleetTask can be associated to zero, one or many CargoItems (via the FleetTaskCargo <<relationship>>).

23.3.7 FleetTaskList

FleetTaskList is a <<relationship>> that defines which FleetTasks are performed by which Fleets for a specific FleetPlanning.

FleetTaskList associations:

- A Fleet can have zero, one or many FleetTasks associated to it (via the FleetTaskList <<relationship>>).

23.3.8 OperationalRequirement

OperationalRequirement is a Requirement about a specific operation of the product.

OperationalRequirement attributes:

- operationalRequirementPeriod
- requirementDescription (inherited from Requirement)
- requirementId (inherited from Requirement)
- requirementName (inherited from Requirement)
- requirementRaisedBy (inherited from Requirement)
- requirementType (inherited from Requirement)

OperationalRequirement implements the following <<interface>>:

- DocumentAssignmentItem (inherited from Requirement)
- SecurityClassificationItem (inherited from Requirement)

OperationalRequirement associations:

- (relating) The OperationalRequirement that requires a FleetPlanning.
- A Requirement can be associated to a defined ServiceRequest. (inherited from Requirement)
- Each OperationalRequirement must be associated to a defined Operator.

23.3.9 OperationalRequirementsPlanning

OperationalRequirementsPlanning is a <<relationship>> that relates an OperationalRquirement to the FleetPlanning during one or several OperationalPeriods.

OperationalRequirementsPlanning associations:

- An OperationalRequirement can be associated to zero, one or many FleetPlannings (via the OperationalRequirementsPlanning

23.3.10 Operator

Operator is an <<interface>>that represents the entities that operate one or several SerializedProductVariants.

Classes that implement the Operator <<interface>> are:

- OperatorOrganization
- OperatorPerson

Operator associations:

- (related) A class instance implementing the Operator <<interface>> that is related to the OperationalEvent.
- The Operator that is related to an OperationalPeriod.
- (operates) The Operator (OperatorPerson or OperatorOrganization) that operates a SerializedProductVariant.
- Each Operator can ave zzero, one or many OperationalRequirements associated to it.
- An Operator can have zero, one or many FleetTaskCancellationNotices associated to it.

23.3.11 RequiredFleetRole

RequiredFleetRole is a <<relationship>> that allows to define the OperationalRoles that a FleetRequirement must meet.

RequiredFleetRole attributes:

- requiredFleetRoleAvailability

RequiredFleetRole associations:

- A FleetRequirement can be associated to zero, one or many required OperationalRoles (via the RequiredFleetRole <<relationship>>).

23.3.12 SerializedProductVariantAssignment

SerializedProductVariantAssignment is a <<relationship>> between a FleetTask and the vehicle that has been assigned to perform that FleetTask.

Note:
Note that the SerializedProductVariant is a vehicle in this case.

SerializedProductVariantAssignment attributes:

- serializedProductVariantAssignmentDate
- serializedProductVariantAssignmentIdentifier
- serializedProductVariantAssignmentStatus
- serializedProductVariantAssignmentType

SerializedProductVariantAssignment associations:

- (assigning) The FleetTask to which a SerializedProductVariant is assigned (via the SerializedProductVariantAssignment <<relationship>.

23.4 S5000F UoF Fleet Planning and Product Assignment - Referenced classes and interfaces

- DownTimePeriod
- Location
- OperationalRole

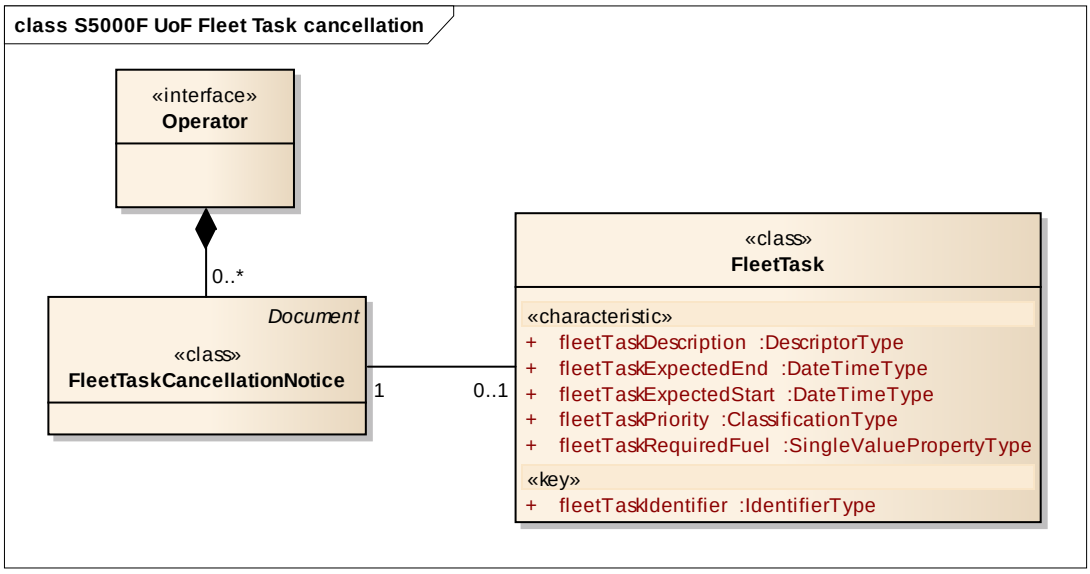
- Report
- SerializedProductVariant
- SerializedProductVariantInFleet

24 S5000F UoFFleet Task cancellation

24.1 Overall description

Fleet Task cancellation provides the capability to cancel a FleetTask.

24.2 Graphical representation



ICN-B6865-S5000F15061-001-00

Fig 23 S5000F UoF Fleet Task cancellation – class model

24.3 S5000F UoF Fleet Task cancellation - New class and interface definitions

24.3.1 FleetTaskCancellationNotice

FleetTaskCancellationNotice is a Document published by an Operator to cancel a FleetTask.

FleetTaskCancellationNotice attributes:

- documentCreationDate (inherited from Document)
- documentDescription (inherited from Document)
- documentIdentifier (inherited from Document)
- documentStatus (inherited from Document)
- documentTitle (inherited from Document)
- documentType (inherited from Document)

FleetTaskCancellationNotice implements the following <<interface>>:

- ApplicabilityAssignmentItem (inherited from Document)
- CommentItem (inherited from Document)
- DocumentAssignmentItem (inherited from Document)
- DocumentItem (inherited from Document)
- SecurityClassificationItem (inherited from Document)

FleetTaskCancellationNotice associations:

- (relating) The Document that relates to a MaintenanceActivity. (inherited from Document)

- (relating) The Document that relates to any class implemnting the SubjectOfPoliciesAndRegulations <<interface>>. (inherited from
- A FleetTaskCancellationNotice must be always associated with a FleetTask.
- An optional association with its DocumentIssues (inherited from Document)
- Each Document can relate to zero, one or many Documents (via the DocumentAssociation <<relationship>> class) (inherited from Document)
- Each FleetTaskCancellationNotice must be associated to an Operator.

24.4 S5000F UoF Fleet Task cancellation - Referenced classes and interfaces

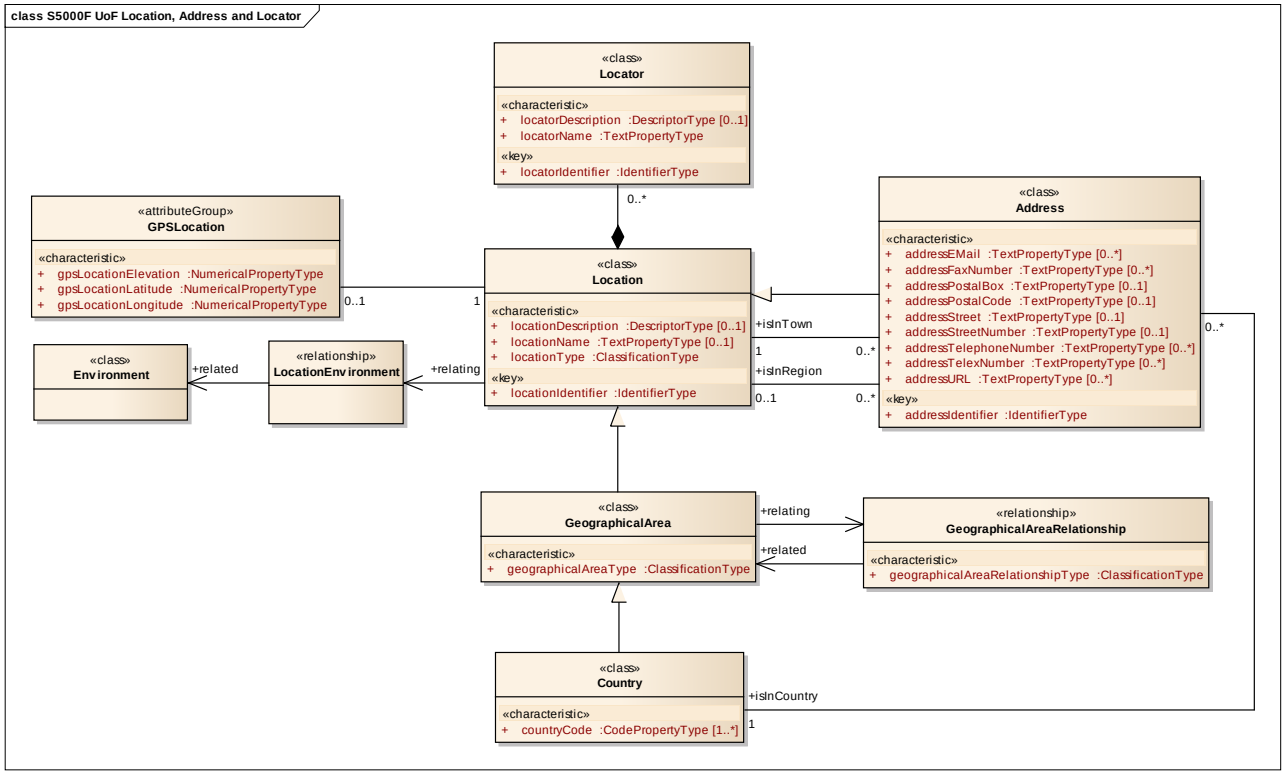
- FleetTask
- Operator

25 S5000F UoFLocation, Address and Locator

25.1 Overall description

Location, Address and Locator UoF provides the capability to specify the physical and functional location of an item.

25.2 Graphical representation



ICN-B6865-S5000F15019-002-00

Fig 24 S5000F UoF Location, Address and Locator – class model

25.3 S5000F UoF Location, Address and Locator - New class and interface definitions

25.3.1 Address

Address is a specific geographical location that has been uniquely identified and where somebody lives or an organization or facility is located.

Example:

- street address

- department address

Address attributes:

- addressEMail
- addressFaxNumber
- addressIdentifier
- addressPostalBox
- addressPostalCode
- addressStreet
- addressStreetNumber
- addressTelephoneNumber
- addressTelexNumber
- addressURL
- locationDescription (inherited from Location)
- locationIdentifier (inherited from Location)
- locationName (inherited from Location)
- locationType (inherited from Location)

Address implements the following <<interface>>:

- DocumentAssignmentItem (inherited from Location)

Address associations:

- A Location instance can be associated to zero, one or many FleetTasks that start at that Location. (inherited from Location)
- OperationalPeriod can be optionally associated to the Location where the OperationalPeriod started. (inherited from Location)
- OperationalPeriod can be optionally associated to the Location where the OperationalPeriod ended. (inherited from Location)
- Each Location can have zero, obe or many Locators assocaited to it. (inherited from Location)
- MovementLeg must be associated to the Location where the MovementLeg ended. (inherited from Location)
- An Adress is always related to a Location representing the time where it is located.
- An Address must be associated to the Country where it is located.
- An Address can be obtionally associated to a Location representing the region where it is located.
- A WarrantyClaim can be optionally associated to a Location instance. (inherited from Location)
- A Location can bve associated to zero, one or many ReportableActivities. (inherited from Location)
- A Location can be associated to zero, one or many ResourceUsageRequests. (inherited from Location)
- A Location can be associated to zero, one or many Events. (inherited from Location)
- A Location can be associated to zero, one or many Addresses to represent the town where that Address is located. (inherited from Location)
- A Location can be associated to zero, one or many Addresses to indicate the reion where the Address is located. (inherited from Location)
- MovementLeg must be associated to the Location where the MovementLeg started. (inherited from Location)
- A Facility can be optionally associated to an Address.
- (relating) The Location that relates to an Environment. (inherited from Location)
- (related) The Location that is related to a ServiceRequest. (inherited from Location)
- (related) The Address associated to a Party.

- A Location can have oprtionally a GPSLocation <<attributeGroup>>. (inherited from Location)

25.3.2 Country

Country is a GeographicalArea occupied by a nation with its own government.

Example:
- USA, France, Germany

Country attributes:

- countryCode
- geographicalAreaType (inherited from GeographicalArea)
- locationDescription (inherited from Location)
- locationIdentifier (inherited from Location)
- locationName (inherited from Location)
- locationType (inherited from Location)

Country implements the following <<interface>>:

- DocumentAssignmentItem (inherited from Location)

Country associations:

- A WarrantyClaim can be optionally associated to a Location instance. (inherited from Location)
- OperationalPeriod can be optionally associated to the Location where the OperationalPeriod started. (inherited from Location)
- OperationalPeriod can be optionally associated to the Location where the OperationalPeriod ended. (inherited from Location)
- MovementLeg must be associated to the Location where the MovementLeg started. (inherited from Location)
- MovementLeg must be associated to the Location where the MovementLeg ended. (inherited from Location)
- Each Location can have zero, obe or many Locators assocaited to it. (inherited from Location)
- A Location can be associated to zero, one or many Addresses to represent the town where that Address is located. (inherited from Location)
- Each GeographicalArea can be related to from zero, one or many other GeographicalAreas(via the GeographicalAreaRelationship
- <<relationship>> class) (inherited from GeographicalArea)
- Each Country can be associated to zero, one or many Addresses.
- A Location instance can be associated to zero, one or many FleetTasks that start at that Location. (inherited from Location)
- A Location can have oprtionally a GPSLocation <<attributeGroup>>. (inherited from Location)
- A Location can bve associated to zero, one or many ReportableActivities. (inherited from Location)
- A Location can be associated to zero, one or many Events. (inherited from Location)
- A Location can be associated to zero, one or many Addresses to indicate the reion where the Address is located. (inherited from Location)
- (relating) The Location that relates to an Environment. (inherited from Location)
- (related) The Location that is related to a ServiceRequest. (inherited from Location)
- A Location can be associated to zero, one or many ResourceUsageRequests. (inherited from Location)

25.3.3 GeographicalArea

GeographicalArea is a location that describes a geographical zone.

Example:

- Europe, Spain, Madrid, Massachusetts, Alps, Gobi desert

Note:

The geographicalAreaType will indicate whether it is a continent, region, country, province, city, etc.

GeographicalArea attributes:

- geographicalAreaType
- locationDescription (inherited from Location)
- locationIdentifier (inherited from Location)
- locationName (inherited from Location)
- locationType (inherited from Location)

GeographicalArea implements the following <<interface>>:

- DocumentAssignmentItem (inherited from Location)

GeographicalArea associations:

- OperationalPeriod can be optionally associated to the Location where the OperationalPeriod started. (inherited from Location)
- Each GeographicalArea can be related to from zero, one or many other GeographicalAreas(via the GeographicalAreaRelationship
- <<relationship>> class)
- A Location can be associated to zero, one or many Events. (inherited from Location)
- Each Location can have zero, obe or many Locators assocaited to it. (inherited from Location)
- MovementLeg must be associated to the Location where the MovementLeg ended. (inherited from Location)
- OperationalPeriod can be optionally associated to the Location where the OperationalPeriod ended. (inherited from Location)
- A WarrantyClaim can be optionally associated to a Location instance. (inherited from Location)
- MovementLeg must be associated to the Location where the MovementLeg started. (inherited from Location)
- A Location can have oprtionally a GPSLocation <<attributeGroup>>. (inherited from Location)
- A Location can be associated to zero, one or many ResourceUsageRequests. (inherited from Location)
- A Location can be associated to zero, one or many Addresses to represent the town where that Address is located. (inherited from Location)
- A Location can be associated to zero, one or many Addresses to indicate the reion where the Address is located. (inherited from Location)
- (relating) The Location that relates to an Environment. (inherited from Location)
- (related) The Location that is related to a ServiceRequest. (inherited from Location)
- A Location instance can be associated to zero, one or many FleetTasks that start at that Location. (inherited from Location)
- A Location can bve associated to zero, one or many ReportableActivities. (inherited from Location)

25.3.4 GeographicalAreaRelationship

GeographicalAreaRelationship is a <<relationship>> that determines how a GeographicalArea is related to another one.

Example:

- belongs to, is adyacent to, is south of

GeographicalAreaRelationship attributes:

- geographicalAreaRelationshipType

GeographicalAreaRelationship associations:

- (related) The GeographicalArea that relates to another GeographicalArea
- (relating) The GeographicalArea that relates to another GeographicalArea

25.3.5 GPSLocation

GPSLocation is an AttributeGroup representing a point in space that defines where a location is geographically situated.

GPSLocation attributes:

- gpsLocationElevation
- gpsLocationLatitude
- gpsLocationLongitude

GPSLocation associations:

- (related) The GPSLocation that is related to a MovementLeg.

25.3.6 Location

Location is a permanent geographical position where an item can be physically present.

Example:

- Paris, Alabama, Spain, South America, port of Rotterdam, Picadilly Circus

Note:
A location can span a broad area or territory or refer to a very precise geographical spot.

Location attributes:

- locationDescription
- locationIdentifier
- locationName
- locationType

Location implements the following <<interface>>:

- DocumentAssignmentItem

Location associations:

- A WarrantyClaim can be optionally associated to a Location instance.
- A Location can have oprtionally a GPSLocation <<attributeGroup>>.
- OperationalPeriod can be optionally associated to the Location where the OperationalPeriod started.
- OperationalPeriod can be optionally associated to the Location where the OperationalPeriod ended.
- MovementLeg must be associated to the Location where the MovementLeg started.
- Each Location can have zero, obe or many Locators assocaited to it.

- A Location instance can be associated to zero, one or many FleetTasks that start at that Location.
- A Location can be associated to zero, one or many ResourceUsageRequests.
- (related) The Location that is related to a ServiceRequest.
- A Location can be associated to zero, one or many Events.
- MovementLeg must be associated to the Location where the MovementLeg ended.
- A Location can be associated to zero, one or many Addresses to represent the town where that Address is located.
- A Location can be associated to zero, one or many Addresses to indicate the reion where the Address is located.
- (relating) The Location that relates to an Environment.
- A Location can bve associated to zero, one or many ReportableActivities.

25.3.7 Locator

Locator is a functional area that indicates where an item is physically placed at a specific location.

Example:

- Drawer or shelf in a warehouse, location identifier for company department.

Note:

Contrary to Location, a Locator cannot be placed on a map and might be reassigned from one location to a different one.

Locator attributes:

- locatorDescription
- locatorIdentifier
- locatorName

Locator implements the following <<interface>>:

- DocumentAssignmentItem

Locator associations:

- Each Locator must be associated to a defined Location.
- A Locator may have zero, one or many DocumentItems assigned to it.

25.4 S5000F UoF Location, Address and Locator - Referenced classes and interfaces

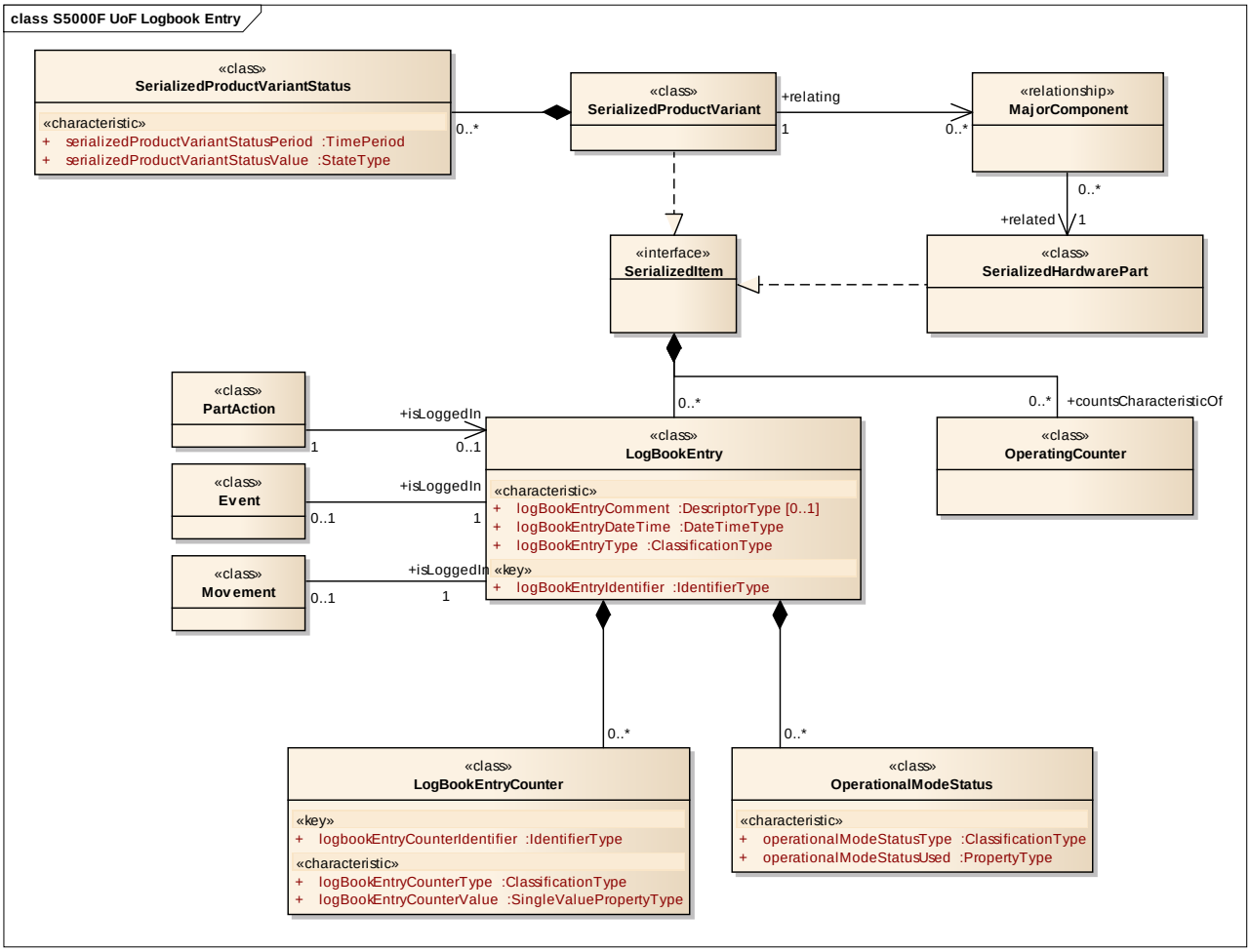
- Environment

26 S5000F UoFLogbook Entry

26.1 Overall description

Logbook Entry UoF provides the registered information about a serialized item.

26.2 Graphical representation



ICN-B6865-S5000F15051-002-00

Fig 25 S5000F UoF Logbook Entry – class model

26.3 S5000F UoF Logbook Entry - New class and interface definitions

26.3.1 LogBookEntry

LogBookEntry is an individual entry into a logbook, defining one critical activity or event to be included in the LogBook.

Example:

- operating hours
- maintenance actions
- overhaul
- flight hours
- cycles
- landings

Note 1:
Multiple counters can be associated to a single logbook entry.

Note 2:
A LogBookEntry can be used for operation, maintenance, overhaul, etc.

LogBookEntry attributes:

- logBookEntryComment
- logBookEntryDateTime
- logBookEntryIdentifier
- logBookEntryType

LogBookEntry implements the following <<interface>>:

- CommentItem
- DocumentAssignmentItem

LogBookEntry associations:

- A LogBookEntry can have zero, one or many OperationalModeStatuses associated to it.
- Each LogBookEntry must be of a defined class implementing the SerializedItem <<interface>>.
- An Event instance can be optionally logged in a LogBookEntry instance.
- A LogBookEntry may be associated to zero, one or many MaintenanceEvents.
- A LogBookEntry instance can be associated to a PartAction that it logs.
- A LogBookEntry can have zero, one or many LogBookEntryCounters.
- A LogBookEntry instance can log a single Movement instance.

26.3.2 LogBookEntryCounter

LogBookEntryCounter is the value of a specific product counter when the logbook entry was performed.

LogBookEntryCounter attributes:

- logbookEntryCounterIdentifier
- logBookEntryCounterType
- logBookEntryCounterValue

LogBookEntryCounter associations:

- Each LogBookEntryCounter must be of a defined LogBookEntry

26.3.3 MajorComponent

MajorComponent is a <<relationship>> declaring that a HardwarePartAsSerialized is of special importance within a

SerializedProductVariant and therefore needs special tracking.

Example:

- Engine
- Landing gear

Note:

A MajorComponent is typically an item that, though embedded in a Product, can be considered a product of its own.

MajorComponent associations:

- A SerielizedProductVariant can be associated with zero, one or many SerializedHardwareParts that have been identified as major components (via the MajorComponent <<relationship>>).

26.3.4 OperationalModeStatus

Mode of operation associated to a LogBookEntry.

Example:

- full power, ETOPS (for aviation).

OperationalModeStatus attributes:

- operationalModeStatusType
- operationalModeStatusUsed

OperationalModeStatus associations:

- Each OperationalModeStatus must be associated to a defined LogBookEntry.

26.3.5 SerializedProductVariantStatus

SerializedProductVariantStatus is a class that describes the operational status of a SerializedProductVariant during specific periods of time.

SerializedProductVariantStatus attributes:

- serializedProductVariantStatusPeriod
- serializedProductVariantStatusValue

SerializedProductVariantStatus associations:

- Each SerializedProductVariantStatus must be associated to a defined SerializedProductVAriant.

26.4 S5000F UoF Logbook Entry - Referenced classes and interfaces

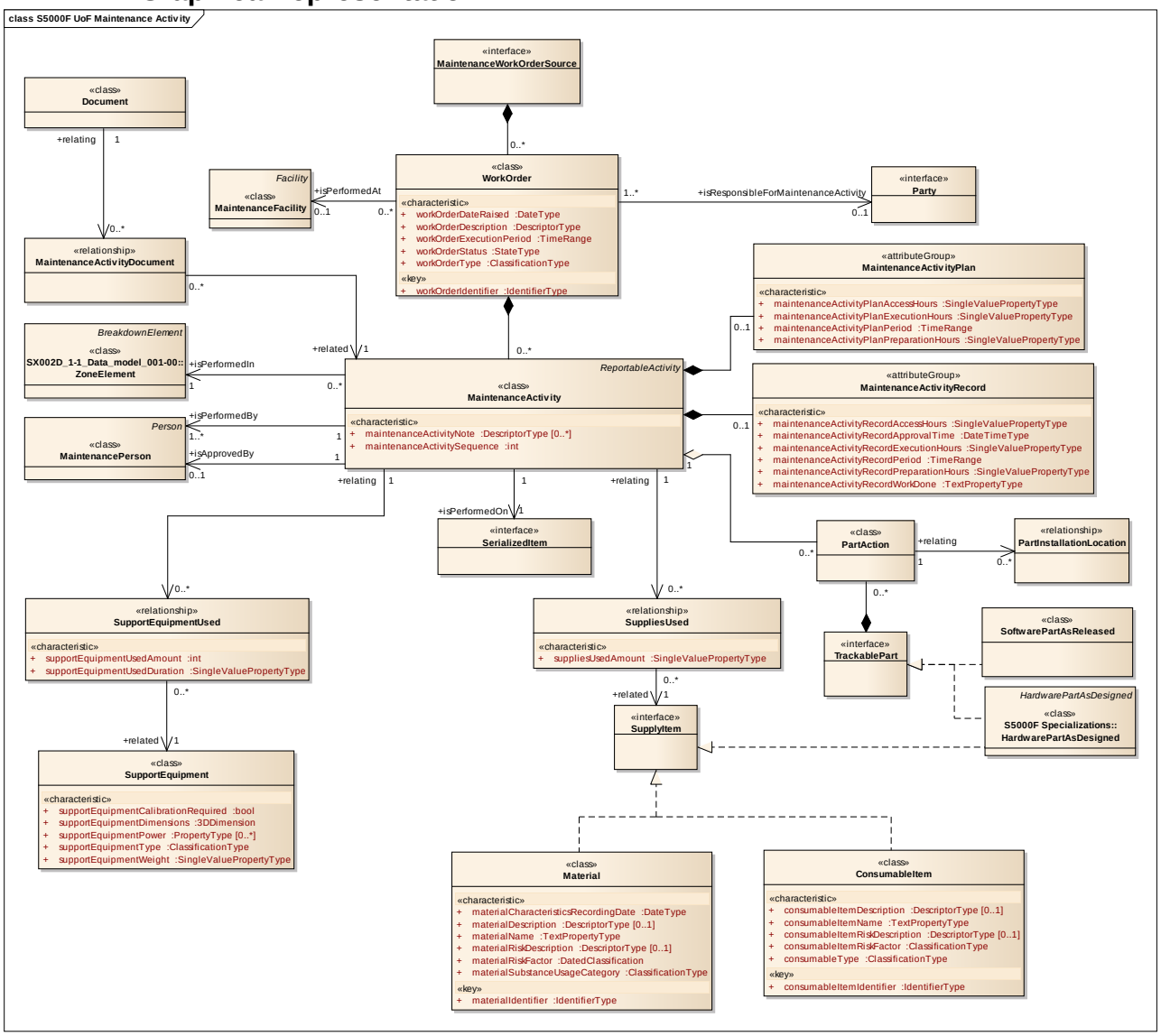
- Event
- Movement
- OperatingCounter
- PartAction
- SerializedHardwarePart
- SerializedItem
- SerializedProductVariant

27 S5000F UoFMaintenance Activity

27.1 Overall description

The Maintenance Activity UoF provides all the necessary information associated to the execution of a maintenance activity.

27.2 Graphical representation



ICN-B6865-S5000F15020-002-00

Fig 26 S5000F UoF Maintenance Activity – class model

27.3 S5000F UoF Maintenance Activity - New class and interface definitions

27.3.1 ConsumableItem

ConsumableItem is a supply item that is consumed and cannot be reused.

Example:

- oil
- fuel
- grease
- detergent

ConsumableItem attributes:

- consumableItemDescription
- consumableItemIdentifier
- consumableItemName

- consumableItemRiskDescription
- consumableItemRiskFactor
- consumableType

ConsumableItem implements the following <<interface>>:

- SupplyItem

ConsumableItem associations:

- (related) The ConsumableItem that is being consumed.

27.3.2 MaintenanceActivity

MaintenanceActivity is a ReportableActivity that is associated to a maintenance task.

MaintenanceActivity attributes:

- maintenanceActivityNote
- maintenanceActivitySequence
- reportableActivityIdentifier (inherited from ReportableActivity)
- reportableActivityPeriod (inherited from ReportableActivity)
- reportableActivityReportingDate (inherited from ReportableActivity)

MaintenanceActivity implements the following <<interface>>:

- CommentItem (inherited from ReportableActivity)
- CostEntryRelatedTo (inherited from ReportableActivity)
- DocumentAssignmentItem
- ReportableItem (inherited from ReportableActivity)

MaintenanceActivity associations:

- A MaintenanceActivity can have zero, one or many PartActions associated to it.
- Each ReportableActivity can be associated to a WorkItem. (inherited from ReportableActivity)
- Each MAintenanceActivity must be associated to a defined WorkOrder.
- A ReportableActivity is always reported by a Person or Organization (via the Party <<interface>>). (inherited from ReportableActivity)
- A ReportableActivity instance is always performed by a Person or Organization (via the Party <<interface>>). (inherited from
- A ReportableActivity can be optionally associated to a Location where such ReportableActivity is carried out. (inherited from
- A MaintenanceActivity is associated to one or many Person instances carrying out such MaintenanceActivity.
- A MaintenanceActivity is always performed on an instance of a class implementing the SerializedItem <<interface>>.
- A MaintenanceActivity can have zero or one MaintenanceActivityRecord associated to it.
- A MaintenanceActivity can have zero or one MaintenanceActivityPlans associated to it.
- A MaintenanceActivity can be optionally associated to a MaintenancePerson instance that approves such MaintenanceActivity.
- (relating) The MaintenanceActivity using the Supplies.
- (relating) The MaintenanceActivity using a SupportEquipment.
- (related) The MaintenanceActivity that is related to a Document.
- A MaintenanceActivity is associated to a ZoneElement instance where the activity is performed.

27.3.3 MaintenanceActivityDocument

MaintenanceActivityDocument is a <<relationship>> that allows to associate documents (relating) to a MaintenanceActivity requiring them (related).

MaintenanceActivityDocument associations:

- A Dcoument can be associated zero, one or many times to a MaintenanceActivity (via the MaintenanceActivityDocument <<relationship>>).

27.3.4 MaintenanceActivityPlan

MaintenanceActivityPlan <<attributeGroup>> details the information associated to the planning of a MaintenanceActivity.

MaintenanceActivityPlan attributes:

- maintenanceActivityPlanAccessHours
- maintenanceActivityPlanExecutionHours
- maintenanceActivityPlanPeriod
- maintenanceActivityPlanPreparationHours

MaintenanceActivityPlan associations:

- An instance of MaintenanceActivityPlan is always related to a specific instance of MaintenanceActivity.

27.3.5 MaintenanceActivityRecord

MaintenanceActivityRecord is an <<attributeGroup>> that details the information associated to the execution of a

MaintenanceActivityRecord attributes:

- maintenanceActivityRecordAccessHours
- maintenanceActivityRecordApprovalTime
- maintenanceActivityRecordExecutionHours
- maintenanceActivityRecordPeriod
- maintenanceActivityRecordPreparationHours
- maintenanceActivityRecordWorkDone

MaintenanceActivityRecord associations:

- An instance of MaintenanceActivityRecord is always related to a specific instance of MaintenanceActivity

27.3.6 Material

Material is a substance that can be refined in a manufacturing process.

Example:

- sheet metal
- plastic
- copper

Material attributes:

- materialCharacteristicsRecordingDate
- materialDescription
- materialIdentifier
- materialName
- materialRiskDescription
- materialRiskFactor

- materialSubstanceUsageCategory

Material implements the following <<interface>>:

- CostEntryRelatedTo
- DocumentAssignmentItem
- SupplyItem

27.3.7 SuppliesUsed

SuppliesUsed is a <<relationship>> that describes the amount of supplies used for a MaintenanceActivity.

SuppliesUsed attributes:

- suppliesUsedAmount

SuppliesUsed associations:

- A MaintenanceActivity can use zero, one or many items implementing the SupplyItem <<interface>> via the SuppliesUsed <<relationship>>.

27.3.8 SupplyItem

SupplyItem is an item that is used for maintenance or operation.

Classes that implement the SupplyItem (inherited from HardwarePartAsDesigned) <<interface>> are:

- Accelerometer
- ConsumableItem
- HardwarePartAsDesigned
- Material
- PressureSensor
- SensorType
- StrainGauge
- SupportEquipment
- Tachometer
- TemperatureSensor

SupplyItem associations:

- (related) The class implementing the SupplyItem <<interface>> that is used as a SUpply for a MaintenanceActivity.

27.3.9 SupportEquipment

SupportEquipment is a HardwareElement used exclusively for support purposes.

Example:

- Automatic Test Equipment (ATE)
- borescope
- oscilloscope
- tester
- tow bar
- hoisting device

SupportEquipment attributes:

- partExportControl (inherited from HardwarePartAsDesigned)
- partIdentifier (inherited from PartAsDesigned)
- partMajorComponent (inherited from HardwarePartAsDesigned)

- partName (inherited from PartAsDesigned)
- supportEquipmentCalibrationRequired
- supportEquipmentDimensions
- supportEquipmentPower
- supportEquipmentType
- supportEquipmentWeight

SupportEquipment implements the following <<interface>>:

- AllowedProductConfigurationItem (inherited from HardwarePartAsDesigned)
- AllowedProductOperationalConfigurationItem (inherited from HardwarePartAsDesigned)
- ApplicabilityAssignmentItem (inherited from HardwarePartAsDesigned)
- ChangeControlledItem (inherited from HardwarePartAsDesigned)
- CommentItem (inherited from HardwarePartAsDesigned)
- ContractItem (inherited from HardwarePartAsDesigned)
- CostEntryRelatedTo (inherited from HardwarePartAsDesigned)
- DetectionMean (inherited from HardwarePartAsDesigned)
- DetectionMean (inherited from PartAsDesigned)
- Detector (inherited from PartAsDesigned)
- DocumentAssignmentItem (inherited from HardwarePartAsDesigned)
- ResourceItem (inherited from HardwarePartAsDesigned)
- SecurityClassificationItem (inherited from PartAsDesigned)
- ServiceItem (inherited from HardwarePartAsDesigned)
- SupplyItem (inherited from HardwarePartAsDesigned)
- TrackablePart (inherited from HardwarePartAsDesigned)

SupportEquipment associations:

- (child) The PartAsDesigned instance that is related to a PartAsDesignedPartsList. (inherited from PartAsDesigned)
- (related) The HardwarePartAsDesigned instance that must be stocked in the Pool. (inherited from HardwarePartAsDesigned)
- (related) The HardwarePartAsDesigned that is related to a SerializedHardwarepart. (inherited from HardwarePartAsDesigned)
- (related) THe SupportEquipment used by a MaintenanceActivity.
- A HardwarePartAsDesigned can have zero, one or many individual NonSerializedHardwareParts associated to it. (inherited from
- HardwarePartAsDesigned)
- A SupportEquiment can be associated to a Facility where it is available.
- Each HardwarePartAsDesigned can have zero or one HardwarePartAsDesignedCommerceData <<attributeGroup>>. (inherited from
- HardwarePartAsDesigned)

27.3.10 SupportEquipmentUsed

SupportEquipmentUsed is a <<relationship>> that defines the equipment that has been used to perform a specific MaintenanceActivity.

SupportEquipmentUsed attributes:

- supportEquipmentUsedAmount
- supportEquipmentUsedDuration

SupportEquipmentUsed associations:

- A MaintenanceActivity can be associated to zero, one or many SupportEquipments that it has used.

27.3.11 WorkOrder

WorkOrder is an instruction to perform maintenance work on a SerializedItem.

WorkOrder attributes:

- workOrderDateRaised
- workOrderDescription
- workOrderExecutionPeriod
- workOrderIdentifier
- workOrderStatus
- workOrderType

WorkOrder implements the following <<interface>>:

- CommentItem
- CostEntryRelatedTo
- DocumentAssignmentItem
- MaintenanceWorkOrderSource
- ReportableItem

WorkOrder associations:

- Each WorkOrder must be associated to a class implementing the MaintenanceWorkOrderSource <<interface>>.
- A WorkOrder can be optionally associated to a MaintenanceFacility where the work has to be performed.
- A WorkOrder can have zero, one or many MaintenanceActivities associated to it.
- A WorkOrder has an optional association with a Person or Organization implementing the Party <<interface>> that is responsible for the
- MaintenanceActivities associated to that WorkOrder.

27.4 S5000F UoF Maintenance Activity - Referenced classes and interfaces

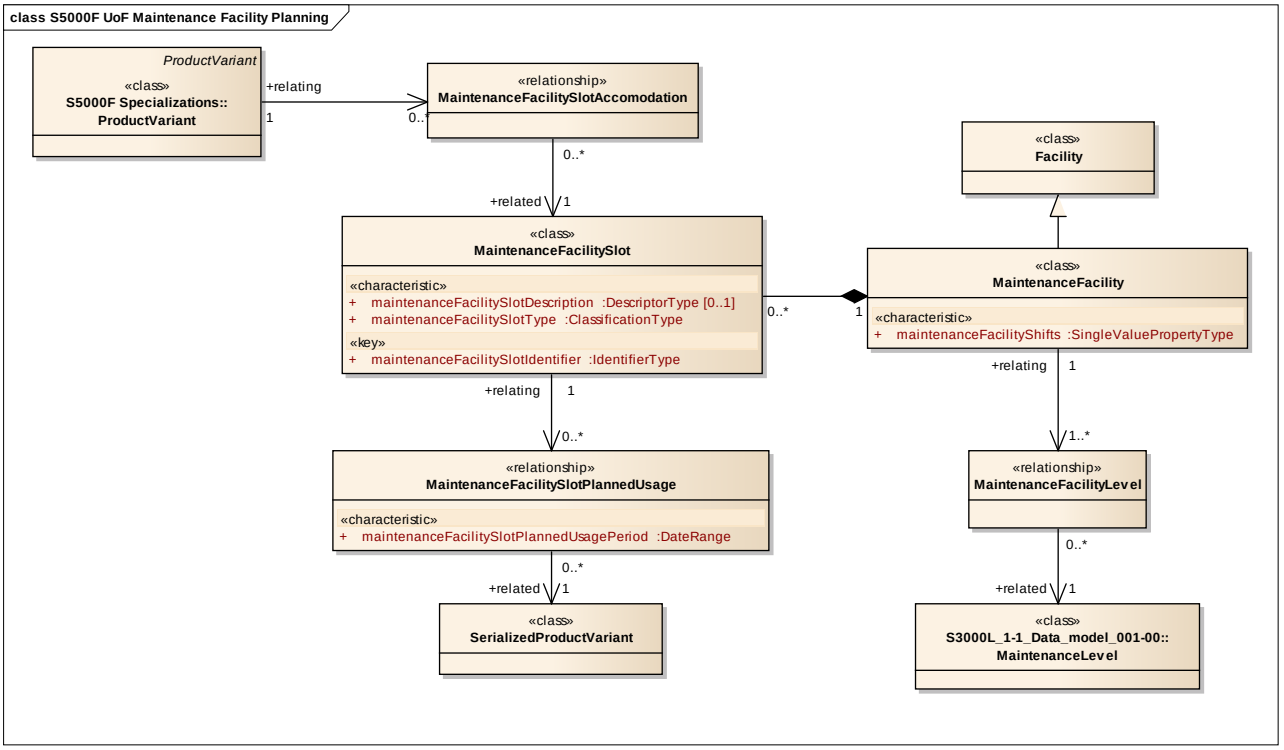
- Document
- HardwarePartAsDesigned
- MaintenanceFacility
- MaintenancePerson
- MaintenanceWorkOrderSource
- PartAction
- PartInstallationLocation
- Party
- SerializedItem
- SoftwarePartAsReleased
- TrackablePart
- ZoneElement

28 S5000F UoFMaintenance Facility Planning

28.1 Overall description

Maintenance Facility Planning UoF provides the necessary information about the Products that can be maintained at one specific facility, as well as the available maintenance slots.

28.2 Graphical representation



ICN-B6865-S5000F15021-002-00

Fig 27 S5000F UoF Maintenance Facility Planning – class model

28.3 S5000F UoF Maintenance Facility Planning - New class and interface definitions

28.3.1 MaintenanceFacility

MaintenanceFacility is a Facility dedicated to carry out maintenance actions.

MaintenanceFacility attributes:

- facilityCleansiness (inherited from Facility)
- facilityDescription (inherited from Facility)
- facilityDimensions (inherited from Facility)
- facilityIdentifier (inherited from Facility)
- facilityName (inherited from Facility)
- facilityType (inherited from Facility)
- maintenanceFacilityShifts

MaintenanceFacility implements the following <<interface>>:

- ApplicabilityAssignmentItem (inherited from Facility)
- CommentItem (inherited from Facility)
- ContractItem (inherited from Facility)
- CostEntryRelatedTo (inherited from Facility)
- DocumentAssignmentItem (inherited from Facility)
- ResourceItem (inherited from Facility)
- SecurityClassificationItem (inherited from Facility)
- ServiceItem (inherited from Facility)
- SubjectOfPoliciesAndRegulations (inherited from Facility)

MaintenanceFacility associations:

- (related) The MaintenanceFacility where tha MaintenancePerson has worked.
- (relating) The MaintenanceFacility that relates to a MaintenanceLevel.
- A Facility can be associated to zero, one or many Environments. (inherited from Facility)
- A Facility can be associated to zero, one or many ShopFindings. (inherited from Facility)
- A Facility can be optionally associated to an Address. (inherited from Facility)
- A Facility can have zero, one or many SupportEquipments associated to it. (inherited from Facility)
- A MaintenanceFacility can have zero, one or many MaintenanceFacilitySlot associated to it.
- A MaintenanceFacility can have zero, one or many WorkOrders associated to it.
- Each Facility can be related to from zero, one or many other Facilities (via the FacilityRelationship <<relationship>> class) (inherited from
- Each MaintenanceFAcility can be associated to one MaintenanceOrganization that operates it.

28.3.2 MaintenanceFacilityLevel

MaintenanceFacilityLevel is a <<relationship> that defines the MaintenanceLevels of a Facility.

MaintenanceFacilityLevel associations:

- A MaintenanceFacility must be associated to at least one MaintenanceLevel (via the MaintenanceFacilityLevel <<relationship>>).

28.3.3 MaintenanceFacilitySlot

MaintenanceFacilitySlot is a fixed position within a MaintenanceFacility in which exactly one SerializedProductVariant can be accommodated.

MaintenanceFacilitySlot attributes:

- maintenanceFacilitySlotDescription
- maintenanceFacilitySlotIdentifier
- maintenanceFacilitySlotType

MaintenanceFacilitySlot associations:

- Each MaintenanceFacilitySlot must be associated to a defined MaintenanceFacility.
- (related) THe MaintenanceFacilitySlot that is related to a ProductVariant.
- (relating) The MaintenanceFailitySlot that relates to a SerializedProductVariant.

28.3.4 MaintenanceFacilitySlotAccomodation

MaintenanceFacilitySlotAccomodation is a <<relationship>> that defines which ProductVariants can be accommodated in a specific MaintenanceFacilitySlot.

MaintenanceFacilitySlotAccomodation associations:

- A ProductVariant can be associated to zero, one or many MaintenanceFacilitySlots where it can be maintained (via the MaintenanceFacilitySlotAccomodation <<relationship>).

28.3.5 MaintenanceFacilitySlotPlannedUsage

MaintenanceFacilitySlotPlannedUsage is a <<relationship>> that indicates the planned allocation of a MaintenanceFacilitySlot to a specific SerializedProductVariant.

MaintenanceFacilitySlotPlannedUsage attributes:

- maintenanceFacilitySlotPlannedUsagePeriod

MaintenanceFacilitySlotPlannedUsage associations:

– A MaintenanceFacilitySlot can be associated to zero, one or many SerializedProductVariants that are supposed to be able to use that MaintenanceFacilitySlot (via the MaintenanceFacilitySlotPlannedUsage <<relationship>>.

28.4 S5000F UoF Maintenance Facility Planning - Referenced classes and interfaces

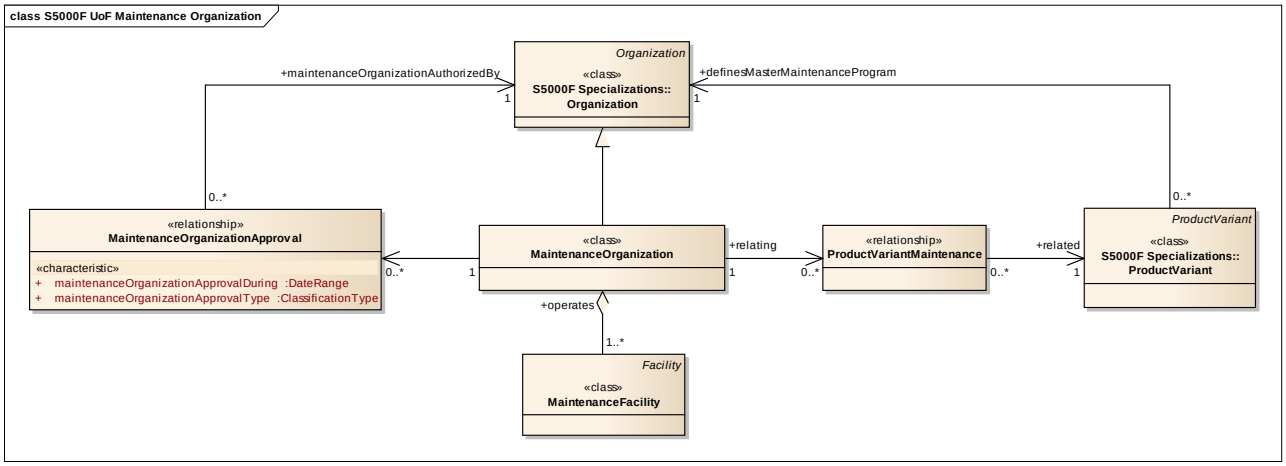
– Facility
– MaintenanceLevel
– ProductVariant
– SerializedProductVariant

29 S5000F UoFMaintenance Organization

29.1 Overall description

Maintenance Organization UoF provides the necssary information about the accreditations of a manitenance organization as well as the type of ProductVariants that it can maintain.

29.2 Graphical representation



ICN-B6865-S5000F15062-001-00

Fig 28 S5000F UoF Maintenance Organization – class model

29.3 S5000F UoF Maintenance Organization - New class and interface definitions

29.3.1 MaintenanceOrganization

MaintenanceOrganization is an organization approved to perform maintenance tasks on a specific set of products or product variants.

MaintenanceOrganization attributes:

– organizationDates (inherited from Organization)
– organizationIdentifier (inherited from Organization)
– organizationName (inherited from Organization)
– organizationType (inherited from Organization)

MaintenanceOrganization implements the following <<interface>>:

– CostEntryRelatedTo (inherited from Organization)
– DocumentAssignmentItem (inherited from Organization)
– Party (inherited from Organization)
– SubjectOfPoliciesAndRegulations (inherited from Organization)

MaintenanceOrganization associations:

- (personOperationAuthorizedBy) The Organization that approves the operation of a specific ProductVariant by an OperatorPerson. (inherited from Organization)
- Each Organization can approve zero, one or many MaintenancePrograms. (inherited from Organization)
- An Organization can manufacture zero, one or many SerializedProductVariants. (inherited from Organization)
- An Organization can have an association with zero, one or many ProductVariants for which it has defined the master maintenance program. (inherited from Organization)
- An Organization can grant zero, one or many MaintenanceLicenses. (inherited from Organization)
- A SecurityClassification is assigned to a Peron or Organization instance implementing the Party <<interface>> by an assiging Organization (through the PartySecurityAssignment <<relationship>>). (inherited from Organization)
- (relating) The MaintenanceOrganization that can maintain a ProductVariant.
- (organisationOperationAuthorizedBy) The Organization that approves the operation of a specific ProductVariant by an OperatorOrganization. (inherited from Organization)
- (isApprovedBy) The Organization that has approved that a MaintenancePerson can work on a specific ProductVariant. (inherited from Organization)
- A MaintenanceOrganisation can be associated to one or many MaintenanceFacilities.

29.3.2 MaintenanceOrganizationApproval

MaintenanceOrganizationApproval is a <<relationship>> that identifies the authorization of an Organization to operate as a Maintenanceorganization for a specific period of time.

MaintenanceOrganizationApproval attributes:

- maintenanceOrganizationApprovalDuring
- maintenanceOrganizationApprovalType

MaintenanceOrganizationApproval associations:

- A MaintenanceOrganization can have zero, one or many MaintenanceOrganizationApprovals from approving Organizations (via the
- MaintenanceOrganizationApproval <<relationships>>).
- An approving Organization can issue zero, one or many MaintenanceOrganizationApprovals to MaintenanceOrganizations (via the
- MaintenanceOrganizationApproval <<relationships>>).

29.3.3 ProductVariantMaintenance

ProductVariantMaintenance is a <<relationship>> allowing to associate a MaintenanceOrganisation (relating) to the ProductVariants it can maintain (related).

ProductVariantMaintenance associations:

- A MaintenanceOrganization can be associated to zero, one or many ProductVariants that it can maintain.

29.4 S5000F UoF Maintenance Organization - Referenced classes and interfaces

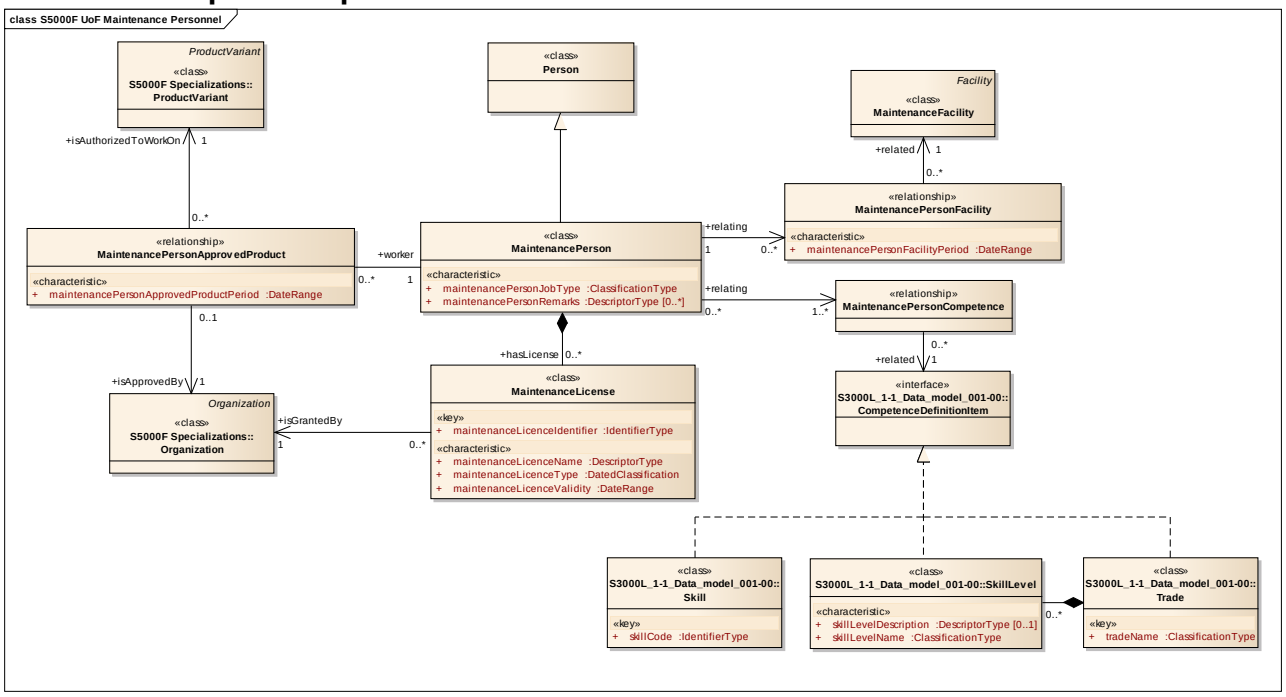
- MaintenanceFacility
- Organization
- ProductVariant

30 S5000F UoFMaintenance Personnel

30.1 Overall description

Maintenance Personnel UoF provides the necessary information associated to maintenance staff.

30.2 Graphical representation



ICN-B6865-S5000F15023-002-00

Fig 29 S5000F UoF Maintenance Personnel – class model

30.3 S5000F UoF Maintenance Personnel - New class and interface definitions

30.3.1 CompetenceDefinitionItem

The CompetenceDefinitionItem <<interface>> enables Skills, SkillLevels and Trades to be associated with the definition of a personnel resource that is needed to perform a Task or a SubtaskByDefinition.

Classes that implement the CompetenceDefinitionItem <<interface>> are:

- Skill
- SkillLevel
- Trade

CompetenceDefinitionItem associations:

- (related) The competences of a MaintenancePerson as defined by the classes implementing the CompetenceDefinionItem <<interface>>.

30.3.2 MaintenanceLicense

MaintenanceLicense is a class representing the authorization of an authority to a MaintenancePerson to perform specific maintenance tasks.

Example:

- B1 aircraft maintenance license.

MaintenanceLicense attributes:

- maintenanceLicenceIdentifier
- maintenanceLicenceName
- maintenanceLicenceType
- maintenanceLicenceValidity

MaintenanceLicense associations:

- Each MaintenanceLicense must be of a defined MaintenancePerson.
- A MaintenanceLicence is always granted by an Organization.

30.3.3 MaintenancePerson

MaintenancePerson is a person with the skills to be able to perform maintenance activities.

MaintenancePerson attributes:

- maintenancePersonJobType
- maintenancePersonRemarks
- personDates (inherited from Person)
- personFamilyName (inherited from Person)
- personIdentifier (inherited from Person)
- personMiddleName (inherited from Person)
- personName (inherited from Person)
- personPrefixTitle (inherited from Person)
- personSuffixTitle (inherited from Person)

MaintenancePerson implements the following <<interface>>:

- CostEntryRelatedTo (inherited from Person)
- Detector (inherited from Person)
- DocumentAssignmentItem (inherited from Person)
- Party (inherited from Person)
- ResourceItem (inherited from Person)

MaintenancePerson associations:

- (relating) The MaintenancePerson relating to a MaintenancxeFacility.
- (relating) The MaintenancePerson that has those competences.
- (worker) The MaintenancePerson that can work on a specific ProductVariant.
- A MaintenanceActivity can be optionally associated to a MaintenancePerson instance that approves such MaintenanceActivity.
- A MaintenanceActivity is associated to one or many Person instances carrying out such MaintenanceActivity.
- A MaintenancePerson can have zero, one or many MaintenanceLicenses.

30.3.4 MaintenancePersonApprovedProduct

MaintenancePersonApprovedProduct is a <<relationship>> that defines which MaintenancePersons have been approved to carry out maintenance on specific ProductVariants, possibly with a specific approval by an organization.

MaintenancePersonApprovedProduct attributes:

- maintenancePersonApprovedProductPeriod

MaintenancePersonApprovedProduct associations:

- A MaintenancePerson can have zero, one or many approvals to work on a ProductVariant (via the MaintenancePersonApprovedProduct <<relationship>>).

30.3.5 MaintenancePersonCompetence

The MaintenancePersonCompetence is a <<relationship>> that defines the competences that a MaintenencePerson has acquired.

MaintenancePersonCompetence associations:

- A MaintenancePerson can be associated to zero, one or many classes implementing the CompetenceDefinitionItem (via the MaintenancePersonCompetence <<relationship>>.

30.3.6 MaintenancePersonFacility

MaintenancePersonFacility is a <<relationship>> that documents the MaintenanceFacility where a MaintenancePerson is working during a specific period of time.

MaintenancePersonFacility attributes:

- maintenancePersonFacilityPeriod

MaintenancePersonFacility associations:

- A MaintenancePerson can be associated to zero, one or many MaintenanceFacilities where he has worked.

30.3.7 Skill

The Skill class identifies specific skills as defined by codes according to agreed encoding systems.

Skill attributes:

- skillCode

Skill implements the following <<interface>>:

- CompetenceDefinitionItem
- DocumentAssignmentItem
- OrganizationAssignmentItem
- RemarkAssignmentItem

30.3.8 SkillLevel

The SkillLevel class defines specific skill levels for a defined Trade.

Example:
- advanced, intermediate, master

SkillLevel attributes:

- skillLevelDescription
- skillLevelName

SkillLevel implements the following <<interface>>:

- CompetenceDefinitionItem
- DocumentAssignmentItem
- RemarkAssignmentItem

SkillLevel associations:

- Each SkillLevel must be associated to a Trade.

30.3.9 Trade

The Trade class identifies types of occupations.

Trade attributes:

- tradeName

Trade implements the following <<interface>>:

- CompetenceDefinitionItem
- DocumentAssignmentItem
- OrganizationAssignmentItem
- RemarkAssignmentItem

Trade associations:

- Each Trade can have zero, one or many SkillLevels.

30.4 S5000F UoF Maintenance Personnel - Referenced classes and interfaces

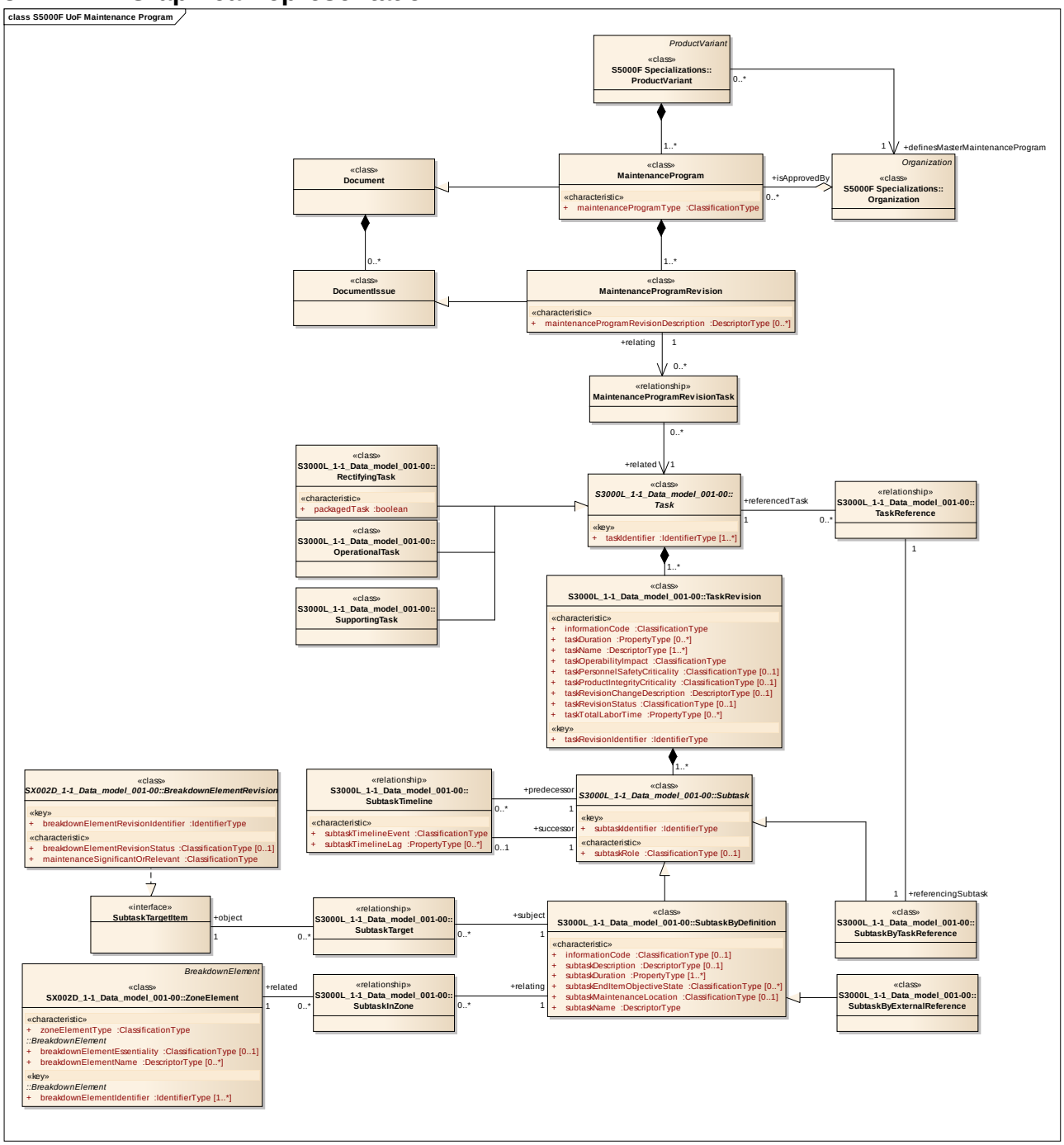
- MaintenanceFacility
- Organization
- Person
- ProductVariant

31 S5000F UoFMaintenance Program

31.1 Overall description

Maintenance Program UoF provides the capability to define a maintenance program for a ProductVariant, either by the OEM or a tailored one by a maintenance organisation.

31.2 Graphical representation



ICN-B6865-S5000F15024-002-00

Fig 30 S5000F UoF Maintenance Program – class model

31.3 S5000F UoF Maintenance Program - New class and interface definitions

31.3.1 MaintenanceProgram

MaintenanceProgram is a class that represents a set of TaskRequirements that have to be applied to a ProductVariant so as to maintain the ProductVariant in an operational state.

Example:

– OEM maintenance program

- operator maintenance program

MaintenanceProgram attributes:

- documentCreationDate (inherited from Document)
- documentDescription (inherited from Document)
- documentIdentifier (inherited from Document)
- documentStatus (inherited from Document)
- documentTitle (inherited from Document)
- documentType (inherited from Document)
- maintenanceProgramType

MaintenanceProgram implements the following <<interface>>:

- ApplicabilityAssignmentItem
- ApplicabilityAssignmentItem (inherited from Document)
- CommentItem (inherited from Document)
- DocumentAssignmentItem
- DocumentAssignmentItem (inherited from Document)
- DocumentItem (inherited from Document)
- MaintenanceWorkOrderSource
- SecurityClassificationItem (inherited from Document)

MaintenanceProgram associations:

- (relating) The Document that relates to any class implemnting the SubjectOfPoliciesAndRegulations <<interface>>. (inherited from
- A MaintenanceProgram can be associated to one or many MaintenanceProgramRevisions.
- An optional association with its DocumentIssues (inherited from Document)
- Each Document can relate to zero, one or many Documents (via the DocumentAssociation <<relationship>> class) (inherited from Document)
- Each MaintenanceProgram can be associated to a defined Organization.
- Each MaintenanceProgram must be associated to one ProductVariant.
- (relating) The Document that relates to a MaintenanceActivity. (inherited from Document)

31.3.2 MaintenanceProgramRevision

MaintenanceProgramRevision is an iteration of a MaintenanceProgram.

MaintenanceProgramRevision attributes:

- documentIssueDate (inherited from DocumentIssue)
- documentIssueIdentifier (inherited from DocumentIssue)
- documentIssueReason (inherited from DocumentIssue)
- maintenanceProgramRevisionDescription

MaintenanceProgramRevision implements the following <<interface>>:

- DocumentAssignmentItem
- DocumentAssignmentItem (inherited from DocumentIssue)
- DocumentItem (inherited from DocumentIssue)

MaintenanceProgramRevision associations:

- (relating) The MaintenanceProgramRevision that relates to a Task.
- An association with the Document of which the DocumentIssue is a revision (inherited from DocumentIssue)
- Each MaintenanceProgramRevision must be associated to a defined MaintenanceProgram.

31.3.3 MaintenanceProgramRevisionTask

MaintenanceProgramRevisionTask is a <<relationship>> that allows to associate Tasks to a MaintenanceProgramRevision.

MaintenanceProgramRevisionTask associations:

- A MaintenanceProgramRevision can be associated to zero, one or many Tasks (via the MaintenanceProgramRevisionTask <<relationship>>).

31.3.4 OperationalTask

The OperationalTask class is a specialization of class Task.

Note:
Operational tasks are tasks that are required for operational purposes, eg, fueling. An operational task may also be used as a subtask within one or many rectifying tasks.

OperationalTask attributes:

- taskIdentifier (inherited from Task)

OperationalTask implements the following <<interface>>:

- DocumentAssignmentItem (inherited from Task)
- MaintenanceWorkOrderSource (inherited from Task)
- OrganizationAssignmentItem (inherited from Task)
- PlannedTaskItem
- RemarkAssignmentItem (inherited from Task)
- SecurityClassificationItem (inherited from Task)
- TaskResourceItem (inherited from Task)

OperationalTask associations:

- (related) The Task that is related to a MaintenanceProgramRevision. (inherited from Task)
- A Task can have one or many TaskRevisions (design iterations) (inherited from Task)
- (referencedTask) The Task that is referenced by a SubTaskByTaskReference. (inherited from Task)

31.3.5 RectifyingTask

The RectifyingTask class is a specialization of class Task.

Note:
Each maintenance activity is driven by an Event. This Event can be a failure, damage, special event or time limit (interval). All these Events require a maintenance action that resolves the event. Each task that is able to resolve an event must be defined as a rectifying task.

RectifyingTask attributes:

- packagedTask
- taskIdentifier (inherited from Task)

RectifyingTask implements the following <<interface>>:

- DocumentAssignmentItem (inherited from Task)
- MaintenanceWorkOrderSource (inherited from Task)
- OrganizationAssignmentItem (inherited from Task)
- PlannedTaskItem
- RemarkAssignmentItem (inherited from Task)
- SecurityClassificationItem (inherited from Task)
- TaskResourceItem (inherited from Task)

RectifyingTask associations:

- (referencedTask) The Task that is referenced by a SubTaskByTaskReference. (inherited from Task)
- (related) The Task that is related to a MaintenanceProgramRevision. (inherited from Task)
- A Task can have one or many TaskRevisions (design iterations) (inherited from Task)

31.3.6 Subtask

The Subtask class defines steps to be performed within a TaskRevision. Subtasks are used to provide detailed information about the Task.

Note 1:
SubTask is an abstract class, ie, an instantiation of Subtask needs to be either a SubtaskByDefinition, a SubtaskByReference, or a SubtaskByExternalReference (subclass of class SubtaskByDefinition).

Note 2:
Subtasks with a TaskRevision can be time lined (scheduled) using the SubtaskTimeline <<relationship>> class.

Note 3:
Alternative Subtasks within a Task must be distinguished by the assignment of ApplicabilityStatements.

Subtask attributes:

- subtaskIdentifier
- subtaskRole

Subtask implements the following <<interface>>:

- ApplicabilityAssignmentItem
- DocumentAssignmentItem
- MaintenanceWorkOrderSource
- RemarkAssignmentItem
- SecurityClassificationItem

Subtask associations:

- An optional association with zero or one related Subtask, on which the starting point for the Subtask under consideration is dependent
- (used for time lining of the overall Tasks, eg, preceding subtask in a Gantt schema)
- An optional association with zero, one or many Subtasks, whose starting points are dependent upon the Subtask under consideration (used for time lining of the overall Task, eg, succeeding subtasks in a Gantt schema)
- EachSubask must be associated to a defined TaskRevision.

31.3.7 SubtaskByDefinition

The SubtaskByDefinition class is a specialization of Subtask. A SubtaskByDefinition provides a detailed characterization of the subtask to be included in the overall TaskRevision. A SubtaskByDefinition cannot be referenced from any other Task.

Note:
SubtaskByDefinition can be specialized into a SubtaskByExternalReference.

SubtaskByDefinition attributes:

- informationCode
- subtaskDescription

- subtaskDuration
- subtaskEndItemObjectiveState
- subtaskIdentifier (inherited from Subtask)
- subtaskMaintenanceLocation
- subtaskName
- subtaskRole (inherited from Subtask)

SubtaskByDefinition implements the following <<interface>>:

- ApplicabilityAssignmentItem (inherited from Subtask)
- DocumentAssignmentItem (inherited from Subtask)
- MaintenanceWorkOrderSource (inherited from Subtask)
- RemarkAssignmentItem (inherited from Subtask)
- SecurityClassificationItem (inherited from Subtask)
- TaskResourceItem

SubtaskByDefinition associations:

- (relating) The SubtaskByDefinition that relates to a ZoneElement.
- (subject) The SubtaskByDefinition that will be performed on the related object (instance of a class that implements the SubtaskTargetItem <<interface>>).
- An optional association with zero or one related Subtask, on which the starting point for the Subtask under consideration is dependent
- (used for time lining of the overall Tasks, eg, preceding subtask in a Gantt schema) (inherited from Subtask)
- An optional association with zero, one or many Subtasks, whose starting points are dependent upon the Subtask under consideration (used
- for time lining of the overall Task, eg, succeeding subtasks in a Gantt schema) (inherited from Subtask)
- EachSubask must be associated to a defined TaskRevision. (inherited from Subtask)

31.3.8 SubtaskByExternalReference

The SubtaskByExternalReference class is a specialization of SubtaskByDefinition. SubtaskByExternalReference must be used whenever the complete description of the Subtask is described in an external source, ie, outside the scope of the LSA program under consideration.

SubtaskByExternalReference attributes:

- informationCode (inherited from SubtaskByDefinition)
- subtaskDescription (inherited from SubtaskByDefinition)
- subtaskDuration (inherited from SubtaskByDefinition)
- subtaskEndItemObjectiveState (inherited from SubtaskByDefinition)
- subtaskIdentifier (inherited from Subtask)
- subtaskMaintenanceLocation (inherited from SubtaskByDefinition)
- subtaskName (inherited from SubtaskByDefinition)
- subtaskRole (inherited from Subtask)

SubtaskByExternalReference implements the following <<interface>>:

- ApplicabilityAssignmentItem (inherited from Subtask)
- DocumentAssignmentItem (inherited from Subtask)
- MaintenanceWorkOrderSource (inherited from Subtask)
- RemarkAssignmentItem (inherited from Subtask)
- SecurityClassificationItem (inherited from Subtask)
- TaskResourceItem (inherited from SubtaskByDefinition)

Classes that implement the SubtaskByExternalReference <<interface>> are:

- DocumentAssignmentItem

SubtaskByExternalReference associations:

- An optional association with zero, one or many Subtasks, whose starting points are dependent upon the Subtask under consideration (used
- for time lining of the overall Task, eg, succeeding subtasks in a Gantt schema) (inherited from Subtask)
- EachSubask must be associated to a defined TaskRevision. (inherited from Subtask)
- (subject) The SubtaskByDefinition that will be performed on the related object (instance of a class that implements the SubtaskTargetItem
- <<interface>>). (inherited from SubtaskByDefinition)
- (relating) The SubtaskByDefinition that relates to a ZoneElement. (inherited from SubtaskByDefinition)
- An optional association with zero or one related Subtask, on which the starting point for the Subtask under consideration is dependent
- (used for time lining of the overall Tasks, eg, preceding subtask in a Gantt schema) (inherited from Subtask)

31.3.9 SubtaskByTaskReference

The SubtaskByTaskReference class is a specialization of SubTask. SubtaskByTaskReference will be used when the Subtask is defined as a Task in its own right.

Note:
SubtaskByTaskReference is the only mechanism that supports reuse of task steps and/or task procedures in between Tasks.

SubtaskByTaskReference attributes:

- subtaskIdentifier (inherited from Subtask)
- subtaskRole (inherited from Subtask)

SubtaskByTaskReference implements the following <<interface>>:

- ApplicabilityAssignmentItem (inherited from Subtask)
- DocumentAssignmentItem (inherited from Subtask)
- MaintenanceWorkOrderSource (inherited from Subtask)
- RemarkAssignmentItem (inherited from Subtask)
- SecurityClassificationItem (inherited from Subtask)

SubtaskByTaskReference associations:

- (referencingSubtask) The SubTask that references a Task.
- An optional association with zero or one related Subtask, on which the starting point for the Subtask under consideration is dependent
- (used for time lining of the overall Tasks, eg, preceding subtask in a Gantt schema) (inherited from Subtask)
- An optional association with zero, one or many Subtasks, whose starting points are dependent upon the Subtask under consideration (used
- for time lining of the overall Task, eg, succeeding subtasks in a Gantt schema) (inherited from Subtask)
- EachSubask must be associated to a defined TaskRevision. (inherited from Subtask)

31.3.10 SubtaskInZone

The SubtaskInZone <<relationship>> class defines associations between instances of SubtaskByDefinition and the zonal location (ZoneElement) in which the respective subtask will be performed.

Note:
There is one instance of SubtaskInZone per relevant combination of SubtaskByDefinition and zonal location (ZoneElement).

SubtaskInZone implements the following <<interface>>:

- ApplicabilityAssignmentItem
- RemarkAssignmentItem

SubtaskInZone associations:

- A SubtaskByDefinition can be associated with zero, one or many ZoneElements.

31.3.11 SubtaskTarget

The SubtaskTarget <<relationship>> class defines an association between an instance of SubtaskByDefinition and the object (instance of a class that implements the SubtaskTargetItem <<interface>>) on which a SubtaskByDefinition will be performed.

SubtaskTarget associations:

- Each instance of a SubTaskTarget can have zero, one or many associated items (through the SubtaskTarget <<relationship>> to the SubtaskTargetItem <<interface>>)

31.3.12 SubtaskTargetItem

The SubtaskTargetItem <<interface>> class represents any item that can be associated to a SubTask.

Classes that implement the SubtaskTargetItem (inherited from BreakdownElementRevision) <<interface>> are:

- AggregatedElementRevision
- BreakdownElementRevision
- HardwareElementRevision
- SoftwareElementRevision
- ZoneElementRevision

SubtaskTargetItem associations:

- (object) The item on which the subtask will be performed.

31.3.13 SubtaskTimeline

The SubtaskTimeLine <<relationship>> class can define timeline associations between two instances of SubTask. The timeline association enables the definition of time dependencies between two Subtasks within the same TaskRevision. The SubtaskTimeLine class defines the event to which relating (successor) Subtasks refers, eg, start or end of the related (predecessor) Subtask. It also defines a possible lag, ie, duration from the time the related event occurs and the time when the relating Subtask can be initiated.

Note:
Subtasks that don't relate to any other Subtask, via de SubtaskTimeLine association, must be regarded as being performed in sequence according to their subtaskIdentifiers (low to high).

This class supports the creation of a GANTTschema for a task.

SubtaskTimeline attributes:

- subtaskTimelineEvent
- subtaskTimelineLag

SubtaskTimeline implements the following <<interface>>:

- ApplicabilityAssignmentItem
- DocumentAssignmentItem
- RemarkAssignmentItem

SubtaskTimeline associations:

- (predecessor) The Subtask on which the successor Subtask instance is dependent
- (successor) The Subtask which is dependent upon its predecessor Subtask instance

31.3.14 SupportingTask

The SupportingTask is a specialization of class Task.

Note:
A supporting task does not "solve" an event, but may be used as a subtask within one or many rectifying tasks.

Example:
- open a hatch
- jack a car.

SupportingTask attributes:

- taskIdentifier (inherited from Task)

SupportingTask implements the following <<interface>>:

- DocumentAssignmentItem (inherited from Task)
- MaintenanceWorkOrderSource (inherited from Task)
- OrganizationAssignmentItem (inherited from Task)
- RemarkAssignmentItem (inherited from Task)
- SecurityClassificationItem (inherited from Task)
- TaskResourceItem (inherited from Task)

SupportingTask associations:

- (referencedTask) The Task that is referenced by a SubTaskByTaskReference. (inherited from Task)
- (related) The Task that is related to a MaintenanceProgramRevision. (inherited from Task)
- A Task can have one or many TaskRevisions (design iterations) (inherited from Task)

31.3.15 Task

The Task class supports the detailed specification of a Task.

Note:
Task is an abstract class, ie, an instantiation of Task must be either a Rectifying Task, Operational Task or Supporting Task.

Task attributes:

- taskIdentifier

Task implements the following <<interface>>:

- DocumentAssignmentItem
- MaintenanceWorkOrderSource

- OrganizationAssignmentItem
- RemarkAssignmentItem
- SecurityClassificationItem
- TaskResourceItem

Task associations:

- (referencedTask) The Task that is referenced by a SubTaskByTaskReference.
- (related) The Task that is related to a MaintenanceProgramRevision.
- A Task can have one or many TaskRevisions (design iterations)

31.3.16 TaskReference

The TaskReference <<relationship>> class defines associations between instances of SubtaskByTaskReference and the Task that is referenced as a subtask.

Note:
There is one instance of TaskReference per combination of SubtaskByTaskReference and Task.

TaskReference associations:

- Each SubtaskByTaskReference must be associated to a Task (via the TaskReference <<relationship>>).

31.3.17 TaskRevision

The TaskRevision class defines an explicit revision (design iteration) of a Task.

TaskRevision attributes:

- informationCode
- taskDuration
- taskName
- taskOperabilityImpact
- taskPersonnelSafetyCriticality
- taskProductIntegrityCriticality
- taskRevisionChangeDescription
- taskRevisionIdentifier
- taskRevisionStatus
- taskTotalLaborTime

TaskRevision implements the following <<interface>>:

- DocumentAssignmentItem
- MaintenanceWorkOrderSource
- RemarkAssignmentItem

TaskRevision associations:

- Each TaskRevision must be of a defined Task.
- Each TaskRevision can have one or many Subtasks

31.4 S5000F UoF Maintenance Program - Referenced classes and interfaces

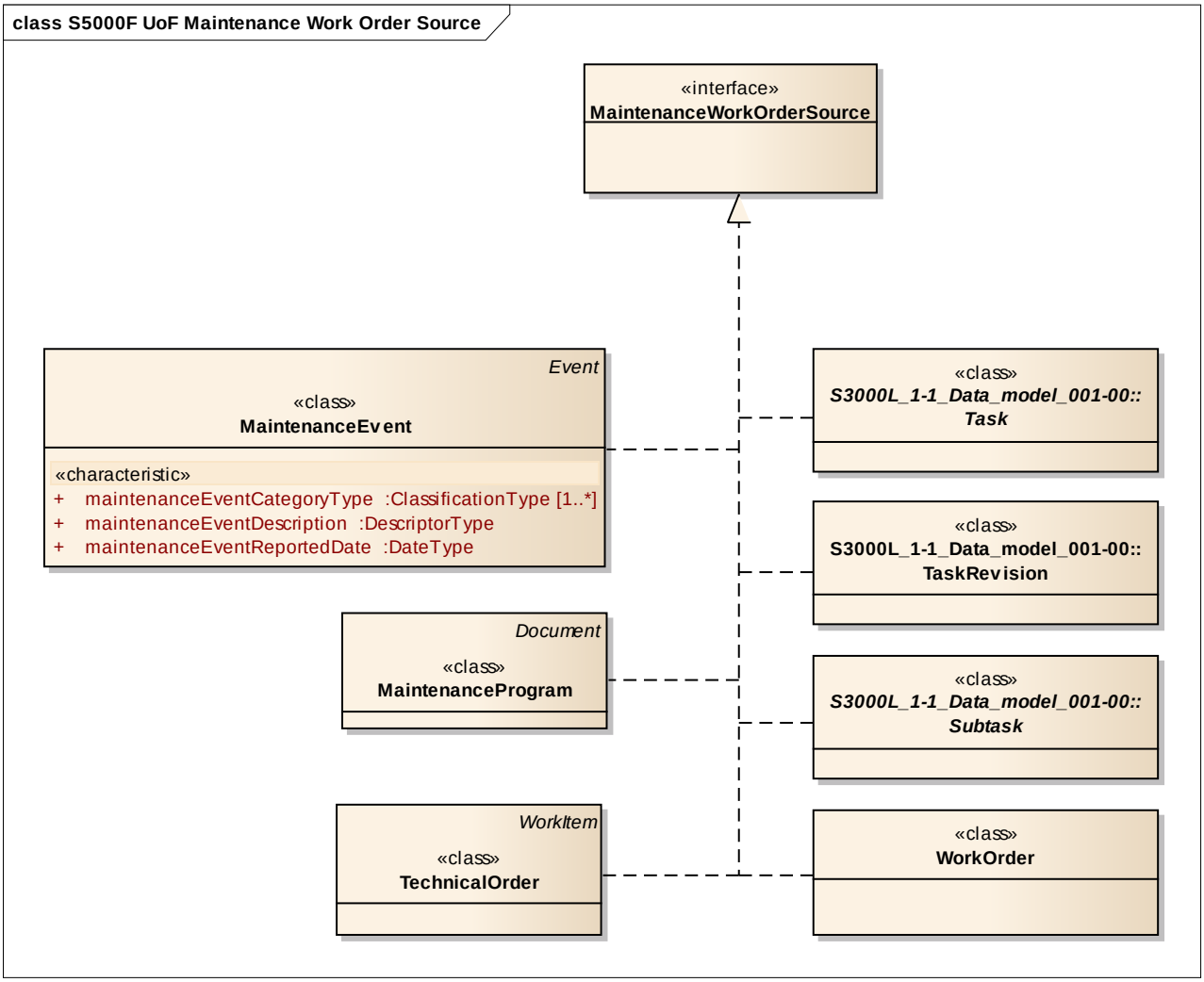
- BreakdownElementRevision
- Document
- DocumentIssue
- Organization
- ProductVariant
- ZoneElement

32 S5000F UoFMaintenance Work Order Source

32.1 Overall description

The Maintenance Work Order Source UoF provides the necessary information to define the source of a WorkOrder.

32.2 Graphical representation



ICN-B6865-S5000F15025-001-00

Fig 31 S5000F UoF Maintenance Work Order Source – class model

32.3 S5000F UoF Maintenance Work Order Source - New class and interface definitions

32.3.1 MaintenanceEvent

MaintenanceEvent is an event that consists in the realization of one or several maintenance activities or occurs as the result of a maintenance activity.

MaintenanceEvent attributes:

- eventDescription (inherited from Event)
- eventGroup (inherited from Event)
- eventIdentifier (inherited from Event)
- eventOcurrenceDateTime (inherited from Event)

- eventSeverity (inherited from Event)
- maintenanceEventCategoryType
- maintenanceEventDescription
- maintenanceEventReportedDate
- eventConfirmedStatus (inherited from Event)

MaintenanceEvent implements the following <<interface>>:

- CommentItem (inherited from Event)
- DocumentAssignmentItem
- DocumentAssignmentItem (inherited from Event)
- MaintenanceWorkOrderSource
- SecurityClassificationItem (inherited from Event)

MaintenanceEvent associations:

- An Event must be reported by a defined Party. (inherited from Event)
- An Event can have zero, one or many Actions associated to it. (inherited from Event)
- Each Event can have zero, one or many Consequences. (inherited from Event)
- Each MaintenanceEvent can be associated to a defined LogBookEntry.
- An Event instance can be optionally logged in a LogBookEntry instance. (inherited from Event)
- An Event has an optional association with a DownTimePeriod that has resulted as a consequence of the Event. (inherited from Event)
- An Event can have zero, one or many EquipmentFaults associated to it. (inherited from Event)
- Each Event can have zero, one or many Damages. (inherited from Event)
- An Event can be optionally associated to a ProductusagePhase. (inherited from Event)
- (related) The Event that is related to another Event. (inherited from Event)
- (related) The Event that is related to the SafetyIssue. (inherited from Event)
- (relating) The Event that relates to a BreakdownElement. (inherited from Event)
- (relating) The Event that relates to another Event. (inherited from Event)
- (relating) The Event that relates to the ExplanatoryFactor. (inherited from Event)
- An Event can be optionally associated to a Location. (inherited from Event)

32.3.2 MaintenanceWorkOrderSource

MaintenanceWorkOrderSource is an <<interface>> that allows to define the sources for WorkOrders.

Classes that implement the MaintenanceWorkOrderSource <<interface>> are:

- MaintenanceEvent
- MaintenanceProgram
- OperationalTask
- RectifyingTask
- Subtask
- SubtaskByDefinition
- SubtaskByExternalReference
- SubtaskByTaskReference
- SupportingTask
- Task
- TaskRevision
- TechnicalOrder
- WorkOrder

MaintenanceWorkOrderSource associations:

– Any class implementing the MaintenanceWorkOrderSource <<interface>> can be associated to zero, one or many WorkOrders.

32.4 S5000F UoF Maintenance Work Order Source - Referenced classes and interfaces

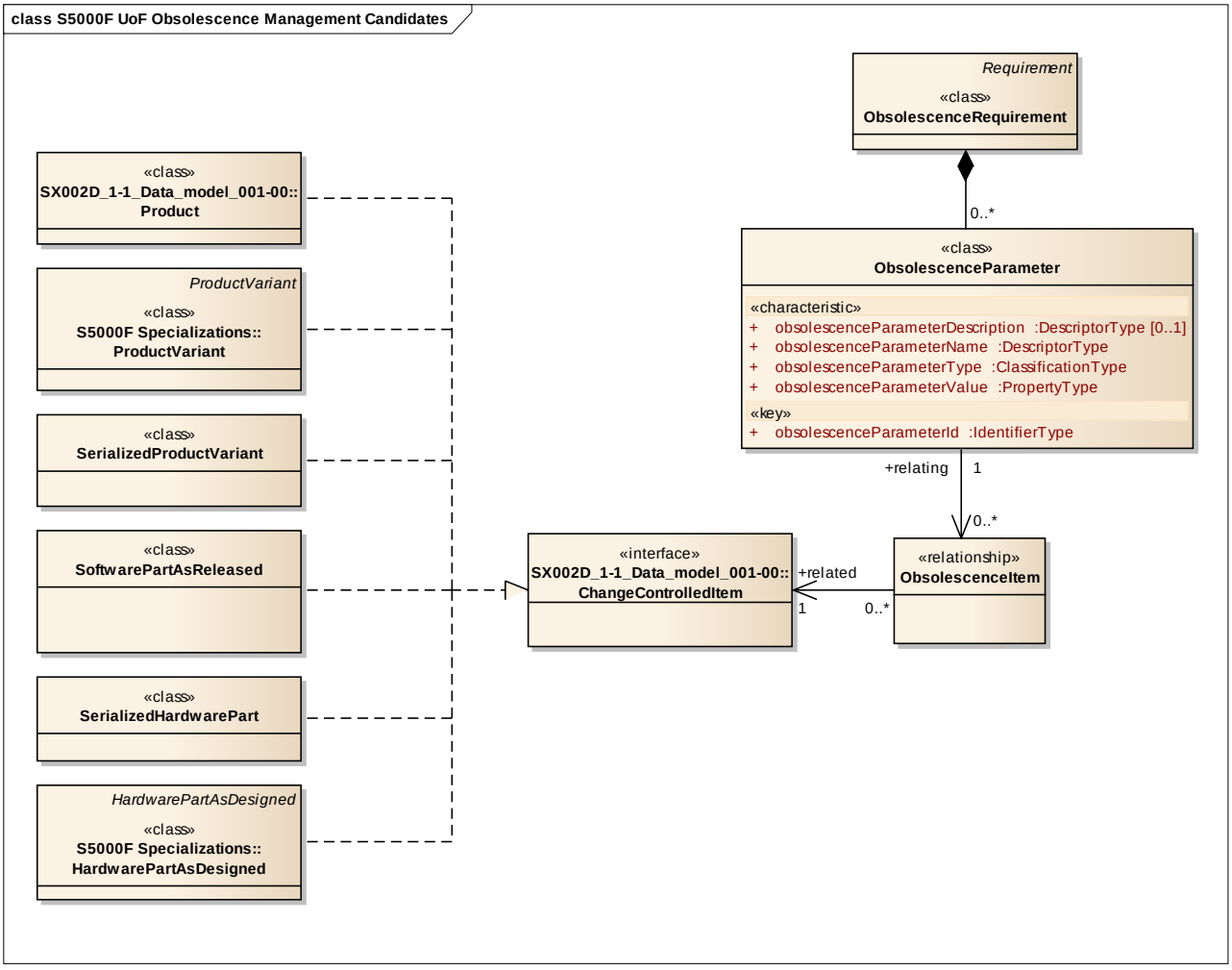
– MaintenanceProgram
– Subtask
– Task
– TaskRevision
– TechnicalOrder
– WorkOrder

33 S5000F UoFObsolescence Management Candidates

33.1 Overall description

Obsolescence Management Candidates provides the capability to identify obsolete items that comply with certain ObsolescenceRequirements.

33.2 Graphical representation



ICN-B6865-S5000F15026-002-00

Fig 32 S5000F UoF Obsolescence Management – class model

33.3 S5000F UoF Obsolescence Management Candidates - New class and interface definitions

33.3.1 ObsolescenceItem

ObsolescenceItem is a <<relationship>> defining what ObsolescenceParameters an item must comply with in order to be declared

ObsolescenceItem associations:

- An ObsolescenceParameter can be associated to zero, one or many ChangeControlledItems (via the ObsolescenceItem <<relationship>>).

33.3.2 ObsolescenceParameter

ObsolescenceParameter is a class representing a criterion that allows to evaluate whether an ObsolescenceRequirement has been

Example:
- No longer manufactured
- Older than ten years

ObsolescenceParameter attributes:

- obsolescenceParameterDescription
- obsolescenceParameterId
- obsolescenceParameterName
- obsolescenceParameterType
- obsolescenceParameterValue

ObsolescenceParameter associations:

- Each ObsolescenceParameter must be associated to a defined ObsolescenceRequirement.
- The ObsolescenceParameter that relates to the ChangeControlledItem.

33.3.3 ObsolescenceRequirement

ObsolescenceRequirement is a Requirement that indicates when an item becomes obsolete.

Example:
- Seek replacement every five years or when supplier informs that item is discontinued.

ObsolescenceRequirement attributes:

- requirementDescription (inherited from Requirement)
- requirementId (inherited from Requirement)
- requirementName (inherited from Requirement)
- requirementRaisedBy (inherited from Requirement)
- requirementType (inherited from Requirement)

ObsolescenceRequirement implements the following <<interface>>:

- DocumentAssignmentItem (inherited from Requirement)
- SecurityClassificationItem (inherited from Requirement)

ObsolescenceRequirement associations:

- A Requirement can be associated to a defined ServiceRequest. (inherited from Requirement)
- Each ObsolescenceRequirement can be associated to zero, one or many ObsolescenceParameters.

33.4 S5000F UoF Obsolescence Management Candidates - Referenced classes and interfaces

- ChangeControlledItem
- HardwarePartAsDesigned
- Product
- ProductVariant
- SerializedHardwarePart
- SerializedProductVariant
- SoftwarePartAsReleased

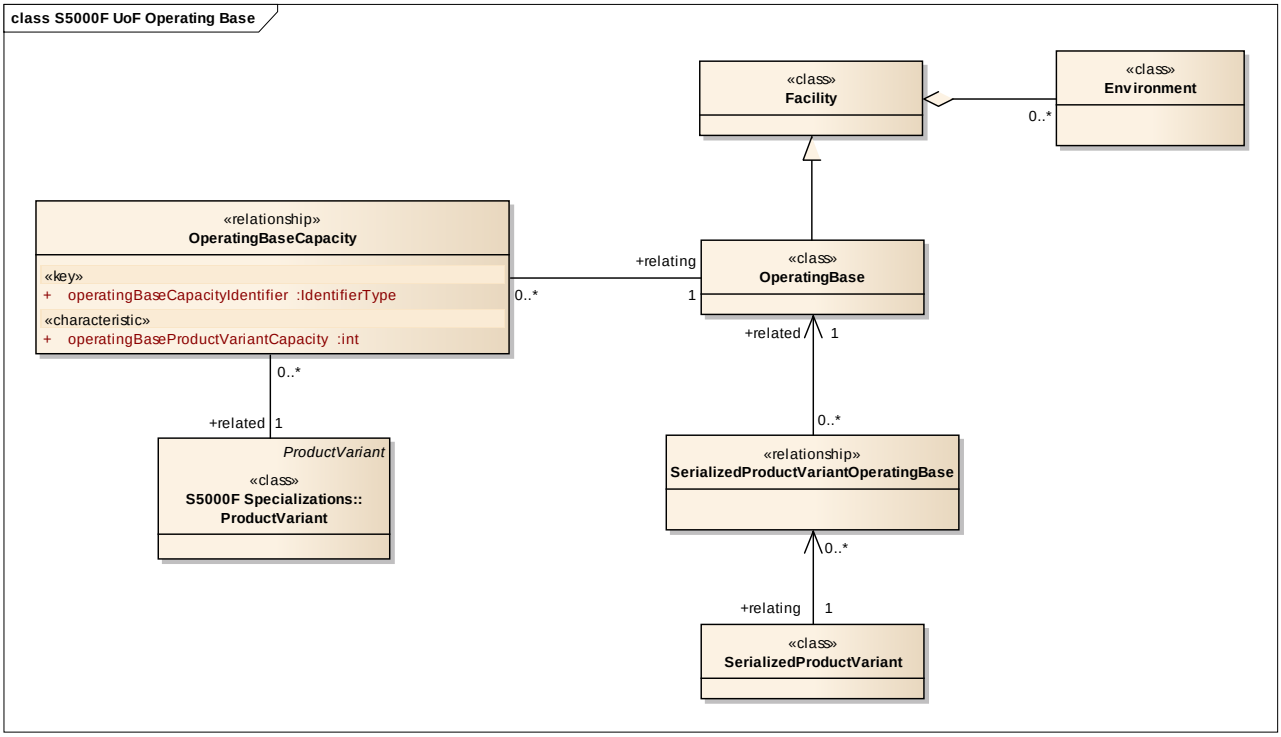
34 S5000F UoFOperating Base

34.1 Overall description

Operating Base UoF provides the necessary information associated to an operating base.

Note:

34.2 Graphical representation



ICN-B6865-S5000F15027-002-00

Fig 33 S5000F UoF Operating Base – class model

34.3 S5000F UoF Operating Base - New class and interface definitions

34.3.1 OperatingBase

OperatingBase is a Facility that is used for the purpose of operating a Product or ProductVariant.

Example:

- harbor
- garage
- airfield

OperatingBase attributes:

- facilityCleansiness (inherited from Facility)
- facilityDescription (inherited from Facility)
- facilityDimensions (inherited from Facility)
- facilityIdentifier (inherited from Facility)
- facilityName (inherited from Facility)
- facilityType (inherited from Facility)

OperatingBase implements the following <<interface>>:

- ApplicabilityAssignmentItem (inherited from Facility)
- CommentItem (inherited from Facility)
- ContractItem (inherited from Facility)
- CostEntryRelatedTo (inherited from Facility)
- DocumentAssignmentItem
- DocumentAssignmentItem (inherited from Facility)
- ResourceItem (inherited from Facility)
- SecurityClassificationItem (inherited from Facility)
- ServiceItem (inherited from Facility)
- SubjectOfPoliciesAndRegulations (inherited from Facility)

OperatingBase associations:

- A Facility can be optionally associated to an Address. (inherited from Facility)
- A Facility can be associated to zero, one or many ShopFindings. (inherited from Facility)
- A Facility can have zero, one or many SupportEquipments associated to it. (inherited from Facility)
- (related) The OperatingBase where the SerielizedProductVariant is operating.
- (relating) The OperatingBase where the ProductVariants can operate.
- A Facility can be associated to zero, one or many Environments. (inherited from Facility)
- Each Facility can be related to from zero, one or many other Facilities (via the FacilityRelationship <<relationship>> class) (inherited from

34.3.2 OperatingBaseCapacity

OperatingBaseCapacity is a <<relationship>> that identifies the capacity of an OperatingBase to allow the operation of a specific ProductVariant.

Example:
- 8 cars
- 2 buses

OperatingBaseCapacity attributes:

- operatingBaseCapacityIdentifier
- operatingBaseProductVariantCapacity

OperatingBaseCapacity associations:

- An OperatingBase can be associated with zero, one or many ProductVariants (via the OperatingBaseCapacity <<relationship>> that can operate there.

34.4 S5000F UoF Operating Base - Referenced classes and interfaces

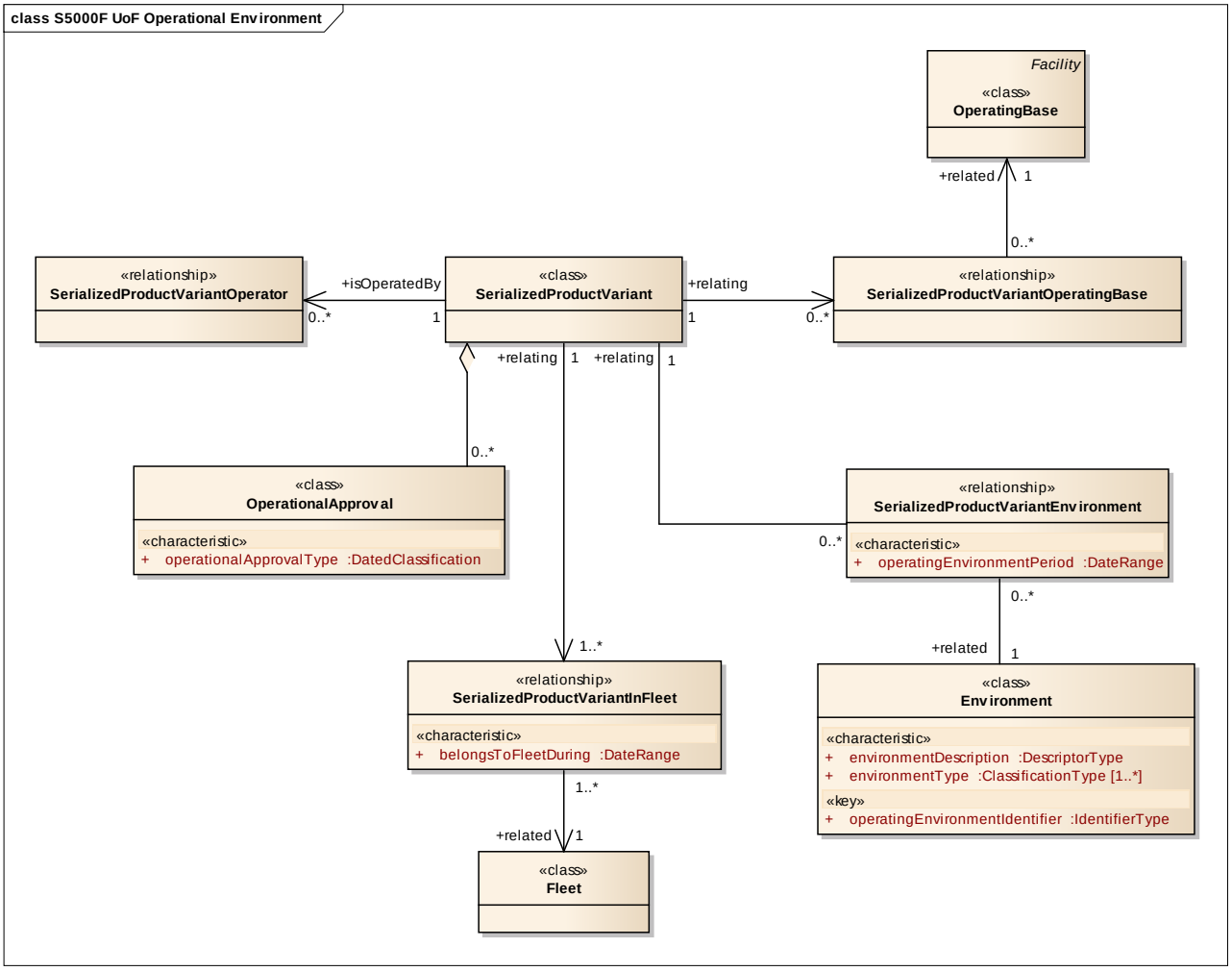
- Environment
- Facility
- ProductVariant
- SerializedProductVariant
- SerializedProductVariantOperatingBase

35 S5000F UoFOperational Environment

35.1 Overall description

Operational Environment UoF provides all necessary information associated to the environment in which a specific SerialiedProductVariant operates.

35.2 Graphical representation



ICN-B6865-S5000F15028-002-00

Fig 34 S5000F UoF Operational Environment – class model

35.3 S5000F UoF Operational Environment - New class and interface definitions

35.3.1 Environment

Environment is a class that represents the environment in which the product operation or maintenance takes place.

Environment attributes:

- environmentDescription
- environmentType
- operatingEnvironmentIdentifier

Environment implements the following <<interface>>:

- DocumentAssignmentItem

Environment associations:

- An Environment can be associated to zero, one or many OperationalEvents.
- The Environment related to where the ProductVariant has operated.
- An Environment can be associated to a Facility.
- (related) The Environment to which a MovementLeg is related.
- The Environment to which a Location is related (throught the LocationEnvironment <<<relationship>>).

35.3.2 OperationalApproval

OperationalApproval is a class that represents the authorization to a SerializedProductVariant for a specific mode of operation.

Example:

- Cargo, RNAV, Autonomous approach, ETOPS

OperationalApproval attributes:

- operationalApprovalType

OperationalApproval implements the following <<interface>>:

- DocumentAssignmentItem

OperationalApproval associations:

- Each OperationalApproval must be associated to a defined SerializedProductVariant.

35.3.3 SerializedProductVariantEnvironment

SerializedProductVariantEnvironment is a <<relationship>> that determines in which Environment a SerializedProductVariant has operated during a specific period of time.

SerializedProductVariantEnvironment attributes:

- operatingEnvironmentPeriod

SerializedProductVariantEnvironment associations:

- A SerializedProductVariant can be associated to zero, one or many Environments where it has operated (via the SerializedProductVariantEnvironment <<relationship>>).

35.3.4 SerializedProductVariantInFleet

SerializedProductVariantInFleet is a <<relationship>> that defines the association between a SerializedProductVariant and the Fleet to which it belongs.

SerializedProductVariantInFleet attributes:

- belongsToFleetDuring

SerializedProductVariantInFleet associations:

- A Fleet must be associated to one or many Fleets (via the SerializedProductVariantInFleet <<relationship>>).

35.4 S5000F UoF Operational Environment - Referenced classes and interfaces

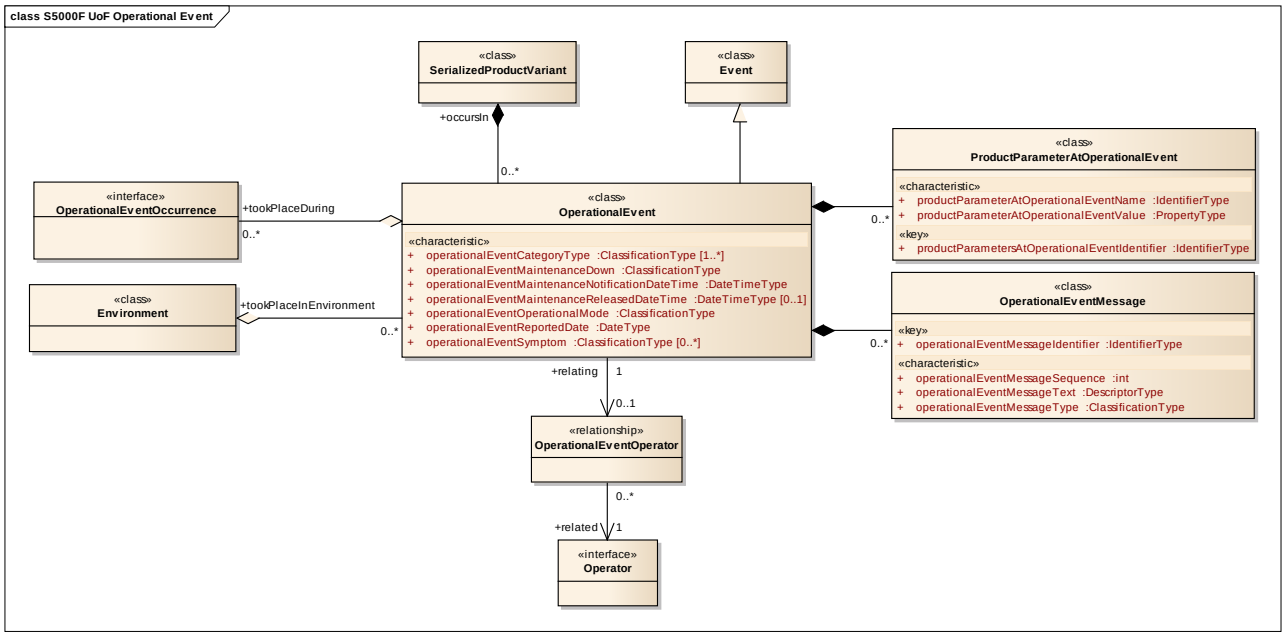
- Fleet
- OperatingBase
- SerializedProductVariant
- SerializedProductVariantOperatingBase
- SerializedProductVariantOperator

36 S5000F UoFOperational Event

36.1 Overall description

Operational Event UoF defines all the information associated to an OperationalEvent.

36.2 Graphical representation



ICN-B6865-S5000F15029-002-00

Fig 35 S5000F UoF Operational Event – class model

36.3 S5000F UoF Operational Event - New class and interface definitions

36.3.1 OperationalEvent

OperationalEvent is a class representing an Event during the SerializedProductVariant operation that might have an impact on the operation itself, on maintenance, or on safety.

OperationalEvent attributes:

- eventConfirmedStatus (inherited from Event)
- eventDescription (inherited from Event)
- eventGroup (inherited from Event)
- eventIdentifier (inherited from Event)
- eventOcurrenceDateTime (inherited from Event)
- eventSeverity (inherited from Event)
- operationalEventCategoryType
- operationalEventMaintenanceDown
- operationalEventMaintenanceNotificationDateTime
- operationalEventMaintenanceReleasedDateTime
- operationalEventOperationalMode
- operationalEventReportedDate
- operationalEventSymptom

OperationalEvent implements the following <<interface>>:

- CommentItem (inherited from Event)
- DocumentAssignmentItem
- DocumentAssignmentItem (inherited from Event)
- ReportableItem

- SecurityClassificationItem (inherited from Event)

OperationalEvent associations:

- An Event instance can be optionally logged in a LogBookEntry instance. (inherited from Event)
- An Event can be optionally associated to a ProductusagePhase. (inherited from Event)
- Each Event can have zero, one or many Damages. (inherited from Event)
- Each Event can have zero, one or many Consequences. (inherited from Event)
- An OperationalEvent must be associated to a defined SerializedProductVariant.
- An OperationalEvent can be associated to zero, one or many ProductParameterAtOperationalEvents.
- An OperationalEvent can be associated to zero, one or many OperationalEventMessages.
- An OperationalEvent can be associated to zero, one or many classes implementing the OperationalEventOccurrence <<interface>>.
- An OperationaEvent must be associated to an Environment instance.
- An Event must be reported by a defined Party. (inherited from Event)
- (related) The Event that is related to another Event. (inherited from Event)
- An Event can have zero, one or many Actions associated to it. (inherited from Event)
- An Event can be optionally associated to a Location. (inherited from Event)
- (relating) The OperationaEvent that relates to an Operator.
- (relating) The Event that relates to the ExplanatoryFactor. (inherited from Event)
- (relating) The Event that relates to another Event. (inherited from Event)
- (relating) The Event that relates to a BreakdownElement. (inherited from Event)
- (related) The Event that is related to the SafetyIssue. (inherited from Event)
- An Event has an optional association with a DownTimePeriod that has resulted as a consequence of the Event. (inherited from Event)
- An Event can have zero, one or many EquipmentFaults associated to it. (inherited from Event)

36.3.2 OperationalEventMessage

OperationalEventMessage is a message, failure code or acoustic or visual warning that ocurred during an OperationEvent.

OperationalEventMessage attributes:

- operationalEventMessageIdentifier
- operationalEventMessageSequence
- operationalEventMessageText
- operationalEventMessageType

OperationalEventMessage associations:

- Each OperationalEventMessage must be assicated to a defined OperationalEvent.

36.3.3 OperationalEventOperator

OperationalEventOperator is a <<relationship>> that allows to associate an OperationalEvent to the Party that was operating the ProductVariant at that moment in time.

OperationalEventOperator associations:

- An OperationalEvent can be optionally related to a class instance implementing the Operator <<interface>>.

36.3.4 ProductParameterAtOperationalEvent

ProductParameterAtOperationalEvent provides the value of a product parameter when an operational event occurred.

ProductParameterAtOperationalEvent attributes:

- productParameterAtOperationalEventName
- productParameterAtOperationalEventValue
- productParametersAtOperationalEventIdentifier

ProductParameterAtOperationalEvent associations:

- Each ProductParameterAtOperationalEvent must be associated to a defined OperationalEvent.

36.4 S5000F UoF Operational Event - Referenced classes and interfaces

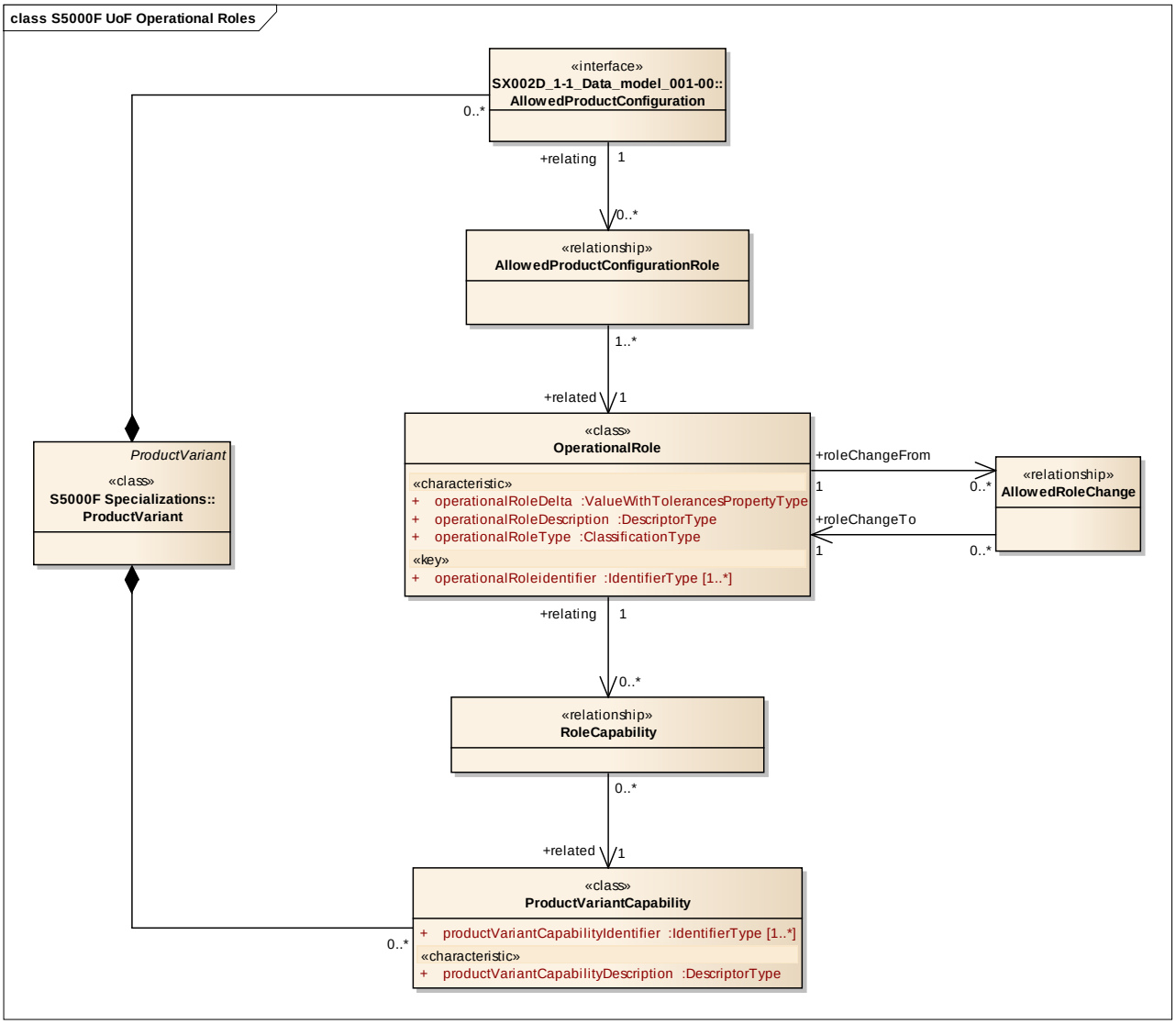
- Environment
- Event
- OperationalEventOccurrence
- Operator
- SerializedProductVariant

37 S5000F UoFOperational Roles

37.1 Overall description

Operational Roles UoF defines the product capabilities associated to each OperationalRole and the allowed role changes associated to each OperationalRole.

37.2 Graphical representation



ICN-B6865-S5000F15030-002-00

Fig 36 S5000F UoF Operational Roles – class model

37.3 S5000F UoF Operational Roles - New class and interface definitions

37.3.1 AllowedProductConfigurationRole

AllowedProductConfigurationRole is a <<relationship>> that defines what OperationalRoles can be performed by a specific AllowedProductConfiguration.

AllowedProductConfigurationRole implements the following <<interface>>:

– SerializedProductVariantConformanceItem

AllowedProductConfigurationRole associations:

– An AllowedProductConfiguration associated to aa specific OperationalRole (via the AllowedProductOperationalConfigurationRole <<relationship>> can be associated to zero, one or many of the classes that implement the AllowedProductOperationalConfigurationIt
– Each AllowedProductConfiguration can be associated to zero, one or many OperationalRoles (via the AllowedPorudctConfigurationRole <<relationship>>).

37.3.2 AllowedRoleChange

AllowedRoleChange is a <<relationship>> that defines the role changes that are possible to allow a product in one specific role to be configured for a different role.

AllowedRoleChange associations:

- (roleChangeTo) The OperationalRole to which an OperationalRole can be changed.
- (roleChangeFrom) The OperationalRole from which the role can be changed

37.3.3 OperationalRole

OperationalRole defines the capabilities that a product must be able to provide so as to perform a specific task or mission as part of its operation.

OperationalRole attributes:

- operationalRoleDelta
- operationalRoleDescription
- operationalRoleidentifier
- operationalRoleType

OperationalRole implements the following <<interface>>:

- DocumentAssignmentItem

OperationalRole associations:

- (related) The OperationalRole that is related to a defined AllowedProductConfiguration.
- (relating) The OperationalRole that relates to a ProductVariantCapability.
- An OperationalRole can be associated to zero, one or many OperationalPeriods of a SerializedProductVariant.
- An OperationalRole can be associated with zero, one or many FleetTasks.
- Each OperationalRole can relate to zero, one or many other OperationalRoles to which it can be changed.
- (related) The OperationalRole required by a FleetRequirement.

37.3.4 ProductVariantCapability

ProductVariantCapability is a class that defines a capability of a ProductVariant.

ProductVariantCapability attributes:

- productVariantCapabilityDescription
- productVariantCapabilityIdentifier

ProductVariantCapability associations:

- Each ProductVariantCapability must be of a defined ProductVariant.
- (related) The ProductVariantCapability that is related to an OperationalRole.

37.3.5 RoleCapability

RoleCapability is a <<relationship>> that defines which product capabilities are provided by a specific OperationalRole.

RoleCapability associations:

- An OperationalRole can be associated to zero, one or many ProductVariantCapabilities (via the RoleCapability <<relationship>>).

37.4 S5000F UoF Operational Roles - Referenced classes and interfaces

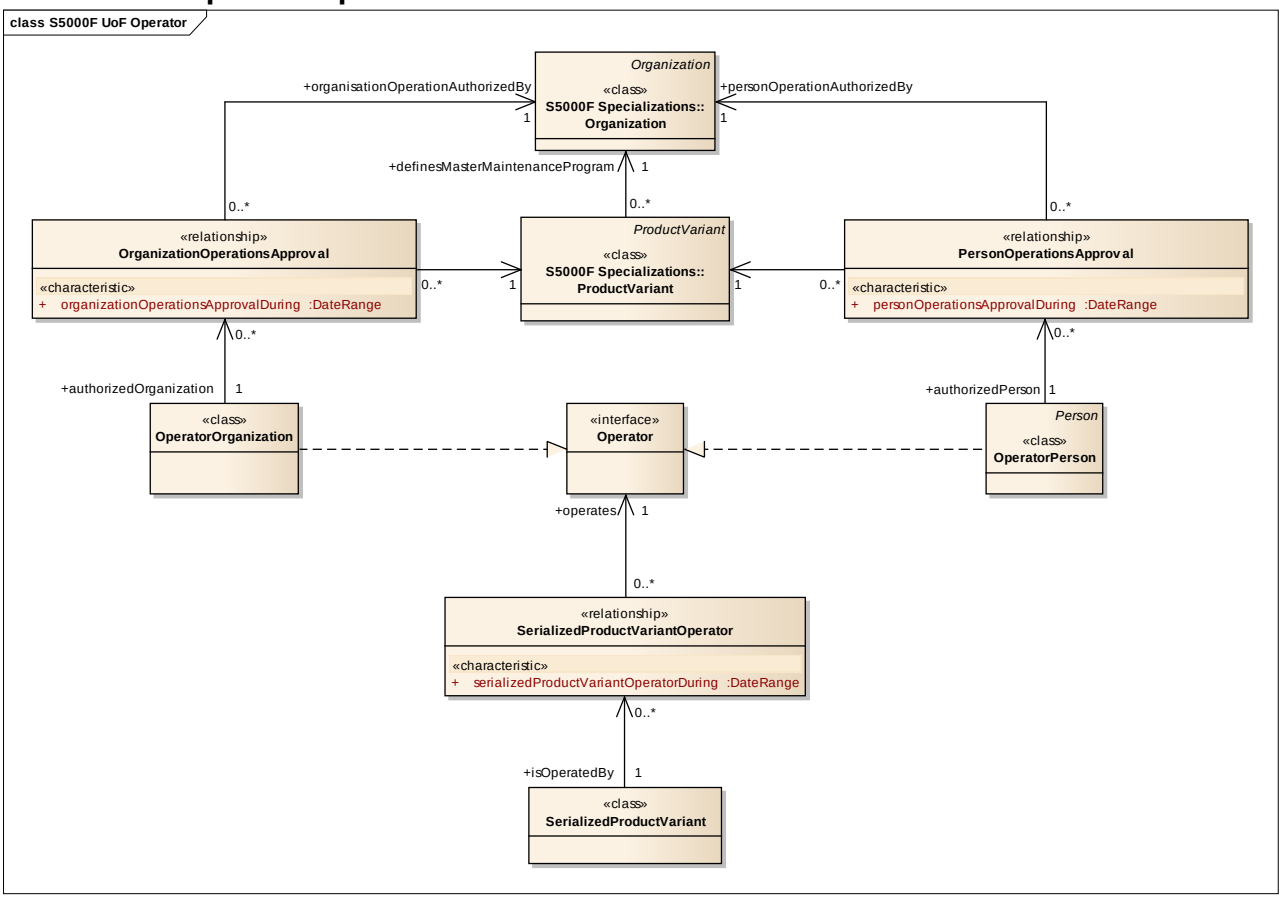
- AllowedProductConfiguration
- ProductVariant

38 S5000F UoFOperator

38.1 Overall description

Operator UoF provides the capability to specify which organizations operate a SerializedProductVariant and which Parties are authorized to operate a ProductVariant.

38.2 Graphical representation



ICN-B6865-S5000F15031-002-00

Fig 37 S5000F UoF Operator – class model

38.3 S5000F UoF Operator - New class and interface definitions

38.3.1 OperatorOrganization

OperatorOrganization is an Organization that operates one or several SerializedProductVariants.

OperatorOrganization attributes:

- organizationDates (inherited from Organization)
- organizationIdentifier (inherited from Organization)
- organizationName (inherited from Organization)
- organizationType (inherited from Organization)

OperatorOrganization implements the following <<interface>>:

- CostEntryRelatedTo (inherited from Organization)
- DocumentAssignmentItem (inherited from Organization)
- Operator
- Party (inherited from Organization)

- SubjectOfPoliciesAndRegulations (inherited from Organization)

OperatorOrganization associations:

- An Organization can have an association with zero, one or many ProductVariants for which it has defined the master maintenance program (inherited from Organization).
- An Organization can manufacture zero, one or many SerializedProductVariants. (inherited from Organization)
- An Organization can grant zero, one or many MaintenanceLicenses. (inherited from Organization)
- A SecurityClassification is assigned to a Peron or Organization instance implementing the Party <<interface>> by an assiging Organization (through the PartySecurityAssignment <<relationship>>). (inherited from Organization)
- (organisationOperationAuthorizedBy) The Organization that approves the operation of a specific ProductVariant by an OperatorOrganization. (inherited from Organization)
- (isApprovedBy) The Organization that has approved that a MaintenancePerson can work on a specific ProductVariant. (inherited from Organization)
- (authorizedOrganization) The OperatorOrganization that is authorized to operate a specific productVariant.
- Each Organization can approve zero, one or many MaintenancePrograms. (inherited from Organization)
- (personOperationAuthorizedBy) The Organization that approves the operation of a specific ProductVariant by an OperatorPerson. (inherited from Organization)

38.3.2 OperatorPerson

OperatorPerson is a Person that operates one or several ProductVariants.

Example:
- pilot
- truck driver
- machine operator

OperatorPerson attributes:

- personDates (inherited from Person)
- personFamilyName (inherited from Person)
- personIdentifier (inherited from Person)
- personMiddleName (inherited from Person)
- personName (inherited from Person)
- personPrefixTitle (inherited from Person)
- personSuffixTitle (inherited from Person)

OperatorPerson implements the following <<interface>>:

- CostEntryRelatedTo (inherited from Person)
- Detector (inherited from Person)
- DocumentAssignmentItem (inherited from Person)
- Operator
- Party (inherited from Person)
- ResourceItem (inherited from Person)

OperatorPerson associations:

- The Person that is poermitted to operate a specific ProductVariant

38.3.3 OrganizationOperationsApproval

OrganizationOperationsApproval is a <<relationship>> that identifies the authorization of an OperatorOrganization to operate a specific ProductVariant by a specific Organization for a specific period of time.

Example:

- municipal authorization to operate a bus line.

OrganizationOperationsApproval attributes:

- organizationOperationsApprovalDuring

OrganizationOperationsApproval associations:

- An OperatorOrganization can have zero, one or many approvals from an approval Organization to operate specific ProductVariants.

38.3.4 PersonOperationsApproval

PersonOperationsApproval is a <<relationship>> that documents the authorization by an Organization to an OperatorPerson to operate a ProductVariant during a specific period of time.

Example:

- driver's licence, pilot type certificate

PersonOperationsApproval attributes:

- personOperationsApprovalDuring

PersonOperationsApproval associations:

- An OperatorPerson can have zero, one or many authorizations from an approval Organization to operate a specific ProductVariant.

38.4 S5000F UoF Operator - Referenced classes and interfaces

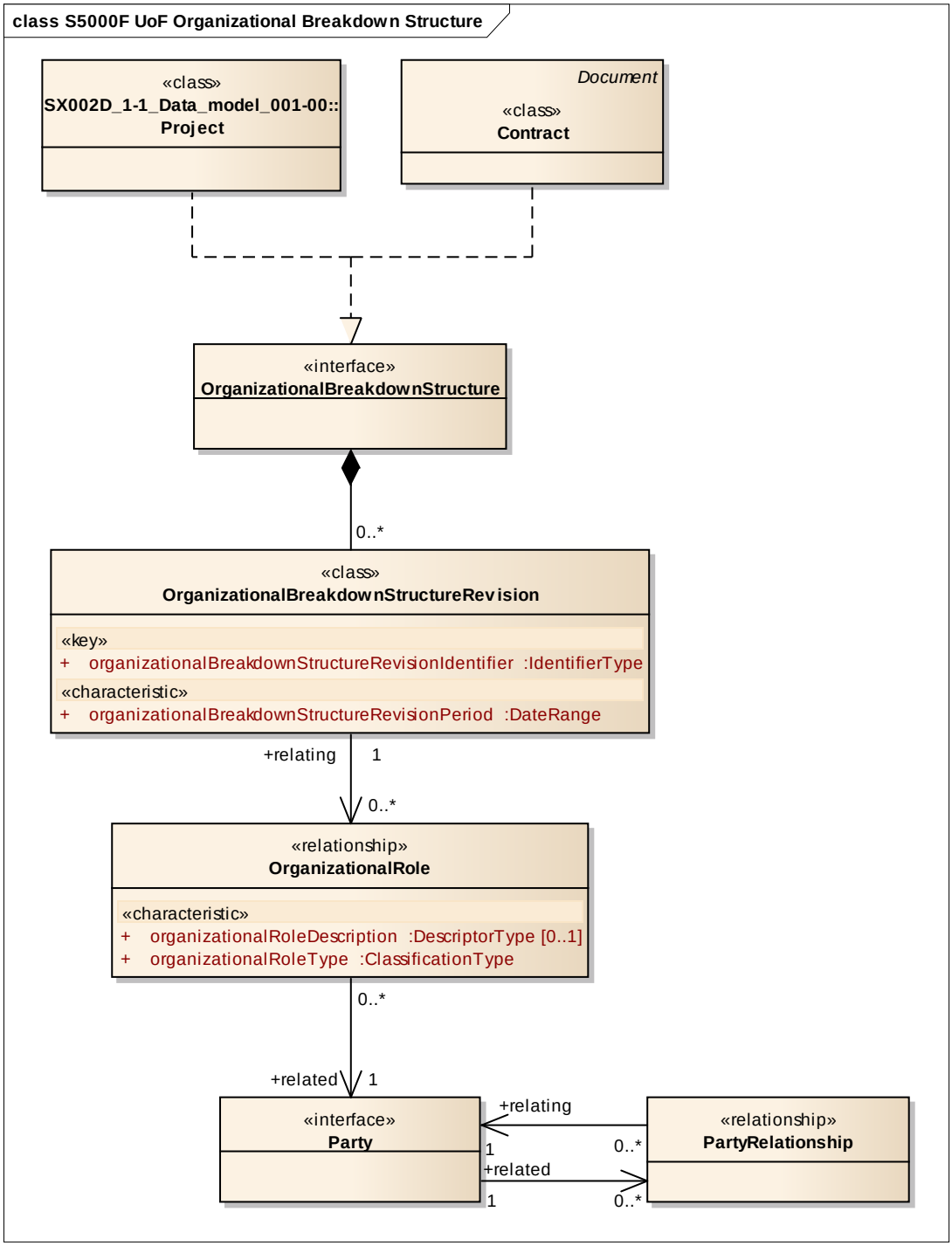
- Operator
- Organization
- ProductVariant
- SerializedProductVariant
- SerializedProductVariantOperator

39 S5000F UoFOrganizational Breakdown Structure

39.1 Overall description

Organizational Breakdown Structure UoF defines the organization that is established specifically for a project or contract.

39.2 Graphical representation



ICN-B6865-S5000F15032-002-00

Fig 38 S5000F UoF Organizational Breakdown – class model

39.3 S5000F UoF Organizational Breakdown Structure - New class and interface definitions

39.3.1 OrganizationalBreakdownStructure

OrganizationalBreakdownStructure is an <<interface>> that allows to relate an organizational structure to a Project or Contract.

Classes that implement the OrganizationalBreakdownStructure <<interface>> are:

- Contract
- Project

OrganizationalBreakdownStructure associations:

- An OrganizationalBreakdownStructure can be associated to zero, one or many OrganizationalBreakdownStructureRevisions.

39.3.2 OrganizationalBreakdownStructureRevision

OrganizationalBreakdownStructureRevision is a class that represents a specific revision of an organizational breakdown structure.

OrganizationalBreakdownStructureRevision attributes:

- organizationalBreakdownStructureRevisionIdentifier
- organizationalBreakdownStructureRevisionPeriod

OrganizationalBreakdownStructureRevision associations:

- (relating) The OrganizationalBreakdownStructureRevision that relates to a Party.
- Each OrganizationalBreakdownStructureRevision must be associated to a defined OrganizationalBreakdownStructure.

39.3.3 OrganizationalRole

OrganizationalRole is a <<relationship>> that defines the role that a Party performs within a project or contractspecific organisational structure.

OrganizationalRole attributes:

- organizationalRoleDescription
- organizationalRoleType

OrganizationalRole associations:

- An OrganizationalBreakdownStructureRevision can be associated (via the OrganizationalRole <<relationship>>) to zero, one or many class instances implementing the Party <<interface>>.

39.4 S5000F UoF Organizational Breakdown Structure - Referenced classes and interfaces

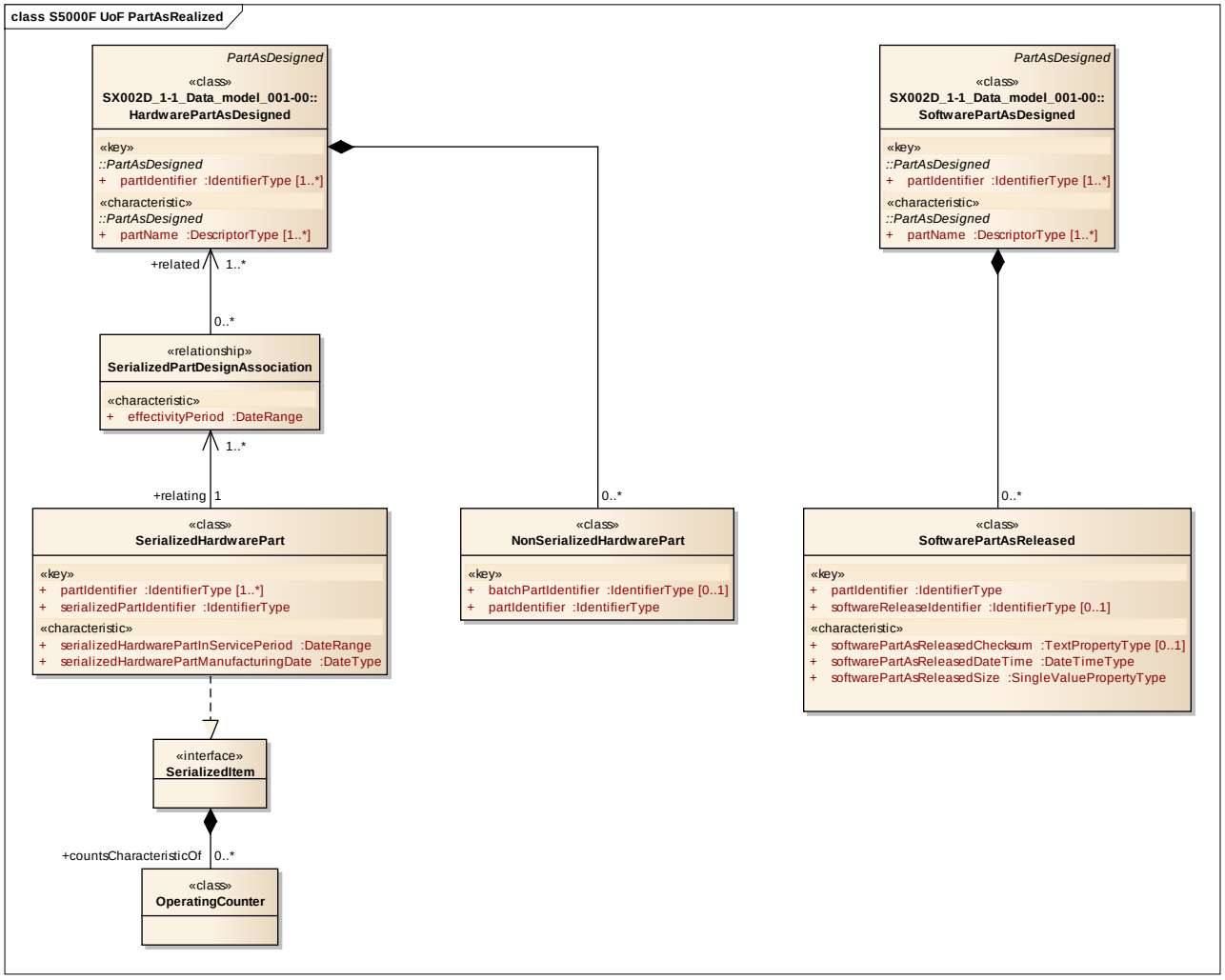
- Contract
- Party
- PartyRelationship
- Project

40 S5000F UoFPartAsRealized

40.1 Overall description

PartAsRealized UoF provides the capability to associate actual (physical parts, both serialized and not serialized, to the Design items that they implement.

40.2 Graphical representation



ICN-B6865-S5000F15063-001-00

Fig 39 S5000F UoF PartAsRealized – class model

40.3 S5000F UoF PartAsRealized - New class and interface definitions

40.3.1 NonSerializedHardwarePart

nonSerializedHardwarePart is a physical part that has no serial number (batched or nonbatched) and instantiates a HardwarePartAsDesigned functionality specification.

Example:

- rivet
- washer
- oring
- cable
- sheet part
- minor structural part

NonSerializedHardwarePart attributes:

- batchPartIdentifier
- partIdentifier

NonSerializedHardwarePart associations:

- Each NonSerializedHardwarePart must be associated to a single HardwarePartAsDesigned instance.

40.3.2 SerializedPartDesignAssociation

SerializedPartDesignAssociation is a <<relationship>> that associates a SerializedHardwarePart to the HardwarePartAsDesigned that defines its functionality.

Example:

- Part A belongs to build standard BS1 from 2013-01-01 to 2016-08-31
- Part A belongs to build standard BS2 from 2016-08-31 onwards

Note:

The relationship has an effectivityPeriod so as to indicate the period during which the SerializedHardwarePart adhered to this specification. Several relationships may exist for different periods if the SerializedHardwarePart has been modificed to adhere to a new specification.

The periods of the different relationships cannot overlap a SerializedHardwarePart can only belong to a single specification at a specific moment in time.

SerializedPartDesignAssociation attributes:

- effectivityPeriod

SerializedPartDesignAssociation associations:

- A SerializedHardwarePart must be asscoiated to one or many HarwarePartAsDesigned (via the SerializedPartDesignAssociation

40.4 S5000F UoF PartAsRealized - Referenced classes and interfaces

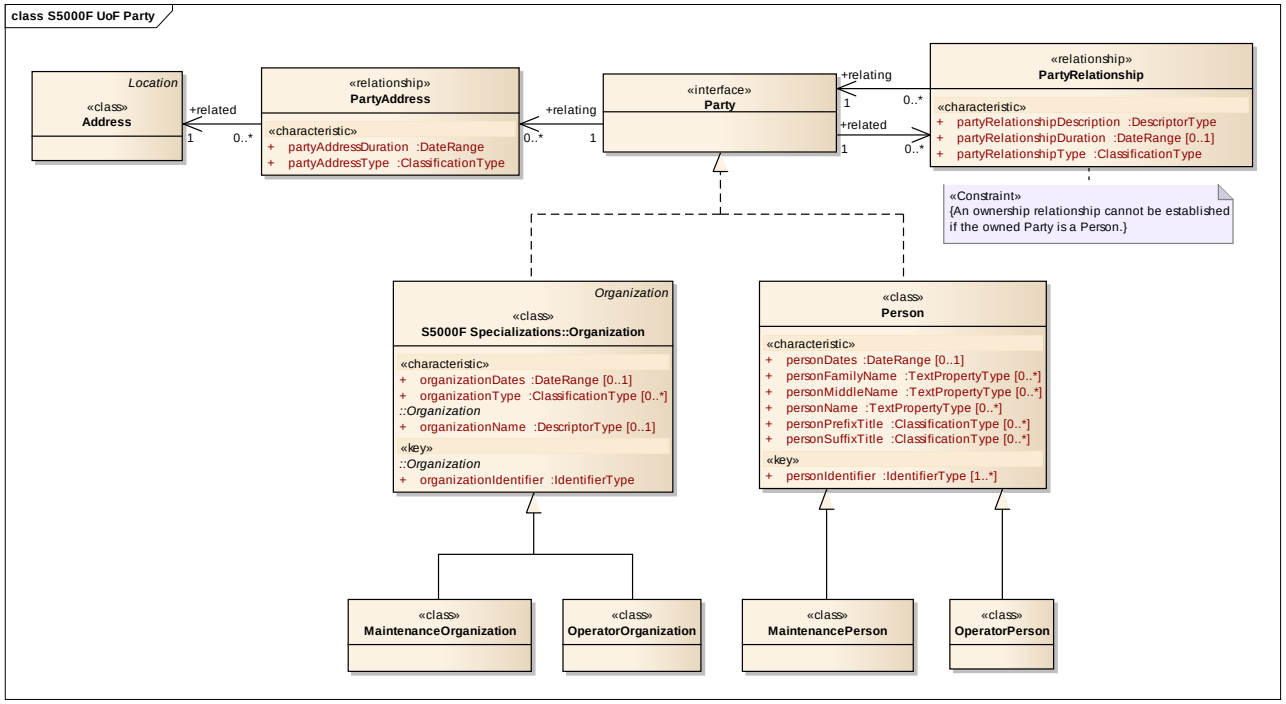
- HardwarePartAsDesigned
- OperatingCounter
- SerializedHardwarePart
- SerializedItem
- SoftwarePartAsDesigned
- SoftwarePartAsReleased

41 S5000F UoFParty

41.1 Overall description

Party UoF describes the generic interface used for the establishment of relations with different parties (organisations or people).

41.2 Graphical representation



ICN-B6865-S5000F15033-002-00

Fig 40 S5000F UoF Party – class model

41.3 S5000F UoF Party - New class and interface definitions

41.3.1 Organization

Organization is a Party representing an administrative structure with a particular purpose belonging to a legal entity.

Example:

- Company
- Government department
- International agency

Organization attributes:

- organizationDates
- organizationIdentifier (inherited from Organization)
- organizationName (inherited from Organization)
- organizationType

Organization implements the following <<interface>>:

- CostEntryRelatedTo
- DocumentAssignmentItem
- Party
- SubjectOfPoliciesAndRegulations

Organization associations:

- An Organization can grant zero, one or many MaintenanceLicenses.
- Each Organization can approve zero, one or many MaintenancePrograms.
- An Organization can have an association with zero, one or many ProductVariants for which it has defined the master maintenance program.

- (personOperationAuthorizedBy) The Organization that approves the operation of a specific ProductVariant by an OperatorPerson.
- (organisationOperationAuthorizedBy) The Organization that approves the operation of a specific ProductVariant by an (isApprovedBy) The Organization that has approved that a MaintenancePerson can work on a specific ProductVariant.
- A SecurityClassification is assigned to a Peron or Organization instance implementing the Party <<interface>> by an assiging Organization (through the PartySecurityAssignment <<relationship>>).
- An Organization can manufacture zero, one or many SerializedProductVariants.

41.3.2 Party

Party is an <<interface>> representing an entity that is capable of signing a contract or carrying out actions by itself without being instructed to do so.

Example:

- Person, organisation

Party implements the following <<interface>>:

- DocumentAssignmentItem
- LegalParty

Classes that implement the Party (inherited from Organization) <<interface>> are:

- MaintenanceOrganization
- MaintenancePerson
- OperatorOrganization
- OperatorPerson
- Organization
- Person

Party associations:

- Each Party can relate from zero, one or many other Contracts (via the ContractRelationship <<relationship>> class)
- A Report is always reported to one or several Person or Organization instances (via the Party <<interface>>).
- A SerializedProductVariantAvailability must be associated to a Person or Organization instance that reports such availability (via the Party <<interface>>).
- A WorkOrder has an optional association with a Person or Organization implementing the Party <<interface>> that is responsible for the MaintenanceActivities associated to that WorkOrder.
- An optional relationship with zero, one or many Documents (via the the DocumentParty <<relationship>> class)
- Each Party can be related to (operate) zero, one or many Facilities (via the FacilityOperator <<relationship>>)
- Each Party can be related to (operate) zero, one or many SerializedHardwareParts (via the EquipmentOperator <<relationship>>)
- Each Party can have zero, one or many ownership relationships with a SerializedHardwarePart (through the EquipmentOwner
- Each Party can relate to from zero, one or many other Parties (via the PartyRelationship <<relationship>> class)
- The Person or Organization, implementing the Party <<interface>> that owns the item implementing the SerializedItem <<interface>>.
- A Person or Organization (via the Party <<interface>>), can report zero, one or many ReportableActivities.

- A Report is always reported by a Person or an Organization instance (via the Party <<interface>>).
- Each Party can be related to (own) zero, one or many Facilities (via the FacilityOwner <<relationship>>)
- (related) The Person or Organization instance implementing the Party <<interface>> that owns the Pool in whole or in part.
- A Person or Organization (via the Party <<interface>>), can be assigned to zero, one or many WorkItems.
- (related) The Party that is related to a ResourceUsageRequest.
- (related) The Party that is related to a ServiceRequest.
- A SecurityClassification is assigned to a Peron or Organization instance implementing the Party <<interface>> by an assiging Organization (through the PartySecurityAssignment <<relationship>>).
- (related) The Person or Organization instance (implementing the Party <<interface>> that is the contact for a WarrantyClaim.
- (related) The Person or Organization instance implementing the Party <<interface>> that uses the Pool.
- (relating) The Party that relates to an Address.
- A FleetAvailability must be associated to a Person or Organization instance that reports such FleetAvailability (via the Party <<interface>>).
- A Party can repoirt zero, one or many Events.
- A Person or an Organization can have zero, one or many CostEntries associated to them (via the Party <<interface>>).
- A Person or Organization (via the Party <<interface>>) can perform zxero, one or many ReportableActivities.
- (related) The Party that is related to a Comment.
- (related) The Party that is related to an OrganizationalBreakdownStructureRevision

41.3.3 PartyAddress

PartyAddress is a <<relationship>> that defines the association between a Party and an Address.

PartyAddress attributes:

- partyAddressDuration
- partyAddressType

PartyAddress associations:

- A Party can be associated zero, one or many times to an Address.

41.3.4 PartyRelationship

A PartyRelationship is a <<relationship>> existing between two Parties (organizations or people).

- An ownership relationship cannot be established if the owned Party is a Person.

PartyRelationship attributes:

- partyRelationshipDescription
- partyRelationshipDuration
- partyRelationshipType <<constraint>> An ownership relationship cannot be established if the owned Party is a Person.

PartyRelationship associations:

- (related) The Party that is related to another Party
- (relating) The Party that relates to another Party

41.3.5 Person

Person is a living human being.

Person attributes:

- personDates
- personFamilyName
- personIdentifier
- personMiddleName
- personName
- personPrefixTitle
- personSuffixTitle

Person implements the following <<interface>>:

- CostEntryRelatedTo
- Detector
- DocumentAssignmentItem
- Party
- ResourceItem

41.4 S5000F UoF Party - Referenced classes and interfaces

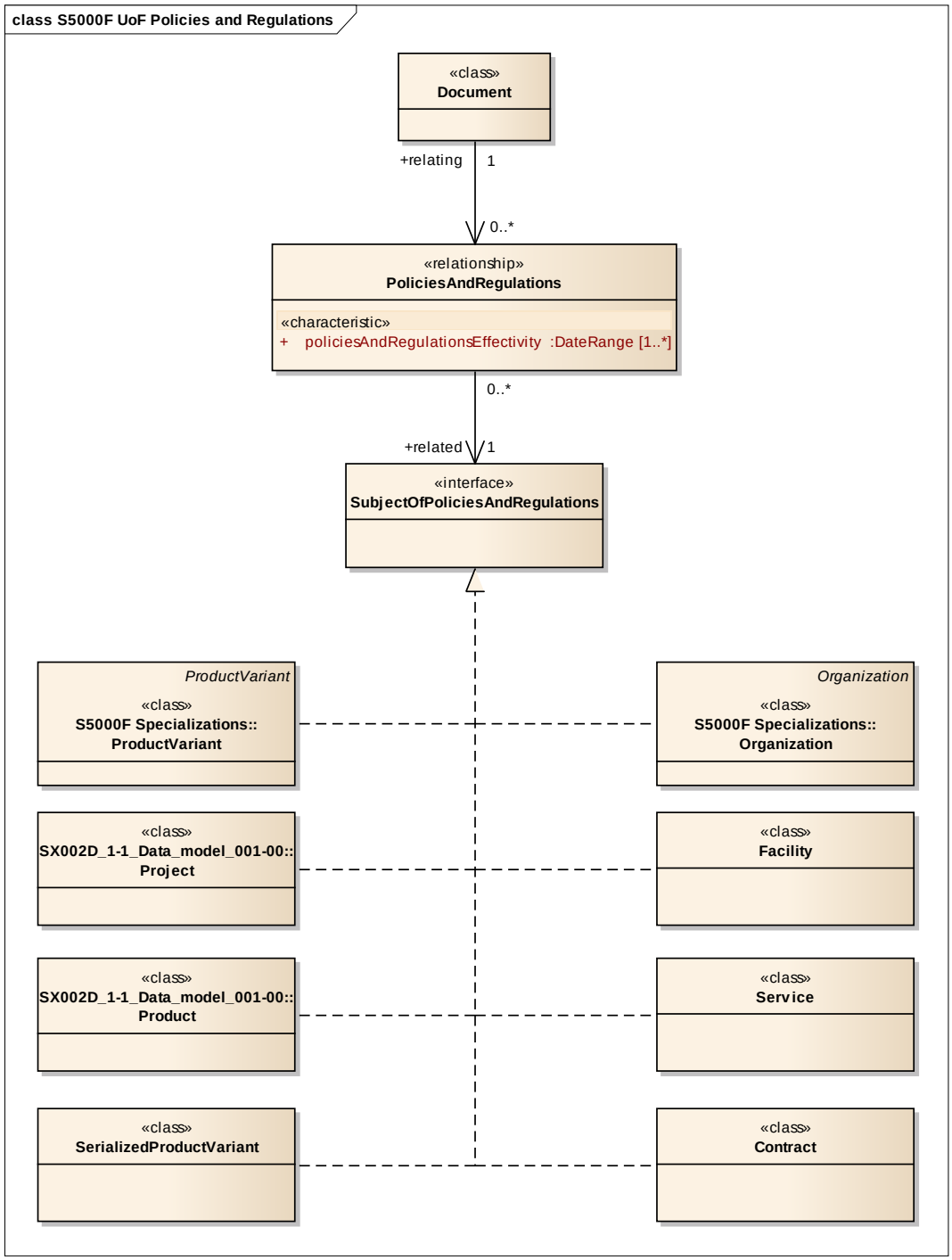
- Address
- MaintenanceOrganization
- MaintenancePerson
- OperatorOrganization
- OperatorPerson

42 S5000F UoFPolicies and Regulations

42.1 Overall description

Policies and Regulations UoF provides the capability to associate policies and regulations to specific projects, contracts, products, services and similar.

42.2 Graphical representation



ICN-B6865-S5000F15064-001-00

Fig 41 S5000F UoF Policies and Regulations – class model

42.3 S5000F UoF Policies and Regulations - New class and interface definitions

42.3.1 PoliciesAndRegulations

PoliciesAndRegulations is a <<relationship>> that allows to associate mandatory practices established by means of a Document to project, product, contract, service or major item requiring specific guidelines.

PoliciesAndRegulations attributes:

- policiesAndRegulationsEffectivity

PoliciesAndRegulations implements the following <<interface>>:

- DocumentAssignmentItem

PoliciesAndRegulations associations:

- A Document stating a policy or regulation may be associated to zero, one or many classes implementing the
- SubjectOfPoliciesAndRegulkations <<interface>> (via the PoliciesAndRegulations <<relationship>>).

42.3.2 SubjectOfPoliciesAndRegulations

SubjectofPoliciesAndRegulations is an <<interface>> that allows to associate items to policies and regulations.

Classes that implement the SubjectOfPoliciesAndRegulations <<interface>> are:

- Contract
- Facility
- MaintenanceFacility
- MaintenanceOrganization
- OperatingBase
- OperatorOrganization
- Organization
- Product
- ProductVariant
- Project
- SerializedProductVariant
- Service
- Warehouse

SubjectOfPoliciesAndRegulations associations:

- (related) The classes implementing the SubjectOfPoliciesAndRegulkations <<interface>> that are related to the policy or regulatory

42.4 S5000F UoF Policies and Regulations - Referenced classes and interfaces

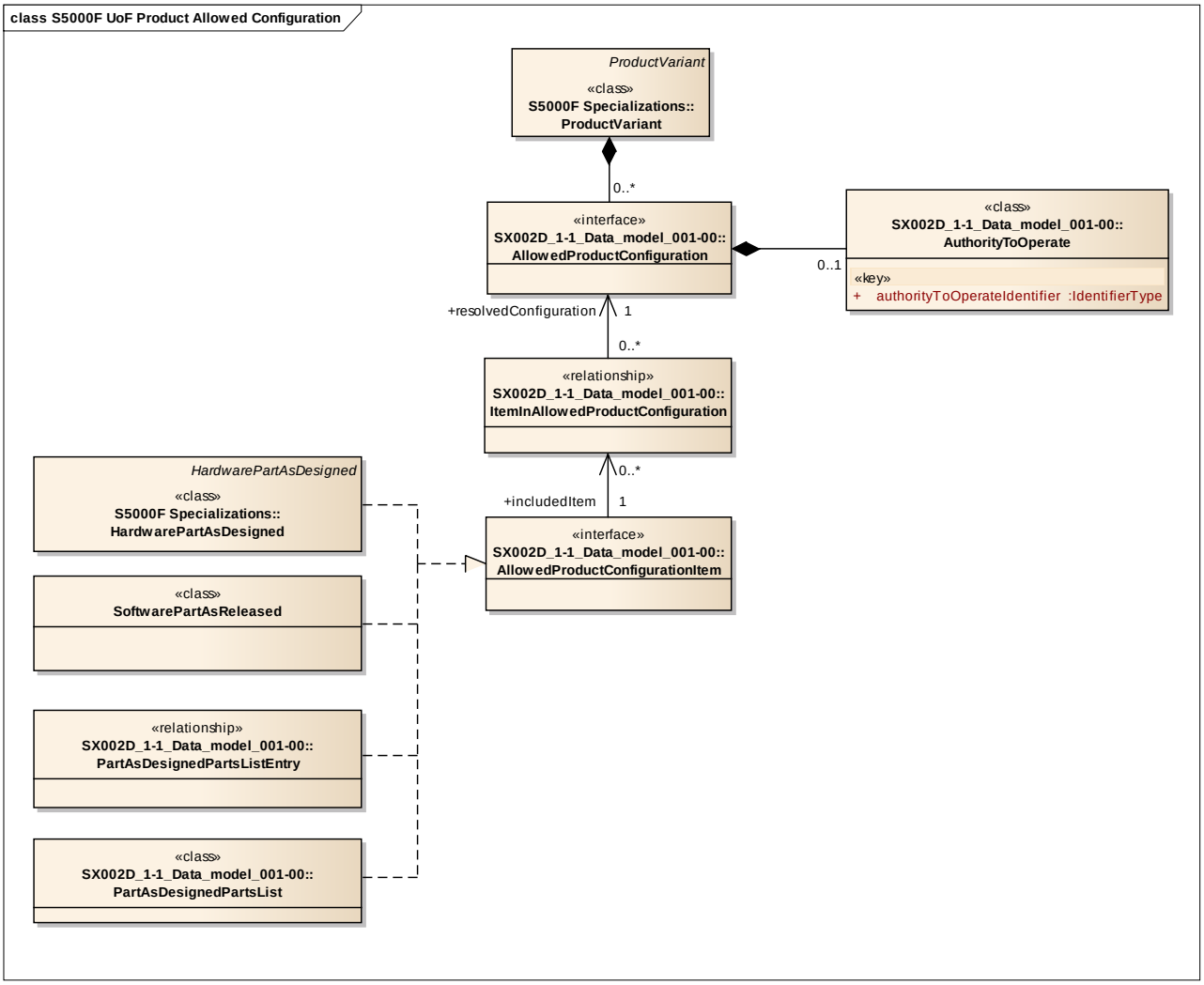
- Contract
- Document
- Facility
- Organization
- Product
- ProductVariant
- Project
- SerializedProductVariant
- Service

43 S5000F UoFProduct Allowed Configuration

43.1 Overall description

Product Allowed Configuration UoF defines what elements may be included in the configuration of a ProductVariant so as to meet design or regulatory requirements (e.g., type certificate).

43.2 Graphical representation



ICN-B6865-S5000F15032-002-00

Fig 42 S5000F UoF Product Allowed Configuration – class model

43.3 S5000F UoF Product Allowed Configuration - New class and interface definitions

No new classes defined in this UoF.

43.4 S5000F UoF Product Allowed Configuration - Referenced classes and interfaces

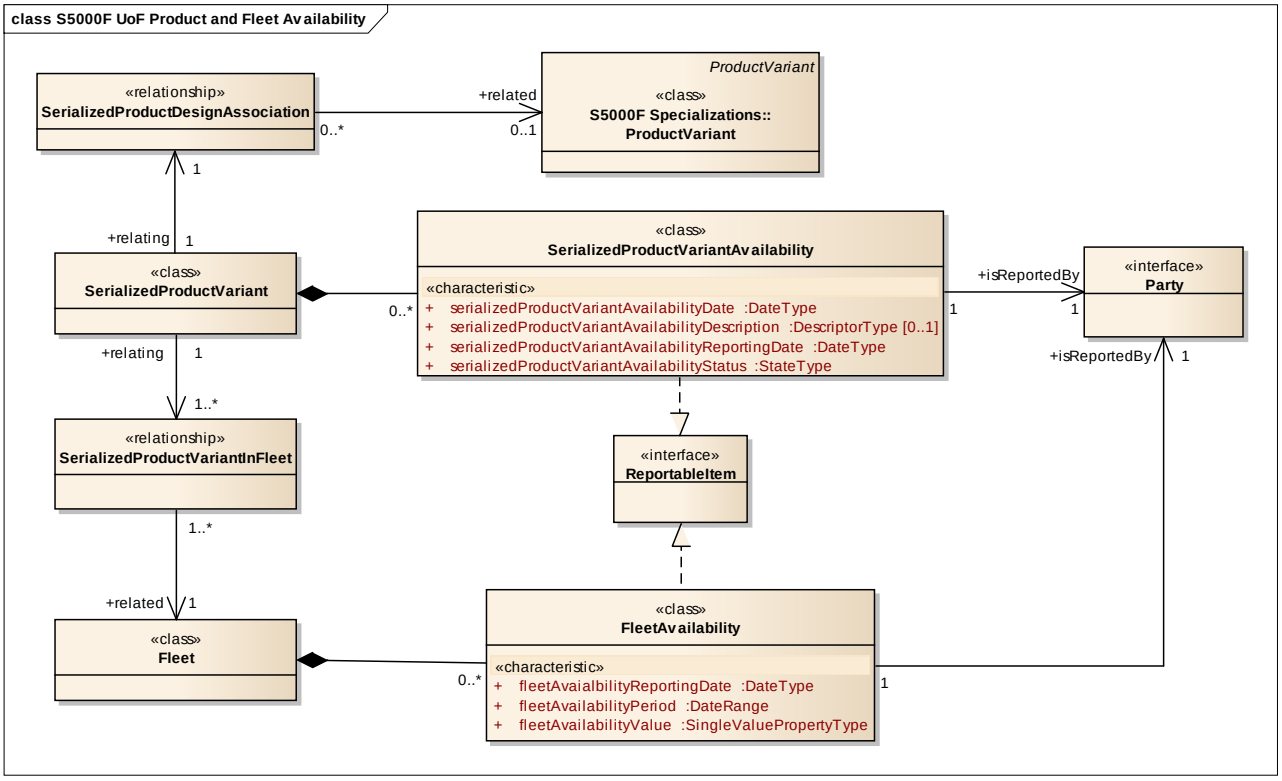
- AllowedProductConfiguration
- AllowedProductConfigurationItem
- AuthorityToOperate
- HardwarePartAsDesigned
- ItemInAllowedProductConfiguration
- PartAsDesignedPartsList
- PartAsDesignedPartsListEntry
- ProductVariant
- SoftwarePartAsReleased

44 S5000F UoFProduct and Fleet Availability

44.1 Overall description

Product and Fleet Availability UoF provides the necessary information to calculate the availability at serialized product variant, product variant, product and fleet level.

44.2 Graphical representation



ICN-B6865-S5000F15035-002-00

Fig 43 S5000F UoF Product and Fleet Availability – class model

44.3 S5000F UoF Product and Fleet Availability - New class and interface definitions

44.3.1 FleetAvailability

FleetAvailability defines the availability of a fleet during a specific period of time.

FleetAvailability attributes:

- fleetAvaialbilityReportingDate
- fleetAvailabilityPeriod
- fleetAvailabilityValue

FleetAvailability implements the following <<interface>>:

- ReportableItem
- SecurityClassificationItem

FleetAvailability associations:

- A FleetAvailability must be associated to a Person or Organization instance that reports such FleetAvailability (via the Party <<interface>>).
- Each FleetAvailability must be associated to a defined Fleet.

44.3.2 SerializedProductVariantAvailability

SerializedProductVarantAvailability is an indication of the global availability status of a serialized product variant at a specific day.

SerializedProductVariantAvailability attributes:

- serializedProductVariantAvailabilityDate
- serializedProductVariantAvailabilityDescription
- serializedProductVariantAvailabilityReportingDate
- serializedProductVariantAvailabilityStatus

SerializedProductVariantAvailability implements the following <<interface>>:

- ReportableItem

SerializedProductVariantAvailability associations:

- Each SerializedProductVariantAvailability must be associated to a SerializedProductVariant.
- A SerializedProductVariantAvailability must be associated to a Person or Organization instance that reports such availability (via the Party <<interface>>).

44.4 S5000F UoF Product and Fleet Availability - Referenced classes and interfaces

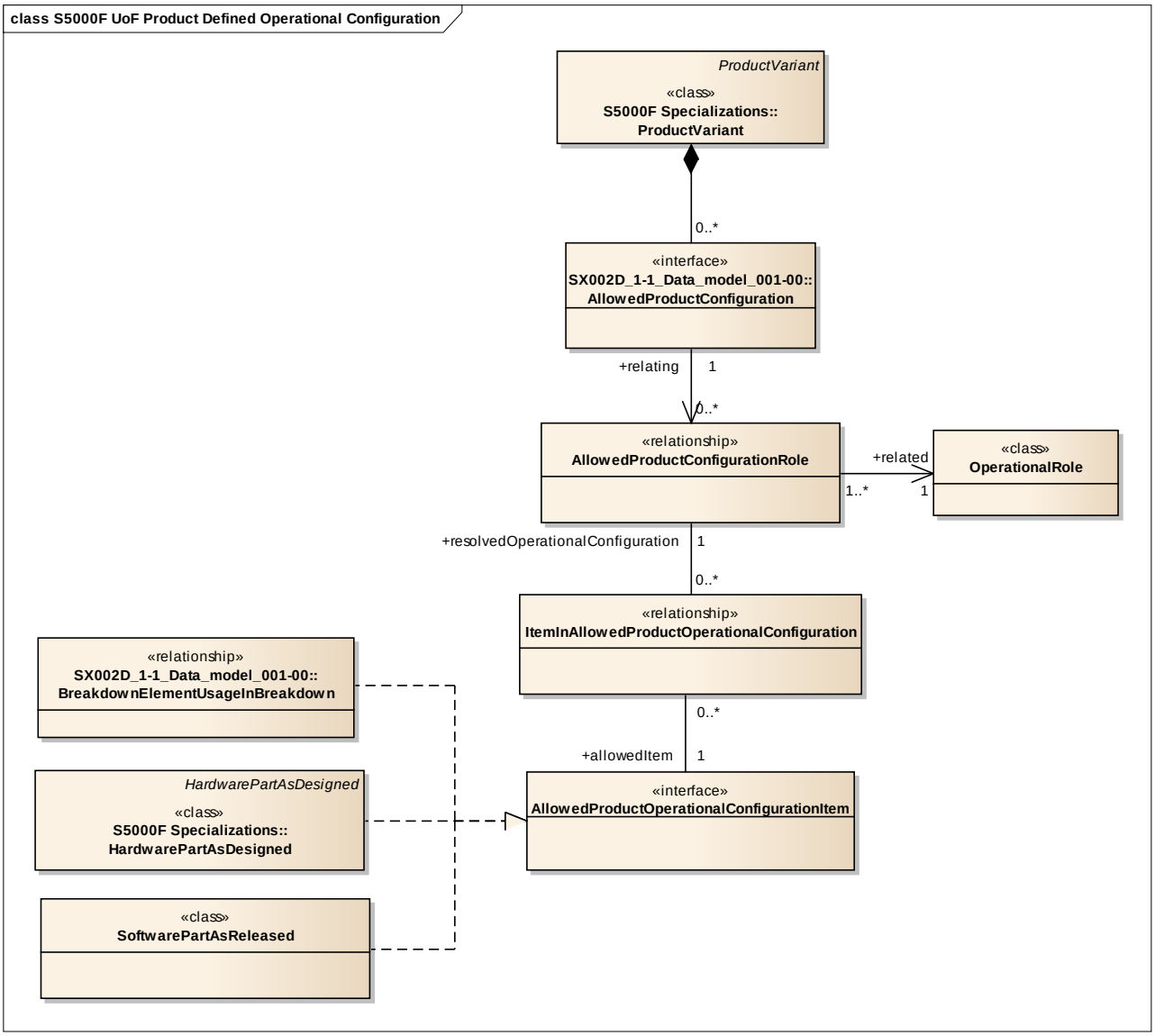
- Fleet
- Party
- ProductVariant
- ReportableItem
- SerializedProductDesignAssociation
- SerializedProductVariant
- SerializedProductVariantInFleet

45 S5000F UoFProduct Defined Operational Configuration

45.1 Overall description

Defined Operational Configuration UoF supports the definition of Role related restrictions within an overall allowed product configuration (type certificate).

45.2 Graphical representation



ICN-B6865-S5000F15036-002-00

Fig 44 S5000F UoF Product Defined Operational Configuration – class model

45.3 S5000F UoF Product Defined Operational Configuration - New class and interface definitions

45.3.1 AllowedProductOperationalConfigurationItem

AllowedProductOperationalConfigurationItem is an <<interface>> that allows to define the items that can be included in the AllowedProductOperationalConfiguration.

Classes that implement the AllowedProductOperationalConfigurationItem (inherited from HardwarePartAsDesigned) <<interface>> are:

- Accelerometer
- BreakdownElementUsageInBreakdown
- HardwarePartAsDesigned
- PressureSensor
- SensorType

- SoftwarePartAsReleased
- StrainGauge
- SupportEquipment
- Tachometer
- TemperatureSensor

AllowedProductOperationalConfigurationItem associations:

- The allowed item in an AllowedProductConfiguration for a specific role.

45.3.2 ItemInAllowedProductOperationalConfiguration

ItemInAllowedProductOperationalConfiguration is a <<relationship>> that defines which items are permitted for a specific AllowedProductConfigurationRole.

45.4 S5000F UoF Product Defined Operational Configuration - Referenced classes and interfaces

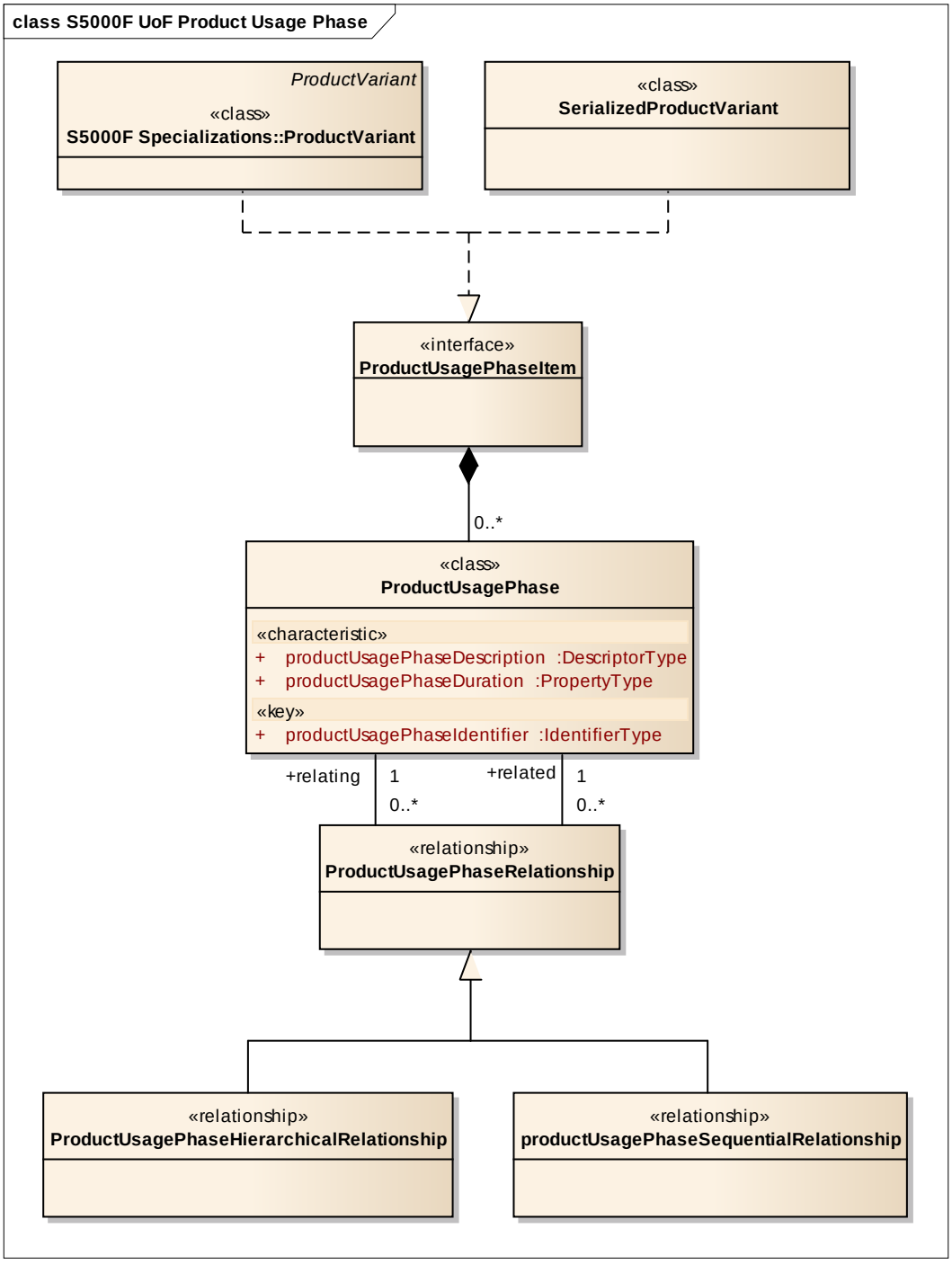
- AllowedProductConfiguration
- AllowedProductConfigurationRole
- BreakdownElementUsageInBreakdown
- HardwarePartAsDesigned
- OperationalRole
- ProductVariant
- SoftwarePartAsReleased

46 S5000F UoFProduct Usage Phase

46.1 Overall description

Product Usage Phase UoF provides the capability to define segments of the product usage that have different usage charactaristics.

46.2 Graphical representation



ICN-B6865-S5000F15037-002-00

Fig 45 S5000F UoF Product Usage Phase – class model

46.3 S5000F UoF Product Usage Phase - New class and interface definitions

46.3.1 ProductUsagePhase

ProductUsagePhase is a distinct period of time during which a Product, ProductVariant or SerializedProductVariant will be used in a specific way, which is different from any other ProductUsagePhase.

Example:
- takeoff, cruise, immersion.

ProductUsagePhase attributes:

- productUsagePhaseDescription
- productUsagePhaseDuration
- productUsagePhaseIdentifier

ProductUsagePhase associations:

- A ProductUsagePhase can be associated to zero, one or many Events.
- Each ProductUsagePhase can relate to from zero, one or many other ProductUsagePhases (via the ProductUsagePhaseRelationship <<relationship>> class)
- Each ProductUsagePhase must be associated to a defined to a class implementing the ProductUsagePhaseItem <<interface>>.

46.3.2 ProductUsagePhaseHierarchicalRelationship

ProductUsagePhaseHierarchicalRelationship is a <<relationship>> that allows to define a hierarchical association between two ProductUsagePhases.

ProductUsagePhaseHierarchicalRelationship associations:

- (related) The ProductUsagePhase that is related to another ProductUsagePhase (inherited from ProductUsagePhaseRelationship)
- (relating) The ProductUsagePhase that relates to another ProductUsagePhase (inherited from ProductUsagePhaseRelationship)

46.3.3 ProductUsagePhaseItem

ProductUsagePhaseItem is an <<interface>> which associates a ProductUsagePhase to the item(s) that have that type of usage.

Classes that implement the ProductUsagePhaseItem <<interface>> are:

- ProductVariant
- SerializedProductVariant

ProductUsagePhaseItem associations:

- Any class implementing the ProductUsagePhaseItem <<interface>> can be associated to zero, one or many ProductUsagePhases.

46.3.4 ProductUsagePhaseRelationship

ProductUsagePhaseRelationship is a <<relationship>> that defines how two ProductUsagePhases are associated with each other.

ProductUsagePhaseRelationship associations:

- (related) The ProductUsagePhase that is related to another ProductUsagePhase
- (relating) The ProductUsagePhase that relates to another ProductUsagePhase

46.3.5 productUsagePhaseSequentialRelationship

ProductUsagePhaseSequentialRelationship is a <<relationship>> that allows to define a sequential association between two ProductUsagePhases.

productUsagePhaseSequentialRelationship associations:

- (relating) The ProductUsagePhase that relates to another ProductUsagePhase (inherited from ProductUsagePhaseRelationship)

– (related) The ProductUsagePhase that is related to another ProductUsagePhase (inherited from ProductUsagePhaseRelationship)

46.4 S5000F UoF Product Usage Phase - Referenced classes and interfaces

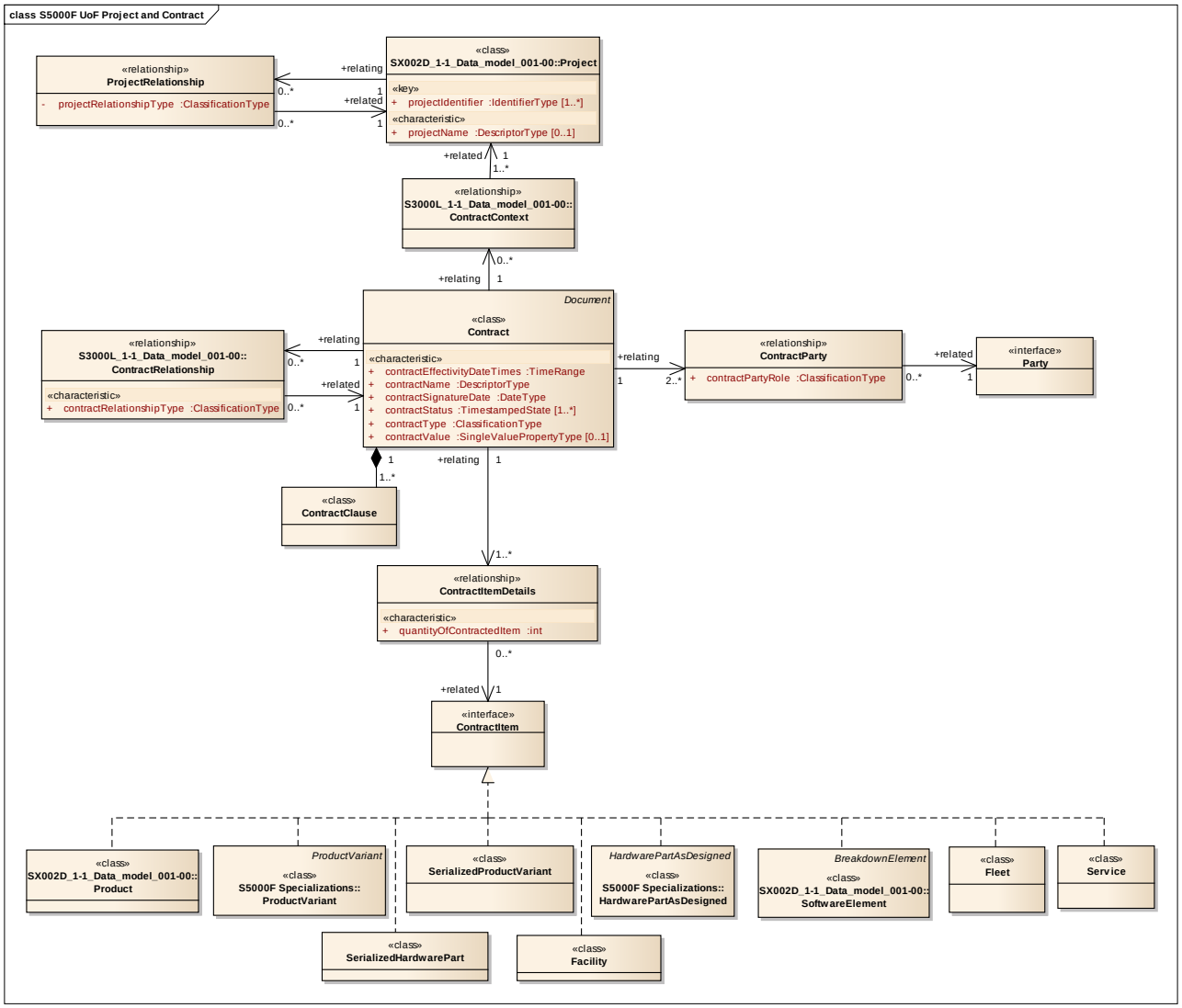
– ProductVariant
– SerializedProductVariant

47 S5000F UoFProject and Contract

47.1 Overall description

Project and Contract UoF defines the main relationships between one or several projects and one or several contracts, including what the purpose of the contract is in relationship with the project.

47.2 Graphical representation



ICN-B6865-S5000F15038-002-00

Fig 46 S5000F UoF Project and Contract – class model

47.3 S5000F UoF Project and Contract - New class and interface definitions

47.3.1 Contract

Contract is a legally binding document that defines a series of obligations between two or more parties.

Example:

- service contract
- procurement contract
- leasing contract
- subcontract

Contract attributes:

- contractEffectivityDateTimes
- contractName
- contractSignatureDate
- contractStatus
- contractType
- contractValue
- documentCreationDate (inherited from Document)
- documentDescription (inherited from Document)
- documentIdentifier (inherited from Document)
- documentStatus (inherited from Document)
- documentTitle (inherited from Document)
- documentType (inherited from Document)

Contract implements the following <<interface>>:

- ApplicabilityAssignmentItem (inherited from Document)
- CommentItem (inherited from Document)
- CostEntryRelatedTo
- DocumentAssignmentItem (inherited from Document)
- DocumentItem (inherited from Document)
- MessageContextItemSelect
- OrganizationalBreakdownStructure
- SecurityClassificationItem (inherited from Document)
- SubjectOfPoliciesAndRegulations

Contract associations:

- A Contract can be associated to zero, one or many ShopFindings.
- Each Document can relate to zero, one or many Documents (via the DocumentAssociation <<relationship>> class) (inherited from Document)
- Each Contract must relate to two or more other Parties (via the ContractPartyRelationship <<relationship>> class).
- Each Contract can relate to zero, one or many Contracts (via the ContractRelationship <<relationship>> class)
- Each Contract can be associated with zero, one or many Projects (via the ContractContext <<relationship>> class).
- An optional association with its DocumentIssues (inherited from Document)
- A Contract can be associated with zero, one or many Services (through the ContractService <<relationship>> class)
- A Contract can be associated to zero, one or many ResourceUsageRequests.
- A Contract can be associated to a Pool.
- (relating) The Document that relates to any class implemnting the SubjectOfPoliciesAndRegulations <<interface>>. (inherited from

- (relating) The Document that relates to a MaintenanceActivity. (inherited from Document)
- (relating) The Contract that relates to a class implementing the ContractItem <<interface>>.
- A Contract can have one or many ContractClauses.

47.3.2 ContractContext

ContractContext is a <<relationship>> class which defines the Project context for a Contract.

ContractContext associations:

- For documentation, see Source and Target Role notes.
- (related) The Project that is related to the relating Contract.
- (relating) The Contract that relates to a Project.

47.3.3 ContractItem

ContractItem is an <<interface>> that associates a Contract with one or several items that form the subject of the Contract.

Classes that implement the ContractItem (inherited from HardwarePartAsDesigned) <<interface>> are:

- Accelerometer
- Facility
- Fleet
- HardwarePartAsDesigned
- MaintenanceFacility
- OperatingBase
- PressureSensor
- Product
- ProductVariant
- SensorType
- SerializedHardwarePart
- SerializedProductVariant
- Service
- SoftwareElement
- StrainGauge
- SupportEquipment
- Tachometer
- TemperatureSensor
- Warehouse

ContractItem associations:

- (related) The class instance implementing the ContractItem <<interface>> that is related to a Contract.

47.3.4 ContractItemDetails

ContractItemDetails is a <<relationship>> that associates a Contract with one or several ContractItems to which a contract is associated.

ContractItemDetails attributes:

- quantityOfContractedItem

ContractItemDetails associations:

- A Contract must be associated to one or many instances of any class implementing the ContractItem <<interface>> that represent the subject of the Contract.

47.3.5 ContractParty

ContractingParty is a <<relationship>> that defines a party associated to a contract and its respective role within that contract.

Example:

– Main contractor, supplier, subcontractor, contract owner

ContractParty attributes:

– contractPartyRole

ContractParty associations:

– (relating) The Contract that relates to a Party.
– (related) The Party that is related to a Contract

47.3.6 ContractRelationship

ContractRelationship is a <<relationship>> class, which defines relationships between two related Contracts.

Example:

– subcontract, service contract of, associated contract

ContractRelationship attributes:

– contractRelationshipType

ContractRelationship implements the following <<interface>>:

– RemarkAssignmentItem

ContractRelationship associations:

– (related) The Contract that is related to from the relating Contract
– (relating) The Contract that relates to another Contract.

47.3.7 ContractStatus

ContractStatus describes the status of a contract during a specific period of time.

Example:

– Contract suspended during 2013.

ContractStatus attributes:

– contractStatusPeriod
– contractStatusReason
– contractStatusType

47.3.8 Project

Project is a class that identifies the overall ILS project (often also known as an ILS program).

Project attributes:

– projectIdentifier
– projectName

Project implements the following <<interface>>:

– ApplicabilityAssignmentItem
– MessageContextItemSelect
– SecurityClassificationItem

47.3.9 ProjectRelationship

ProjectRelationShip is a <<relationship>> that defines an association between two different Projects.

ProjectRelationship attributes:

– projectRelationshipType

ProjectRelationship associations:

– (relating) The Project that relates to another Project

47.4 S5000F UoF Project and Contract - Referenced classes and interfaces

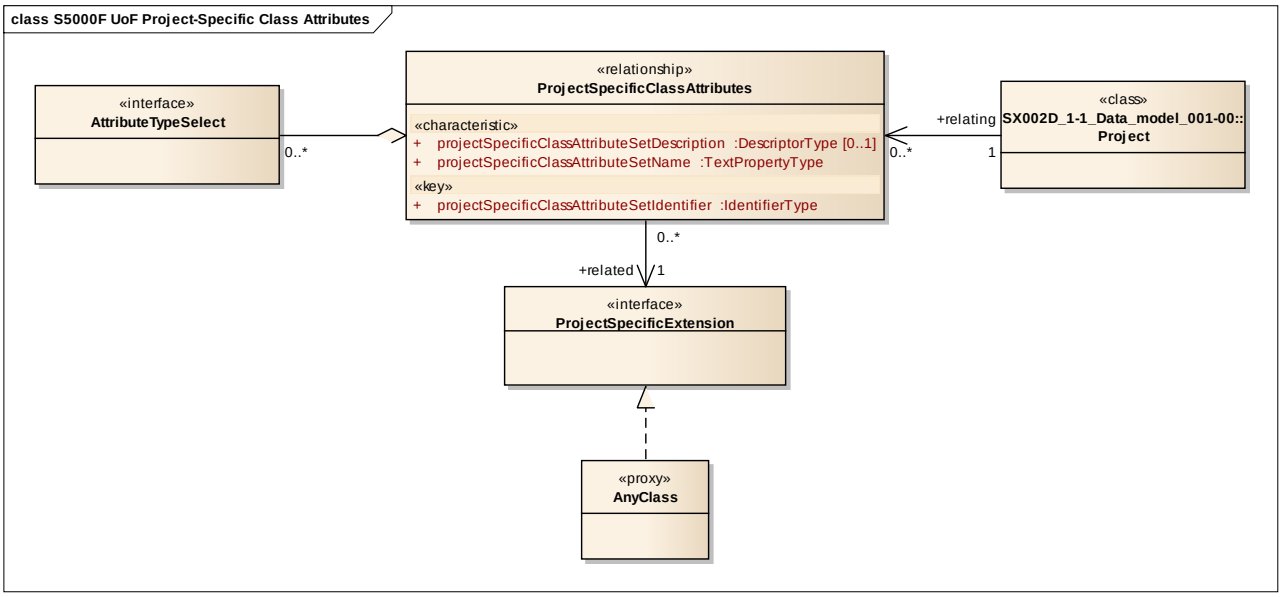
– ContractClause
– Facility
– Fleet
– HardwarePartAsDesigned
– Party
– Product
– ProductVariant
– Project
– SerializedHardwarePart
– SerializedProductVariant
– Service
– SoftwareElement

48 S5000F UoFProjectSpecific Class Attributes

48.1 Overall description

Projectspecific attributes UoF provides the capability to add data that is not considered in S5000F as a projectspecific extension to specific class instances.

48.2 Graphical representation



ICN-B6865-S5000F15039-002-00

Fig 47 S5000F UoF ProjectSpecific Class Attributes – class model

48.3 S5000F UoF ProjectSpecific Class Attributes - New class and interface definitions

48.3.1 AnyClass

AnyClass is a <<proxy>> stub that represents any class in the data model.

AnyClass implements the following <<interface>>:

- ProjectSpecificExtension

AnyClass associations:

- Any class that is related to a DigitalFile.

48.3.2 ProjectSpecificClassAttributes

ProjectSpecificClassAttributes is a <<relationship>> that associates the value(s) of projectspecific attribute(s) to a specific instance of a data model class.

Note:
As the ProjectSpecificData class represents an attribute value, it can be only associated to an instantiated class, and only to one that has a unique identifier.

ProjectSpecificClassAttributes attributes:

- projectSpecificClassAttributeSetDescription
- projectSpecificClassAttributeSetIdentifier
- projectSpecificClassAttributeSetName

ProjectSpecificClassAttributes implements the following <<interface>>:

- SecurityClassificationItem

ProjectSpecificClassAttributes associations:

- A Project can be associated with zero, one or many clases that implement the ProjectSpecificExtension <<interface>>.
- ProjectSpecificClassAttributes can have zero, one or many attributes (though the AttributeTypeSelect <<interface>>) associated to it.

48.3.3 ProjectSpecificExtension

ProjectSpecificExtension is an <<interface>> that allows to include projectspecific attributes to any class in the data model.

Classes that implement the ProjectSpecificExtension <<interface>> are:

- AnyClass

ProjectSpecificExtension associations:

- (related) Any class implementinh the ProjectSpecificExtension <<interface>>).

48.4 S5000F UoF ProjectSpecific Class Attributes - Referenced classes and interfaces

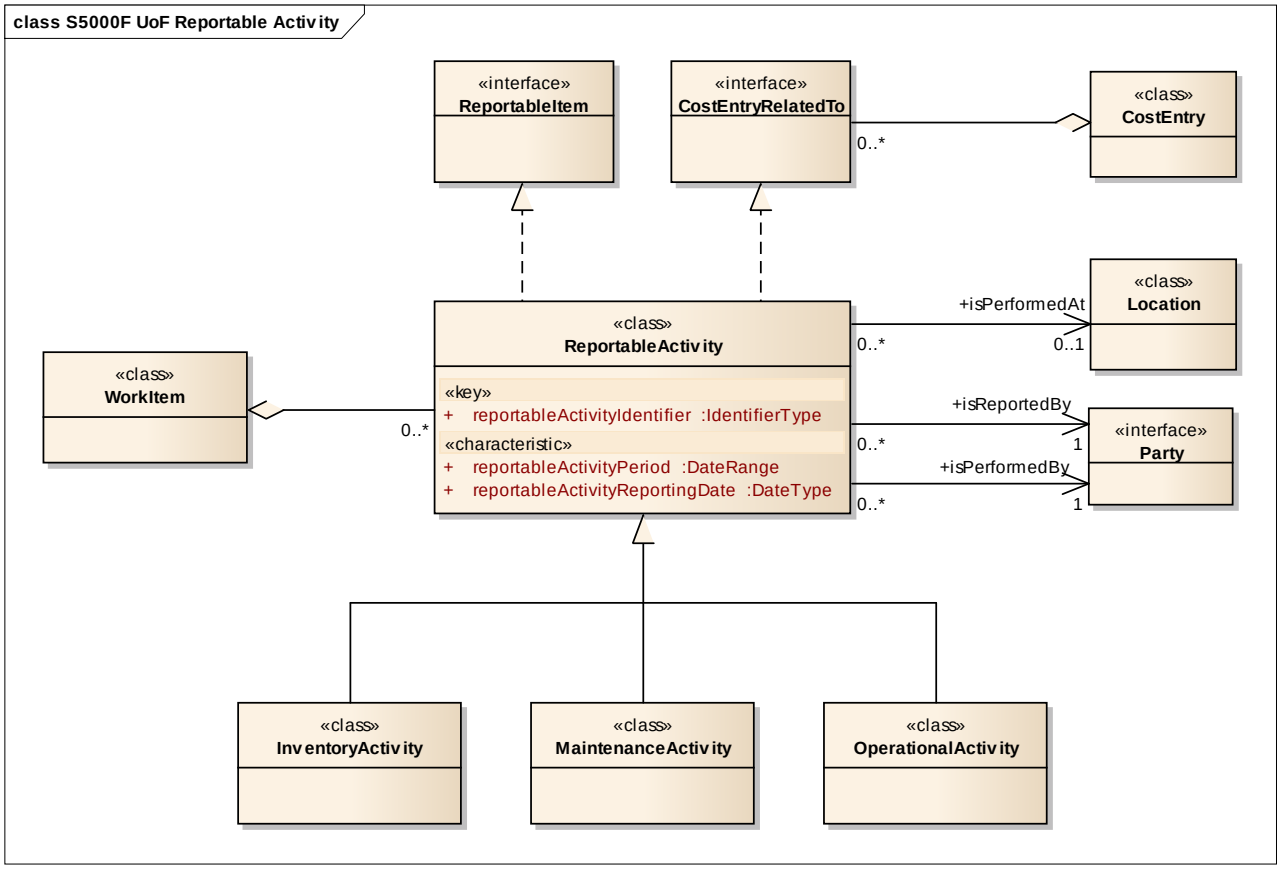
- AttributeTypeSelect
- Project

49 S5000F UoFReportable Activity

49.1 Overall description

Reportable Activity UoF provides the main relationships of a ReportableActvity and derived classes.

49.2 Graphical representation



ICN-B6865-S5000F15040-002-00

Fig 48 S5000F UoF Reportable Activity – class model

49.3 S5000F UoF Reportable Activity - New class and interface definitions

49.3.1 InventoryActivity

InventoryActivity is an Activity associated to the management of spares or warehouses

InventoryActivity attributes:

- reportableActivityIdentifier (inherited from ReportableActivity)
- reportableActivityPeriod (inherited from ReportableActivity)
- reportableActivityReportingDate (inherited from ReportableActivity)

InventoryActivity implements the following <<interface>>:

- CommentItem (inherited from ReportableActivity)
- CostEntryRelatedTo (inherited from ReportableActivity)
- ReportableItem (inherited from ReportableActivity)

InventoryActivity associations:

- Each ReportableActivity can be associated to a WorkItem. (inherited from ReportableActivity)
- A ReportableActivity is always reported by a Person or Organization (via the Party <<interface>>). (inherited from ReportableActivity)
- A ReportableActivity instance is always performed by a Person or Organization (via the Party <<interface>>). (inherited from

- A ReportableActivity can be optionally associated to a Location where such ReportableActivity is carried out. (inherited from

49.3.2 OperationalActivity

OperationalActivity is an Activity associated to the operation of a SerializedProduct.

OperationalActivity attributes:

- reportableActivityIdentifier (inherited from ReportableActivity)
- reportableActivityPeriod (inherited from ReportableActivity)
- reportableActivityReportingDate (inherited from ReportableActivity)

OperationalActivity implements the following <<interface>>:

- CommentItem (inherited from ReportableActivity)
- CostEntryRelatedTo (inherited from ReportableActivity)
- DocumentAssignmentItem
- ReportableItem (inherited from ReportableActivity)

OperationalActivity associations:

- An OperationalActivity can be optionally associated to a Location where such ReportableActivity is carried out. (inherited from ReportableActivity)
- An OperationalActivity instance is always performed by a Person or Organization (via the Party <<interface>>). (inherited from ReportableActivity)
- An OperationalActivity is always reported by a Person or Organization (via the Party <<interface>>). (inherited from ReportableActivity)
- Each OperationalActivity can be associated to a WorkItem. (inherited from ReportableActivity)

49.3.3 ReportableActivity

ReportableActivity is an activity that is part of work item that is deemed to be of sufficient importance as to be reported.

Example:
- maintenance action

ReportableActivity attributes:

- reportableActivityIdentifier
- reportableActivityPeriod
- reportableActivityReportingDate

ReportableActivity implements the following <<interface>>:

- CommentItem
- CostEntryRelatedTo
- ReportableItem

ReportableActivity associations:

- Each ReportableActivity can be associated to a WorkItem.
- A ReportableActivity can be optionally associated to a Location where such ReportableActivity is carried out.
- A ReportableActivity instance is always performed by a Person or Organization (via the Party <<interface>>).
- A ReportableActivity is always reported by a Person or Organization (via the Party <<interface>>).

49.4 S5000F UoF Reportable Activity - Referenced classes and interfaces

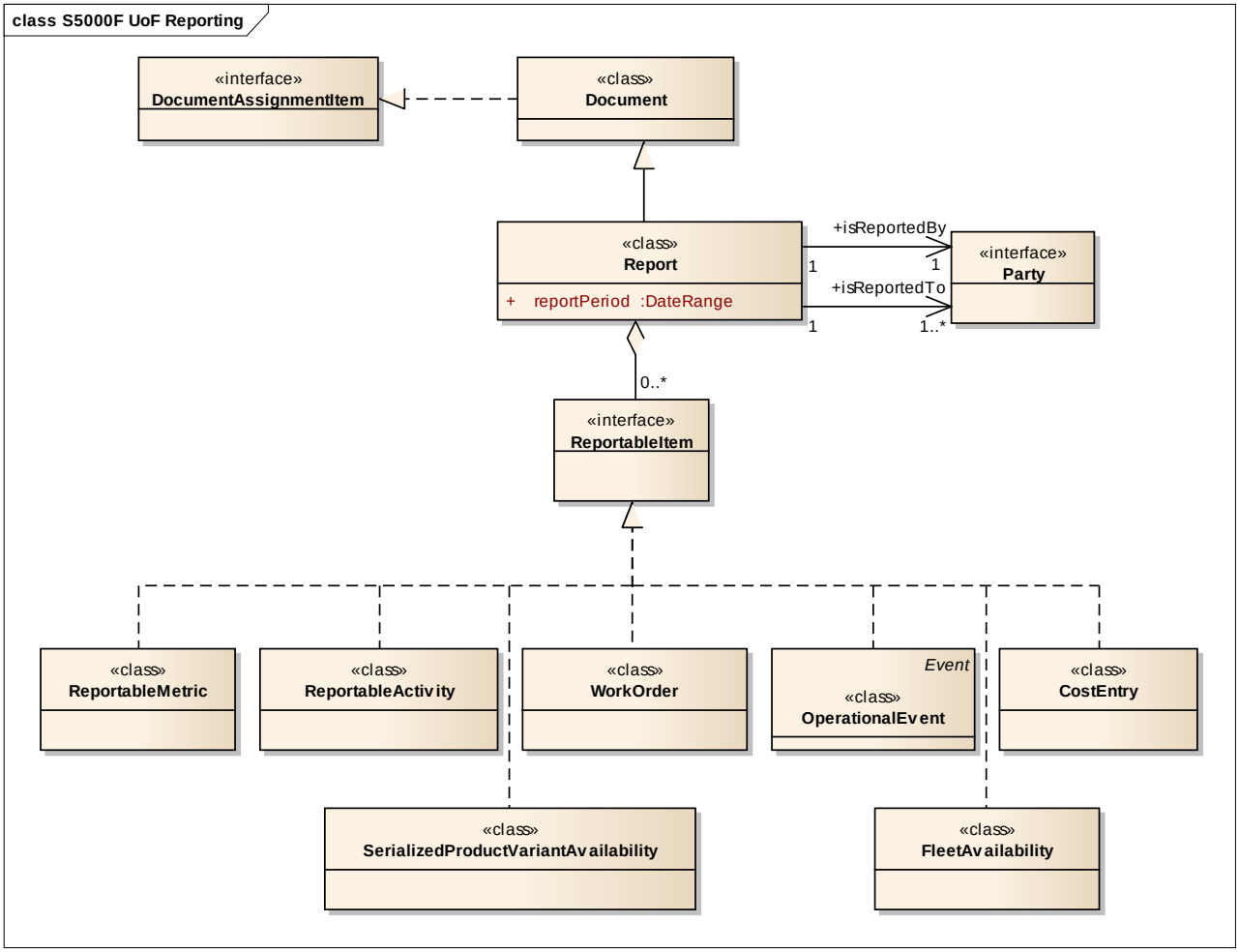
- CostEntry
- CostEntryRelatedTo
- Location
- MaintenanceActivity
- Party
- ReportableItem
- WorkItem

50 S5000F UoFReporting

50.1 Overall description

Reporting UoF permits to deliver formal information between parties, usually as part of a contractual requirement.

50.2 Graphical representation



ICN-B6865-S5000F15041-002-00

Fig 49 S5000F UoF Reporting – class model

50.3 S5000F UoF Reporting - New class and interface definitions

50.3.1 Report

Report is a Document that provides information about the execution of certain activities or significant events that have taken place.

Example:
- progress report
- cost report
- technical report

Note:
The relationship of Report with the subject of the Report (eg, a Contract) is performed through the DocumentAssignmentItem <<interface>> that is inherited from the Document class.

Report attributes:

- documentCreationDate (inherited from Document)
- documentDescription (inherited from Document)
- documentIdentifier (inherited from Document)
- documentStatus (inherited from Document)
- documentTitle (inherited from Document)
- documentType (inherited from Document)
- reportPeriod

Report implements the following <<interface>>:

- ApplicabilityAssignmentItem (inherited from Document)
- CommentItem (inherited from Document)
- DocumentAssignmentItem (inherited from Document)
- DocumentItem (inherited from Document)
- SecurityClassificationItem (inherited from Document)

Report associations:

- A Report can be associated zero, one or many classes implementing the ReportableItem <<interface>>.
- Each Report can be associated to a FleetTask.
- Each Document can relate to zero, one or many Documents (via the DocumentAssociation <<relationship>> class) (inherited from Document)
- An optional association with its DocumentIssues (inherited from Document)
- A Report is always reported by a Person or an Organization instance (via the Party <<interface>>).
- (relating) The Document that relates to any class implemnting the SubjectOfPoliciesAndRegulations <<interface>>. (inherited from Document)
- (relating) The Document that relates to a MaintenanceActivity. (inherited from Document)
- A Report is always reported to one or several Person or Organization instances (via the Party <<interface>>).

50.3.2 ReportableItem

ReportableItem is an <<interface>> representing everything that is worth reporting.

Example:
- incurred cost
- operational event
- maintenance activity

Classes that implement the ReportableItem <<interface>> are:

- CostEntry
- FleetAvailability
- InventoryActivity
- MaintenanceActivity

- OperationalActivity
- OperationalEvent
- ReportableActivity
- ReportableMetric
- SerializedProductVariantAvailability
- WorkOrder

ReportableItem associations:

- Any class implementing the ReportableItem <<interface>> can be associated to a Report.

50.4 S5000F UoF Reporting - Referenced classes and interfaces

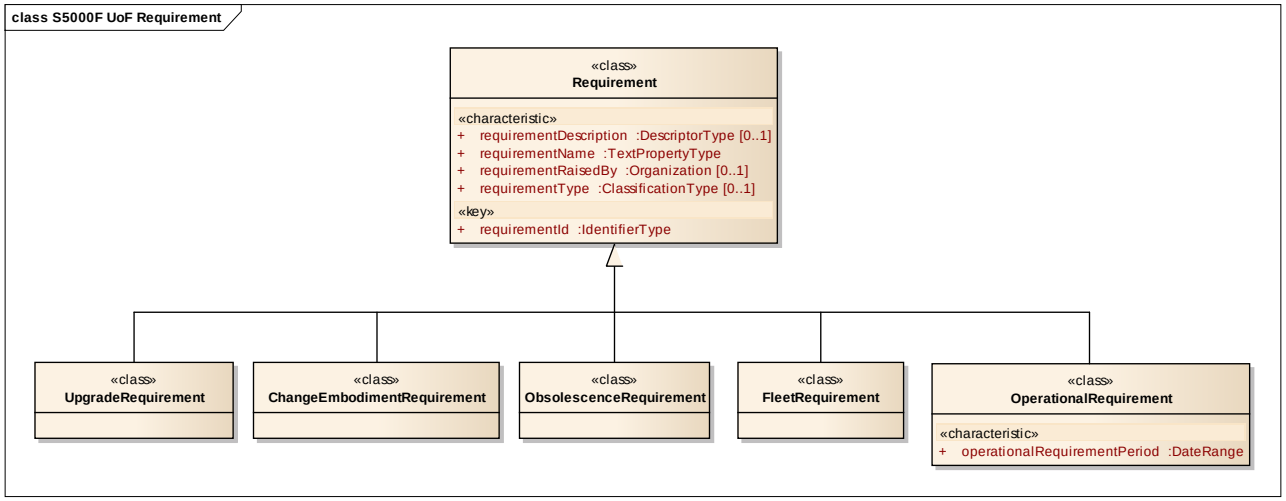
- CostEntry
- Document
- DocumentAssignmentItem
- FleetAvailability
- OperationalEvent
- Party
- ReportableActivity
- ReportableMetric
- SerializedProductVariantAvailability
- WorkOrder

51 S5000F UoFRequirement

51.1 Overall description

Requirement UoF provides the capability to specify statements of needs that require implementation.

51.2 Graphical representation



ICN-B6865-S5000F15042-002-00

Fig 50 S5000F UoF Requirement – class model

51.3 S5000F UoF Requirement - New class and interface definitions

51.3.1 Requirement

Requirement is a documented need that has to be implemented.

Requirement attributes:

- requirementDescription

- requirementId
- requirementName
- requirementRaisedBy
- requirementType

Requirement implements the following <<interface>>:

- DocumentAssignmentItem
- SecurityClassificationItem

Requirement associations:

- A Requirement can be associated to a defined ServiceRequest.

51.4 S5000F UoF Requirement - Referenced classes and interfaces

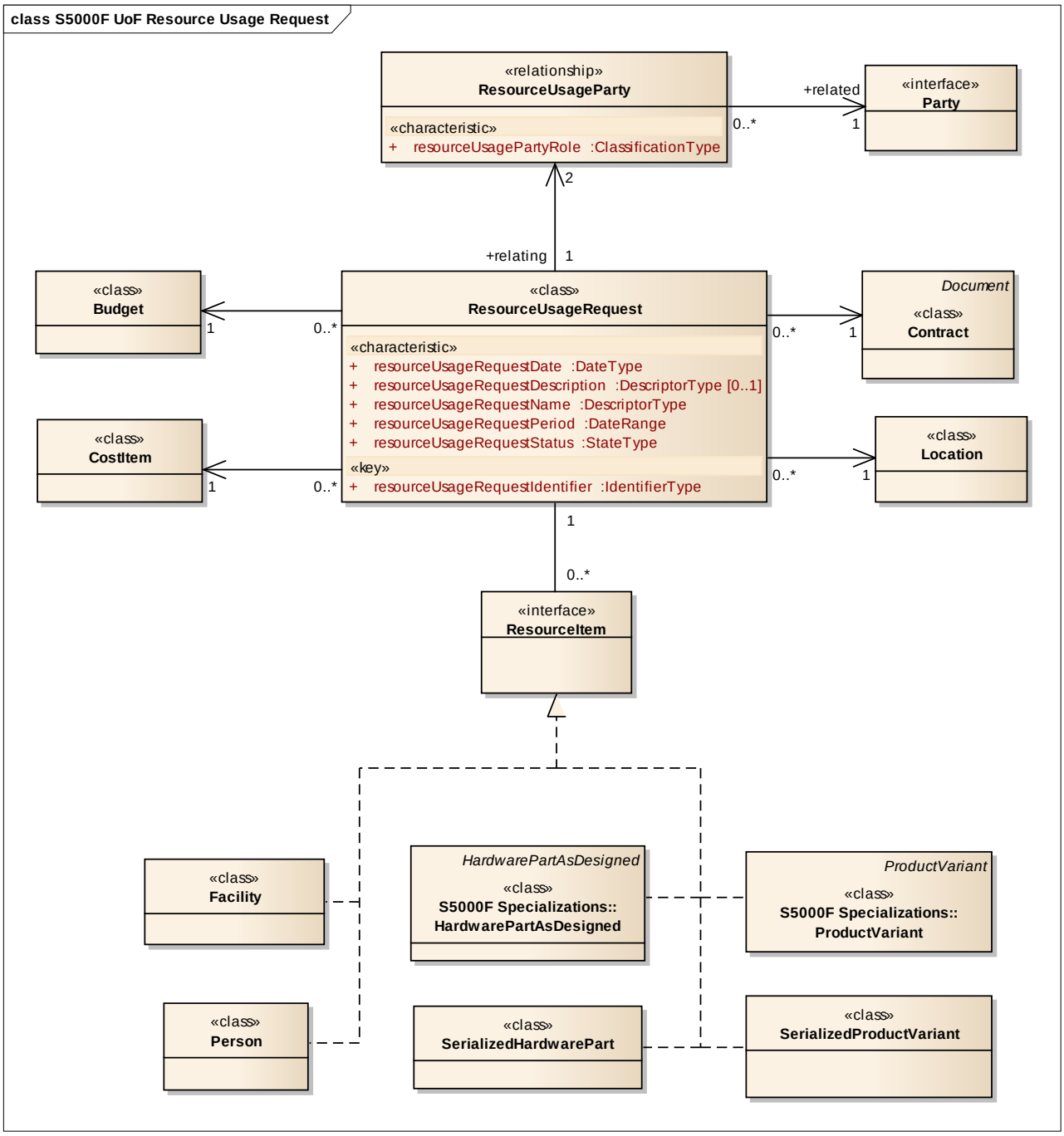
- ChangeEmbodimentRequirement
- FleetRequirement
- ObsolescenceRequirement
- OperationalRequirement
- UpgradeRequirement

52 S5000F UoFResource Usage Request

52.1 Overall description

Resource Usage Request UoF provides the capability for one party to ask for the utilization of resources from a different party.

52.2 Graphical representation



ICN-B6865-S5000F15065-001-00

Fig 51 S5000F UoF Resource Usage Request – class model

52.3 S5000F UoF Resource Usage Request - New class and interface definitions

52.3.1 ResourceItem

ResourceItem is an <<interface>> representing items whose usage can be requested for a specific period of time and during which they cannot be used by somebody else.

ResourceItem implements the following <<interface>>:

- DocumentAssignmentItem

Classes that implement the ResourceItem (inherited from HardwarePartAsDesigned) <<interface>> are:

- Accelerometer
- Facility
- HardwarePartAsDesigned
- MaintenanceFacility
- MaintenancePerson
- OperatingBase
- OperatorPerson
- Person
- PressureSensor
- ProductVariant
- SensorType
- SerializedHardwarePart
- SerializedProductVariant
- StrainGauge
- SupportEquipment
- Tachometer
- TemperatureSensor
- Warehouse

ResourceItem associations:

- Anu class implementing the ResourceItem <<interface>> can be associated to zero, one or many ResourceUsageRequests.

52.3.2 ResourceUsageParty

ResourceUsageParty is a <<relationship>> that defines which party request which one to use a resource.

ResourceUsageParty attributes:

- resourceUsagePartyRole

ResourceUsageParty associations:

- A ResourceUsageRequest must be associated to exactly two Paties (via the ResourceUsageParty <<relationship>>).

52.3.3 ResourceUsageRequest

ResourceUsageRequest is a class representing a demand from a party to use a resource belonging to a different party.

Example:

- request for a simulator slot
- request for usage of a hangar

ResourceUsageRequest attributes:

- resourceUsageRequestDate
- resourceUsageRequestDescription
- resourceUsageRequestIdentifier
- resourceUsageRequestName
- resourceUsageRequestPeriod
- resourceUsageRequestStatus

ResourceUsageRequest implements the following <<interface>>:

- CommentItem
- DocumentAssignmentItem

ResourceUsageRequest associations:

- A ResourceUsageRequest can be optionally associated to one single Location.
- ResourceUsageRequest must have at least one class implementing the ResourceItem <<interface>> associated to it.
- A ResourceUsageRequest can be optionally associated to a single CostItem.
- A ResourceUsageRequest can be associated to one single Budget.
- (relating) The ResourceUsageRequest to which a Party is associated.

52.4 S5000F UoF Resource Usage Request - Referenced classes and interfaces

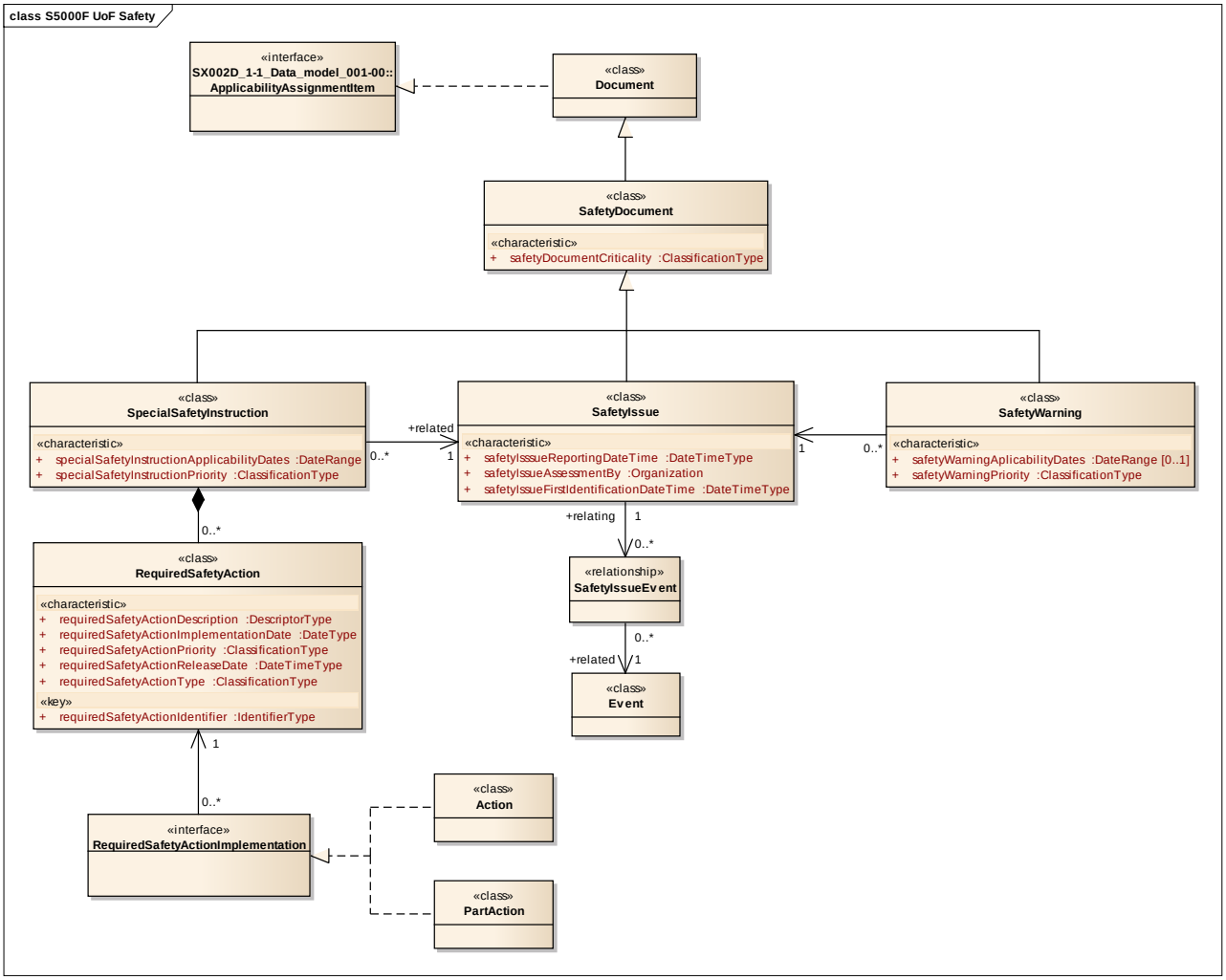
- Budget
- Contract
- CostItem
- Facility
- HardwarePartAsDesigned
- Location
- Party
- Person
- ProductVariant
- SerializedHardwarePart
- SerializedProductVariant

53 S5000F UoFSafety

53.1 Overall description

Safety UoF identifies how safety issues and safety documents are related.

53.2 Graphical representation



ICN-B6865-S5000F15046-002-00

Fig 52 S5000F UoF Safety – class model

53.3 S5000F UoF Safety - New class and interface definitions

53.3.1 RequiredSafetyAction

RequiredSafetyAction is a class representing the action to be taken as part of a SpecialSafetyInstruction so as to ensure the product safety.

RequiredSafetyAction attributes:

- requiredSafetyActionDescription
- requiredSafetyActionIdentifier
- requiredSafetyActionImplementationDate
- requiredSafetyActionPriority
- requiredSafetyActionReleaseDate
- requiredSafetyActionType

RequiredSafetyAction associations:

- Each RequiredSafetyAction must be associated to a defined SpecialSafetyInstruction.
- A RequiredSafetyAction can be associated with zero, one or many of the classes implementing the RequiredSafetyActionImplementation <<interface>>.

53.3.2 RequiredSafetyActionImplementation

RequiredSafetyActionImplementation is an <<interface>> that allows to provide traceability between taken actions to the RequiredSafetyAction.

Classes that implement the RequiredSafetyActionImplementation <<interface>> are:

- Action
- PartAction

RequiredSafetyActionImplementation associations:

- Any of the classes implementing the RequiredSafetyActionImplementation <<interface>> can be associated to a RequiredSafetyAction.

53.3.3 SafetyDocument

SafetyDocument is a Document associated to the safety of an item.

SafetyDocument attributes:

- documentCreationDate (inherited from Document)
- documentDescription (inherited from Document)
- documentIdentifier (inherited from Document)
- documentStatus (inherited from Document)
- documentTitle (inherited from Document)
- documentType (inherited from Document)
- safetyDocumentCriticality

SafetyDocument implements the following <<interface>>:

- ApplicabilityAssignmentItem (inherited from Document)
- CommentItem (inherited from Document)
- DocumentAssignmentItem (inherited from Document)
- DocumentItem (inherited from Document)
- SecurityClassificationItem (inherited from Document)

SafetyDocument associations:

- Each Document can relate to zero, one or many Documents (via the DocumentAssociation <<relationship>> class) (inherited from Document)
- (relating) The Document that relates to a MaintenanceActivity. (inherited from Document)
- (relating) The Document that relates to any class implemnting the SubjectOfPoliciesAndRegulations <<interface>>. (inherited from
- An optional association with its DocumentIssues (inherited from Document)

53.3.4 SafetyIssue

SafetyIssue is a SafetyDocument reporting a safety issue associated to the safety of a product, service or hardware or software item.

Note:
Note: SafetyIssues are usually generated by a productvariant operator, typically as the result of an (operational) Event.

Note: The organization reporting theSafetyIssue, the relationship with other SafetyIssues, applicability, etc., are inherited from the Document class.

SafetyIssue attributes:

- documentCreationDate (inherited from Document)
- documentDescription (inherited from Document)

- documentIdentifier (inherited from Document)
- documentStatus (inherited from Document)
- documentTitle (inherited from Document)
- documentType (inherited from Document)
- safetyDocumentCriticality (inherited from SafetyDocument)
- safetyIsssueReportingDateTime
- safetyIssueAssessmentBy
- safetyIssueFirstIdentificationDateTime

SafetyIssue implements the following <<interface>>:

- ApplicabilityAssignmentItem (inherited from Document)
- CommentItem (inherited from Document)
- DocumentAssignmentItem (inherited from Document)
- DocumentItem (inherited from Document)
- SecurityClassificationItem (inherited from Document)

SafetyIssue associations:

- (relating) The Document that relates to a MaintenanceActivity. (inherited from Document)
- (relating) The Document that relates to any class implemnting the SubjectOfPoliciesAndRegulations <<interface>>. (inherited from Document)
- (relating) The SafetyIssue that relates to an Event.
- A SafetyIssue can be related to zero, one or many SafetyWarnings.
- A SafetyIssue can relate to zero, one or many SpecialSafetyInstructions.
- An optional association with its DocumentIssues (inherited from Document)
- Each Document can relate to zero, one or many Documents (via the DocumentAssociation <<relationship>> class) (inherited from Document)

53.3.5 SafetyIssueEvent

SafetyIssueEvent is a <<relationship>> that allows to associate a SafetyIssue to associated Events.

SafetyIssueEvent associations:

- A SafetyIssue can be associated to zero, one or many Events (via the SafetyIssueEvent <<relationship>>).

53.3.6 SafetyWarning

SafetyWarning is a SafetyDocument that provides information about potential safety issues associated to a product, service or hardware or software items.

Note 1:
SafetyWarnings are usually generated by the Product manufacturer or by legal authorities.

Note 2:
Note that the organization generating theSafetyWarning, relationship with other SafetyIssues or SafetyWarnings, applicability, etc., are inherited from the Document class.

SafetyWarning attributes:

- documentCreationDate (inherited from Document)
- documentDescription (inherited from Document)
- documentIdentifier (inherited from Document)
- documentStatus (inherited from Document)
- documentTitle (inherited from Document)
- documentType (inherited from Document)
- safetyDocumentCriticality (inherited from SafetyDocument)

- safetyWarningAplicabilityDates
- safetyWarningPriority

SafetyWarning implements the following <<interface>>:

- ApplicabilityAssignmentItem (inherited from Document)
- CommentItem (inherited from Document)
- DocumentAssignmentItem (inherited from Document)
- DocumentItem (inherited from Document)
- SecurityClassificationItem (inherited from Document)

SafetyWarning associations:

- Each Document can relate to zero, one or many Documents (via the DocumentAssociation <<relationship>> class) (inherited from Document)
- An optional association with its DocumentIssues (inherited from Document)
- A SafetyWarning must relate to a one SafetyIssue.
- (relating) The Document that relates to a MaintenanceActivity. (inherited from Document)
- (relating) The Document that relates to any class implemnting the SubjectOfPoliciesAndRegulations <<interface>>. (inherited from Document)

53.3.7 SpecialSafetyInstruction

SpecialSafetyInstruction is a SafetyDocument providing specific mandatory instructions to be followed in addition to those existing in the standard documentations so as to address special safety issues.

Note 1:
SpecialSafetyInstructions are usually generated by the Product manufacturer or by legal authorities.

Note 2:
Note that the organization generating the SpecialSafetyInstruction, relationship with SafetyIssues, SafetyWarnings or other SpecialSafetyInstruction, applicability, etc., are inherited from the Document class.

SpecialSafetyInstruction attributes:

- documentCreationDate (inherited from Document)
- documentDescription (inherited from Document)
- documentIdentifier (inherited from Document)
- documentStatus (inherited from Document)
- documentTitle (inherited from Document)
- documentType (inherited from Document)
- safetyDocumentCriticality (inherited from SafetyDocument)
- specialSafetyInstructionApplicabilityDates
- specialSafetyInstructionPriority

SpecialSafetyInstruction implements the following <<interface>>:

- ApplicabilityAssignmentItem (inherited from Document)
- CommentItem (inherited from Document)
- DocumentAssignmentItem (inherited from Document)
- DocumentItem (inherited from Document)
- SecurityClassificationItem (inherited from Document)

SpecialSafetyInstruction associations:

- A SpecialSafetyInstruction must related to one SafetyIssue.

- Each Document can relate to zero, one or many Documents (via the DocumentAssociation <<relationship>> class) (inherited from Document)
- A SpecialSafetyInstrucion can be associated to zero one or many RequiredSaftyActions.
- (relating) The Document that relates to any class implemnting the SubjectOfPoliciesAndRegulations <<interface>>. (inherited from
- (relating) The Document that relates to a MaintenanceActivity. (inherited from Document)
- An optional association with its DocumentIssues (inherited from Document)

53.4 S5000F UoF Safety - Referenced classes and interfaces

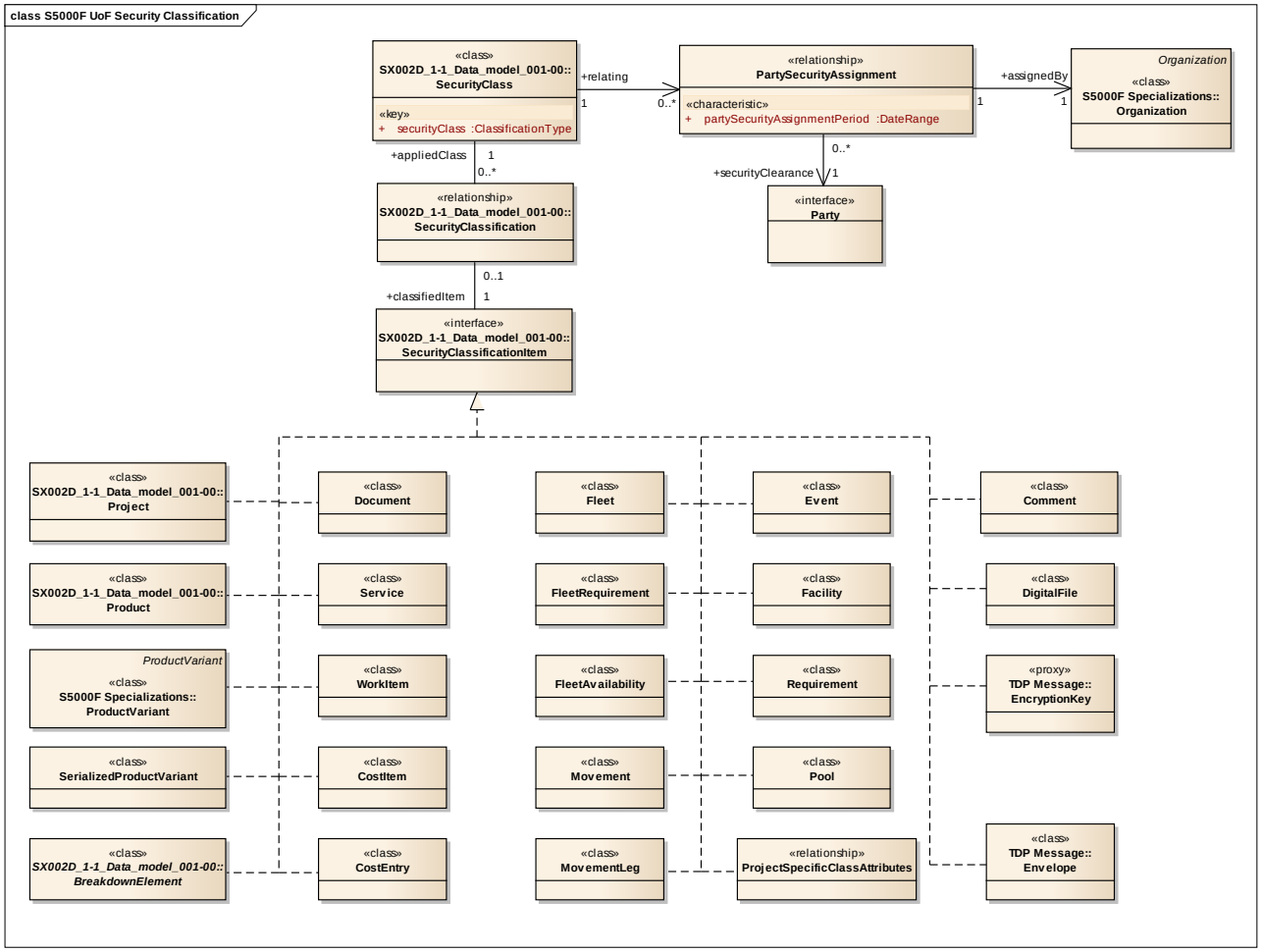
- Action
- ApplicabilityAssignmentItem
- Document
- Event
- PartAction

54 S5000F UoFSecurity Classification

54.1 Overall description

Security Classification UoF provides the capability to assign security classifications to objects that need special handling for protection against unauthorized access or distribution.

54.2 Graphical representation



ICN-B6865-S5000F15047-002-00

Fig 53 S5000F UoF Security Classification – class model

54.3 S5000F UoF Security Classification - New class and interface definitions

54.3.1 DigitalFile

DigitalFile is a class that allows to reference an external electronic object.

DigitalFile attributes:

- digitalFileContentClass
- digitalFileContentDescription
- digitalFileLocator
- digitalFileType

DigitalFile implements the following <<interface>>:

- SecurityClassificationItem

DigitalFile associations:

- (relating) The DigitalFile referencing a class.
- A DigitalFile can me associated to one single MessageContent.

54.3.2 PartySecurityAssignment

PartySecurityAssignment is a <<relationship>> that establishes the security clearance of a Party during a certain period of time.

PartySecurityAssignment attributes:

- partySecurityAssignmentPeriod

PartySecurityAssignment associations:

- A SecurityClassification is assigned to a Peron or Organization instance implementing the Party <<interface>> by an assiging Organization (through the PartySecurityAssignment <<relationship>>).

54.3.3 SecurityClass

SecurityClass is a classification that defines the level of confidentiality.

Example:

- unclassified
- restricted
- confidential
- secret
- topSecret
- companyConfidential

SecurityClass attributes:

- securityClass

SecurityClass associations:

- (appliedClass) The SecurityClass that is applied to the classified item.
- A SecurityClassification is assigned to a Peron or Organization instance implementing the Party <<interface>> by an assiging Organization (through the PartySecurityAssignment <<relationship>>).

54.3.4 SecurityClassificationItem

SecurityClassificationItem in an <<interface>> that represents the common behavior of those items (class instances) that can be Classes that implement the SecurityClassificationItem (inherited from PartAsDesigned) <<interface>> are:

- Accelerometer
- AggregatedElement
- AllowedProductConfigurationHardwarePartAsDesigned
- BreakdownElement
- ChangeEmbodimentRequirement
- Comment
- Contract
- Contract
- CostEntry
- CostItem
- DigitalFile
- Document
- EncryptionKey
- Envelope
- Event
- ExternalDocument
- Facility
- Fleet
- FleetAvailability
- FleetRequirement
- FleetRequirement
- FleetTaskCancellationNotice
- HardwareElement
- HardwarePartAsDesigned
- HardwarePartAsDesigned
- MaintenanceEvent
- MaintenanceFacility
- MaintenanceProgram
- Message
- Message
- Movement
- MovementLeg
- ObsolescenceRequirement
- OperatingBase
- OperationalEvent
- OperationalRequirement
- PartAsDesigned
- Pool
- PressureSensor
- Product
- ProductVariant
- ProductVariant
- ProductVariant
- Project
- Project
- ProjectSpecificClassAttributes
- Report
- Requirement
- S1000DDataModule
- S1000DDataModule
- S1000DLearningDataModule
- S1000DPublicationModule
- SafetyDocument

- SafetyIssue
- SafetyWarning
- SCORMContentPackage
- SensorType
- SerializedProductVariant
- Service
- ServiceBulletin
- SoftwareElement
- SoftwarePartAsDesigned
- SpecialSafetyInstruction
- StrainGauge
- SupportEquipment
- Tachometer
- TechnicalOrder
- TemperatureSensor
- UpgradeRequirement
- Warehouse
- WarrantyEvent
- WorkItem
- ZoneElement

SecurityClassificationItem associations:

- (classifieditem) The class implementing the SecurityClassificationItem <<interface>> representing the item that is classified.

54.4 S5000F UoF Security Classification - Referenced classes and interfaces

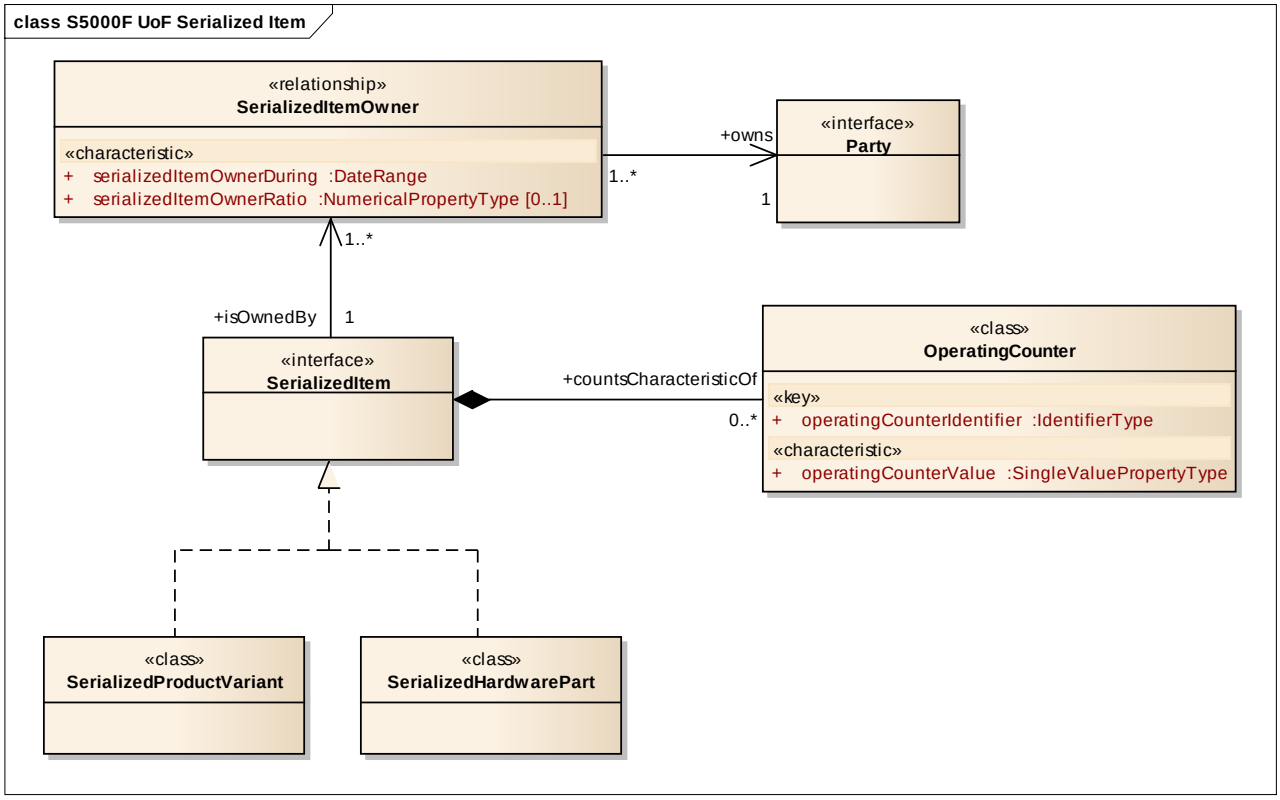
- BreakdownElement
- Comment
- CostEntry
- CostItem
- Document
- EncryptionKey
- Envelope
- Event
- Facility
- Fleet
- FleetAvailability
- FleetRequirement
- Movement
- MovementLeg
- Organization
- Party
- Pool
- Product
- ProductVariant
- Project
- ProjectSpecificClassAttributes
- Requirement
- SecurityClassification
- SerializedProductVariant
- Service
- WorkItem

55 S5000F UoFSerialized Item

55.1 Overall description

Serialized Item UoF represents an interface of elements that can be serialized and can therefore have an individual tracking.

55.2 Graphical representation



ICN-B6865-S5000F15048-002-00

Fig 54 S5000F UoF Serialized Item – class model

55.3 S5000F UoF Serialized Item - New class and interface definitions

55.3.1 OperatingCounter

OperatingCounter is a counter associated with an equipment or product variant that measures a certain feature of that equipment or product variant during its operation.

Example:

– Counter measuring operational hours, cycles, etc.

Note:

operatingCounterValue has a SingleValuePropertyType with a valueRecordingDateTime instead if a valueRecordingDate attribute as defined in SX002D Issue 1.1. The change request has been raised and approved, and will be incorporated in SX002D Issue 2.0. This deviation from the Common Data Model (CDM) has been made so as to avoid creating an additional attrribute that would later have to be declared obsolete, as soon as teh CDM was updated.

OperatingCounter attributes:

– operatingCounterIdentifier
– operatingCounterValue

OperatingCounter associations:

– Each OperatingCounter must be of a defined class implementing the SerializedItem <<interface>>.

55.3.2 SerializedItem

SerializedItem is an <<interface>> class representing all serialized items.

Example:

– Serialized product variant, hardware part as serialized

Classes that implement the SerializedItem <<interface>> are:

– SerializedHardwarePart
– SerializedProductVariant

SerializedItem associations:

– (related) The class implementing the SerializedItem <<interface>> that is covered by a warranty defined in a ContractClause.
– A class implementing the SerializedItem <<interface>> can have zero, one or many OperatingCounters.
– A MaintenanceActivity is always performed on an instance of a class implementing the SerializedItem <<interface>>.
– Any class implementing the SerializedItem <<interface>> can have zero, one or many LogBookEntries.
– Any class instance implementing the SerializedItem <<interface>> can be associated to zero, one or many WarrantyEvents.
– The class implementing the SerializedItemt <<interface>> that is owned by an instance of a Person or Organization implementing the Party <<interface>>.

55.4 S5000F UoF Serialized Item - Referenced classes and interfaces

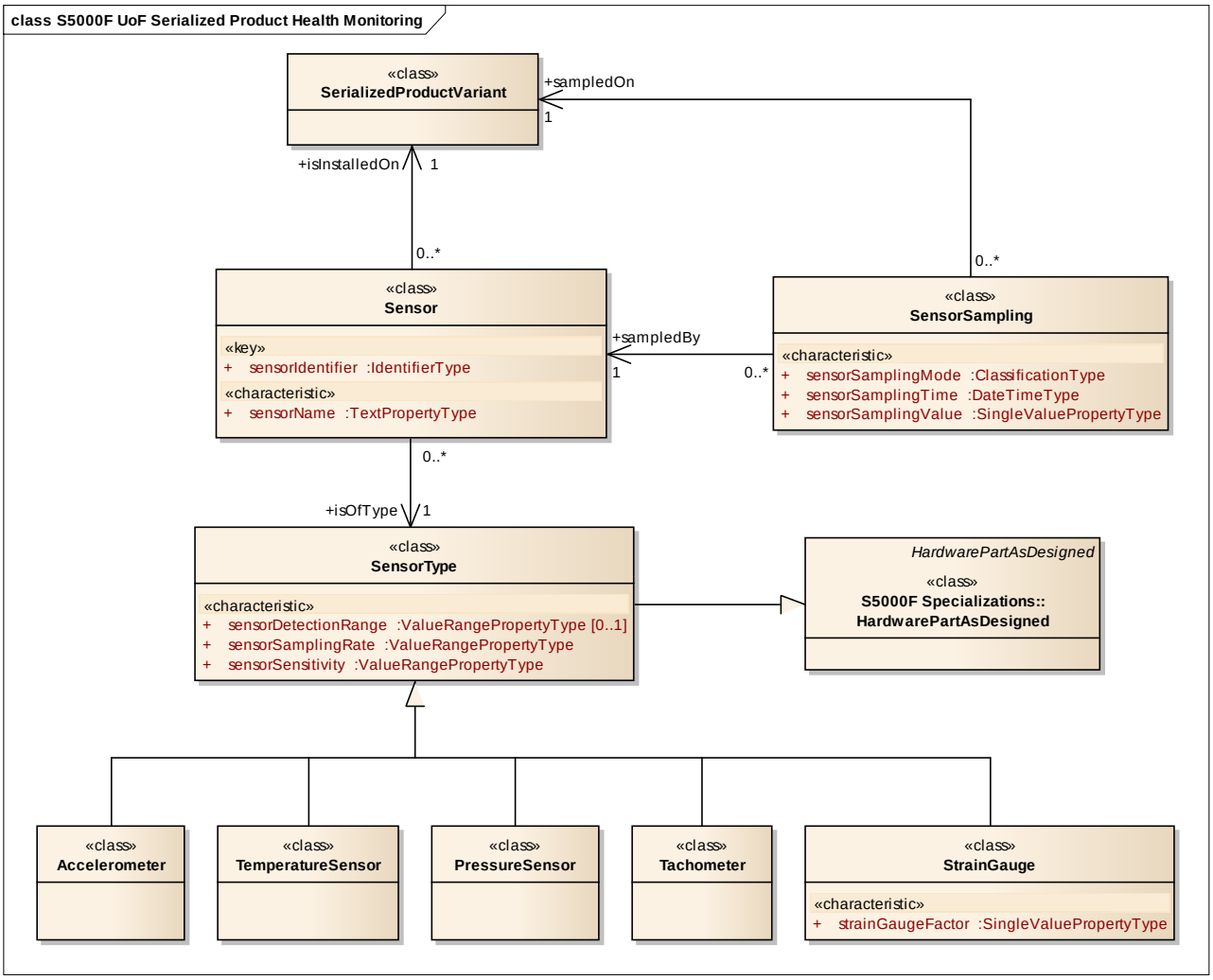
– Party
– SerializedHardwarePart
– SerializedItemOwner
– SerializedProductVariant

56 S5000F UoFSerialized Product Health Monitoring

56.1 Overall description

Serialized Product Variant Health Monitoring UoF provides the capability to transfer health monitoring data from a SerializedProductVariant.

56.2 Graphical representation



ICN-B6865-S5000F15050-002-00

Fig 55 S5000F UoF Serialized Product Health Monitoring – class model

56.3 S5000F UoF Serialized Product Health Monitoring - New class and interface definitions

56.3.1 Accelerometer

Accelerometer is a SensorType that measures acceleration.

Accelerometer attributes:

- partExportControl (inherited from HardwarePartAsDesigned)
- partIdentifier (inherited from PartAsDesigned)
- partMajorComponent (inherited from HardwarePartAsDesigned)
- partName (inherited from PartAsDesigned)
- sensorDetectionRange (inherited from SensorType)
- sensorSamplingRate (inherited from SensorType)
- sensorSensitivity (inherited from SensorType)

Accelerometer implements the following <<interface>>:

- AllowedProductConfigurationItem (inherited from HardwarePartAsDesigned)

- AllowedProductOperationalConfigurationItem (inherited from HardwarePartAsDesigned)
- ApplicabilityAssignmentItem (inherited from HardwarePartAsDesigned)
- ChangeControlledItem (inherited from HardwarePartAsDesigned)
- CommentItem (inherited from HardwarePartAsDesigned)
- ContractItem (inherited from HardwarePartAsDesigned)
- CostEntryRelatedTo (inherited from HardwarePartAsDesigned)
- DetectionMean (inherited from HardwarePartAsDesigned)
- DetectionMean (inherited from PartAsDesigned)
- Detector (inherited from PartAsDesigned)
- DocumentAssignmentItem (inherited from HardwarePartAsDesigned)
- ResourceItem (inherited from HardwarePartAsDesigned)
- SecurityClassificationItem (inherited from PartAsDesigned)
- ServiceItem (inherited from HardwarePartAsDesigned)
- SupplyItem (inherited from HardwarePartAsDesigned)
- TrackablePart (inherited from HardwarePartAsDesigned)

Accelerometer associations:

- A SensorType can have zero, one or many assocations to Sensor instances of the type it describes. (inherited from SensorType)
- Each HardwarePartAsDesigned can have zero or one HardwarePartAsDesignedCommerceData <<attributeGroup>>. (inherited from
- HardwarePartAsDesigned)
- A HardwarePartAsDesigned can have zero, one or many individual NonSerializedHardwareParts associated to it. (inherited from
- HardwarePartAsDesigned)
- (related) The HardwarePartAsDesigned that is related to a SerializedHardwarepart. (inherited from HardwarePartAsDesigned)
- (related) The HardwarePartAsDesigned instance that must be stocked in the Pool. (inherited from HardwarePartAsDesigned)
- (child) The PartAsDesigned instance that is related to a PartAsDesignedPartsList. (inherited from PartAsDesigned)

56.3.2 PressureSensor

PressureSensor is a SensorType that measures pressure.

PressureSensor attributes:

- partExportControl (inherited from HardwarePartAsDesigned)
- partIdentifier (inherited from PartAsDesigned)
- partMajorComponent (inherited from HardwarePartAsDesigned)
- partName (inherited from PartAsDesigned)
- sensorDetectionRange (inherited from SensorType)
- sensorSamplingRate (inherited from SensorType)
- sensorSensitivity (inherited from SensorType)

PressureSensor implements the following <<interface>>:

- AllowedProductConfigurationItem (inherited from HardwarePartAsDesigned)
- AllowedProductOperationalConfigurationItem (inherited from HardwarePartAsDesigned)
- ApplicabilityAssignmentItem (inherited from HardwarePartAsDesigned)
- ChangeControlledItem (inherited from HardwarePartAsDesigned)
- CommentItem (inherited from HardwarePartAsDesigned)
- ContractItem (inherited from HardwarePartAsDesigned)
- CostEntryRelatedTo (inherited from HardwarePartAsDesigned)
- DetectionMean (inherited from HardwarePartAsDesigned)

- DetectionMean (inherited from PartAsDesigned)
- Detector (inherited from PartAsDesigned)
- DocumentAssignmentItem (inherited from HardwarePartAsDesigned)
- ResourceItem (inherited from HardwarePartAsDesigned)
- SecurityClassificationItem (inherited from PartAsDesigned)
- ServiceItem (inherited from HardwarePartAsDesigned)
- SupplyItem (inherited from HardwarePartAsDesigned)
- TrackablePart (inherited from HardwarePartAsDesigned)

PressureSensor associations:

- (related) The HardwarePartAsDesigned instance that must be stocked in the Pool. (inherited from HardwarePartAsDesigned)
- A SensorType can have zero, one or many assocations to Sensor instances of the type it describes. (inherited from SensorType)
- Each HardwarePartAsDesigned can have zero or one HardwarePartAsDesignedCommerceData <<attributeGroup>>. (inherited from HardwarePartAsDesigned)
- (related) The HardwarePartAsDesigned that is related to a SerializedHardwarepart. (inherited from HardwarePartAsDesigned)
- (child) The PartAsDesigned instance that is related to a PartAsDesignedPartsList. (inherited from PartAsDesigned)
- A HardwarePartAsDesigned can have zero, one or many individual NonSerializedHardwareParts associated to it. (inherited from HardwarePartAsDesigned)

56.3.3 Sensor

Sensor is an individual SensorType that has a unique identity and can be used to measure values of a specific type.

Note:
The unique identification of a Sensor can be a part number+serial number (if it is serialized) or a location identifier together with the identifier of the SerializedProduct where it is mounted.

Sensor attributes:

- sensorIdentifier
- sensorName

Sensor associations:

- A Sensor can have zero, one or many SensorSamplings associated to it.
- A Sensor must be associated to the SerializedProductVariant hwere it is installed.
- A Sensor must have an association to the SensorType that defines its type.

56.3.4 SensorSampling

SensorSampling is a particular reading of an individual sensor at a specific point in time.

SensorSampling attributes:

- sensorSamplingMode
- sensorSamplingTime
- sensorSamplingValue

SensorSampling associations:

- A SensorSampling must be always associated to the Sensor who has performed that sampling.
- A SensorSampling must be always associated to the SerializedProductVariant on which the SensorSampling was performed.

56.3.5 SensorType

SensorType is HardwarePartAsDesigned that measures physical events and provides the information to external devices.

Example:

- Pressure gauge
- Strain gauge
- Tachometer
- Accelerometer
- Temperature sensor.

SensorType attributes:

- partExportControl (inherited from HardwarePartAsDesigned)
- partIdentifier (inherited from PartAsDesigned)
- partMajorComponent (inherited from HardwarePartAsDesigned)
- partName (inherited from PartAsDesigned)
- sensorDetectionRange
- sensorSamplingRate
- sensorSensitivity

SensorType implements the following <<interface>>:

- AllowedProductConfigurationItem (inherited from HardwarePartAsDesigned)
- AllowedProductOperationalConfigurationItem (inherited from HardwarePartAsDesigned)
- ApplicabilityAssignmentItem (inherited from HardwarePartAsDesigned)
- ChangeControlledItem (inherited from HardwarePartAsDesigned)
- CommentItem (inherited from HardwarePartAsDesigned)
- ContractItem (inherited from HardwarePartAsDesigned)
- CostEntryRelatedTo (inherited from HardwarePartAsDesigned)
- DetectionMean (inherited from HardwarePartAsDesigned)
- DetectionMean (inherited from PartAsDesigned)
- Detector (inherited from PartAsDesigned)
- DocumentAssignmentItem (inherited from HardwarePartAsDesigned)
- ResourceItem (inherited from HardwarePartAsDesigned)
- SecurityClassificationItem (inherited from PartAsDesigned)
- ServiceItem (inherited from HardwarePartAsDesigned)
- SupplyItem (inherited from HardwarePartAsDesigned)
- TrackablePart (inherited from HardwarePartAsDesigned)

SensorType associations:

- A HardwarePartAsDesigned can have zero, one or many individual NonSerializedHardwareParts associated to it. (inherited from HardwarePartAsDesigned)
- (related) The HardwarePartAsDesigned that is related to a SerializedHardwarepart. (inherited from HardwarePartAsDesigned)
- Each HardwarePartAsDesigned can have zero or one HardwarePartAsDesignedCommerceData <<attributeGroup>>. (inherited from HardwarePartAsDesigned)
- (child) The PartAsDesigned instance that is related to a PartAsDesignedPartsList. (inherited from PartAsDesigned)
- (related) The HardwarePartAsDesigned instance that must be stocked in the Pool. (inherited from HardwarePartAsDesigned)
- A SensorType can have zero, one or many assocations to Sensor instances of the type it describes.

56.3.6 StrainGauge

StrainGauge is a SensorType whose resistance varies with applied force; it converts force, pressure, tension, weight, etc., into a change in electrical resistance which can then be measured.

StrainGauge attributes:

- partExportControl (inherited from HardwarePartAsDesigned)
- partIdentifier (inherited from PartAsDesigned)
- partMajorComponent (inherited from HardwarePartAsDesigned)
- partName (inherited from PartAsDesigned)
- sensorDetectionRange (inherited from SensorType)
- sensorSamplingRate (inherited from SensorType)
- sensorSensitivity (inherited from SensorType)
- strainGaugeFactor

StrainGauge implements the following <<interface>>:

- AllowedProductConfigurationItem (inherited from HardwarePartAsDesigned)
- AllowedProductOperationalConfigurationItem (inherited from HardwarePartAsDesigned)
- ApplicabilityAssignmentItem (inherited from HardwarePartAsDesigned)
- ChangeControlledItem (inherited from HardwarePartAsDesigned)
- CommentItem (inherited from HardwarePartAsDesigned)
- ContractItem (inherited from HardwarePartAsDesigned)
- CostEntryRelatedTo (inherited from HardwarePartAsDesigned)
- DetectionMean (inherited from HardwarePartAsDesigned)
- DetectionMean (inherited from PartAsDesigned)
- Detector (inherited from PartAsDesigned)
- DocumentAssignmentItem (inherited from HardwarePartAsDesigned)
- ResourceItem (inherited from HardwarePartAsDesigned)
- SecurityClassificationItem (inherited from PartAsDesigned)
- ServiceItem (inherited from HardwarePartAsDesigned)
- SupplyItem (inherited from HardwarePartAsDesigned)
- TrackablePart (inherited from HardwarePartAsDesigned)

StrainGauge associations:

- A SensorType can have zero, one or many assocations to Sensor instances of the type it describes. (inherited from SensorType)
- Each HardwarePartAsDesigned can have zero or one HardwarePartAsDesignedCommerceData <<attributeGroup>>. (inherited from HardwarePartAsDesigned)
- A HardwarePartAsDesigned can have zero, one or many individual NonSerializedHardwareParts associated to it. (inherited from HardwarePartAsDesigned)
- (related) The HardwarePartAsDesigned that is related to a SerializedHardwarepart. (inherited from HardwarePartAsDesigned)
- (related) The HardwarePartAsDesigned instance that must be stocked in the Pool. (inherited from HardwarePartAsDesigned)
- (child) The PartAsDesigned instance that is related to a PartAsDesignedPartsList. (inherited from PartAsDesigned)

56.3.7 Tachometer

Tachometer is a SensorType that measures revolutions of a rotating item.

Tachometer attributes:

- sensorSensitivity (inherited from SensorType)

- partExportControl (inherited from HardwarePartAsDesigned)
- partIdentifier (inherited from PartAsDesigned)
- partMajorComponent (inherited from HardwarePartAsDesigned)
- partName (inherited from PartAsDesigned)
- sensorDetectionRange (inherited from SensorType)
- sensorSamplingRate (inherited from SensorType)

Tachometer implements the following <<interface>>:

- AllowedProductConfigurationItem (inherited from HardwarePartAsDesigned)
- AllowedProductOperationalConfigurationItem (inherited from HardwarePartAsDesigned)
- ApplicabilityAssignmentItem (inherited from HardwarePartAsDesigned)
- ChangeControlledItem (inherited from HardwarePartAsDesigned)
- CommentItem (inherited from HardwarePartAsDesigned)
- ContractItem (inherited from HardwarePartAsDesigned)
- CostEntryRelatedTo (inherited from HardwarePartAsDesigned)
- DetectionMean (inherited from HardwarePartAsDesigned)
- DetectionMean (inherited from PartAsDesigned)
- Detector (inherited from PartAsDesigned)
- DocumentAssignmentItem (inherited from HardwarePartAsDesigned)
- ResourceItem (inherited from HardwarePartAsDesigned)
- SecurityClassificationItem (inherited from PartAsDesigned)
- ServiceItem (inherited from HardwarePartAsDesigned)
- SupplyItem (inherited from HardwarePartAsDesigned)
- TrackablePart (inherited from HardwarePartAsDesigned)

Tachometer associations:

- (related) The HardwarePartAsDesigned instance that must be stocked in the Pool. (inherited from HardwarePartAsDesigned)
- (related) The HardwarePartAsDesigned that is related to a SerializedHardwarepart. (inherited from HardwarePartAsDesigned)
- A HardwarePartAsDesigned can have zero, one or many individual NonSerializedHardwareParts associated to it. (inherited from HardwarePartAsDesigned)
- A SensorType can have zero, one or many assocations to Sensor instances of the type it describes. (inherited from SensorType)
- Each HardwarePartAsDesigned can have zero or one HardwarePartAsDesignedCommerceData <<attributeGroup>>. (inherited from HardwarePartAsDesigned)
- (child) The PartAsDesigned instance that is related to a PartAsDesignedPartsList. (inherited from PartAsDesigned)

56.3.8 TemperatureSensor

TemperatureSensor is a SensorType that measures temperature.

TemperatureSensor attributes:

- partExportControl (inherited from HardwarePartAsDesigned)
- partIdentifier (inherited from PartAsDesigned)
- partMajorComponent (inherited from HardwarePartAsDesigned)
- partName (inherited from PartAsDesigned)
- sensorDetectionRange (inherited from SensorType)
- sensorSamplingRate (inherited from SensorType)
- sensorSensitivity (inherited from SensorType)

TemperatureSensor implements the following <<interface>>:

- AllowedProductConfigurationItem (inherited from HardwarePartAsDesigned)
- AllowedProductOperationalConfigurationItem (inherited from HardwarePartAsDesigned)
- ApplicabilityAssignmentItem (inherited from HardwarePartAsDesigned)
- ChangeControlledItem (inherited from HardwarePartAsDesigned)
- CommentItem (inherited from HardwarePartAsDesigned)
- ContractItem (inherited from HardwarePartAsDesigned)
- CostEntryRelatedTo (inherited from HardwarePartAsDesigned)
- DetectionMean (inherited from HardwarePartAsDesigned)
- DetectionMean (inherited from PartAsDesigned)
- Detector (inherited from PartAsDesigned)
- DocumentAssignmentItem (inherited from HardwarePartAsDesigned)
- ResourceItem (inherited from HardwarePartAsDesigned)
- SecurityClassificationItem (inherited from PartAsDesigned)
- ServiceItem (inherited from HardwarePartAsDesigned)
- SupplyItem (inherited from HardwarePartAsDesigned)
- TrackablePart (inherited from HardwarePartAsDesigned)

TemperatureSensor associations:

- (child) The PartAsDesigned instance that is related to a PartAsDesignedPartsList. (inherited from PartAsDesigned)
- Each HardwarePartAsDesigned can have zero or one HardwarePartAsDesignedCommerceData <<attributeGroup>>. (inherited from HardwarePartAsDesigned)
- A SensorType can have zero, one or many assocations to Sensor instances of the type it describes. (inherited from SensorType)
- A HardwarePartAsDesigned can have zero, one or many individual NonSerializedHardwareParts associated to it. (inherited from HardwarePartAsDesigned)
- (related) The HardwarePartAsDesigned instance that must be stocked in the Pool. (inherited from HardwarePartAsDesigned)
- (related) The HardwarePartAsDesigned that is related to a SerializedHardwarepart. (inherited from HardwarePartAsDesigned)

56.4 S5000F UoF Serialized Product Health Monitoring - Referenced classes and interfaces

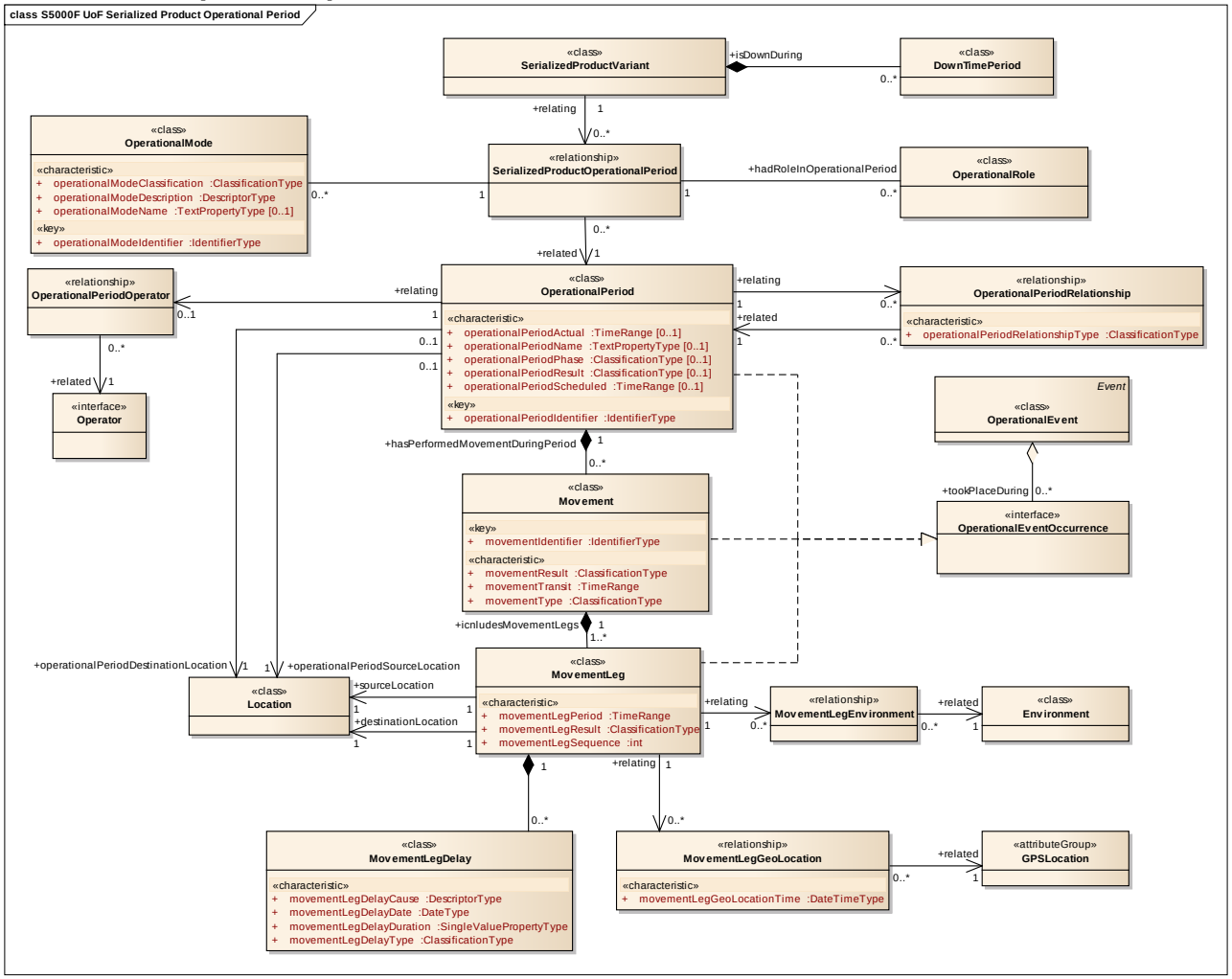
- HardwarePartAsDesigned
- SerializedProductVariant

57 S5000F UoFSerialized Product Operational Period

57.1 Overall description

Serialized Product Operational Period UoF provides the information associated to one specific operational period of the product as part of its operation.

57.2 Graphical representation



ICN-B6865-S5000F15052-002-00

Fig 56 S5000F UoF Serialized Product Operational Period – class model

57.3 S5000F UoF Serialized Product Operational Period - New class and interface definitions

57.3.1 Movement

Movement represents the act of changing the physical location or position of a serialized product.

Example:

- Ship sailing from London to New York.
- Train driving from Paris to Munich.
- Aircraft flying from Madrid to Rome.

Movement attributes:

- movementIdentifier
- movementResult
- movementTransit
- movementType

Movement implements the following <<interface>>:

- CostEntryRelatedTo
- DocumentAssignmentItem
- OperationalConsumption
- OperationalEventOccurrence
- SecurityClassificationItem

Movement associations:

- Each Movement must be of a defined OperationalPeriod.
- Each Movement can have one or many MovementLegs.
- A Movement instance can be optionally logged in a single LogBookEntry instance.

57.3.2 MovementLeg

MovementLeg is a class representing one of the individual displacements performed during a Movement, which will be at least one MovementLeg.

Example:

- A flight from Madrid to Singapore, stopping at Dubai, has two movement legs: MadridDubai and DubaiSingapore.

Note:

A characteristing of a MovementLeg is that there is a physical stop during the movement. A Movement that is uninterrupted would only have one single MovementLeg.

MovementLeg attributes:

- movementLegPeriod
- movementLegResult
- movementLegSequence

MovementLeg implements the following <<interface>>:

- CostEntryRelatedTo
- DocumentAssignmentItem
- OperationalConsumption
- OperationalEventOccurrence
- SecurityClassificationItem

MovementLeg associations:

- (relating) The MovementLeg that relates to a GPSLocation.
- A MovementLeg can be associated to zero, one or many MovementLegDelays.
- Each MovementLeg must be of a defined Movement.
- MovementLeg must be associated to the Location where the MovementLeg ended.
- MovementLeg must be associated to the Location where the MovementLeg started.
- (relating) The MovementLeg relating to the Environment.

57.3.3 MovementLegDelay

MovementLegDelay is a class representing a delay that occurred during a travelLeg.

MovementLegDelay attributes:

- movementLegDelayCause
- movementLegDelayDate
- movementLegDelayDuration
- movementLegDelayType

MovementLegDelay associations:

- Each MovementLegDelay must be associated to a defined MovementLeg.

57.3.4 MovementLegEnvironment

MovementLegEnvironment is a <<relationship>> that allows to associate a MovementLeg to the Environment(s) where this took place.

MovementLegEnvironment associations:

- A MovementLeg can be realted to zero, one or many Environments.

57.3.5 MovementLegGeoLocation

MovementLegGeoLocation is a <<relationship>> that defines at which point in space a product was at a certain moment during a movement leg.

MovementLegGeoLocation attributes:

- movementLegGeoLocationTime

MovementLegGeoLocation associations:

- A movementLeg can relate to zero, one or many GPS Locations (via the MovementLegGeoLocation <<relationship>>).

57.3.6 OperationalEventOccurrence

OperationalEventOccurrence is an <<interface>> that allows linking an OperationalEvent to a specific operationa moment, such as an operating period, movement or travel leg.

Classes that implement the OperationalEventOccurrence <<interface>> are:

- Movement
- MovementLeg
- OperationalPeriod

OperationalEventOccurrence associations:

- Any class implementing the OperationalEVentOccurrence <<interface>> can be associated to a defined OperationalEvent.

57.3.7 OperationalMode

OperationalMode represents the actual usage mode of a SerializedProductVariant during a specific operational period.

Example:
- scheduled cargo transport
- nonscheduled international passenger transport

Note:
Note that a same OperationalRole might have different OperationalModes associated to it (scheduled, unscheduled, passenger or cargo transport, dual/sol training, etc. Can be used to provide ECCAIRS information.

OperationalMode attributes:

- operationalModeClassification
- operationalModeDescription
- operationalModeIdentifier
- operationalModeName

OperationalMode associations:

- An OperationalMode can be associated to zero, one or many OperationalPeriods of a SerializedProductVariant.

57.3.8 OperationalPeriod

OperationalPeriod is a class that defines the characteristics of a time frame during which a SerializedProductVariant was operated.

OperationalPeriod attributes:

- operationalPeriodActual
- operationalPeriodIdentifier
- operationalPeriodName
- operationalPeriodPhase
- operationalPeriodResult
- operationalPeriodScheduled

OperationalPeriod implements the following <<interface>>:

- DocumentAssignmentItem
- OperationalConsumption
- OperationalEventOccurrence

OperationalPeriod associations:

- (related) The OperationalPeriod that is related to another OperationalPeriod
- OperationalPeriod can be optionally associated to the Location where the OperationalPeriod started.
- OperationalPeriod can be optionally associated to the Location where the OperationalPeriod ended.
- Each OperationalPeriod can relate to zero, one or many other OperationalPeriods (via the OperationalPeriodRelationship <<relationship>>
- An OperationalPeriod can have zero, one or many movements.
- (relating) The OperationalPeriod that relates to an Operator.
- (related) The OperationalPeriod that is related to a SerializedProductVariant.
- An OperationalPeriod can be associated to zero or one FleetTask.

57.3.9 OperationalPeriodOperator

OperationalPeriodOperator is a <<relationship>> that defines which Party has carried out the operation during an OperationalPeriod.

OperationalPeriodOperator associations:

- An OperationalPeriod can be optionally associated to one single Operator.

57.3.10 OperationalPeriodRelationship

OperationalPeriodRelationship is a <<relationship>> that defines the association between two different OperationalPeriods.

Example:

- before
- after
- simultaneous to

OperationalPeriodRelationship attributes:

- operationalPeriodRelationshipType

OperationalPeriodRelationship associations:

– (relating) The OperationalPeriod that relates to another OperationalPeriod

57.3.11 SerializedProductOperationalPeriod

SerializedProductOperationalPeriod is a <<relationship>> that describes the specific operational role of a serialized product variant during a particular operational period.

SerializedProductOperationalPeriod associations:

– A SerializedProductOperationalPeriod is associated to one OperationalMode.
– A SerializedProductOperationalPeriod is associated with one OperationalRole.
– A SerializedProductVariant can be associated to zero, one or many OperationalPeriods (via the SerializedProductOperationalPeriod <<relationship>>).

57.4 S5000F UoF Serialized Product Operational Period - Referenced classes and interfaces

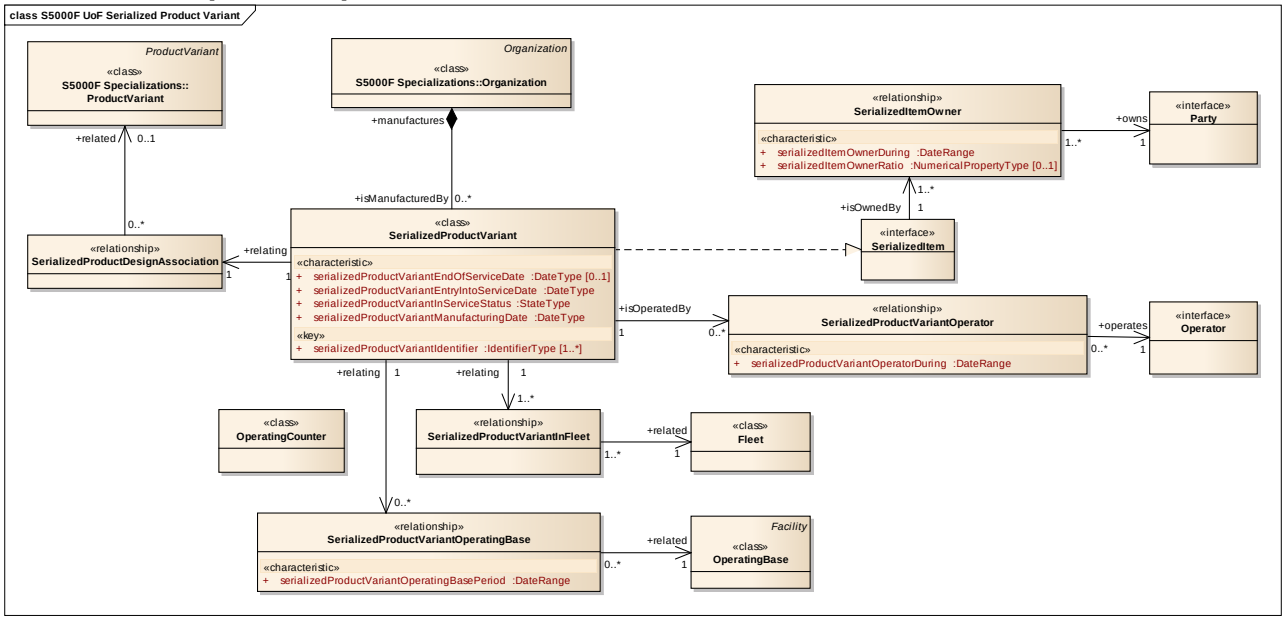
– DownTimePeriod
– Environment
– GPSLocation
– Location
– OperationalEvent
– OperationalRole
– Operator
– SerializedProductVariant

58 S5000F UoFSerialized Product Variant

58.1 Overall description

Serialized Product Variant UoF defines the relationship of a serialied product variant with its product base and key parties associated

58.2 Graphical representation



ICN-B6865-S5000F15053-002-00

Fig 57 S5000F UoF Serialized Product Variant – class model

58.3 S5000F UoF Serialized Product Variant - New class and interface definitions

58.3.1 SerializedItemOwner

SerializedItemOwner is a <<relationship>> describing the party holding the partial or total ownership of an item implementing the SerializedItem <<interface>>.

SerializedItemOwner attributes:

- serializedItemOwnerDuring
- serializedItemOwnerRatio

SerializedItemOwner associations:

- A class implementing the SerializedItem <<interface>> must be associated with at least one Person or Organization implementing the Party <<interface>> via the SerializedProductVariantOwner <<relationship>>.

58.3.2 SerializedProductDesignAssociation

SerializedProductDesignAssociation is a <<relationship>> that allows to define the ProductVariant to which a SerializedProductVariant is associated.

SerializedProductDesignAssociation associations:

- Each SerializedProductVariant can be associated to one ProductVariant (through the SerializedProductDesignAssociation <<relationship>>).

58.3.3 SerializedProductVariant

SerializedProductVariant is an individual ProductVariant that can be uniquely identified among other ProductVariants of the same

SerializedProductVariant attributes:

- serializedProductVariantEndOfServiceDate
- serializedProductVariantEntryIntoServiceDate
- serializedProductVariantIdentifier
- serializedProductVariantInServiceStatus
- serializedProductVariantManufacturingDate

SerializedProductVariant implements the following <<interface>>:

- ApplicabilityAssignmentItem
- ChangeControlledItem
- CommentItem
- ContractItem
- CostEntryRelatedTo
- DocumentAssignmentItem
- MessageContextItemSelect
- ProductUsagePhaseItem
- ResourceItem
- SecurityClassificationItem
- SerializedItem
- ServiceItem
- SubjectOfPoliciesAndRegulations

SerializedProductVariant associations:

- (relating) The SerializedProductVariant that relates to the Environment.

- The SerializedProductVariant to which a FleetTask hasb eeb assigned (through the SerializedProductVariantAssignment <<relationship>>).
- Each SerializedProductVariant must be manufactured by a defined Organization.
- A SerializedProductVariant must be associated to zero, one or many SerializedProductVariantAvailabilities.
- A SerializedProductVariant can have zero, one or many SensorSamplings associated to it.
- A SerializedProductVariant can have zero, one or many OperationalEvents associated to it.
- A SerializedProductVariant can have zero, one or many OperationalApprovals associated to it.
- A SerializedProductVariant can have zero, one or many DownTimePeriods.
- A SerializedProductVariant can have zero, oe or many SerializedProductVariantStatuses associated to it.
- A SerializedProductVariant can be associated to zero, one or many PartActions that are planned to be performed on it.
- (relating) The SerializedProductVariant to which the ProductVariant is related.
- (relating) The SerializedProductVariant that relates to an OperationalPeriod.
- (relating) The SerializedProductVariant that relates to an OperatingBase.
- (relating) The SerializedProductVariant that relates to an AllowedProductConfiguration.
- (relating) The SerializedProductVariant that is associated to a Fleet (via the SerializedProductVariantInFleet <<relationship>>).
- (relating) The SerializedProductvariant that contains a SerializedHardwarePart as a MajorComponent.
- (related) The SerializedProductVariant that is related to a MaintenanceFacilitySlot.
- (isOperatedBy) The serializedProductVariant that is operated by the Operator.
- A ProductVariant can be associated to zero, one or many Sensor that are installed on it.

58.3.4 SerializedProductVariantOperatingBase

SerializedProductVariantOperatingBase is a <<relationship>> that establishes in which OperatingBase a SerializedProductVariant has been operating during a specific period of time.

SerializedProductVariantOperatingBase attributes:

- serializedProductVariantOperatingBasePeriod

SerializedProductVariantOperatingBase associations:

- A SerializedProductVariant can be associated to zero, one or many OperatingBases (via the SerializedProductVariantOperatingBase <<relationship>>).

58.3.5 SerializedProductVariantOperator

SerializedProductVariantOperator is a <<relationship>> defining the operation of a SerializedProductVariant during a specific period of time.

SerializedProductVariantOperator attributes:

- serializedProductVariantOperatorDuring

SerializedProductVariantOperator associations:

- A SerializedProductVraint can have zero, one or many asscociations to Operator instances (via the SerializedProductVariantOperator <<relationship>>).

58.4 S5000F UoF Serialized Product Variant - Referenced classes and interfaces

- Fleet
- OperatingBase
- OperatingCounter

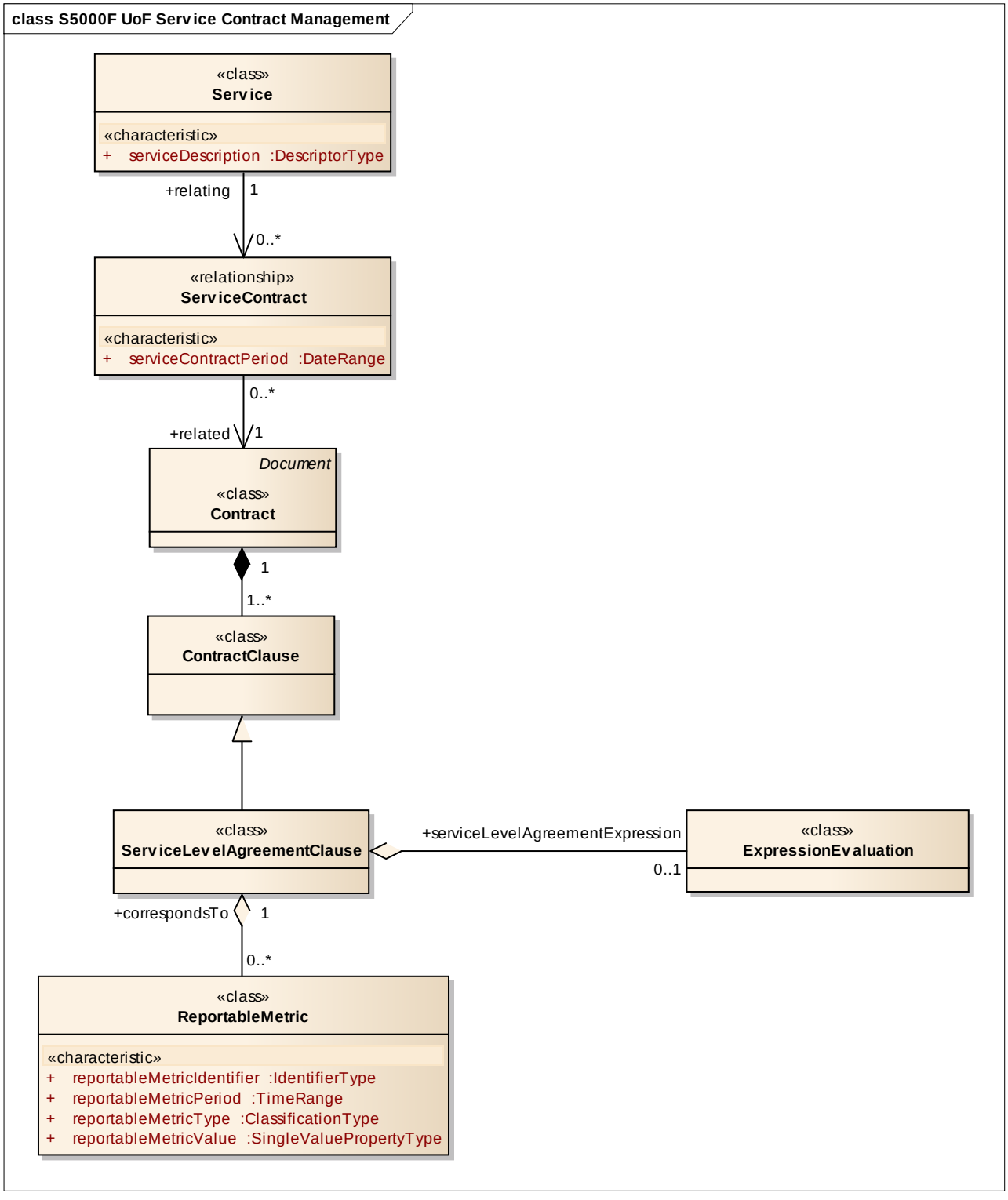
- Operator
- Organization
- Party
- ProductVariant
- SerializedItem
- SerializedProductVariantInFleet

59 S5000F UoFService Contract Management

59.1 Overall description

Service Contract management UoF permits to map the service reporting to the service level agreement (SLA) clauses so as to ensure compliance with the contractual SLAs.

59.2 Graphical representation



ICN-B6865-S5000F15054-002-00

Fig 58 S5000F UoF Service Contract Management – class model

59.3 S5000F UoF Service Contract Management - New class and interface definitions

59.3.1 ReportableMetric

ReportableMetric is a measure of a specific characteristic that may evolve over time and is reported periodically for program or contract management purposes.

ReportableMetric attributes:

- reportableMetricIdentifier
- reportableMetricPeriod
- reportableMetricType
- reportableMetricValue

ReportableMetric implements the following <<interface>>:

- ReportableItem

ReportableMetric associations:

- Each ReportableMetric can be associated to a ServiceLevelAgreementClause

59.3.2 Service

A Service is a contract where technical or intellectual work is performed but no delivery of goods takes place.

Service attributes:

- serviceDescription

Service implements the following <<interface>>:

- ApplicabilityAssignmentItem
- CommentItem
- ContractItem
- CostEntryRelatedTo
- DocumentAssignmentItem
- SecurityClassificationItem
- SubjectOfPoliciesAndRegulations

Service associations:

- A Service can be associated with zero, one or many Contracts (through theServiceContract <<relationship>>).
- A Service can have zero, one or many ServiceRequests associated to it.

59.3.3 ServiceContract

ServiceContract is a <<relationship>> that allows to associate a service being provided to a specific contract.

ServiceContract attributes:

- serviceContractPeriod

ServiceContract associations:

- (related) The contract related to the Service
- The Service related to the Contract

59.4 S5000F UoF Service Contract Management - Referenced classes and interfaces

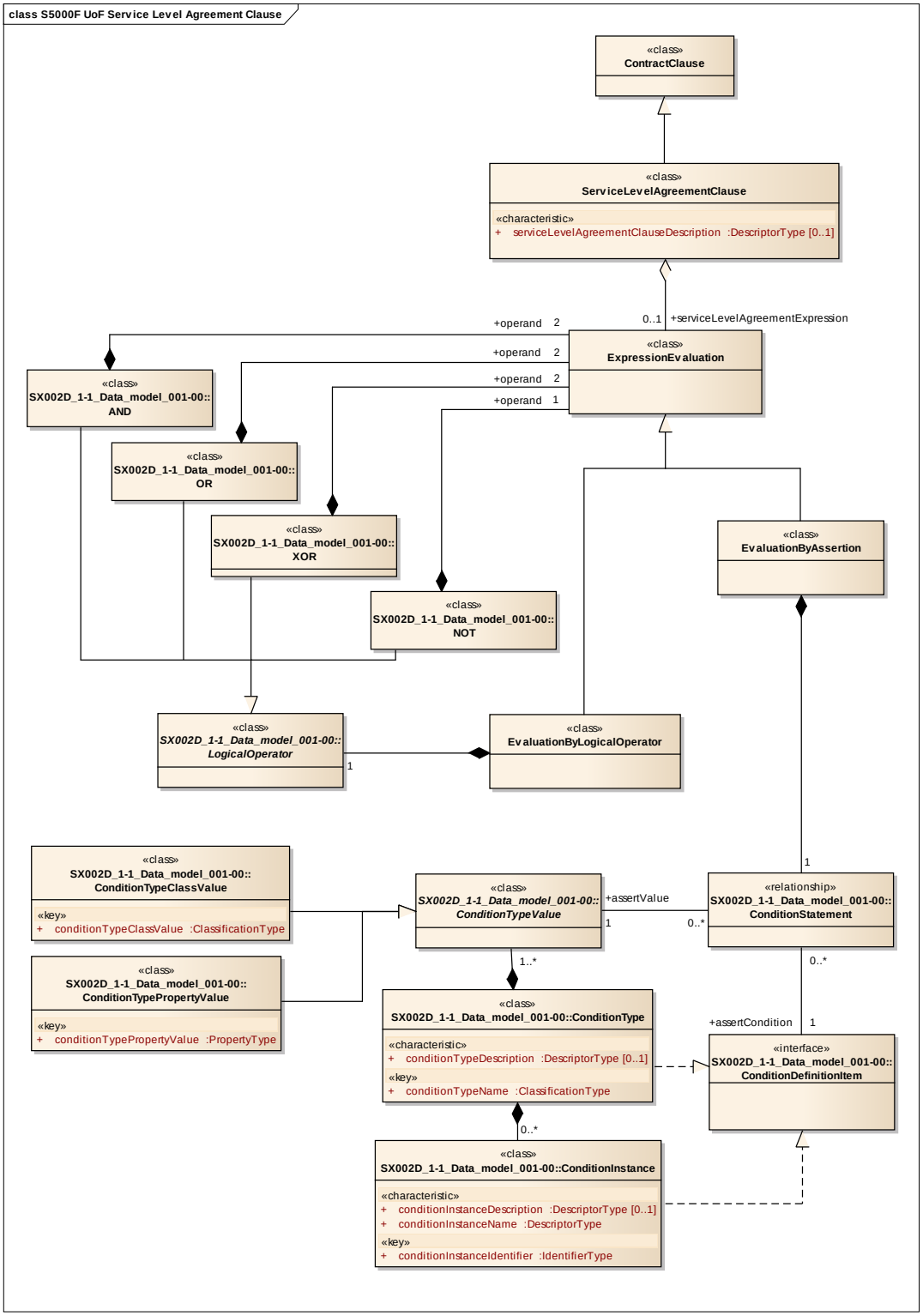
- Contract
- ContractClause
- ExpressionEvaluation
- ServiceLevelAgreementClause

60 S5000F UoFService Level Agreement Clause

60.1 Overall description

Service Level Agreement (SLA) Clause UoF provides the capability to define complex SLA conditions that a service must comply with as part of a contract.

60.2 Graphical representation



ICN-B6865-S5000F15055-002-00

Fig 59 S5000F UoF Service Level Agreement Clause – class model

60.3 S5000F UoF Service Level Agreement Clause - New class and interface definitions

60.3.1 EvaluationByAssertion

EvaluationByAssertion is an ExpressionEvaluation that identifies a value or condition that can be tested and evaluated to either TRUE or FALSE.

EvaluationByAssertion associations:

- An AND instance of a LogicalOperator must be associated with two instances of ExpressionEvaluation. (inherited from ExpressionEvaluation)
- An OR instance of a LogicalOperator must be associated with two instances of ExpressionEvaluation. (inherited from ExpressionEvaluation)
- An XOR instance of a LogicalOperator must be associated with two instances of ExpressionEvaluation. (inherited from ExpressionEvaluation)
- Each ServiceLevelAgreementEvaluation can be associated to a defined ServiceLevelAgrementClause. (inherited from ExpressionEvaluation)
- Each ServiceLevelAgreementEvaluationByAssertion can have one or many ConditionStaments.
- A NOT instance of a LogicalOperator must be associated with one instance of ExpressionEvaluation. (inherited from ExpressionEvaluation)

60.3.2 EvaluationByLogicalOperator

EvaluationByLogicalOperator is a ExpressionEvaluation that defines a Boolean expression between additional ExpressionEvaluation that can be evaluated to either TRUE or FALSE.

EvaluationByLogicalOperator associations:

- An XOR instance of a LogicalOperator must be associated with two instances of ExpressionEvaluation. (inherited from ExpressionEvaluation)
- Each ServiceLevelAgreementEvaluation can be associated to a defined ServiceLevelAgrementClause. (inherited from ExpressionEvaluation)
- An OR instance of a LogicalOperator must be associated with two instances of ExpressionEvaluation. (inherited from ExpressionEvaluation)
- An instance of LogicalOperator can be associated to an instance of EvaluationByLogicalOperator.
- An AND instance of a LogicalOperator must be associated with two instances of ExpressionEvaluation. (inherited from ExpressionEvaluation)
- A NOT instance of a LogicalOperator must be associated with one instance of ExpressionEvaluation. (inherited from ExpressionEvaluation)

60.3.3 ExpressionEvaluation

ExpressiontEvaluation is a Boolean expression that can be evaluated to be either TRUE or FALSE.

ExpressionEvaluation associations:

- An OR instance of a LogicalOperator must be associated with two instances of ExpressionEvaluation.
- An XOR instance of a LogicalOperator must be associated with two instances of ExpressionEvaluation.
- An AND instance of a LogicalOperator must be associated with two instances of ExpressionEvaluation.
- A NOT instance of a LogicalOperator must be associated with one instance of ExpressionEvaluation.
- Each ServiceLevelAgreementEvaluation can be associated to a defined ServiceLevelAgrementClause.

60.3.4 ServiceLevelAgreementClause

ServiceLevelAgreementClause is a contractual clause related to a service that determines the level of service to be provided.

ServiceLevelAgreementClause attributes:

- contractClauseDescription (inherited from ContractClause)
- contractClauseIdentifier (inherited from ContractClause)
- contractClauseValidityPeriod (inherited from ContractClause)
- serviceLevelAgreementClauseDescription

ServiceLevelAgreementClause implements the following <<interface>>:

- CommentItem (inherited from ContractClause)

ServiceLevelAgreementClause associations:

- (relating) The ContractClause covering the warranty of a class instance that implements the SerializedItem <<interface>>. (inherited from ContractClause)
- A ContractClause can have zero, one or many CostBreakdowns associated to it. (inherited from ContractClause)
- A ContractClause can have zero, one or many WarrantyClaims associated to it. (inherited from ContractClause)
- A ContractClause can have zero, one or many WorkBreakdowns associated to it. (inherited from ContractClause)
- A ServiceLevelAgreementClause can have zero, one or many ReportableMetric associated to it
- A ServiceLevelAgrementClause.can have zerio or one ServiceLevelAgreementEvaluations associated to it.
- Each ContractClause must be of a defined Contract. (inherited from ContractClause)

60.4 S5000F UoF Service Level Agreement Clause - Referenced classes and interfaces

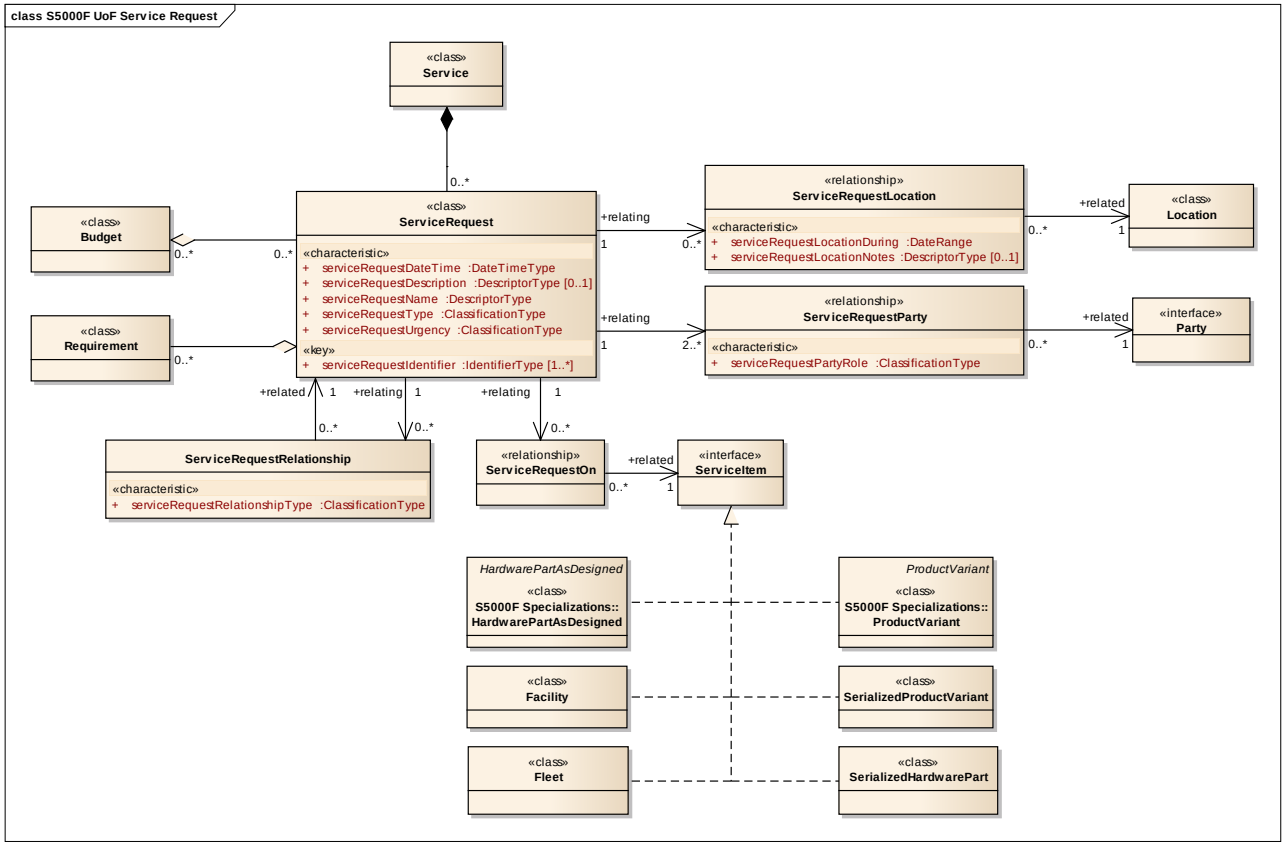
- AND
- ConditionDefinitionItem
- ConditionInstance
- ConditionStatement
- ConditionType
- ConditionTypeClassValue
- ConditionTypePropertyValue
- ConditionTypeValue
- ContractClause
- LogicalOperator
- NOT
- OR
- XOR

61 S5000F UoFService Request

61.1 Overall description

Service Request UoF provides the capability to generate a service request from one party to another party.

61.2 Graphical representation



ICN-B6865-S5000F15066-001-00

Fig 60 S5000F UoF Service Request – class model

61.3 S5000F UoF Service Request - New class and interface definitions

61.3.1 ServiceItem

SericeItem is an <<interface>> that allows to define the items for which a service can be requested.

Classes that implement the ServiceItem (inherited from HardwarePartAsDesigned) <<interface>> are:

- Accelerometer
- Facility
- Fleet
- HardwarePartAsDesigned
- MaintenanceFacility
- OperatingBase
- PressureSensor
- ProductVariant
- SensorType
- SerializedHardwarePart
- SerializedProductVariant
- StrainGauge
- SupportEquipment
- Tachometer
- TemperatureSensor

- Warehouse

ServiceItem associations:

- (related) The item that is related to a ServiceRequest.

61.3.2 ServiceRequest

ServiceRequest is a class representing a demand from one party to another partyto provide a service.

ServiceRequest attributes:

- serviceRequestDateTime
- serviceRequestDescription
- serviceRequestIdentifier
- serviceRequestName
- serviceRequestType
- serviceRequestUrgency

ServiceRequest implements the following <<interface>>:

- CommentItem
- CostEntryRelatedTo
- DocumentAssignmentItem

ServiceRequest associations:

- Each ServiceRequest must be of a defined Service.
- (relating) The ServiceRequest that is associated to a Party.
- (relating) The ServiceRequest that relates to a Location.
- (relating) The ServiceRequest that relates to an item to be serviced.
- (relating) The ServiceRequest that relates to another ServiceRequest.
- A ServiceRequest can have zero, one or many Requirements associated to it.
- Each ServiceRequest can be associated to a Budget.
- (related) The ServiceRequest that is related to another ServiceRequest.

61.3.3 ServiceRequestLocation

ServiceRequestLocation is a <<relationship>> stating the locating where a ServiceRequest has to be complied with.

ServiceRequestLocation attributes:

- serviceRequestLocationDuring
- serviceRequestLocationNotes

ServiceRequestLocation associations:

- A ServiceRequest can be associated to zero, one or many Locations (via the ServiceRequestLocation <<relationship>>) where the Service has to be performed.

61.3.4 ServiceRequestOn

ServiceRequestOn is a <<relationship>> that associates a ServiceRequest to a ServiceItem for which the service has to be provided.

ServiceRequestOn associations:

- A ServiceRequest can be associated to zero, one or many classes implementing the ServiceItem <<interface>> (via the ServiceRequestOn <<relationship>>).

61.3.5 ServiceRequestParty

ServiceRequestParty is a <<relationship>> that associates a ServiceRequest to the party that has demanded it or has to provide it.

Note:
At least two relationships must exist, one for the Party demanding the ServiceRequest and one for the Party that will fulfill it.

Additional relationships can exist, eg, for a subcontractor or another Party that will assist to that ServiceRequest.

ServiceRequestParty attributes:

- serviceRequestPartyRole

ServiceRequestParty associations:

- A ServiceRequest must be associated to two or more Parties (via the ServiceRequestParty <<relationship>>).

61.3.6 ServiceRequestRelationship

ServiceRequestRelationship is a <<relationship>> that indicates the association between two different ServiceRequests.

ServiceRequestRelationship attributes:

- serviceRequestRelationshipType

ServiceRequestRelationship associations:

- A ServiceRequest can be related to zero, one or many other ServiceRequests (via the ServiceRequestRelationship <<relationship>>).

61.4 S5000F UoF Service Request - Referenced classes and interfaces

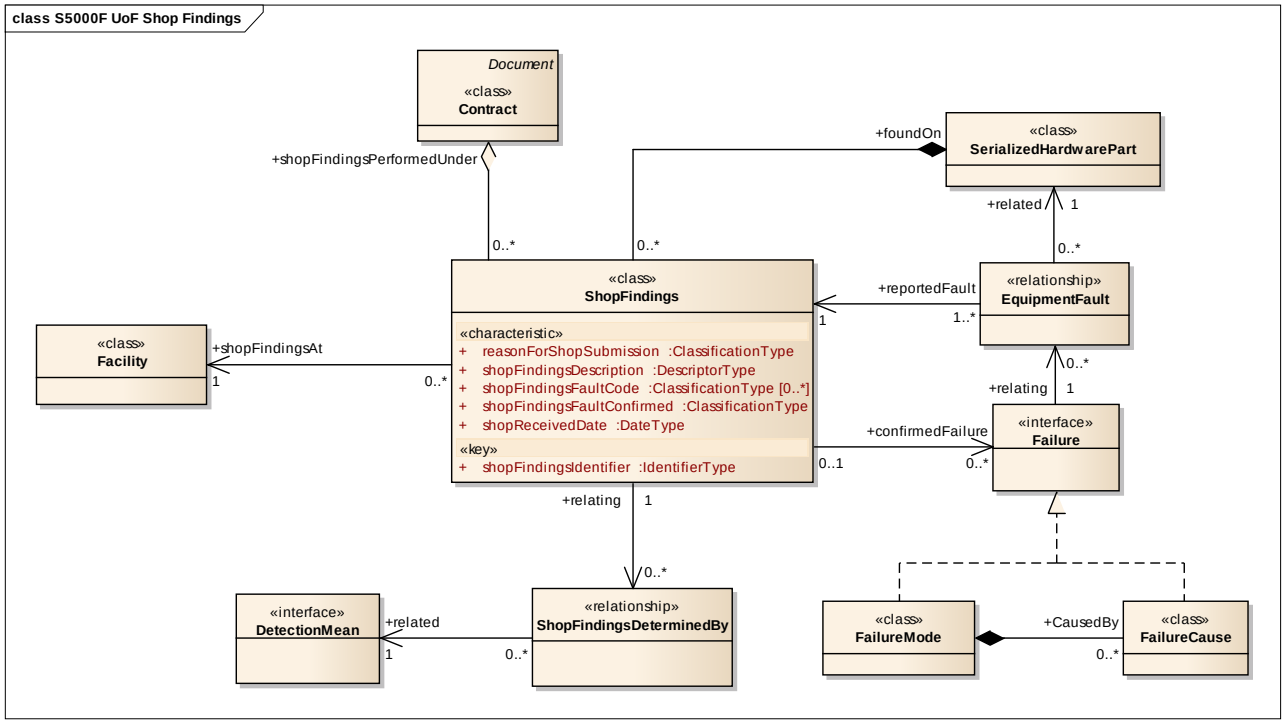
- Budget
- Facility
- Fleet
- HardwarePartAsDesigned
- Location
- Party
- ProductVariant
- Requirement
- SerializedHardwarePart
- SerializedProductVariant
- Service

62 S5000F UoFShop Findings

62.1 Overall description

Shop Findings UoF provides the capability to report on the shop findings related to reported faults associated to an equipment.

62.2 Graphical representation



ICN-B6865-S5000F15056-002-00

Fig 61 S5000F UoF Shop Findings – class model

62.3 S5000F UoF Shop Findings - New class and interface definitions

62.3.1 ShopFindings

ShopFindings is a class representing the results of a fault investigation performed on an equipment in a workshop.

ShopFindings attributes:

- reasonForShopSubmission
- shopFindingsDescription
- shopFindingsFaultCode
- shopFindingsFaultConfirmed
- shopFindingsIdentifier
- shopReceivedDate

ShopFindings implements the following <<interface>>:

- DocumentAssignmentItem

ShopFindings associations:

- ShopFindings can have zero, one or many confirmed Failure instances associated to it.
- Shopfindings must be associated to a defined SerializedHardwarePart.
- ShopFindings can be associated to a single Contract.
- (relating) The Shopfindings that were determined by a DetectionMean <<interface>>.
- ShopFindings can have one or many reported EquipmentFaults associated to it.
- ShopFindings must be associated to the Facility instance where the ShopFindings were made.

62.3.2 ShopFindingsDeterminedBy

ShopFindingsDeterminedBy is a <<relationship>> that allows to associate ShopFindings to the DetectionMeans that allowed such findings.

ShopFindingsDeterminedBy associations:

– ShopFindings acn be associated to zero, one or many DetectioMeans (via the ShopFindingsDeterminedBy <<relationship>>).

62.4 S5000F UoF Shop Findings - Referenced classes and interfaces

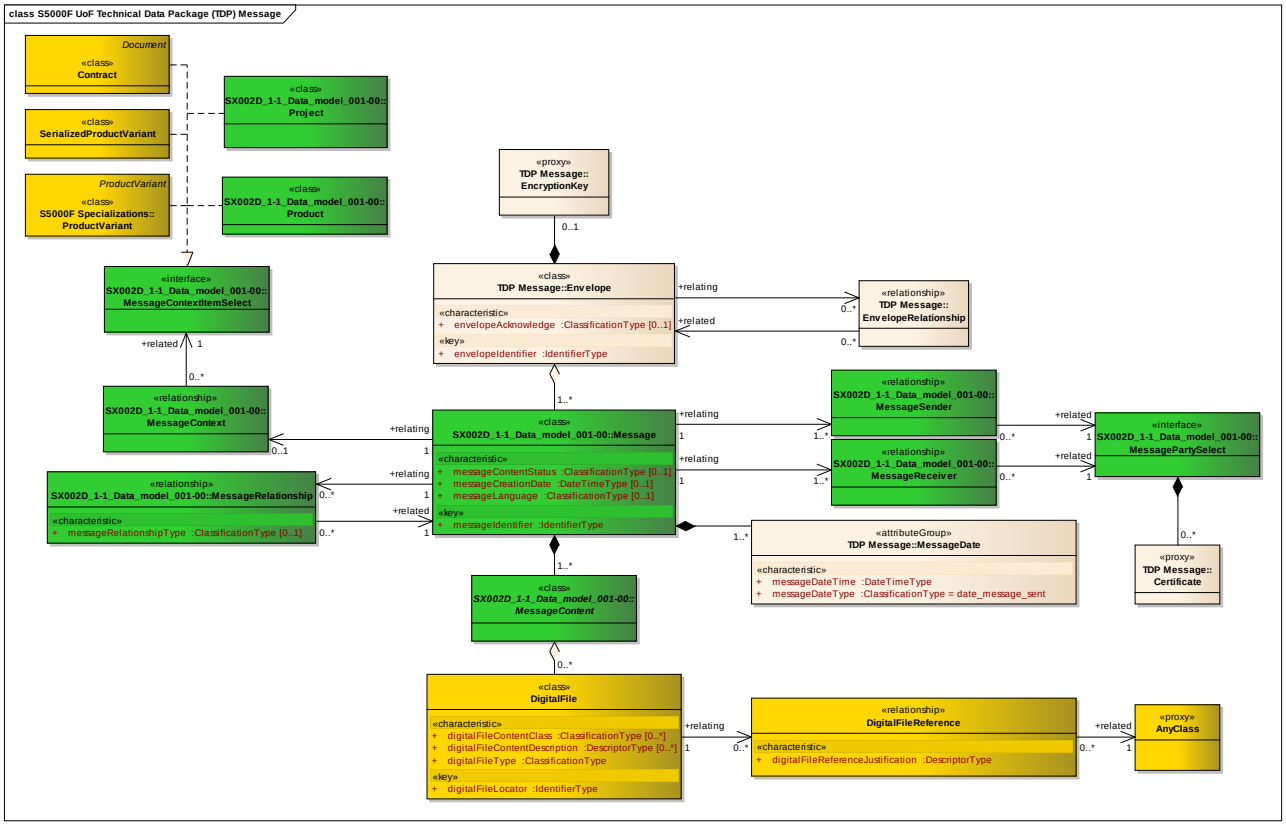
– Contract
– DetectionMean
– EquipmentFault
– Facility
– Failure
– FailureCause
– FailureMode
– SerializedHardwareP art

63 S5000F UoFTechnical Data Package (TDP) Message

63.1 Overall description

Technical Data Package (TDP) Message UoF provides the capability to exchange unstructured data or transfer data not covered by the S-Series of ILS specifications. It is based on the technical data package message defined by the ASD SSG.

63.2 Graphical representation



ICN-B6865-S5000F15057-002-00

Fig 62 S5000F UoF Technical Data Package (TDP) – class model

63.3 S5000F UoF Technical Data Package (TDP) Message - New class and interface definitions

63.3.1 Certificate

Certificate is a <<proxy>> class representing an electronic certificate.

Certificate associations:

- Each Certificate must belong to a defined MessageParty (through the MessagePartySelect <<interface>>).

63.3.2 DigitalFileReference

DigitalFileReference is a <<relationship>> that allows to associate a DigitalFile to any class.

Example:

- Associate a video to a SerializedProductVariant
- Associate a sound file to an engine
- Associate a scanned document to a Contract

Note:
This relationship allows to map nonstructured data to individual S5000F elements.

DigitalFileReference attributes:

- digitalFileReferenceJustification

DigitalFileReference associations:

- A DigitalFile can be associated to zero, one or many classes (via the DigitalFileReference <<relationship>>).

63.3.3 EncryptionKey

EncriptionKey is a <<proxy>> representing an encryption key to be used for a message Envelope.

EncryptionKey implements the following <<interface>>:

- SecurityClassificationItem

EncryptionKey associations:

- An EncryptionKey must be always associated to a message Envelope.

63.3.4 Envelope

Envelope is a class that represents a package of one or several messages that are sent together as one single data package.

Envelope attributes:

- envelopeAcknowledge
- envelopeIdentifier

Envelope implements the following <<interface>>:

- SecurityClassificationItem

Envelope associations:

- An Envelope can have one or many Messages associated to it.
- A message Envelope can be associated to zero or one EncryptionKeys.
- (related) The message Envelope that is related to the referencing Envelope.
- (relating) The message Envelope that relates to another message Envelope.

63.3.5 EnvelopeRelationship

EnvelopeRelationship is a <<relationship>> that defines how two or more message envelopes are related with each other.

EnvelopeRelationship associations:

- A message Envelope can me associated to zero, one or many other message Envelopes (via the EnvelopeRelationship <<relationship>>).

63.3.6 Message

Message is a collection of information brought together by a MessageSender for the purpose of communicating it to another party.

Message attributes:

- messageContentStatus
- messageCreationDate
- messageIdentifier
- messageLanguage

Message implements the following <<interface>>:

- RemarkItem
- SecurityClassificationItem

Message associations:

- (relating) The Message that relates to a MessageContext item.
- A Message can have zero, one or m any MessageDates associated to it.
- A Message can be associated to an Envelope.
- Each Message can have zero, one or many MessageContents.
- (relating) The Message that relates to another Message.
- (relating) The Message that has a Sender.
- (related) The Message that is related to another Message.
- (relating) The Message that relates to the message receivers.

63.3.7 MessageContent

MessageContent is the collection of information that is the subject of the Message.

63.3.8 MessageContext

MessageContext is a <<relationship>> between a Message and the framework for which it is being provided.

MessageContext associations:

- Each Message can be optionally associated (via the MessageContext <<relationship>>) to a MessageContext item that implements the MessageContextItemSelect <<interface>>.

63.3.9 MessageContextItemSelect

MessageContextItemSelect represents the common behavior of those items that can be identified as the framework for a Message.

Classes that implement the MessageContextItemSelect <<interface>> are:

- Contract
- Contract
- Product
- ProductVariant
- ProductVariant

- ProductVariant
- Project
- Project
- SerializedProductVariant

MessageContextItemSelect associations:

- (related) The related item that forms the message context of the Message.

63.3.10 MessageDate

MessageDate is an attributegroup that provides information about different message dates.

MessageDate attributes:

- messageDateTime
- messageDateType

MessageDate associations:

- Each MessageDate must be of a defined Message.

63.3.11 MessagePartySelect

MessagePartySelect represents the common behavior of those items that can be identified as a MessageSender or a MessageReceiver.

Classes that implement the MessagePartySelect <<interface>> are:

- Organization

MessagePartySelect associations:

- (related) The Receiver of the Message (implemented by the MessagePartySelect <<interface>>).
- (related) The Sender of the message (implemented by the MessagePartySelect <<interface>>).
- A Party can (through the MessagePartySelect <<interface) have zero, one or several certificates associated to it.

63.3.12 MessageReceiver

MessageReceiver is a <<relationship>> between a Message and the intended recipient of the message.

MessageReceiver associations:

- A Message can be associated to multiple receivers of the message (via the MessageReceiver <<relationship>>).

63.3.13 MessageRelationship

MessageRelationship is a <<relationship>> between two Messages.

MessageRelationship attributes:

- messageRelationshipType

MessageRelationship associations:

- A Message can be assiciated to zero, one or many other Messages (via the MessageRelationship <<relationship>>).

63.3.14 MessageSender

MessageSender is a <<relationship>> between a Message and the originator of the message.

MessageSender associations:

– A Message can be associated to one or many senders (via the MessageSender <<interface>>).

63.4 S5000F UoF Technical Data Package (TDP) Message - Referenced classes and interfaces

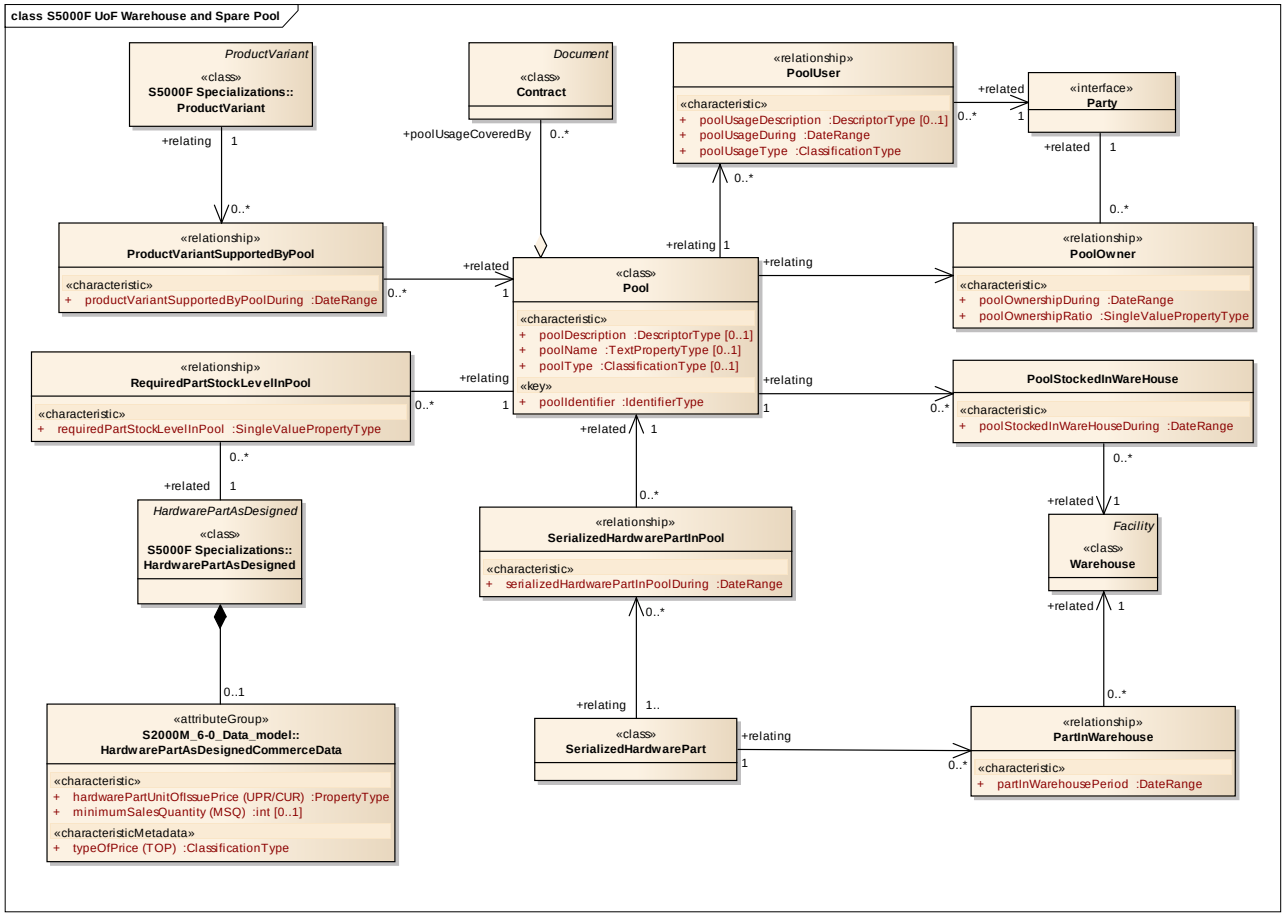
– AnyClass
– Contract
– DigitalFile
– MessageContent
– Product
– ProductVariant
– Project
– SerializedProductVariant

64 S5000F UoFWarehouse and Spare Pool

64.1 Overall description

Warehouse and Spare Pool UoF provides the capability to exchange information about warehouse stock and pools of spares.

64.2 Graphical representation



ICN-B6865-S5000F15058-002-00

Fig 63 S5000F UoF Warehouse and Spare Pool – class model

64.3 S5000F UoF Warehouse and Spare Pool - New class and interface definitions

64.3.1 PartInWarehouse

PartInWarehouse is a <<relationship>> that defines the time that a HardwarePartAsSerialized has been stored in a Warehouse.

PartInWarehouse attributes:

- partInWarehousePeriod

PartInWarehouse associations:

- (relating) The SerializedHardwarePart that relates to a Warehouse.
- (related) The Warehouse that is related to from the relating SerializedHardwarePart

64.3.2 Pool

Pool is a set of parts that are managed as a functional group and that is shared by different Parties.

Pool attributes:

- poolDescription
- poolIdentifier
- poolName
- poolType

Pool implements the following <<interface>>:

- DocumentAssignmentItem
- SecurityClassificationItem

Pool associations:

- (related) The Pool that supports zero, one or many ProductVariants.
- A Pool can be associated to zero, one or many Contracts.
- The Pool requiring a certain stock level of HardWarePartsAsDesigned.
- (relating) The Pool that is used by the Parties.
- (related) The part Pool to which a SerializedHardwarePart beongs.
- (relating) The Pool that is stocked in the Warehouse.
- (relating) The Pool that is associated to the Party or Parties owning it.

64.3.3 PoolOwner

PoolOwner is a <<relationship>> that defines the ownership ration and period of a Party over a Pool.

PoolOwner attributes:

- poolOwnershipDuring
- poolOwnershipRatio

PoolOwner associations:

- A Pool can be associated (by means of the PoolOwer <<relationship>>) to zero, one or many Parties owning the Pool.

64.3.4 PoolUser

PoolUser is a <<relationship>> that associates a spare Pool with the Parties that are allowed to access and use that SparePool.

PoolUser attributes:

- poolUsageDescription
- poolUsageDuring
- poolUsageType

PoolUser associations:

- A Pool can be used by zero, one or many Person or Organization instances implementing the Party <<interface>> (via the PoolUser <<relationship>>).

64.3.5 RequiredPartStockLevelInPool

RequiredPartStockLevelInPool is a <<relationship>> that defines the number of parts that have to be stored in a Pool.

RequiredPartStockLevelInPool attributes:

- requiredPartStockLevelInPool

RequiredPartStockLevelInPool associations:

- A Pool can be associated to zero, one or many HardwarePartsAsDesigned (via the RequiredPartStockLevelInPool <<relationship>> for which a specific stock level is required in the Pool.

64.4 S5000F UoF Warehouse and Spare Pool - Referenced classes and interfaces

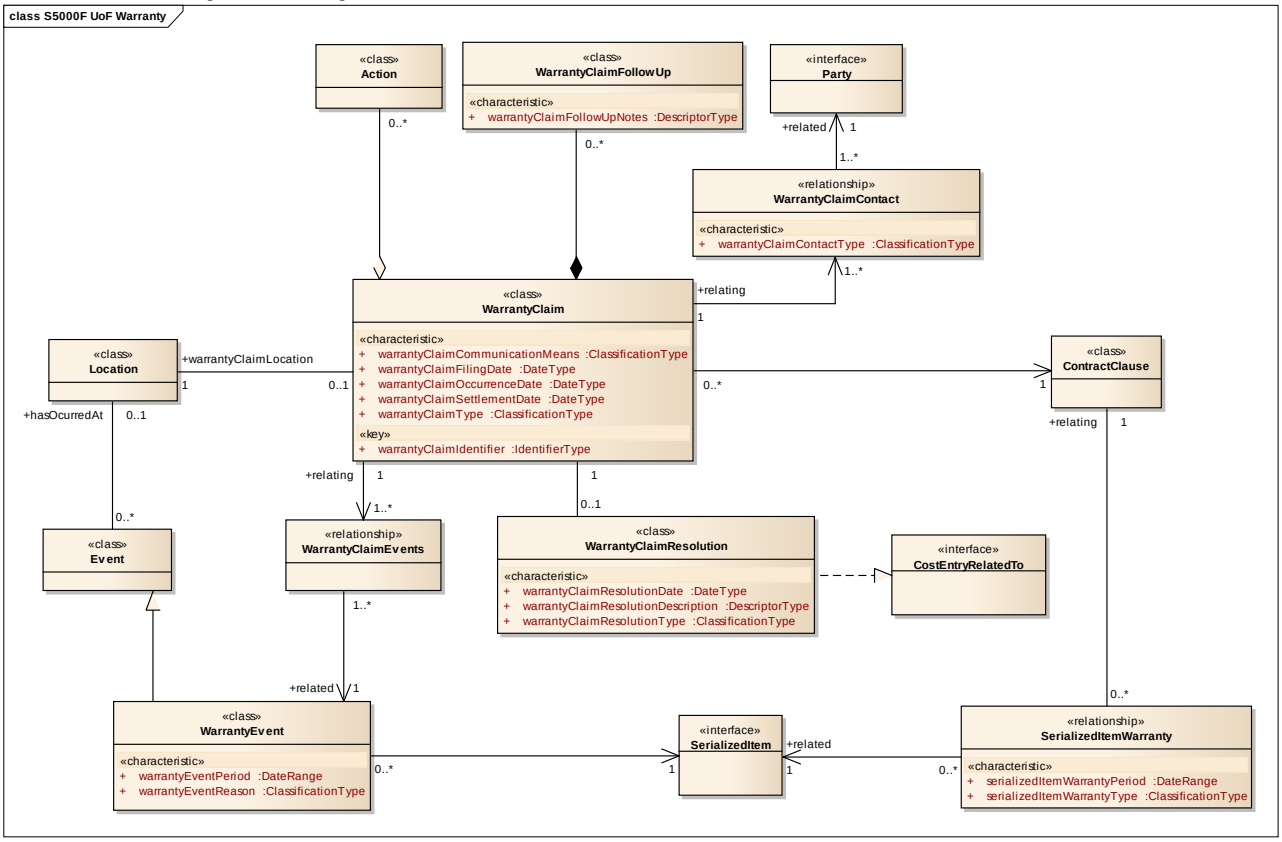
- Contract
- HardwarePartAsDesigned
- HardwarePartAsDesignedCommerceData
- Party
- ProductVariant
- SerializedHardwarePart
- Warehouse

65 S5000F UoFWarranty

65.1 Overall description

Warranty UoF provides the information associated to the warranty process.

65.2 Graphical representation



ICN-B6865-S5000F15059-002-00

Fig 64 S5000F UoF Warranty – class model

65.3 S5000F UoF Warranty - New class and interface definitions

65.3.1 SerializedItemWarranty

SerializedItemWarranty is a <<relationship>> that defines the association between a HardwarePartAsSerialized and the legal justification for the warranty of the SerializedItem, such as a contract or contract clause.

SerializedItemWarranty attributes:

- serializedItemWarrantyPeriod
- serializedItemWarrantyType

SerializedItemWarranty associations:

- A ContractClause can be associated to zero, one or many class instances implementing the SerielizedItem <<interface>> (via the SerializedItemWarranty <<relationship>> to indicate that they are covered by a warranty.

65.3.2 WarrantyClaim

WarrantyClaim is a class representing a customer's claim for repair or replacement of a defective item or nonperformance of that item as established in a warranty contract.

WarrantyClaim attributes:

- warrantyClaimCommunicationMeans
- warrantyClaimFilingDate
- warrantyClaimIdentifier

- warrantyClaimOccurrenceDate
- warrantyClaimSettlementDate
- warrantyClaimType

WarrantyClaim implements the following <<interface>>:

- CommentItem
- DocumentAssignmentItem

WarrantyClaim associations:

- A WarrantyClaim can have zero, one or many WaarntyClaimFollowsUps associated to it.
- (relating) The WarrantyClaim that relates to a WarrantyEvent.
- A WarrantClaim can be associated to a ContractClause.
- A WarrantyClaim can be optionally associated to a Location instance.
- A WarrantyClaim can have several Actions associated to it.
- A WarrantyClaim can have zero or one WarrantyClaimResolutions associated to it.

65.3.3 WarrantyClaimContact

WarrantyClaimContact is a <<relationship>> that associates a WarrantyClaim to a Party.

WarrantyClaimContact attributes:

- warrantyClaimContactType

WarrantyClaimContact associations:

- A WarrantyClaim must be associated to at least one Person or Organization (via the Party <<interface>> (via the WarrantyClaimContact <<relationship>>).

65.3.4 WarrantyClaimEvents

WarrantyClaimEvents is a <<relationship>> that associates WarrantyClaims to WarrantyEvents.

WarrantyClaimEvents associations:

- A WarrantyClaim must be associated to one or many WarrantyEvents (via the WarrantyClaimEvents <<interface>>).

65.3.5 WarrantyClaimFollowUp

WarrantyClaimFollowUp is a class that represents any followup associated to a WarrantyClaim.

WarrantyClaimFollowUp attributes:

- warrantyClaimFollowUpNotes

WarrantyClaimFollowUp associations:

- Each WarrantyClaimFollowUp must be associated to a single WarrantyClaim instance.

65.3.6 WarrantyClaimResolution

WarrantyClaimResolution is a class that represents the conclusion of the WarrantyClaim.

WarrantyClaimResolution attributes:

- warrantyClaimResolutionDate
- warrantyClaimResolutionDescription
- warrantyClaimResolutionType

WarrantyClaimResolution implements the following <<interface>>:

- CostEntryRelatedTo

WarrantyClaimResolution associations:

- A WarrantyClaimResolution must be always associated to a WarrantyClaim instance.

65.3.7 WarrantyEvent

WarrantyEvent is an Event that has as the consequence that a WarrantyClaim is raised.

WarrantyEvent attributes:

- eventConfirmedStatus (inherited from Event)
- eventDescription (inherited from Event)
- eventGroup (inherited from Event)
- eventIdentifier (inherited from Event)
- eventOcurrenceDateTime (inherited from Event)
- eventSeverity (inherited from Event)
- warrantyEventPeriod
- warrantyEventReason

WarrantyEvent implements the following <<interface>>:

- CommentItem (inherited from Event)
- DocumentAssignmentItem
- DocumentAssignmentItem (inherited from Event)
- SecurityClassificationItem (inherited from Event)

WarrantyEvent associations:

- An Event can have zero, one or many EquipmentFaults associated to it. (inherited from Event)
- An Event has an optional association with a DownTimePeriod that has resulted as a consequence of the Event. (inherited from Event)
- An Event instance can be optionally logged in a LogBookEntry instance. (inherited from Event)
- An Event must be reported by a defined Party. (inherited from Event)
- Each Event can have zero, one or many Consequences. (inherited from Event)
- An Event can have zero, one or many Actions associated to it. (inherited from Event)
- (relating) The Event that relates to another Event. (inherited from Event)
- Each Event can have zero, one or many Damages. (inherited from Event)
- An Event can be optionally associated to a Location. (inherited from Event)
- (related) The Event that is related to another Event. (inherited from Event)
- (relating) The Event that relates to the ExplanatoryFactor. (inherited from Event)
- An Event can be optionally associated to a ProductusagePhase. (inherited from Event)
- (relating) The Event that relates to a BreakdownElement. (inherited from Event)
- (related) The WarrantyEvent that is related to a WarrantyClaim.
- (related) The Event that is related to the SafetyIssue. (inherited from Event)
- A WarrantyEvent must be associated to one instance of a class implementing the SerializedItem <<interface>>.

65.4 S5000F UoF Warranty - Referenced classes and interfaces

- Action
- ContractClause
- CostEntryRelatedTo
- Event
- Location
- Party
- SerializedItem

Chapter 15.5

Mapping of use cases to individual UoFs

Table of contents

List of tables

References

Table 1 References

Chap No./Document No.	Title
Chap 3	Feedback data for the purpose of reliability, maintainability, capability and testability
Chap 4	Feedback of data for maintenance analysis

Chap 5	Feedback of safety data
Chap 6	Feedback of data for supply support
Chap 7	Feedback for Life Cycle Cost analysis
Chap 8	Feedback of data for warranty analysis
Chap 9	Feedback data for the purpose of platform health and usage monitoring
Chap 10	Feedback of data to support obsolescence management
Chap 11	Feedback of data for integrated fleet management
Chap 12	Feedback of data for product configuration
Chap 13	Feedback of data to support the management of in-service contracts
Chap 14	Feedback of non-predefined information
Chap 15.3	Common Data Model (CDM) units of functionality

1 General

The S5000F data model has been defined on the basis of the use cases defined throughout this specification. This will ensure that when applying a specific use case, all necessary information is available so as to be able to carry out that use case.

The current chapter provides a mapping of the Units of Functionality (UoFs) as defined in Chap 15.3 and Chap 15.4 that are required for each individual use case.

2 Mapping of Use Cases to UoFs

2.1 UoFs for reliability, availability, maintainability, capability and testability use cases

The UoFs required for the different RAMCT use cases, as defined in Chap 3, are listed in Table 2. In order to avoid having to cross-check the use case numbers, a summary of each use case is provided below:

The **Reliability** use cases are as follows:

1 Monitor the performance of equipment

2 Influencing future designs

3 Trends, Failures, Root Cause Analysis and Issue Warnings

The **Availability** use cases are as follows:

4 Operations and deployment support, through-life support and equipment availability

5 Maintenance Management and Contracting for availability

The **Maintainability** use cases are as follows:

6 Maintenance Activities, Effectiveness of repairs, Specified Maintenance, predict Maintenance Periods, products status

7 Retaining Performance, Support manuals and Support Infrastructure

The **Capability** use cases are as follows:

8 Mission capable, capability shortfalls

9 Efficiency, Performance against specification

The **Testability** use cases are as follows:

10 Can product be tested

11 Fault diagnosis, fault identification

Table 2 UoFs for RAMCT use cases

UoF name	Reliability			Availa-bility		Main-taina-bility		Capa-bility		Testa-bility	
	1	2	3	4	5	6	7	8	9	10	11
CDM UoF Applicability Statement	X	X	X								
CDM UoF Breakdown Structure	X	X	X	X	X	X	X	X	X	X	X
CDM UoF Hardware Element	X	X	X	X	X	X	X	X	X	X	X
CDM UoF Part Definition	X	X	X	X	X	X	X	X	X	X	X
CDM UoF Product Design Configuration	X	X	X								
CDM UoF Remark	X	X	X	X	X	X	X	X	X	X	X
S5000F UoF Actual Serialized Product Variant Configuration	X	X	X	X	X	X	X	X	X	X	X
S5000F UoF Comment	X	X	X	X	X	X	X	X	X	X	X
S5000F UoF Comment Items	X	X	X	X	X	X	X	X	X	X	X
S5000F UoF Cost Entry		X		X	X	X	X	X		X	X
S5000F UoF Document	X	X	X	X	X	X	X	X	X	X	X
S5000F UoF Document Assignment Items	X	X	X	X	X	X	X	X	X	X	X
S5000F UoF Equipment	X	X	X	X	X	X	X	X	X	X	X
S5000F UoF Event	X	X	X	X	X	X	X	X	X	X	X
S5000F UoF Facility				X	X	X		X		X	X
S5000F UoF Failure Detection and Location										X	X
S5000F UoF Fleet Planning and Product Assignment								X			
S5000F UoF Logbook Entry	X	X	X	X	X	X	X	X	X	X	X
S5000F UoF Maintenance Activity	X	X		X	X	X	X		X	X	X

UoF name	Reliability			Availa-bility		Main-taina-bility		Capa-bility		Testa-bility	
	1	2	3	4	5	6	7	8	9	10	11
S5000F UoF Maintenance Facility Planning				X	X			X		X	X
S5000F UoF Maintenance Personnel			X	X	X	X	X			X	X
S5000F UoF Operational Environment	X	X	X	X	X				X	X	X
S5000F UoF Operational Event	X	X	X	X	X	X	X		X	X	X
S5000F UoF Operational Roles	X	X	X	X	X	X		X	X	X	X
S5000F UoF Product Allowed Configuration	X	X	X	X	X	X		X	X	X	X
S5000F UoF Product and Fleet Availability					X	X	X	X		X	X
S5000F UoF Product Defined Operational Configuration	X	X	X	X	X	X	X	X		X	X
S5000F UoF Reportable Activity	X	X	X			X					X
S5000F UoF Reporting	X	X		X	X	X	X			X	X
S5000F UoF Safety	X	X	X	X	X					X	X
S5000F UoF Security Classification											
S5000F UoF Serialized Item	X	X	X	X	X	X	X	X	X	X	X
S5000F UoF Serialized Product Operational Period	X	X	X	X	X						
S5000F UoF Serialized Product Variant	X	X	X	X	X	X	X	X	X	X	X
S5000F UoF Warranty		X									

2.2 UoFs for maintenance analysis use cases

The UoFs required for the different maintenance analysis use cases, as defined in Chap 4, are those listed in Table 3. In order to avoid having to cross-check the use case numbers, a summary of each use case is provided below:

1 Manufacturer maintenance schedule

2 Product operational environment data

3 Operational profile data

4 Work order / package data

5 New modifications for product

6 Technical queries

Table 3 UoFs for maintenance analysis use cases

UoF name	Use case					
	1	2	3	4	5	6
CDM UoF Remark	X	X	X	X	X	X
S5000F UoF Change Embodiment	X		X		X	
S5000F UoF Change Embodiment Planning					X	
S5000F UoF Change Embodiment Strategy					X	
S5000F UoF Comment	X	X	X	X	X	X
S5000F UoF Comment Items	X	X	X	X	X	X
S5000F UoF Document	X	X			X	X
S5000F UoF Document Assignment Items	X	X			X	X
S5000F UoF Equipment	X		X			
S5000F UoF Event						X
S5000F UoF Failure Detection and Location	X		X			
S5000F UoF Logbook Entry	X		X	X		
S5000F UoF Maintenance Activity	X		X	X	X	
S5000F UoF Maintenance Facility Planning	X		X			
S5000F UoF Maintenance Organization	X	X				
S5000F UoF Maintenance Personnel	X		X	X		
S5000F UoF Maintenance Program	X		X		X	
S5000F UoF Maintenance Work Order Source	X		X		X	
S5000F UoF Operating Base		X		X		
S5000F UoF Operational Environment		X		X		X
S5000F UoF Operational Event				X		
S5000F UoF Operational Roles		X		X		X
S5000F UoF Operator		X				
S5000F UoF PartAsRealized			X		X	X
S5000F UoF Product and Fleet Availability		X		X		
S5000F UoF Safety						X

UoF name	Use case					
	1	2	3	4	5	6
S5000F UoF Serialized Product Operational Period				X		
S5000F UoF Shop Findings	X					

2.3 UoFs for safety analysis use cases

The UoFs required for the different safety use cases, as defined in Chap 5, are those listed in Table 4. In order to avoid having to cross-check the use case numbers, a summary of each use case is provided below:

1 Report safety issue

2 Provide operational limitations due to safety issue

3 Provide special safety instructions

Table 4 UoFs for safety analysis use cases

UoF name	Use case		
	1	2	3
CDM UoF Remark	X	X	X
S5000F UoF Actual Serialized Product Variant Configuration	X		
S5000F UoF Applicability Assignment Item		X	X
S5000F UoF Comment	X	X	X
S5000F UoF Comment Items	X	X	X
S5000F UoF Document	X	X	X
S5000F UoF Document Assignment Items	X	X	X
S5000F UoF Event	X		
S5000F UoF Operational Environment	X		
S5000F UoF Operational Event	X		
S5000F UoF PartAsRealized	X	X	X
S5000F UoF Product Allowed Configuration		X	
S5000F UoF Product Defined Operational Configuration	X		
S5000F UoF Reporting	X	X	
S5000F UoF Requirement		X	X
S5000F UoF Safety	X	X	X

UoF name	Use case		
	1	2	3
S5000F UoF Serialized Product Operational Period	X		

2.4 UoFs for supply support use cases

The UoFs required for the different supply support use cases, as defined in Chap 6, are those listed in Table 5. In order to avoid having to cross-check the use case numbers, a summary of each use case is provided below:

1 Inventory management

2 Shelf life management

3 Spares and SE pool management

4 Logistic Response time

5 Facilities management and maintenance

Table 5 UoFs for supply support use cases

UoF name	Use case				
	1	2	3	4	5
CDM UoF Remark	X	X	X	X	X
S5000F UoF Comment	X	X	X	X	X
S5000F UoF Comment Items	X	X	X	X	X
S5000F UoF Facility			X		X
S5000F UoF PartAsRealized		X	X		
S5000F UoF Reportable Activity	X			X	
S5000F UoF Reporting	X			X	X
S5000F UoF Shop Findings	X				
S5000F UoF Warehouse and Spare Pool	X	X	X	X	

2.5 UoFs for LCC analysis use cases

The UoFs required for the different LCC use cases, as defined in Chap 7, are those listed in Table 6. . In order to avoid having to cross-check the use case numbers, a summary of each use case is provided below:

1 Provide cost breakdown structure

4 Estimate maintenance costs

5 Costs due to operational requirements

6 Cost of modifications or upgrades

7 Costs of in-service support

Table 6 UoFs for LCC analysis use cases

UoF name	Use case				
	1	2	3	4	5
CDM UoF Remark	X	X	X	X	X
S5000F UoF Change Embodiment				X	
S5000F UoF Change Embodiment Planning				X	
S5000F UoF Change Embodiment Strategy				X	
S5000F UoF Comment	X	X	X	X	X
S5000F UoF Comment Items	X	X	X	X	X
S5000F UoF Contract Breakdown	X	X	X	X	
S5000F UoF Cost Entry	X	X	X	X	X
S5000F UoF Document				X	
S5000F UoF Document Assignment Items				X	
S5000F UoF Fleet Monitoring			X		
S5000F UoF Fleet Planning and Product Assignment			X		
S5000F UoF Project and Contract	X				X
S5000F UoF Reportable Activity		X	X	X	X
S5000F UoF Reporting		X		X	X
S5000F UoF Requirement			X		

2.6 UoFs for warranty analysis use cases

The UoFs required for the different warranty use cases, as defined in Chap 8, are those listed in Table 7. In order to avoid having to cross-check the use case numbers, a summary of each use case is provided below:

1. Evaluate maintenance actions
2. Collect warranty costs
3. Determine misuse of warranty
4. Identify items causing risk to warranty program
5. Improve standard warranty rules and process

Table 7 UoFs for warranty analysis use cases

UoF name	Use case				
	1	2	3	4	5
CDM UoF Remark	X	X	X	X	X
S5000F UoF Actual Serialized Product Variant Configuration		X	X	X	X
S5000F UoF Change Embodiment					X
S5000F UoF Comment	X	X	X	X	X
S5000F UoF Comment Items	X	X	X	X	X
S5000F UoF Contract Breakdown		X	X		
S5000F UoF Cost Entry		X			
S5000F UoF Equipment	X	X		X	X
S5000F UoF Event				X	
S5000F UoF Failure Detection and Location	X				
S5000F UoF Maintenance Program	X				
S5000F UoF Operational Environment			X	X	X
S5000F UoF Operational Event	X		X		
S5000F UoF PartAsRealized	X		X	X	X
S5000F UoF Product Allowed Configuration	X			X	X
S5000F UoF Reportable Activity		X	X		
S5000F UoF Reporting		X	X		
S5000F UoF Shop Findings	X		X	X	X
S5000F UoF Warehouse and Spare Pool				X	
S5000F UoF Warranty	X	X	X	X	X

2.7 UoFs for platform usage & health monitoring use cases

The UoFs required for the different usage & health monitoring use cases, as defined in Chap 9, are those listed in Table 8. In order to avoid having to cross-check the use case numbers, a summary of each use case is provided below:

1 Record usage and health data

2 Report usage information

3 Respond to usage information

Table 8 UoFs for platform usage and health monitoring use cases

UoF name	Use case		
	1	2	3
CDM UoF Remark	X	X	X
S5000F UoF Comment	X	X	X
S5000F UoF Comment Items	X	X	X
S5000F UoF Fleet Planning and Product Assignment			X
S5000F UoF Logbook Entry	X	X	X
S5000F UoF Product Defined Operational Configuration			X
S5000F UoF Product Usage Phase			X
S5000F UoF Serialized Product Health Monitoring	X	X	X
S5000F UoF Serialized Product Operational Period		X	

2.8 UoFs for obsolescence management use cases

The UoFs required for the different obsolescence use cases, as defined in Chap 10, are those listed in Table 9. In order to avoid having to cross-check the use case numbers, a summary of each use case is provided below:

1 Create basis for obsolescence management planning

2 Determine obsolescence candidates /perform risk assessment

3 Determine obsolescence strategy

4 Obsolescence monitoring

5 Solutions/proposals to solve obsolescence

Table 9 UoFs for obsolescence management use cases

UoF name	Use case				
	1	2	3	4	5
CDM UoF Product Design Configuration	X				
CDM UoF Remark	X	X	X	X	X
S5000F UoF Actual Serialized Product Variant Configuration	X	X			
S5000F UoF Change Embodiment Planning			X		X
S5000F UoF Change Embodiment Strategy					X
S5000F UoF Comment	X	X	X	X	X

UoF name	Use case				
	1	2	3	4	5
S5000F UoF Comment Items	X	X	X	X	X
S5000F UoF Equipment			X		
S5000F UoF Fleet Planning and Product Assignment			X		
S5000F UoF Logbook Entry		X	X	X	
S5000F UoF Maintenance Activity		X			
S5000F UoF Obsolescence Management Candidates		X			
S5000F UoF PartAsRealized	X				
S5000F UoF Reportable Activity				X	
S5000F UoF Reporting				X	
S5000F UoF Requirement		X	X		
S5000F UoF Serialized Product Operational Period		X			
S5000F UoF Shop Findings				X	
S5000F UoF Warehouse and Spare Pool		X	X	X	

2.9 UoFs for integrated fleet management use cases

The UoFs required for the different integrated fleet management use cases, as defined in Chap 11, are those listed in Table 10. In order to avoid having to cross-check the use case numbers, a summary of each use case is provided below:

1 Assignment Proposal Elaboration

2 Fleet task cancellation

3 Fleet task modification

4 Fleet availability plan elaboration

5 Fleet Task Evaluation

6 Product preparation for fleet task

7 Product Recovery after fleet task

Table 10 UoFs for integrated fleet management use cases

UoF name	Use case						
	1	2	3	4	5	6	7
CDM UoF Remark	X	X	X	X	X	X	X

UoF name	Use case						
	1	2	3	4	5	6	7
S5000F UoF Actual Serialized Product Variant Configuration	X					X	X
S5000F UoF Comment	X	X	X	X	X	X	X
S5000F UoF Comment Items	X	X	X	X	X	X	X
S5000F UoF Document		X					
S5000F UoF Document Assignment Items		X					
S5000F UoF Fleet Monitoring	X		X		X		X
S5000F UoF Fleet Planning and Product Assignment	X	X	X	X	X	X	X
S5000F UoF Fleet Task cancellation		X					
S5000F UoF Location, Address and Locator	X						
S5000F UoF Logbook Entry					X		
S5000F UoF Operating Base	X		X	X	X	X	X
S5000F UoF Operational Environment						X	
S5000F UoF Operational Event							X
S5000F UoF Operational Roles	X					X	X
S5000F UoF Policies and Regulations				X			
S5000F UoF Product and Fleet Availability	X			X	X		
S5000F UoF Product Defined Operational Configuration	X						
S5000F UoF Service Level Agreement Clause	X				X		

2.10 UoFs for configuration management use cases

The UoFs required for the different configuration management use cases, as defined in Chap 12, are those listed in Table 11. In order to avoid having to cross-check the use case numbers, a summary of each use case is provided below:

1 Provide as-delivered configuration

2 Provide as-allowed configuration

3 Provide operational configuration

4 Provide customer modification

5 Provide as-desired configuration

Table 11 UoFs for configuration management use cases

UoF name	Use case				
	1	2	3	4	5
CDM UoF Applicability Statement	X	X	X	X	X
CDM UoF Breakdown Structure	X	X			
CDM UoF Change Information	X			X	
CDM UoF Hardware Element	X	X		X	
CDM UoF Part Definition	X	X		X	
CDM UoF Product Design Configuration	X	X			
CDM UoF Remark	X	X	X	X	X
S5000F UoF Actual Serialized Product Variant Configuration	X		X		
S5000F UoF Applicability Assignment Item	X	X	X	X	X
S5000F UoF As-desired Configuration					X
S5000F UoF Change Embodiment				X	
S5000F UoF Comment	X	X	X	X	X
S5000F UoF Comment Items	X	X	X	X	X
S5000F UoF Logbook Entry	X		X		
S5000F UoF Operational Roles			X		
S5000F UoF PartAsRealized	X		X	X	
S5000F UoF Product Allowed Configuration		X			
S5000F UoF Product Defined Operational Configuration			X		

2.11 UoFs for management of in-service contracts use cases

The UoFs required for the different management of in-service contracts use cases, as defined in Chap 13, are those listed in Table 12. In order to avoid having to cross-check the use case numbers, a summary of each use case is provided below:

1 Provide contractual information

2 Provide Work Breakdown Structure (WBS)

3 Provide Cost Breakdown Structure (CBS)

4 Provide Organisational Breakdown Structure (OBS)

5 Provide/update activity planning

6 Report Service Level Agreement (SLA) compliance

7 Provide contract incurred costs

8 Provide status report

9 Provide information about locations and infrastructure

10 Manage service request

11 Request/grant/deny usage of resource

12 Assign security classification

Table 12 UoFs for in-service contract management use cases

UoF name	Use case											
	1	2	3	4	5	6	7	8	9	10	11	12
CDM UoF Remark	X	X	X	X	X	X	X	X	X	X	X	X
S5000F UoF Comment	X	X	X	X	X	X	X	X	X	X	X	X
S5000F UoF Comment Items	X	X	X	X	X	X	X	X	X	X	X	X
S5000F UoF Contract Breakdown	X	X	X				X	X				
S5000F UoF Cost Entry							X					
S5000F UoF Document	X	X	X	X			X	X	X	X		
S5000F UoF Document Assignment Items	X	X	X	X			X	X	X	X		
S5000F UoF Facility	X								X			
S5000F UoF Location, Address and Locator									X			
S5000F UoF Organizational Breakdown Structure					X							
S5000F UoF Party				X								
S5000F UoF Policies and Regulations	X					X				X		
S5000F UoF Project and Contract	X	X	X	X								
S5000F UoF Reportable Activity					X		X					
S5000F UoF Reporting	X				X	X	X	X				
S5000F UoF Resource Usage Request											X	
S5000F UoF Security Classification												X
S5000F UoF Service Contract Management	X					X						
S5000F UoF Service Level Agreement Clause	X					X						
S5000F UoF Service Request										X		

2.12 UoFs for non-predefined information use cases

The UoFs required for the different non-predefined information use cases, as defined in Chap 14, are those listed in Table 13. In order to avoid having to cross-check the use case numbers, a summary of each use case is provided below:

1 Provide project-specific values

2 Provide non-predefined information

Table 13 UoFs for non-predefined information use cases

UoF name	Use case	
	1	2
CDM UoF Remark	X	X
S5000F UoF AttributeTypeSelect	X	
S5000F UoF Comment	X	X
S5000F UoF Comment Items	X	X
S5000F UoF Project-Specific Class Attributes	X	
S5000F UoF Technical Data Package (TDP) Message		X

Chapter 16

Data exchange

Table of contents

List of tables

List of figures

References

Table 1 References

Chap No./Document No.	Title
Chap 15	Data Model
Chap 18	Tailoring and contracting against S5000F
Chap 19	Data required for the different use cases
ISO 8000	Data Quality
ISO 10303-239 (AP239)	Product Life-Cycle Services (PLCS)
SX000i	International guide for the use of the S-Series Integrated Logistics Support (ILS) specifications
SX002D	Common data model for the S-Series ILS Specifications

SX003X

Compatibility matrix for the S-Series Integrated Logistics Support (ILS) specifications

1 General

1.1 Introduction

The purpose for this chapter is to define a coherent set of guidelines for the implementation of the data exchange required for the operational and maintenance data feedback. The exchange of data for S5000F, issue 1.0, is defined using XML and XML Schemas.

The S5000F XML Schemas use the XML Schemas defined for the [SX002D] Common Data Model, so as to ensure the interoperability with the other S-Series of ILS Specifications. For the potential interoperability restrictions with other specifications, please refer to [SX003X].

The S5000F XML Schemas will be published separately on the S5000F website (http://www.s5000f.org).

1.2 Objective

The objective for this chapter is to describe how the S5000F SML schemas support the S5000F feedback and its interaction with other business processes.

1.3 Scope

The scope of the data exchange includes all mechanisms related to the operational and maintenance data feedback outlined in this specification, including:

- Overview of S5000F data exchange using S5000F XML Schemas
- Overview of the defined S5000F SML Schemas
- Relationship between the S5000F XML Schemas and ISO 10303-239
- Recommendations regarding an in-service data repository
- Recommendations regarding data quality

1.4 Out of scope

The data exchange does not cover potential the processing or cleansing of exchanged information.

1.5 Interoperability

This data exchange has considered for its development both the existing S5000F data model and the Common Data Model (CDM) that has been developed across all S-Series specifications, so as to ensure the interoperability of S5000F with the other S-Series specifications. The CDM has been published as [SX002D].

This data exchange has also considered global policies as defined by the AIA/ASD Data Modelling and Exchange Working Group (DMEWG), so as to ensure the interoperability with the exchange of data with other S-Series specifications. For details of how such interoperability will be achieved, please refer to [SX000i] ILS Guide.

2 Data exchange

Data exchange of S5000F data is performed by means of XML messages. The basic messages are defined in [SX002D] and replicated here in UoF Message. A message is a collection of information to be communicated from one party to another. Messages can provide new

information (creation), modify existing information (update) or require deletion of existing information.

S5000F currently does not mandate the content of a specific message. It can be the information associated to a single class, or to multiple classes. Typically, information sets to be exchanged in one or multiple messages will include the information associated to one single use case. Information shared by multiple use cases should be sent as a separate message.

The messages to be sent, as well as their frequency and the business rules to which they should comply, must be defined during the guidance conference, as detailed in Chap 18.

It must be highlighted that the in-service feedback is not unidirectional (e.g., from the operator to the OEM) but rather multi-directional, in the sense that different roles can be taken by Customer and Contractor in different contracts, and thus the data flows might change. The data formats remain the same, but the actors who provide and receive data might change due to contractual arrangements. The responsibilities of who provides which information must be also defined as detailed in Chap 18.

Data exchanged should be logged, so as to provide traceability of the exchange. The data itself should be stored in an in-service data repository, as described in Para 6.

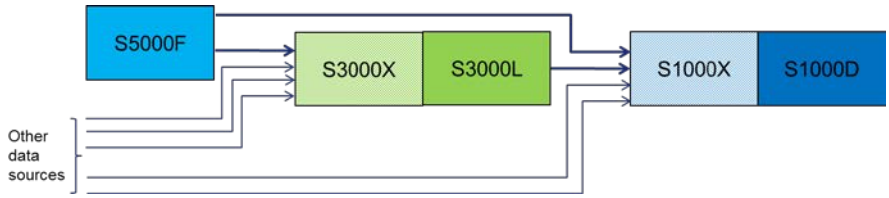
3 Feedback to other S-Series ILS specifications

S5000F does not provide a direct set of information for all other specifications. Though sharing the same common data model, some conversion might be required to actually feed the S5000F feedback for the use of the individual specifications. Thus, data might be converted, filtered according to certain criteria or aggregated for their use. For example, failure data might require both filtering and aggregation so as to calculate the resulting in-service MTBF.

Such conversion/filtering/aggregation will be performed as defined in the corresponding input specification of the “consumer” specification. For example, [S3000X] will define how S5000F data will be used by [S3000L] for an in-service LSA.

Note that the individual specifications will receive only the information that is specific for them. Feedback that is common to several specifications will follow the process as defined in [SX000i], typically through [S3000L].

Fig 1 shows the example flow for both [S3000L] and [S1000D].



ICN-B6865-5000F1601-001-00

Fig 1 Feedback to other S-Series ILS specifications

4 S5000F XML Schemas

The S5000F XML Schemas are derived from the S5000F data model defined in Chap 15. The method of mapping the S5000F data model to the S5000F XML Schemas is performed in accordance with the XML Schema Authoring Rules defined by the DMEW (Data Model and Exchange Working Group), which is common to all S-Series ILS specifications.

An added feature for the exchange of in-service data feedback data using the XML Schemas of S5000F, issue 1.0 is the option to only exchange updates. Update messages can be sent in between complete (baseline) messages and can accommodate both minor and major changes to the in-service data.

This means that the receiver of in-service data does not need to analyze what actions need to be taken so as to update the target data set (eg. In-service database).

The XML Schema used for complete (baseline) messages enforces all the rules defined in the S5000F data model in order to guarantee consistency in the exchanged data set.

The XML schemas of S5000F, issue 1.0, support all the UoFs defined in Chap 15 and all Use Cases defined throughout the whole specification.

5 Product Life Cycle Support (PLCS)

The S5000F XML Schemas will provide mappings to ISO 10303-239 PLCS (Product Life Cycle Support) edition 2, in order to support continued use of ISO 10303-239 PLCS and enable mapping of the feedback data to design information through the internal product life-cycle management (PLM) systems. These mappings will be an integral part of the respective S5000F XML schemas.

Thus, organizations wishing to use PLCS instead of the defined XML schemas, will have the possibility to implement S5000F using of ISO 10303-239 edition 2.

The rationale for introducing the S5000F XML Schemas as the basis for supporting S5000F data exchanges is to allow for organizations that do not have the required PLCS skills (mainly small and medium enterprises) to still support the S5000F specified data exchanges.

In awaiting ISO 10303-239 PLCS edition 3 and its associated data exchange development environment, all future S-Series ILS specifications will follow the same XML Schema approach as described for S5000F. Fig. 2 illustrates how the S-Series ILS specification XML Schemas are to be viewed in general in respect of ISO 10303-239 PLCS and OASIS PLCS PSM. Note that the mapping to OASIS PSM is not envisaged, but might be handled by other organizations.

The S-Series ILS Specifications XML Schemas are targeted to support data exchange at the Business Object Model (BOM) layer. However, each XML Schema will also include the mapping details required for an unambiguous mapping of each element and attribute to PLCS in order to enable PLCS-based data exchanges and/or PLCS-based data consolidation, as well as the future integration with other ISO 10303 (STEP) based data (eg, AP233, AP242).

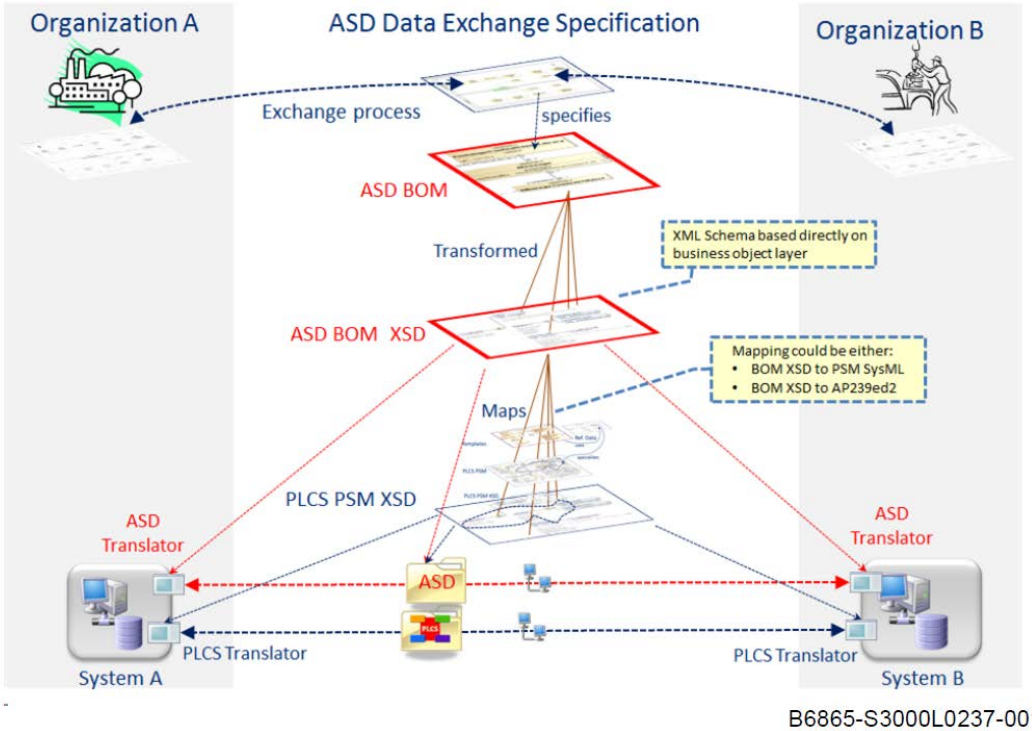


Fig 2 ASD XML Schema to PLCS implementation mapping

This approach has been approved by the AIA/ASD ILS Specification Council for all S-series of ILS specifications.

6 In-Service information database

It is highly recommended to store all the information provided as part of the operational and maintenance feedback into a common repository. The data model of this specification has been designed in such a way that all data can be integrated into a single database, including project-specific information.

It is recommended that such in-service feedback data is maintained separately from other logistic databases. There are multiple reasons for this architecture:

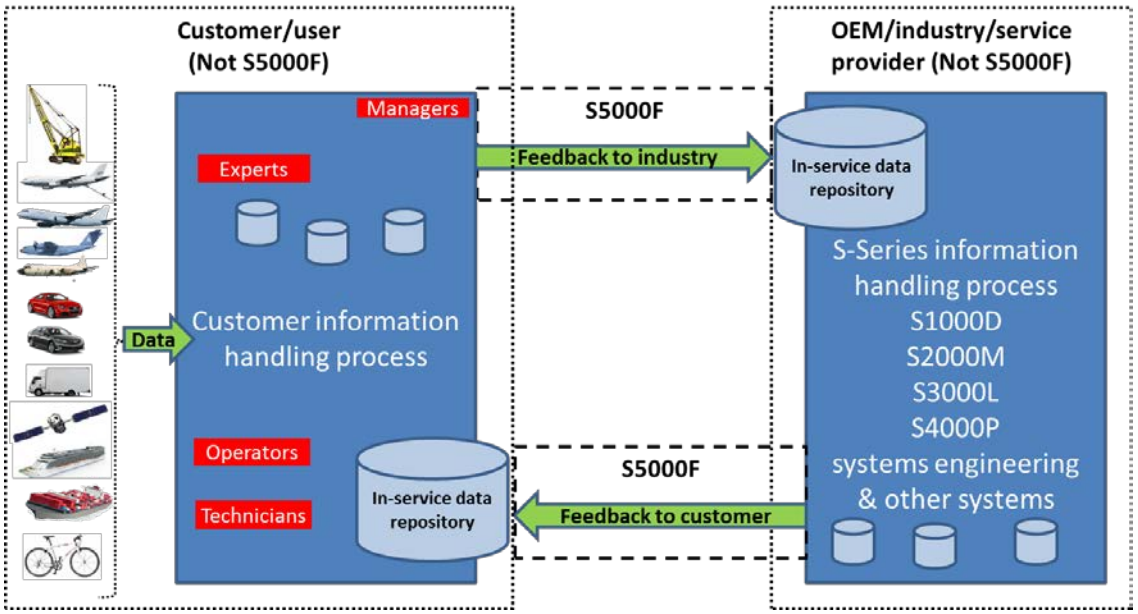
1 The data received are likely to be received from multiple actors (multiple OEMs or multiple customers/operators) and might require harmonization.

2 The data received will have different levels of quality and might require filtering and/or validation before it is useable.

3 The mapping of the received data can perhaps not always be mapped directly to other ILS databases (such as the S3000L database), either because such databases do not exist at the other actor or because the actor at the other side of the exchange does not maintain the cross-referencing between the different logistic elements.

4 Each actor will have a different IT infrastructure and different applications. It is therefore advisable to have a common reference data set for all applications using in-service feedback data.

5 A same in-service database at both sides of the communication channel allows for proper synchronization of data, better data integration and improved data quality, easy clarification of doubts, and it also dissociates individual actor's IT systems and the way that the information is distributed inside an organization from the actual exchange.



ICN-B6865-5000F1602-001-00

Fig 3 Outline of data exchange and in-service databases

It is recommended that the data exchange is performed from/to the in-service repositories, so as to ensure the consistency of the information. Such in-service repositories would integrate the information from different IT systems and would distribute the information to other internal IT systems, ensuring the consistency of the information sent and received.

Note that this does NOT imply that the repositories on both sides of the exchange should contain the same information, nor even have the same database structure. Indeed, the information contained at both sides of the exchange will be different, as the operator/customer will store the in-service information for different products and the OEM/industry will store the information for different customers. The importance of these in-service repositories is to have a “single version of the truth” at each side, rather than trying to reconcile multiple systems across multiple organizations. While it is possible to have a specific in-service repository that is exactly the same at both sides of the exchange, this would imply higher costs and increase systems integration complexity, as repositories would be created for each different program and/or customer.

An important benefit of a single in-service database at the customer/user side is that all operational and maintenance data associated to its product fleet is stored in one single repository, therefore allowing to control the performance across multiple products from different vendors and assessing improvement measures.

On the OEM/industry side the obvious benefit of a single in-service database is to have the data from multiple customers in one single repository, therefore having a statistically significant corpus of information for statistical analysis (e.g., reliability purposes) even if the number of products purchased by individual customers is not statistically significant. It also allows comparing customer information, so as to identify potential issues at one particular customer if their data strongly deviates from the general pattern.

An additional key benefit to all users of an integrated in-service database is that it provides a coherent repository of information that is unlikely to be achieved by integrating a set on heterogeneous in-service tools (usually at a great expense).

Note that the establishment/usage of an integrated in-service information database does not imply the usage of a single tool for the in-service activities, neither at customer/user nor OEM/industry level. The integrated in-service information database is a consolidated repository

of information, which may be created by the aggregation of information from different tools. Similarly, multiple tools can access this repository for the capture of in-service data, without the need to design ad-hoc interfaces with other related tools. The process of aggregating data into this integrated in-service information database exceeds the scope of this specification.

An in-service information repository can be created using the Data Model specified in Chap 15 of this specification.

7 Data quality

It is a fact that in-service operational and maintenance data feedback is most of the time dirty and cannot be usually used “as is” without some processing. The fact that this specification provides the means to transfer the data in a standard way will however not solve the issue that the data may require cleansing before it can be used, no matter how strict the adherence to this specification is.

This dirtiness (inadequacy of the data) is due basically to four main reasons:

- **It is incomplete**: It lacks attribute values, lacks certain attributes of interest or contains only aggregated data.
  Example: Missing country name.

  Incomplete data usually is due to the following factors:

  – Data values were not available when collected
  – Different criteria were used between the time when data was collected and when it was analyzed
  – Legacy systems did not include the necessary information, or collected it in a way that could not be properly transformed to be fed back in accordance with this specification
  – Human/Hardware/Software problems

- **It is noisy:** The information contains errors or outliers (Spelling, phonetic and typing errors, word transpositions, multiple values in a single free-form field).
  Examples:

  – Age=-10
  – Name=”Jones”, LastName=”Mike”
  – ManufacturingDate=”31/12/9999”

  Noisy data usually is due to the following factors:

  – Data collection by faulty instruments
  – Data entry: human or computer errors
  – Data transmission problems

- **It is inconsistent:** The information contains discrepancies in codes and names (synonyms and nicknames, prefix and suffix variations, abbreviations, truncation, and initials).
  Examples:

  – Age = “42”, Birthday=”03/12/2012”
  – Part number 203 Name=”CAMU HW” and “CAMU H/W”
  – Was rating “1,2,3”, now rating is “A,B,C”

  Inconsistent (and redundant) data is usually due to:

  – Different data sources, so non-uniform naming conventions / data codes
  – Different data models across legacy applications

  - Functional dependency and/or referential integrity violation in source systems
  - Inadequate data conversion to the S5000F format.

- **It is out of context**: Some information may be meaningless and/or be misinterpreted if it is not supplied within a specific context.
  Examples:

  - Date and time without a time zone reference can be misinterpreted.
  - Product data without customer or contract reference cannot be processed.

  Out of context data is usually due to an incomplete definition of the required data.

The greatest impact of data quality is found in the collection and preparation of the raw data. Data quality controls should be established so as to ensure that the data that is collected and that is prepared for exchange is both complete and accurate. The later such quality controls are introduced in the process, the higher the impact of such lack of data quality will be.

It should be stressed that the usage of this specification does **not** guarantee the adequacy or quality of the data, only that it is provided in a specific format and –for certain data– within specific ranges. Thus, the usage of this specification should be accompanied by a set of business rules that would provide the means to validate the received data. An example of a business rule could be that the date of a maintenance task cannot take place before the product delivery (or at least product manufacturing) date. These business rules can be used not only for validation of received data, but also for checking data quality during the collection of such data, or at least before it is provided as feedback. Refer to Chap 18 on how to agree for the establishment of such business rules.

The application of a data quality process standard such as the ISO 8000 is also recommended so as to enhance the quality of both the prepared and the exchanged data.

The cleansing of received data is usually performed as part of a process called *staging*, where received data is validated in accordance with business rules, supplemented with additional information if required, and then stored in the in-service database, where it is also cross-referenced to other ILS elements. The description of how such cleansing and cross-referencing should be performed is outside of the scope of this specification. It is however recommended that a record is kept of what the cleansing entailed, so as to have full traceability of potential data transformations.

Similarly, it should be kept in mind that data exchange is always performed for a specific *purpose*. The incompleteness of such data, or the fact that it is out of context, may prevent such purpose to be fulfilled. Chap 19 provides a mapping of the use cases of this specification to the classes and data elements that these use cases require. It is strongly recommended to use this mapping so as to ensure that data being exchanged is always complete and within context so as to be able to comply with a specific business scenario.

Notwithstanding the data quality checks highlighted in this Para, which are usually carried out at the data receiving party, it should be stressed that the responsibility for providing quality data always lies on the party providing such data, and that these checks should be performed before the data is exchanged. It is however recommended that a data quality group is established by both parties, so that data quality issues can be properly reported and appropriate measures are taken by the party generating the data to correct any data quality issues.

Chapter 17

Data element list

Table of contents

List of tables

References

Table 1 References

Chap No./Document No.	Title
SX001G	Glossary for the S-Series ILS specifications
SX002D	Common data model for the S-Series ILS specifications
Chap 15	Data model
Chap 16	Data exchange

1 General

This chapter defines all the data elements that are used as attributes in the S5000F data model, refer to Chap 15.

The data element list in Table 2 is organized alphabetically by the data element name, and contains:

- Data element name
- Data element data type (refer to Chap 15 on more details on data types used in S5000F)
- Data element definition contains a textual definition and a list of valid values
- Class/interface name, identifies Classes/interfaces in the S5000F data model where the data element is used as an attribute (Chap 15).
- Unit of Functionality (UoF), identifies the section in Chap 15 where the Class is defined. If the UoF name is preceded by “CDM”, then the UoF is defined in [SX002D].

For completeness, the data elements of the UoFs used “as is” from [SX002D] are also listed in this specification, The UoFs from [SX002D] used by this specification are listed in Chap 15.3.

A mapping of the classes and attributes required for the individual use cases can be found in Chap 19.

2 Data element list

The full list of S5000F data elements is provided in Table 2. This includes data elements from [SX002D] used by S5000F but defined in [SX001G].

Table 2 Data Elements list

Data element	Type	Definition	Class/interface	UoF
actionCloseDate	DateType	actionCloseDate is the date at which the action was closed.	Action	S5000F UoF Event
actionCreationDate	DateRange	actionCreationDate is the date at which the action is created.	Action	S5000F UoF Event
actionDescription	DescriptorType	actionDescription is a textual description of a taken action.	Action	S5000F UoF Event
actionIdentifier	IdentifierType	actionIdentifier is a string of characters used to uniquely identify an Action and to differentiate it from other Actions.	Action	S5000F UoF Event
actionScheduledDate	DateType	actionScheduledDate is the date for which the action is scheduled.	Action	S5000F UoF Event
actionType	ClassificationType	actionType is a classification that characterizes an Action.	Action	S5000F UoF Event
addressEMail	TextPropertyType	addressEMail is a text indicating an e-mail associated to an address.	Address	S5000F UoF Location, Address and Locator
addressFaxNumber	TextPropertyType	addressFaxNumber is a text indicating the fax number associated to an address.	Address	S5000F UoF Location, Address and Locator
addressIdentifier	IdentifierType	addressIdentifier is a unique string of characters that is used to uniquely identify an Address and to differentiate it from other Addresses.	Address	S5000F UoF Location, Address and Locator

Data element	Type	Definition	Class/interface	UoF
addressPostalBox	TextPropertyType	addressPostalBox is a text that indicates the identification of a Postal Box that is used as an address.	Address	S5000F UoF Location, Address and Locator
addressPostalCode	TextPropertyType	addressPostalCode is a text that indicates the Postal Code of an address.	Address	S5000F UoF Location, Address and Locator
addressStreet	TextPropertyType	addressStreet is a text indicating the name of the street in an address.	Address	S5000F UoF Location, Address and Locator
addressStreetNumber	TextPropertyType	addressStreetNumber is a text indicating the street number of an address.	Address	S5000F UoF Location, Address and Locator
addressTelephoneNumber	TextPropertyType	addressTelephoneNumber is a text indicating the telephone number associated to an address.	Address	S5000F UoF Location, Address and Locator
addressTelexNumber	TextPropertyType	addressTelexNumber is a text indicating the telex number associated to an address.	Address	S5000F UoF Location, Address and Locator
addressURL	TextPropertyType	addressURL is a text indicating an URL associated to an address.	Address	S5000F UoF Location, Address and Locator
batchPartIdentifier	IdentifierType	batchPartIdentifier is a string of characters that uniquely identifies the manufacturing batch of a part and allows to differentiate it from parts belonging to other manufacturing batches.	NonSerializedHardwarePart	S5000F UoF PartAsRealized
belongsToFleetDuring	DateRange	belongsToFleetDuring is a range of dates that indicate the period of time during which a SerializedProductVariant belongs to a specific fleet.	SerializedProductVariantInFleet	S5000F UoF Operational Environment
breakdownElementEssentiality	ClassificationType	breakdownElementEssentiality is a classification that identifies the operational impact of the BreakdownElement at	BreakdownElement	CDM UoF Breakdown Structure

Data element	Type	Definition	Class/interface	UoF
		the product level. </Definition> <Notes> <Note>Based on the criticality as defined during the FMECA.		
breakdownElementIdentifier	IdentifierType	breakdownElementIdentifier is a string of characters used to uniquely identify a BreakdownElement and to differentiate it from other BreakdownElements.	BreakdownElement	CDM UoF Breakdown Structure
breakdownElementName	DescriptorType	breakdownElementName is a word or phrase by which the breakdown element is known and can be easily referenced.	BreakdownElement	CDM UoF Breakdown Structure
breakdownElementRevisionIdentifier	IdentifierType	breakdownElementRevisionIdentifier is a string of characters used to uniquely identify a BreakdownElementRevision and to differentiate it from other BreakdownElementRevisions.	BreakdownElement Revision	CDM UoF Breakdown Structure
breakdownElementRevisionStatus	ClassificationType	breakdownElementRevisionStatus is a classification that identifies the maturity of a BreakdownElementRevision.	BreakdownElement Revision	CDM UoF Breakdown Structure
budgetApprovedDate	DateType	budgetApprovedDate is the date at which a Budget was approved.	Budget	S5000F UoF Contract Breakdown
budgetApprovedStatus	StateType	budgetApprovedStatus is the state at which a Budget proposal is.	Budget	S5000F UoF Contract Breakdown
budgetDate	DateType	budgetDateTime is the date at which the budget was released.	Budget	S5000F UoF Contract Breakdown
budgetDescription	DescriptorType	budgetDescription is a textual narrative explaining the Budget.	Budget	S5000F UoF Contract Breakdown

Data element	Type	Definition	Class/interface	UoF
budgetIdentifier	IdentifierType	budgetIdentifier is a string of text that uniquely identifies the Budget and allows to differentiate it from other Budgets.	Budget	S5000F UoF Contract Breakdown
budgetName	DescriptorType	budgetName is a is a word or phrase by which the budget is commonly known.	Budget	S5000F UoF Contract Breakdown
budgetValidUntilDate	DateType	budgetValidUntilDate is a date until which the budget is valid.	Budget	S5000F UoF Contract Breakdown
cargoItemDescription	DescriptorType	cargoItemDescription is a narrative statement explaining the CargoItem.	CargoItem	S5000F UoF Fleet Planning and Vehicle Assignment
cargoItemIdentifier	IdentifierType	cargoItemIdentifier is a string of text that allows to uniquely identify a CargoItem and differentiate it from other CargoItems.	CargoItem	S5000F UoF Fleet Planning and Vehicle Assignment
cargoItemName	TextPropertyType	cargoItemName is a text by which a CargoItem is commonly known.	CargoItem	S5000F UoF Fleet Planning and Vehicle Assignment
cargoItemUnitaryDimensions	3DDimension	cargoItemUnitaryDimensions represents the dimensions (length, width and height) or each individual unit that forms part of the CargoItem.	CargoItem	S5000F UoF Fleet Planning and Vehicle Assignment
cargoItemUnitaryWeight	NumericalPropertyType	cargoItemUnitaryWeight represents the weight of each individual unit that forms the CargoItem.	CargoItem	S5000F UoF Fleet Planning and Vehicle Assignment
cargoItemUnits	int	cargoItemUnits is an integer that represents the number of units of a same type that a CargoItem represents.	CargoItem	S5000F UoF Fleet Planning and Vehicle Assignment
codePropertyAssignment	ClassificationType	codePropertyAssignment is a classification that allows to separate assigned codes by the specification where these have been defined.	CodeProperty	S5000F Compound Attributes

Data element	Type	Definition	Class/interface	UoF
codePropertyDescription	DescriptorType	codePropertyDescription is a narrative statement explaining the meaning of a code.	CodeProperty	S5000F Compound Attributes
codePropertyValue	TextPropertyType	codePropertyValue is a text indicating a code defined by a specific specification.	CodeProperty	S5000F Compound Attributes
commentDate	DateType	commentDate is the date at which a comment was raised.	Comment	S5000F UoF Comment
commentIdentifier	IdentifierType	commentIdentifier is a string of characters that is used to uniquely identify a Comment and to differentiate it from other Comments.	Comment	S5000F UoF Comment
commentPartyRole	ClassificationType	commentPartyRole is a classification that indicates the role of a specific Party in a specific Comment.	CommentParty	S5000F UoF Comment
commentPriority	ClassificationType	commentPriority is a classification that allows to define the importance of a comment and the need for an urgent response.	Comment	S5000F UoF Comment
commentRelationshipType	ClassificationType	commentRelationshipType is a classification that allows to identify the relationship between two comments.	CommentRelationship	S5000F UoF Comment
commentStatus	ClassificationType	commentStatus is a classification that allows to determine whether a comment has been responded to.	Comment	S5000F UoF Comment
commentText	DescriptorType	commentText is a text describing the comment.	Comment	S5000F UoF Comment
commentTitle	DescriptorType	commentTitle is a textual description that summarizes the comment.	Comment	S5000F UoF Comment

Data element	Type	Definition	Class/interface	UoF
commentType	ClassificationType	commentType is a classification that allows the grouping of similar comments.	Comment	S5000F UoF Comment
conditionInstanceDescription	DescriptorType	conditionInstanceDescription is a narrative statement of the meaning of the ConditionInstance.	ConditionInstance	CDM UoF Applicability Statement
conditionInstanceIdentifier	IdentifierType	conditionInstanceIdentifier id s dtring of characters that is used to uniquely identify a ConditionInstance and to differentiate it from other ConditionInstances.	ConditionInstance	CDM UoF Applicability Statement
conditionInstanceName	DescriptorType	conditionInstanceName is a word or phrase by which the ConditionInstance is known and can be easily referenced.	ConditionInstance	CDM UoF Applicability Statement
conditionTypeClassValue	ClassificationType	conditionTypeClassValue is a classification that is valid for a specific Condition Type.	ConditionTypeClassValue	CDM UoF Applicability Statement
conditionTypeDescription	DescriptorType	conditionTypeDescription is a narrative statement of the meaning of the ConditionType.	ConditionType	CDM UoF Applicability Statement
conditionTypeName	ClassificationType	conditionTypeName is a word or phrase by which the ConditionType is known and can be easily referenced.	ConditionType	CDM UoF Applicability Statement
conditionTypePropertyValue	PropertyType	conditionTypePropertyValue is a property that is valid for a specific Conition Type.	ConditionTypePropertyValue	CDM UoF Applicability Statement
consequenceDescription	DescriptorType	consequenceDescription is a a textual narrative statement explaining the consequence of an Event.	Consequence	S5000F UoF Event
consequenceType	ClassificationType	consequenceType is a classificationthat allows to group Consequences.	Consequence	S5000F UoF Event

Data element	Type	Definition	Class/interface	UoF
consumableItemDescription	DescriptorType	consumableItemDescription is a narrative statement explaining the ConsumableItem.	ConsumableItem	S5000F UoF Maintenance Activity
consumableItemIdentifier	IdentifierType	consumableItemItentifier is a string of text that uniquely identifies a ConsumableItem and differentiates it from other ConsumableItems.	ConsumableItem	S5000F UoF Maintenance Activity
consumableItemName	TextPropertyType	consumableItemName is a text by which the ConsumableItem is commonly known.	ConsumableItem	S5000F UoF Maintenance Activity
consumableItemRiskDescription	DescriptorType	consumableItemDescription is a narrative statement explaining the risk factor of the ConsumableItem.	ConsumableItem	S5000F UoF Maintenance Activity
consumableItemRiskFactor	ClassificationType	The consumableItemRiskFactor is a classification that allows to define whether the ConsumableItem presents any safety issues or hazards.	ConsumableItem	S5000F UoF Maintenance Activity
consumableType	ClassificationType	consumableItemType is a classification that allows to group ConsumableItems of similar characteristics.	ConsumableItem	S5000F UoF Maintenance Activity
consumptionIdentifier	IdentifierType	consumptionIdentifier is a string that uniquely identifies a Consumption and differentiates it from other Consumptions.	Consumption	S5000F UoF Fleet Monitoring
consumptionValue	SingleValuePropertyType	consumptionValue is the amount of product that has been consumed during the associated operational period, movement or movement leg.	Consumption	S5000F UoF Fleet Monitoring
contractClauseDescription	DescriptorType	contractClauseDescription is a phrase stating the contract clause or summarizing the content of the contract clause.	ContractClause	S5000F UoF Contract Breakdown
contractClauseIdentifier	IdentifierType	contractClauseIdentifier is a string of characters that are unique to the ContractClause and is used to designate a	ContractClause	S5000F UoF Contract Breakdown

Data element	Type	Definition	Class/interface	UoF
		ContractClause and to differentiate it from other ContractClauses.		
contractClauseValidityPeriod	DateRange	contractClauseValidityPeriod is the period of time during which the ContractClause is in effect.	ContractClause	S5000F UoF Contract Breakdown
contractEffectivityDateTimes	TimeRange	contractEffectivityDateTimes is the range of time during which the Contract if effective.	Contract	S5000F UoF Project and Contract
contractName	DescriptorType	Contract name is a word or phrase by which the Contract is known and can be easily referenced.	Contract	S5000F UoF Project and Contract
contractPartyRole	ClassificationType	contractPartyRole is a classification that defines the type of relationship of a Party regarding a Contract.	ContractParty	S5000F UoF Project and Contract
contractRelationshipType	ClassificationType	contractRelationshipType is a classification that defines the type of relationship that is established between two Contracts.	ContractRelationship	S5000F UoF Project and Contract
contractSignatureDate	DateType	contractSignatureDate is the date at which the Contract was signed.	Contract	S5000F UoF Project and Contract
contractStatus	TimestampedState	contractStatus is a timestampedState that indicates the state of a Contract at a specific moment in time.	Contract	S5000F UoF Project and Contract
contractType	ClassificationType	contractType is a classification describing the Contract.	Contract	S5000F UoF Project and Contract
contractValue	SingleValuePropertyType	contractValue is the amount of money that the Contract is worth.	Contract	S5000F UoF Project and Contract
costBreakdownDescription	DescriptorType	costBreakdownDescription is a narrative statement explaining the CostBreakdown.	CostBreakdown	S5000F UoF Contract Breakdown

Data element	Type	Definition	Class/interface	UoF
costBreakdownIdentifier	IdentifierType	costBreakdownIdentifier is a string of text that uniquely identifies a CostBreakdown, allowing to differentiate it from all other CostBreakdowns.	CostBreakdown	S5000F UoF Contract Breakdown
costBreakdownName	DescriptorType	costBreakdownName is a word or phrase by which the CostBreakdown is commonly known.	CostBreakdown	S5000F UoF Contract Breakdown
costBreakdownRevisionIdentifier	IdentifierType	costBreakdownRevisionIdentifier is a string of characters that uniquely identifies a CostBreakdownRevision.	CostBreakdownRevision	S5000F UoF Contract Breakdown
costBreakdownRevisionStatus	ClassificationType	costBreakdownRevisionStatus is a state that defines the active status of a CostBreakdownRevision.	CostBreakdownRevision	S5000F UoF Contract Breakdown
costEntryDate	DateType	costEntryDate is the date at which the cost entry was made or incurred.	CostEntry	S5000F UoF Cost Entry
costEntryDescription	DescriptorType	costEntryDescription is a textual narrative statement explaining the nature of the CostEntry	CostEntry	S5000F UoF Cost Entry
costEntryIdentifier	IdentifierType	costEntryIdentifier is a string of characters used to uniquely identify a CostEntry and differentiate it from other CostEntries.	CostEntry	S5000F UoF Cost Entry
costEntryPeriod	DateRange	costEntryPeriod is the period of time during which the cost for this CostEntry was incurred.	CostEntry	S5000F UoF Cost Entry
costEntryType	ClassificationType	costEntryType is a classification used to differentiate between different kinds of costs incurred.	CostEntry	S5000F UoF Cost Entry
costEntryValue	SingleValuePropertyType	costEntryValue is the monetary value of the cost, including its currency.	CostEntry	S5000F UoF Cost Entry

Data element	Type	Definition	Class/interface	UoF
costItemDescription	DescriptorType	costItemDescription is a narrative statement explaining what the CostItem is.	CostItem	S5000F UoF Contract Breakdown
costItemIdentifier	IdentifierType	costItemIdentifier is a string of characters that is used to uniquely designate a CostItem and to differentiate it from other CostItems.	CostItem	S5000F UoF Contract Breakdown
costItemRelationshipType	ClassificationType	costItemRelationshipType is a classification that defines the relationship between two CostItems.	CostItemRelationship	S5000F UoF Contract Breakdown
countryCode	CodePropertyType	countryCode is a code of a specific type used to identify that country. (eg, ISO 3166-1 "ES" code to indicate "Spain")	Country	S5000F UoF Location, Address and Locator
changeAuthorizationIdentifier	IdentifierType	changeAuthorizationIdentifier is a string of characters that are unique to the issuing organization which is used to designate a change authorization and to differentiate it from other change authorizations.	ChangeAuthorization	S5000F UoF Change Embodiment
changeEffectDescription	DescriptorType	changeEffectDescription is a narrative statement providing a summary of effects made to the related items due to a ChangeAuthorization.	ChangeEffect	S5000F UoF Change Embodiment
changeEffectType	ClassificationType	changeEffectType is a classification which identifies a change effect as belonging to a group of change effects sharing a particular characteristic or set of characteristics.	ChangeEffect	S5000F UoF Change Embodiment
changeEmbodimentRequirementDate	DateType	changeEmbodimentRequirementDate is the date at which a required or mandatory change embodiment requirement must have been embodied.	ChangeEmbodimentRequirement	S5000F UoF Change Embodiment

Data element	Type	Definition	Class/interface	UoF
changeEmbodimentRequirementId	IdentifierType	changeEmbodimentRequirementId is a string of characters used to uniquely identify a ChangeEmbodimentRequirement.	ChangeEmbodimentRequirement	S5000F UoF Change Embodiment
changeEmbodimentRequirementType	ClassificationType	changeEmbodimentRequirementType is a classification that allows to group similar ChangeEmbodimentRequirements	ChangeEmbodimentRequirement	S5000F UoF Change Embodiment
changeRequestDescription	DescriptorType	changeRequestDescription is a phrase that gives more information on a desired product design change.	ChangeRequest	S5000F UoF Change Embodiment
changeRequestIdentifier	IdentifierType	changeRequestIdentifier is a string of characters that uniquely identifies a ChangeRequest and to differentiate it from other ChangeRequests.	ChangeRequest	S5000F UoF Change Embodiment
damageDescription	DescriptorType	damageDescription is a textual description of the damage.	Damage	S5000F UoF Event
damageEstimatedCost	ValueRangePropertyType	damageEstimatedCost is a range of possible costs associated to a specific damage.	Damage	S5000F UoF Event
damageFamily	ClassificationType	damageFamily is a classification that defines the type of damage.	Damage	S5000F UoF Event
damageIdentifier	IdentifierType	damageIdentifier is a string of characters used to uniquely identify a Damage.	Damage	S5000F UoF Event
damageStatus	DatedClassification	damageStatus is a classification that indicates the status of the damage at a specific moment in time.	Damage	S5000F UoF Event
dataModuleCode	IdentifierType	dataModuleCode is a string of characters used to uniquely identify an S1000DDataModule and to differentiate it from other S1000DDataModules.	S1000DDataModule	S5000F UoF Document

Data element	Type	Definition	Class/interface	UoF
		Note: A dataModuleCode must be created in accordance with the rules defined in S1000D.		
dataModuleInfoname	DescriptorType	dataModuleInfoName is a word or phrase by which the data module is known and can be easily referenced. Note: Equals S1000D element "Infoname".	S1000DDataModule	S5000F UoF Document
dateRangeEnd	DateType	dateRangeEnd is a Date at which a DateRange or period of time finishes.	DateRange	S5000F Compound Attributes
dateRangeStart	DateType	dateRangeStart is a Date at which a DateRange or period of time starts.	DateRange	S5000F Compound Attributes
detectionMeanCapabilityCapabilityType	ClassificationType	detectionMeanCapabilityCapabilityType is a <<classification>> that allows to group different DetectionMeanCapabilities based on their individual characteristics.	DetectionMeanCapability	S5000F UoF Failure Detection and Location
detectionMeanCapabilityDescription	DescriptorType	detectionMeanCapabilityDescription is a narrative statement that explains a DetectionMeanCapability.	DetectionMeanCapability	S5000F UoF Failure Detection and Location
detectionMeanCapabilityIdentifier	IdentifierType	detectionMeanCapabilityIdentifier is a string of text that uniquely identifies a DetectionMeanCapability and differentiates it from other DetectionMeanCapabilities.	DetectionMeanCapability	S5000F UoF Failure Detection and Location
detectionMechanismDescription	DescriptorType	detectionMechanismDescription is a textual narrative statement that explains a DetectionMechanism.	DetectionMechanism	S5000F UoF Failure Detection and Location
detectionMechanismFalseAlarmRate	PropertyType	detectionMechanismFalseAlarmRate is the frequency at which the DetectionMechanism is expected to raise a false alarm.	DetectionMechanism	S5000F UoF Failure Detection and Location

Data element	Type	Definition	Class/interface	UoF
detectionMechanismIdentifier	IdentifierType	detectionMechanismIdentifier is a string of text that uniquely identifies a DetectionMechanism and differentiates it from other DetectionMechanisms.	DetectionMechanism	S5000F UoF Failure Detection and Location
detectionMechanismPresentation	DescriptorType	detectionMechanismPresentation is a textual narrative statement that indicates how the FailureMechanism is brought to the attention of the user.	DetectionMechanism	S5000F UoF Failure Detection and Location
detectionMechanismType	ClassificationType	detectionMechanismType is a classification that allows to group similar DetectionMechanisms.	DetectionMechanism	S5000F UoF Failure Detection and Location
digitalFileContentClass	ClassificationType	digitalFileContentClass is a classification that allows to determine the content of the DigitalFile (eg, wiring, schematics, drawing).	DigitalFile	S5000F UoF Security Classification
digitalFileContentDescription	DescriptorType	digitalFileContentDescription is a narrative statement explaining the content of the DigitalFile (eg, crack on right wing).	DigitalFile	S5000F UoF Security Classification
digitalFileLocator	IdentifierType	digitalFileLocator is used to locate and access the file. Can be the actual file path and name or a URL/URI	DigitalFile	S5000F UoF Security Classification
digitalFileReferenceJustification	DescriptorType	digitalFileReferenceJustification is textual narrative explaining the reason why a DigitalFile sent with a Message is associated to a specific class.	DigitalFileReference	S5000F UoF Technical Data Package (TDP) Message
digitalFileType	ClassificationType	digitalFileType is a classification that allows to identify the format of the digital file (eg, JPG, MP3, PNG, PDF).	DigitalFile	S5000F UoF Security Classification
documentCreationDate	DateType	documentCreationDate is the date at which the document was published.	Document	S5000F UoF Document

Data element	Type	Definition	Class/interface	UoF
documentDescription	DescriptorType	documentDescription is a textual narrative statement that explains what the document is about.	Document	S5000F UoF Document
documentIdentifier	IdentifierType	documentIdentifier is a string of characters used to uniquely identify a Document.	Document	S5000F UoF Document
documentIssueDate	DateType	documentIssueDate is the date at which a specific DocumentIssue was released.	DocumentIssue	S5000F UoF Document
documentIssueIdentifier	IdentifierType	documentIssueIdentifier is a string of text that uniquely identifies a DocumentIssue and allows to differentiate it from other DocumentIssues.	DocumentIssue	S5000F UoF Document
documentIssueReason	ClassificationType	documentIssueReason is a <<classification>> that allows to group DocumentIssues bythe different causes for their release.	DocumentIssue	S5000F UoF Document
documentPartyRelationshipType	DatedClassification	documentPartyRelationshipType ia relationship identifying the type of association between a document and a Party at a specific date.	DocumentParty	S5000F UoF Document
documentRelationshipType	ClassificationType	documentRelationshipType is a classification describing the type of relationship between two documents.	DocumentRelationship	S5000F UoF Document
documentStatus	StateType	documentStatus is a state that indicates the status of the document.	Document	S5000F UoF Document
documentTitle	DescriptorType	documentTitle is a brief description that summarizes the content of a document.	Document	S5000F UoF Document

Data element	Type	Definition	Class/interface	UoF
documentType	ClassificationType	documentType is a classification that allows to differentiate between different types of documents.	Document	S5000F UoF Document
DownTimeId	IdentifierType	downTimeId is a string of text that uniquely identifies a DownTimePeriod and differentiates it from other DownTimePeriods.	DownTimePeriod	S5000F UoF Change Embodiment Planning
downTimePeriod	TimeRange	downTimePeriod is a period of time during which the SerializedProductVariant is or will be not available.	DownTimePeriod	S5000F UoF Change Embodiment Planning
downTimePeriodReason	ClassificationType	downTimePeriodReason is a narrative text providing information about the DownTimePeriod.	DownTimePeriod	S5000F UoF Change Embodiment Planning
downTimeStatus	ClassificationType	downTimeStatus is a classification allowing to determine the validity of a DownTime.	DownTimePeriod	S5000F UoF Change Embodiment Planning
effectivityPeriod	DateRange	effectivityPeriod is the period of time during which a SerializedHardwarePart has complied with a HardwarePartAsDesigned specification.	SerializedPartDesignAssociation	S5000F UoF PartAsRealized
envelopeAcknowledge	ClassificationType	envelopeAcknowledge is a classification that indicates whether a message Envelope requires acknowledgement by the receiver.	Envelope	S5000F UoF Technical Data Package (TDP) Message
envelopeIdentifier	IdentifierType	envelopeIdentifier is a string of text that uniquely identifies a message envelope, differentiating it from other Envelopes.	Envelope	S5000F UoF Technical Data Package (TDP) Message
environmentDescription	DescriptorType	environmentDescription is a textual description of an environment.	Environment	S5000F UoF Operational Environment

Data element	Type	Definition	Class/interface	UoF
environmentType	ClassificationType	environmentType is a classification that allows to group different Environments by their characteristics.	Environment	S5000F UoF Operational Environment
equipmentFaultDeferredToDate	DateType	equipmentFaultDeferred is the date that indicates when resolution of an EquipmentFault will be solved.	EquipmentFault	S5000F UoF Equipment
equipmentFaultDetectedDate	DateType	equipmentFaultDetectedDate is the date at which the EquipmentFault has been detected.	EquipmentFault	S5000F UoF Equipment
equipmentFaultFixedDate	DateType	equipmentFaultFixedDate is the date at which the EquipmentFault was fixed.	EquipmentFault	S5000F UoF Equipment
equipmentFaultIdentifier	IdentifierType	equipmentFaultIdentifier is a string of characters that is used to uniquely identify an EquipmentFault and to differentiate it from other EquipmentFaults.	EquipmentFault	S5000F UoF Equipment
equipmentFaultStatus	ClassificationType	equipmentFaultStatus is a classification that indicates whether an EquipmentFault has been resolved or not.	EquipmentFault	S5000F UoF Equipment
equipmentFaultSymptom	DescriptorType	equipmentFaultSymptom is a textual description of the symptoms that indicate the EquipmentFault.	EquipmentFault	S5000F UoF Equipment
equipmentOperatingPeriod	DateRange	equipmentOperatingPeriod is the period during which the equipment is operated by a specific Party.	EquipmentOperation	S5000F UoF Equipment
equipmentOwnershipPeriod	DateRange	equipmentOwnershipPeriod is the period during which the item was owned by a specific Party.	EquipmentOwner	S5000F UoF Equipment
equipmentStatusPeriod	TimeRange	equipmentStatusPeriod is the period during which the equipment had that specific status.	EquipmentStatus	S5000F UoF Equipment

Data element	Type	Definition	Class/interface	UoF
equipmentStatusReason	ClassificationType	equipmentStatusReason is a classification indicating the reason for which an equipment has been in that status during a specific period of time.	EquipmentStatus	S5000F UoF Equipment
equipmentStatusType	ClassificationType	equipmentStatusType is a classification that describes the status of the equipment.	EquipmentStatus	S5000F UoF Equipment
eventConfirmedStatus	DatedClassification	eventConfirmedStatus is a classification at a specific moment in time describing whether the event has or not been confirmed.	Event	S5000F UoF Event
eventDescription	DescriptorType	eventDescription is a narrative statement explaining an Event or the circumstances surrounding it.	Event	S5000F UoF Event
eventGroup	ClassificationType	eventGroup is a classification that is used to categorize the type of Event.	Event	S5000F UoF Event
eventIdentifier	IdentifierType	eventIdentifier is a string of characters that uniquely identifies an Event so as to differentiate it from other Events.	Event	S5000F UoF Event
eventOcurrenceDateTime	DateTimeType	eventOcurrenceDateTime is the date and time at which the Event occurred.	Event	S5000F UoF Event
eventRelationshipType	ClassificationType	eventRelationshipType is a classification that indicates the type of relationship between two different Events.	EventRelationship	S5000F UoF Event
eventSeverity	ClassificationType	eventOccurrenceDateTime is the date and time indicating the moment at which an Event occurred.	Event	S5000F UoF Event
explanatoryFactorDescription	DescriptorType	explanatoryFactorDescription is a textual explanation of the ExplanatoryFactor.	ExplanatoryFactor	S5000F UoF Event

Data element	Type	Definition	Class/interface	UoF
explanatoryFactorIdentifier	IdentifierType	explanatoryFactor is an unique identifier that allows to differentiate between one ExplanatoryFactor and another one.	ExplanatoryFactor	S5000F UoF Event
explanatoryFactorName	DescriptorType	explanatoryFactorName is a short textual description that allows to identify an explanatoryFactor.	ExplanatoryFactor	S5000F UoF Event
explanatoryFactorOrganization	Organization	explanatoryFactorOrganization is the Organization that has defined the ExplanatoryFactor.	ExplanatoryFactor	S5000F UoF Event
externalDocumentType	ClassificationType	externalDocumentType is a classification that allows to group ExternalDocuments of a similar nature.	ExternalDocument	S5000F UoF Document
facilityCleansiness	ClassificationType	facilityCleansiness is a classification that indicates the cleansiness that is required for the facility.	Facility	S5000F UoF Facility
facilityDescription	DescriptorType	facilityDescription is a textual explanation of what the facility is.	Facility	S5000F UoF Facility
facilityDimensions	3DDimension	facilityDimensions are the dimensions (length, width, height) of the Facility.	Facility	S5000F UoF Facility
facilityIdentifier	IdentifierType	facilityIdentifier is a string of characters that identifies a Facility and differentiates it from other Facilities.	Facility	S5000F UoF Facility
facilityName	DescriptorType	facilityName is a short text by which the Facility is known.	Facility	S5000F UoF Facility
facilityOperatorDuring	DateRange	facilityOperatorDuring is the period during which a certain Party operates a Facility.	FacilityOperator	S5000F UoF Facility

Data element	Type	Definition	Class/interface	UoF
facilityOwnedDuring	DateRange	facilityOwnedDuring is the period during which a facility is or has been owned by a specific Party.	FacilityOwner	S5000F UoF Facility
facilityOwnershipRatio	NumericalPropertyType	facilityOwnerRatio is the percentage of ownership that a Party has over the associated facility during the associated period.	FacilityOwner	S5000F UoF Facility
facilityRelationshipType	ClassificationType	facilityRelationshipType is a classification that describes the relationship between two facilities.	FacilityRelationship	S5000F UoF Facility
facilityType	ClassificationType	facilityType is a classification that allows to differentiate between different classes of facilities.	Facility	S5000F UoF Facility
failureCauseCode	ClassificationType	failureCauseCode is a classification that allows to group different failures.	FailureCause	S5000F UoF Failure Detection and Location
failureCauseDescription	DescriptorType	failureCauseDescription is a textual explanation that describes a failure.	FailureCause	S5000F UoF Failure Detection and Location
failureCauseIdentifier	IdentifierType	failureCauseIdentifier is a string of characters that identifies a Failure and allows to differentiate it from other Failures.	FailureCause	S5000F UoF Failure Detection and Location
failureDetectionRate	ClassificationType	failureDetectionRate is a classification that indicates the rate at which a failure can be detected.	FailureDetection	S5000F UoF Failure Detection and Location
failureModeDescription	DescriptorType	failureModeDescription is a textual explanation that describes the reason for a failure mode.	FailureMode	S5000F UoF Failure Detection and Location
failureModeEffectDescription	DescriptorType	failureModeEffectDescription is a narrative text explaining the eefect of a FailurMode.	FailureModeEffect	S5000F UoF Failure Detection and Location

Data element	Type	Definition	Class/interface	UoF
failureModeEffectIdentifier	IdentifierType	failureModeEffectIdentifier is a string that allows to uniquely identify a FailureModeEffect and differentiate it from othe FailureModeEffects.	FailureModeEffect	S5000F UoF Failure Detection and Location
failureModeIdentifier	IdentifierType	failureModeIdentifier is a string of characters that identifies a FailureMode and allows to differentiate it from other FailureModes.	FailureMode	S5000F UoF Failure Detection and Location
fleetAvaialbilityReportingDate	DateType	fleetAvailabilityReportingDate is the date at which the FleetAvailability was reported.	FleetAvailability	S5000F UoF Product and Fleet Availability
fleetAvailabilityPeriod	DateRange	fleetAvailabilityPeriod is the range of dates for which a FleetAvailability is reported.	FleetAvailability	S5000F UoF Product and Fleet Availability
fleetAvailabilityValue	SingleValuePropertyTyp e	fleetAvailabilityValue is the actual FleetAvailability value during a specific period of time.	FleetAvailability	S5000F UoF Product and Fleet Availability
fleetDescription	DescriptorType	fleetDescription is a narrative statement explaining the Fleet.	Fleet	S5000F UoF Fleet Planning and Vehicle Assignment
fleetIdentifier	IdentifierType	fleetIdentifier is a string of text that uniquely identifies a Fleet and differentiates it from other Fleets.	Fleet	S5000F UoF Fleet Planning and Vehicle Assignment
FleetPlanningDescription	DescriptorType	fleetPlanningDescription is a narrative statement explaining the FleetPlanning.	FleetPlanning	S5000F UoF Fleet Planning and Vehicle Assignment
fleetPlanningIdentifier	IdentifierType	fleetPlanningIdentifier is a string of text that uniquely identifies a FleetPlanning and allows to differentiate it from other FleetPlannings.	FleetPlanning	S5000F UoF Fleet Planning and Vehicle Assignment

Data element	Type	Definition	Class/interface	UoF
fleetPlanningPeriod	DateRange	fleetPlanningPeriod is a range of dates for which the FleetPlanning is being performed.	FleetPlanning	S5000F UoF Fleet Planning and Vehicle Assignment
fleetPlanningStatus	ClassificationType	fleetPlanningStatus is a classification that allows to define the validity of a FleetPlanning.	FleetPlanning	S5000F UoF Fleet Planning and Vehicle Assignment
fleetRequirementAvailability	SingleValuePropertyType	fleetRequirementAvailability is the availability that the fleet must have to comply with a specific FLeetRequirement.	FleetRequirement	S5000F UoF Fleet Planning and Vehicle Assignment
fleetRequirementDate	DateType	fleetRequirementDate is the date at which a FleetRequirement has been defined.	FleetRequirement	S5000F UoF Fleet Planning and Vehicle Assignment
fleetRequirementMinimumFleetSize	int	fleetRequirementMinimumFleetSize is the minimum number of vehicles that a fleet must contain so as to comply with the FleetRequirement.	FleetRequirement	S5000F UoF Fleet Planning and Vehicle Assignment
fleetRequirementPeriod	DateRange	fleetRequirementPeriod is the period of time during which a fleet must meet this requirement.	FleetRequirement	S5000F UoF Fleet Planning and Vehicle Assignment
fleetRequirementUsage	SingleValuePropertyType	fleetRequirementUsage reflects the planned usage of the fleet.	FleetRequirement	S5000F UoF Fleet Planning and Vehicle Assignment
fleetRequirementUsageLimitation	DescriptorType	fleetRequirementUsageLimitation is a narrative statement explaining potential limitations of usage of the fleet.	FleetRequirement	S5000F UoF Fleet Planning and Vehicle Assignment
fleetTaskDescription	DescriptorType	fleetTaskDescription is a narrative statement explaining the FleetTask.	FleetTask	S5000F UoF Fleet Planning and Vehicle Assignment
fleetTaskExpectedEnd	DateTimeType	fleetTaskExpectedEnd is the date and time at which the FleetTask is expected to end.	FleetTask	S5000F UoF Fleet Planning and Vehicle Assignment

Data element	Type	Definition	Class/interface	UoF
fleetTaskExpectedStart	DateTimeType	fleetTaskExpectedStart is the date and time at which the FleetTask is expected to start.	FleetTask	S5000F UoF Fleet Planning and Vehicle Assignment
fleetTaskIdentifier	IdentifierType	fleetTaskIdentifier is a string of text that uniquely identifies a FleetTask and differentiates it from other FleetTasks.	FleetTask	S5000F UoF Fleet Planning and Vehicle Assignment
fleetTaskPriority	ClassificationType	fleetTaskPriority is a classification that allows to define the importance of a FleetTask.	FleetTask	S5000F UoF Fleet Planning and Vehicle Assignment
fleetTaskRequiredFuel	SingleValuePropertyTyp e	fleetTaskRequiredFuel is the amount of fuel estimated to be required to carry out the FleetTask.	FleetTask	S5000F UoF Fleet Planning and Vehicle Assignment
geographicalAreaRelationship Type	ClassificationType	geographicalAreaRelationshipType is a classification that allows to indicate the relationship between two different GeographicalAreas.	GeographicalAreaR elationship	S5000F UoF Location, Address and Locator
geographicalAreaType	ClassificationType	geographicalAreaType is a classification that allows to group similar GeographicalAreas.	GeographicalArea	S5000F UoF Location, Address and Locator
gpsLocationElevation	NumericalPropertyType	gpsLocationElevation is a number representing the elevation at a certain GPS location.	GPSLocation	S5000F UoF Location, Address and Locator
gpsLocationLatitude	NumericalPropertyType	gpsLocationLatitude is a number representing the latitude of a GPS location.	GPSLocation	S5000F UoF Location, Address and Locator
gpsLocationLongitude	NumericalPropertyType	gpsLocationLongitude is a number representing the longitude of a GPS location.	GPSLocation	S5000F UoF Location, Address and Locator
hardwarePartHazardousClass	ClassificationType	hardwarePartHazardousClass is a design classification which identifies a design part as capable of posing a significant risk	HardwarePartAsDe signedDesignData	CDM UoF Part Definition

Data element	Type	Definition	Class/interface	UoF
		to health, safety or property during transportation, handing or storage.		
hardwarePartLogisticsCategory	ClassificationType	hardwarePartLogisticsCategory is a support classification that defines the role of a hardware part as designed in the context of product support.	HardwarePartAsDesignedSupportData	CDM UoF Part Definition
hardwarePartOperationalAuthorizedLife	AuthorizedLife	hardwarePartOperationalAuthorizedLife is a design characteristic which identifies the maximum usage limit for which an item may be operated, and upon reaching this limit, any further usage of the item must be re-authorized.	HardwarePartAsDesignedDesignData	CDM UoF Part Definition
hardwarePartRepairability	ClassificationType	hardwarePartRepairability is a support classification which defines whether the HardwarePartAsDesigned is repairable from a technical perspective (i.e., a vendor/supplier standpoint) independent of customer maintenance concepts.	HardwarePartAsDesignedSupportData	CDM UoF Part Definition
hardwarePartScrapRate	PropertyType	hardwarePartScrapRate is a support characteristic of a hardware part which defines the percentage of repairable units which, when removed from service, will be found to be beyond economic repair and therefore have to be scrapped.	HardwarePartAsDesignedSupportData	CDM UoF Part Definition
height	SingleValuePropertyType	height is the measurement or extent of an item from base to top.	3DDimension	S5000F Compound Attributes
informationCode	ClassificationType	informationCode is a classification which identifies type of task according to S1000D.	TaskRevision	S5000F UoF Maintenance Program
informationCode	ClassificationType	informationCode is a classification which identifies type of task according to S1000D.	SubtaskByDefinition	S5000F UoF Maintenance Program

Data element	Type	Definition	Class/interface	UoF
length	SingleValuePropertyType	length is the measurement or extent of the longest side of an item.	3DDimension	S5000F Compound Attributes
locationDescription	DescriptorType	locationDescription is a narrative statement about the location.	Location	S5000F UoF Location, Address and Locator
locationIdentifier	IdentifierType	locationIdentifier is a string of characters used to uniquely identify a Location.	Location	S5000F UoF Location, Address and Locator
locationName	TextPropertyType	locationName is a word or phrase by which a location is known and can be easily referenced.	Location	S5000F UoF Location, Address and Locator
locationType	ClassificationType	locationType is a classification that defines the type of location.	Location	S5000F UoF Location, Address and Locator
locatorDescription	DescriptorType	locationDescription is a narrative statement about the locator.	Locator	S5000F UoF Location, Address and Locator
locatorIdentifier	IdentifierType	locatorIdentifier is a string of characters used to uniquely identify a Locator.	Locator	S5000F UoF Location, Address and Locator
locatorName	TextPropertyType	locatorName is a word or phrase by which a locator is known and can easily be referenced.	Locator	S5000F UoF Location, Address and Locator
logBookEntryComment	DescriptorType	logBookEntryComment is a textual wording providing additional information to a logBookEntry.	LogBookEntry	S5000F UoF Logbook Entry
logbookEntryCounterIdentifier	IdentifierType	logBookEntryCounterIdentifier is a string of characters that uniquely identifies a LogBookEntryCounter and allows to differentiate if from other LogBookEntryCounters.	LogBookEntryCounter	S5000F UoF Logbook Entry

Data element	Type	Definition	Class/interface	UoF
logBookEntryCounterType	ClassificationType	logBookEntryCounterType is a classification that allows to group LogBookEntryCounter entries.	LogBookEntryCounter	S5000F UoF Logbook Entry
logBookEntryCounterValue	SingleValuePropertyType	The actual value of the counter at the moment of the logbook entry.	LogBookEntryCounter	S5000F UoF Logbook Entry
logBookEntryDateTime	DateTimeType	logBookEntryDateTime is the date and time at which the logbook entry was recorded.	LogBookEntry	S5000F UoF Logbook Entry
logBookEntryIdentifier	IdentifierType	logBookEntryIdentifier is a string of characters used to uniquely identify a logBookEntry, thus being able to differentiate it from other logBookEntries.	LogBookEntry	S5000F UoF Logbook Entry
logBookEntryType	ClassificationType	logBookEntryType is a classification that is valid for a specific LogBookEntry.	LogBookEntry	S5000F UoF Logbook Entry
lowerLimitValue	double	The lower limit of a value range.	ValueRangePropertyType	S5000F Primitives
maintenanceActivityNote	DescriptorType	maintenanceActivityNote is a narrative statement about potential issues encountered during the MaintenanceActivity.	MaintenanceActivity	S5000F UoF Maintenance Activity
maintenanceActivityPlanAccessHours	SingleValuePropertyType	maintenanceActivityPlanAccessHours is the is the expected time to be spent in gaining access for the MaintenanceActivity.	MaintenanceActivityPlan	S5000F UoF Maintenance Activity
maintenanceActivityPlanExecutionHours	SingleValuePropertyType	maintenanceActivityPlanExecutionHours is the planned time to be spent carrying out the MaintenanceActivity.	MaintenanceActivityPlan	S5000F UoF Maintenance Activity
maintenanceActivityPlanPeriod	TimeRange	maintenanceActivityPlanPeriod is the period of time during which the MaintenanceActivity is or was planned.	MaintenanceActivityPlan	S5000F UoF Maintenance Activity

Data element	Type	Definition	Class/interface	UoF
maintenanceActivityPlanPreparationHours	SingleValuePropertyType	maintenanceActivityPlanPreparationHours is the expected time to be spect on preparation for the MaintenanceActivity.	MaintenanceActivityPlan	S5000F UoF Maintenance Activity
maintenanceActivityRecordAccessHours	SingleValuePropertyType	maintenanceActivityRecordAccessHours is the real time in hours spent in gaining access for the MaintenanceActivity.	MaintenanceActivityRecord	S5000F UoF Maintenance Activity
maintenanceActivityRecordApprovalTime	DateTimeType	maintenanceActivityRecordApprovalTime is the date and time at which the MaintenanceActivity was approved.	MaintenanceActivityRecord	S5000F UoF Maintenance Activity
maintenanceActivityRecordExecutionHours	SingleValuePropertyType	maintenanceActivityRecordExecutionHours is the real time in hours spent carrying out the MaintenanceActivity.	MaintenanceActivityRecord	S5000F UoF Maintenance Activity
maintenanceActivityRecordPeriod	TimeRange	maintenanceActivityRecordPeriod is the period of time during which the maintenance was actually executed.	MaintenanceActivityRecord	S5000F UoF Maintenance Activity
maintenanceActivityRecordPreparationHours	SingleValuePropertyType	maintenanceActivityRecordPreparationHours is the real time in hours spent for the preparation of the MaintenanceActivity.	MaintenanceActivityRecord	S5000F UoF Maintenance Activity
maintenanceActivityRecordWorkDone	TextPropertyType	maintenanceActivityRecordWorkDone is a text that briefly describes the work that has been done as part of a MaintenanceActivity.	MaintenanceActivityRecord	S5000F UoF Maintenance Activity
maintenanceActivitySequence	int	maintenanceActivity is an integer that indicates the sequence number of the MaintenanceActivity in a set of MaintenanceActivities that are part of a WorkOrder.	MaintenanceActivity	S5000F UoF Maintenance Activity
maintenanceEventCategoryType	ClassificationType	maintenanceEventCategoryType is a classification that indicates a characteristic of a MaintenanceEvent.	MaintenanceEvent	S5000F UoF Maintenance Work Order Source
maintenanceEventDescription	DescriptorType	maintenanceEventDescription is a textual description of a MaintenanceEvent.	MaintenanceEvent	S5000F UoF Maintenance Work Order Source

Data element	Type	Definition	Class/interface	UoF
maintenanceEventReportedDate	DateType	maintenanceEventReportedDate is the date at which a MaintenanceEvent was reported.	MaintenanceEvent	S5000F UoF Maintenance Work Order Source
maintenanceFacilityShifts	SingleValuePropertyType	maintenanceFacilityShifts is the number of staff shifts in a MaintenanceFacility.	MaintenanceFacility	S5000F UoF Maintenance Facility Planning
maintenanceFacilitySlotDescription	DescriptorType	maintenanceFacilitySlotDescription is a textual explanation of the characteristics of a MaintenanceFacilitySlot.	MaintenanceFacilitySlot	S5000F UoF Maintenance Facility Planning
maintenanceFacilitySlotIdentifier	IdentifierType	maintenanceFacilitySlotIdentifier is a string of characters that allows to uniquely identify a MaintenanceFacilitySlot and differentiate it from other MaintenanceFacilitySlots.	MaintenanceFacilitySlot	S5000F UoF Maintenance Facility Planning
maintenanceFacilitySlotPlannedUsagePeriod	DateRange	maintenanceFacilitySlotPlannedUsagePeriod is a period of time in which a specific MaintenanceFacilitySlot has been allocated to a specific SerializedProductVariant.	MaintenanceFacilitySlotPlannedUsage	S5000F UoF Maintenance Facility Planning
maintenanceFacilitySlotType	ClassificationType	maintenanceFacilitySlotType is a classification that allows to group MaintenanceFacilitySlots.	MaintenanceFacilitySlot	S5000F UoF Maintenance Facility Planning
maintenanceLicenceIdentifier	IdentifierType	maintenanceLicenceIdentifier is a string of characters that allows to uniquely identify a MaintenanceLicense and differentiate it from other MaintenanceLicenses.	MaintenanceLicense	S5000F UoF Maintenance Personnel
maintenanceLicenceName	DescriptorType	maintenanceLicenceName is a name or short phrase by which a MaintenanceLicense is usually known.	MaintenanceLicense	S5000F UoF Maintenance Personnel
maintenanceLicenceType	DatedClassification	maintenanceLicenceType is a DatedClassification that defines the kind of MaintenanceLicence that has been granted.	MaintenanceLicense	S5000F UoF Maintenance Personnel

Data element	Type	Definition	Class/interface	UoF
maintenanceLicenceValidity	DateRange	maintenanceLicenceValidity is the standard duration for which a maintenance license is granted.	MaintenanceLicense	S5000F UoF Maintenance Personnel
maintenanceOrganizationApprovalDuring	DateRange	maintenanceOrganizationApprovalDuring is a period during which a specific MaintenanceOrganizationApproval is in effect.	MaintenanceOrganizationApproval	S5000F UoF Maintenance Organization
maintenanceOrganizationApprovalType	ClassificationType	maintenanceOrganizationApprovalType is a classification that defines the kind of MaintenanceOrganizationApproval that has been granted.	MaintenanceOrganizationApproval	S5000F UoF Maintenance Organization
maintenancePersonApprovedProductPeriod	DateRange	maintenancePersonApprovedProductPeriod is a period of time during which a MaintenancePerson has been approved to work on a specific ProductVariant.	MaintenancePersonApprovedProduct	S5000F UoF Maintenance Personnel
maintenancePersonFacilityPeriod	DateRange	maintenancePersonFacilityPeriod is the time period during which a MaintenancePerson has worked at a specific MaintenanceFacility.	MaintenancePersonFacility	S5000F UoF Maintenance Personnel
maintenancePersonJobType	ClassificationType	maintenancePersonJobType is a classification that identifies the kind of maintenance job that a MaintenancePerson has.	MaintenancePerson	S5000F UoF Maintenance Personnel
maintenancePersonRemarks	DescriptorType	maintenancePersonRemarks is a textual statement related to a person.	MaintenancePerson	S5000F UoF Maintenance Personnel
maintenanceProgramRevisionDescription	DescriptorType	maintenanceProgramRevisionDescription is a narrative statement explaining the MaintenanceProgramRevision and/or the changes that have been made to the MaintenanceProgram.	MaintenanceProgramRevision	S5000F UoF Maintenance Program

Data element	Type	Definition	Class/interface	UoF
maintenanceProgramType	ClassificationType	maintenanceProgramType is a classification that allows to group different types of Maintenance Programs.	MaintenanceProgram	S5000F UoF Maintenance Program
maintenanceSignificantOrRelevant	ClassificationType	maintenanceSignificantOrRelevantIndicator is a classfication of a BreakdownElement as a candidate for maintenance as a result of scheduled maintenance analyses or failure modes and effects analyses.	BreakdownElementRevision	CDM UoF Breakdown Structure
materialCharacteristicsRecordingDate	DateType	materialCharacteristicsRecordingDate is the date at which the Material information was last recorded or updated.	Material	S5000F UoF Maintenance Activity
materialDescription	DescriptorType	materialDescription is a narrative statement explaining the Material.	Material	S5000F UoF Maintenance Activity
materialIdentifier	IdentifierType	materialIdentifier is a string of text that uniquely identifies a Material and differentiates it from other materials.	Material	S5000F UoF Maintenance Activity
materialName	TextPropertyType	materialName is a text under which the Material is commonly known.	Material	S5000F UoF Maintenance Activity
materialRiskDescription	DescriptorType	materialRiskDescription is a narrative statement explaining the Material risk.	Material	S5000F UoF Maintenance Activity
materialRiskFactor	DatedClassification	materialRiskFactor is a classification that allows to determine whether the Material presents some safety or hazard risk.	Material	S5000F UoF Maintenance Activity
materialSubstanceUsageCategory	ClassificationType	materialSubstanceUsageCategory is a classification that defines the purpose for which the Material is used.	Material	S5000F UoF Maintenance Activity
messageContentStatus	ClassificationType	messageContentStatus is a classification that identifies the overall quality assurance status of the Message content.	Message	S5000F UoF Technical Data Package (TDP) Message

Data element	Type	Definition	Class/interface	UoF
messageCreationDate	DateTimeType	messageCreationDate is a date/time that defines the date and time that the Message was generated.	Message	S5000F UoF Technical Data Package (TDP) Message
messageDateTime	DateTimeType	messageDateTime is a timestamp associated to a message.	MessageDate	S5000F UoF Technical Data Package (TDP) Message
messageDateType	ClassificationType	messageDateRole is a classification indicating to what the Message date corresponds.	MessageDate	S5000F UoF Technical Data Package (TDP) Message
messageIdentifier	IdentifierType	messageIdentifier is a string of characters that is used to uniquely identify a Message and to differentiate it from other Messages.	Message	S5000F UoF Technical Data Package (TDP) Message
messageLanguage	ClassificationType	messageLanguage is a classification that identifies the default language of the information identified in the MessageContent.	Message	S5000F UoF Technical Data Package (TDP) Message
messageRelationshipType	ClassificationType	messageRelationshipType is a classification that identifies the type of relationship between two Messages.	MessageRelationship	S5000F UoF Technical Data Package (TDP) Message
movementIdentifier	IdentifierType	movementIdentifier is a string of characters that uniquely defines a Movement and allows to differentiate it from other Movements.	Movement	S5000F UoF Serialized Product Operational Period
movementLegDelayCause	DescriptorType	movementLegDelayCause is a textual narrative describingthe reason for the delay.	MovementLegDelay	S5000F UoF Serialized Product Operational Period
movementLegDelayDate	DateType	movementLegDelayDate is the date at which the delay took place.	MovementLegDelay	S5000F UoF Serialized Product Operational Period

Data element	Type	Definition	Class/interface	UoF
movementLegDelayDuration	SingleValuePropertyType	movementLegDelayDuration represents the duration of the travel leg delay.	MovementLegDelay	S5000F UoF Serialized Product Operational Period
movementLegDelayType	ClassificationType	movementLegDelayType is a classification that permits to group the MovementLegDelays.	MovementLegDelay	S5000F UoF Serialized Product Operational Period
movementLegGeoLocationTime	DateTimeType	movementLegGeoLocationTime is the time at which a serialized product variant was at a specific geo-location during a movement leg.	MovementLegGeoLocation	S5000F UoF Serialized Product Operational Period
movementLegPeriod	TimeRange	movementLegPeriod is the period during which the product is performing a travel leg (is in transit).	MovementLeg	S5000F UoF Serialized Product Operational Period
movementLegResult	ClassificationType	movementLegResult is a classification that allows to group different movement legs based on the result of the MovementLeg.	MovementLeg	S5000F UoF Serialized Product Operational Period
movementLegSequence	int	movementLegSequence is an integer that indicates the sequence in which the travel leg has been performed during a specific product movement.	MovementLeg	S5000F UoF Serialized Product Operational Period
movementResult	ClassificationType	movementResult is a classification that allows to group different movement legs based on the result of the Movement.	Movement	S5000F UoF Serialized Product Operational Period
movementTransit	TimeRange	Period during which the product has been in movement from its start location until its end location, considering both the individual travel legs and intermediate times that might have taken place between different travel legs.	Movement	S5000F UoF Serialized Product Operational Period

Data element	Type	Definition	Class/interface	UoF
movementType	ClassificationType	movementType is a classification of the movement of the product. (e.g., ferry, transport, etc.)	Movement	S5000F UoF Serialized Product Operational Period
obsolescenceParameterDescription	DescriptorType	obsolescenceParameterDescription is a narrative statement describing the ObsolescenceParameter.	ObsolescenceParameter	S5000F UoF Obsolescence Management Candidates
obsolescenceParameterId	IdentifierType	obsolescenceParameterId is a string of text that uniquely identifies an ObsolescenceParameter and differentiates it from other ObsolescenceParameters.	ObsolescenceParameter	S5000F UoF Obsolescence Management Candidates
obsolescenceParameterName	DescriptorType	obsolescenceParameterName is a text that represents an identifier by which an ObsolescenceParamenter is commonly known.	ObsolescenceParameter	S5000F UoF Obsolescence Management Candidates
obsolescenceParameterType	ClassificationType	obsolescenceParameterType is a classification that describes the type of parameter (e.g. obsolescence parameter, order, reliability, etc.)	ObsolescenceParameter	S5000F UoF Obsolescence Management Candidates
obsolescenceParameterValue	PropertyType	obsolescenceParameterValue is a property that represents the value of the ObsolescenceParameter that indicates that an item is obsolete.	ObsolescenceParameter	S5000F UoF Obsolescence Management Candidates
operatingBaseCapacityIdentifier	IdentifierType	operatingBaseCapacityIdentifier is a string that uniquely identifies an OperatingBaseCapacity and allows to differentiate it from other OperatingBaseCapacities.	OperatingBaseCapacity	S5000F UoF Operating Base
operatingBaseProductVariantCapacity	int	operatingBaseProductVariantCapacity is the number of ProductVariants that can operate simultaneously at a specific OperatingBase.	OperatingBaseCapacity	S5000F UoF Operating Base
operatingCounterIdentifier	IdentifierType	operatingCounterIdentifier is a string of characters that is used to uniquely identify an EquipmentOperationalCounter	OperatingCounter	S5000F UoF Equipment

Data element	Type	Definition	Class/interface	UoF
		and to differentiate it from other EquipmentOperationalCounters.		
operatingCounterValue	SingleValuePropertyType	operatingCounterValue is the value than an OperationalCounter has at a specific moment in time.	OperatingCounter	S5000F UoF Equipment
operatingEnvironmentIdentifier	IdentifierType	environmentIdentifier is a string of characters used to uniquely identify a environment and to differentiate it from other environments.	Environment	S5000F UoF Operational Environment
operatingEnvironmentPeriod	DateRange	operatingEnvironmentPeriod is a range of dates that represent a period during which a SerializedProductVariant operated in a specific OperatingEnvironment.	SerializedProductVariantEnvironment	S5000F UoF Operational Environment
operationalApprovalType	DatedClassification	operationalApprovalType is a dated classification that describes the type of operational approval that is approved for use.	OperationalApproval	S5000F UoF Operational Environment
operationalEventCategoryType	ClassificationType	operationalEventCategoryType is a classification that indicates a characteristic of an OperationalEvent.	OperationalEvent	S5000F UoF Operational Event
operationalEventMaintenanceDown	ClassificationType	operationalEventMaintenanceDown is a classification indicating that the OperationalEvent caused a maintenance down time to the SerializedProductVariant.	OperationalEvent	S5000F UoF Operational Event
operationalEventMaintenanceNotificationDateTime	DateTimeType	operationalEventMaintenanceNotificationDateTime is the date and time where the maintenance organization has been notified that maintenance was required due to the OperationalEvent.	OperationalEvent	S5000F UoF Operational Event
operationalEventMaintenanceReleasedDateTime	DateTimeType	operationalEventMaintenanceNotificationReleasedDateTime is the date and time at which the maintenance organization	OperationalEvent	S5000F UoF Operational Event

Data element	Type	Definition	Class/interface	UoF
		released the serialized product from maintenance after solving the issues caused by the operational event.		
operationalEventMessageIdentifier	IdentifierType	operationalEventMessageIdentifier is a string of characters used to uniquely identify an OperationalEventMessage and to differentiate it from other operationalEventMessages.	OperationalEventMessage	S5000F UoF Operational Event
operationalEventMessageSequence	int	operationalEventMessageSequence is an integer stating the sequence in which a particular OperationalEventMessage was made.	OperationalEventMessage	S5000F UoF Operational Event
operationalEventMessageText	DescriptorType	operationalEventMessageText is a text that appears during or as a consequence of an OperationalEvent (eg, on an operator display or maintenance panel).	OperationalEventMessage	S5000F UoF Operational Event
operationalEventMessageType	ClassificationType	operationalEventMessageType is a classification of the operationalEventMessage.	OperationalEventMessage	S5000F UoF Operational Event
operationalEventOperationalMode	ClassificationType	operationalEventOperationalMode is a classification indicating the specific operational mode at which the operationalEvent occurred.	OperationalEvent	S5000F UoF Operational Event
operationalEventReportedDate	DateType	operationalEventReportedDate is the date at which the operational event was reported.	OperationalEvent	S5000F UoF Operational Event
operationalEventSymptom	ClassificationType	operationalEventSymptom is a classification of the symptom that the product presents during the OperationalEvent.	OperationalEvent	S5000F UoF Operational Event
operationalModeClassification	ClassificationType	operationalModeClassification is a classification that allows to assign an OperationalMode to a specific category or place the operationalModeIdentifier in context.	OperationalMode	S5000F UoF Serialized Product Operational Period

Data element	Type	Definition	Class/interface	UoF
operationalModeDescription	DescriptorType	operationalModeDescription is a textual explanation of an OperationalMode.	OperationalMode	S5000F UoF Serialized Product Operational Period
operationalModeIdentifier	IdentifierType	operationalModeIdentifier is an unique identifier that allows to distinguish one OperationalMode from a different one.	OperationalMode	S5000F UoF Serialized Product Operational Period
operationalModeName	TextPropertyType	operationalModeName is a text that identifies an OperationalMode in an understandable way.	OperationalMode	S5000F UoF Serialized Product Operational Period
operationalModeStatusType	ClassificationType	operationalModeStatusType is a classification of the operational mode.	OperationalModeStatus	S5000F UoF Logbook Entry
operationalModeStatusUsed	PropertyType	An indicator of whether the operationModeType was or not used, and how.	OperationalModeStatus	S5000F UoF Logbook Entry
operationalPeriodActual	TimeRange	operationalPeriodActual is the period of time during which the OperationalPeriod took effectively place.	OperationalPeriod	S5000F UoF Serialized Product Operational Period
operationalPeriodIdentifier	IdentifierType	operationalPeriodIdentifier is a string of characters used to uniquely identify an OperationalPeriod of an individual Product instance.	OperationalPeriod	S5000F UoF Serialized Product Operational Period
operationalPeriodName	TextPropertyType	operationalPeriodName is a word or phrase by which an Operational Period is commonly known and can be easily referenced.	OperationalPeriod	S5000F UoF Serialized Product Operational Period
operationalPeriodPhase	ClassificationType	operationalPeriodPhase is a classification that allows to classify an OperationalPeriod.	OperationalPeriod	S5000F UoF Serialized Product Operational Period

Data element	Type	Definition	Class/interface	UoF
operationalPeriodRelationshipType	ClassificationType	operationalPeriodRelationshipType is a classification that defines the association between two individual operational periods.	OperationalPeriodRelationship	S5000F UoF Serialized Product Operational Period
operationalPeriodResult	ClassificationType	operationalPeriodResult is a classification that defines the result of the OperationalPeriod.	OperationalPeriod	S5000F UoF Serialized Product Operational Period
operationalPeriodScheduled	TimeRange	operationalPeriodScheduled is the period of time during which it was forseen that the OperationalPeriod would take place.	OperationalPeriod	S5000F UoF Serialized Product Operational Period
operationalRequirementPeriod	DateRange	operationalRequirementPeriod is a period of time during which an OperationalRequirement is in effect.	OperationalRequirement	S5000F UoF Fleet Planning and Vehicle Assignment
operationalRoleDelta	ValueWithTolerancesPropertyType	operationalRoleDelta is a value that describes the delta regarding the baseline configuration of the OperationalRole in regard to the baseline ProductVariant.	OperationalRole	S5000F UoF Operational Roles
operationalRoleDescription	DescriptorType	operationalRoleDescription is a narrative statement of what a specific OperationalRole is.	OperationalRole	S5000F UoF Operational Roles
operationalRoleidentifier	IdentifierType	operationalRoleIdentifier is a string of characters that uniquely identifies an OperationalRole.	OperationalRole	S5000F UoF Operational Roles
operationalRoleType	ClassificationType	operationalRoleType is a classification that allows to group different OperationalRoles.	OperationalRole	S5000F UoF Operational Roles
organizationalBreakdownStructureRevisionIdentifier	IdentifierType	organizationalBreakdownStructureRevisionIdentifier is a string of characters that allow to uniquely identify a OrganizationalBreakdownStructureRevision and differentiate it from other OrganizationalBreakdownStructureRevisions.	OrganizationalBreakdownStructureRevision	S5000F UoF Organizational Breakdown Structure

Data element	Type	Definition	Class/interface	UoF
organizationalBreakdownStructureRevisionPeriod	DateRange	organizationalBreakdownStructureRevisionPeriod is the period of time during which an OrganizationalBreakdownStructureRevision is or has been in effect.	OrganizationalBreakdownStructureRevision	S5000F UoF Organizational Breakdown Structure
organizationalRoleDescription	DescriptorType	organisationalRoleDescription is a textual narrative statement describing an OrganizationalRole	OrganizationalRole	S5000F UoF Organizational Breakdown Structure
organizationalRoleType	ClassificationType	organisationalRoleType is a classification that allows to group similar OrganisationalRoles.	OrganizationalRole	S5000F UoF Organizational Breakdown Structure
organizationDates	DateRange	organizationDates is a period of time during which the organization exists.	Organization	S5000F UoF Party
organizationOperationsApprovalDuring	DateRange	organizationOperationsApprovalDuring is the period of time during which the approval of an OperatorOrganization to operate during a specific product variant is in effect.	OrganizationOperationsApproval	S5000F UoF Operator
organizationType	ClassificationType	organizationType is a classification that allows to define groups of organizations.	Organization	S5000F UoF Party
packagedTask	boolean	packagedTask identifies if the task is created in order to group a set of previously defined tasks.	RectifyingTask	S5000F UoF Maintenance Program
partActionCause	ClassificationType	A classification describing the cause for a specific PartAction.	PartAction	S5000F UoF Equipment
partActionCauseDescription	DescriptorType	A textual description describing the underlying cause for a PartAction.	PartAction	S5000F UoF Equipment
partActionDate	DateTimeType	partActionDate is the date at which a specific PartAction was performed.	PartAction	S5000F UoF Equipment

Data element	Type	Definition	Class/interface	UoF
partActionIdentifier	IdentifierType	partActionIdentifier is a string that uniquely identifies a PartAction and diffrentiates it from other PartActions.	PartAction	S5000F UoF Equipment
partActionTimeSinceNew	TimeSinceType	partActionTimeSinceNew is the elapsed time since the part was put into service at the moment of the PartAction.	PartAction	S5000F UoF Equipment
partActionTimeSinceOverhaul	TimeSince	partActionTimeSinceOverhaul is the elapsed time since the part was overhauled for the last time at the moment that the PartAction took place.	PartAction	S5000F UoF Equipment
partActionType	ClassificationType	partActionType is a classification describing the PartAction that has been performed on a part.	PartAction	S5000F UoF Equipment
partExportControl	ClassificationType	partExportControl is a classification that indicates whether the part is subject to export control restrictions.	HardwarePartAsDesigned	S5000F UoF Specializations
partIdentifier	IdentifierType	partIdentifier is the identifier of the HardwarePartAsDesigned to which a SerializedHardwarePart belongs.	SerializedHardwarePart	S5000F UoF Equipment
partIdentifier	IdentifierType	partIdentifier is the a string of text that uniquely identifies the SoftwarepartAsDesigned which specifies the functionality of the SoftwarePartAsReleased.	PartAsDesigned	CDM UoF Part Definition
partIdentifier	IdentifierType	partIdentifier is the identifier of the HardwarePartAsDesigned to which a NonSerializedHardwarePart belongs.	NonSerializedHardwarePart	S5000F UoF PartAsRealized
partInWarehousePeriod	DateRange	partInWarehousePeriod is the period of time that a part is stored in a specific warehouse.	PartInWarehouse	S5000F UoF Warehouse and Spare Pool

Data element	Type	Definition	Class/interface	UoF
partMajorComponent	bool	partMajorComponent is a classification that indicates that a part needs separate tracking because it can be considered a major SerializedProductVariant by its own right.	HardwarePartAsDesigned	S5000F UoF Specializations
partName	DescriptorType	partName is a word or phrase by which the designed part is known and can be easily referenced.	PartAsDesigned	CDM UoF Part Definition
partsListEntryPosition	char	partsListEntryPosition is a string of characters providing a relative position within the parts list.	PartAsDesignedPartsListEntry	CDM UoF Part Definition
partsListRevisionIdentifier	IdentifierType	partListRevisionIdentifier is a string of characters used to uniquely identify a revision of a PartAsDesignedPartsList partsListType and to differentiate it from other PartAsDesignedPartsList revisions of the same partsListType.	PartAsDesignedPartsList	CDM UoF Part Definition
partsListType	ClassificationType	partsListType is a characteristic which identifies the context and intended use of the list of parts.	PartAsDesignedPartsList	CDM UoF Part Definition
partyAddressDuration	DateRange	Period of time during which the address of a Party is valid.	PartyAddress	S5000F UoF Party
partyAddressType	ClassificationType	partyAddressType is a <<classification>> describing the type of relationship between a Party and an Address.	PartyAddress	S5000F UoF Party
partyRelationshipDescription	DescriptorType	partyRelationshipDescription is a textual narrative statement explaining the association between two Parties.	PartyRelationship	S5000F UoF Party
partyRelationshipDuration	DateRange	The date range during which the association between two parties exists.	PartyRelationship	S5000F UoF Party

Data element	Type	Definition	Class/interface	UoF
partyRelationshipType	ClassificationType	partyRelationshipType is a relationship describing how two Parties are associated.	PartyRelationship	S5000F UoF Party
partySecurityAssignmentPeriod	DateRange	partySecurityAssignmentPeriod is range of dates that indicates during which a Party has been assigned a certain security clearance.	PartySecurityAssignment	S5000F UoF Security Classification
personDates	DateRange	personDates are the dates during which a Person exists.	Person	S5000F UoF Party
personFamilyName	TextPropertyType	PersonFamilyName is a text that indicates the family name of a Person.	Person	S5000F UoF Party
personIdentifier	IdentifierType	personIdentifier is a unique identifier that differentiates a Person from any other Person.	Person	S5000F UoF Party
personMiddleName	TextPropertyType	personMiddleName is a text that indicates the middle name of a person.	Person	S5000F UoF Party
personName	TextPropertyType	personName is a textual description used normally to identify a Person	Person	S5000F UoF Party
personOperationsApprovalDuring	DateRange	personOperationsApprovalDuring is the period of time during which the approval of an OperatorPerson to operate during a specific product variant is in effect.	PersonOperationsApproval	S5000F UoF Operator
personPrefixTitle	ClassificationType	personPrefixTitle is a classification indicating a title that is used before a Person's name.	Person	S5000F UoF Party
personSuffixTitle	ClassificationType	personSuffixTitle is a classification indicating a title that is added after a Person name.	Person	S5000F UoF Party

Data element	Type	Definition	Class/interface	UoF
plannedItemUpgradeIdentifier	IdentifierType	plannedItemUpgradeIdentifier is a string of text that uniquely identifies a PlannedItemUpgrade and differentiates it from all othe rplanned PlannedItemUpgrades.	PlannedItemUpgrade	S5000F UoF Change Embodiment Strategy
plannedItemUpgradePriority	ClassificationType	plannedProductUpgradeIdentifier is a string of characters that uniquely identifies a PlannedProductUpgrade, differentiating it from all other PlannedProductUpgrades.	PlannedItemUpgrade	S5000F UoF Change Embodiment Strategy
plannedItemUpgradeReason	ClassificationType	plannedItemUpgradeReason is a <<classification>> that allows to group different PlannedItemUpgrades by the root causes for such upgrade.	PlannedItemUpgrade	S5000F UoF Change Embodiment Strategy
plannedUpgradePeriod	TimeRange	plannedUpgradePeriod is the range of time during which the product update has been planned.	PlannedUpgradeTimescales	S5000F UoF Change Embodiment Strategy
plannedUpgradeTimeIdentifier	IdentifierType	plannedUpgradeTimeIdentifier is a string of text that uniquely identifies a PlannedProductUpgrade and differentiates it from the other PlannedProductUpgrades.	PlannedUpgradeTimescales	S5000F UoF Change Embodiment Strategy
plannedUpgradeTimeVersion	IdentifierType	plannedUpgradeTimeVersion is a string of text that allows to differentiate a different version og a same PlannedProductUpgrade.	PlannedUpgradeTimescales	S5000F UoF Change Embodiment Strategy
policiesAndRegulationsEffectivity	DateRange	policiesAndRegulationsEffectivity is the period of time during which a policy or regulation is in effect.	PoliciesAndRegulations	S5000F UoF Policies and Regulations
poolDescription	DescriptorType	poolDescription is textual narrative statement explaining the purpose of a Pool.	Pool	S5000F UoF Warehouse and Spare Pool
poolIdentifier	IdentifierType	poolIdentifier is string of characters that allows to uniquely identify a specific Pool among other Pools.	Pool	S5000F UoF Warehouse and Spare Pool

Data element	Type	Definition	Class/interface	UoF
poolName	TextPropertyType	poolName is a word or phrase under which the Pool is commonly known and to which it can be referred.	Pool	S5000F UoF Warehouse and Spare Pool
poolOwnershipDuring	DateRange	poolOwnershipDuring defines the period of time during which the ownership of a Pool by a specific Part is valid.	PoolOwner	S5000F UoF Warehouse and Spare Pool
poolOwnershipRatio	SingleValuePropertyType	poolOwnershipRatio is the percentage of ownership of a Pool by a specific Party during a specific period of time.	PoolOwner	S5000F UoF Warehouse and Spare Pool
poolType	ClassificationType	poolType is a classification that allows to determine the kind of Pool.	Pool	S5000F UoF Warehouse and Spare Pool
poolUsageDescription	DescriptorType	poolUsageDescription is a textual narrative statement explaining the usage of a Pool by a specific Party.	PoolUser	S5000F UoF Warehouse and Spare Pool
poolUsageDuring	DateRange	poolUsageDuring is the period during which a Party can have a certain type of access to a spares Pool.	PoolUser	S5000F UoF Warehouse and Spare Pool
poolUsageType	ClassificationType	poolUsageType is a classification that defines the kind of usage that a Party can have on a specific spares Pool.	PoolUser	S5000F UoF Warehouse and Spare Pool
productParameterAtOperationalEventName	IdentifierType	productParameterAtOperationalEventName is a word or phrase by which the productParameter that occurred at an OperationalEvent is known.	ProductParameterAtOperationalEvent	S5000F UoF Operational Event
productParameterAtOperationalEventValue	PropertyType	productParametersAtOperationalEventValue is the value of the productParametersAtOperationalEvent.	ProductParameterAtOperationalEvent	S5000F UoF Operational Event
productParametersAtOperationalEventIdentifier	IdentifierType	productParametersAtOperationalEventIdentifier is a string of text that uniquely identifies a ProductParameterAtOperationalEvent and allows to	ProductParameterAtOperationalEvent	S5000F UoF Operational Event

Data element	Type	Definition	Class/interface	UoF
		differentiate it from other ProductParameterAtOperationalEvent.		
productUsagePhaseDescription	DescriptorType	productUsagePhaseDescription is a textual narrative statement explaining a ProductUsagePhase.	ProductUsagePhase	S5000F UoF Product Usage Phase
productUsagePhaseDuration	PropertyType	productUsagePhaseDuration is a property indicating the period of time during which the ProductUsagePhase extends.	ProductUsagePhase	S5000F UoF Product Usage Phase
productUsagePhaseIdentifier	IdentifierType	productUsagePhaseIdentifier is a string that uniquely identifies a ProductUsagePhase and differentiates it from other ProductUsagePhases.	ProductUsagePhase	S5000F UoF Product Usage Phase
productVariantCapabilityDescription	DescriptorType	productVariantCapabilityDescription is a narrative statement explaining the capability of a ProductVariant.	ProductVariantCapability	S5000F UoF Operational Roles
productVariantCapabilityIdentifier	IdentifierType	productVariantCapabilityIdentifier is a string of characters that uniquely identifies a specific capability of ProductVariant.	ProductVariantCapability	S5000F UoF Operational Roles
productVariantEntryIntoServiceDate	DateType	productVariantEntryIntoServiceDate is the date at which the first item or product of a specific ProductVariant entered service.	ProductVariant	S5000F UoF Specializations
productVariantLastBuyDate	DateType	productVariantLastBuyDate is the last date at which a ProductVariant can be purchased.	ProductVariant	S5000F UoF Specializations
productVariantProductionDates	DateRange	productVariantProductionDates is the period of time during which a ProductVariant is in production.	ProductVariant	S5000F UoF Specializations
projectRelationshipType	ClassificationType	projectRelationshipType is a classification that defines the type of relationship between two Projects.	ProjectRelationship	S5000F UoF Project and Contract

Data element	Type	Definition	Class/interface	UoF
projectSpecificClassAttributeSetDescription	DescriptorType	projectSpecificClassAttributeSetDescription is a narrative statement describing the project-specific attributes associated to the class instance.	ProjectSpecificClassAttributes	S5000F UoF Project-Specific Class Attributes
projectSpecificClassAttributeSetIdentifier	IdentifierType	projectSpecificClassAttributeSetIdentifier is a string that uniquely identifies a ProjectSpecificClassAttributeSet and allows to differentiate it from other ProjectSpecificClassAttributeSets.	ProjectSpecificClassAttributes	S5000F UoF Project-Specific Class Attributes
projectSpecificClassAttributeSetName	TextPropertyType	projectSpecificClassAttributeSetName is a string of characters used to uniquely identifies the set of project-specific attributed extending the class and differentiate it from other project-specific class extension attributes.	ProjectSpecificClassAttributes	S5000F UoF Project-Specific Class Attributes
publicationModuleCode	IdentifierType	publicationModuleCode is a string of characters used to uniquely identify an S1000DPublicationModule and to differentiate it from other S100DPublicationModules.	S1000DPublicationModule	S5000F UoF Document
publicationModuleTitle	DescriptorType	publicationModuleTitle is a word or phrase by which the publication module is known and can be easily referenced.	S1000DPublicationModule	S5000F UoF Document
quantityOfContractedItem	int	quantityOfContractedItem is an integer representing the number of ContractItems that have been contracted.	ContractItemDetails	S5000F UoF Project and Contract
quantityOfChildElement	PropertyType	quantityOfChildElement is the amount that a child element is used in its parent element within a parent/child relationship.	PartAsDesignedPartsListEntry	CDM UoF Part Definition
reasonForShopSubmission	ClassificationType	reasonForShopSubmission is a classification that provides the justification for the submission of an equipment to a workshop.	ShopFindings	S5000F UoF Shop Findings

Data element	Type	Definition	Class/interface	UoF
referenceDesignator	IdentifierType	referenceDesignator is a string of characters used to uniquely identify the location of a child element within a parent element.	PartAsDesignedPartsListEntry	CDM UoF Part Definition
reportableActivityIdentifier	IdentifierType	reportableActivityIdentifier is a string of characters that is used to uniquely identify a ReportableActivity and to differentiate it from other ReportableActivities.	ReportableActivity	S5000F UoF Reportable Activity
reportableActivityPeriod	DateRange	reportableActivityPeriod is the period of time on which the reporting is performed.	ReportableActivity	S5000F UoF Reportable Activity
reportableActivityReportingDate	DateType	reportableActivityDate is the date at which the reporting is performed.	ReportableActivity	S5000F UoF Reportable Activity
reportableMetricIdentifier	IdentifierType	reportableMetricIdentifier is a unique identifier that allows to uniquely identify a ReportableMetric from any other one.	ReportableMetric	S5000F UoF Service Contract Management
reportableMetricPeriod	TimeRange	reportableMetricPeriod is the period of time over which the metric was collected.	ReportableMetric	S5000F UoF Service Contract Management
reportableMetricType	ClassificationType	reportableMetricType is a classification that allows to group ReportabaleMetrics by its characteristics.	ReportableMetric	S5000F UoF Service Contract Management
reportableMetricValue	SingleValuePropertyType	reportableMetricValue is the numeric value that a ReportableMetric has during a specific reporting period.	ReportableMetric	S5000F UoF Service Contract Management
reportPeriod	DateRange	reportPeriod is the period of time on which a report is providing information.	Report	S5000F UoF Reporting

Data element	Type	Definition	Class/interface	UoF
requiredFleetRoleAvailability	SingleValuePropertyType	requiredFleetRoleAvailability defines the necessary availability in a specific OperationalRole to be able to comply with a FleetRequirement.	RequiredFleetRole	S5000F UoF Fleet Planning and Vehicle Assignment
requiredPartStockLevelInPool	SingleValuePropertyType	requiredPartStockLevelInPool is a value indicating the required number of parts that have to be stocked for a specific spare pool.	RequiredPartStockLevelInPool	S5000F UoF Warehouse and Spare Pool
requiredSafetyActionDescription	DescriptorType	requiredSafetyActionDescription is a narrative statement explaining what theRequiredSafetyAction consists of.	RequiredSafetyAction	S5000F UoF Safety
requiredSafetyActionIdentifier	IdentifierType	requiredSafetyActionIdentifier is a string of text that uniquely identifies a RequiredSafetyAction and differentiates it from other RequiredSafetyActions.	RequiredSafetyAction	S5000F UoF Safety
requiredSafetyActionImplementationDate	DateType	requiredSafetyActionImplementationDate is the date by which the RequiredSafetyAction has to be completed.	RequiredSafetyAction	S5000F UoF Safety
requiredSafetyActionPriority	ClassificationType	requiredSafetyActionPriority is a classification that allows to determine the urgency of a RequiredSafetyAction.	RequiredSafetyAction	S5000F UoF Safety
requiredSafetyActionReleaseDate	DateTimeType	requiredSafetyActionReleaseDate is the date and time at which a RequiredSafetyAction was officially released.	RequiredSafetyAction	S5000F UoF Safety
requiredSafetyActionType	ClassificationType	requiredSafetyActionType is a classification that allows to group similar RequiredSafetyActions.	RequiredSafetyAction	S5000F UoF Safety
requirementDescription	DescriptorType	requirementDescription is a narrative statement that explains what the requirement is.	Requirement	S5000F UoF Requirement

Data element	Type	Definition	Class/interface	UoF
requirementId	IdentifierType	requirementId is a string of text that allows to uniquely identify a Requirement and differentiate it from other Requirements.	Requirement	S5000F UoF Requirement
requirementName	TextPropertyType	requirementName is a text that provides an identifier by which a Requirement is commonly known.	Requirement	S5000F UoF Requirement
requirementRaisedBy	Organization	requirementRaisedBy represents the organization that has raised a requirement.	Requirement	S5000F UoF Requirement
requirementType	ClassificationType	requirementType is a classification that allows to group Requirements of a same kind.	Requirement	S5000F UoF Requirement
resourceUsagePartyRole	ClassificationType	resourceUsagePartyRole is the role that the party is perfroming for a specific ResourceUsageRequest.	ResourceUsageParty	S5000F UoF Resource Usage Request
resourceUsageRequestDate	DateType	resourceUsageRequestDate is the date at which a ResourceUsageRequest was perfromed.	ResourceUsageRequest	S5000F UoF Resource Usage Request
resourceUsageRequestDescription	DescriptorType	resourceUsageRequestDescription is a textual narrative explaining the ResourceUsageRequest.	ResourceUsageRequest	S5000F UoF Resource Usage Request
resourceUsageRequestIdentifier	IdentifierType	resourceUsageRequestIdentifier is a text that uniquely identifies a ResourceUsageRequest and differentiates it from other ResourceUsageRequests.	ResourceUsageRequest	S5000F UoF Resource Usage Request
resourceUsageRequestName	DescriptorType	resourceUsageRequestName is a string of text that summarizes the ResourceUsageRequest and can be used to easily reference it in common speech.	ResourceUsageRequest	S5000F UoF Resource Usage Request

Data element	Type	Definition	Class/interface	UoF
resourceUsageRequestPeriod	DateRange	resourceUsageRequestPeriod is the period of time during which a Resource is requested.	ResourceUsageRequest	S5000F UoF Resource Usage Request
resourceUsageRequestStatus	StateType	resourceUsageRequestStatus is a state indicating what the current status of a ResourceUsageRequest is.	ResourceUsageRequest	S5000F UoF Resource Usage Request
safetyDocumentCriticality	ClassificationType	safetyDocumentCriticality is a classification on the criticality of a safety issue addressed in a SafetyDocument.	SafetyDocument	S5000F UoF Safety
safetyIsssueReportingDateTime	DateTimeType	safetyIssueReportingDateTime is the date and time at which the SafetyIssue was reported.	SafetyIssue	S5000F UoF Safety
safetyIssueAssessmentBy	Organization	safetyIssueAssessmentBy is the Orgamization that has to assess the safety issue.	SafetyIssue	S5000F UoF Safety
safetyIssueFirstIdentificationDateTime	DateTimeType	safetyIssueFirstIdentificationDateTime is the date and time at which the SafetyIssue was first identified.	SafetyIssue	S5000F UoF Safety
safetyWarningAplicabilityDates	DateRange	safetyWarningAplicabilityDates is the period of time during which a SafetyWarning is applicable.	SafetyWarning	S5000F UoF Safety
safetyWarningPriority	ClassificationType	safetyWarningPriority is a <<classification>> that allows to group SafetyWarnings by their priority.	SafetyWarning	S5000F UoF Safety
securityClass	ClassificationType	securityClass is a classification that defines the level of confidentiality.	SecurityClass	S5000F UoF Security Classification
sensorDetectionRange	ValueRangePropertyType	sensorDetectionRange is the range of values measured by the SensorType.	SensorType	S5000F UoF Serialized Product Health Monitoring

Data element	Type	Definition	Class/interface	UoF
sensorIdentifier	IdentifierType	sensorIdentifier is a string of text that uniquely identifies a Sensor and differentiates it from any other Sensor.	Sensor	S5000F UoF Serialized Product Health Monitoring
sensorName	TextPropertyType	sensorName is a string of text that is used to commonly refer to a sensor of a specific type.	Sensor	S5000F UoF Serialized Product Health Monitoring
sensorSamplingMode	ClassificationType	sensorSamplingMode is a classification of the type of sensor sampling if it can provide multiple samples or error codes.	SensorSampling	S5000F UoF Serialized Product Health Monitoring
sensorSamplingRate	ValueRangePropertyType	sensorSamplingRate is the frequency by which a SensorType measures values.	SensorType	S5000F UoF Serialized Product Health Monitoring
sensorSamplingTime	DateTimeType	sensorSamplingTime is the moment in time where the sensor reading took place.	SensorSampling	S5000F UoF Serialized Product Health Monitoring
sensorSamplingValue	SinglePropertyType	sensorSamplingValue is the value measured by the sensor at the moment of the sampling.	SensorSampling	S5000F UoF Serialized Product Health Monitoring
sensorSensitivity	ValueRangePropertyType	sensorSensitivity is the range of values that a SensorType can measure.	SensorType	S5000F UoF Serialized Product Health Monitoring
serializedHardwarePartInServicePeriod	DateRange	serializedHardwarePartInServicePeriod is a date range during which the serialized hardware part was in service.	SerializedHardwarePart	S5000F UoF Equipment
serializedHardwarePartManufacturingDate	DateType	serializedHardwarePartManufacturingDate is the date when the Equipment was manufactured.	SerializedHardwarePart	S5000F UoF Equipment
serializedItemWarrantyPeriod	DateRange	serializedItemWarrantyPeriod is the period of time during which the warranty for a SerializedItem is in effect.	SerializedItemWarranty	S5000F UoF Warranty

Data element	Type	Definition	Class/interface	UoF
serializedItemWarrantyType	ClassificationType	serializedItemWarrantyType is a classification that allows to categorize a SerielizedItem warranty.	SerializedItemWarranty	S5000F UoF Warranty
serializedPartIdentifier	IdentifierType	serializedPartIdentifier is a string of characters that allows to uniquely identify a SerializedHardwarePart within a set of SerializedHardwareParts of the same type.	SerializedHardwarePart	S5000F UoF Equipment
serializedProductVariantAssignmentDate	DateType	serializedProductVariantAssignmentDate is the date at which a specific serializedProductVariant was assigned to perform a specific OperationalRole.	SerializedProductVariantAssignment	S5000F UoF Fleet Planning and Vehicle Assignment
serializedProductVariantAssignmentIdentifier	IdentifierType	serializedProductVariantAssignmentIdentifier is an unique identifier that unambiguously allows to identify different OperationalRole assignments to individual serializedProductVariants as specific moments in time ("tasking").	SerializedProductVariantAssignment	S5000F UoF Fleet Planning and Vehicle Assignment
serializedProductVariantAssignmentStatus	ClassificationType	serializedProductVariantAssignmentStatus is a classification that allows to determine the status of an assignment of a serializedProductVariant to carry out a specific OperationalRole.	SerializedProductVariantAssignment	S5000F UoF Fleet Planning and Vehicle Assignment
serializedProductVariantAssignmentType	ClassificationType	serializedProductVariantAssignmentType is a classification that allows to define the type of assignment of a specific serializedProductVariant to an OperationalRole.	SerializedProductVariantAssignment	S5000F UoF Fleet Planning and Vehicle Assignment
serializedProductVariantAvailabilityDate	DateType	serializedProductVariantAvailabilityDate is date for which the availability of a SerializedProductVariant is reported.	SerializedProductVariantAvailability	S5000F UoF Product and Fleet Availability

Data element	Type	Definition	Class/interface	UoF
serializedProductVariantAvailabilityDescription	DescriptorType	serializedProductVariantAvailabilityDescription is a narrative statement clarifying the status of the ProductVariantAvailability.	SerializedProductVariantAvailability	S5000F UoF Product and Fleet Availability
serializedProductVariantAvailabilityReportingDate	DateType	serializedProductVariantAvailabilityReportingDate is the date at which the serializedProductVariantAvailability was reported.	SerializedProductVariantAvailability	S5000F UoF Product and Fleet Availability
serializedProductVariantAvailabilityStatus	StateType	serializedProductVariantAvailabilityStatus is a classification that indicates the avaialbility of a SerializedProductVariant at a specific date.	SerializedProductVariantAvailability	S5000F UoF Product and Fleet Availability
serializedProductVariantConformancePeriod	DateRange	serializedProductVariantConformancePeriod is a range of dates during which the SerializedProductVariance complied with a specific allowed configuration.	SerializedProductVariantConformance	S5000F UoF As-desired Configuration
serializedProductVariantEndOfServiceDate	DateType	serializedProductVariantEndOfServiceDate is the date at which the serialized product variant was retired from service.	SerializedProductVariant	S5000F UoF Serialized Product Variant
serializedProductVariantEntryIntoServiceDate	DateType	The date at which the serialized product variant entered into service.	SerializedProductVariant	S5000F UoF Serialized Product Variant
serializedProductVariantIdentifier	IdentifierType	serializedProductVariantIdentifier is an unique identifier that allows to differentiate between different SerializedProductVariants of a same ProductVariant.	SerializedProductVariant	S5000F UoF Serialized Product Variant
serializedProductVariantInServiceStatus	StateType	serializedProductVariantInServiceStatus is a state describing the operational status of the SerializedProductVariant.	SerializedProductVariant	S5000F UoF Serialized Product Variant

Data element	Type	Definition	Class/interface	UoF
serializedProductVariantManufacturingDate	DateType	serializedProductVariantManufacturingDate is the date at which the manufacturing of a SerializedProductVariant was finished.	SerializedProductVariant	S5000F UoF Serialized Product Variant
serializedProductVariantOperatingBasePeriod	DateRange	serializedProductVariantOperatingBasePeriod is a range of dates during which a SerializedProductVariant was operating at a specific OperatingBase.	SerializedProductVariantOperatingBase	S5000F UoF Serialized Product Variant
serializedProductVariantOperatorDuring	DateRange	serializedProductVariantOperatorDuring is the period of time during which the SerializedProductVariant was operated by a specific operator.	SerializedProductVariantOperator	S5000F UoF Serialized Product Variant
serializedProductVariantOwnerDuring	DateRange	serializedProductVariantOwnerDuring is a date range that indicates during which time a SerializedProductVariantOwner held ownership of a SerializedProductVariant.	SerializedProductVariantOwner	S5000F UoF Serialized Product Variant
serializedProductVariantOwnerRatio	NumericalPropertyType	serializedProductVariantOwnerRatio is the percentage of ownership of the SerializedProductVariantOwner during the period of time defined for that ownership period.	SerializedProductVariantOwner	S5000F UoF Serialized Product Variant
serializedProductVariantStatusPeriod	TimePeriod	serializedProductVariantStatusPeriod is the period during which a SerializedProductVariant had a specific operational status.	SerializedProductVariantStatus	S5000F UoF Logbook Entry
serializedProductVariantStatusValue	StateType	serializedProductVariantStatusValue is a classification that indicates the status of a SerializedProductVariant during a specific period of time.	SerializedProductVariantStatus	S5000F UoF Logbook Entry
serviceBulletinCost	SingleValuePropertyType	serviceBulletinCost is the monetary cost of a ServiceBulletin.	ServiceBulletin	S5000F UoF Change Embodiment

Data element	Type	Definition	Class/interface	UoF
serviceBulletinEmbodimentLimit	DateType	serviceBulletinEmbodimentLimit is a Date by which a ServiceBulletin must be mandatorily embodied.	ServiceBulletin	S5000F UoF Change Embodiment
serviceBulletinPriority	ClassificationType	serviceBulletinPriority is a classification that determines the urgency with which a ServiceBulletin should be embodied.	ServiceBulletin	S5000F UoF Change Embodiment
serviceBulletinType	ClassificationType	serviceBulletinType is classification that allows to group different types of ServiceBulletins.	ServiceBulletin	S5000F UoF Change Embodiment
serviceContractPeriod	DateRange	serviceContractPeriod is the period of time during which a Service is associated to a Contract.	ServiceContract	S5000F UoF Service Contract Management
serviceDescription	DescriptorType	serviceDescription is a narrative statement explaining a Service.	Service	S5000F UoF Service Contract Management
serviceLevelAgreementClauseDescription	DescriptorType	serviceLevelAgreementClauseDescription is a narrative statement of the meaning of serviceLevelAgreementClause.	ServiceLevelAgreementClause	S5000F UoF Service Level Agreement Clause
serviceRequestDateTime	DateTimeType	serviceRequestDateTime is teh date and time at which a ServiceRequest has been made.	ServiceRequest	S5000F UoF Service Request
serviceRequestDescription	DescriptorType	serviceRequestDescription is a narrative statement explaining the ServiceRequest.	ServiceRequest	S5000F UoF Service Request
serviceRequestIdentifier	IdentifierType	serviceRequestIdentifier is a string of text that uniquely identifies a ServiceRequest and differentiates it from other ServiceRequests.	ServiceRequest	S5000F UoF Service Request
serviceRequestLocationDuring	DateRange	serviceRequestlocationDuring is the period during which the service is requested at a specific location.	ServiceRequestLocation	S5000F UoF Service Request

Data element	Type	Definition	Class/interface	UoF
serviceRequestLocationNotes	DescriptorType	serviceRequestLocationNotes is a textual narrative providing clarifications about when the location where the service has t be provided.	ServiceRequestLocation	S5000F UoF Service Request
serviceRequestName	DescriptorType	serviceRequestName is a string of characters by which a ServiceRequest is commonly known.	ServiceRequest	S5000F UoF Service Request
serviceRequestPartyRole	ClassificationType	serviceRequestpartyRole is a classification that allows to determine the role of a Party regarding a ServiceRequest.	ServiceRequestParty	S5000F UoF Service Request
serviceRequestRelationshipType	ClassificationType	serviceRequestRelationshipType is a classification that defines the type of relationship between two ServiceRequests.	ServiceRequestRelationship	S5000F UoF Service Request
serviceRequestType	ClassificationType	serviceRequestType is a classification that allows to group different types of ServiceRequests.	ServiceRequest	S5000F UoF Service Request
serviceRequestUrgency	ClassificationType	serviceRequestUrgency is a classification that allows to determine how urgent a ServiceRequest is.	ServiceRequest	S5000F UoF Service Request
shopFindingsDescription	DescriptorType	shopFindingsDescription is a narrative text explaining the ShopFindings.	ShopFindings	S5000F UoF Shop Findings
shopFindingsFaultCode	ClassificationType	shopFindingsFaultCode is a classification that represents a fault code that the equipment under test has provided during the problem investigation.	ShopFindings	S5000F UoF Shop Findings
shopFindingsFaultConfirmed	ClassificationType	shopFindingsFaultConfirmed is a classification of the fault that has been confirmed as part of the shop findings.	ShopFindings	S5000F UoF Shop Findings

Data element	Type	Definition	Class/interface	UoF
shopFindingsIdentifier	IdentifierType	shopFindingsIdentifier is a string of characters that uniquely identifies a ShopFinding and differentiates it from other ShopFindings.	ShopFindings	S5000F UoF Shop Findings
shopReceivedDate	DateType	shopReceivedDate is the Date at which an equipment was received at a workshop for diagnostics.	ShopFindings	S5000F UoF Shop Findings
skillCode	IdentifierType	skillCode is a string of characters used to uniquely identify a Skill and to differentiate it from other Skills.	Skill	S5000F UoF Maintenance Personnel
skillLevelDescription	DescriptorType	skillLevelDescription is a phrase that gives more information on the identified skill level.	SkillLevel	S5000F UoF Maintenance Personnel
skillLevelName	ClassificationType	skillLevelName is a classification which identifies a competency level.	SkillLevel	S5000F UoF Maintenance Personnel
specialSafetyInstructionApplicabilityDates	DateRange	specialSafetyInstructionApplicabilityDates is the period during which the SpecialSafetyInstruction must be applied.	SpecialSafetyInstruction	S5000F UoF Safety
specialSafetyInstructionPriority	ClassificationType	specialSafetyInstructionPriority is a classification that defines the urgency of a SpecialSafetyInstruction.	SpecialSafetyInstruction	S5000F UoF Safety
state	char	state is a character that represents the state of an item as part of a process.	StateType	S5000F Primitives
state	StateType	state is a StateType representing the state of an item at a specific date as part of a process.	DatedState	S5000F Compound Attributes
stateDate	DateType	stateDate is the date at which an item changed its state.	DatedState	S5000F Compound Attributes

Data element	Type	Definition	Class/interface	UoF
stateReason	DescriptorType	stateReason is a descriptive narrative statement explaining the reason for the change of state.	DatedState	S5000F Compound Attributes
strainGaugeFactor	SingleValuePropertyType	strainGaugeFactor is the gauge factor (also called strain factor) of a StrainGauge.	StrainGauge	S5000F UoF Serialized Product Health Monitoring
subtaskDescription	DescriptorType	subtaskDescription is a phrase that gives more information on the subtask procedure.	SubtaskByDefinition	S5000F UoF Maintenance Program
subtaskDuration	PropertyType	subtaskDuration is the average time expended, regardless of the number of personnel working simultaneously, required for the performance of the subtask.	SubtaskByDefinition	S5000F UoF Maintenance Program
subtaskEndItemObjectiveState	ClassificationType	subtaskEndItemObjectiveState is a classification which defines the state that will exist after the accomplishment of the subtask.	SubtaskByDefinition	S5000F UoF Maintenance Program
subtaskIdentifier	IdentifierType	subtaskIdentifier is a string of characters used to uniquely identify a Subtask and to differentiate it from other Subtasks	Subtask	S5000F UoF Maintenance Program
subtaskMaintenanceLocation	ClassificationType	subtaskMaintenanceLocation is a classification which indicates where the maintenance task will be carried out in terms of a product (end item or major assembly).	SubtaskByDefinition	S5000F UoF Maintenance Program
subtaskName	DescriptorType	subtaskName is a word or phrase by which a subtask is known and can be easily referenced.	SubtaskByDefinition	S5000F UoF Maintenance Program
subtaskRole	ClassificationType	subtaskRole is a classification which identifies if the subtask is required for preparation, core, or close-up purposes.	Subtask	S5000F UoF Maintenance Program
subtaskTimelineEvent	ClassificationType	subtaskTimelineEvent is a classification which identifies the starting point for subtask under consideration in relation to	SubtaskTimeline	S5000F UoF Maintenance Program

Data element	Type	Definition	Class/interface	UoF
		the start or end point of the subtask playing the role of its predecessor.		
subtaskTimelineLag	PropertyType	subtaskTimelineLag is the time between the related subtask timeline event (start/end) and the start for the subtask under consideration.	SubtaskTimeline	S5000F UoF Maintenance Program
suppliesUsedAmount	SingleValuePropertyType	suppliesUsedAmount is the amount of supply items used for a MaintenanceActivity.	SuppliesUsed	S5000F UoF Maintenance Activity
supportEquipmentCalibrationRequired	bool	supportEquipmentCalibrationRequired is a classification that indicates whether a support equipment requires calibration.	SupportEquipment	S5000F UoF Maintenance Activity
supportEquipmentDimensions	3DDimension	supportEquipmentDimensions are the maximum dimensions of the SupportEquipment (length, width, height).	SupportEquipment	S5000F UoF Maintenance Activity
supportEquipmentPower	PropertyType	supportEquipmentPower indicates the type of power that a support equipment requires.	SupportEquipment	S5000F UoF Maintenance Activity
supportEquipmentType	ClassificationType	supportEquipmentType is a classification that allows to group different types of support equipment.	SupportEquipment	S5000F UoF Maintenance Activity
supportEquipmentUsedAmount	int	supportEquipmentUsedAmount is the number of a specific SupportEquipment that has been used in a MaintenanceActivity.	SupportEquipmentUsed	S5000F UoF Maintenance Activity
supportEquipmentUsedDuration	SingleValuePropertyType	supportEquipmentUsedDuration is the time that the SupportEquiment is used during a MaintenanceActivity.	SupportEquipmentUsed	S5000F UoF Maintenance Activity
supportEquipmentWeight	SingleValuePropertyType	supportEquipmentWeight is the weight of the SupportEquipment.	SupportEquipment	S5000F UoF Maintenance Activity

Data element	Type	Definition	Class/interface	UoF
taskDuration	PropertyType	taskDuration is the average time expended, regardless of the number of personnel working simultaneously, required for the performance of a task, scheduled or unscheduled.	TaskRevision	S5000F UoF Maintenance Program
taskIdentifier	IdentifierType	taskIdentifier is a string of characters used to uniquely identify a Task and to differentiate it from other Tasks.	Task	S5000F UoF Maintenance Program
taskName	DescriptorType	taskName is a word or phrase by which a task is known and can be easily referenced.	TaskRevision	S5000F UoF Maintenance Program
taskOperabilityImpact	ClassificationType	taskOperabilityImpact is a classification that indicates the operational status and mission readiness of the end item during the task.	TaskRevision	S5000F UoF Maintenance Program
taskPersonnelSafetyCriticality	ClassificationType	taskPersonnelSafetyCriticality is a classification that identifies the most serious health aspects that the performance of the task can pose on personnel performing the task.	TaskRevision	S5000F UoF Maintenance Program
taskProductIntegrityCriticality	ClassificationType	taskProductIntegrityCriticality is a classification that identifies whether the task is critical if failure to accomplish it would result in adverse effects on system reliability, efficiency, effectiveness, safety, or cost.	TaskRevision	S5000F UoF Maintenance Program
taskRevisionChangeDescription	DescriptorType	taskRevisionChangeDescription is a phrase that gives more information on changes introduced between two revisions of a task.	TaskRevision	S5000F UoF Maintenance Program
taskRevisionIdentifier	IdentifierType	taskRevisionIdentifier is a string of characters used to uniquely identify a TaskRevision and to differentiate it from other TaskRevisions.	TaskRevision	S5000F UoF Maintenance Program

Data element	Type	Definition	Class/interface	UoF
taskRevisionStatus	ClassificationType	taskRevisionStatus is a classification which identifies the progress on the definition of a task revision.	TaskRevision	S5000F UoF Maintenance Program
taskTotalLaborTime	PropertyType	taskTotalLabourTime is the total time expended within a task. Includes the labor time for all required personnel resources.	TaskRevision	S5000F UoF Maintenance Program
technicalOrderPriority	ClassificationType	technicalOrderPriority is a classification that indicates the urgency with which an TechnicalOrder has to be implemented.	TechnicalOrder	S5000F UoF Change Embodiment
technicalOrderRequiredImplementationDate	DateType	technicalOrderRequiredImplementationDate is the mandatory date by which the TechnicalOrder has to be executed.	TechnicalOrder	S5000F UoF Change Embodiment
temporaryClassificationType	ClassificationType	temporaryClassificationType is a classification that is used to group an item with similar items.	TemporaryClassification	S5000F Compound Attributes
temporaryClassificationValidity	DateRange	temporaryClassificationValidity is a date range or period of time during whcih a TemporaryClassification is valid.	TemporaryClassification	S5000F Compound Attributes
temporaryIdentifier	IdentifierType	temporaryIdentifier is a string of text that temporarily uniquely identifies an item and differentiates it from other items.	TemporaryIdentifier	S5000F Compound Attributes
temporaryIdentifierValidity	DateRange	temporaryIdentifierValidity is a period of time during which a TemporaryIdentifier is valid.	TemporaryIdentifier	S5000F Compound Attributes
textValue	char	The string that is the element of representation.	TextPropertyType	S5000F Primitives
timedState	StateType	state is a StateType representing the state of an item at a specific date and time as part of a process.	TimestampedState	S5000F Compound Attributes

Data element	Type	Definition	Class/interface	UoF
timedStateReason	DescriptorType	timedStateReason is a descriptive narrative statement explaining the reason for the change of state.	TimestampedState	S5000F Compound Attributes
timedStateTimestamp	DateTimeType	timedStateTimeStamp is the time at which an item changed its state.	TimestampedState	S5000F Compound Attributes
timeRangeFrom	DateTimeType	timeRangeFrom is a DateTime where a TimeRange begins.	TimeRange	S5000F Compound Attributes
timeRangeUntil	DateTimeType	timeRangeUntil is a DateTime where a TimeRange ends.	TimeRange	S5000F Compound Attributes
timeSinceClassifier	ClassificationType	Time Since New, Time Since Overhaul, Time Since Check, Time Since Visit, Time Since Installation, Time Since Repair	TimeSince	S5000F Compound Attributes
timeSinceValue	SingleValuePropertyTyp e	timeSinceType is a classification that allows to determine since when a specific time is measured.	TimeSince	S5000F Compound Attributes
tradeName	ClassificationType	tradeName is a classification which identifies the type of occupation.	Trade	S5000F UoF Maintenance Personnel
unit	ClassificationType	The unit with which the quantity is expressed.	NumericalProperty Type	S5000F Primitives
upperLimitValue	double	The upper limit of a value range.	ValueRangePropert yType	S5000F Primitives
value	double	The value of the quantity.	SingleValueProperty Type	S5000F Primitives
valueDetermination	ClassificationType	logBookEntryComment is a textual wording providing additional information to a logBookEntry.	PropertyType	S5000F Primitives

Data element	Type	Definition	Class/interface	UoF
valueRecordingTimeDate	DateTimeType	The date and time when the property value was recorded.	PropertyType	S5000F Primitives
warrantyClaimCommunicationMeans	ClassificationType	warrantyClaimCommunicationMeans is a classification that defines the means by which a WarrantyClaim was raised.	WarrantyClaim	S5000F UoF Warranty
warrantyClaimContactType	ClassificationType	warrantyClaimContactType is a classification that allows to group different types of WarrantyClaimContacts.	WarrantyClaimContact	S5000F UoF Warranty
warrantyClaimFilingDate	DateType	warrantyClaimFilingDate is the date at which the Warranty Claim has been sent.	WarrantyClaim	S5000F UoF Warranty
warrantyClaimFollowUpNotes	DescriptorType	warrantyClaimFollowUpNotes is a narrative text describing the follow-up of a WarrantyClaim.	WarrantyClaimFollowUp	S5000F UoF Warranty
warrantyClaimIdentifier	IdentifierType	warrantyClaimIdentifier is a string of text that uniquely identifies a WarrantyClaim and differentiates it from other WarrantyClaims.	WarrantyClaim	S5000F UoF Warranty
warrantyClaimOccurrenceDate	DateType	warrantyClaimOccurrenceDate is the date at which the event that generated the claim occurred.	WarrantyClaim	S5000F UoF Warranty
warrantyClaimResolutionDate	DateType	warrantyClaimResolutionType is a classification that indicates the kind of resolution that was taken.	WarrantyClaimResolution	S5000F UoF Warranty
warrantyClaimResolutionDescription	DescriptorType	warrantyClaimResolutionDescription is a narrative text explaining the WarrantyClaimResolution.	WarrantyClaimResolution	S5000F UoF Warranty
warrantyClaimResolutionType	ClassificationType	warrantyClaimResolutionType is a <<classification>> that allows to group the WarrantyClaimResolutions by different criteria.	WarrantyClaimResolution	S5000F UoF Warranty

Data element	Type	Definition	Class/interface	UoF
warrantyClaimSettlementDate	DateType	warrantyClaimSettlementDate is the date at which the WarrantyClaim has been settled.	WarrantyClaim	S5000F UoF Warranty
warrantyClaimType	ClassificationType	warrantyClaimType is a classification that permits to group different types of WarrantyClaims.	WarrantyClaim	S5000F UoF Warranty
warrantyEventPeriod	DateRange	warrantyEventPeriod is the period of time during which the WarrantyEvent extended.	WarrantyEvent	S5000F UoF Warranty
warrantyEventReason	ClassificationType	warrantyEventReason is a classification that describes the type of WarrantyEvent.	WarrantyEvent	S5000F UoF Warranty
width	SingleValuePropertyType	width is the measurement or extent of an item from side to side.	3DDimension	S5000F Compound Attributes
workBreakdownDescription	DescriptorType	workBreakdownDescription is a narrative statement explaining the WorkBreakdown.	WorkBreakdown	S5000F UoF Contract Breakdown
workBreakdownIdentifier	IdentifierType	workBreakdownIdentifier is a string of text that uniquely identifies a WorkBreakdown, allowing to differentiate it from all other WorkBreakdowns.	WorkBreakdown	S5000F UoF Contract Breakdown
workBreakdownName	DescriptorType	workBreakdownName is a word or phrase by which the WorkBreakdown is commonly known.	WorkBreakdown	S5000F UoF Contract Breakdown
workBreakdownRevisionIdentifier	IdentifierType	workBreakdownRevisionIdentifier is a string of characters which uniquely identifies a WorkBreakdownRevision.	WorkBreakdownRevision	S5000F UoF Contract Breakdown
workBreakdownRevisionStatus	ClassificationType	workBreakdownRevisionStatus is a classification that defines the situation of a WorkBreakdownRevision.	WorkBreakdownRevision	S5000F UoF Contract Breakdown

Data element	Type	Definition	Class/interface	UoF
workItemDescription	DescriptorType	workItemDescription is a narrative statement explaining what the WorkItem is.	WorkItem	S5000F UoF Contract Breakdown
workItemIdentifier	IdentifierType	workItemIdentifier is a string of characters that uniquely identifies a WorkItem.	WorkItem	S5000F UoF Contract Breakdown
workItemPeriod	DateRange	workItemPeriod is the period during which a WorkItem has to take place.	WorkItem	S5000F UoF Contract Breakdown
workItemRelationshipType	ClassificationType	workItemRelationshipType is a classification indicating the relationship type between two WorkItems.	WorkItemRelationship	S5000F UoF Contract Breakdown
workItemStatus	ClassificationType	workItemStatus is a classification that defines the situation of a WorkItem.	WorkItem	S5000F UoF Contract Breakdown
workItemTimelineEvent	ClassificationType	workItemTimelineEvent is a classification which identifies the starting point for the WorkItem under consideration in relation to the start or end point of the WorkItem playing the role of its predecessor, if any.	WorkItemRelationship	S5000F UoF Contract Breakdown
workItemTimelineLag	PropertyType	workItemTimelineLag is the time between the related WorkItem timeline event (start/end) and the start for the WorkItem under consideration.	WorkItemRelationship	S5000F UoF Contract Breakdown
workItemType	ClassificationType	workItemType is a classification that allows to define different categories of work for a WorkItems.	WorkItem	S5000F UoF Contract Breakdown
workOrderDateRaised	DateType	workOrderDateRaised is the date at which the work order was raised.	WorkOrder	S5000F UoF Maintenance Activity

Data element	Type	Definition	Class/interface	UoF
workOrderDescription	DescriptorType	workOrderDescription is a narrative statement explaining the WorkOrder.	WorkOrder	S5000F UoF Maintenance Activity
workOrderExecutionPeriod	TimeRange	workOrderExecutionPeriod is the period of time during which the work order has to be carried out.	WorkOrder	S5000F UoF Maintenance Activity
workOrderIdentifier	IdentifierType	workOrderIdentifier is a string of text that uniquely identifies a WorkOrder and allows to distinguish it from other WorkOrders.	WorkOrder	S5000F UoF Maintenance Activity
workOrderStatus	StateType	workOrderStatus is a state describing the current status of the WorkOrder.	WorkOrder	S5000F UoF Maintenance Activity
workOrderType	ClassificationType	workOrderType is a classification that allows to group different WorkOrders of similar characteristics.	WorkOrder	S5000F UoF Maintenance Activity
zoneElementType	ClassificationType	zoneElementType is a classification that identifies further specialization of a ZoneElement.	ZoneElement	CDM UoF Zone Element

Chapter 18

Tailoring and contracting against S5000F

Table of contents

List of tables

List of figures

References

Table 1 References

Chap No./Document No.	Title
Chap 1	Introduction
Chap 14	Feedback of non-predefined information
Chap 15.5	Mapping of use cases to individual UoFs
Chap 16	Data exchange
Chap 19	Data required for the different use cases
SX000i	International guide for the use of the S-Series Integrated Logistics Support (ILS) specifications

1 General

1.1 Introduction

The purpose for this chapter is to define the general rules to be followed when tailoring or contracting against this specification, thus providing a contractual framework that can be invoked between two parties.

1.2 Scope

The scope of this chapter only extends to tailoring and contractual aspects, and does not cover the data model itself, the data to be exchanged or the mechanism of such exchange, only the means to agree to such exchange.

2 Tailoring

Tailoring of the specification is basically adapting it for a specific purpose and is therefore not different from the contracting steps listed below, as the tailoring is usually part of the contract or technical negotiations.

In order to tailor the specification for internal purposes without a contract, proceed with the steps listed in Para 3, Para 4.1 and Para 4.2 below. In this case, simply replace the word “Contract” by “Agreement between involved organizations”. In this particular case, Para 4.3 is not necessary but is strongly recommended.

3 Basic contracting process

3.1 Contracting principles

As every contracting process is different due to different contractual environments and applicable laws, S5000F provides a simple mechanism for contracting: All data are directly associated to the use of such data (use cases). Thus, the contracting mechanism would not be associated to the data itself, but rather to the activity to be carried out that requires such data. That is, a contract will define the use cases (activities) to be carried out by the contractor and customer, and the data required for that particular use case will be delivered by the customer or contractor, as applicable, depending on who will carry out the activity.

Note that S5000F does not indicate the direction of the data flow, because the same activities can be performed by different actors, depending on the contract. The receiver of the data will always be the party carrying out the activity for which the data is required.

There may be however the need for certain data that are not directly associated to a certain activity. This information may be necessary from a legal or controlling point of view, or on

specific customer request. This is a special case that has been also considered in the contracting process.

3.2 Contracting steps

The contracting process can be defined as follows:

3.2.1 Activity contracting

The customer and the contractor shall agree on the activities to be carried out by the contractor and the customer. It is recommended to define all activities in such a way that each of them maps exactly to one single use case as defined in S5000F.

The associated use cases for each activity will be identified in the different chapters. If no equivalent use case is found for a certain activity, proceed as indicated in Para 3.2.3.

The contract shall also define the basic data delivery intervals required to perform each activity in a reasonable manner. Note that different activities might require different data delivery intervals, ranging from real-time delivery to a monthly delivery.

This activities and their required information shall be included in the work breakdown structure.

The basic contractual data to be delivered for each work item (activity) are those that correspond to the associated use case in S5000F. For that purpose, the tables provided in Chap 19 and the use cases of each chapter are the only normative portion of the specification and shall be called upon in the contract for the definition of the data to be provided. The rest of the specification shall be treated as informative.

3.2.2 Shared activities

Note that in case an activity is shared by several parties, it must be documented who will provide the data for the activity to be carried out and who is responsible for providing the resulting data from the activity. This is particularly important for reporting purposes. Normally, the party that must provide the resulting data for a specific activity is the party that is accountable for such activity.

3.2.3 Special activities

If an activity to be carried out contractually is not defined as a use case in the S5000F specification, the recommended way to contract such an activity in accordance with this specification is as follows:

1 Identify the Units of Functionality (UoFs) that provide the necessary information to carry out that activity, in a similar way as performed in Chap 15.5.

2 Within each UoF, identify the classes that provide the necessary data, including the intermediate classes that provide the required relationships between the data.

3 Create a table similar to those listed in Chap 19 and include it in the contract or work breakdown structure document, associated to that particular activity, together with the exchange frequency. Alternatively, the Technical data exchange document defined in Para 4.3 can be used for this purpose.

It is recommended that, should such special activities be encountered, a comment is raised against S5000F (see Chap 1) defining the activity and required UoFs/classes, so as to include it in a future S5000F issue as a new use case.

3.2.4 Reporting

Each individual program will have different reporting requirements. S5000F provides a mechanism for providing reports in a structured way that can be automatically processed. S5000F however does not mandate explicit reporting information, as this will be usually specific to each program.

To define the reporting in a contractual manner, the contract shall define the information that needs to be exchanged for reporting purposes and its periodicity. This will usually be in the form of Key Performance Indicators (KPIs), activity reporting and textual information. The UoF Reporting, UoF Reportable Activity, UoF Cost Entries and UoF Service Contract Management will cover probably most of the reporting requirements.

4 Contract details

No matter how descriptive a contract is, there are always technical details that might escape the global negotiation or that are left for later agreement in order to speed up the contractual negotiations. For this purpose, it is recommended to have a guidance conference to establish the main exchange agreements/framework and a technical exchange document defining the detailed exchange parameters. Both the guidance conference and the technical data exchange document shall be called upon in the contract.

The guidance conference must be held after a global ILS guidance conference has been held as required by SX000i, and ideally after the guidance conference of the individual ILS elements that are affected by this data exchange, so as to ensure that their data feedback requirements are properly covered.

4.1 Guidance conference

It is recommended to hold a guidance conference between all parties affected by the S5000F exchange so as to:

- Agree implementation timescales
- Define organizational aspects
- Define the exchange mechanism
- Confirm the data delivery responsibilities
- Define data security and access
- Define the data exchange frequency
- Refine the agreed data exchange
- Define project-specific values and data
- Define master data sources
- Define specific Business Rules
- Define data analysis guidelines
- Data quality and data feedback reporting
- Any other aspect that might require agreement regarding the data exchange

The results of the agreements of this guidance conference shall be documented in a technical data exchange document.

The following paragraphs provide a more detailed description of these aspects.

4.1.1 Agree implementation timescales

Normally, an IT system needs to be put in place to carry out the exchange. Even though the contract will define a specific data for the exchange system to be in place, it is necessary to test it before going “live”, and an agreement is required between both sides about when such testing will be performed, as both will have to commit resources for this purpose.

4.1.2 Define organizational aspects

It is necessary to identify on both sides the organizations that are involved in the exchange, including technical focal points for IT problems or data quality issues, so as to be able to quickly solve potential problems.

4.1.3 Define the exchange mechanism

This can be either “pull” (the receiving party extracts the data) or “push” (the data is sent by the data originating party). The usual mechanism is “push”, because the party sending the data is usually the one that knows when the data is ready. Similarly, the exchange can be synchronous or asynchronous. The exchange method can be also by means of FTP, http, web services or similar, and needs to be agreed. It is necessary to agree on the data exchange handshake, and also to ensure that this handshake effectively occurs, including error recovery. Finally, it is necessary to define whether the data will be sent in full or only the modified (“delta”) data will be exchanged.

4.1.4 Confirm the data delivery responsibilities

Normally, the responsible for delivering a data set for a specific activity will be already established in the contract. However, lower-level data exchanges might not have been covered. The Guidance Conference must in that case ensure that all data exchanges have a responsible assigned for such data delivery, including the responsibility for data quality. It is recommended that the data exchanges are defined at Use Case level. The responsibility for defining Master Data should be also established at the Guidance Conference.

4.1.5 Define data security and access

If not contractually specified, it is necessary to agree on the security classification of the data, the security of the networks and encryption mechanisms for the data exchange. It must be defined whether there are restrictions on the access to the data that is being provided, and whether it can be mixed or not with data from other customers or a physical or functional segregation is required.

Part of the data access agreements might include read/write rights by individual organizations. If not already contractually established, these agreements might also cover the intellectual property of the created data, but also of the processed data (analysis results).

Note that such restrictions might also have an impact on other contractual aspects. (Eg, if data cannot be consolidated, a comparison analysis of customer fleet behavior in respect to the overall fleet behavior –across all customers– cannot be performed and this will mask potential fleet problems.)

4.1.6 Define the data exchange frequency

This frequency will be usually established based on the activity for which the data is required. An activity that is performed once a month (e.g., reliability analysis) does not require a daily data exchange. Other activities (e.g., fleet management) might however require data to be exchanged in (near) real time. Typical exchange rates will be quarterly, monthly, weekly or daily. In special cases, hourly or real-time exchange might be required. Depending on the activity, specific dates might also be required for the data delivery (e.g., one week before the activity is due to start, due to data processing requirements).

There might be also restrictions on the times at which the data can be exchanged (e.g., only at certain hours or on certain days) due to infrastructure issues or security constraints.

4.1.7 Refine the agreed data exchange

The tables provided in Chap 19 provide a good overview of what data is required for each use case/contractual activity. However, in some cases there might be issues because some data might be simply not available for one or several products or because the effort to collect it does not justify the benefit of receiving that information. This requires that in some cases the tables in Chap 19 will have to be rewritten with mutual agreement.

4.1.8 Define project-specific values and data

If not already identified in the contract, it will be necessary to agree on project-specific values (e.g., a special data classification for a particular attribute), so as to include it in the project-specific values XML file. The standard S5000F allowed values, supplemented by the project-

specific values, are commonly referred to as reference data. Reference data (eg, country codes, units of measure or project codes) usually does not change much over the lifetime of a project, thought it might require periodic revisions.

Similarly, there might be a need for a specific project data set that is not covered in the standard S5000F data elements set. This specification provides the means to include project-specific data, but it is necessary to define such data, as well as its data types. Refer to Chap 14 for the definition of project-specific data.

4.1.9 Define master data and primary data sources

It is necessary to define standard business objects that need to be referred to across the project and across all involved systems (organizations, locations, etc). This information, commonly referred to as master data, needs to be managed by a single entity, in order to ensure data consistency. Given that master data tends to change over the lifetime of a project, the guidance conference needs to nominate a single responsible for the maintenance of the master data, and the process to update such master data in case any of the involved actors is aware of a necessary change.

Though not always necessary, in some cases it might be also required to specify which data sources will be used as the primary data for the delivery of the information. This is especially true if certain data can come from several systems and might be subject to transformation and/or different validation rules within those systems. In that case, it becomes essential to ensure that all parties reference the same data from the same source. For example, flight hours can be extracted by electronic operators, an aircraft/helicopter logbook or by a ground station. The usage of different primary data sources by the different parties involved in a project will inevitably lead to serious data quality issues.

4.1.10 Define specific Business Rules

S5000F provides a mechanism for data exchange. It does however not mandate specific business rules for data validation, which must be defined by a project. Such rules might for example require that part identifiers are based on a NATO Stock Number (NSN), have a specific part number range or adhere to a project-specific codification. The guidelines should in particular consider the data quality section included in Chap 16.

4.1.11 Define data analysis guidelines

If data analysis is required, the rules for such data analysis must be agreed, including potential analysis extensions such as root cause analysis for anomalies detected during the analysis.

4.1.12 Data quality and data feedback reporting

A specific reporting on the data feedback itself may be agreed, so as to ensure that the data feedback is adequate at all times. In particular, in is important to ensure that this data feedback report is used to continuously improve data quality at the data source systems when systematic data quality problems are detected and correct potentially incorrect source data. Note that this data feedback reporting can be also performed using S5000F constructs. A sample data feedback reporting is provided at Fig 1. S5000F does not mandate any specific data feedback report.

Data feedback report		
Project: XYZ Manufacturing robot line	Product: HiTech Rob-32	Reported by: Robot-X Associates
Reporting date: 2016-09-01	Reporting period: 2016-08	Days: 31
Messages received: 3765	Messages rejected: 23	Messages repeated: 11
Total data transfer: 1.7 Gbytes	Average message size: 459 kbytes	Average messages/day: 121.5
Message rejection rate: 0.61%	Message repetition rate: 0.16%	Transfer availability: 99.97%
Total data objects: 647581	Average data objects/message: 172	Non-predefined info files: 134
Messages rejected: 334, 476, 544, 545, 612, 752, 1033, 1489, 2131, 2541, 2917, 3002, 3047, 2541 Causes for message rejection: - Wrong sender/wrong recipient: 544, 545 - Invalid XML schema: 334, 2131, 2541, 3002 - Not S5000D data: 1033 - Business rule #12: 476, 3047 - Business rule #15: 752 - Corrupted information: 2917 - Other: 612, 1489		
Messages repeated: 734 (3x), 1095 (2x), 2376 (1x), 2917 (5x)	**Main reasons for message repetition:** Timeout, data corruption	
Data quality errors:		
Average data object errors: 2.6%	Dubious data object information: 0.7%	
Business rule violations: 1026	Average business rule violations: 0.16%	
Master data violations: 1720	Average master data violations: 2.54%	
Reference data violations: 955	Average reference data violations: 0.15%	
Top 5 BR violations: BR32, BR17, BR52, BR78, BR5 Top 5 MASTERDATA violations: Contract, Organization, Location, Facility, Fleet Top 5 REFDATA violations: unit, partsListType, securityClass, zoneElementType, amountCurrency Refer to Annex for detailed data quality report.		

ICN-B6865-S5000F18001-001-00

Fig 1 Sample top-level data feedback report

4.2 Additional technical meetings

It might be necessary to have additional technical meetings to refine the agreements of the Guidance Conference (eg, to discuss specific points between specialists). Additional technical meetings might be also required to reflect potential contract amendments, based on the updated technical requirements.

These meetings must be properly minuted, all agreements be properly documented, and such agreements will be included in the technical data exchange document.

4.3 Technical data exchange document

Not to be confused with an interface control document (ICD), which defines a technical interface between computer systems, the technical data exchange document provides a detailed description of the data exchange, including but not restricted to:

- Responsible organizations and contact points at both sides (for IT and data quality)
- Planning/implementation timescales (including testing)

- Infrastructure details (e.g., IP addresses)
- Help desk
- Reporting on exchange issues
- Security requirements (e.g., https, ftps, encryption mechanisms, etc.)
- Responsible for the maintenance of the master data and change process for such data
- Responsible for delivery of each individual data set and delivery frequency
- Exchange mechanisms
- Exact data to be exchanged (copying the tables from Chap 19 as necessary, including changes agreed at the Guidance Conference/additional technical meetings)
- XML schema for project-specific values
- Business rules for data validation
- Service-level agreement, exchange times (if synchronous)

The technical data exchange document will be an official delivery and shall be considered as being contractual. This document will contain all technical aspects agreed at the Guidance Conference and possible ad-hoc additional technical meetings. It will be approved by both parties involved in the exchange and its modifications must be properly approved by authorized personnel.

Chapter 19

Data required for the different use cases

Table of contents

List of tables

References

Table 1 References

Chap No./Document No.	Title
Chap 3	Feedback data for the purpose of reliability, availability, maintainability, capability and testability analysis
Chap 4	Feedback of data for maintenance analysis
Chap 5	Feedback of safety data
Chap 6	Feedback of data for supply support
Chap 7	Feedback for Life Cycle Cost analysis
Chap 8	Feedback of data for warranty analysis
Chap 9	Feedback data for the purpose of product health and usage monitoring
Chap 10	Feedback of data to support obsolescence management
Chap 11	Feedback of integrated fleet management data
Chap 12	Feedback of data for configuration management
Chap 13	Feedback of data to support the management of in-service contracts
Chap 14	Feedback of non-predefined information
Chap 15	Data model
Chap 17	Data element list
Chap 18	Tailoring and contracting against S5000F

1 General

This chapter provides a mapping of the classes and data elements (attributes) as defined in the data model described in Chap 15 against the individual use cases described in the different chapters. The purpose of this mapping is to enable a quick determination of what information is required to carry out the activities for a specific use case. This also permits to contract for such data as indicated in Chap 18.

2 Mapping of use cases against data model classes

The current section provides a detailed mapping of all data model classes to the use cases of each individual chapter, for easy cross-referencing.

2.1 Classes for reliability, availability, maintainability, capability and testability

The classes used for each RAMCT use case as defined in Chap 3 are listed in Table 2. In order to avoid having to cross-check the use case numbers, a summary of each use case is provided below:

The **Reliability** use cases are as follows:

1 Monitor the performance of equipment

2 Influencing future designs

3 Trends, Failures, Root Cause Analysis and Issue Warnings

The **Availability** use cases are as follows:

4 Operations and deployment support, through-life support and equipment availability

5 Maintenance Management and Contracting for availability

The **Maintainability** use cases are as follows:

6 Maintenance Activities, Effectiveness of repairs, Specified Maintenance, predict Maintenance Periods, products status

7 Retaining Performance, Support manuals and Support Infrastructure

The **Capability** use cases are as follows:

8 Mission capable, capability shortfalls

9 Efficiency, Performance against specification

The **Testability** use cases are as follows:

10 Can product be tested

11 Fault diagnosis, fault identification

Table 2 Classes used for RAMCT use cases

Class name	Reliability			Availa-bility		Main-taina-bility		Capa-bility		Testa-bility	
	1	2	3	4	5	6	7	8	9	10	11
Action	X	X	X	X	X	X	X	X	X	X	X

Class name	Reliability			Availa-bility		Main-taina-bility		Capa-bility		Testa-bility	
	1	2	3	4	5	6	7	8	9	10	11
Address				X	X	X		X		X	X
AllowedProductConfiguration	X	X	X	X	X	X	X	X	X	X	X
AllowedProductConfigurationByConfigurationIdentifier	X	X	X								
AllowedProductConfigurationHardwarePartAsDesigned	X	X	X								
AllowedProductConfigurationItem	X	X	X	X	X	X		X	X	X	X
AllowedProductConfigurationRole	X	X	X	X	X	X	X	X	X	X	X
AllowedProductOperationalConfigurationItem	X	X	X	X	X	X	X	X		X	X
AllowedRoleChange	X	X	X	X	X	X		X	X	X	X
AlternatePartAsDesignedRelationship	X	X	X	X	X	X	X	X	X	X	X
AND	X	X	X	X	X						
ApplicabilityAssertItem	X	X	X	X	X						
ApplicabilityAssignment	X	X	X	X	X						
ApplicabilityAssignmentItem	X	X	X	X	X					X	X
ApplicabilityEvaluation	X	X	X	X	X						
ApplicabilityEvaluationByApplicabilityStatementReference	X	X	X	X	X						
ApplicabilityEvaluationByAssertion	X	X	X	X	X						
ApplicabilityEvaluationByAssertionOfClassInstance	X	X	X	X	X						
ApplicabilityEvaluationByAssertionOfCondition	X	X	X	X	X						
ApplicabilityEvaluationByLogicalOperator	X	X	X	X	X						
ApplicabilityStatement	X	X	X	X	X						
ApplicableBlockOfSerializedEndItems	X	X	X								
AuthorityToOperate	X	X	X	X	X	X		X	X	X	X
Breakdown	X	X	X	X	X	X	X	X	X	X	X
BreakdownElement	X	X	X	X	X	X	X	X	X	X	X
BreakdownElementInZoneRelationship				X	X	X	X		X	X	X
BreakdownElementRevision	X	X	X	X	X	X	X	X	X	X	X

Class name	Reliability			Availa-bility		Main-taina-bility		Capa-bility		Testa-bility	
	1	2	3	4	5	6	7	8	9	10	11
BreakdownElementRevisionRelationship	X	X	X	X	X	X	X	X	X	X	X
BreakdownElementStructure	X	X	X	X	X	X	X	X	X	X	X
BreakdownElementStructureRelationship	X	X	X	X	X	X	X	X	X	X	X
BreakdownElementUsageInBreakdown	X	X	X	X	X	X	X	X	X	X	X
BreakdownItem	X	X	X	X	X	X	X	X	X	X	X
BreakdownRevision	X	X	X	X	X	X	X	X	X	X	X
CargoItem								X			
ChangeAuthorization	X	X	X	X	X	X		X			
ChangeControlledItem	X	X		X	X	X		X			
ChangeEffect	X	X		X	X	X		X			
ChangeEmbodimentRequirement	X	X	X	X	X	X	X	X		X	X
ChangeRequest	X	X	X	X	X	X	X	X		X	X
Comment	X	X	X	X	X	X	X	X	X	X	X
CommentedItem	X	X	X	X	X	X	X	X	X	X	X
CommentParty	X	X	X	X	X	X	X	X	X	X	X
CommentRelationship	X	X	X	X	X	X	X	X	X	X	X
CompetenceDefinitionItem		X	X	X	X	X	X			X	X
ConditionDefinitionItem	X	X	X	X	X						
ConditionInstance	X	X	X	X	X						
ConditionStatement	X	X	X	X	X						
ConditionType	X	X	X	X	X						
ConditionTypeClassValue	X	X	X	X	X						
ConditionTypePropertyValue	X	X	X	X	X						
ConditionTypeValue	X	X	X	X	X						
Consequence	X	X	X	X	X	X	X	X	X	X	X
ConsumableItem	X	X	X	X	X	X	X		X	X	X

Class name	Reliability			Availa-bility		Main-taina-bility		Capa-bility		Testa-bility	
	1	2	3	4	5	6	7	8	9	10	11
ContainedSubstance	X	X	X	X	X	X	X	X	X	X	X
Contract	X	X	X	X	X	X	X	X	X	X	X
ContractClause		X									
CostEntry	X	X	X	X	X	X	X	X		X	X
CostEntryRelatedTo	X	X	X	X	X	X	X	X	X	X	X
CostItem	X	X		X	X	X		X			
Damage	X	X	X	X	X	X	X	X	X	X	X
DatedApplicabilityStatement	X	X	X	X	X						
DetectionMean										X	X
DetectionMeanCapability										X	X
DetectionMechanism										X	X
Detector	X	X	X	X	X	X	X	X	X	X	X
Document	X	X	X	X	X	X	X	X	X	X	X
DocumentAssignment	X	X	X	X	X	X	X	X	X	X	X
DocumentAssignmentItem	X	X	X	X	X	X	X	X	X	X	X
DocumentIssue	X	X	X	X	X	X	X	X	X	X	X
DocumentItem	X	X	X	X	X	X	X	X	X	X	X
DocumentParty	X	X	X	X	X	X	X	X	X	X	X
DocumentRelationship	X	X	X	X	X	X	X	X	X	X	X
DownTimePeriod	X	X	X	X	X	X	X	X	X	X	X
Environment	X	X	X	X	X	X			X	X	X
EquipmentFault	X	X	X	X	X	X	X	X	X	X	X
EquipmentOperation	X	X	X	X	X	X	X	X	X	X	X
EquipmentOwner	X	X	X	X	X	X	X	X	X	X	X
EquipmentStatus	X	X	X	X	X	X	X	X	X	X	X
Event	X	X	X	X	X	X	X	X	X	X	X

Class name	Reliability			Availa-bility		Main-taina-bility		Capa-bility		Testa-bility	
	1	2	3	4	5	6	7	8	9	10	11
EventRelationship	X	X	X	X	X	X	X	X	X	X	X
ExplanatoryFactor	X	X	X	X	X	X	X	X	X	X	X
ExternalDocument	X	X	X	X	X	X	X	X	X	X	X
Facility	X	X	X	X	X	X	X	X		X	X
FacilityOperator				X	X	X		X		X	X
FacilityOwner				X	X	X		X		X	X
FacilityRelationship				X	X	X		X		X	X
Failure	X	X	X	X	X	X	X	X	X	X	X
FailureCause										X	X
FailureDetection										X	X
FailureMode										X	X
FailureModeEffect										X	X
Fleet	X	X	X	X	X	X	X	X	X	X	X
FleetAvailability	X	X		X	X	X	X	X		X	X
FleetPlanning								X			
FleetRequirement								X			
FleetTask								X			
FleetTaskCancellationNotice	X	X	X	X	X	X	X	X	X	X	X
FleetTaskList								X			
GPSLocation	X	X	X	X	X						
HardwareElement	X	X	X	X	X	X	X	X	X	X	X
HardwareElementPartRealization	X	X	X	X	X	X	X	X	X	X	X
HardwareElementRevision	X	X	X	X	X	X	X	X	X	X	X
HardwarePartAsDesigned	X	X	X	X	X	X	X	X	X	X	X
HardwarePartAsDesignedDesignData	X	X	X	X	X	X	X	X	X	X	X
HardwarePartAsDesignedSupportData	X	X	X	X	X	X	X	X	X	X	X

Class name	Reliability			Availa-bility		Main-taina-bility		Capa-bility		Testa-bility	
	1	2	3	4	5	6	7	8	9	10	11
InventoryActivity	X	X	X	X	X	X	X	X		X	X
ItemInAllowedProductConfiguration	X	X	X	X	X	X		X	X	X	X
ItemInAllowedProductOperationalConfiguration	X	X	X	X	X	X	X	X		X	X
ItemInProductVariant	X	X	X								
Location	X	X	X	X	X	X	X	X	X	X	X
Locator	X	X	X	X	X	X	X	X	X	X	X
LogBookEntry	X	X	X	X	X	X	X	X	X	X	X
LogBookEntryCounter	X	X	X	X	X	X	X	X	X	X	X
LogicalOperator	X	X	X	X	X						
MaintenanceActivity	X	X	X	X	X	X	X	X	X	X	X
MaintenanceActivityPlan	X	X	X	X	X	X	X		X	X	X
MaintenanceActivityRecord	X	X	X	X	X	X	X		X	X	X
MaintenanceEvent	X	X	X	X	X	X	X	X	X	X	X
MaintenanceFacility	X	X	X	X	X	X	X	X	X	X	X
MaintenanceFacilitySlot				X	X			X		X	X
MaintenanceFacilitySlotAccomodation				X	X			X		X	X
MaintenanceFacilitySlotPlannedUsage				X	X			X		X	X
MaintenanceLevel				X	X			X		X	X
MaintenanceLicense		X	X	X	X	X	X			X	X
MaintenancePerson	X	X	X	X	X	X	X		X	X	X
MaintenancePersonApprovedProduct		X	X	X	X	X	X			X	X
MaintenancePersonCompetence		X	X	X	X	X	X			X	X
MaintenancePersonFacility		X	X	X	X	X	X			X	X
MaintenanceProgram	X	X	X	X	X	X	X	X	X	X	X
MaintenanceWorkOrderSource	X	X	X	X	X	X	X	X	X	X	X
MajorComponent	X	X	X	X	X	X	X	X	X	X	X

Class name	Reliability			Availa-bility		Main-taina-bility		Capa-bility		Testa-bility	
	1	2	3	4	5	6	7	8	9	10	11
Material	X	X	X	X	X	X	X	X	X	X	X
Message	X	X	X	X	X	X	X	X	X	X	X
Movement	X	X	X	X	X	X	X	X	X	X	X
MovementLeg	X	X	X	X	X	X	X	X		X	X
MovementLegDelay	X	X	X	X	X						
MovementLegGeoLocation	X	X	X	X	X						
NestedAllowedProductConfigurationRelationship	X	X	X								
NestedProductVariantRelationship	X	X	X								
NonConformanceData	X	X	X								
NOT	X	X	X	X	X						
OperatingBase	X	X	X	X	X	X	X	X	X	X	X
OperatingBaseCapacity	X	X	X	X	X	X				X	X
OperatingCounter	X	X	X	X	X	X	X	X	X	X	X
OperationalActivity	X	X	X	X	X	X	X	X		X	X
OperationalApproval	X	X	X	X	X				X	X	X
OperationalEvent	X	X	X	X	X	X	X	X	X	X	X
OperationalEventMessage	X	X	X	X	X				X	X	X
OperationalEventOccurrence	X	X	X	X	X				X	X	X
OperationalMode	X	X	X	X	X						
OperationalModeStatus	X	X	X	X	X	X	X	X	X	X	X
OperationalPeriod	X	X	X	X	X						
OperationalPeriodOperator	X	X	X	X	X						
OperationalPeriodRelationship	X	X	X	X	X						
OperationalRequirement								X			
OperationalRequirementsPlanning								X			
OperationalRole	X	X	X	X	X	X	X	X	X	X	X

Class name	Reliability			Availa-bility		Main-taina-bility		Capa-bility		Testa-bility	
	1	2	3	4	5	6	7	8	9	10	11
Operator								X			
OR	X	X	X	X	X						
Organization	X	X	X	X	X	X	X	X	X	X	X
PartAction	X	X	X	X	X	X	X	X	X	X	X
PartAsDesigned	X	X	X	X	X	X	X	X	X	X	X
PartAsDesignedPartsList	X	X	X	X	X	X	X	X	X	X	X
PartAsDesignedPartsListEntry	X	X	X	X	X	X	X	X	X	X	X
PartInstallationLocation	X	X	X	X	X	X	X	X	X	X	X
Party	X	X	X	X	X	X	X	X	X	X	X
Person	X	X	X	X	X	X	X	X		X	X
PlannedItemUpgrade	X	X		X	X	X		X			
PlannedUpgradeTimescales	X	X		X	X	X		X			
Product	X	X	X	X	X	X	X	X	X	X	X
ProductParameterAtOperationalEvent	X	X	X	X	X				X	X	X
ProductUsagePhase	X	X	X	X	X	X	X	X	X	X	X
ProductVariant	X	X	X	X	X	X	X	X	X	X	X
ProductVariantCapability	X	X	X	X	X	X		X	X	X	X
ProductVariantItem	X	X	X								
Remark	X	X	X	X	X	X	X	X	X	X	X
RemarkItem	X	X	X	X	X	X	X	X	X	X	X
Report	X	X	X	X	X	X	X	X	X	X	X
ReportableActivity	X	X	X	X	X	X	X	X		X	X
ReportableItem	X	X	X	X	X	X	X	X		X	X
ReportableMetric	X	X		X	X	X	X			X	X
RequiredFleetRole								X			
RequiredSafetyAction	X	X	X	X	X					X	X

Class name	Reliability			Availa-bility		Main-taina-bility		Capa-bility		Testa-bility	
	1	2	3	4	5	6	7	8	9	10	11
RequiredSafetyActionImplementation	X	X	X	X	X					X	X
RoleCapability	X	X	X	X	X	X		X	X	X	X
S1000DDataModule	X	X	X	X	X	X	X	X	X	X	X
S1000DLearningDataModule	X	X	X	X	X	X	X	X	X	X	X
S1000DPublicationModule	X	X	X	X	X	X	X	X	X	X	X
SafetyDocument	X	X	X	X	X	X	X	X	X	X	X
SafetyIssue	X	X	X	X	X					X	X
SafetyWarning	X	X	X	X	X					X	X
SCORMContentPackage	X	X	X	X	X	X	X	X	X	X	X
SerializedHardwarePart	X	X	X	X	X	X	X	X	X	X	X
SerializedItem	X	X	X	X	X	X	X	X	X	X	X
SerializedItemWarranty		X									
SerializedProductDesignAssociation	X	X	X	X	X	X	X	X	X	X	X
SerializedProductOperationalPeriod	X	X	X	X	X						
SerializedProductVariant	X	X	X	X	X	X	X	X	X	X	X
SerializedProductVariantAssignment								X			
SerializedProductVariantAvailability	X	X		X	X	X	X	X		X	X
SerializedProductVariantConformance	X	X	X	X	X	X	X	X	X	X	X
SerializedProductVariantEnvironment	X	X	X	X	X				X	X	X
SerializedProductVariantInFleet	X	X	X	X	X	X	X	X	X	X	X
SerializedProductVariantOperatingBase	X	X	X	X	X	X	X	X	X	X	X
SerializedProductVariantOperator	X	X	X	X	X	X	X	X	X	X	X
SerializedProductVariantOwner	X	X	X	X	X	X	X	X	X	X	X
SerializedProductVariantStatus	X	X	X	X	X	X	X	X	X	X	X
SerialNumberApplicabilityItem	X	X	X								
Service	X	X	X	X	X	X	X	X		X	X

Class name	Reliability			Availa-bility		Main-taina-bility		Capa-bility		Testa-bility	
	1	2	3	4	5	6	7	8	9	10	11
ServiceBulletin	X	X	X	X	X	X	X	X	X	X	X
Skill		X	X	X	X	X	X			X	X
SkillLevel		X	X	X	X	X	X			X	X
SoftwareElementPartRealization	X	X	X	X	X						
SoftwarePartAsDesigned	X	X	X	X	X	X	X	X	X	X	X
SoftwarePartAsReleased	X	X	X	X	X	X	X	X	X	X	X
SpecialSafetyInstruction	X	X	X	X	X					X	X
SubstanceDefinition	X	X	X	X	X	X	X	X	X	X	X
SubstitutePartAsDesignedRelationship	X	X	X	X	X	X	X	X	X	X	X
SuppliesUsed	X	X	X	X	X	X	X		X	X	X
SupplyItem	X	X	X	X	X	X	X		X	X	X
SupportEquipment	X	X	X	X	X	X	X	X	X	X	X
SupportEquipmentUsed	X	X	X	X	X	X	X		X	X	X
TechnicalOrder	X	X		X	X	X		X			
TrackablePart	X	X	X	X	X	X	X	X	X	X	X
Trade		X	X	X	X	X	X			X	X
Warehouse				X	X	X		X		X	X
WarrantyClaim		X									
WarrantyClaimContact		X									
WarrantyClaimEvents		X									
WarrantyClaimFollowUp		X									
WarrantyClaimResolution	X	X	X	X	X	X	X	X		X	X
WarrantyEvent	X	X	X	X	X	X	X	X	X	X	X
WorkItem	X	X	X	X	X	X	X	X		X	X
WorkOrder	X	X	X	X	X	X	X	X	X	X	X
XOR	X	X	X	X	X						

Class name	Reliability			Availa-bility		Main-taina-bility		Capa-bility		Testa-bility	
	1	2	3	4	5	6	7	8	9	10	11
ZoneElement	X	X	X	X	X	X	X		X	X	X
ZoneElementRevision				X	X	X	X		X	X	X

2.2 Classes for maintenance analysis

The classes used for each maintenance analysis use case as defined in Chap 4 are listed in Table 3. In order to avoid having to cross-check the use case numbers, a summary of each use case is provided below:

1 Manufacturer maintenance schedule

2 Product operational environment data

3 Operational profile data

4 Work order / package data

5 New modifications for product

6 Technical queries

Table 3 Classes used for maintenance analysis use cases

Class name	Use case					
	1	2	3	4	5	6
Action	X	X	X	X	X	X
AllowedProductConfiguration		X		X		X
AllowedProductConfigurationRole		X		X		X
AllowedRoleChange		X		X		X
ApplicabilityAssignmentItem						X
AuthorityToOperate						X
BreakdownElement	X		X			X
BreakdownElementRevision	X		X			
ChangeAuthorization	X		X		X	
ChangeControlledItem	X		X		X	
ChangedItemtAvailabilityRequirement					X	
ChangeEffect	X		X		X	

Class name	Use case					
	1	2	3	4	5	6
ChangeEmbodimentRequirement	X		X		X	
ChangeRequest	X		X		X	
Comment	X	X	X	X	X	X
CommentedItem	X	X	X	X	X	X
CommentParty	X	X	X	X	X	X
CommentRelationship	X	X	X	X	X	X
CompetenceDefinitionItem	X		X	X		
Consequence						X
ConsumableItem	X		X	X		
Contract	X	X			X	X
CostEntry						X
CostEntryRelatedTo	X		X			
CostItem	X		X		X	X
Damage						X
DetectionMean	X		X			
DetectionMeanCapability	X		X			
DetectionMechanism	X		X			
Detector	X		X			
Document	X	X	X	X	X	X
DocumentAssignment	X	X			X	X
DocumentAssignmentItem	X	X			X	X
DocumentIssue	X	X	X		X	X
DocumentItem	X	X			X	X
DocumentParty	X	X			X	X
DocumentRelationship	X	X			X	X
DownTimePeriod				X	X	X
Environment		X		X		X

Class name	Use case					
	1	2	3	4	5	6
EquipmentFault	X		X			X
EquipmentOperation	X		X			
EquipmentOwner	X		X			
EquipmentStatus	X		X			
Event	X		X	X		X
EventRelationship						X
ExplanatoryFactor						X
ExternalDocument	X	X			X	X
Facility	X	X	X	X		X
Failure	X		X			
FailureCause	X		X			
FailureDetection	X		X			
FailureMode	X		X			
FailureModeEffect	X		X			
Fleet		X		X	X	X
FleetAvailability		X		X		
FleetPlanning					X	
FleetRequirement					X	
FleetTask						X
FleetTaskCancellationNotice	X	X			X	X
GPSLocation				X		
HardwarePartAsDesigned	X		X	X	X	X
Location				X		X
Locator	X	X			X	X
LogBookEntry	X		X	X		X
LogBookEntryCounter	X		X	X		
MaintenanceActivity	X		X	X		X

Class name	Use case					
	1	2	3	4	5	6
MaintenanceActivityPlan	X		X	X		
MaintenanceActivityRecord	X		X	X		
MaintenanceEvent	X		X		X	X
MaintenanceFacility	X	X	X	X		
MaintenanceFacilitySlot	X		X			
MaintenanceFacilitySlotAccomodation	X		X			
MaintenanceFacilitySlotPlannedUsage	X		X			
MaintenanceLevel	X		X			
MaintenanceLicense	X		X	X		
MaintenanceOrganisation	X	X				
MaintenanceOrganizationApproval	X	X				
MaintenancePerson	X		X	X		
MaintenancePersonApprovedProduct	X		X	X		
MaintenancePersonCompetence	X		X	X		
MaintenancePersonFacility	X		X	X		
MaintenanceProgram	X	X	X		X	X
MaintenanceProgramRevision	X		X			X
MaintenanceWorkOrderSource	X		X	X	X	
MajorComponent	X		X	X		
Material	X		X	X		X
Message	X	X	X	X	X	X
Movement	X		X	X		X
MovementLeg				X		X
MovementLegDelay				X		
MovementLegGeoLocation				X		
NonSerializedHardwarePart			X		X	X
OperatingBase		X		X	X	X

Class name	Use case					
	1	2	3	4	5	6
OperatingBaseCapacity		X		X		
OperatingCounter	X		X	X	X	X
OperationalActivity						X
OperationalApproval		X		X		X
OperationalEvent				X		X
OperationalEventMessage				X		
OperationalEventOccurrence				X		
OperationalMode				X		
OperationalModeStatus	X		X	X		
OperationalPeriod				X		X
OperationalPeriodOperator				X		
OperationalPeriodRelationship				X		
OperationalRole		X		X		X
OperationalTask	X		X			
Operator		X				
OperatorOrganization		X				
OperatorPerson		X				
Organization	X	X	X	X		X
OrganizationOperationsApproval		X				
PartAction	X		X	X	X	X
PartAsDesigned	X		X			
PartInstallationLocation	X		X	X		
PartInWarehouse					X	
Party	X	X	X	X	X	X
Person	X		X	X		X
PersonOperationsApproval		X				
PlannedItemUpgrade	X		X		X	X

Class name	Use case					
	1	2	3	4	5	6
PlannedPartInstallationLocation					X	
PlannedUpgradeTimescales	X		X		X	
PoliciesAndRegulations						X
Pool						X
ProductParameterAtOperationalEvent				X		
ProductUsagePhase						X
ProductVariant	X	X	X	X	X	X
ProductVariantCapability		X		X		X
Project						X
RectifyingTask	X		X			
Remark	X	X	X	X	X	X
RemarkItem	X	X	X	X	X	X
Report	X	X			X	X
ReportableItem		X		X		
RequiredSafetyAction						X
RequiredSafetyActionImplementation						X
Requirement					X	X
ResourceUsageRequest						X
RoleCapability		X		X		X
SX000DDataModule	X	X			X	X
SX000DLearningDataModule	X	X			X	X
SX000DPublicationModule	X	X			X	X
SafetyDocument	X	X			X	X
SafetyIssue						X
SafetyWarning						X
SCORMContentPackage	X	X			X	X
SerializedHardwarePart	X		X	X	X	X

Class name	Use case					
	1	2	3	4	5	6
SerializedItem	X		X	X		
SerializedPartDesignAssociation			X		X	X
SerializedProductDesignAssociation		X		X		
SerializedProductOperationalPeriod				X		
SerializedProductVariant	X	X	X	X	X	X
SerializedProductVariantAvailability		X		X		
SerializedProductVariantEnvironment		X		X		X
SerializedProductVariantInFleet		X		X	X	X
SerializedProductVariantOperatingBase		X		X	X	X
SerializedProductVariantOperator		X		X		X
SerializedProductVariantStatus	X		X	X		
Service						X
ServiceBulletin	X	X	X		X	X
ServiceRequest						X
ShopFindings	X					X
Skill	X		X	X		
SkillLevel	X		X	X		
SoftwarePartAsDesigned			X		X	X
SoftwarePartAsReleased	X		X	X	X	X
SpecialSafetyInstruction						X
SubstanceDefinition						X
Subtask	X		X		X	
SubtaskByDefinition	X		X			
SubtaskByExternalReference	X		X			
SubtaskByTaskReference	X		X			
SubtaskInZone	X		X			
SubtaskTarget	X		X			

Class name	Use case					
	1	2	3	4	5	6
SubtaskTargetItem	X		X			
SubtaskTimeline	X		X			
SuppliesUsed	X		X	X		
SupplyItem	X		X	X		
SupportEquipment	X		X	X		
SupportEquipmentUsed	X		X	X		
SupportingTask	X		X			
Task	X		X		X	
TaskReference	X		X			
TaskRevision	X		X		X	
TechnicalOrder	X		X		X	
TrackablePart	X		X	X	X	
Trade	X		X	X		
UpgradeRequirement					X	X
Warehouse					X	
WarrantyClaim						X
WarrantyEvent						X
WorkItem	X		X		X	X
WorkOrder	X		X	X	X	X
ZoneElement	X		X	X		

2.3 Classes for safety analysis

The classes used for each safety analysis use case as defined in Chap 5 are listed in Table 4. In order to avoid having to cross-check the use case numbers, a summary of each use case is provided below:

1 Report safety issue

2 Provide operational limitations due to safety issue

3 Provide special safety instructions

Table 4 Classes used for safety analysis use cases

Class name	Use case		
	1	2	3
Action	X	X	X
AllowedProductConfiguration	X	X	X
AllowedProductConfigurationItem		X	
AllowedProductConfigurationRole	X		
AllowedProductOperationalConfigurationItem	X		
ApplicabilityAssignmentItem	X	X	X
AuthorityToOperate		X	
BreakdownElement	X		
BreakdownElementUsageInBreakdown	X		
ChangeEmbodimentRequirement		X	X
Comment	X	X	X
CommentedItem	X	X	X
CommentParty	X	X	X
CommentRelationship	X	X	X
Consequence	X		
Contract	X	X	X
CostEntry	X	X	
Damage	X		
Document	X	X	X
DocumentAssignment	X	X	X
DocumentAssignmentItem	X	X	X
DocumentIssue	X	X	X
DocumentItem	X	X	X
DocumentParty	X	X	X
DocumentRelationship	X	X	X
DownTimePeriod	X		

Class name	Use case		
	1	2	3
Environment	X		
EquipmentFault	X		
Event	X	X	X
EventRelationship	X		
ExplanatoryFactor	X		
ExternalDocument	X	X	X
Facility		X	X
Fleet	X	X	X
FleetAvailability	X	X	
FleetRequirement		X	X
FleetTaskCancellationNotice	X	X	X
GPSLocation	X		
HardwarePartAsDesigned	X	X	X
ItemInAllowedProductConfiguration		X	
ItemInAllowedProductOperationalConfiguration	X		
Location	X		
Locator	X	X	X
LogBookEntry	X		
MaintenanceEvent	X		
MaintenanceProgram	X	X	X
Message	X	X	X
Movement	X		
MovementLeg	X		
MovementLegDelay	X		
MovementLegGeoLocation	X		
NonSerializedHardwarePart	X	X	X
ObsolescenceRequirement		X	X

Class name	Use case		
	1	2	3
OperatingBase	X		
OperatingCounter	X	X	X
OperationalApproval	X		
OperationalEvent	X	X	
OperationalEventMessage	X		
OperationalEventOccurrence	X		
OperationalMode	X		
OperationalPeriod	X		
OperationalPeriodOperator	X		
OperationalPeriodRelationship	X		
OperationalRequirement		X	X
OperationalRole	X		
PartAction	X	X	X
PartAsDesignedPartsList		X	
PartAsDesignedPartsListEntry		X	
PartInstallationLocation	X		
Party	X	X	X
ProductParameterAtOperationalEvent	X		
ProductUsagePhase	X		
ProductVariant	X	X	X
Project		X	X
Remark	X	X	X
RemarkItem	X	X	X
Report	X	X	X
ReportableActivity	X	X	
ReportableItem	X	X	
ReportableMetric	X	X	

Class name	Use case		
	1	2	3
RequiredSafetyAction	X	X	X
RequiredSafetyActionImplementation	X	X	X
Requirement		X	X
S1000DDataModule	X	X	X
S1000DLearningDataModule	X	X	X
S1000DPublicationModule	X	X	X
SafetyDocument	X	X	X
SafetyIssue	X	X	X
SafetyWarning	X	X	X
SCORMContentPackage	X	X	X
SerializedHardwarePart	X	X	X
SerializedPartDesignAssociation	X	X	X
SerializedProductDesignAssociation	X		
SerializedProductOperationalPeriod	X		
SerializedProductVariant	X	X	X
SerializedProductVariantAvailability	X	X	
SerializedProductVariantConformance	X		
SerializedProductVariantEnvironment	X		
SerializedProductVariantInFleet	X		
SerializedProductVariantOperatingBase	X		
SerializedProductVariantOperator	X		
Service		X	X
ServiceBulletin	X	X	X
SoftwarePartAsDesigned	X	X	X
SoftwarePartAsReleased	X	X	X
SpecialSafetyInstruction	X	X	X
TrackablePart	X		

Class name	Use case		
	1	2	3
UpgradeRequirement		X	X
WarrantyEvent	X		
WorkOrder	X	X	

2.4 Classes for supply support

The classes used for each supply support use case as defined in Chap 6 are listed in Table 5. In order to avoid having to cross-check the use case numbers, a summary of each use case is provided below:

1 Inventory management

2 Shelf life management

3 Spares and SE pool management

4 Logistic Response time

5 Facilities management and maintenance

Table 5 Classes used for supply support use cases

Class name	Use case				
	1	2	3	4	5
Action	X	X	X	X	X
Address	X	X	X		X
Comment	X	X	X	X	X
CommentedItem	X	X	X	X	X
CommentParty	X	X	X	X	X
CommentRelationship	X	X	X	X	X
Contract	X	X	X	X	
CostEntry	X			X	X
CostEntryRelatedTo	X			X	
DetectionMean	X				
Document	X			X	X
DocumentAssignmentItem	X			X	X

Class name	Use case				
	1	2	3	4	5
EquipmentFault	X				
Facility	X	X	X		X
FacilityOperator	X	X	X		X
FacilityOwner	X	X	X		X
FacilityRelationship	X	X	X		X
Failure	X				
FailureCause	X				
FailureMode	X				
FleetAvailability	X			X	X
HardwarePartAsDesigned	X	X	X	X	
HardwarePartAsDesignedCommerceData	X	X	X	X	
InventoryActivity	X			X	
Location	X			X	
MaintenanceActivity	X			X	
MaintenanceFacility	X	X	X		X
Message	X	X	X	X	X
NonSerializedHardwarePart		X	X		
OperatingBase	X	X	X		X
OperatingCounter		X	X		
OperationalActivity	X			X	
OperationalEvent	X			X	X
PartInWarehouse	X	X	X	X	
Party	X	X	X	X	X
Pool	X	X	X	X	
PoolOwner	X	X	X	X	
PoolUser	X	X	X	X	
ProductVariant	X	X	X	X	

Class name	Use case				
	1	2	3	4	5
Remark	X	X	X	X	X
RemarkItem	X	X	X	X	X
Report	X			X	X
ReportableActivity	X			X	X
ReportableItem	X			X	X
ReportableMetric	X			X	X
RequiredPartStockLevelInPool	X	X	X	X	
SerializedHardwarePart	X	X	X	X	
SerializedPartDesignAssociation		X	X		
SerializedProductVariantAvailability	X			X	X
ShopFindings	X				
SoftwarePartAsDesigned		X	X		
SoftwarePartAsReleased		X	X		
SupportEquipment	X	X	X		X
Warehouse	X	X	X	X	X
WorkItem	X			X	
WorkOrder	X			X	X

2.5 Classes for life cycle cost analysis

The classes used for each LCC use case as defined in Chap 7 are listed in Table 6. In order to avoid having to cross-check the use case numbers, a summary of each use case is provided below:

1 Provide cost breakdown structure

2 Estimate maintenance costs

3 Costs due to operational requirements

4 Cost of modifications or upgrades

5 Costs of in-service support

Table 6 Classes used for LCC use cases

Class name	Use case				
	1	2	3	4	5
Action	X	X	X	X	X
AuthorityToOperate				X	
BreakdownElement				X	
Budget	X	X	X	X	
CargoItem			X		
ChangeAuthorization				X	
ChangeControlledItem				X	
ChangedItemtAvailabilityRequirement				X	
ChangeEffect				X	
ChangeEmbodimentRequirement	X	X	X	X	X
ChangeRequest	X	X	X	X	X
Comment	X	X	X	X	X
CommentedItem	X	X	X	X	X
CommentParty	X	X	X	X	X
CommentRelationship	X	X	X	X	X
ConsumableItem			X		
Consumption			X		
Contract	X	X	X	X	X
ContractClause	X	X	X	X	X
ContractContext	X				X
ContractItem	X				X
ContractItemDetails	X				X
ContractParty	X				X
ContractRelationship	X	X	X	X	X
CostBreakdown	X	X	X	X	
CostBreakdownRevision	X	X	X	X	

Class name	Use case				
	1	2	3	4	5
CostEntry	X	X	X	X	X
CostEntryRelatedTo	X	X	X	X	X
CostItem	X	X	X	X	
CostItemRelationship	X	X	X	X	
Damage	X	X	X	X	X
Document		X		X	X
DocumentAssignment				X	
DocumentAssignmentItem		X		X	X
DocumentIssue				X	
DocumentItem				X	
DocumentParty				X	
DocumentRelationship				X	
DownTimePeriod			X	X	
Environment				X	
Event				X	
ExternalDocument				X	
Facility	X	X	X	X	X
Fleet	X	X	X	X	X
FleetAvailability		X		X	X
FleetPlanning			X	X	
FleetRequirement			X	X	
FleetTask			X	X	
FleetTaskCancellationNotice				X	
FleetTaskList			X		
HardwarePartAsDesigned	X	X	X	X	X
InventoryActivity		X	X	X	X
Location		X	X	X	X

Class name	Use case				
	1	2	3	4	5
Locator				X	
LogBookEntry				X	
MaintenanceActivity		X	X	X	X
MaintenanceEvent				X	
MaintenanceProgram				X	
MaintenanceProgramRevision				X	
MaintenanceWorkOrderSource				X	
Material	X	X	X	X	X
Message	X	X	X	X	X
Movement	X	X	X	X	X
MovementLeg	X	X	X	X	X
MovementLegDelay			X		
ObsolescenceRequirement			X		
OperatingBase				X	
OperationalActivity		X	X	X	X
OperationalApproval				X	
OperationalConsumption			X		
OperationalEvent		X	X	X	X
OperationalEventOccurrence			X		
OperationalPeriod			X	X	
OperationalRequirement			X		
OperationalRequirementsPlanning			X		
OperationalRole			X	X	
Operator			X		
Organization	X	X	X	X	X
PartAction				X	
PartInWarehouse				X	

Class name	Use case				
	1	2	3	4	5
Party	X	X	X	X	X
Person	X	X	X	X	X
PlannedItemUpgrade				X	
PlannedPartInstallationLocation				X	
PlannedUpgradeTimescales				X	
PoliciesAndRegulations				X	
Pool				X	
Product	X	X	X	X	X
ProductVariant	X	X	X	X	X
Project	X			X	X
ProjectRelationship	X				X
Remark	X	X	X	X	X
RemarkItem	X	X	X	X	X
Report		X	X	X	X
ReportableActivity	X	X	X	X	X
ReportableItem		X	X	X	X
ReportableMetric		X		X	X
RequiredFleetRole			X		
Requirement			X	X	
ResourceUsageRequest				X	
S1000DDataModule				X	
S1000DLearningDataModule				X	
S1000DPublicationModule				X	
SafetyDocument				X	
SCORMContentPackage				X	
SerializedHardwarePart	X	X	X	X	X
SerializedProductOperationalPeriod			X		

Class name	Use case				
	1	2	3	4	5
SerializedProductVariant	X	X	X	X	X
SerializedProductVariantAssignment			X		
SerializedProductVariantAvailability		X		X	X
SerializedProductVariantInFleet			X	X	
SerializedProductVariantOperatingBase				X	
Service	X	X	X	X	X
ServiceBulletin	X	X	X	X	X
ServiceLevelAgreementClause	X	X	X	X	
ServiceRequest				X	
ShopFindings				X	
SoftwareElement	X				X
SoftwarePartAsReleased	X	X	X	X	X
SubstanceDefinition				X	
TechnicalOrder				X	
TrackablePart				X	
UpgradeRequirement			X	X	
Warehouse				X	
WarrantyClaim				X	
WarrantyClaimResolution	X	X	X	X	X
WarrantyEvent				X	
WorkBreakdown	X	X	X	X	
WorkBreakdownRevision	X	X	X	X	
WorkItem	X	X	X	X	X
WorkItemRelationship	X	X	X	X	
WorkOrder	X	X	X	X	X

2.6 Classes for warranty analysis

The classes used for each warranty analyis use case as defined in Chap 8 are listed in Table 7. In order to avoid having to cross-check the use case numbers, a summary of each use case is provided below:

1. Evaluate maintenance actions
2. Collect warranty costs
3. Determine misuse of warranty
4. Identify items causing risk to warranty program
5. Improve standard warranty rules and process

Table 7 Classes used for warranty analysis use cases

Class name	Use case				
	1	2	3	4	5
Action	X	X	X	X	X
AllowedProductConfiguration	X	X	X	X	X
AllowedProductConfigurationItem	X		X	X	X
AuthorityToOperate	X		X	X	X
BreakdownElement	X	X	X	X	X
BreakdownElementRevision	X				
Budget		X	X		
ChangeAuthorization					X
ChangeControlledItem					X
ChangeEffect					X
ChangeEmbodimentRequirement		X			X
ChangeRequest		X			X
Comment	X	X	X	X	X
CommentedItem	X	X	X	X	X
CommentParty	X	X	X	X	X
CommentRelationship	X	X	X	X	X
Consequence				X	
Contract	X	X	X	X	X
ContractClause	X	X	X	X	X

Class name	Use case				
	1	2	3	4	5
ContractRelationship		X	X		
CostBreakdown		X	X		
CostBreakdownRevision		X	X		
CostEntry		X	X		X
CostEntryRelatedTo	X	X	X	X	X
CostItem		X	X		X
CostItemRelationship		X	X		
Damage		X		X	
DetectionMean	X		X	X	X
DetectionMeanCapability	X				
DetectionMechanism	X				
Detector	X	X		X	X
Document	X	X	X		X
DocumentAssignmentItem		X	X	X	X
DocumentIssue	X				
DownTimePeriod				X	
Environment	X		X	X	X
EquipmentFault	X	X	X	X	X
EquipmentOperation	X	X		X	X
EquipmentOwner	X	X		X	X
EquipmentStatus	X	X		X	X
Event	X	X	X	X	X
EventRelationship				X	
ExplanatoryFactor				X	
Facility	X	X	X	X	X
Failure	X	X	X	X	X
FailureCause	X		X	X	X

Class name	Use case				
	1	2	3	4	5
FailureDetection	X				
FailureMode	X		X	X	X
FailureModeEffect	X				
Fleet		X	X	X	X
FleetAvailability		X	X		X
HardwarePartAsDesigned	X	X	X	X	X
HardwarePartAsDesignedCommerceData				X	
InventoryActivity		X	X		
ItemInAllowedProductConfiguration	X		X	X	X
Location	X	X	X	X	X
LogBookEntry	X	X		X	X
MaintenanceActivity		X	X		
MaintenanceEvent				X	
MaintenanceProgram	X				
MaintenanceProgramRevision	X				
MaintenanceWorkOrderSource					X
Material		X			
Message	X	X	X	X	X
Movement		X			
MovementLeg		X			
NonSerializedHardwarePart	X		X	X	X
OperatingBase			X	X	X
OperatingCounter	X	X	X	X	X
OperationalActivity		X	X		
OperationalApproval			X	X	X
OperationalEvent	X	X	X	X	X
OperationalEventMessage	X		X	X	

Class name	Use case				
	1	2	3	4	5
OperationalEventOccurrence	X		X	X	
OperationalTask	X				
Organization	X	X			
PartAction	X	X	X	X	X
PartAsDesigned	X				
PartAsDesignedPartsList	X		X	X	X
PartAsDesignedPartsListEntry	X		X	X	X
PartInstallationLocation	X	X	X	X	X
PartInWarehouse				X	
Party	X	X	X	X	X
Person	X	X			
PlannedItemUpgrade					X
PlannedUpgradeTimescales					X
Pool				X	
PoolOwner				X	
PoolUser				X	
Product		X			
ProductParameterAtOperationalEvent	X		X	X	
ProductUsagePhase				X	
ProductVariant	X	X	X	X	X
RectifyingTask	X				
Remark	X	X	X	X	X
RemarkItem	X	X	X	X	X
Report		X	X		X
ReportableActivity		X	X		X
ReportableItem		X	X		X
ReportableMetric		X	X		X

Class name	Use case				
	1	2	3	4	5
RequiredPartStockLevelInPool				X	
SerializedHardwarePart	X	X	X	X	X
SerializedItem	X	X	X	X	X
SerializedItemWarranty	X	X	X	X	X
SerializedPartDesignAssociation	X		X	X	X
SerializedProductDesignAssociation		X	X	X	X
SerializedProductVariant	X	X	X	X	X
SerializedProductVariantAvailability		X	X		X
SerializedProductVariantConformance		X	X	X	X
SerializedProductVariantEnvironment			X	X	X
SerializedProductVariantInFleet			X	X	X
SerializedProductVariantOperatingBase			X	X	X
SerializedProductVariantOperator			X	X	X
Service		X			
ServiceBulletin		X			X
ServiceLevelAgreementClause		X	X		
ShopFindings	X		X	X	X
SoftwarePartAsDesigned	X		X	X	X
SoftwarePartAsReleased	X	X	X	X	X
Subtask	X				
SubtaskByDefinition	X				
SubtaskByExternalReference	X				
SubtaskByTaskReference	X				
SubtaskInZone	X				
SubtaskTarget	X				
SubtaskTargetItem	X				
SubtaskTimeline	X				

Class name	Use case				
	1	2	3	4	5
SupportingTask	X				
Task	X				
TaskReference	X				
TaskRevision	X				
TechnicalOrder					X
TrackablePart	X	X	X	X	X
Warehouse				X	
WarrantyClaim	X	X	X	X	X
WarrantyClaimContact	X	X	X	X	X
WarrantyClaimEvents	X	X	X	X	X
WarrantyClaimFollowUp	X	X	X	X	X
WarrantyClaimResolution	X	X	X	X	X
WarrantyEvent	X	X	X	X	X
WorkBreakdown		X	X		
WorkBreakdownRevision		X	X		
WorkItem		X	X		X
WorkItemRelationship		X	X		
WorkOrder		X	X		X
ZoneElement	X				

2.7 Classes for product health and usage monitoring

The classes used for each poduct health and usage monitoring use case as defined in Chap 9 are listed in Table 8. In order to avoid having to cross-check the use case numbers, a summary of each use case is provided below:

1 Record usage and health data

2 Report usage information

3 Respond to usage information

Table 8 Classes used for product health and usage monitoring use cases

Class name	Use case		
	1	2	3
Accelerometer	X	X	X
Action	X	X	X
AllowedProductConfiguration			X
AllowedProductConfigurationRole			X
AllowedProductOperationalConfigurationItem			X
BreakdownElementUsageInBreakdown			X
CargoItem			X
Comment	X	X	X
CommentedItem	X	X	X
CommentParty	X	X	X
CommentRelationship	X	X	X
DownTimePeriod		X	X
Environment		X	
Event	X	X	X
Fleet			X
FleetPlanning			X
FleetRequirement			X
FleetTask			X
FleetTaskList			X
GPSLocation		X	
HardwarePartAsDesigned	X	X	X
ItemInAllowedProductOperationalConfiguration			X
Location		X	X
LogBookEntry	X	X	X
LogBookEntryCounter	X	X	X
MajorComponent	X	X	X

Class name	Use case		
	1	2	3
Message	X	X	X
Movement	X	X	X
MovementLeg		X	
MovementLegDelay		X	
MovementLegGeoLocation		X	
OperatingCounter	X	X	X
OperationalEvent		X	
OperationalEventOccurrence		X	
OperationalMode		X	
OperationalModeStatus	X	X	X
OperationalPeriod		X	
OperationalPeriodOperator		X	
OperationalPeriodRelationship		X	
OperationalRequirement			X
OperationalRequirementsPlanning			X
OperationalRole		X	X
Operator			X
PartAction	X	X	X
Party	X	X	X
PressureSensor	X	X	X
ProductUsagePhase			X
ProductUsagePhaseHierarchicalRelationship			X
ProductUsagePhaseItem			X
ProductUsagePhaseRelationship			X
productUsagePhaseSequentialRelationship			X
ProductVariant			X
Remark	X	X	X

Class name	Use case		
	1	2	3
RemarkItem	X	X	X
Report			X
RequiredFleetRole			X
Sensor	X	X	X
SensorSampling	X	X	X
SensorType	X	X	X
SerializedHardwarePart	X	X	X
SerializedItem	X	X	X
SerializedProductOperationalPeriod		X	
SerializedProductVariant	X	X	X
SerializedProductVariantAssignment			X
SerializedProductVariantInFleet			X
SerializedProductVariantStatus	X	X	X
SoftwarePartAsReleased			X
StrainGauge	X	X	X
Tachometer	X	X	X
TemperatureSensor	X	X	X

2.8 Classes for obsolescence management

The classes used for each obsolescence management use case as defined in Chap 10 are listed in Table 9. In order to avoid having to cross-check the use case numbers, a summary of each use case is provided below:

1 Create basis for obsolescence management planning

2 Determine obsolescence candidates /perform risk assessment

3 Determine obsolescence strategy

4 Obsolescence monitoring

5 Solutions/proposals to solve obsolescence

Table 9 Classes used for obsolescence management use cases

Class name	Use case				
	1	2	3	4	5
Action	X	X	X	X	X
AllowedProductConfiguration	X				
AllowedProductConfigurationByConfigurationIdentifier	X				
AllowedProductConfigurationHardwarePartAsDesigned	X				
AllowedProductConfigurationItem	X				
ApplicableBlockOfSerializedEndItems	X				
AuthorityToOperate	X				
BreakdownElement	X	X			
BreakdownElementUsageInBreakdown	X				
CargoItem			X		
ChangeControlledItem		X	X		X
ChangedItemtAvailabilityRequirement					X
ChangeEmbodimentRequirement		X	X		X
Comment	X	X	X	X	X
CommentedItem	X	X	X	X	X
CommentParty	X	X	X	X	X
CommentRelationship	X	X	X	X	X
ConsumableItem		X			
Contract		X	X	X	
CostEntry				X	
CostEntryRelatedTo		X		X	
DetectionMean		X		X	
Detector		X			
Document		X		X	
DocumentAssignmentItem				X	
DownTimePeriod			X		X

Class name	Use case				
	1	2	3	4	5
EquipmentFault		X		X	
EquipmentOperation		X			
EquipmentOwner		X			
EquipmentStatus		X			
Event		X	X	X	
Facility		X		X	
Failure		X		X	
FailureCause		X		X	
FailureMode		X		X	
Fleet			X		X
FleetAvailability				X	
FleetPlanning			X		X
FleetRequirement		X	X		X
FleetTask			X		
FleetTaskList			X		
HardwareElementPartRealization	X				
HardwarePartAsDesigned	X	X	X	X	
HardwarePartAsDesignedCommerceData		X	X	X	
InventoryActivity				X	
ItemInAllowedProductConfiguration	X				
ItemInProductVariant	X				
Location			X	X	
LogBookEntry		X	X	X	
LogBookEntryCounter		X	X	X	
MaintenanceActivity		X		X	
MaintenanceActivityPlan		X			
MaintenanceActivityRecord		X			

Class name	Use case				
	1	2	3	4	5
MaintenanceFacility		X			
MaintenancePerson		X			
MaintenanceWorkOrderSource		X			
MajorComponent		X	X	X	
Material		X			
Message	X	X	X	X	X
Movement		X	X	X	
NestedAllowedProductConfigurationRelationship	X				
NestedProductVariantRelationship	X				
NonConformanceData	X				
NonSerializedHardwarePart	X				
ObsolescenceItem		X			
ObsolescenceParameter		X			
ObsolescenceRequirement		X	X		
OperatingBase			X		X
OperatingCounter	X	X	X	X	
OperationalActivity				X	
OperationalEvent				X	
OperationalModeStatus		X	X	X	
OperationalRequirement		X	X		
OperationalRequirementsPlanning			X		
OperationalRole			X		
Operator			X		
PartAction	X	X	X	X	X
PartAsDesignedPartsList	X				
PartAsDesignedPartsListEntry	X				
PartInstallationLocation	X	X			

Class name	Use case				
	1	2	3	4	5
PartInWarehouse		X	X	X	X
Party	X	X	X	X	X
PlannedItemUpgrade					X
PlannedPartInstallationLocation			X		X
PlannedUpgradeTimescales			X		X
Pool		X	X	X	
PoolOwner		X	X	X	
PoolUser		X	X	X	
Product		X			
ProductVariant	X	X	X	X	X
ProductVariantItem	X				
Remark	X	X	X	X	X
RemarkItem	X	X	X	X	X
Report			X	X	
ReportableActivity				X	
ReportableItem				X	
ReportableMetric				X	
RequiredFleetRole			X		
RequiredPartStockLevelInPool		X	X	X	
Requirement		X	X		X
SerializedHardwarePart	X	X	X	X	X
SerializedItem		X	X	X	
SerializedPartDesignAssociation	X				
SerializedProductDesignAssociation	X				
SerializedProductVariant	X	X	X	X	X
SerializedProductVariantAssignment			X		
SerializedProductVariantAvailability				X	

Class name	Use case				
	1	2	3	4	5
SerializedProductVariantConformance	X				
SerializedProductVariantInFleet			X		X
SerializedProductVariantOperatingBase			X		X
SerializedProductVariantStatus		X	X	X	
SerialNumberApplicabilityItem	X				
ShopFindings		X		X	
SoftwareElementPartRealization	X				
SoftwarePartAsDesigned	X				
SoftwarePartAsReleased	X	X	X		X
SuppliesUsed		X			
SupplyItem		X			
SupportEquipment		X			
SupportEquipmentUsed		X			
TrackablePart	X	X	X		X
UpgradeRequirement		X	X		X
Warehouse		X	X	X	X
WorkItem				X	
WorkOrder		X		X	
ZoneElement		X			

2.9 Classes for integrated fleet management

The classes used for each integrated fleet management use case as defined in Chap 11 are listed in Table 10. In order to avoid having to cross-check the use case numbers, a summary of each use case is provided below:

1 Assignment Proposal Elaboration

2 Fleet task cancellation

3 Fleet task modification

4 Fleet availability plan elaboration

5 Fleet Task Evaluation

6 Product preparation for fleet task

7 Product Recovery after fleet task

Table 10 Classes used for integrated fleet management use cases

Class name	Use case						
	1	2	3	4	5	6	7
Action	X	X	X	X	X	X	X
Address	X						
AllowedProductConfiguration	X					X	X
AllowedProductConfigurationRole	X					X	X
AllowedProductOperationalConfigurationItem	X						
AllowedRoleChange	X					X	X
AND	X				X		
BreakdownElement	X					X	X
BreakdownElementUsageInBreakdown	X						
CargoItem	X	X	X	X	X	X	X
Comment	X	X	X	X	X	X	X
CommentedItem	X	X	X	X	X	X	X
CommentParty	X	X	X	X	X	X	X
CommentRelationship	X	X	X	X	X	X	X
ConditionDefinitionItem	X				X		
ConditionInstance	X				X		
ConditionStatement	X				X		
ConditionType	X				X		
ConditionTypeClassValue	X				X		
ConditionTypePropertyValue	X				X		
ConditionTypeValue	X				X		
ConsumableItem	X		X		X		X
Consumption	X		X		X		X
Contract		X		X			

Class name	Use case						
	1	2	3	4	5	6	7
ContractClause	X				X		
Country	X						
Document		X		X			
DocumentAssignment		X					
DocumentAssignmentItem		X					
DocumentIssue		X					
DocumentItem		X					
DocumentParty		X					
DocumentRelationship		X					
DownTimePeriod	X	X	X	X	X	X	X
Environment	X		X	X		X	X
Event					X		X
ExternalDocument		X					
Facility	X		X	X		X	X
Fleet	X	X	X	X	X	X	X
FleetAvailability	X			X	X		
FleetPlanning	X	X	X	X	X	X	X
FleetRequirement	X	X	X	X	X	X	X
FleetTask	X	X	X	X	X	X	X
FleetTaskCancellationNotice		X					
FleetTaskList	X	X	X	X	X	X	X
GeographicalArea	X						
GeographicalAreaRelationship	X						
GPSLocation	X						
HardwarePartAsDesigned	X						
ItemInAllowedProductOperationalConfiguration	X						
Location	X	X	X	X	X	X	X

Class name	Use case						
	1	2	3	4	5	6	7
Locator	X	X					
LogBookEntry					X		
LogBookEntryCounter					X		
LogicalOperator	X				X		
MaintenanceProgram		X					
MajorComponent					X		
Message	X	X	X	X	X	X	X
Movement	X		X		X		X
MovementLeg	X		X		X		X
MovementLegDelay	X		X		X		X
NOT	X				X		
OperatingBase	X		X	X		X	X
OperatingBaseCapacity	X		X	X		X	X
OperatingCounter					X		
OperationalApproval						X	
OperationalConsumption	X		X		X		X
OperationalEvent	X		X		X		X
OperationalEventMessage							X
OperationalEventOccurrence	X		X		X		X
OperationalModeStatus					X		
OperationalPeriod	X		X		X		X
OperationalRequirement	X	X	X	X	X	X	X
OperationalRequirementsPlanning	X	X	X	X	X	X	X
OperationalRole	X	X	X	X	X	X	X
Operator	X	X	X	X	X	X	X
OR	X				X		
Organization				X			

Class name	Use case						
	1	2	3	4	5	6	7
PartAction	X				X	X	X
PartInstallationLocation	X					X	X
Party	X	X	X	X	X	X	X
PoliciesAndRegulations				X			
Product				X			
ProductParameterAtOperationalEvent							X
ProductVariant	X		X	X	X	X	X
ProductVariantCapability	X					X	X
Project				X			
Remark	X	X	X	X	X	X	X
RemarkItem	X	X	X	X	X	X	X
Report	X	X	X	X	X	X	X
ReportableItem	X			X	X		
RequiredFleetRole	X	X	X	X	X	X	X
RoleCapability	X					X	X
S1000DDataModule		X					
S1000DLearningDataModule		X					
S1000DPublicationModule		X					
SafetyDocument		X					
SCORMContentPackage		X					
SerializedHardwarePart	X				X	X	X
SerializedItem					X		
SerializedProductDesignAssociation	X			X	X	X	X
SerializedProductOperationalPeriod	X		X		X		X
SerializedProductVariant	X	X	X	X	X	X	X
SerializedProductVariantAssignment	X	X	X	X	X	X	X
SerializedProductVariantAvailability	X			X	X		

Class name	Use case						
	1	2	3	4	5	6	7
SerializedProductVariantConformance	X					X	X
SerializedProductVariantEnvironment						X	
SerializedProductVariantInFleet	X	X	X	X	X	X	X
SerializedProductVariantOperatingBase	X		X	X		X	X
SerializedProductVariantOperator						X	
SerializedProductVariantStatus					X		
Service				X			
ServiceBulletin		X					
ServiceLevelAgreementClause	X				X		
ServiceLevelAgreementEvaluation	X				X		
ServiceLevelAgreementEvaluationByAssertion	X				X		
ServiceLevelAgreementEvaluationByLogicalOperator	X				X		
SoftwarePartAsReleased	X					X	X
SubjectOfPoliciesAndRegulations				X			
TrackablePart	X					X	X
XOR	X				X		

2.10 Classes for configuration management

The classes used for each configuration management use case as defined in Chap 12 are listed in Table 11. In order to avoid having to cross-check the use case numbers, a summary of each use case is provided below:

8 Provide as-delivered configuration

9 Provide as-allowed configuration

10 Provide operational configuration

11 Provide customer modification

12 Provide as-desired configuration

Table 11 Classes used for configuration management use cases

Class name	Use case				
	1	2	3	4	5
Action	X	X	X	X	X
AllowedProductConfiguration	X	X	X	X	X
AllowedProductConfigurationByConfigurationIdentifier	X	X			
AllowedProductConfigurationHardwarePartAsDesigned	X	X			
AllowedProductConfigurationItem	X	X			
AllowedProductConfigurationRole			X		X
AllowedProductOperationalConfigurationItem			X		
AllowedRoleChange			X		
AlternatePartAsDesignedRelationship	X	X		X	
AND	X	X	X	X	X
ApplicabilityAssertItem	X	X	X	X	X
ApplicabilityAssignment	X	X	X	X	X
ApplicabilityAssignmentItem	X	X	X	X	X
ApplicabilityEvaluation	X	X	X	X	X
ApplicabilityEvaluationByApplicabilityStatementReference	X	X	X	X	X
ApplicabilityEvaluationByAssertion	X	X	X	X	X
ApplicabilityEvaluationByAssertionOfClassInstance	X	X	X	X	X
ApplicabilityEvaluationByAssertionOfCondition	X	X	X	X	X
ApplicabilityEvaluationByLogicalOperator	X	X	X	X	X
ApplicabilityStatement	X	X	X	X	X
ApplicableBlockOfSerializedEndItems	X	X			
AuthorityToOperate	X	X			
Breakdown	X	X			
BreakdownElement	X	X	X	X	
BreakdownElementRevision	X	X		X	
BreakdownElementRevisionRelationship	X	X			

Class name	Use case				
	1	2	3	4	5
BreakdownElementStructure	X	X			
BreakdownElementStructureRelationship	X	X			
BreakdownElementUsageInBreakdown	X	X	X	X	X
BreakdownItem	X	X			
BreakdownRevision	X	X		X	
ChangeAuthorization	X	X	X	X	X
ChangeControlledItem	X			X	
ChangeEffect	X			X	
ChangeEmbodimentRequirement				X	
ChangeRequest				X	
Comment	X	X	X	X	X
CommentedItem	X	X	X	X	X
CommentParty	X	X	X	X	X
CommentRelationship	X	X	X	X	X
ConditionDefinitionItem	X	X	X	X	X
ConditionInstance	X	X	X	X	X
ConditionStatement	X	X	X	X	X
ConditionType	X	X	X	X	X
ConditionTypeClassValue	X	X	X	X	X
ConditionTypePropertyValue	X	X	X	X	X
ConditionTypeValue	X	X	X	X	X
ContainedSubstance		X		X	
CostItem				X	
DatedApplicabilityStatement	X	X	X	X	X
Document	X	X	X	X	X
Event	X		X		
Facility	X	X	X	X	X

Class name	Use case				
	1	2	3	4	5
Fleet	X	X	X	X	X
FleetTask					X
HardwareElement	X	X		X	
HardwareElementPartRealization	X	X	X	X	X
HardwareElementRevision	X	X		X	
HardwarePartAsDesigned	X	X	X	X	X
HardwarePartAsDesignedDesignData		X		X	
HardwarePartAsDesignedSupportData		X		X	
ItemInAllowedProductConfiguration	X	X		X	
ItemInAllowedProductOperationalConfiguration			X		
ItemInProductVariant	X	X		X	
LogBookEntry	X		X		
LogBookEntryCounter	X		X		
LogicalOperator	X	X	X	X	X
MaintenanceProgram	X	X	X	X	X
MaintenanceWorkOrderSource				X	
MajorComponent	X		X		
Message	X	X	X	X	X
Movement	X		X		
NestedAllowedProductConfigurationRelationship	X	X			
NestedProductVariantRelationship	X	X			
NonConformanceData	X	X			
NonSerializedHardwarePart	X		X	X	
NOT	X	X	X	X	X
OperatingCounter	X		X	X	
OperationalModeStatus	X		X		
OperationalRole			X		X

Class name	Use case				
	1	2	3	4	5
OR	X	X	X	X	X
PartAction	X		X		
PartAsDesigned		X		X	
PartAsDesignedPartsList	X	X		X	
PartAsDesignedPartsListEntry	X	X		X	
PartInstallationLocation	X		X		
Party	X	X	X	X	X
PlannedItemUpgrade				X	
PlannedUpgradeTimescales				X	
Product	X	X			
ProductVariant	X	X	X	X	X
ProductVariantCapability			X		
ProductVariantItem	X	X			
Project	X	X	X	X	X
Remark	X	X	X	X	X
RemarkItem	X	X	X	X	X
RoleCapability			X		
SerializedHardwarePart	X		X	X	
SerializedItem	X		X		
SerializedPartDesignAssociation	X		X	X	
SerializedProductDesignAssociation	X		X		
SerializedProductVariant	X	X	X	X	X
SerializedProductVariantAssignment					X
SerializedProductVariantConformance	X		X		X
SerializedProductVariantStatus	X		X		
SerialNumberApplicabilityItem	X	X			
Service	X	X	X	X	X

Class name	Use case				
	1	2	3	4	5
ServiceBulletin				X	
SoftwareElementPartRealization	X	X	X	X	X
SoftwarePartAsDesigned	X	X	X	X	
SoftwarePartAsReleased	X	X	X	X	X
SubstanceDefinition		X		X	
SubstitutePartAsDesignedRelationship		X		X	
TechnicalOrder				X	
TrackablePart	X		X		
WorkItem				X	
XOR	X	X	X	X	X

2.11 Classes used for in-service contract management

The classes used for each in-service contract management use case as defined in Chap 13 are listed in Table 12. In order to avoid having to cross-check the use case numbers, a summary of each use case is provided below:

1 Provide contractual information

2 Provide Work Breakdown Structure (WBS)

3 Provide Cost Breakdown Structure (CBS)

4 Provide Organisational Breakdown Structure (OBS)

5 Provide/update activity planning

6 Report Service Level Agreement (SLA) compliance

7 Provide contract incurred costs

8 Provide status report

9 Provide information about locations and infrastructure

10 Manage service request

11 Request/grant/deny usage of resource

12 Assign security classification

Table 12 Classes used for in-service contract management use cases

Class name	Use case											
	1	2	3	4	5	6	7	8	9	10	11	12
Action	X	X	X	X	X	X	X	X	X	X	X	X
Address	X			X					X			
AND	X					X						
BreakdownElement												X
Budget	X	X	X				X	X		X	X	
ChangeEmbodimentRequirement							X					
ChangeRequest							X					
Comment	X	X	X	X	X	X	X	X	X	X	X	X
CommentedItem	X	X	X	X	X	X	X	X	X	X	X	X
CommentParty	X	X	X	X	X	X	X	X	X	X	X	X
CommentRelationship	X	X	X	X	X	X	X	X	X	X	X	X
ConditionDefinitionItem	X					X						
ConditionInstance	X					X						
ConditionStatement	X					X						
ConditionType	X					X						
ConditionTypeClassValue	X					X						
ConditionTypePropertyValue	X					X						
ConditionTypeValue	X					X						
Contract	X	X	X	X	X	X	X	X	X	X	X	
ContractClause	X	X	X	X		X	X	X				
ContractContext	X	X	X	X								
ContractItem	X	X	X	X								
ContractItemDetails	X	X	X	X								
ContractParty	X	X	X	X								
ContractRelationship	X	X	X	X			X	X				
CostBreakdown	X	X	X				X	X				

Class name	Use case											
	1	2	3	4	5	6	7	8	9	10	11	12
CostBreakdownRevision	X	X	X				X	X				
CostEntry	X	X	X		X	X	X	X				X
CostEntryRelatedTo					X		X					
CostItem	X	X	X				X	X			X	X
CostItemRelationship	X	X	X				X	X				
Country									X			
Damage							X					
DigitalFile												X
Document	X	X	X	X	X	X	X	X	X	X		X
DocumentAssignment	X	X	X	X			X	X	X	X		
DocumentAssignmentItem	X	X	X	X	X	X	X	X	X	X		
DocumentIssue	X	X	X	X			X	X	X	X		
DocumentItem	X	X	X	X			X	X	X	X		
DocumentParty	X	X	X	X			X	X	X	X		
DocumentRelationship	X	X	X	X			X	X	X	X		
EncryptionKey												X
Envelope												X
Environment									X			
Event												X
ExternalDocument	X	X	X	X			X	X	X	X		
Facility	X	X	X	X		X	X		X	X	X	X
FacilityOperator	X								X			
FacilityOwner	X								X			
FacilityRelationship	X								X			
Fleet	X	X	X	X			X			X		X
FleetAvailability	X				X	X	X	X				X
FleetRequirement												X

Class name	Use case											
	1	2	3	4	5	6	7	8	9	10	11	12
FleetTaskCancellationNotice	X	X	X	X			X	X	X	X		
GeographicalArea									X			
GeographicalAreaRelationship									X			
GPSLocation									X			
HardwarePartAsDesigned	X	X	X	X			X			X	X	
InventoryActivity					X		X					
Location					X		X		X	X	X	
Locator	X	X	X	X			X	X	X	X		
LogicalOperator	X					X						
MaintenanceActivity					X		X					
MaintenanceFacility	X								X			
MaintenanceOrganisation				X								
MaintenancePerson				X								
MaintenanceProgram	X	X	X	X			X	X	X	X		
Material							X					
Message	X	X	X	X	X	X	X	X	X	X	X	X
Movement							X					X
MovementLeg							X					X
NOT	X					X						
OperatingBase	X								X			
OperationalActivity					X		X					
OperationalEvent	X				X	X	X	X				
OperatorOrganization				X								
OperatorPerson				X								
OR	X					X						
Organization	X			X		X	X			X		X
OrganizationalBreakdownStructure					X							

Class name	Use case											
	1	2	3	4	5	6	7	8	9	10	11	12
OrganizationalBreakdownStructureRevision					X							
OrganizationalRole					X							
Party	X	X	X	X	X	X	X	X	X	X	X	X
PartyAddress				X								
PartyRelationship				X	X							
PartySecurityAssignment												X
Person				X			X				X	
PoliciesAndRegulations	X					X				X		
Pool												X
Product	X	X	X	X		X	X			X		X
ProductVariant	X	X	X	X		X	X			X	X	X
Project	X	X	X	X	X	X				X		X
ProjectRelationship	X	X	X	X								
ProjectSpecificClassAttributes												X
Remark	X	X	X	X	X	X	X	X	X	X	X	X
RemarkItem	X	X	X	X	X	X	X	X	X	X	X	X
Report	X	X	X	X	X	X	X	X	X	X		
ReportableActivity	X	X	X		X	X	X	X				
ReportableItem	X				X	X	X	X				
ReportableMetric	X				X	X	X	X				
Requirement										X		X
ResourceItem											X	
ResourceUsageParty											X	
ResourceUsageRequest											X	
S1000DDataModule	X	X	X	X			X	X	X	X		
S1000DLearningDataModule	X	X	X	X			X	X	X	X		
S1000DPublicationModule	X	X	X	X			X	X	X	X		

Class name	Use case											
	1	2	3	4	5	6	7	8	9	10	11	12
SafetyDocument	X	X	X	X			X	X	X	X		
SCORMContentPackage	X	X	X	X			X	X	X	X		
SecurityClass												X
SecurityClassification												X
SecurityClassificationItem												X
SerializedHardwarePart	X	X	X	X			X			X	X	
SerializedProductVariant	X	X	X	X		X	X			X	X	X
SerializedProductVariantAvailability	X				X	X	X	X				
Service	X	X	X	X		X	X			X		X
ServiceBulletin	X	X	X	X			X	X	X	X		
ServiceContract	X					X						
ServiceItem										X		
ServiceLevelAgreementClause	X	X	X			X	X	X				
ServiceLevelAgreementEvaluation	X					X						
ServiceLevelAgreementEvaluationByAssertion	X					X						
ServiceLevelAgreementEvaluationByLogicalOperator	X					X						
ServiceRequest										X		
ServiceRequestLocation										X		
ServiceRequestOn										X		
ServiceRequestParty										X		
ServiceRequestRelationship										X		
SoftwareElement	X	X	X	X								
SoftwarePartAsReleased							X					
SubjectOfPoliciesAndRegulations	X					X				X		
SupportEquipment	X								X			
Warehouse	X								X			
WarrantyClaimResolution							X					

Class name	Use case											
	1	2	3	4	5	6	7	8	9	10	11	12
WorkBreakdown	X	X	X				X	X				
WorkBreakdownRevision	X	X	X				X	X				
WorkItem	X	X	X		X		X	X				X
WorkItemRelationship	X	X	X				X	X				
WorkOrder	X				X	X	X	X				
XOR	X					X						

2.12 Classes used for non-predefined information

The classes used for each non-predefined information use case as defined in Chap 14 are listed in Table 13. In order to avoid having to cross-check the use case numbers, a summary of each use case is provided below:

1 Provide project-specific values

2 Provide non-predefined information

Table 13 Classes for used non-predefined information use cases

ClassName	Use case	
	1	2
3DDimension	X	
Action	X	X
AnyClass	X	X
AttributeTypeSelect	X	
AuthorizedLife	X	
BreakdownElement	X	
Budget	X	
Certificate		X
ChangeRequest	X	
ClassificationType	X	
CodeProperty	X	
Comment	X	X
CommentedItem	X	X

ClassName	Use case	
	1	2
CommentParty	X	X
CommentRelationship	X	X
Contract		X
ContractClause	X	
CostEntry	X	
CostItem	X	
Damage	X	
DatedClassification	X	
DatedState	X	
DateRange	X	
DateType	X	
DescriptorType	X	
DigitalFile		X
DigitalFileReference		X
Document	X	
EncryptionKey		X
Envelope		X
EnvelopeRelationship		X
Event	X	
Facility	X	
FailureMode	X	
Fleet	X	
FleetTask	X	
HardwarePartAsDesigned	X	
IdentifierType	X	
LogBookEntry	X	
Message	X	X

ClassName	Use case	
	1	2
MessageContent		X
MessageContext		X
MessageContextItemSelect		X
MessageDate		X
MessagePartySelect		X
MessageReceiver		X
MessageRelationship		X
MessageSender		X
PartAction	X	
Party	X	X
Product		X
ProductVariant	X	X
Project	X	X
ProjectSpecificClassAttributes	X	
ProjectSpecificExtension	X	
PropertyType	X	
Remark	X	X
RemarkItem	X	X
ReportableActivity	X	
ResourceUsageRequest	X	
SerializedHardwarePart	X	
SerializedProductVariant	X	X
SerialNumberRange	X	
Service	X	
ServiceRequest	X	
SoftwarePartAsReleased	X	
TemporaryClassification	X	

ClassName	Use case	
	1	2
TemporaryIdentifier	X	
TimeRange	X	
TimeSince	X	
TimestampedState	X	
WarrantyClaim	X	
WorkItem	X	
WorkOrder	X	

3 Mapping of data elements against chapter use cases

The current section provides a cross-reference between the different data elements and the specification use cases. This section can be used for the selection of the required data elements to be able to implement a specific chapter and/or use case. Thus, this section can be invoked so as to identify the information that has to be exchanged in order to be able to execute a specific in-service activity and/or to report on specific issues.

It should be highlighted that program-specific needs might require that some of the data elements listed here as optional become mandatory. This should be part of the tailoring process as described in Chap 18.The opposite is unlikely to be true, as mandatory elements are typically critical information, and in some cases essential for the data integration. If one of the mandatory fields cannot be provided on a specific program, an assessment should be made about its criticality on the overall data model. The S5000F steering committee will be pleased to assess in that regard.

Due to the big number of use cases, the mapping has been performed chapter by chapter. Each data element has been mapped to the individual chapter use cases, with a code indicating the need for the data element in question. Only data elements that are used in at least one use case have been listed for each chapter, unused data elements will not appear in the chapter mappings.

The codes that have been used are as follows:

- "**X":** **Required.** The data element is necessary to perform the indicated use case.
- **"O":** **Optional.** The work can be performed without the data element in question but it contributes with information that is useful and will facilitate the work considered in the use case.

Note that any data element can be used for multiple use cases and multiple chapters. This does not imply that the data element in question has to be sent repeatedly; a same feedback of a data element will however be used at the same time for several use cases.

For a description of the different data elements, refer to Chap 17.

3.1 Data elements for reliability, availability, maintainability, capability and testability

The data elements used for each RACMT use case as defined in Chap 3 are listed in Table 14. In order to avoid having to cross-check the use case numbers, a summary of each use case is provided below:

The **Reliability** use cases are as follows:

1. Monitor the performance of equipment
2. Influencing future designs
3. Trends, Failures, Root Cause Analysis and Issue Warnings

The **Availability** use cases are as follows:

4. Operations and deployment support, through-life support and equipment availability
5. Maintenance Management and Contracting for availability

The **Maintainability** use cases are as follows:

6. Maintenance Activities, Effectiveness of repairs, Specified Maintenance, predict Maintenance Periods, products status
7. Retaining Performance, Support manuals and Support Infrastructure

The **Capability** use cases are as follows:

8. Mission capable, capability shortfalls
9. Efficiency, Performance against specification

The **Testability** use cases are as follows:

10. Can product be tested
11. Fault diagnosis, fault identification

Table 14 Data elements for RAMCT use cases

Data Element	Reliability			Avail-ability		Main-taina-bility		Capa-bility		Testa-bility	
	1	2	3	4	5	6	7	8	9	10	11
actionCloseDate	O	O	O	O	O	O	O	O	O	O	O
actionCreationDate	X	X	X	X	X	X	X	X	X	X	X
actionDescription	X	X	X	X	X	X	X	X	X	X	X
actionIdentifier	X	X	X	X	X	X	X	X	X	X	X
actionScheduledDate	O	O	O	O	O	O	O	O	O	O	O
actionType	X	X	X	X	X	X	X	X	X	X	X
addressEMail				O	O	O		O		O	O

Data Element	Reliability			Avail-ability		Main-taina-bility		Capa-bility		Testa-bility	
	1	2	3	4	5	6	7	8	9	10	11
addressFaxNumber				O	O	O		O		O	O
addressIdentifier				X	X	X		X		X	X
addressPostalBox				O	O	O		O		O	O
addressPostalCode				O	O	O		O		O	O
addressStreet				O	O	O		O		O	O
addressStreetNumber				O	O	O		O		O	O
addressTelephoneNumber				O	O	O		O		O	O
addressTelexNumber				O	O	O		O		O	O
addressURL				O	O	O		O		O	O
allowedProductConfigurationIdentifier	X	X	X								
applicabilityEndDate	O	O	O	O	O						
applicabilityStartDate	O	O	O	O	O						
applicabilityStatementDescription	O	O	O	O	O						
applicabilityStatementIdentifier	O	O	O	O	O						
applicableSerialNumberRange	X	X	X								
authorityToOperateIdentifier	X	X	X	X	X	X		X	X	X	X
belongsToFleetDuring	X	X	X	X	X	X	X	X	X	X	X
breakdownElementEssentiality	O	O	O	O	O	O	O	O	O	O	O
breakdownElementIdentifier	X	X	X	X	X	X	X	X	X	X	X
breakdownElementName	O	O	O	O	O	O	O	O	O	O	O
breakdownElementRelationshipType	X	X	X	X	X	X	X	X	X	X	X
breakdownElementRevisionIdentifier	X	X	X	X	X	X	X	X	X	X	X
breakdownElementRevisionStatus	O	O	O	O	O	O	O	O	O	O	O
breakdownElementStructureRelationshipType	X	X	X	X	X	X	X	X	X	X	X
breakdownRevisionIdentifier	X	X	X	X	X	X	X	X	X	X	X
breakdownRevisionStatus	O	O	O	O	O	O	O	O	O	O	O

Data Element	Reliability			Avail-ability		Main-taina-bility		Capa-bility		Testa-bility	
	1	2	3	4	5	6	7	8	9	10	11
breakdownType	X	X	X	X	X	X	X	X	X	X	X
cargoItemDescription								O			
cargoItemIdentifier								X			
cargoItemName								O			
cargoItemUnitaryDimensions								O			
cargoItemUnitaryWeight								O			
cargoItemUnits								X			
changeAuthorizationIdentifier	X	X	X	X	X	X		X			
changeEffectDescription	O	O		O	O	O		O			
changeEffectType	O	O		O	O	O		O			
changeEmbodimentRequirementDate	X	X	X	X	X	X	X	X		X	X
changeEmbodimentRequirementId	X	X	X	X	X	X	X	X		X	X
changeEmbodimentRequirementType	X	X	X	X	X	X	X	X		X	X
changeRequestDescription	X	X	X	X	X	X	X	X		X	X
changeRequestIdentifier	X	X	X	X	X	X	X	X		X	X
commentDate	X	X	X	X	X	X	X	X	X	X	X
commentIdentifier	X	X	X	X	X	X	X	X	X	X	X
commentPartyRole	O	O	O	O	O	O	O	O	O	O	O
commentPriority	X	X	X	X	X	X	X	X	X	X	X
commentRelationshipType	X	X	X	X	X	X	X	X	X	X	X
commentStatus	X	X	X	X	X	X	X	X	X	X	X
commentText	X	X	X	X	X	X	X	X	X	X	X
commentTitle	X	X	X	X	X	X	X	X	X	X	X
commentType	X	X	X	X	X	X	X	X	X	X	X
conditionInstanceDescription	O	O	O	O	O						
conditionInstanceIdentifier	X	X	X	X	X						

Data Element	Reliability			Avail-ability		Main-taina-bility		Capa-bility		Testa-bility	
	1	2	3	4	5	6	7	8	9	10	11
conditionInstanceName	X	X	X	X	X						
conditionTypeClassValue	X	X	X	X	X						
conditionTypeDescription	O	O	O	O	O						
conditionTypeName	X	X	X	X	X						
conditionTypePropertyValue	X	X	X	X	X						
consequenceDescription	X	X	X	X	X	X	X	X	X	X	X
consequenceType	X	X	X	X	X	X	X	X	X	X	X
consumableItemDescription	O	O	O	O	O	O	O		O	O	O
consumableItemIdentifier	X	X	X	X	X	X	X		X	X	X
consumableItemName	X	X	X	X	X	X	X		X	X	X
consumableItemRiskDescription	O	O	O	O	O	O	O		O	O	O
consumableItemRiskFactor	X	X	X	X	X	X	X		X	X	X
consumableType	X	X	X	X	X	X	X		X	X	X
contractClauseDescription		O									
contractClauseIdentifier		X									
contractClauseValidityPeriod		O									
contractEffectivityDateTimes	X	X	X	X	X	X	X	X	X	X	X
contractName	X	X	X	X	X	X	X	X	X	X	X
contractSignatureDate	X	X	X	X	X	X	X	X	X	X	X
contractStatus	X	X	X	X	X	X	X	X	X	X	X
contractType	X	X	X	X	X	X	X	X	X	X	X
contractValue	O	O	O	O	O	O	O	O	O	O	O
costEntryDate	X	X	X	X	X	X	X	X		X	X
costEntryDescription	X	X	X	X	X	X	X	X		X	X
costEntryIdentifier	X	X	X	X	X	X	X	X		X	X
costEntryPeriod	O	O	O	O	O	O	O	O		O	O

Data Element	Reliability			Avail-ability		Main-taina-bility		Capa-bility		Testa-bility	
	1	2	3	4	5	6	7	8	9	10	11
costEntryType	X	X	X	X	X	X	X	X		X	X
costEntryValue	X	X	X	X	X	X	X	X		X	X
costItemDescription	X	X		X	X	X		X			
costItemIdentifier	X	X		X	X	X		X			
damageDescription	X	X	X	X	X	X	X	X	X	X	X
damageEstimatedCost	O	O	O	O	O	O	O	O	O	O	O
damageFamily	X	X	X	X	X	X	X	X	X	X	X
damageIdentifier	X	X	X	X	X	X	X	X	X	X	X
damageStatus	O	O	O	O	O	O	O	O	O	O	O
dataModuleCode	X	X	X	X	X	X	X	X	X	X	X
dataModuleInfoname	O	O	O	O	O	O	O	O	O	O	O
detectionMeanCapabilityCapabilityType										X	X
detectionMeanCapabilityDescription										X	X
detectionMeanCapabilityIdentifier										O	O
detectionMechanismDescription										X	X
detectionMechanismFalseAlarmRate										O	O
detectionMechanismIdentifier										X	X
detectionMechanismPresentation										O	O
detectionMechanismType										X	X
documentAssignmentRole	X	X	X	X	X	X	X	X	X	X	X
documentCreationDate	O	O	O	O	O	O	O	O	O	O	O
documentDescription	O	O	O	O	O	O	O	O	O	O	O
documentIdentifier	X	X	X	X	X	X	X	X	X	X	X
documentIssueDate	O	O	O	O	O	O	O	O	O	O	O
documentIssueIdentifier	X	X	X	X	X	X	X	X	X	X	X
documentIssueReason	O	O	O	O	O	O	O	O	O	O	O

Data Element	Reliability			Avail-ability		Main-taina-bility		Capa-bility		Testa-bility	
	1	2	3	4	5	6	7	8	9	10	11
documentPartyRelationshipType	X	X	X	X	X	X	X	X	X	X	X
documentPortion	O	O	O	O	O	O	O	O	O	O	O
documentRelationshipType	X	X	X	X	X	X	X	X	X	X	X
documentStatus	O	O	O	O	O	O	O	O	O	O	O
documentTitle	O	O	O	O	O	O	O	O	O	O	O
documentType	X	X	X	X	X	X	X	X	X	X	X
DownTimeId	X	X	X	X	X	X	X	X	X	X	X
downTimePeriod	X	X	X	X	X	X	X	X	X	X	X
downTimePeriodReason	O	O	O	O	O	O	O	O	O	O	O
downTimeStatus	O	O	O	O	O	O	O	O	O	O	O
environmentDescription	X	X	X	X	X	X			X	X	X
environmentType	X	X	X	X	X	X			X	X	X
equipmentFaultDeferredToDate	O	O	O	O	O	O	O	O	O	O	O
equipmentFaultDetectedDate	X	X	X	X	X	X	X	X	X	X	X
equipmentFaultFixedDate	O	O	O	O	O	O	O	O	O	O	O
equipmentFaultIdentifier	X	X	X	X	X	X	X	X	X	X	X
equipmentFaultStatus	X	X	X	X	X	X	X	X	X	X	X
equipmentFaultSymptom	O	O	O	O	O	O	O	O	O	O	O
equipmentOperatingPeriod	X	X	X	X	X	X	X	X	X	X	X
equipmentOwnershipPeriod	X	X	X	X	X	X	X	X	X	X	X
equipmentStatusPeriod	X	X	X	X	X	X	X	X	X	X	X
equipmentStatusReason	X	X	X	X	X	X	X	X	X	X	X
equipmentStatusType	X	X	X	X	X	X	X	X	X	X	X
eventConfirmedStatus	X	X	X	X	X	X	X	X	X	X	X
eventDescription	X	X	X	X	X	X	X	X	X	X	X
eventGroup	X	X	X	X	X	X	X	X	X	X	X

Data Element	Reliability			Avail-ability		Main-taina-bility		Capa-bility		Testa-bility	
	1	2	3	4	5	6	7	8	9	10	11
eventIdentifier	X	X	X	X	X	X	X	X	X	X	X
eventOcurrenceDateTime	X	X	X	X	X	X	X	X	X	X	X
eventRelationshipType	X	X	X	X	X	X	X	X	X	X	X
eventSeverity	X	X	X	X	X	X	X	X	X	X	X
explanatoryFactorDescription	X	X	X	X	X	X	X	X	X	X	X
explanatoryFactorIdentifier	X	X	X	X	X	X	X	X	X	X	X
explanatoryFactorName	X	X	X	X	X	X	X	X	X	X	X
explanatoryFactorOrganization	X	X	X	X	X	X	X	X	X	X	X
externalDocumentType	O	O	O	O	O	O	O	O	O	O	O
facilityCleansiness	X	X	X	X	X	X	X	X		X	X
facilityDescription	X	X	X	X	X	X	X	X		X	X
facilityDimensions	X	X	X	X	X	X	X	X		X	X
facilityIdentifier	X	X	X	X	X	X	X	X		X	X
facilityName	X	X	X	X	X	X	X	X		X	X
facilityOperatorDuring				X	X	X		X		X	X
facilityOwnedDuring				X	X	X		X		X	X
facilityOwnershipRatio				O	O	O		O		O	O
facilityRelationshipType				X	X	X		X		X	X
facilityType	X	X	X	X	X	X	X	X		X	X
failureCauseCode										X	X
failureCauseDescription										X	X
failureCauseIdentifier										X	X
failureDetectionRate										O	O
failureModeDescription										X	X
failureModeEffectDescription										X	X
failureModeEffectIdentifier										X	X

Data Element	Reliability			Avail-ability		Main-taina-bility		Capa-bility		Testa-bility	
	1	2	3	4	5	6	7	8	9	10	11
failureModeIdentifier										X	X
fleetAvaialbilityReportingDate	X	X		X	X	X	X	X		X	X
fleetAvailabilityPeriod	X	X		X	X	X	X	X		X	X
fleetAvailabilityValue	X	X		X	X	X	X	X		X	X
fleetDescription	X	X	X	X	X	X	X	X	X	X	X
fleetIdentifier	X	X	X	X	X	X	X	X	X	X	X
FleetPlanningDescription								X			
fleetPlanningIdentifier								X			
fleetPlanningPeriod								X			
fleetPlanningStatus								X			
fleetRequirementAvailability								X			
fleetRequirementDate								X			
fleetRequirementMinimumFleetSize								O			
fleetRequirementPeriod								X			
fleetRequirementUsage								X			
fleetRequirementUsageLimitation								O			
fleetTaskDescription								X			
fleetTaskExpectedEnd								X			
fleetTaskExpectedStart								X			
fleetTaskIdentifier								X			
fleetTaskPriority								X			
fleetTaskRequiredFuel								X			
gpsLocationElevation	X	X	X	X	X						
gpsLocationLatitude	X	X	X	X	X						
gpsLocationLongitude	X	X	X	X	X						
hardwareElementRepairability	X	X	X	X	X	X	X	X	X	X	X

Data Element	Reliability			Avail-ability		Main-taina-bility		Capa-bility		Testa-bility	
	1	2	3	4	5	6	7	8	9	10	11
hardwareElementReplaceability	X	X	X	X	X	X	X	X	X	X	X
hardwareElementType	X	X	X	X	X	X	X	X	X	X	X
hardwarePartHazardousClass	O	O	O	O	O	O	O	O	O	O	O
hardwarePartLogisticsCategory	X	X	X	X	X	X	X	X	X	X	X
hardwarePartOperationalAuthorizedLife	O	O	O	O	O	O	O	O	O	O	O
hardwarePartRepairability	X	X	X	X	X	X	X	X	X	X	X
hardwarePartScrapRate	O	O	O	O	O	O	O	O	O	O	O
locationDescription	O	O	O	O	O	O	O	O	O	O	O
locationIdentifier	X	X	X	X	X	X	X	X	X	X	X
locationName	O	O	O	O	O	O	O	O	O	O	O
locationType	X	X	X	X	X	X	X	X	X	X	X
locatorDescription	O	O	O	O	O	O	O	O	O	O	O
locatorIdentifier	X	X	X	X	X	X	X	X	X	X	X
locatorName	X	X	X	X	X	X	X	X	X	X	X
logBookEntryComment	O	O	O	O	O	O	O	O	O	O	O
logbookEntryCounterIdentifier	X	X	X	X	X	X	X	X	X	X	X
logBookEntryCounterType	X	X	X	X	X	X	X	X	X	X	X
logBookEntryCounterValue	X	X	X	X	X	X	X	X	X	X	X
logBookEntryDateTime	X	X	X	X	X	X	X	X	X	X	X
logBookEntryIdentifier	X	X	X	X	X	X	X	X	X	X	X
logBookEntryType	X	X	X	X	X	X	X	X	X	X	X
maintenanceActivityNote	O	O	O	O	O	O	O	O	O	O	O
maintenanceActivityPlanAccessHours	X	X	X	X	X	X	X		X	X	X
maintenanceActivityPlanExecutionHours	X	X	X	X	X	X	X		X	X	X
maintenanceActivityPlanPeriod	X	X	X	X	X	X	X		X	X	X
maintenanceActivityPlanPreparationHours	X	X	X	X	X	X	X		X	X	X

Data Element	Reliability			Avail-ability		Main-taina-bility		Capa-bility		Testa-bility	
	1	2	3	4	5	6	7	8	9	10	11
maintenanceActivityRecordAccessHours	X	X	X	X	X	X	X		X	X	X
maintenanceActivityRecordApprovalTime	X	X	X	X	X	X	X		X	X	X
maintenanceActivityRecordExecutionHours	X	X	X	X	X	X	X		X	X	X
maintenanceActivityRecordPeriod	X	X	X	X	X	X	X		X	X	X
maintenanceActivityRecordPreparationHours	X	X	X	X	X	X	X		X	X	X
maintenanceActivityRecordWorkDone	X	X	X	X	X	X	X		X	X	X
maintenanceActivitySequence	X	X	X	X	X	X	X	X	X	X	X
maintenanceEventCategoryType	X	X	X	X	X	X	X	X	X	X	X
maintenanceEventDescription	X	X	X	X	X	X	X	X	X	X	X
maintenanceEventReportedDate	X	X	X	X	X	X	X	X	X	X	X
maintenanceFacilityShifts	X	X	X	X	X	X	X	X	X	X	X
maintenanceFacilitySlotDescription				O	O			O		O	O
maintenanceFacilitySlotIdentifier				X	X			X		X	X
maintenanceFacilitySlotPlannedUsagePeriod				X	X			X		X	X
maintenanceFacilitySlotType				X	X			X		X	X
maintenanceLevelCapabilityDescription				O	O			O		O	O
maintenanceLevelIdentifier				X	X			X		X	X
maintenanceLevelName				O	O			O		O	O
maintenanceLicenceIdentifier		X	X	X	X	X	X			X	X
maintenanceLicenceName		X	X	X	X	X	X			X	X
maintenanceLicenceType		X	X	X	X	X	X			X	X
maintenanceLicenceValidity		X	X	X	X	X	X			X	X
maintenancePersonApprovedProductPeriod		X	X	X	X	X	X			X	X
maintenancePersonFacilityPeriod		X	X	X	X	X	X			X	X
maintenancePersonJobType	X	X	X	X	X	X	X		X	X	X
maintenancePersonRemarks	O	O	O	O	O	O	O		O	O	O

Data Element	Reliability			Avail-ability		Main-taina-bility		Capa-bility		Testa-bility	
	1	2	3	4	5	6	7	8	9	10	11
maintenanceProgramType	X	X	X	X	X	X	X	X	X	X	X
maintenanceSignificantOrRelevant	X	X	X	X	X	X	X	X	X	X	X
materialCharacteristicsRecordingDate	X	X	X	X	X	X	X	X	X	X	X
materialDescription	O	O	O	O	O	O	O	O	O	O	O
materialIdentifier	X	X	X	X	X	X	X	X	X	X	X
materialName	X	X	X	X	X	X	X	X	X	X	X
materialRiskDescription	O	O	O	O	O	O	O	O	O	O	O
materialRiskFactor	X	X	X	X	X	X	X	X	X	X	X
materialSubstanceUsageCategory	X	X	X	X	X	X	X	X	X	X	X
messageContentStatus	O	O	O	O	O	O	O	O	O	O	O
messageCreationDate	O	O	O	O	O	O	O	O	O	O	O
messageIdentifier	X	X	X	X	X	X	X	X	X	X	X
messageLanguage	O	O	O	O	O	O	O	O	O	O	O
movementIdentifier	X	X	X	X	X	X	X	X	X	X	X
movementLegDelayCause	X	X	X	X	X						
movementLegDelayDate	X	X	X	X	X						
movementLegDelayDuration	X	X	X	X	X						
movementLegDelayType	X	X	X	X	X						
movementLegGeoLocationTime	X	X	X	X	X						
movementLegPeriod	X	X	X	X	X	X	X	X		X	X
movementLegResult	X	X	X	X	X	X	X	X		X	X
movementLegSequence	X	X	X	X	X	X	X	X		X	X
movementResult	X	X	X	X	X	X	X	X	X	X	X
movementTransit	X	X	X	X	X	X	X	X	X	X	X
movementType	X	X	X	X	X	X	X	X	X	X	X
nonConformanceDescription	O	O	O								

Data Element	Reliability			Avail-ability		Main-taina-bility		Capa-bility		Testa-bility	
	1	2	3	4	5	6	7	8	9	10	11
nonConformanceRestriction	O	O	O								
nonConformanceType	X	X	X								
operatingBaseCapacityIdentifier	X	X	X	X	X	X				X	X
operatingBaseProductVariantCapacity	X	X	X	X	X	X				X	X
operatingCounterIdentifier	X	X	X	X	X	X	X	X	X	X	X
operatingCounterValue	X	X	X	X	X	X	X	X	X	X	X
operatingEnvironmentIdentifier	X	X	X	X	X	X			X	X	X
operatingEnvironmentPeriod	X	X	X	X	X				X	X	X
operationalApprovalType	X	X	X	X	X				X	X	X
operationalEventCategoryType	X	X	X	X	X	X	X	X	X	X	X
operationalEventMaintenanceDown	X	X	X	X	X	X	X	X	X	X	X
operationalEventMaintenanceNotificationDateTime	X	X	X	X	X	X	X	X	X	X	X
operationalEventMaintenanceReleasedDateTime	O	O	O	O	O	O	O	O	O	O	O
operationalEventMessageIdentifier	X	X	X	X	X				X	X	X
operationalEventMessageSequence	X	X	X	X	X				X	X	X
operationalEventMessageText	X	X	X	X	X				X	X	X
operationalEventMessageType	X	X	X	X	X				X	X	X
operationalEventOperationalMode	X	X	X	X	X	X	X	X	X	X	X
operationalEventReportedDate	X	X	X	X	X	X	X	X	X	X	X
operationalEventSymptom	O	O	O	O	O	O	O	O	O	O	O
operationalModeClassification	X	X	X	X	X						
operationalModeDescription	X	X	X	X	X						
operationalModeIdentifier	X	X	X	X	X						
operationalModeName	O	O	O	O	O						
operationalModeStatusType	X	X	X	X	X	X	X	X	X	X	X

Data Element	Reliability			Avail-ability		Main-taina-bility		Capa-bility		Testa-bility	
	1	2	3	4	5	6	7	8	9	10	11
operationalModeStatusUsed	X	X	X	X	X	X	X	X	X	X	X
operationalPeriodActual	O	O	O	O	O						
operationalPeriodIdentifier	X	X	X	X	X						
operationalPeriodName	O	O	O	O	O						
operationalPeriodPhase	O	O	O	O	O						
operationalPeriodRelationshipType	X	X	X	X	X						
operationalPeriodResult	O	O	O	O	O						
operationalPeriodScheduled	O	O	O	O	O						
operationalRequirementPeriod								X			
operationalRoleDelta	X	X	X	X	X	X	X	X	X	X	X
operationalRoleDescription	X	X	X	X	X	X	X	X	X	X	X
operationalRoleidentifier	X	X	X	X	X	X	X	X	X	X	X
operationalRoleType	X	X	X	X	X	X	X	X	X	X	X
organizationDates	O	O	O	O	O	O	O	O	O	O	O
organizationType	O	O	O	O	O	O	O	O	O	O	O
partActionCause	O	O	O	O	O	O	O	O	O	O	O
partActionCauseDescription	O	O	O	O	O	O	O	O	O	O	O
partActionDate	X	X	X	X	X	X	X	X	X	X	X
partActionIdentifier	X	X	X	X	X	X	X	X	X	X	X
partActionTimeSinceNew	O	O	O	O	O	O	O	O	O	O	O
partActionTimeSinceOverhaul	X	X	X	X	X	X	X	X	X	X	X
partActionType	X	X	X	X	X	X	X	X	X	X	X
partExportControl	O	O	O	O	O	O	O	O	O	O	O
partIdentifier	X	X	X	X	X	X	X	X	X	X	X
partMajorComponent	O	O	O	O	O	O	O	O	O	O	O
partName	X	X	X	X	X	X	X	X	X	X	X

Data Element	Reliability			Avail-ability		Main-taina-bility		Capa-bility		Testa-bility	
	1	2	3	4	5	6	7	8	9	10	11
partsListEntryPosition	O	O	O	O	O	O	O	O	O	O	O
partsListRevisionIdentifier	O	O	O	O	O	O	O	O	O	O	O
partsListType	X	X	X	X	X	X	X	X	X	X	X
personDates	O	O	O	O	O	O	O	O		O	O
personFamilyName	O	O	O	O	O	O	O	O		O	O
personIdentifier	X	X	X	X	X	X	X	X		X	X
personMiddleName	O	O	O	O	O	O	O	O		O	O
personName	O	O	O	O	O	O	O	O		O	O
personPrefixTitle	O	O	O	O	O	O	O	O		O	O
personSuffixTitle	O	O	O	O	O	O	O	O		O	O
plannedItemUpgradeIdentifier	X	X		X	X	X		X			
plannedItemUpgradePriority	X	X		X	X	X		X			
plannedItemUpgradeReason	O	O		O	O	O		O			
plannedUpgradePeriod	X	X		X	X	X		X			
plannedUpgradeTimeIdentifier	X	X		X	X	X		X			
plannedUpgradeTimeVersion	X	X		X	X	X		X			
productIdentifier	X	X	X	X	X	X	X	X	X	X	X
productName	O	O	O	O	O	O	O	O	O	O	O
productParameterAtOperationalEventName	X	X	X	X	X				X	X	X
productParameterAtOperationalEventValue	X	X	X	X	X				X	X	X
productParametersAtOperationalEventIdentifier	X	X	X	X	X				X	X	X
productUsagePhaseDescription	X	X	X	X	X	X	X	X	X	X	X
productUsagePhaseDuration	X	X	X	X	X	X	X	X	X	X	X
productUsagePhaseIdentifier	X	X	X	X	X	X	X	X	X	X	X
productVariantCapabilityDescription	X	X	X	X	X	X		X	X	X	X
productVariantCapabilityIdentifier	X	X	X	X	X	X		X	X	X	X

Data Element	Reliability			Avail-ability		Main-taina-bility		Capa-bility		Testa-bility	
	1	2	3	4	5	6	7	8	9	10	11
productVariantEntryIntoServiceDate	X	X	X	X	X	X	X	X	X	X	X
productVariantIdentifier	X	X	X	X	X	X	X	X	X	X	X
productVariantLastBuyDate	X	X	X	X	X	X	X	X	X	X	X
productVariantName	O	O	O	O	O	O	O	O	O	O	O
productVariantProductionDates	X	X	X	X	X	X	X	X	X	X	X
publicationModuleCode	X	X	X	X	X	X	X	X	X	X	X
publicationModuleTitle	O	O	O	O	O	O	O	O	O	O	O
quantityOfChildElement	O	O	O	O	O	O	O	O	O	O	O
quantityOfContainedSubstance	O	O	O	O	O	O	O	O	O	O	O
referenceDesignator	O	O	O	O	O	O	O	O	O	O	O
remarkText	X	X	X	X	X	X	X	X	X	X	X
remarkType	O	O	O	O	O	O	O	O	O	O	O
reportableActivityIdentifier	X	X	X	X	X	X	X	X		X	X
reportableActivityPeriod	X	X	X	X	X	X	X	X		X	X
reportableActivityReportingDate	X	X	X	X	X	X	X	X		X	X
reportableMetricIdentifier	X	X		X	X	X	X			X	X
reportableMetricPeriod	X	X		X	X	X	X			X	X
reportableMetricType	X	X		X	X	X	X			X	X
reportableMetricValue	X	X		X	X	X	X			X	X
reportPeriod	X	X	X	X	X	X	X	X	X	X	X
requiredFleetRoleAvailability								O			
requiredSafetyActionDescription	X	X	X	X	X					X	X
requiredSafetyActionIdentifier	X	X	X	X	X					X	X
requiredSafetyActionImplementationDate	X	X	X	X	X					X	X
requiredSafetyActionPriority	X	X	X	X	X					X	X
requiredSafetyActionReleaseDate	X	X	X	X	X					X	X

Data Element	Reliability			Avail-ability		Main-taina-bility		Capa-bility		Testa-bility	
	1	2	3	4	5	6	7	8	9	10	11
requiredSafetyActionType	X	X	X	X	X					X	X
safetyDocumentCriticality	X	X	X	X	X	X	X	X	X	X	X
safetyIsssueReportingDateTime	X	X	X	X	X					X	X
safetyIssueAssessmentBy	X	X	X	X	X					X	X
safetyIssueFirstIdentificationDateTime	X	X	X	X	X					X	X
safetyWarningAplicabilityDates	O	O	O	O	O					O	O
safetyWarningPriority	X	X	X	X	X					X	X
serializedHardwarePartInServicePeriod	X	X	X	X	X	X	X	X	X	X	X
serializedHardwarePartManufacturingDate	X	X	X	X	X	X	X	X	X	X	X
serializedItemWarrantyPeriod		X									
serializedItemWarrantyType		X									
serializedPartIdentifier	X	X	X	X	X	X	X	X	X	X	X
serializedProductVariantAssignmentDate								X			
serializedProductVariantAssignmentIdentifier								X			
serializedProductVariantAssignmentStatus								X			
serializedProductVariantAssignmentType								X			
serializedProductVariantAvailabilityDate	X	X		X	X	X	X	X		X	X
serializedProductVariantAvailabilityDescription	O	O		O	O	O	O	O		O	O
serializedProductVariantAvailabilityReportingDate	X	X		X	X	X	X	X		X	X
serializedProductVariantAvailabilityStatus	X	X		X	X	X	X	X		X	X
serializedProductVariantConformancePeriod	X	X	X	X	X	X	X	X	X	X	X
serializedProductVariantEndOfServiceDate	O	O	O	O	O	O	O	O	O	O	O
serializedProductVariantEntryIntoServiceDate	X	X	X	X	X	X	X	X	X	X	X
serializedProductVariantIdentifier	X	X	X	X	X	X	X	X	X	X	X
serializedProductVariantInServiceStatus	X	X	X	X	X	X	X	X	X	X	X

Data Element	Reliability			Avail-ability		Main-taina-bility		Capa-bility		Testa-bility	
	1	2	3	4	5	6	7	8	9	10	11
serializedProductVariantManufacturingDate	X	X	X	X	X	X	X	X	X	X	X
serializedProductVariantOperatingBasePeriod	X	X	X	X	X	X	X	X	X	X	X
serializedProductVariantOperatorDuring	X	X	X	X	X	X	X	X	X	X	X
serializedProductVariantOwnerDuring	X	X	X	X	X	X	X	X	X	X	X
serializedProductVariantOwnerRatio	O	O	O	O	O	O	O	O	O	O	O
serializedProductVariantStatusPeriod	X	X	X	X	X	X	X	X	X	X	X
serializedProductVariantStatusValue	X	X	X	X	X	X	X	X	X	X	X
serviceBulletinCost	O	O	O	O	O	O	O	O	O	O	O
serviceBulletinEmbodimentLimit	O	O	O	O	O	O	O	O	O	O	O
serviceBulletinPriority	X	X	X	X	X	X	X	X	X	X	X
serviceBulletinType	X	X	X	X	X	X	X	X	X	X	X
serviceDescription	X	X	X	X	X	X	X	X		X	X
skillCode		X	X	X	X	X	X			X	X
skillLevelDescription		O	O	O	O	O	O			O	O
skillLevelName		X	X	X	X	X	X			X	X
softwarePartAsReleasedChecksum	O	O	O	O	O	O	O	O	O	O	O
softwarePartAsReleasedDateTime	X	X	X	X	X	X	X	X	X	X	X
softwarePartAsReleasedSize	X	X	X	X	X	X	X	X	X	X	X
softwareReleaseIdentifier	O	O	O	O	O	O	O	O	O	O	O
specialSafetyInstructionApplicabilityDates	X	X	X	X	X					X	X
specialSafetyInstructionPriority	X	X	X	X	X					X	X
substanceIdentifier	X	X	X	X	X	X	X	X	X	X	X
substanceName	X	X	X	X	X	X	X	X	X	X	X
suppliesUsedAmount	X	X	X	X	X	X	X		X	X	X
supportEquipmentCalibrationRequired	X	X	X	X	X	X	X	X	X	X	X
supportEquipmentDimensions	X	X	X	X	X	X	X	X	X	X	X

Data Element	Reliability			Avail-ability		Main-taina-bility		Capa-bility		Testa-bility	
	1	2	3	4	5	6	7	8	9	10	11
supportEquipmentPower	O	O	O	O	O	O	O	O	O	O	O
supportEquipmentType	X	X	X	X	X	X	X	X	X	X	X
supportEquipmentUsedAmount	X	X	X	X	X	X	X		X	X	X
supportEquipmentUsedDuration	X	X	X	X	X	X	X		X	X	X
supportEquipmentWeight	X	X	X	X	X	X	X	X	X	X	X
technicalOrderPriority	X	X		X	X	X		X			
technicalOrderRequiredImplementationDate	O	O		O	O	O		O			
tradeName		X	X	X	X	X	X			X	X
warrantyClaimCommunicationMeans		X									
warrantyClaimContactType		X									
warrantyClaimFilingDate		X									
warrantyClaimFollowUpNotes		X									
warrantyClaimIdentifier		X									
warrantyClaimOccurrenceDate		X									
warrantyClaimResolutionDate	X	X	X	X	X	X	X	X		X	X
warrantyClaimResolutionDescription	X	X	X	X	X	X	X	X		X	X
warrantyClaimResolutionType	X	X	X	X	X	X	X	X		X	X
warrantyClaimSettlementDate		X									
warrantyClaimType		X									
warrantyEventPeriod	X	X	X	X	X	X	X	X	X	X	X
warrantyEventReason	X	X	X	X	X	X	X	X	X	X	X
workItemDescription	X	X	X	X	X	X	X	X		X	X
workItemIdentifier	X	X	X	X	X	X	X	X		X	X
workItemPeriod	X	X	X	X	X	X	X	X		X	X
workItemStatus	X	X	X	X	X	X	X	X		X	X
workItemType	X	X	X	X	X	X	X	X		X	X

Data Element	Reliability			Avail-ability		Main-taina-bility		Capa-bility		Testa-bility	
	1	2	3	4	5	6	7	8	9	10	11
workOrderDateRaised	X	X	X	X	X	X	X	X	X	X	X
workOrderDescription	X	X	X	X	X	X	X	X	X	X	X
workOrderExecutionPeriod	X	X	X	X	X	X	X	X	X	X	X
workOrderIdentifier	X	X	X	X	X	X	X	X	X	X	X
workOrderStatus	X	X	X	X	X	X	X	X	X	X	X
workOrderType	X	X	X	X	X	X	X	X	X	X	X
zoneElementType	X	X	X	X	X	X	X		X	X	X

3.2 Data elements for maintenance analysis

The data elements used for each maintenance analysis use case as defined in Chap 4 are listed in Table 15. In order to avoid having to cross-check the use case numbers, a summary of each use case is provided below:

1. Manufacturer maintenance schedule
2. Product operational environment data
3. Operational profile data
4. Work order / package data
5. New modifications for product
6. Technical queries

Table 15 Data elements for maintenance analysis use cases

Data Element	Use case					
	1	2	3	4	5	6
actionCloseDate	O	O	O	O	O	O
actionCreationDate	X	X	X	X	X	X
actionDescription	X	X	X	X	X	X
actionIdentifier	X	X	X	X	X	X
actionScheduledDate	O	O	O	O	O	O
actionType	X	X	X	X	X	X
authorityToOperateIdentifier						X

Data Element	Use case					
	1	2	3	4	5	6
batchPartIdentifier			O		O	O
belongsToFleetDuring		X		X	X	X
breakdownElementEssentiality	O		O			O
breakdownElementIdentifier	X		X			X
breakdownElementName	O		O			O
breakdownElementRevisionIdentifier	X		X			
breakdownElementRevisionStatus	O		O			
changeAuthorizationIdentifier	X		X		X	
changeEffectDescription	O		O		O	
changeEffectType	O		O		O	
changeEmbodimentRequirementDate	X		X		X	
changeEmbodimentRequirementId	X		X		X	
changeEmbodimentRequirementType	X		X		X	
changeRequestDescription	X		X		X	
changeRequestIdentifier	X		X		X	
commentDate	X	X	X	X	X	X
commentIdentifier	X	X	X	X	X	X
commentPartyRole	O	O	O	O	O	O
commentPriority	X	X	X	X	X	X
commentRelationshipType	X	X	X	X	X	X
commentStatus	X	X	X	X	X	X
commentText	X	X	X	X	X	X
commentTitle	X	X	X	X	X	X
commentType	X	X	X	X	X	X
consequenceDescription						X
consequenceType						X
consumableItemDescription	O		O	O		

Data Element	Use case					
	1	2	3	4	5	6
consumableItemIdentifier	X		X	X		
consumableItemName	X		X	X		
consumableItemRiskDescription	O		O	O		
consumableItemRiskFactor	X		X	X		
consumableType	X		X	X		
contractEffectivityDateTimes	X	X			X	X
contractName	X	X			X	X
contractSignatureDate	X	X			X	X
contractStatus	X	X			X	X
contractType	X	X			X	X
contractValue	O	O			O	O
costEntryDate						X
costEntryDescription						X
costEntryIdentifier						X
costEntryPeriod						O
costEntryType						X
costEntryValue						X
costItemDescription	X		X		X	X
costItemIdentifier	X		X		X	X
damageDescription						X
damageEstimatedCost						O
damageFamily						X
damageIdentifier						X
damageStatus						O
dataModuleCode	X	X			X	X
dataModuleInfoname	O	O			O	O
detectionMeanCapabilityCapabilityType	X		X			

Data Element	Use case					
	1	2	3	4	5	6
detectionMeanCapabilityDescription	X		X			
detectionMeanCapabilityIdentifier	O		O			
detectionMechanismDescription	X		X			
detectionMechanismFalseAlarmRate	O		O			
detectionMechanismIdentifier	X		X			
detectionMechanismPresentation	O		O			
detectionMechanismType	X		X			
documentAssignmentRole	X	X			X	X
documentCreationDate	O	O	O	O	O	O
documentDescription	O	O	O	O	O	O
documentIdentifier	X	X	X	X	X	X
documentIssueDate	O	O	O		O	O
documentIssueIdentifier	X	X	X		X	X
documentIssueReason	O	O	O		O	O
documentPartyRelationshipType	X	X			X	X
documentPortion	O	O			O	O
documentRelationshipType	X	X			X	X
documentStatus	O	O	O	O	O	O
documentTitle	O	O	O	O	O	O
documentType	X	X	X	X	X	X
DownTimeId				X	X	X
downTimePeriod				X	X	X
downTimePeriodReason				O	O	O
downTimeStatus				O	O	O
effectivityPeriod			X		X	X
environmentDescription		X		X		X
environmentType		X		X		X

Data Element	Use case					
	1	2	3	4	5	6
equipmentFaultDeferredToDate	O		O			O
equipmentFaultDetectedDate	X		X			X
equipmentFaultFixedDate	O		O			O
equipmentFaultIdentifier	X		X			X
equipmentFaultStatus	X		X			X
equipmentFaultSymptom	O		O			O
equipmentOperatingPeriod	X		X			
equipmentOwnershipPeriod	X		X			
equipmentStatusPeriod	X		X			
equipmentStatusReason	X		X			
equipmentStatusType	X		X			
eventConfirmedStatus	X		X	X		X
eventDescription	X		X	X		X
eventGroup	X		X	X		X
eventIdentifier	X		X	X		X
eventOcurrenceDateTime	X		X	X		X
eventRelationshipType						X
eventSeverity	X		X	X		X
explanatoryFactorDescription						X
explanatoryFactorIdentifier						X
explanatoryFactorName						X
explanatoryFactorOrganization						X
externalDocumentType	O	O			O	O
facilityCleansiness	X	X	X	X		X
facilityDescription	X	X	X	X		X
facilityDimensions	X	X	X	X		X
facilityIdentifier	X	X	X	X		X

Data Element	Use case					
	1	2	3	4	5	6
facilityName	X	X	X	X		X
facilityType	X	X	X	X		X
failureCauseCode	X		X			
failureCauseDescription	X		X			
failureCauseIdentifier	X		X			
failureDetectionRate	O		O			
failureModeDescription	X		X			
failureModeEffectDescription	X		X			
failureModeEffectIdentifier	X		X			
failureModeIdentifier	X		X			
fleetAvaialbilityReportingDate		X		X		
fleetAvailabilityPeriod		X		X		
fleetAvailabilityValue		X		X		
fleetDescription		X		X	X	X
fleetIdentifier		X		X	X	X
FleetPlanningDescription					X	
fleetPlanningIdentifier					X	
fleetPlanningPeriod					X	
fleetPlanningStatus					X	
fleetRequirementAvailability					X	
fleetRequirementDate					X	
fleetRequirementMinimumFleetSize					O	
fleetRequirementPeriod					X	
fleetRequirementUsage					X	
fleetRequirementUsageLimitation					O	
fleetTaskDescription						X
fleetTaskExpectedEnd						X

Data Element	Use case					
	1	2	3	4	5	6
fleetTaskExpectedStart						X
fleetTaskIdentifier						X
fleetTaskPriority						X
fleetTaskRequiredFuel						X
gpsLocationElevation				X		
gpsLocationLatitude				X		
gpsLocationLongitude				X		
informationCode	O		O		X	
locationDescription				O		O
locationIdentifier				X		X
locationName				O		O
locationType				X		X
locatorDescription	O	O			O	O
locatorIdentifier	X	X			X	X
locatorName	X	X			X	X
logBookEntryComment	O		O	O		O
logbookEntryCounterIdentifier	X		X	X		
logBookEntryCounterType	X		X	X		
logBookEntryCounterValue	X		X	X		
logBookEntryDateTime	X		X	X		X
logBookEntryIdentifier	X		X	X		X
logBookEntryType	X		X	X		X
maintenanceActivityNote	O		O	O		O
maintenanceActivityPlanAccessHours	X		X	X		
maintenanceActivityPlanExecutionHours	X		X	X		
maintenanceActivityPlanPeriod	X		X	X		
maintenanceActivityPlanPreparationHours	X		X	X		

Data Element	Use case					
	1	2	3	4	5	6
maintenanceActivityRecordAccessHours	X		X	X		
maintenanceActivityRecordApprovalTime	X		X	X		
maintenanceActivityRecordExecutionHours	X		X	X		
maintenanceActivityRecordPeriod	X		X	X		
maintenanceActivityRecordPreparationHours	X		X	X		
maintenanceActivityRecordWorkDone	X		X	X		
maintenanceActivitySequence	X		X	X		X
maintenanceEventCategoryType	X		X		X	X
maintenanceEventDescription	X		X		X	X
maintenanceEventReportedDate	X		X		X	X
maintenanceFacilityShifts	X	X	X	X		
maintenanceFacilitySlotDescription	O		O			
maintenanceFacilitySlotIdentifier	X		X			
maintenanceFacilitySlotPlannedUsagePeriod	X		X			
maintenanceFacilitySlotType	X		X			
maintenanceLevelCapabilityDescription	O		O			
maintenanceLevelIdentifier	X		X			
maintenanceLevelName	O		O			
maintenanceLicenceIdentifier	X		X	X		
maintenanceLicenceName	X		X	X		
maintenanceLicenceType	X		X	X		
maintenanceLicenceValidity	X		X	X		
maintenanceOrganizationApprovalDuring	X	X				
maintenanceOrganizationApprovalType	X	X				
maintenancePersonApprovedProductPeriod	X		X	X		
maintenancePersonFacilityPeriod	X		X	X		
maintenancePersonJobType	X		X	X		

Data Element	Use case					
	1	2	3	4	5	6
maintenancePersonRemarks	O		O	O		
maintenanceProgramRevisionDescription	O		O			O
maintenanceProgramType	X	X	X		X	X
maintenanceSignificantOrRelevant	X		X			
materialCharacteristicsRecordingDate	X		X	X		X
materialDescription	O		O	O		O
materialIdentifier	X		X	X		X
materialName	X		X	X		X
materialRiskDescription	O		O	O		O
materialRiskFactor	X		X	X		X
materialSubstanceUsageCategory	X		X	X		X
messageContentStatus	O	O	O	O	O	O
messageCreationDate	O	O	O	O	O	O
messageIdentifier	X	X	X	X	X	X
messageLanguage	O	O	O	O	O	O
movementIdentifier	X		X	X		X
movementLegDelayCause				X		
movementLegDelayDate				X		
movementLegDelayDuration				X		
movementLegDelayType				X		
movementLegGeoLocationTime				X		
movementLegPeriod				X		X
movementLegResult				X		X
movementLegSequence				X		X
movementResult	X		X	X		X
movementTransit	X		X	X		X
movementType	X		X	X		X

Data Element	Use case					
	1	2	3	4	5	6
operatingBaseCapacityIdentifier		X		X		
operatingBaseProductVariantCapacity		X		X		
operatingCounterIdentifier	X		X	X	X	X
operatingCounterValue	X		X	X	X	X
operatingEnvironmentIdentifier		X		X		X
operatingEnvironmentPeriod		X		X		X
operationalApprovalType		X		X		X
operationalEventCategoryType				X		X
operationalEventMaintenanceDown				X		X
operationalEventMaintenanceNotificationDateTime				X		X
operationalEventMaintenanceReleasedDateTime				O		O
operationalEventMessageIdentifier				X		
operationalEventMessageSequence				X		
operationalEventMessageText				X		
operationalEventMessageType				X		
operationalEventOperationalMode				X		X
operationalEventReportedDate				X		X
operationalEventSymptom				O		O
operationalModeClassification				X		
operationalModeDescription				X		
operationalModeIdentifier				X		
operationalModeName				O		
operationalModeStatusType	X		X	X		
operationalModeStatusUsed	X		X	X		
operationalPeriodActual				O		O
operationalPeriodIdentifier				X		X
operationalPeriodName				O		O

Data Element	Use case					
	1	2	3	4	5	6
operationalPeriodPhase				O		O
operationalPeriodRelationshipType				X		
operationalPeriodResult				O		O
operationalPeriodScheduled				O		O
operationalRoleDelta		X		X		X
operationalRoleDescription		X		X		X
operationalRoleidentifier		X		X		X
operationalRoleType		X		X		X
organizationDates	O	O	O	O		O
organizationOperationsApprovalDuring		X				
organizationType	O	O	O	O		O
packagedTask	X		X			
partActionCause	O		O	O	O	O
partActionCauseDescription	O		O	O	O	O
partActionDate	X		X	X	X	X
partActionIdentifier	X		X	X	X	X
partActionTimeSinceNew	O		O	O	O	O
partActionTimeSinceOverhaul	X		X	X	X	X
partActionType	X		X	X	X	X
partExportControl	O		O	O		O
partIdentifier	X		X	X	X	X
partInWarehousePeriod					X	
partMajorComponent	O		O	O		O
partName	X		X			
personDates	O		O	O		O
personFamilyName	O		O	O		O
personIdentifier	X		X	X		X

Data Element	Use case					
	1	2	3	4	5	6
personMiddleName	O		O	O		O
personName	O		O	O		O
personOperationsApprovalDuring		X				
personPrefixTitle	O		O	O		O
personSuffixTitle	O		O	O		O
plannedItemUpgradeIdentifier	X		X		X	X
plannedItemUpgradePriority	X		X		X	X
plannedItemUpgradeReason	O		O		O	O
plannedUpgradePeriod	X		X		X	
plannedUpgradeTimeIdentifier	X		X		X	
plannedUpgradeTimeVersion	X		X		X	
policiesAndRegulationsEffectivity						X
poolDescription						O
poolIdentifier						X
poolName						O
poolType						O
productParameterAtOperationalEventName				X		
productParameterAtOperationalEventValue				X		
productParametersAtOperationalEventIdentifier				X		
productUsagePhaseDescription						X
productUsagePhaseDuration						X
productUsagePhaseIdentifier						X
productVariantCapabilityDescription		X		X		X
productVariantCapabilityIdentifier		X		X		X
productVariantEntryIntoServiceDate	X	X	X	X	X	X
productVariantLastBuyDate	X	X	X	X	X	X
productVariantProductionDates	X	X	X	X	X	X

Data Element	Use case					
	1	2	3	4	5	6
projectIdentifier						X
projectName						O
publicationModuleCode	X	X			X	X
publicationModuleTitle	O	O			O	O
reasonForShopSubmission	X					X
remarkText	X	X	X	X	X	X
remarkType	O	O	O	O	O	O
reportPeriod	X	X			X	X
requiredSafetyActionDescription						X
requiredSafetyActionIdentifier						X
requiredSafetyActionImplementationDate						X
requiredSafetyActionPriority						X
requiredSafetyActionReleaseDate						X
requiredSafetyActionType						X
requirementDescription					O	O
requirementId					X	X
requirementName					X	X
requirementRaisedBy					O	O
requirementType					O	O
resourceUsageRequestDate						X
resourceUsageRequestDescription						O
resourceUsageRequestIdentifier						X
resourceUsageRequestName						X
resourceUsageRequestPeriod						X
resourceUsageRequestStatus						X
safetyDocumentCriticality	X	X			X	X
safetyIsssueReportingDateTime						X

Data Element	Use case					
	1	2	3	4	5	6
safetyIssueAssessmentBy						X
safetyIssueFirstIdentificationDateTime						X
safetyWarningAplicabilityDates						O
safetyWarningPriority						X
serializedHardwarePartInServicePeriod	X		X	X	X	X
serializedHardwarePartManufacturingDate	X		X	X	X	X
serializedPartIdentifier	X		X	X	X	X
serializedProductVariantAvailabilityDate		X		X		
serializedProductVariantAvailabilityDescription		O		O		
serializedProductVariantAvailabilityReportingDate		X		X		
serializedProductVariantAvailabilityStatus		X		X		
serializedProductVariantEndOfServiceDate	O	O	O	O	O	O
serializedProductVariantEntryIntoServiceDate	X	X	X	X	X	X
serializedProductVariantIdentifier	X	X	X	X	X	X
serializedProductVariantInServiceStatus	X	X	X	X	X	X
serializedProductVariantManufacturingDate	X	X	X	X	X	X
serializedProductVariantOperatingBasePeriod		X		X	X	X
serializedProductVariantOperatorDuring		X		X		X
serializedProductVariantStatusPeriod	X		X	X		
serializedProductVariantStatusValue	X		X	X		
serviceBulletinCost	O	O	O		O	O
serviceBulletinEmbodimentLimit	O	O	O		O	O
serviceBulletinPriority	X	X	X		X	X
serviceBulletinType	X	X	X		X	X
serviceDescription						X
serviceRequestDateTime						X
serviceRequestDescription						O

Data Element	Use case					
	1	2	3	4	5	6
serviceRequestIdentifier						X
serviceRequestName						X
serviceRequestType						X
serviceRequestUrgency						X
shopFindingsDescription	X					X
shopFindingsFaultCode	O					O
shopFindingsFaultConfirmed	X					X
shopFindingsIdentifier	X					X
shopReceivedDate	X					X
skillCode	X		X	X		
skillLevelDescription	O		O	O		
skillLevelName	X		X	X		
softwarePartAsReleasedChecksum	O		O	O	O	O
softwarePartAsReleasedDateTime	X		X	X	X	X
softwarePartAsReleasedSize	X		X	X	X	X
softwareReleaseIdentifier	O		O	O	O	O
specialSafetyInstructionApplicabilityDates						X
specialSafetyInstructionPriority						X
substanceIdentifier						X
substanceName						X
subtaskDescription	O		O			
subtaskDuration	X		X			
subtaskEndItemObjectiveState	O		O			
subtaskIdentifier	X		X		X	
subtaskMaintenanceLocation	O		O			
subtaskName	X		X			
subtaskRole	O		O		O	

Data Element	Use case					
	1	2	3	4	5	6
subtaskTimelineEvent	X		X			
subtaskTimelineLag	O		O			
suppliesUsedAmount	X		X	X		
supportEquipmentCalibrationRequired	X		X	X		
supportEquipmentDimensions	X		X	X		
supportEquipmentPower	O		O	O		
supportEquipmentType	X		X	X		
supportEquipmentUsedAmount	X		X	X		
supportEquipmentUsedDuration	X		X	X		
supportEquipmentWeight	X		X	X		
taskDuration	O		O		O	
taskIdentifier	X		X		X	
taskName	X		X		X	
taskOperabilityImpact	X		X		X	
taskPersonnelSafetyCriticality	O		O		O	
taskProductIntegrityCriticality	O		O		O	
taskRevisionChangeDescription	O		O		O	
taskRevisionIdentifier	X		X		X	
taskRevisionStatus	O		O		O	
taskTotalLaborTime	O		O		O	
technicalOrderPriority	X		X		X	
technicalOrderRequiredImplementationDate	O		O		O	
tradeName	X		X	X		
warrantyClaimCommunicationMeans						X
warrantyClaimFilingDate						X
warrantyClaimIdentifier						X
warrantyClaimOccurrenceDate						X

Data Element	Use case					
	1	2	3	4	5	6
warrantyClaimSettlementDate						X
warrantyClaimType						X
warrantyEventPeriod						X
warrantyEventReason						X
workItemDescription	X		X		X	X
workItemIdentifier	X		X		X	X
workItemPeriod	X		X		X	X
workItemStatus	X		X		X	X
workItemType	X		X		X	X
workOrderDateRaised	X		X	X	X	X
workOrderDescription	X		X	X	X	X
workOrderExecutionPeriod	X		X	X	X	X
workOrderIdentifier	X		X	X	X	X
workOrderStatus	X		X	X	X	X
workOrderType	X		X	X	X	X
zoneElementType	X		X	X		

3.3 Data elements for safety analysis

The data elements used for each safetyanalysis use case as defined in Chap 5 are listed in Table 16. In order to avoid having to cross-check the use case numbers, a summary of each use case is provided below:

1. Report safety issue
2. Provide operational limitations due to safety issue
3. Provide special safety instructions

Table 16 Data elements for safety analysis use cases

Data element	Use case		
	1	2	3
actionCloseDate	O	O	O
actionCreationDate	X	X	X

Data element	Use case		
	1	2	3
actionDescription	X	X	X
actionIdentifier	X	X	X
actionScheduledDate	O	O	O
actionType	X	X	X
authorityToOperateIdentifier		X	
batchPartIdentifier	O	O	O
belongsToFleetDuring	X		
breakdownElementEssentiality	O		
breakdownElementIdentifier	X		
breakdownElementName	O		
changeEmbodimentRequirementDate		X	X
changeEmbodimentRequirementId		X	X
changeEmbodimentRequirementType		X	X
commentDate	X	X	X
commentIdentifier	X	X	X
commentPartyRole	O	O	O
commentPriority	X	X	X
commentRelationshipType	X	X	X
commentStatus	X	X	X
commentText	X	X	X
commentTitle	X	X	X
commentType	X	X	X
consequenceDescription	X		
consequenceType	X		
contractEffectivityDateTimes	X	X	X
contractName	X	X	X
contractSignatureDate	X	X	X

Data element	Use case		
	1	2	3
contractStatus	X	X	X
contractType	X	X	X
contractValue	O	O	O
costEntryDate	X	X	
costEntryDescription	X	X	
costEntryIdentifier	X	X	
costEntryPeriod	O	O	
costEntryType	X	X	
costEntryValue	X	X	
damageDescription	X		
damageEstimatedCost	O		
damageFamily	X		
damageIdentifier	X		
damageStatus	O		
dataModuleCode	X	X	X
dataModuleInfoname	O	O	O
documentAssignmentRole	X	X	X
documentCreationDate	O	O	O
documentDescription	O	O	O
documentIdentifier	X	X	X
documentIssueDate	O	O	O
documentIssueIdentifier	X	X	X
documentIssueReason	O	O	O
documentPartyRelationshipType	X	X	X
documentPortion	O	O	O
documentRelationshipType	X	X	X
documentStatus	O	O	O

Data element	Use case		
	1	2	3
documentTitle	O	O	O
documentType	X	X	X
DownTimeId	X		
downTimePeriod	X		
downTimePeriodReason	O		
downTimeStatus	O		
effectivityPeriod	X	X	X
environmentDescription	X		
environmentType	X		
equipmentFaultDeferredToDate	O		
equipmentFaultDetectedDate	X		
equipmentFaultFixedDate	O		
equipmentFaultIdentifier	X		
equipmentFaultStatus	X		
equipmentFaultSymptom	O		
eventConfirmedStatus	X	X	X
eventDescription	X	X	X
eventGroup	X	X	X
eventIdentifier	X	X	X
eventOcurrenceDateTime	X	X	X
eventRelationshipType	X		
eventSeverity	X	X	X
explanatoryFactorDescription	X		
explanatoryFactorIdentifier	X		
explanatoryFactorName	X		
explanatoryFactorOrganization	X		
externalDocumentType	O	O	O

Data element	Use case		
	1	2	3
facilityCleansiness		X	X
facilityDescription		X	X
facilityDimensions		X	X
facilityIdentifier		X	X
facilityName		X	X
facilityType		X	X
fleetAvaialbilityReportingDate	X	X	
fleetAvailabilityPeriod	X	X	
fleetAvailabilityValue	X	X	
fleetDescription	X	X	X
fleetIdentifier	X	X	X
fleetRequirementAvailability		X	X
fleetRequirementDate		X	X
fleetRequirementMinimumFleetSize		O	O
fleetRequirementPeriod		X	X
fleetRequirementUsage		X	X
fleetRequirementUsageLimitation		O	O
gpsLocationElevation	X		
gpsLocationLatitude	X		
gpsLocationLongitude	X		
locationDescription	O		
locationIdentifier	X		
locationName	O		
locationType	X		
locatorDescription	O	O	O
locatorIdentifier	X	X	X
locatorName	X	X	X

Data element	Use case		
	1	2	3
logBookEntryComment	O		
logBookEntryDateTime	X		
logBookEntryIdentifier	X		
logBookEntryType	X		
maintenanceEventCategoryType	X		
maintenanceEventDescription	X		
maintenanceEventReportedDate	X		
maintenanceProgramType	X	X	X
messageContentStatus	O	O	O
messageCreationDate	O	O	O
messageIdentifier	X	X	X
messageLanguage	O	O	O
movementIdentifier	X		
movementLegDelayCause	X		
movementLegDelayDate	X		
movementLegDelayDuration	X		
movementLegDelayType	X		
movementLegGeoLocationTime	X		
movementLegPeriod	X		
movementLegResult	X		
movementLegSequence	X		
movementResult	X		
movementTransit	X		
movementType	X		
operatingCounterIdentifier	X	X	X
operatingCounterValue	X	X	X
operatingEnvironmentIdentifier	X		

Data element	Use case		
	1	2	3
operatingEnvironmentPeriod	X		
operationalApprovalType	X		
operationalEventCategoryType	X	X	
operationalEventMaintenanceDown	X	X	
operationalEventMaintenanceNotificationDateTime	X	X	
operationalEventMaintenanceReleasedDateTime	O	O	
operationalEventMessageIdentifier	X		
operationalEventMessageSequence	X		
operationalEventMessageText	X		
operationalEventMessageType	X		
operationalEventOperationalMode	X	X	
operationalEventReportedDate	X	X	
operationalEventSymptom	O	O	
operationalModeClassification	X		
operationalModeDescription	X		
operationalModeIdentifier	X		
operationalModeName	O		
operationalPeriodActual	O		
operationalPeriodIdentifier	X		
operationalPeriodName	O		
operationalPeriodPhase	O		
operationalPeriodRelationshipType	X		
operationalPeriodResult	O		
operationalPeriodScheduled	O		
operationalRequirementPeriod		X	X
operationalRoleDelta	X		
operationalRoleDescription	X		

Data element	Use case		
	1	2	3
operationalRoleidentifier	X		
operationalRoleType	X		
partActionCause	O	O	O
partActionCauseDescription	O	O	O
partActionDate	X	X	X
partActionIdentifier	X	X	X
partActionTimeSinceNew	O	O	O
partActionTimeSinceOverhaul	X	X	X
partActionType	X	X	X
partExportControl	O	O	O
partIdentifier	X	X	X
partMajorComponent	O	O	O
partsListEntryPosition		O	
partsListRevisionIdentifier		O	
partsListType		X	
productParameterAtOperationalEventName	X		
productParameterAtOperationalEventValue	X		
productParametersAtOperationalEventIdentifier	X		
productUsagePhaseDescription	X		
productUsagePhaseDuration	X		
productUsagePhaseIdentifier	X		
productVariantEntryIntoServiceDate	X	X	X
productVariantLastBuyDate	X	X	X
productVariantProductionDates	X	X	X
projectIdentifier		X	X
projectName		O	O
publicationModuleCode	X	X	X

Data element	Use case		
	1	2	3
publicationModuleTitle	O	O	O
quantityOfChildElement		O	
referenceDesignator		X	
remarkText	X	X	X
remarkType	O	O	O
reportableActivityIdentifier	X	X	
reportableActivityPeriod	X	X	
reportableActivityReportingDate	X	X	
reportableMetricIdentifier	X	X	
reportableMetricPeriod	X	X	
reportableMetricType	X	X	
reportableMetricValue	X	X	
reportPeriod	X	X	X
requiredSafetyActionDescription	X	X	X
requiredSafetyActionIdentifier	X	X	X
requiredSafetyActionImplementationDate	X	X	X
requiredSafetyActionPriority	X	X	X
requiredSafetyActionReleaseDate	X	X	X
requiredSafetyActionType	X	X	X
requirementDescription		O	O
requirementId		X	X
requirementName		X	X
requirementRaisedBy		O	O
requirementType		O	O
safetyDocumentCriticality	X	X	X
safetyIsssueReportingDateTime	X	X	X
safetyIssueAssessmentBy	X	X	X

Data element	Use case		
	1	2	3
safetyIssueFirstIdentificationDateTime	X	X	X
safetyWarningAplicabilityDates	O	O	O
safetyWarningPriority	X	X	X
serializedHardwarePartInServicePeriod	X	X	X
serializedHardwarePartManufacturingDate	X	X	X
serializedPartIdentifier	X	X	X
serializedProductVariantAvailabilityDate	X	X	
serializedProductVariantAvailabilityDescription	O	O	
serializedProductVariantAvailabilityReportingDate	X	X	
serializedProductVariantAvailabilityStatus	X	X	
serializedProductVariantConformancePeriod	X		
serializedProductVariantEndOfServiceDate	O	O	O
serializedProductVariantEntryIntoServiceDate	X	X	X
serializedProductVariantIdentifier	X	X	X
serializedProductVariantInServiceStatus	X	X	X
serializedProductVariantManufacturingDate	X	X	X
serializedProductVariantOperatingBasePeriod	X		
serializedProductVariantOperatorDuring	X		
serviceBulletinCost	O	O	O
serviceBulletinEmbodimentLimit	O	O	O
serviceBulletinPriority	X	X	X
serviceBulletinType	X	X	X
serviceDescription		X	X
softwarePartAsReleasedChecksum	O	O	O
softwarePartAsReleasedDateTime	X	X	X
softwarePartAsReleasedSize	X	X	X
softwareReleaseIdentifier	O	O	O

Data element	Use case		
	1	2	3
specialSafetyInstructionApplicabilityDates	X	X	X
specialSafetyInstructionPriority	X	X	X
warrantyEventPeriod	X		
warrantyEventReason	X		
workOrderDateRaised	X	X	
workOrderDescription	X	X	
workOrderExecutionPeriod	X	X	
workOrderIdentifier	X	X	
workOrderStatus	X	X	
workOrderType	X	X	

3.4 Data elements for supply support

The data elements used for each supply support use case as defined in Chap 6 are listed in Table 17. In order to avoid having to cross-check the use case numbers, a summary of each use case is provided below:

3 Inventory management

4 Shelf life management

5 Spares and SE pool management

6 Logistic Response time

7 Facilities management and maintenance

Table 17 Data elements for supply support use cases

Data element	Use case				
	1	2	3	4	5
actionCloseDate	O	O	O	O	O
actionCreationDate	X	X	X	X	X
actionDescription	X	X	X	X	X
actionIdentifier	X	X	X	X	X
actionScheduledDate	O	O	O	O	O
actionType	X	X	X	X	X
addressEMail	O	O	O		O

Data element	Use case				
	1	2	3	4	5
addressFaxNumber	O	O	O		O
addressIdentifier	X	X	X		X
addressPostalBox	O	O	O		O
addressPostalCode	O	O	O		O
addressStreet	O	O	O		O
addressStreetNumber	O	O	O		O
addressTelephoneNumber	O	O	O		O
addressTelexNumber	O	O	O		O
addressURL	O	O	O		O
batchPartIdentifier		O	O		
commentDate	X	X	X	X	X
commentIdentifier	X	X	X	X	X
commentPartyRole	O	O	O	O	O
commentPriority	X	X	X	X	X
commentRelationshipType	X	X	X	X	X
commentStatus	X	X	X	X	X
commentText	X	X	X	X	X
commentTitle	X	X	X	X	X
commentType	X	X	X	X	X
contractEffectivityDateTimes	X	X	X	X	
contractName	X	X	X	X	
contractSignatureDate	X	X	X	X	
contractStatus	X	X	X	X	
contractType	X	X	X	X	
contractValue	O	O	O	O	
costEntryDate	X			X	X
costEntryDescription	X			X	X

Data element	Use case				
	1	2	3	4	5
costEntryIdentifier	X			X	X
costEntryPeriod	O			O	O
costEntryType	X			X	X
costEntryValue	X			X	X
documentCreationDate	O			O	O
documentDescription	O			O	O
documentIdentifier	X			X	X
documentStatus	O			O	O
documentTitle	O			O	O
documentType	X			X	X
effectivityPeriod		X	X		
equipmentFaultDeferredToDate	O				
equipmentFaultDetectedDate	X				
equipmentFaultFixedDate	O				
equipmentFaultIdentifier	X				
equipmentFaultStatus	X				
equipmentFaultSymptom	O				
facilityCleansiness	X	X	X		X
facilityDescription	X	X	X		X
facilityDimensions	X	X	X		X
facilityIdentifier	X	X	X		X
facilityName	X	X	X		X
facilityOperatorDuring	X	X	X		X
facilityOwnedDuring	X	X	X		X
facilityOwnershipRatio	O	O	O		O
facilityRelationshipType	X	X	X		X
facilityType	X	X	X		X

Data element	Use case				
	1	2	3	4	5
failureCauseCode	X				
failureCauseDescription	X				
failureCauseIdentifier	X				
failureModeDescription	X				
failureModeIdentifier	X				
fleetAvaialbilityReportingDate	X			X	X
fleetAvailabilityPeriod	X			X	X
fleetAvailabilityValue	X			X	X
hardwarePartUnitOfIssuePrice (UPR/CUR)	X	X	X	X	
locationDescription	O			O	
locationIdentifier	X			X	
locationName	O			O	
locationType	X			X	
maintenanceActivityNote	O			O	
maintenanceActivitySequence	X			X	
maintenanceFacilityShifts	X	X	X		X
messageContentStatus	O	O	O	O	O
messageCreationDate	O	O	O	O	O
messageIdentifier	X	X	X	X	X
messageLanguage	O	O	O	O	O
minimumSalesQuantity (MSQ)	O	O	O	O	
operatingCounterIdentifier		X	X		
operatingCounterValue		X	X		
operationalEventCategoryType	X			X	X
operationalEventMaintenanceDown	X			X	X
operationalEventMaintenanceNotificationDateTime	X			X	X
operationalEventMaintenanceReleasedDateTime	O			O	O

Data element	Use case				
	1	2	3	4	5
operationalEventOperationalMode	X			X	X
operationalEventReportedDate	X			X	X
operationalEventSymptom	O			O	O
partExportControl	O	O	O	O	
partIdentifier	X	X	X	X	
partInWarehousePeriod	X	X	X	X	
partMajorComponent	O	O	O	O	
poolDescription	O	O	O	O	
poolIdentifier	X	X	X	X	
poolName	O	O	O	O	
poolOwnershipDuring	X	X	X	X	
poolOwnershipRatio	X	X	X	X	
poolType	O	O	O	O	
poolUsageDescription	O	O	O	O	
poolUsageDuring	X	X	X	X	
poolUsageType	X	X	X	X	
productVariantEntryIntoServiceDate	X	X	X	X	
productVariantLastBuyDate	X	X	X	X	
productVariantProductionDates	X	X	X	X	
reasonForShopSubmission	X				
remarkText	X	X	X	X	X
remarkType	O	O	O	O	O
reportableActivityIdentifier	X			X	X
reportableActivityPeriod	X			X	X
reportableActivityReportingDate	X			X	X
reportableMetricIdentifier	X			X	X
reportableMetricPeriod	X			X	X

Data element	Use case				
	1	2	3	4	5
reportableMetricType	X			X	X
reportableMetricValue	X			X	X
reportPeriod	X			X	X
requiredPartStockLevelInPool	X	X	X	X	
serializedHardwarePartInServicePeriod	X	X	X	X	
serializedHardwarePartManufacturingDate	X	X	X	X	
serializedPartIdentifier	X	X	X	X	
serializedProductVariantAvailabilityDate	X			X	X
serializedProductVariantAvailabilityDescription	O			O	O
serializedProductVariantAvailabilityReportingDate	X			X	X
serializedProductVariantAvailabilityStatus	X			X	X
shopFindingsDescription	X				
shopFindingsFaultCode	O				
shopFindingsFaultConfirmed	X				
shopFindingsIdentifier	X				
shopReceivedDate	X				
softwarePartAsReleasedChecksum		O	O		
softwarePartAsReleasedDateTime		X	X		
softwarePartAsReleasedSize		X	X		
softwareReleaseIdentifier		O	O		
supportEquipmentCalibrationRequired	X	X	X		X
supportEquipmentDimensions	X	X	X		X
supportEquipmentPower	O	O	O		O
supportEquipmentType	X	X	X		X
supportEquipmentWeight	X	X	X		X
typeOfPrice (TOP)	X	X	X	X	
workItemDescription	X			X	

Data element	Use case				
	1	2	3	4	5
workItemIdentifier	X			X	
workItemPeriod	X			X	
workItemStatus	X			X	
workItemType	X			X	
workOrderDateRaised	X			X	X
workOrderDescription	X			X	X
workOrderExecutionPeriod	X			X	X
workOrderIdentifier	X			X	X
workOrderStatus	X			X	X
workOrderType	X			X	X

3.5 Data elements for life cycle cost analysis

The data elements used for each LCC use case as defined in Chap 7 are listed in Table 18. In order to avoid having to cross-check the use case numbers, a summary of each use case is provided below:

1 Provide cost breakdown structure

2 Estimate maintenance costs

3 Costs due to operational requirements

4 Cost of modifications or upgrades

5 Costs of in-service support

Table 18 Data elements for LCC use cases

Data element	Use case				
	1	2	3	4	5
actionCloseDate	O	O	O	O	O
actionCreationDate	X	X	X	X	X
actionDescription	X	X	X	X	X
actionIdentifier	X	X	X	X	X
actionScheduledDate	O	O	O	O	O
actionType	X	X	X	X	X
authorityToOperateIdentifier				X	

Data element	Use case				
	1	2	3	4	5
belongsToFleetDuring			X	X	
breakdownElementEssentiality				O	
breakdownElementIdentifier				X	
breakdownElementName				O	
budgetApprovedDate	O	O	O	O	
budgetApprovedStatus	X	X	X	X	
budgetDate	X	X	X	X	
budgetDescription	O	O	O	O	
budgetIdentifier	X	X	X	X	
budgetName	O	O	O	O	
budgetValidUntilDate	X	X	X	X	
cargoItemDescription			O		
cargoItemIdentifier			X		
cargoItemName			O		
cargoItemUnitaryDimensions			O		
cargoItemUnitaryWeight			O		
cargoItemUnits			X		
changeAuthorizationIdentifier				X	
changeEffectDescription				O	
changeEffectType				O	
changeEmbodimentRequirementDate	X	X	X	X	X
changeEmbodimentRequirementId	X	X	X	X	X
changeEmbodimentRequirementType	X	X	X	X	X
changeRequestDescription	X	X	X	X	X
changeRequestIdentifier	X	X	X	X	X
commentDate	X	X	X	X	X
commentIdentifier	X	X	X	X	X

Data element	Use case				
	1	2	3	4	5
commentPartyRole	O	O	O	O	O
commentPriority	X	X	X	X	X
commentRelationshipType	X	X	X	X	X
commentStatus	X	X	X	X	X
commentText	X	X	X	X	X
commentTitle	X	X	X	X	X
commentType	X	X	X	X	X
consumableItemDescription			O		
consumableItemIdentifier			X		
consumableItemName			X		
consumableItemRiskDescription			O		
consumableItemRiskFactor			X		
consumableType			X		
consumptionIdentifier			X		
consumptionValue			X		
contractClauseDescription	O	O	O	O	O
contractClauseIdentifier	X	X	X	X	X
contractClauseValidityPeriod	O	O	O	O	O
contractEffectivityDateTimes	X	X	X	X	X
contractName	X	X	X	X	X
contractPartyRole	X				X
contractRelationshipType	X	X	X	X	X
contractSignatureDate	X	X	X	X	X
contractStatus	X	X	X	X	X
contractType	X	X	X	X	X
contractValue	O	O	O	O	O
costBreakdownDescription	O	O	O	O	

Data element	Use case				
	1	2	3	4	5
costBreakdownIdentifier	X	X	X	X	
costBreakdownName	X	X	X	X	
costBreakdownRevisionIdentifier	X	X	X	X	
costBreakdownRevisionStatus	O	O	O	O	
costEntryDate	X	X	X	X	X
costEntryDescription	X	X	X	X	X
costEntryIdentifier	X	X	X	X	X
costEntryPeriod	O	O	O	O	O
costEntryType	X	X	X	X	X
costEntryValue	X	X	X	X	X
costItemDescription	X	X	X	X	
costItemIdentifier	X	X	X	X	
costItemRelationshipType	X	X	X	X	
damageDescription	X	X	X	X	X
damageEstimatedCost	O	O	O	O	O
damageFamily	X	X	X	X	X
damageIdentifier	X	X	X	X	X
damageStatus	O	O	O	O	O
dataModuleCode				X	
dataModuleInfoname				O	
documentAssignmentRole				X	
documentCreationDate		O		O	O
documentDescription		O		O	O
documentIdentifier		X		X	X
documentIssueDate				O	
documentIssueIdentifier				X	
documentIssueReason				O	

Data element	Use case				
	1	2	3	4	5
documentPartyRelationshipType				X	
documentPortion				O	
documentRelationshipType				X	
documentStatus		O		O	O
documentTitle		O		O	O
documentType		X		X	X
DownTimeId			X	X	
downTimePeriod			X	X	
downTimePeriodReason			O	O	
downTimeStatus			O	O	
environmentDescription				X	
environmentType				X	
eventConfirmedStatus				X	
eventDescription				X	
eventGroup				X	
eventIdentifier				X	
eventOcurrenceDateTime				X	
eventSeverity				X	
externalDocumentType				O	
facilityCleansiness	X	X	X	X	X
facilityDescription	X	X	X	X	X
facilityDimensions	X	X	X	X	X
facilityIdentifier	X	X	X	X	X
facilityName	X	X	X	X	X
facilityType	X	X	X	X	X
fleetAvaialbilityReportingDate		X		X	X
fleetAvailabilityPeriod		X		X	X

Data element	Use case				
	1	2	3	4	5
fleetAvailabilityValue		X		X	X
fleetDescription	X	X	X	X	X
fleetIdentifier	X	X	X	X	X
FleetPlanningDescription			X	X	
fleetPlanningIdentifier			X	X	
fleetPlanningPeriod			X	X	
fleetPlanningStatus			X	X	
fleetRequirementAvailability			X	X	
fleetRequirementDate			X	X	
fleetRequirementMinimumFleetSize			O	O	
fleetRequirementPeriod			X	X	
fleetRequirementUsage			X	X	
fleetRequirementUsageLimitation			O	O	
fleetTaskDescription			X	X	
fleetTaskExpectedEnd			X	X	
fleetTaskExpectedStart			X	X	
fleetTaskIdentifier			X	X	
fleetTaskPriority			X	X	
fleetTaskRequiredFuel			X	X	
locationDescription		O	O	O	O
locationIdentifier		X	X	X	X
locationName		O	O	O	O
locationType		X	X	X	X
locatorDescription				O	
locatorIdentifier				X	
locatorName				X	
logBookEntryComment				O	

Data element	Use case				
	1	2	3	4	5
logBookEntryDateTime				X	
logBookEntryIdentifier				X	
logBookEntryType				X	
maintenanceActivityNote		O	O	O	O
maintenanceActivitySequence		X	X	X	X
maintenanceEventCategoryType				X	
maintenanceEventDescription				X	
maintenanceEventReportedDate				X	
maintenanceProgramRevisionDescription				O	
maintenanceProgramType				X	
materialCharacteristicsRecordingDate	X	X	X	X	X
materialDescription	O	O	O	O	O
materialIdentifier	X	X	X	X	X
materialName	X	X	X	X	X
materialRiskDescription	O	O	O	O	O
materialRiskFactor	X	X	X	X	X
materialSubstanceUsageCategory	X	X	X	X	X
messageContentStatus	O	O	O	O	O
messageCreationDate	O	O	O	O	O
messageIdentifier	X	X	X	X	X
messageLanguage	O	O	O	O	O
movementIdentifier	X	X	X	X	X
movementLegDelayCause			X		
movementLegDelayDate			X		
movementLegDelayDuration			X		
movementLegDelayType			X		
movementLegPeriod	X	X	X	X	X

Data element	Use case				
	1	2	3	4	5
movementLegResult	X	X	X	X	X
movementLegSequence	X	X	X	X	X
movementResult	X	X	X	X	X
movementTransit	X	X	X	X	X
movementType	X	X	X	X	X
operatingEnvironmentIdentifier				X	
operationalApprovalType				X	
operationalEventCategoryType		X	X	X	X
operationalEventMaintenanceDown		X	X	X	X
operationalEventMaintenanceNotificationDateTime		X	X	X	X
operationalEventMaintenanceReleasedDateTime		O	O	O	O
operationalEventOperationalMode		X	X	X	X
operationalEventReportedDate		X	X	X	X
operationalEventSymptom		O	O	O	O
operationalPeriodActual			O	O	
operationalPeriodIdentifier			X	X	
operationalPeriodName			O	O	
operationalPeriodPhase			O	O	
operationalPeriodResult			O	O	
operationalPeriodScheduled			O	O	
operationalRequirementPeriod			X		
operationalRoleDelta			X	X	
operationalRoleDescription			X	X	
operationalRoleidentifier			X	X	
operationalRoleType			X	X	
organizationDates	O	O	O	O	O
organizationType	O	O	O	O	O

Data element	Use case				
	1	2	3	4	5
partActionCause				O	
partActionCauseDescription				O	
partActionDate				X	
partActionIdentifier				X	
partActionTimeSinceNew				O	
partActionTimeSinceOverhaul				X	
partActionType				X	
partExportControl	O	O	O	O	O
partIdentifier	X	X	X	X	X
partInWarehousePeriod				X	
partMajorComponent	O	O	O	O	O
personDates	O	O	O	O	O
personFamilyName	O	O	O	O	O
personIdentifier	X	X	X	X	X
personMiddleName	O	O	O	O	O
personName	O	O	O	O	O
personPrefixTitle	O	O	O	O	O
personSuffixTitle	O	O	O	O	O
plannedItemUpgradeIdentifier				X	
plannedItemUpgradePriority				X	
plannedItemUpgradeReason				O	
plannedUpgradePeriod				X	
plannedUpgradeTimeIdentifier				X	
plannedUpgradeTimeVersion				X	
policiesAndRegulationsEffectivity				X	
poolDescription				O	
poolIdentifier				X	

Data element	Use case				
	1	2	3	4	5
poolName				O	
poolType				O	
productIdentifier	X	X	X	X	X
productName	O	O	O	O	O
productVariantEntryIntoServiceDate	X	X	X	X	X
productVariantLastBuyDate	X	X	X	X	X
productVariantProductionDates	X	X	X	X	X
projectIdentifier	X			X	X
projectName	O			O	O
projectRelationshipType	X				X
publicationModuleCode				X	
publicationModuleTitle				O	
quantityOfContractedItem	X				X
reasonForShopSubmission				X	
remarkText	X	X	X	X	X
remarkType	O	O	O	O	O
reportableActivityIdentifier	X	X	X	X	X
reportableActivityPeriod	X	X	X	X	X
reportableActivityReportingDate	X	X	X	X	X
reportableMetricIdentifier		X		X	X
reportableMetricPeriod		X		X	X
reportableMetricType		X		X	X
reportableMetricValue		X		X	X
reportPeriod		X	X	X	X
requiredFleetRoleAvailability			O		
requirementDescription			O	O	
requirementId			X	X	

Data element	Use case				
	1	2	3	4	5
requirementName			X	X	
requirementRaisedBy			O	O	
requirementType			O	O	
resourceUsageRequestDate				X	
resourceUsageRequestDescription				O	
resourceUsageRequestIdentifier				X	
resourceUsageRequestName				X	
resourceUsageRequestPeriod				X	
resourceUsageRequestStatus				X	
safetyDocumentCriticality				X	
serializedHardwarePartInServicePeriod	X	X	X	X	X
serializedHardwarePartManufacturingDate	X	X	X	X	X
serializedPartIdentifier	X	X	X	X	X
serializedProductVariantAssignmentDate			X		
serializedProductVariantAssignmentIdentifier			X		
serializedProductVariantAssignmentStatus			X		
serializedProductVariantAssignmentType			X		
serializedProductVariantAvailabilityDate		X		X	X
serializedProductVariantAvailabilityDescription		O		O	O
serializedProductVariantAvailabilityReportingDate		X		X	X
serializedProductVariantAvailabilityStatus		X		X	X
serializedProductVariantEndOfServiceDate	O	O	O	O	O
serializedProductVariantEntryIntoServiceDate	X	X	X	X	X
serializedProductVariantIdentifier	X	X	X	X	X
serializedProductVariantInServiceStatus	X	X	X	X	X
serializedProductVariantManufacturingDate	X	X	X	X	X
serializedProductVariantOperatingBasePeriod				X	

Data element	Use case				
	1	2	3	4	5
serviceBulletinCost	O	O	O	O	O
serviceBulletinEmbodimentLimit	O	O	O	O	O
serviceBulletinPriority	X	X	X	X	X
serviceBulletinType	X	X	X	X	X
serviceDescription	X	X	X	X	X
serviceLevelAgreementClauseDescription	O	O	O	O	
serviceRequestDateTime				X	
serviceRequestDescription				O	
serviceRequestIdentifier				X	
serviceRequestName				X	
serviceRequestType				X	
serviceRequestUrgency				X	
shopFindingsDescription				X	
shopFindingsFaultCode				O	
shopFindingsFaultConfirmed				X	
shopFindingsIdentifier				X	
shopReceivedDate				X	
softwareElementType	X				X
softwarePartAsReleasedChecksum	O	O	O	O	O
softwarePartAsReleasedDateTime	X	X	X	X	X
softwarePartAsReleasedSize	X	X	X	X	X
softwareReleaseIdentifier	O	O	O	O	O
substanceIdentifier				X	
substanceName				X	
technicalOrderPriority				X	
technicalOrderRequiredImplementationDate				O	
warrantyClaimCommunicationMeans				X	

Data element	Use case				
	1	2	3	4	5
warrantyClaimFilingDate				X	
warrantyClaimIdentifier				X	
warrantyClaimOccurrenceDate				X	
warrantyClaimResolutionDate	X	X	X	X	X
warrantyClaimResolutionDescription	X	X	X	X	X
warrantyClaimResolutionType	X	X	X	X	X
warrantyClaimSettlementDate				X	
warrantyClaimType				X	
warrantyEventPeriod				X	
warrantyEventReason				X	
workBreakdownDescription	X	X	X	X	
workBreakdownIdentifier	X	X	X	X	
workBreakdownName	X	X	X	X	
workBreakdownRevisionIdentifier	X	X	X	X	
workBreakdownRevisionStatus	O	O	O	O	
workItemDescription	X	X	X	X	X
workItemIdentifier	X	X	X	X	X
workItemPeriod	X	X	X	X	X
workItemRelationshipType	X	X	X	X	
workItemStatus	X	X	X	X	X
workItemTimelineEvent	O	O	O	O	
workItemTimelineLag	O	O	O	O	
workItemType	X	X	X	X	X
workOrderDateRaised	X	X	X	X	X
workOrderDescription	X	X	X	X	X
workOrderExecutionPeriod	X	X	X	X	X
workOrderIdentifier	X	X	X	X	X

Data element	Use case				
	1	2	3	4	5
workOrderStatus	X	X	X	X	X
workOrderType	X	X	X	X	X

3.6 Data elements for warranty analysis

The data elements used for each warranty analysis use case as defined in Chap 8 are listed in Table 19. In order to avoid having to cross-check the use case numbers, a summary of each use case is provided below:

1. Evaluate maintenance actions
2. Collect warranty costs
3. Determine misuse of warranty
4. Identify items causing risk to warranty program
5. Improve standard warranty rules and process

Table 19 Data elements for warranty analysis use cases

Data element	Use case				
	1	2	3	4	5
actionCloseDate	O	O	O	O	O
actionCreationDate	X	X	X	X	X
actionDescription	X	X	X	X	X
actionIdentifier	X	X	X	X	X
actionScheduledDate	O	O	O	O	O
actionType	X	X	X	X	X
authorityToOperateIdentifier	X		X	X	X
batchPartIdentifier	O		O	O	O
belongsToFleetDuring			X	X	X
breakdownElementEssentiality	O	O	O	O	O
breakdownElementIdentifier	X	X	X	X	X
breakdownElementName	O	O	O	O	O
breakdownElementRevisionIdentifier	X				
breakdownElementRevisionStatus	O				
budgetApprovedDate		O	O		

Data element	Use case				
	1	2	3	4	5
budgetApprovedStatus		X	X		
budgetDate		X	X		
budgetDescription		O	O		
budgetIdentifier		X	X		
budgetName		O	O		
budgetValidUntilDate		X	X		
changeAuthorizationIdentifier					X
changeEffectDescription					O
changeEffectType					O
changeEmbodimentRequirementDate		X			X
changeEmbodimentRequirementId		X			X
changeEmbodimentRequirementType		X			X
changeRequestDescription		X			X
changeRequestIdentifier		X			X
commentDate	X	X	X	X	X
commentIdentifier	X	X	X	X	X
commentPartyRole	O	O	O	O	O
commentPriority	X	X	X	X	X
commentRelationshipType	X	X	X	X	X
commentStatus	X	X	X	X	X
commentText	X	X	X	X	X
commentTitle	X	X	X	X	X
commentType	X	X	X	X	X
consequenceDescription				X	
consequenceType				X	
contractClauseDescription	O	O	O	O	O
contractClauseIdentifier	X	X	X	X	X

Data element	Use case				
	1	2	3	4	5
contractClauseValidityPeriod	O	O	O	O	O
contractEffectivityDateTimes	X	X	X	X	X
contractName	X	X	X	X	X
contractRelationshipType		X	X		
contractSignatureDate	X	X	X	X	X
contractStatus	X	X	X	X	X
contractType	X	X	X	X	X
contractValue	O	O	O	O	O
costBreakdownDescription		O	O		
costBreakdownIdentifier		X	X		
costBreakdownName		X	X		
costBreakdownRevisionIdentifier		X	X		
costBreakdownRevisionStatus		O	O		
costEntryDate		X	X		X
costEntryDescription		X	X		X
costEntryIdentifier		X	X		X
costEntryPeriod		O	O		O
costEntryType		X	X		X
costEntryValue		X	X		X
costItemDescription		X	X		X
costItemIdentifier		X	X		X
costItemRelationshipType		X	X		
damageDescription		X		X	
damageEstimatedCost		O		O	
damageFamily		X		X	
damageIdentifier		X		X	
damageStatus		O		O	

Data element	Use case				
	1	2	3	4	5
detectionMeanCapabilityCapabilityType	X				
detectionMeanCapabilityDescription	X				
detectionMeanCapabilityIdentifier	O				
detectionMechanismDescription	X				
detectionMechanismFalseAlarmRate	O				
detectionMechanismIdentifier	X				
detectionMechanismPresentation	O				
detectionMechanismType	X				
documentCreationDate	O	O	O		O
documentDescription	O	O	O		O
documentIdentifier	X	X	X		X
documentIssueDate	O				
documentIssueIdentifier	X				
documentIssueReason	O				
documentStatus	O	O	O		O
documentTitle	O	O	O		O
documentType	X	X	X		X
DownTimeId				X	
downTimePeriod				X	
downTimePeriodReason				O	
downTimeStatus				O	
effectivityPeriod	X		X	X	X
environmentDescription	X		X	X	X
environmentType	X		X	X	X
equipmentFaultDeferredToDate	O	O	O	O	O
equipmentFaultDetectedDate	X	X	X	X	X
equipmentFaultFixedDate	O	O	O	O	O

Data element	Use case				
	1	2	3	4	5
equipmentFaultIdentifier	X	X	X	X	X
equipmentFaultStatus	X	X	X	X	X
equipmentFaultSymptom	O	O	O	O	O
equipmentOperatingPeriod	X	X		X	X
equipmentOwnershipPeriod	X	X		X	X
equipmentStatusPeriod	X	X		X	X
equipmentStatusReason	X	X		X	X
equipmentStatusType	X	X		X	X
eventConfirmedStatus	X	X	X	X	X
eventDescription	X	X	X	X	X
eventGroup	X	X	X	X	X
eventIdentifier	X	X	X	X	X
eventOcurrenceDateTime	X	X	X	X	X
eventRelationshipType				X	
eventSeverity	X	X	X	X	X
explanatoryFactorDescription				X	
explanatoryFactorIdentifier				X	
explanatoryFactorName				X	
explanatoryFactorOrganization				X	
facilityCleansiness	X	X	X	X	X
facilityDescription	X	X	X	X	X
facilityDimensions	X	X	X	X	X
facilityIdentifier	X	X	X	X	X
facilityName	X	X	X	X	X
facilityType	X	X	X	X	X
failureCauseCode	X		X	X	X
failureCauseDescription	X		X	X	X

Data element	Use case				
	1	2	3	4	5
failureCauseIdentifier	X		X	X	X
failureDetectionRate	O				
failureModeDescription	X		X	X	X
failureModeEffectDescription	X				
failureModeEffectIdentifier	X				
failureModeIdentifier	X		X	X	X
fleetAvaialbilityReportingDate		X	X		X
fleetAvailabilityPeriod		X	X		X
fleetAvailabilityValue		X	X		X
fleetDescription		X	X	X	X
fleetIdentifier		X	X	X	X
hardwarePartUnitOfIssuePrice (UPR/CUR)				X	
informationCode	O				
locationDescription	O	O	O	O	O
locationIdentifier	X	X	X	X	X
locationName	O	O	O	O	O
locationType	X	X	X	X	X
logBookEntryComment	O	O		O	O
logBookEntryDateTime	X	X		X	X
logBookEntryIdentifier	X	X		X	X
logBookEntryType	X	X		X	X
maintenanceActivityNote		O	O		
maintenanceActivitySequence		X	X		
maintenanceEventCategoryType				X	
maintenanceEventDescription				X	
maintenanceEventReportedDate				X	
maintenanceProgramRevisionDescription	O				

Data element	Use case				
	1	2	3	4	5
maintenanceProgramType	X				
maintenanceSignificantOrRelevant	X				
materialCharacteristicsRecordingDate		X			
materialDescription		O			
materialIdentifier		X			
materialName		X			
materialRiskDescription		O			
materialRiskFactor		X			
materialSubstanceUsageCategory		X			
messageContentStatus	O	O	O	O	O
messageCreationDate	O	O	O	O	O
messageIdentifier	X	X	X	X	X
messageLanguage	O	O	O	O	O
minimumSalesQuantity (MSQ)				O	
movementIdentifier		X			
movementLegPeriod		X			
movementLegResult		X			
movementLegSequence		X			
movementResult		X			
movementTransit		X			
movementType		X			
operatingCounterIdentifier	X	X	X	X	X
operatingCounterValue	X	X	X	X	X
operatingEnvironmentIdentifier	X		X	X	X
operatingEnvironmentPeriod			X	X	X
operationalApprovalType			X	X	X
operationalEventCategoryType	X	X	X	X	X

Data element	Use case				
	1	2	3	4	5
operationalEventMaintenanceDown	X	X	X	X	X
operationalEventMaintenanceNotificationDateTime	X	X	X	X	X
operationalEventMaintenanceReleasedDateTime	O	O	O	O	O
operationalEventMessageIdentifier	X		X	X	
operationalEventMessageSequence	X		X	X	
operationalEventMessageText	X		X	X	
operationalEventMessageType	X		X	X	
operationalEventOperationalMode	X	X	X	X	X
operationalEventReportedDate	X	X	X	X	X
operationalEventSymptom	O	O	O	O	O
organizationDates	O	O			
organizationType	O	O			
packagedTask	X				
partActionCause	O	O	O	O	O
partActionCauseDescription	O	O	O	O	O
partActionDate	X	X	X	X	X
partActionIdentifier	X	X	X	X	X
partActionTimeSinceNew	O	O	O	O	O
partActionTimeSinceOverhaul	X	X	X	X	X
partActionType	X	X	X	X	X
partExportControl	O	O	O	O	O
partIdentifier	X	X	X	X	X
partInWarehousePeriod				X	
partMajorComponent	O	O	O	O	O
partName	X				
partsListEntryPosition	O		O	O	O
partsListRevisionIdentifier	O		O	O	O

Data element	Use case				
	1	2	3	4	5
partsListType	X		X	X	X
personDates	O	O			
personFamilyName	O	O			
personIdentifier	X	X			
personMiddleName	O	O			
personName	O	O			
personPrefixTitle	O	O			
personSuffixTitle	O	O			
plannedItemUpgradeIdentifier					X
plannedItemUpgradePriority					X
plannedItemUpgradeReason					O
plannedUpgradePeriod					X
plannedUpgradeTimeIdentifier					X
plannedUpgradeTimeVersion					X
poolDescription				O	
poolIdentifier				X	
poolName				O	
poolOwnershipDuring				X	
poolOwnershipRatio				X	
poolType				O	
poolUsageDescription				O	
poolUsageDuring				X	
poolUsageType				X	
productIdentifier		X			
productName		O			
productParameterAtOperationalEventName	X		X	X	
productParameterAtOperationalEventValue	X		X	X	

Data element	Use case				
	1	2	3	4	5
productParametersAtOperationalEventIdentifier	X		X	X	
productUsagePhaseDescription				X	
productUsagePhaseDuration				X	
productUsagePhaseIdentifier				X	
productVariantEntryIntoServiceDate	X	X	X	X	X
productVariantLastBuyDate	X	X	X	X	X
productVariantProductionDates	X	X	X	X	X
quantityOfChildElement	O		O	O	O
reasonForShopSubmission	X		X	X	X
referenceDesignator	X		X	X	X
remarkText	X	X	X	X	X
remarkType	O	O	O	O	O
reportableActivityIdentifier		X	X		X
reportableActivityPeriod		X	X		X
reportableActivityReportingDate		X	X		X
reportableMetricIdentifier		X	X		X
reportableMetricPeriod		X	X		X
reportableMetricType		X	X		X
reportableMetricValue		X	X		X
reportPeriod		X	X		X
requiredPartStockLevelInPool				X	
serializedHardwarePartInServicePeriod	X	X	X	X	X
serializedHardwarePartManufacturingDate	X	X	X	X	X
serializedItemWarrantyPeriod	X	X	X	X	X
serializedItemWarrantyType	X	X	X	X	X
serializedPartIdentifier	X	X	X	X	X
serializedProductVariantAvailabilityDate		X	X		X

Data element	Use case				
	1	2	3	4	5
serializedProductVariantAvailabilityDescription		O	O		O
serializedProductVariantAvailabilityReportingDate		X	X		X
serializedProductVariantAvailabilityStatus		X	X		X
serializedProductVariantConformancePeriod		X	X	X	X
serializedProductVariantEndOfServiceDate	O	O	O	O	O
serializedProductVariantEntryIntoServiceDate	X	X	X	X	X
serializedProductVariantIdentifier	X	X	X	X	X
serializedProductVariantInServiceStatus	X	X	X	X	X
serializedProductVariantManufacturingDate	X	X	X	X	X
serializedProductVariantOperatingBasePeriod			X	X	X
serializedProductVariantOperatorDuring			X	X	X
serviceBulletinCost		O			O
serviceBulletinEmbodimentLimit		O			O
serviceBulletinPriority		X			X
serviceBulletinType		X			X
serviceDescription		X			
serviceLevelAgreementClauseDescription		O	O		
shopFindingsDescription	X		X	X	X
shopFindingsFaultCode	O		O	O	O
shopFindingsFaultConfirmed	X		X	X	X
shopFindingsIdentifier	X		X	X	X
shopReceivedDate	X		X	X	X
softwarePartAsReleasedChecksum	O	O	O	O	O
softwarePartAsReleasedDateTime	X	X	X	X	X
softwarePartAsReleasedSize	X	X	X	X	X
softwareReleaseIdentifier	O	O	O	O	O
subtaskDescription	O				

Data element	Use case				
	1	2	3	4	5
subtaskDuration	X				
subtaskEndItemObjectiveState	O				
subtaskIdentifier	X				
subtaskMaintenanceLocation	O				
subtaskName	X				
subtaskRole	O				
subtaskTimelineEvent	X				
subtaskTimelineLag	O				
taskDuration	O				
taskIdentifier	X				
taskName	X				
taskOperabilityImpact	X				
taskPersonnelSafetyCriticality	O				
taskProductIntegrityCriticality	O				
taskRevisionChangeDescription	O				
taskRevisionIdentifier	X				
taskRevisionStatus	O				
taskTotalLaborTime	O				
technicalOrderPriority					X
technicalOrderRequiredImplementationDate					O
typeOfPrice (TOP)				X	
warrantyClaimCommunicationMeans	X	X	X	X	X
warrantyClaimContactType	X	X	X	X	X
warrantyClaimFilingDate	X	X	X	X	X
warrantyClaimFollowUpNotes	X	X	X	X	X
warrantyClaimIdentifier	X	X	X	X	X
warrantyClaimOccurrenceDate	X	X	X	X	X

Data element	Use case				
	1	2	3	4	5
warrantyClaimResolutionDate	X	X	X	X	X
warrantyClaimResolutionDescription	X	X	X	X	X
warrantyClaimResolutionType	X	X	X	X	X
warrantyClaimSettlementDate	X	X	X	X	X
warrantyClaimType	X	X	X	X	X
warrantyEventPeriod	X	X	X	X	X
warrantyEventReason	X	X	X	X	X
workBreakdownDescription		X	X		
workBreakdownIdentifier		X	X		
workBreakdownName		X	X		
workBreakdownRevisionIdentifier		X	X		
workBreakdownRevisionStatus		O	O		
workItemDescription		X	X		X
workItemIdentifier		X	X		X
workItemPeriod		X	X		X
workItemRelationshipType		X	X		
workItemStatus		X	X		X
workItemTimelineEvent		O	O		
workItemTimelineLag		O	O		
workItemType		X	X		X
workOrderDateRaised		X	X		X
workOrderDescription		X	X		X
workOrderExecutionPeriod		X	X		X
workOrderIdentifier		X	X		X
workOrderStatus		X	X		X
workOrderType		X	X		X
zoneElementType	X				

3.7 Data elements for product health and usage monitoring

The data elements used for each product health and usage monitoring use case as defined in Chap 9 are listed in Table 20. In order to avoid having to cross-check the use case numbers, a summary of each use case is provided below:

1 Record usage and health data

2 Report usage information

3 Respond to usage information

Table 20 Data elements for product health and usage monitoring use cases

Data element	Use case		
	1	2	3
actionCloseDate	O	O	O
actionCreationDate	X	X	X
actionDescription	X	X	X
actionIdentifier	X	X	X
actionScheduledDate	O	O	O
actionType	X	X	X
belongsToFleetDuring			X
cargoItemDescription			O
cargoItemIdentifier			X
cargoItemName			O
cargoItemUnitaryDimensions			O
cargoItemUnitaryWeight			O
cargoItemUnits			X
commentDate	X	X	X
commentIdentifier	X	X	X
commentPartyRole	O	O	O
commentPriority	X	X	X
commentRelationshipType	X	X	X
commentStatus	X	X	X
commentText	X	X	X
commentTitle	X	X	X

Data element	Use case		
	1	2	3
commentType	X	X	X
DownTimeId		X	X
downTimePeriod		X	X
downTimePeriodReason		O	O
downTimeStatus		O	O
environmentDescription		X	
environmentType		X	
eventConfirmedStatus	X	X	X
eventDescription	X	X	X
eventGroup	X	X	X
eventIdentifier	X	X	X
eventOcurrenceDateTime	X	X	X
eventSeverity	X	X	X
fleetDescription			X
fleetIdentifier			X
FleetPlanningDescription			X
fleetPlanningIdentifier			X
fleetPlanningPeriod			X
fleetPlanningStatus			X
fleetRequirementAvailability			X
fleetRequirementDate			X
fleetRequirementMinimumFleetSize			O
fleetRequirementPeriod			X
fleetRequirementUsage			X
fleetRequirementUsageLimitation			O
fleetTaskDescription			X
fleetTaskExpectedEnd			X

Data element	Use case		
	1	2	3
fleetTaskExpectedStart			X
fleetTaskIdentifier			X
fleetTaskPriority			X
fleetTaskRequiredFuel			X
gpsLocationElevation		X	
gpsLocationLatitude		X	
gpsLocationLongitude		X	
locationDescription		O	O
locationIdentifier		X	X
locationName		O	O
locationType		X	X
logBookEntryComment	O	O	O
logbookEntryCounterIdentifier	X	X	X
logBookEntryCounterType	X	X	X
logBookEntryCounterValue	X	X	X
logBookEntryDateTime	X	X	X
logBookEntryIdentifier	X	X	X
logBookEntryType	X	X	X
messageContentStatus	O	O	O
messageCreationDate	O	O	O
messageIdentifier	X	X	X
messageLanguage	O	O	O
movementIdentifier	X	X	X
movementLegDelayCause		X	
movementLegDelayDate		X	
movementLegDelayDuration		X	
movementLegDelayType		X	

Data element	Use case		
	1	2	3
movementLegGeoLocationTime		X	
movementLegPeriod		X	
movementLegResult		X	
movementLegSequence		X	
movementResult	X	X	X
movementTransit	X	X	X
movementType	X	X	X
operatingCounterIdentifier	X	X	X
operatingCounterValue	X	X	X
operatingEnvironmentIdentifier		X	
operationalEventCategoryType		X	
operationalEventMaintenanceDown		X	
operationalEventMaintenanceNotificationDateTime		X	
operationalEventMaintenanceReleasedDateTime		O	
operationalEventOperationalMode		X	
operationalEventReportedDate		X	
operationalEventSymptom		O	
operationalModeClassification		X	
operationalModeDescription		X	
operationalModeIdentifier		X	
operationalModeName		O	
operationalModeStatusType	X	X	X
operationalModeStatusUsed	X	X	X
operationalPeriodActual		O	
operationalPeriodIdentifier		X	
operationalPeriodName		O	
operationalPeriodPhase		O	

Data element	Use case		
	1	2	3
operationalPeriodRelationshipType		X	
operationalPeriodResult		O	
operationalPeriodScheduled		O	
operationalRequirementPeriod			X
operationalRoleDelta		X	X
operationalRoleDescription		X	X
operationalRoleidentifier		X	X
operationalRoleType		X	X
partActionCause	O	O	O
partActionCauseDescription	O	O	O
partActionDate	X	X	X
partActionIdentifier	X	X	X
partActionTimeSinceNew	O	O	O
partActionTimeSinceOverhaul	X	X	X
partActionType	X	X	X
partExportControl	O	O	O
partIdentifier	X	X	X
partMajorComponent	O	O	O
productUsagePhaseDescription			X
productUsagePhaseDuration			X
productUsagePhaseIdentifier			X
productVariantEntryIntoServiceDate			X
productVariantLastBuyDate			X
productVariantProductionDates			X
remarkText	X	X	X
remarkType	O	O	O
reportPeriod			X

Data element	Use case		
	1	2	3
requiredFleetRoleAvailability			O
sensorDetectionRange	O	O	O
sensorIdentifier	X	X	X
sensorName	X	X	X
sensorSamplingMode	X	X	X
sensorSamplingRate	X	X	X
sensorSamplingTime	X	X	X
sensorSamplingValue	X	X	X
sensorSensitivity	X	X	X
serializedHardwarePartInServicePeriod	X	X	X
serializedHardwarePartManufacturingDate	X	X	X
serializedPartIdentifier	X	X	X
serializedProductVariantAssignmentDate			X
serializedProductVariantAssignmentIdentifier			X
serializedProductVariantAssignmentStatus			X
serializedProductVariantAssignmentType			X
serializedProductVariantEndOfServiceDate	O	O	O
serializedProductVariantEntryIntoServiceDate	X	X	X
serializedProductVariantIdentifier	X	X	X
serializedProductVariantInServiceStatus	X	X	X
serializedProductVariantManufacturingDate	X	X	X
serializedProductVariantStatusPeriod	X	X	X
serializedProductVariantStatusValue	X	X	X
softwarePartAsReleasedChecksum			O
softwarePartAsReleasedDateTime			X
softwarePartAsReleasedSize			X
softwareReleaseIdentifier			O

Data element	Use case		
	1	2	3
strainGaugeFactor	X	X	X

3.8 Data elements for obsolescence management

The data elements used for each obsolescence management use case as defined in Chap 10 are listed in Table 21. In order to avoid having to cross-check the use case numbers, a summary of each use case is provided below:

1 Create basis for obsolescence management planning

2 Determine obsolescence candidates /perform risk assessment

3 Determine obsolescence strategy

4 Obsolescence monitoring

5 Solutions/proposals to solve obsolescence

Table 21 Data elements for obsolescence management use cases

Data element	Data element				
	1	2	3	4	5
actionCloseDate	O	O	O	O	O
actionCreationDate	X	X	X	X	X
actionDescription	X	X	X	X	X
actionIdentifier	X	X	X	X	X
actionScheduledDate	O	O	O	O	O
actionType	X	X	X	X	X
allowedProductConfigurationIdentifier	X				
applicableSerialNumberRange	X				
authorityToOperateIdentifier	X				
batchPartIdentifier	O				
belongsToFleetDuring			X		X
breakdownElementEssentiality	O	O			
breakdownElementIdentifier	X	X			
breakdownElementName	O	O			
cargoItemDescription			O		
cargoItemIdentifier			X		

Data element	Data element				
	1	2	3	4	5
cargoItemName			O		
cargoItemUnitaryDimensions			O		
cargoItemUnitaryWeight			O		
cargoItemUnits			X		
changeEmbodimentRequirementDate		X	X		X
changeEmbodimentRequirementId		X	X		X
changeEmbodimentRequirementType		X	X		X
commentDate	X	X	X	X	X
commentIdentifier	X	X	X	X	X
commentPartyRole	O	O	O	O	O
commentPriority	X	X	X	X	X
commentRelationshipType	X	X	X	X	X
commentStatus	X	X	X	X	X
commentText	X	X	X	X	X
commentTitle	X	X	X	X	X
commentType	X	X	X	X	X
consumableItemDescription		O			
consumableItemIdentifier		X			
consumableItemName		X			
consumableItemRiskDescription		O			
consumableItemRiskFactor		X			
consumableType		X			
contractEffectivityDateTimes		X	X	X	
contractName		X	X	X	
contractSignatureDate		X	X	X	
contractStatus		X	X	X	
contractType		X	X	X	

Data element	Data element				
	1	2	3	4	5
contractValue		O	O	O	
costEntryDate				X	
costEntryDescription				X	
costEntryIdentifier				X	
costEntryPeriod				O	
costEntryType				X	
costEntryValue				X	
documentCreationDate		O		O	
documentDescription		O		O	
documentIdentifier		X		X	
documentStatus		O		O	
documentTitle		O		O	
documentType		X		X	
DownTimeId			X		X
downTimePeriod			X		X
downTimePeriodReason			O		O
downTimeStatus			O		O
effectivityPeriod	X				
equipmentFaultDeferredToDate		O		O	
equipmentFaultDetectedDate		X		X	
equipmentFaultFixedDate		O		O	
equipmentFaultIdentifier		X		X	
equipmentFaultStatus		X		X	
equipmentFaultSymptom		O		O	
equipmentOperatingPeriod		X			
equipmentOwnershipPeriod		X			
equipmentStatusPeriod		X			

Data element	Data element				
	1	2	3	4	5
equipmentStatusReason		X			
equipmentStatusType		X			
eventConfirmedStatus		X	X	X	
eventDescription		X	X	X	
eventGroup		X	X	X	
eventIdentifier		X	X	X	
eventOcurrenceDateTime		X	X	X	
eventSeverity		X	X	X	
facilityCleansiness		X		X	
facilityDescription		X		X	
facilityDimensions		X		X	
facilityIdentifier		X		X	
facilityName		X		X	
facilityType		X		X	
failureCauseCode		X		X	
failureCauseDescription		X		X	
failureCauseIdentifier		X		X	
failureModeDescription		X		X	
failureModeIdentifier		X		X	
fleetAvaialbilityReportingDate				X	
fleetAvailabilityPeriod				X	
fleetAvailabilityValue				X	
fleetDescription			X		X
fleetIdentifier			X		X
FleetPlanningDescription			X		X
fleetPlanningIdentifier			X		X
fleetPlanningPeriod			X		X

Data element	Data element				
	1	2	3	4	5
fleetPlanningStatus			X		X
fleetRequirementAvailability		X	X		X
fleetRequirementDate		X	X		X
fleetRequirementMinimumFleetSize		O	O		O
fleetRequirementPeriod		X	X		X
fleetRequirementUsage		X	X		X
fleetRequirementUsageLimitation		O	O		O
fleetTaskDescription			X		
fleetTaskExpectedEnd			X		
fleetTaskExpectedStart			X		
fleetTaskIdentifier			X		
fleetTaskPriority			X		
fleetTaskRequiredFuel			X		
hardwarePartUnitOfIssuePrice (UPR/CUR)		X	X	X	
locationDescription			O	O	
locationIdentifier			X	X	
locationName			O	O	
locationType			X	X	
logBookEntryComment		O	O	O	
logbookEntryCounterIdentifier		X	X	X	
logBookEntryCounterType		X	X	X	
logBookEntryCounterValue		X	X	X	
logBookEntryDateTime		X	X	X	
logBookEntryIdentifier		X	X	X	
logBookEntryType		X	X	X	
maintenanceActivityNote		O		O	
maintenanceActivityPlanAccessHours		X			

Data element	Data element				
	1	2	3	4	5
maintenanceActivityPlanExecutionHours		X			
maintenanceActivityPlanPeriod		X			
maintenanceActivityPlanPreparationHours		X			
maintenanceActivityRecordAccessHours		X			
maintenanceActivityRecordApprovalTime		X			
maintenanceActivityRecordExecutionHours		X			
maintenanceActivityRecordPeriod		X			
maintenanceActivityRecordPreparationHours		X			
maintenanceActivityRecordWorkDone		X			
maintenanceActivitySequence		X		X	
maintenanceFacilityShifts		X			
maintenancePersonJobType		X			
maintenancePersonRemarks		O			
materialCharacteristicsRecordingDate		X			
materialDescription		O			
materialIdentifier		X			
materialName		X			
materialRiskDescription		O			
materialRiskFactor		X			
materialSubstanceUsageCategory		X			
messageContentStatus	O	O	O	O	O
messageCreationDate	O	O	O	O	O
messageIdentifier	X	X	X	X	X
messageLanguage	O	O	O	O	O
minimumSalesQuantity (MSQ)		O	O	O	
movementIdentifier		X	X	X	
movementResult		X	X	X	

Data element	Data element				
	1	2	3	4	5
movementTransit		X	X	X	
movementType		X	X	X	
nonConformanceDescription	O				
nonConformanceRestriction	O				
nonConformanceType	X				
obsolescenceParameterDescription		O			
obsolescenceParameterId		X			
obsolescenceParameterName		X			
obsolescenceParameterType		X			
obsolescenceParameterValue		X			
operatingCounterIdentifier	X	X	X	X	
operatingCounterValue	X	X	X	X	
operationalEventCategoryType				X	
operationalEventMaintenanceDown				X	
operationalEventMaintenanceNotificationDateTime				X	
operationalEventMaintenanceReleasedDateTime				O	
operationalEventOperationalMode				X	
operationalEventReportedDate				X	
operationalEventSymptom				O	
operationalModeStatusType		X	X	X	
operationalModeStatusUsed		X	X	X	
operationalRequirementPeriod		X	X		
operationalRoleDelta			X		
operationalRoleDescription			X		
operationalRoleidentifier			X		
operationalRoleType			X		
partActionCause	O	O	O	O	O

Data element	Data element				
	1	2	3	4	5
partActionCauseDescription	O	O	O	O	O
partActionDate	X	X	X	X	X
partActionIdentifier	X	X	X	X	X
partActionTimeSinceNew	O	O	O	O	O
partActionTimeSinceOverhaul	X	X	X	X	X
partActionType	X	X	X	X	X
partExportControl		O	O	O	
partIdentifier	X	X	X	X	X
partInWarehousePeriod		X	X	X	X
partMajorComponent		O	O	O	
partsListEntryPosition	O				
partsListRevisionIdentifier	O				
partsListType	X				
plannedItemUpgradeIdentifier					X
plannedItemUpgradePriority					X
plannedItemUpgradeReason					O
plannedUpgradePeriod			X		X
plannedUpgradeTimeIdentifier			X		X
plannedUpgradeTimeVersion			X		X
poolDescription		O	O	O	
poolIdentifier		X	X	X	
poolName		O	O	O	
poolOwnershipDuring		X	X	X	
poolOwnershipRatio		X	X	X	
poolType		O	O	O	
poolUsageDescription		O	O	O	
poolUsageDuring		X	X	X	

Data element	Data element				
	1	2	3	4	5
poolUsageType		X	X	X	
productIdentifier		X			
productName		O			
productVariantEntryIntoServiceDate	X	X	X	X	X
productVariantIdentifier	X				
productVariantLastBuyDate	X	X	X	X	X
productVariantName	O				
productVariantProductionDates	X	X	X	X	X
quantityOfChildElement	O				
reasonForShopSubmission		X		X	
referenceDesignator	X				
remarkText	X	X	X	X	X
remarkType	O	O	O	O	O
reportableActivityIdentifier				X	
reportableActivityPeriod				X	
reportableActivityReportingDate				X	
reportableMetricIdentifier				X	
reportableMetricPeriod				X	
reportableMetricType				X	
reportableMetricValue				X	
reportPeriod			X	X	
requiredFleetRoleAvailability			O		
requiredPartStockLevelInPool		X	X	X	
requirementDescription		O	O		O
requirementId		X	X		X
requirementName		X	X		X
requirementRaisedBy		O	O		O

Data element	Data element				
	1	2	3	4	5
requirementType		O	O		O
serializedHardwarePartInServicePeriod	X	X	X	X	X
serializedHardwarePartManufacturingDate	X	X	X	X	X
serializedPartIdentifier	X	X	X	X	X
serializedProductVariantAssignmentDate			X		
serializedProductVariantAssignmentIdentifier			X		
serializedProductVariantAssignmentStatus			X		
serializedProductVariantAssignmentType			X		
serializedProductVariantAvailabilityDate				X	
serializedProductVariantAvailabilityDescription				O	
serializedProductVariantAvailabilityReportingDate				X	
serializedProductVariantAvailabilityStatus				X	
serializedProductVariantConformancePeriod	X				
serializedProductVariantEndOfServiceDate	O	O	O	O	O
serializedProductVariantEntryIntoServiceDate	X	X	X	X	X
serializedProductVariantIdentifier	X	X	X	X	X
serializedProductVariantInServiceStatus	X	X	X	X	X
serializedProductVariantManufacturingDate	X	X	X	X	X
serializedProductVariantOperatingBasePeriod			X		X
serializedProductVariantStatusPeriod		X	X	X	
serializedProductVariantStatusValue		X	X	X	
shopFindingsDescription		X		X	
shopFindingsFaultCode		O		O	
shopFindingsFaultConfirmed		X		X	
shopFindingsIdentifier		X		X	
shopReceivedDate		X		X	
softwarePartAsReleasedChecksum	O	O	O		O

Data element	Data element				
	1	2	3	4	5
softwarePartAsReleasedDateTime	X	X	X		X
softwarePartAsReleasedSize	X	X	X		X
softwareReleaseIdentifier	O	O	O		O
suppliesUsedAmount		X			
supportEquipmentCalibrationRequired		X			
supportEquipmentDimensions		X			
supportEquipmentPower		O			
supportEquipmentType		X			
supportEquipmentUsedAmount		X			
supportEquipmentUsedDuration		X			
supportEquipmentWeight		X			
typeOfPrice (TOP)		X	X	X	
workItemDescription				X	
workItemIdentifier				X	
workItemPeriod				X	
workItemStatus				X	
workItemType				X	
workOrderDateRaised		X		X	
workOrderDescription		X		X	
workOrderExecutionPeriod		X		X	
workOrderIdentifier		X		X	
workOrderStatus		X		X	
workOrderType		X		X	
zoneElementType		X			

3.9 Data elements for integrated fleet management

The data elements used for each integrated fleet management use case as defined in Chap 11 are listed in Table 22. In order to avoid having to cross-check the use case numbers, a summary of each use case is provided below:

1 Assignment Proposal Elaboration

2 Fleet task cancellation

3 Fleet task modification

4 Fleet availability plan elaboration

5 Fleet Task Evaluation

6 Product preparation for fleet task

7 Product Recovery after fleet task

Table 22 Data elements for integrated fleet management use cases

Data element	Use case						
	1	2	3	4	5	6	7
actionCloseDate	O	O	O	O	O	O	O
actionCreationDate	X	X	X	X	X	X	X
actionDescription	X	X	X	X	X	X	X
actionIdentifier	X	X	X	X	X	X	X
actionScheduledDate	O	O	O	O	O	O	O
actionType	X	X	X	X	X	X	X
addressEMail	O						
addressFaxNumber	O						
addressIdentifier	X						
addressPostalBox	O						
addressPostalCode	O						
addressStreet	O						
addressStreetNumber	O						
addressTelephoneNumber	O						
addressTelexNumber	O						
addressURL	O						
belongsToFleetDuring	X	X	X	X	X	X	X
breakdownElementEssentiality	O					O	O
breakdownElementIdentifier	X					X	X
breakdownElementName	O					O	O

Data element	Use case						
	1	2	3	4	5	6	7
cargoItemDescription	O	O	O	O	O	O	O
cargoItemIdentifier	X	X	X	X	X	X	X
cargoItemName	O	O	O	O	O	O	O
cargoItemUnitaryDimensions	O	O	O	O	O	O	O
cargoItemUnitaryWeight	O	O	O	O	O	O	O
cargoItemUnits	X	X	X	X	X	X	X
commentDate	X	X	X	X	X	X	X
commentIdentifier	X	X	X	X	X	X	X
commentPartyRole	O	O	O	O	O	O	O
commentPriority	X	X	X	X	X	X	X
commentRelationshipType	X	X	X	X	X	X	X
commentStatus	X	X	X	X	X	X	X
commentText	X	X	X	X	X	X	X
commentTitle	X	X	X	X	X	X	X
commentType	X	X	X	X	X	X	X
conditionInstanceDescription	O				O		
conditionInstanceIdentifier	X				X		
conditionInstanceName	X				X		
conditionTypeClassValue	X				X		
conditionTypeDescription	O				O		
conditionTypeName	X				X		
conditionTypePropertyValue	X				X		
consumableItemDescription	O		O		O		O
consumableItemIdentifier	X		X		X		X
consumableItemName	X		X		X		X
consumableItemRiskDescription	O		O		O		O
consumableItemRiskFactor	X		X		X		X

Data element	Use case						
	1	2	3	4	5	6	7
consumableType	X		X		X		X
consumptionIdentifier	X		X		X		X
consumptionValue	X		X		X		X
contractClauseDescription	O				O		
contractClauseIdentifier	X				X		
contractClauseValidityPeriod	O				O		
contractEffectivityDateTimes		X		X			
contractName		X		X			
contractSignatureDate		X		X			
contractStatus		X		X			
contractType		X		X			
contractValue		O		O			
countryCode	X						
dataModuleCode		X					
dataModuleInfoname		O					
documentAssignmentRole		X					
documentCreationDate		O		O			
documentDescription		O		O			
documentIdentifier		X		X			
documentIssueDate		O					
documentIssueIdentifier		X					
documentIssueReason		O					
documentPartyRelationshipType		X					
documentPortion		O					
documentRelationshipType		X					
documentStatus		O		O			
documentTitle		O		O			

Data element	Use case						
	1	2	3	4	5	6	7
documentType		X		X			
DownTimeId	X	X	X	X	X	X	X
downTimePeriod	X	X	X	X	X	X	X
downTimePeriodReason	O	O	O	O	O	O	O
downTimeStatus	O	O	O	O	O	O	O
environmentDescription	X		X	X		X	X
environmentType	X		X	X		X	X
eventConfirmedStatus					X		X
eventDescription					X		X
eventGroup					X		X
eventIdentifier					X		X
eventOcurrenceDateTime					X		X
eventSeverity					X		X
externalDocumentType		O					
facilityCleansiness	X		X	X		X	X
facilityDescription	X		X	X		X	X
facilityDimensions	X		X	X		X	X
facilityIdentifier	X		X	X		X	X
facilityName	X		X	X		X	X
facilityType	X		X	X		X	X
fleetAvaialbilityReportingDate	X			X	X		
fleetAvailabilityPeriod	X			X	X		
fleetAvailabilityValue	X			X	X		
fleetDescription	X	X	X	X	X	X	X
fleetIdentifier	X	X	X	X	X	X	X
FleetPlanningDescription	X	X	X	X	X	X	X
fleetPlanningIdentifier	X	X	X	X	X	X	X

Data element	Use case						
	1	2	3	4	5	6	7
fleetPlanningPeriod	X	X	X	X	X	X	X
fleetPlanningStatus	X	X	X	X	X	X	X
fleetRequirementAvailability	X	X	X	X	X	X	X
fleetRequirementDate	X	X	X	X	X	X	X
fleetRequirementMinimumFleetSize	O	O	O	O	O	O	O
fleetRequirementPeriod	X	X	X	X	X	X	X
fleetRequirementUsage	X	X	X	X	X	X	X
fleetRequirementUsageLimitation	O	O	O	O	O	O	O
fleetTaskDescription	X	X	X	X	X	X	X
fleetTaskExpectedEnd	X	X	X	X	X	X	X
fleetTaskExpectedStart	X	X	X	X	X	X	X
fleetTaskIdentifier	X	X	X	X	X	X	X
fleetTaskPriority	X	X	X	X	X	X	X
fleetTaskRequiredFuel	X	X	X	X	X	X	X
geographicalAreaRelationshipType	X						
geographicalAreaType	X						
gpsLocationElevation	X						
gpsLocationLatitude	X						
gpsLocationLongitude	X						
locationDescription	O	O	O	O	O	O	O
locationIdentifier	X	X	X	X	X	X	X
locationName	O	O	O	O	O	O	O
locationType	X	X	X	X	X	X	X
locatorDescription	O	O					
locatorIdentifier	X	X					
locatorName	X	X					
logBookEntryComment					O		

Data element	Use case						
	1	2	3	4	5	6	7
logbookEntryCounterIdentifier					X		
logBookEntryCounterType					X		
logBookEntryCounterValue					X		
logBookEntryDateTime					X		
logBookEntryIdentifier					X		
logBookEntryType					X		
maintenanceProgramType		X					
messageContentStatus	O	O	O	O	O	O	O
messageCreationDate	O	O	O	O	O	O	O
messageIdentifier	X	X	X	X	X	X	X
messageLanguage	O	O	O	O	O	O	O
movementIdentifier	X		X		X		X
movementLegDelayCause	X		X		X		X
movementLegDelayDate	X		X		X		X
movementLegDelayDuration	X		X		X		X
movementLegDelayType	X		X		X		X
movementLegPeriod	X		X		X		X
movementLegResult	X		X		X		X
movementLegSequence	X		X		X		X
movementResult	X		X		X		X
movementTransit	X		X		X		X
movementType	X		X		X		X
operatingBaseCapacityIdentifier	X		X	X		X	X
operatingBaseProductVariantCapacity	X		X	X		X	X
operatingCounterIdentifier					X		
operatingCounterValue					X		
operatingEnvironmentIdentifier	X		X	X		X	X

Data element	Use case						
	1	2	3	4	5	6	7
operatingEnvironmentPeriod						X	
operationalApprovalType						X	
operationalEventCategoryType	X		X		X		X
operationalEventMaintenanceDown	X		X		X		X
operationalEventMaintenanceNotificationDateTime	X		X		X		X
operationalEventMaintenanceReleasedDateTime	O		O		O		O
operationalEventMessageIdentifier							X
operationalEventMessageSequence							X
operationalEventMessageText							X
operationalEventMessageType							X
operationalEventOperationalMode	X		X		X		X
operationalEventReportedDate	X		X		X		X
operationalEventSymptom	O		O		O		O
operationalModeStatusType					X		
operationalModeStatusUsed					X		
operationalPeriodActual	O		O		O		O
operationalPeriodIdentifier	X		X		X		X
operationalPeriodName	O		O		O		O
operationalPeriodPhase	O		O		O		O
operationalPeriodResult	O		O		O		O
operationalPeriodScheduled	O		O		O		O
operationalRequirementPeriod	X	X	X	X	X	X	X
operationalRoleDelta	X	X	X	X	X	X	X
operationalRoleDescription	X	X	X	X	X	X	X
operationalRoleidentifier	X	X	X	X	X	X	X
operationalRoleType	X	X	X	X	X	X	X
organizationDates				O			

Data element	Use case						
	1	2	3	4	5	6	7
organizationType				O			
partActionCause	O				O	O	O
partActionCauseDescription	O				O	O	O
partActionDate	X				X	X	X
partActionIdentifier	X				X	X	X
partActionTimeSinceNew	O				O	O	O
partActionTimeSinceOverhaul	X				X	X	X
partActionType	X				X	X	X
partExportControl	O						
partIdentifier	X				X	X	X
partMajorComponent	O						
policiesAndRegulationsEffectivity				X			
productIdentifier				X			
productName				O			
productParameterAtOperationalEventName							X
productParameterAtOperationalEventValue							X
productParametersAtOperationalEventIdentifier							X
productVariantCapabilityDescription	X					X	X
productVariantCapabilityIdentifier	X					X	X
productVariantEntryIntoServiceDate	X		X	X	X	X	X
productVariantLastBuyDate	X		X	X	X	X	X
productVariantProductionDates	X		X	X	X	X	X
projectIdentifier				X			
projectName				O			
publicationModuleCode		X					
publicationModuleTitle		O					
remarkText	X	X	X	X	X	X	X

Data element	Use case						
	1	2	3	4	5	6	7
remarkType	O	O	O	O	O	O	O
reportPeriod	X	X	X	X	X	X	X
requiredFleetRoleAvailability	O	O	O	O	O	O	O
safetyDocumentCriticality		X					
serializedHardwarePartInServicePeriod	X				X	X	X
serializedHardwarePartManufacturingDate	X				X	X	X
serializedPartIdentifier	X				X	X	X
serializedProductVariantAssignmentDate	X	X	X	X	X	X	X
serializedProductVariantAssignmentIdentifier	X	X	X	X	X	X	X
serializedProductVariantAssignmentStatus	X	X	X	X	X	X	X
serializedProductVariantAssignmentType	X	X	X	X	X	X	X
serializedProductVariantAvailabilityDate	X			X	X		
serializedProductVariantAvailabilityDescription	O			O	O		
serializedProductVariantAvailabilityReportingDate	X			X	X		
serializedProductVariantAvailabilityStatus	X			X	X		
serializedProductVariantConformancePeriod	X					X	X
serializedProductVariantEndOfServiceDate	O	O	O	O	O	O	O
serializedProductVariantEntryIntoServiceDate	X	X	X	X	X	X	X
serializedProductVariantIdentifier	X	X	X	X	X	X	X
serializedProductVariantInServiceStatus	X	X	X	X	X	X	X
serializedProductVariantManufacturingDate	X	X	X	X	X	X	X
serializedProductVariantOperatingBasePeriod	X		X	X		X	X
serializedProductVariantOperatorDuring						X	
serializedProductVariantStatusPeriod					X		
serializedProductVariantStatusValue					X		
serviceBulletinCost		O					
serviceBulletinEmbodimentLimit		O					

Data element	Use case						
	1	2	3	4	5	6	7
serviceBulletinPriority		X					
serviceBulletinType		X					
serviceDescription				X			
serviceLevelAgreementClauseDescription	O				O		
softwarePartAsReleasedChecksum	O					O	O
softwarePartAsReleasedDateTime	X					X	X
softwarePartAsReleasedSize	X					X	X
softwareReleaseIdentifier	O					O	O

3.10 Data elements for configuration management

The data elements used for each configuration management use case as defined in Chap 12 are listed in Table 23. In order to avoid having to cross-check the use case numbers, a summary of each use case is provided below:

1 Provide as-delivered configuration

2 Provide as-allowed configuration

3 Provide operational configuration

4 Provide customer modification

5 Provide as-desired configuration

Table 23 Data elements for configuration management use cases

Data element	Use case				
	1	2	3	4	5
actionCloseDate	O	O	O	O	O
actionCreationDate	X	X	X	X	X
actionDescription	X	X	X	X	X
actionIdentifier	X	X	X	X	X
actionScheduledDate	O	O	O	O	O
actionType	X	X	X	X	X
allowedProductConfigurationIdentifier	X	X			
applicabilityEndDate	O	O	O	O	O

Data element	Use case				
	1	2	3	4	5
applicabilityStartDate	O	O	O	O	O
applicabilityStatementDescription	O	O	O	O	O
applicabilityStatementIdentifier	O	O	O	O	O
applicableSerialNumberRange	X	X			
authorityToOperateIdentifier	X	X			
batchPartIdentifier	O		O	O	
breakdownElementEssentiality	O	O	O	O	
breakdownElementIdentifier	X	X	X	X	
breakdownElementName	O	O	O	O	
breakdownElementRelationshipType	X	X			
breakdownElementRevisionIdentifier	X	X		X	
breakdownElementRevisionStatus	O	O		O	
breakdownElementStructureRelationshipType	X	X			
breakdownRevisionIdentifier	X	X		X	
breakdownRevisionStatus	O	O		O	
breakdownType	X	X			
changeAuthorizationIdentifier	X	X	X	X	X
changeEffectDescription	O			O	
changeEffectType	O			O	
changeEmbodimentRequirementDate				X	
changeEmbodimentRequirementId				X	
changeEmbodimentRequirementType				X	
changeRequestDescription				X	
changeRequestIdentifier				X	
commentDate	X	X	X	X	X
commentIdentifier	X	X	X	X	X
commentPartyRole	O	O	O	O	O

Data element	Use case				
	1	2	3	4	5
commentPriority	X	X	X	X	X
commentRelationshipType	X	X	X	X	X
commentStatus	X	X	X	X	X
commentText	X	X	X	X	X
commentTitle	X	X	X	X	X
commentType	X	X	X	X	X
conditionInstanceDescription	O	O	O	O	O
conditionInstanceIdentifier	X	X	X	X	X
conditionInstanceName	X	X	X	X	X
conditionTypeClassValue	X	X	X	X	X
conditionTypeDescription	O	O	O	O	O
conditionTypeName	X	X	X	X	X
conditionTypePropertyValue	X	X	X	X	X
costItemDescription				X	
costItemIdentifier				X	
documentCreationDate	O	O	O	O	O
documentDescription	O	O	O	O	O
documentIdentifier	X	X	X	X	X
documentStatus	O	O	O	O	O
documentTitle	O	O	O	O	O
documentType	X	X	X	X	X
effectivityPeriod	X		X	X	
eventConfirmedStatus	X		X		
eventDescription	X		X		
eventGroup	X		X		
eventIdentifier	X		X		
eventOcurrenceDateTime	X		X		

Data element	Use case				
	1	2	3	4	5
eventSeverity	X		X		
facilityCleansiness	X	X	X	X	X
facilityDescription	X	X	X	X	X
facilityDimensions	X	X	X	X	X
facilityIdentifier	X	X	X	X	X
facilityName	X	X	X	X	X
facilityType	X	X	X	X	X
fleetDescription	X	X	X	X	X
fleetIdentifier	X	X	X	X	X
fleetTaskDescription					X
fleetTaskExpectedEnd					X
fleetTaskExpectedStart					X
fleetTaskIdentifier					X
fleetTaskPriority					X
fleetTaskRequiredFuel					X
hardwareElementRepairability	X	X		X	
hardwareElementReplaceability	X	X		X	
hardwareElementType	X	X		X	
hardwarePartHazardousClass		O		O	
hardwarePartLogisticsCategory		X		X	
hardwarePartOperationalAuthorizedLife		O		O	
hardwarePartRepairability		X		X	
hardwarePartScrapRate		O		O	
logBookEntryComment	O		O		
logbookEntryCounterIdentifier	X		X		
logBookEntryCounterType	X		X		
logBookEntryCounterValue	X		X		

Data element	Use case				
	1	2	3	4	5
logBookEntryDateTime	X		X		
logBookEntryIdentifier	X		X		
logBookEntryType	X		X		
maintenanceProgramType	X	X	X	X	X
maintenanceSignificantOrRelevant	X	X		X	
messageContentStatus	O	O	O	O	O
messageCreationDate	O	O	O	O	O
messageIdentifier	X	X	X	X	X
messageLanguage	O	O	O	O	O
movementIdentifier	X		X		
movementResult	X		X		
movementTransit	X		X		
movementType	X		X		
nonConformanceDescription	O	O			
nonConformanceRestriction	O	O			
nonConformanceType	X	X			
operatingCounterIdentifier	X		X	X	
operatingCounterValue	X		X	X	
operationalModeStatusType	X		X		
operationalModeStatusUsed	X		X		
operationalRoleDelta			X		X
operationalRoleDescription			X		X
operationalRoleidentifier			X		X
operationalRoleType			X		X
partActionCause	O		O		
partActionCauseDescription	O		O		
partActionDate	X		X		

Data element	Use case				
	1	2	3	4	5
partActionIdentifier	X		X		
partActionTimeSinceNew	O		O		
partActionTimeSinceOverhaul	X		X		
partActionType	X		X		
partExportControl	O	O	O	O	O
partIdentifier	X	X	X	X	X
partMajorComponent	O	O	O	O	O
partName		X		X	
partsListEntryPosition	O	O		O	
partsListRevisionIdentifier	O	O		O	
partsListType	X	X		X	
plannedItemUpgradeIdentifier				X	
plannedItemUpgradePriority				X	
plannedItemUpgradeReason				O	
plannedUpgradePeriod				X	
plannedUpgradeTimeIdentifier				X	
plannedUpgradeTimeVersion				X	
productIdentifier	X	X			
productName	O	O			
productVariantCapabilityDescription			X		
productVariantCapabilityIdentifier			X		
productVariantEntryIntoServiceDate	X	X	X	X	X
productVariantIdentifier	X	X	X	X	X
productVariantLastBuyDate	X	X	X	X	X
productVariantName	O	O	O	O	O
productVariantProductionDates	X	X	X	X	X
projectIdentifier	X	X	X	X	X

Data element	Use case				
	1	2	3	4	5
projectName	O	O	O	O	O
quantityOfChildElement	O	O		O	
quantityOfContainedSubstance		O		O	
referenceDesignator	O	O		X	
remarkText	X	X	X	X	X
remarkType	O	O	O	O	O
serializedHardwarePartInServicePeriod	X		X	X	
serializedHardwarePartManufacturingDate	X		X	X	
serializedPartIdentifier	X		X	X	
serializedProductVariantAssignmentDate					X
serializedProductVariantAssignmentIdentifier					X
serializedProductVariantAssignmentStatus					X
serializedProductVariantAssignmentType					X
serializedProductVariantConformancePeriod	X		X		X
serializedProductVariantEndOfServiceDate	O	O	O	O	O
serializedProductVariantEntryIntoServiceDate	X	X	X	X	X
serializedProductVariantIdentifier	X	X	X	X	X
serializedProductVariantInServiceStatus	X	X	X	X	X
serializedProductVariantManufacturingDate	X	X	X	X	X
serializedProductVariantStatusPeriod	X		X		
serializedProductVariantStatusValue	X		X		
serviceBulletinCost				O	
serviceBulletinEmbodimentLimit				O	
serviceBulletinPriority				X	
serviceBulletinType				X	
serviceDescription	X	X	X	X	X
softwarePartAsReleasedChecksum	O	O	O	O	O

Data element	Use case				
	1	2	3	4	5
softwarePartAsReleasedDateTime	X	X	X	X	X
softwarePartAsReleasedSize	X	X	X	X	X
softwareReleaseIdentifier	O	O	O	O	O
substanceIdentifier		X		X	
substanceName		X		X	
technicalOrderPriority				X	
technicalOrderRequiredImplementationDate				O	
workItemDescription				X	
workItemIdentifier				X	
workItemPeriod				X	
workItemStatus				X	
workItemType				X	

3.11 Data elements for in-service contract management

The data elements used for each in-service contract management use case as defined in Chap 13 are listed in Table 24. In order to avoid having to cross-check the use case numbers, a summary of each use case is provided below:

1 Provide contractual information

2 Provide Work Breakdown Structure (WBS)

3 Provide Cost Breakdown Structure (CBS)

4 Provide Organisational Breakdown Structure (OBS)

5 Provide/update activity planning

6 Report Service Level Agreement (SLA) compliance

7 Provide contract incurred costs

8 Provide status report

9 Provide information about locations and infrastructure

10 Manage service request

11 Request/grant/deny usage of resource

12 Assign security classification

Table 24 Data elements for in-service contract management use cases

Data element	Use case											
	1	2	3	4	5	6	7	8	9	10	11	12
actionCloseDate	O	O	O	O	O	O	O	O	O	O	O	O
actionCreationDate	X	X	X	X	X	X	X	X	X	X	X	X
actionDescription	X	X	X	X	X	X	X	X	X	X	X	X
actionIdentifier	X	X	X	X	X	X	X	X	X	X	X	X
actionScheduledDate	O	O	O	O	O	O	O	O	O	O	O	O
actionType	X	X	X	X	X	X	X	X	X	X	X	X
addressEMail	O			O					O			
addressFaxNumber	O			O					O			
addressIdentifier	X			X					X			
addressPostalBox	O			O					O			
addressPostalCode	O			O					O			
addressStreet	O			O					O			
addressStreetNumber	O			O					O			
addressTelephoneNumber	O			O					O			
addressTelexNumber	O			O					O			
addressURL	O			O					O			
breakdownElementEssentiality												O
breakdownElementIdentifier												X
breakdownElementName												O
budgetApprovedDate	O	O	O				O	O		O	O	
budgetApprovedStatus	X	X	X				X	X		X	X	
budgetDate	X	X	X				X	X		X	X	
budgetDescription	O	O	O				O	O		O	O	
budgetIdentifier	X	X	X				X	X		X	X	
budgetName	O	O	O				O	O		O	O	
budgetValidUntilDate	X	X	X				X	X		X	X	

Data element	Use case											
	1	2	3	4	5	6	7	8	9	10	11	12
changeEmbodimentRequirementDate							X					
changeEmbodimentRequirementId							X					
changeEmbodimentRequirementType							X					
changeRequestDescription							X					
changeRequestIdentifier							X					
commentDate	X	X	X	X	X	X	X	X	X	X	X	X
commentIdentifier	X	X	X	X	X	X	X	X	X	X	X	X
commentPartyRole	O	O	O	O	O	O	O	O	O	O	O	O
commentPriority	X	X	X	X	X	X	X	X	X	X	X	X
commentRelationshipType	X	X	X	X	X	X	X	X	X	X	X	X
commentStatus	X	X	X	X	X	X	X	X	X	X	X	X
commentText	X	X	X	X	X	X	X	X	X	X	X	X
commentTitle	X	X	X	X	X	X	X	X	X	X	X	X
commentType	X	X	X	X	X	X	X	X	X	X	X	X
conditionInstanceDescription	O					O						
conditionInstanceIdentifier	X					X						
conditionInstanceName	X					X						
conditionTypeClassValue	X					X						
conditionTypeDescription	O					O						
conditionTypeName	X					X						
conditionTypePropertyValue	X					X						
contractClauseDescription	O	O	O	O		O	O	O				
contractClauseIdentifier	X	X	X	X		X	X	X				
contractClauseValidityPeriod	O	O	O	O		O	O	O				
contractEffectivityDateTimes	X	X	X	X	X	X	X	X	X	X	X	
contractName	X	X	X	X	X	X	X	X	X	X	X	
contractPartyRole	X	X	X	X								

Data element	Use case											
	1	2	3	4	5	6	7	8	9	10	11	12
contractRelationshipType	X	X	X	X			X	X				
contractSignatureDate	X	X	X	X	X	X	X	X	X	X	X	
contractStatus	X	X	X	X	X	X	X	X	X	X	X	
contractType	X	X	X	X	X	X	X	X	X	X	X	
contractValue	O	O	O	O	O	O	O	O	O	O	O	
costBreakdownDescription	O	O	O				O	O				
costBreakdownIdentifier	X	X	X				X	X				
costBreakdownName	X	X	X				X	X				
costBreakdownRevisionIdentifier	X	X	X				X	X				
costBreakdownRevisionStatus	O	O	O				O	O				
costEntryDate	X	X	X		X	X	X	X				X
costEntryDescription	X	X	X		X	X	X	X				X
costEntryIdentifier	X	X	X		X	X	X	X				X
costEntryPeriod	O	O	O		O	O	O	O				O
costEntryType	X	X	X		X	X	X	X				X
costEntryValue	X	X	X		X	X	X	X				X
costItemDescription	X	X	X				X	X			X	X
costItemIdentifier	X	X	X				X	X			X	X
costItemRelationshipType	X	X	X				X	X				
countryCode									X			
damageDescription							X					
damageEstimatedCost							O					
damageFamily							X					
damageIdentifier							X					
damageStatus							O					
dataModuleCode	X	X	X	X			X	X	X	X		
dataModuleInfoname	O	O	O	O			O	O	O	O		

Data element	Use case											
	1	2	3	4	5	6	7	8	9	10	11	12
digitalFileContentClass												O
digitalFileContentDescription												O
digitalFileLocator												X
digitalFileType												X
documentAssignmentRole	X	X	X	X			X	X	X	X		
documentCreationDate	O	O	O	O	O	O	O	O	O	O		O
documentDescription	O	O	O	O	O	O	O	O	O	O		O
documentIdentifier	X	X	X	X	X	X	X	X	X	X		X
documentIssueDate	O	O	O	O			O	O	O	O		
documentIssueIdentifier	X	X	X	X			X	X	X	X		
documentIssueReason	O	O	O	O			O	O	O	O		
documentPartyRelationshipType	X	X	X	X			X	X	X	X		
documentPortion	O	O	O	O			O	O	O	O		
documentRelationshipType	X	X	X	X			X	X	X	X		
documentStatus	O	O	O	O	O	O	O	O	O	O		O
documentTitle	O	O	O	O	O	O	O	O	O	O		O
documentType	X	X	X	X	X	X	X	X	X	X		X
envelopeAcknowledge												O
envelopeIdentifier												X
environmentDescription									X			
environmentType									X			
eventConfirmedStatus												X
eventDescription												X
eventGroup												X
eventIdentifier												X
eventOcurrenceDateTime												X
eventSeverity												X

Data element	Use case											
	1	2	3	4	5	6	7	8	9	10	11	12
externalDocumentType	O	O	O	O			O	O	O	O		
facilityCleansiness	X	X	X	X		X	X		X	X	X	X
facilityDescription	X	X	X	X		X	X		X	X	X	X
facilityDimensions	X	X	X	X		X	X		X	X	X	X
facilityIdentifier	X	X	X	X		X	X		X	X	X	X
facilityName	X	X	X	X		X	X		X	X	X	X
facilityOperatorDuring	X								X			
facilityOwnedDuring	X								X			
facilityOwnershipRatio	O								O			
facilityRelationshipType	X								X			
facilityType	X	X	X	X		X	X		X	X	X	X
fleetAvaialbilityReportingDate	X				X	X	X	X				X
fleetAvailabilityPeriod	X				X	X	X	X				X
fleetAvailabilityValue	X				X	X	X	X				X
fleetDescription	X	X	X	X			X			X		X
fleetIdentifier	X	X	X	X			X			X		X
fleetRequirementAvailability												X
fleetRequirementDate												X
fleetRequirementMinimumFleetSize												O
fleetRequirementPeriod												X
fleetRequirementUsage												X
fleetRequirementUsageLimitation												O
geographicalAreaRelationshipType									X			
geographicalAreaType									X			
gpsLocationElevation									X			
gpsLocationLatitude									X			
gpsLocationLongitude									X			

Data element	Use case											
	1	2	3	4	5	6	7	8	9	10	11	12
locationDescription					O		O		O	O	O	
locationIdentifier					X		X		X	X	X	
locationName					O		O		O	O	O	
locationType					X		X		X	X	X	
locatorDescription	O	O	O	O			O	O	O	O		
locatorIdentifier	X	X	X	X			X	X	X	X		
locatorName	X	X	X	X			X	X	X	X		
maintenanceActivityNote					O		O					
maintenanceActivitySequence					X		X					
maintenanceFacilityShifts	X								X			
maintenancePersonJobType				X								
maintenancePersonRemarks				O								
maintenanceProgramType	X	X	X	X			X	X	X	X		
materialCharacteristicsRecordingDate							X					
materialDescription							O					
materialIdentifier							X					
materialName							X					
materialRiskDescription							O					
materialRiskFactor							X					
materialSubstanceUsageCategory							X					
messageContentStatus	O	O	O	O	O	O	O	O	O	O	O	O
messageCreationDate	O	O	O	O	O	O	O	O	O	O	O	O
messageIdentifier	X	X	X	X	X	X	X	X	X	X	X	X
messageLanguage	O	O	O	O	O	O	O	O	O	O	O	O
movementIdentifier							X					X
movementLegPeriod							X					X
movementLegResult							X					X

Data element	Use case											
	1	2	3	4	5	6	7	8	9	10	11	12
movementLegSequence							X					X
movementResult							X					X
movementTransit							X					X
movementType							X					X
operatingEnvironmentIdentifier									X			
operationalEventCategoryType	X				X	X	X	X				
operationalEventMaintenanceDown	X				X	X	X	X				
operationalEventMaintenanceNotificationDateTime	X				X	X	X	X				
operationalEventMaintenanceReleasedDateTime	O				O	O	O	O				
operationalEventOperationalMode	X				X	X	X	X				
operationalEventReportedDate	X				X	X	X	X				
operationalEventSymptom	O				O	O	O	O				
organizationalBreakdownStructureRevisionIdentifier					X							
organizationalBreakdownStructureRevisionPeriod					X							
organizationalRoleDescription					O							
organizationalRoleType					X							
organizationDates	O			O		O	O			O		O
organizationType	O			O		O	O			O		O
partExportControl	O	O	O	O			O			O	O	
partIdentifier	X	X	X	X			X			X	X	
partMajorComponent	O	O	O	O			O			O	O	
partyAddressDuration				X								
partyAddressType				X								
partyRelationshipDescription				X	X							
partyRelationshipDuration				O	O							
partyRelationshipType				X	X							
partySecurityAssignmentPeriod												X

Data element	Use case											
	1	2	3	4	5	6	7	8	9	10	11	12
personDates				O			O				O	
personFamilyName				O			O				O	
personIdentifier				X			X				X	
personMiddleName				O			O				O	
personName				O			O				O	
personPrefixTitle				O			O				O	
personSuffixTitle				O			O				O	
policiesAndRegulationsEffectivity	X					X				X		
poolDescription												O
poolIdentifier												X
poolName												O
poolType												O
productIdentifier	X	X	X	X		X	X			X		X
productName	O	O	O	O		O	O			O		O
productVariantEntryIntoServiceDate	X	X	X	X		X	X			X	X	X
productVariantLastBuyDate	X	X	X	X		X	X			X	X	X
productVariantProductionDates	X	X	X	X		X	X			X	X	X
projectIdentifier	X	X	X	X	X	X				X		X
projectName	O	O	O	O	O	O				O		O
projectRelationshipType	X	X	X	X								
projectSpecificClassAttributeSetDescription												O
projectSpecificClassAttributeSetIdentifier												X
projectSpecificClassAttributeSetName												X
publicationModuleCode	X	X	X	X			X	X	X	X		
publicationModuleTitle	O	O	O	O			O	O	O	O		
quantityOfContractedItem	X	X	X	X								
remarkText	X	X	X	X	X	X	X	X	X	X	X	X

Data element	Use case											
	1	2	3	4	5	6	7	8	9	10	11	12
remarkType	O	O	O	O	O	O	O	O	O	O	O	O
reportableActivityIdentifier	X	X	X		X	X	X	X				
reportableActivityPeriod	X	X	X		X	X	X	X				
reportableActivityReportingDate	X	X	X		X	X	X	X				
reportableMetricIdentifier	X				X	X	X	X				
reportableMetricPeriod	X				X	X	X	X				
reportableMetricType	X				X	X	X	X				
reportableMetricValue	X				X	X	X	X				
reportPeriod	X	X	X	X	X	X	X	X	X	X		
requirementDescription										O		O
requirementId										X		X
requirementName										X		X
requirementRaisedBy										O		O
requirementType										O		O
resourceUsagePartyRole											X	
resourceUsageRequestDate											X	
resourceUsageRequestDescription											O	
resourceUsageRequestIdentifier											X	
resourceUsageRequestName											X	
resourceUsageRequestPeriod											X	
resourceUsageRequestStatus											X	
safetyDocumentCriticality	X	X	X	X			X	X	X	X		
securityClass												X
serializedHardwarePartInServicePeriod	X	X	X	X			X			X	X	
serializedHardwarePartManufacturingDate	X	X	X	X			X			X	X	
serializedPartIdentifier	X	X	X	X			X			X	X	
serializedProductVariantAvailabilityDate	X				X	X	X	X				

Data element	Use case											
	1	2	3	4	5	6	7	8	9	10	11	12
serializedProductVariantAvailabilityDescription	O				O	O	O	O				
serializedProductVariantAvailabilityReportingDate	X				X	X	X	X				
serializedProductVariantAvailabilityStatus	X				X	X	X	X				
serializedProductVariantEndOfServiceDate	O	O	O	O		O	O			O	O	O
serializedProductVariantEntryIntoServiceDate	X	X	X	X		X	X			X	X	X
serializedProductVariantIdentifier	X	X	X	X		X	X			X	X	X
serializedProductVariantInServiceStatus	X	X	X	X		X	X			X	X	X
serializedProductVariantManufacturingDate	X	X	X	X		X	X			X	X	X
serviceBulletinCost	O	O	O	O			O	O	O	O		
serviceBulletinEmbodimentLimit	O	O	O	O			O	O	O	O		
serviceBulletinPriority	X	X	X	X			X	X	X	X		
serviceBulletinType	X	X	X	X			X	X	X	X		
serviceContractPeriod	X					X						
serviceDescription	X	X	X	X		X	X			X		X
serviceLevelAgreementClauseDescription	O	O	O			O	O	O				
serviceRequestDateTime										X		
serviceRequestDescription										O		
serviceRequestIdentifier										X		
serviceRequestLocationDuring										X		
serviceRequestLocationNotes										O		
serviceRequestName										X		
serviceRequestPartyRole										X		
serviceRequestRelationshipType										X		
serviceRequestType										X		
serviceRequestUrgency										X		
softwareElementType	X	X	X	X								
softwarePartAsReleasedChecksum							O					

Data element	Use case											
	1	2	3	4	5	6	7	8	9	10	11	12
softwarePartAsReleasedDateTime							X					
softwarePartAsReleasedSize							X					
softwareReleaseIdentifier							O					
supportEquipmentCalibrationRequired	X								X			
supportEquipmentDimensions	X								X			
supportEquipmentPower	O								O			
supportEquipmentType	X								X			
supportEquipmentWeight	X								X			
warrantyClaimResolutionDate							X					
warrantyClaimResolutionDescription							X					
warrantyClaimResolutionType							X					
workBreakdownDescription	X	X	X				X	X				
workBreakdownIdentifier	X	X	X				X	X				
workBreakdownName	X	X	X				X	X				
workBreakdownRevisionIdentifier	X	X	X				X	X				
workBreakdownRevisionStatus	O	O	O				O	O				
workItemDescription	X	X	X		X		X	X				X
workItemIdentifier	X	X	X		X		X	X				X
workItemPeriod	X	X	X		X		X	X				X
workItemRelationshipType	X	X	X				X	X				
workItemStatus	X	X	X		X		X	X				X
workItemTimelineEvent	O	O	O				O	O				
workItemTimelineLag	O	O	O				O	O				
workItemType	X	X	X		X		X	X				X
workOrderDateRaised	X				X	X	X	X				
workOrderDescription	X				X	X	X	X				
workOrderExecutionPeriod	X				X	X	X	X				

Data element	Use case											
	1	2	3	4	5	6	7	8	9	10	11	12
workOrderIdentifier	X				X	X	X	X				
workOrderStatus	X				X	X	X	X				
workOrderType	X				X	X	X	X				

3.12 Data elements for non-predefined information

The data elements used for each non-predefined information use case as defined in Chap 14 are listed in Table 25. In order to avoid having to cross-check the use case numbers, a summary of each use case is provided below:

1 Provide project-specific values

2 Provide non-predefined information

Table 25 Data elements for non-predefined information use cases

Data element	Use case	
	1	2
actionCloseDate	O	O
actionCreationDate	X	X
actionDescription	X	X
actionIdentifier	X	X
actionScheduledDate	O	O
actionType	X	X
authorizedLife	X	
breakdownElementEssentiality	O	
breakdownElementIdentifier	X	
breakdownElementName	O	
budgetApprovedDate	O	
budgetApprovedStatus	X	
budgetDate	X	
budgetDescription	O	
budgetIdentifier	X	
budgetName	O	

Data element	Use case	
	1	2
budgetValidUntilDate	X	
changeRequestDescription	X	
changeRequestIdentifier	X	
class	X	
classificationDate	X	
classifier	X	
codePropertyAssignment	X	
codePropertyDescription	O	
codePropertyValue	X	
commentDate	X	X
commentIdentifier	X	X
commentPartyRole	O	O
commentPriority	X	X
commentRelationshipType	X	X
commentStatus	X	X
commentText	X	X
commentTitle	X	X
commentType	X	X
contractClauseDescription	O	
contractClauseIdentifier	X	
contractClauseValidityPeriod	O	
contractEffectivityDateTimes		X
contractName		X
contractSignatureDate		X
contractStatus		X
contractType		X
contractValue		O

Data element	Use case	
	1	2
costEntryDate	X	
costEntryDescription	X	
costEntryIdentifier	X	
costEntryPeriod	O	
costEntryType	X	
costEntryValue	X	
costItemDescription	X	
costItemIdentifier	X	
damageDescription	X	
damageEstimatedCost	O	
damageFamily	X	
damageIdentifier	X	
damageStatus	O	
dateRangeEnd	O	
dateRangeStart	X	
dayComponent	X	
descriptorLanguage	O	
descriptorProvidedBy	O	
descriptorProvidedDate	O	
descriptorText	X	
digitalFileContentClass		O
digitalFileContentDescription		O
digitalFileLocator		X
digitalFileReferenceJustification		X
digitalFileType		X
documentCreationDate	O	
documentDescription	O	

Data element	Use case	
	1	2
documentIdentifier	X	
documentStatus	O	
documentTitle	O	
documentType	X	
envelopeAcknowledge		O
envelopeIdentifier		X
eventConfirmedStatus	X	
eventDescription	X	
eventGroup	X	
eventIdentifier	X	
eventOcurrenceDateTime	X	
eventSeverity	X	
facilityCleansiness	X	
facilityDescription	X	
facilityDimensions	X	
facilityIdentifier	X	
facilityName	X	
facilityType	X	
failureModeDescription	X	
failureModeIdentifier	X	
fleetDescription	X	
fleetIdentifier	X	
fleetTaskDescription	X	
fleetTaskExpectedEnd	X	
fleetTaskExpectedStart	X	
fleetTaskIdentifier	X	
fleetTaskPriority	X	

Data element	Use case	
	1	2
fleetTaskRequiredFuel	X	
height	X	
identifier	X	
identifierClassifier	O	
identifierSetBy	O	
length	X	
lifeAuthorizingOrganization	O	
logBookEntryComment	O	
logBookEntryDateTime	X	
logBookEntryIdentifier	X	
logBookEntryType	X	
lowerBound	X	
messageContentStatus	O	O
messageCreationDate	O	O
messageDateTime		X
messageDateType		X
messageIdentifier	X	X
messageLanguage	O	O
messageRelationshipType		O
monthComponent	X	
partActionCause	O	
partActionCauseDescription	O	
partActionDate	X	
partActionIdentifier	X	
partActionTimeSinceNew	O	
partActionTimeSinceOverhaul	X	
partActionType	X	

Data element	Use case	
	1	2
partExportControl	O	
partIdentifier	X	
partMajorComponent	O	
productIdentifier		X
productName		O
productVariantEntryIntoServiceDate	X	X
productVariantLastBuyDate	X	X
productVariantProductionDates	X	X
projectIdentifier	X	X
projectName	O	O
projectSpecificClassAttributeSetDescription	O	
projectSpecificClassAttributeSetIdentifier	X	
projectSpecificClassAttributeSetName	X	
remarkText	X	X
remarkType	O	O
reportableActivityIdentifier	X	
reportableActivityPeriod	X	
reportableActivityReportingDate	X	
resourceUsageRequestDate	X	
resourceUsageRequestDescription	O	
resourceUsageRequestIdentifier	X	
resourceUsageRequestName	X	
resourceUsageRequestPeriod	X	
resourceUsageRequestStatus	X	
serializedHardwarePartInServicePeriod	X	
serializedHardwarePartManufacturingDate	X	
serializedPartIdentifier	X	

Data element	Use case	
	1	2
serializedProductVariantEndOfServiceDate	O	O
serializedProductVariantEntryIntoServiceDate	X	X
serializedProductVariantIdentifier	X	X
serializedProductVariantInServiceStatus	X	X
serializedProductVariantManufacturingDate	X	X
serviceDescription	X	
serviceRequestDateTime	X	
serviceRequestDescription	O	
serviceRequestIdentifier	X	
serviceRequestName	X	
serviceRequestType	X	
serviceRequestUrgency	X	
softwarePartAsReleasedChecksum	O	
softwarePartAsReleasedDateTime	X	
softwarePartAsReleasedSize	X	
softwareReleaseIdentifier	O	
state	X	
stateDate	X	
stateReason	O	
temporaryClassificationType	X	
temporaryClassificationValidity	X	
temporaryIdentifier	X	
temporaryIdentifierValidity	X	
timedState	X	
timedStateReason	O	
timedStateTimestamp	X	
timeRangeFrom	X	

Data element	Use case	
	1	2
timeRangeUntil	X	
timeSinceClassifier	X	
timeSinceValue	X	
upperBound	O	
valueDetermination	O	
valueRecordingTimeDate	O	
warrantyClaimCommunicationMeans	X	
warrantyClaimFilingDate	X	
warrantyClaimIdentifier	X	
warrantyClaimOccurrenceDate	X	
warrantyClaimSettlementDate	X	
warrantyClaimType	X	
width	X	
workItemDescription	X	
workItemIdentifier	X	
workItemPeriod	X	
workItemStatus	X	
workItemType	X	
workOrderDateRaised	X	
workOrderDescription	X	
workOrderExecutionPeriod	X	
workOrderIdentifier	X	
workOrderStatus	X	
workOrderType	X	
yearComponent	X	

Chapter 20

Terms, abbreviations and acronyms

Table of contents

List of tables

References

Table 1 References

Chap No./Document No.	Title
ARMP-7	NATO R&M terminology applicable to ARMPs
DEF STAN 00-42	Reliability & Maintainability (R&M) Assurance Guide
DEF STAN 00-56	Safety Management Requirements for Defence Systems
IEC 60050-191	International Electrotechnical Vocabulary. Chapter 191: Dependability and quality of service
MIL-HDBK-61A	Military Handbook Configuration Management Guide
RTCA DO-178B	Software Considerations in Airborne Systems and Equipment Certification
S3000L	International procedure specification for Logistics Support Analysis (LSA)
S4000P	International specification for developing and continuously improving preventive maintenance
SX001G	Glossary for the S-Series ILS specifications

1 Introduction

It is necessary to be precise in the usage of terms across the whole specification and clarify the use of acronyms and abbreviations across this document.

2 Scope

This chapter includes a comprehensive terminology dictionary for the terms used throughout this specification in Para 3. A complete list of abbreviations and acronyms used throughout this specification is included in Para 4. Both the definitions of the terms and the abbreviations and acronyms are consolidated with those of the other S-Series specifications in [SX001G].

3 Terms

The terms defined in S5000F have been taken as far as feasible from S3000L or other S-Series specifications. When no definition for a term could be found, an alternative was sought referencing other international specifications; a new definition was created only when no alternative could be found.

Table 2 Terms

Term	Definition
Administrative delay time	Administrative time for which maintenance action cannot proceed due to administrative reasons (eg, awaiting approval to start maintenance, budget limitations, coordination requirements). (IEC 60050-191)
Allowed configurations	The different configuration statuses authorized by the Product OEM Engineering, or design authority, in which a product can be at a given moment during actual operation.
As delivered configuration	The actual configuration (including serial numbers) that the product has at the moment of the handover from the OEM to the Customer for the entry into service.
As desired configuration	The specified allowed configuration baseline that has to be achieved at a certain moment (eg, to return a product to service or to perform a specific mission).
As maintained configuration	The product configuration (including serial numbers) that exists at a given moment during the in-service.
Availability	Availability is the measure of the degree to which an item is in an operable and ready-to-use state at the start of a mission or operation, when the mission or operation is called for at an unknown time. This is sometimes called operational readiness. (S3000L)
Availability Instantaneous (Point Availability)	Probability that an item is in a state to perform as required at a given instant. (IEC 60050-191)
Availability, Intrinsic (inherent)	Availability value determined when maintenance and operational conditions are assumed to be ideal. (IEC 60050-191)
Availability, Operational	Is the probability than an equipment/ system at any instant in the required operating time will operate satisfactorily under stated conditions where the time considered includes operating, corrective and preventative maintenance administrative delay time and logistic delay time. (ARMP-7)

Term	Definition
Aviation Critical Safety Item	a part, an assembly, installation equipment, launch equipment, recovery equipment, or support equipment for an aircraft or aviation weapon system if the part, assembly, or equipment contains a characteristic any failure, malfunction, or absence of which could cause a catastrophic or critical failure resulting in the loss of or serious damage to the aircraft or weapon system, an unacceptable risk of personal injury or loss of life, or an uncommanded engine shutdown that jeopardizes safety. (Public law 108-136, sec 802)
Baseline Configuration	A basic allowed configuration from which by means of equipment exchange all other allowed configurations can be achieved without having to embody a modification.
Built -In Test	Built in tests (BIT) are implemented on items to enable them to carry out some self testing up to a given degree. Usually three types of built in test are implemented: -power-on built-in tests (P-BIT) executed at start-up of the item -continuous built-in tests (C-BIT), periodically and automatically executed during the operation of the item, without any intervention from the operating crew -initiated built-in tests (I-BIT), executed upon order from the operator or from the maintenance team. Each of these types of tests detects specific categories of failures. (S3000L)
Capability (of an item)	Ability to meet a service demand of given quantitative characteristics under given conditions. (IEC 60050-191)
Cataloguing	The process of accounting for items and arranging them systematically with descriptive details to include naming, describing, classifying and assigning a unique combination of letters and numerals, or both, for easy retrieval of the item information.
Cause, external	A cause is said to be external when an event independent of product usage occurs, eg, a bird-strike. (S3000L)
Certification	Legal recognition by the certification authority that a product, service, organization or person complies with the requirements. Such certification comprises the activity of technically checking the product, service, organization or person and the formal recognition of compliance with the applicable requirements by issue of a certificate, license, approval or other documents as required by national laws and procedures. In particular, certification of a product involves: (a) the process of assessing the design of a product to ensure that it complies with a set of standards applicable to that type of product so as to demonstrate an acceptable level of safety; (b) the process of assessing an individual product to ensure that it conforms with the certified type design; (c) the issuance of a certificate required by national laws to declare that compliance or conformity has been found with standards in accordance with items (a) or (b) above.(RTCA DO-178B)

Term	Definition
Certification Authority	The organization or person responsible within the state or country concerned with the certification of compliance with the requirements.(RTCA DO-178B)
Combat Capability	The potential ability to do combat work, perform a combat function or combat mission, achieve a combat objective or provide a combat service
Commercial Off-The-Shelf	Software or hardware, generally technology products, that is ready-made and available for sale, lease, or license to the general public. (S3000L)
Common Cause	Some failures may lead to several malfunctions. For instance, the failure of a power supply leads to a malfunction of all its supplied items. This type of failure with multiple impacts is called a common cause. (S3000L)
Condition Based Maintenance	Maintenance initiated as a result of knowledge of the condition of an item of equipment gained from routine or continuous monitoring. (JSP 817)
Condition monitoring	Obtaining information about physical state or operational parameters. (IEC 60050-191)
Configuration control	1) The establishment of an agreed build standard for an item and the procedure for controlling change to that standard, in order that it may be defined at any time. (ARMP-7) 2) A systematic process that ensures that changes to released configuration documentation are properly identified, documented, evaluated for impact, approved by an appropriate level of authority, incorporated, and verified. (MIL-HDBK-61A)
Configuration identification	(1) The process of designating the configuration items in a system and recording their characteristic. (RTCA DO-178B) (2) The approved documentation that defines a configuration item (RTCA DO-178B) (3) The systematic process of selecting the system attributes, organizing associated information about the attributes, and stating the attributes. (MIL-HDBK-61A)
Configuration item	An element or set of elements, being hardware, software or a combination of both, or any of its discrete parts, which performs a final function and which is decided to be subject to configuration control. This is an element that forms part of the configuration tree.
Configuration Item	Is a hardware, software, or combination of both that satisfies an end user function and is designed for separate configuration management. (MIL-HDBK-61A)

Term	Definition
Configuration management	(1) The process of identifying and defining the configuration items of a system, controlling the release and change of these items throughout the software life cycle, recording and reporting the status of configuration items and change requests and verifying the completeness and correctness of configuration items. (2) A discipline applying technical and administrative direction and surveillance to (a) identify and record the functional and physical characteristics of a configuration item, (b) control changes to those characteristics, and (c) record and report change control processing and implementation status. (RTCA DO-178B) (2) A management process for establishing and maintaining consistency of a system's performance, functional, and physical attributes with its requirements, design and operational information throughout its life. (MIL-HDBK-61A)
Configuration slot	Specific position within the product configuration tree that can be occupied by a configuration item. A configuration item is identified by the configuration item identifier and the position it occupies. For less complex products (eg, equipment) where the position is irrelevant, the configuration item can be identified exclusively by its identifier.
Configuration status accounting	The recording and reporting of the information necessary to manage a configuration effectively, including a listing of the approved configuration identification, the status of proposed changes to the configuration and the implementation status of approved changes. (RTCA DO-178B)
Configuration tree	The representation of the product baseline configuration, formed by blocks and structured hierarchically.
Damage	A loss or reduction of functionality, excluding inherent failure (intrinsic reliabilities). Normally a maintenance task will be required. Damages can be grouped into "damage families", eg, concerning structures; typical damage can be identified like scratches, dents or cracks. These damage families are typical candidates for a standard repair procedure. (S3000L)
Damage, accidental	Physical deterioration of an item caused by contact or impact with an object or influence which is not part of the product, or by human error during manufacturing, operation of the product, or maintenance practices. (S4000P)
Data	Recorded information of any nature (including administrative, managerial, financial, and technical) regardless of medium or characteristics. (MIL-HDBK-61A) Reinterpretable representation of information in a formalized manner suitable for communication, interpretation, or processing. (IEC 2382-1 101-12-03)
Data cluster	Family of data related to a single concept.
Data element	1) a value contained in a single message field 2) atomic unit of data

Term	Definition
Data element list	List of selected data elements or an output of a data element tailoring process. This list can contain additional data elements required for a special project, which are not predefined in any standard. (S3000L)
Data Item	A document or collection of documents that must be submitted by the performing activity to the procuring or tasking activity to fulfill a contract or tasking directive requirement for the delivery of information. (MIL-HDBK-61A)
Data sub-cluster	Subset of a data cluster focused on a specific type of data. As an example, "Flight Fault Reports" is a sub-cluster of "Technical Information". "Organizational Level removals" is a sub-cluster of "Organizational Level Events". "Depot Level Events" is a sub-cluster of "Shop Events". "Applicable configuration" is a sub-cluster of "Reference Data". The sub-cluster concept has only been created to ease the analysis of data elements required to implement feedback processes. It is a first tier breakdown of data clusters.
Defect	Any non-conformance of an item with its specified requirements is a defect. Note that a defect does not necessarily result in the failure of an item. (S3000L)
Deviation	Authorized approval to depart from a particular requirement of a product/equipment approved configuration documentation for a specified period of time. This allows the acceptance of an equipment/product which departs from the particular requirement but is considered as suitable for use 'as is' or after repair by an approved method. (S3000L)
Dependability	The collective term used to describe the availability performance and its influencing factors: reliability performance, maintainability performance and maintenance support performance. (IEC 60050-191)
Diagnostic test	Test procedure carried out in order to make a diagnosis. (IEC 60050-191)
Dispatch Interruption Rate	Ratio of the number of delays and cancellations, whose imputation is technical and intrinsic to the product, on the number of scheduled sorties (%)
Document	A self-contained body of information or data that can be packaged for delivery on a single medium. Some examples of documents are: drawings, reports, standards, databases, application software, engineering designs, virtual part-models, etc. (MIL-HDBK-61A)
Down time (maximum)	The acceptable (maximum) down time (MDT), where MDT is the time where an item is non-operational.
Durability	Ability to perform as required under given conditions of use and maintenance until a limiting state is reached. (IEC 60050-191)

Term	Definition
Engineering Change Proposal	The documentation by which a proposed engineering change is described, justified, and submitted to (a) the current document change authority for approval or disapproval of the design change in the documentation and (b) to the procuring activity for approval or disapproval of implementing the design change in units to be delivered or retrofit into assets already delivered. (MIL-HDBK-61A)
Event	An important happening or occurrence at a specific point in time that needs to be documented or recorded.
Event description	Description of the failure event or special event that can cause a related failure mode.
Event record	Record which describes the action performed on a product, and its results
Failure	Unacceptable reduction of functionality of an item where the item cannot continue in its intended use. The failure occurs inherently during proper usage of the item. (S3000L)
Failure cause	A failure cause is any circumstance during design, manufacture or use which led to the failure (S3000L)
Failure condition	The effect on the product and its occupants, both direct and consequential, caused or contributed to by one or more failures, considering relevant adverse operational or environmental conditions. (S4000P)
Failure criteria	Are predefined conditions or limits to be accepted as conclusive evidence of failure. (IEC 60050-191 Ed 2.0)
Failure effect	Is the consequence of a failure in terms of operation function or status of the item and higher system levels. (IEC 60050-191 Ed 2.0)
Failure mechanism	The process that leads to failure. (IEC 60050-191 Ed 2.0)
Failure mode	Is the manner in which the failure occurs and may be defined by the function lost or the state transition that occurred. (IEC 60050-191 Ed 2.0) A failure mode is a predicted or observed physical, mechanical, thermal or other process which leads to failure. The result of this process is stated in relation to the operating conditions at the time of the failure. (S3000L)
Failure mode probability	Defines how often a specific event (failure, damage or special event) results in a specific failure mode.
Failure rate	The number of failures of an item per unit of measure, expressed in hours cycles, kilometers as applicable to the item. (IEC 60050-191) The failure rate is the probability of failure per unit of time of items in operation. (S3000L)
Failure, critical	A failure that could result in injury to persons or that prevents an item from performing an essential mission. (IEC 60050-191)
Failure, primary	Is a failure not caused either directly or indirectly by a failure or fault of another item (IEC 60050-191)

Term	Definition
Fault	State characterized by an inability to perform as required. (IEC 60050-191 Ed 2.0) An identifiable condition in which one element of a redundant system has failed (no longer available) without impact on the required function output of the system (MSI). At the system level, a fault is not considered a functional failure. (S4000P)
Fault found, Primary	Is a failure not caused either directly or indirectly by a failure or fault of another item. (IEC 60050-191)
Fault found, Secondary	All failures which are not originally caused by the equipment itself. (IEC 60050-191)
Fault, software	Or software bug is a condition of a software item that may prevent it from performing as required. (IEC 60050-191)
Fault Diagnosis	Action to identify and characterise the fault. (IEC 60050-191)
Feedback	Any data transfer process between different stakeholders during the in-service of a product.
Field loadable software	Software that can be installed to one or several equipments on a system/product without need to dismount the target from its installation location. (S3000L)
Firmware	Software that can be loaded into a LRU or SRU but requires the target to be dismounted from its installation on the operational system and requiring the replacement of a component. (S3000L)
Fleet	A group of products operated under unified control (eg, ships, aircraft, trucks, buses, sensors, computers, etc).
Function	The normal characteristic actions of an item. (S4000P)
Functional characteristics	Quantitative performance parameters and design constraints, including operational and logistic parameters and their respective tolerances. Functional characteristics include all performance parameters, such as range, speed, lethality, reliability, maintainability, and safety. (MIL-HDBK-61A)
Functional check	A quantitative check to determine if one or more functions of an item or a system perform within specified limits. The task must be able to detect degradation, eg, wear, leakage, etc., and not just the complete failure. (S4000P)
Functional configuration audit	The formal examination of functional characteristics of a configuration item, or system to verify that the item has achieved the requirements specified in its functional and/or allocated configuration documentation. (MIL-HDBK-61A)
Functional failure	Failure of an item or system to perform its intended function within specified limits. (S4000P)
Functional symptom	A functional symptom characterizes a failure detected by a functional check and/or by loss or degradation of an operational function. It is detectable when the system is currently operated or checked via a functional check. (S3000L)

Term	Definition
Functions required	Are a characteristic or combination of characteristics considered necessary to complete a mission or tasks. (IEC 60050-191)
Hardware part material hazardous class	Identifies articles or substances which are capable of posing a significant risk to health, safety or property during transportation, handling or storage.
Integrated Logistics Support (ILS)	The management process which facilitates development and integration between individual logistics support elements to specify, design, develop, acquire, test, field and support technical systems. (S3000L)
Internal cause	A cause is said internal when it comes from product usage by itself, eg, excessive vibration. (S3000L)
Item	An item can be a part, component, device, subsystem, functional unit, equipment or system that can be individually considered. An item may consist of hardware, software or both. A group of items may be considered as an item. (IEC 60050-191)
Labor time	Summarized duration of personnel work. The duration should be addressed against the sub tasks. If more than one person is working in parallel on a subtask, the Labor time for each different skill must be summarized. (S3000L)
Life Cycle Cost (LCC)	It consists of all direct costs plus indirect-variable costs associated with the procurement, O&S and disposal of the system. Indirect costs may include linked costs such as additional common support equipment, additional administrative personnel and non-linked costs such as new recruiters to recruit additional personnel. All indirect costs related to activities or resources that are not affected by the introduction of the system are not part of LCC. (NATO)
Line Replaceable Unit (LRU)	Any item or component that is designed to be removed from the product at its operating location.
Localization (failure)	Failure localization indicates which item or group of items has failed. This localization is generally a complement to failure detection. (S3000L)
Logistic delay time	Accumulative time excluding administrative taken to provide resources needed for maintenance to proceed. (IEC 60050-191)
Logistics Support Analysis (LSA)	The selective application of scientific and engineering efforts undertaken during the development process and continuing throughout the complete life cycle, as part of the system engineering and design process, to assist in complying with the supportability and other Integrated Logistics Support activities. (S3000L)
Maintainability	The measure of the ability of an item to be retained in or restored to a specified condition, when maintenance is performed by personnel having specified skill levels, using prescribed procedures and resources, at each prescribed level of maintenance and repair. (S3000L)
Maintenance	Maintenance includes all action taken in order to retain or to restore an item system etc to a specified level of performance. It combines all necessary technical and administrative actions. (IEC 60050-191)

Term	Definition
Maintenance Concept	A statement of maintenance considerations, constraints and strategy for the operational support that governs the maintenance levels and type of maintenance activities to be carried out for the system/equipment under analysis. (S3000L)
Maintenance free operating period	The acceptable (minimum) maintenance free operating period, where maintenance free operating period is the interval in which no maintenance actions occur.
Maintenance level type name	The name by which a maintenance level type is known
Maintenance Man hours	Sum of the individual personnel times taken to carry out a maintenance action. (IEC 60050-191)
Maintenance significant item	Item that fails often and therefore requires many maintenance actions or that has a significant cost and its maintenance needs therefore to be assessed with special care.
Maintenance time	Time interval for which maintenance is performed including time attributed to maintenance actions and technical and logistic delays. (IEC 60050-191)
Maintenance Time, Active	Is that part of the overall maintenance time taken to physically perform a maintenance action and therefore includes fault isolation diagnosis of failure and subsequent testing. Logistic delays are excluded. (IEC 60050-191)
Maintenance, Corrective	All maintenance activities which are carried out to reset a faulty item to full functionality. (S3000L)
Maintenance, Preventive	Maintenance activities to prevent the occurrence of critical failures or damages in conjunction with safety, economical or ecological aspects. The Preventive Maintenance also includes activities after special events where these events, chronological intervals or regular thresholds cannot be defined. (S3000L)
Maintenance, Scheduled	Maintenance activities to prevent the occurrence of critical failures or damages in conjunction with safety, economical or ecological aspects. These maintenance tasks are defined with a corresponding interval or threshold, eg, after a certain time, cycles, rounds, distance. Scheduled maintenance is a subset of the preventive maintenance. (S3000L)
Maritime Critical Safety Item	A maritime critical safety item means any ship part, assembly, or support equipment containing a characteristic the failure, malfunction, or absence of which could cause: (1) A catastrophic or critical failure resulting in loss of or serious damage to the ship; or (2) An unacceptable risk of personal injury or loss of life. (48 CFR 209.270)
Master data	Master data represents the business objects which are agreed on and shared across an enterprise or a project. Master data is a single source of common business data used across multiple systems, applications, and/or processes. Examples of master data are organizations, part numbers, parties, locations, etc.

Term	Definition
Mean Active Corrective Maintenance Time	The sum total of the average active scheduled/ corrective maintenance times respectively factored by their frequency of repair. (IEC 60050-191)
Mean Time Between Failures (MTBF)	Mean time between failures is the predicted elapsed time between inherent failures of a system during operation. MTBF can be calculated as the arithmetic mean (average) time between failures of a system. The MTBF is typically part of a model that assumes the failed system is immediately repaired (zero elapsed time), as a part of a renewal process. This is in contrast to the Mean Time To Failure (MTTF), which measures average time between failures with the modeling assumption that the failed system is not repaired. (S3000L)
Mean time to First failure	Expected value of the operating time to first failure. (IEC 60050-191)
Mean Variant Between failures (MVBF)	Similar to MTBF but any other variants than time or distance should use MVBF where the variant as appropriate should be defined separately. (IEC 60050-191)
Mission Capability	Material condition of a product indicating it can perform at least one and potentially all of its designated missions or assigned tasks.
Mission Profile	A time phased description of the events and environments an item experiences from initiation to completion of a specified mission. It identifies the tasks events durations operating conditions and environments for each phase of a mission. (ARMP-7)
Model Identifier	The Model Identifier is a code, which uniquely identifies the product variant. It is recommended to use the model identifier in conjunction with other identifiers within the entire ILS process. (S3000L)
No Fault Found	When the item is sent for repair with a report of failure but subsequently it is not possible to reproduce or detect the reported failure and the item meets its requirements for return to service.
Non repairable item	Any part or assembly for which user-maintenance is limited to replenishment of consumables and replacement of the part or assembly upon failure or malfunction. (MIL-HDBK-61A)
Obsolescence	Obsolescence is the state of being which occurs when an object, service, or practice is no longer wanted even though it may still be in good working order. Obsolescence frequently occurs because a replacement has become available that has more advantages when compared to the disadvantages incurred by maintaining or repairing the original item, when the item in question is no longer available or it can no longer adequately perform the function for which it was created.
Operating requirement	Value of the (annual) operating requirement per operating location type and contracted product.
Operating Time	The time when the system or equipment is turned on and/or actively performing at least one of its functions.
Operating Time, essential	Is the time period during a mission when it is essential that the item is required to be in an operating state. (IEC 60050-191)

Term	Definition
Operational check	An operational check is a task to determine that an item is fulfilling its intended purpose. Does not require quantitative tolerances. This is a failure finding task. (S4000P)
Operational Readiness	The capability of a product to perform the missions or functions for which it is organized or designed. May be used in a general sense or to express a level or degree of readiness.
Part Number	A set of numbers, letters or other characters used to identify an item.
Physical breakdown	A top-down representation of hardware and software of a product based on the engineering design model/drawings. (S3000L)
Physical Configuration Audit (PCA)	The formal examination of the "as-built" configuration of a configuration item against its technical documentation to establish or verify the configuration item's system baseline. (MIL-HDBK-61A)
Physical symptom	A physical symptom characterizes a failure detected by visual inspection, measurement of a wear-out parameter, material degradation. It is detectable or measurable when the system is currently operated or if it is undergoing inspection or maintenance. (S3000L)
Preventative maintenance	Maintenance carried out to reduce the probability of failure or degradation. (IEC 60050-191)
Product	The Product is a final combination of systems, subsystems, component parts/materials, etc., such as an aircraft, a ship, vehicle, or a complex technical system. The product always represents the top level of any hierarchical breakdown. S3000L definition is: "Any platform, system, or equipment (air, sea, land vehicle, equipment, or facility, civil or military)."
Product service life	The number of years the LSA candidate is expected to be in service.
Prognostics	The process of using one or more parameters to predict the condition of an item at a defined point in its future operation and when it will no longer be able to perform its intended function.
R&M case	A reasoned auditable argument created to support the condition that a defined system will satisfy the Reliability & Maintainability requirements. (DEF STAN 00-42 part 3)
Record	Two or more values or variables stored in consecutive memory positions or database entries.
Recoverability	Is the ability to achieve restoration (with or without repair) following a failure. (IEC 60050-191)
Rectifying Task	A maintenance activity which resolves an event such as failures, damages, special events or thresholds. A rectifying task contains subtasks in terms of referenced supporting tasks and/or definite working steps. (S3000L)
Reference data	Reference Data is the set of permissible values to be used by other (master or transaction) data fields. Typical examples of reference data are units of measure, country codes, fixed conversion rates (eg, weight, temperature or length).

Term	Definition
Reliability	The duration or probability of failure free performance of a product or system under stated conditions, or the probability that an item can perform its intended function, under stated conditions, is a prime driver of support resources. (S3000L)
Reliability Centered Maintenance	A disciplined logic or methodology used to identify scheduled maintenance tasks to maintain the inherent reliability of equipment at a minimum expenditure of resources. (S3000L)
Reliability growth tests	Iterative process to improve reliability through testing until failure analysis implementing corrective action and continuing the test. (IEC 60050-191)
Reliability, Basic	The ability of an item to perform its required functions without failure or defect for the duration of its life profile. (ARMP-7)
Reliability, Mission	The probability that an item will perform its required functions for the duration of a specified mission profile. (ARMP-7)
Repair	(1) See rectifying task. (2) A procedure which reduces, but does not completely eliminate, a nonconformance. Repair is distinguished from rework in that the characteristic after repair still does not completely conform to the applicable drawings, specifications, or contract requirements. (MIL-HDBK-61A)
Repair Time	The part of maintenance time taken to conduct the repair action comprising of fault localization, fault correction and functional check but excludes technical administration and logistic delay. (IEC 60050-191)
Repairable item	Any part or assembly which, upon failure or malfunction, is intended to be repaired or reworked. (MIL-HDBK-61A)
Replacement item	One which is interchangeable with another item, but which differs physically from the original item in that the installation of the replacement item requires operations such as drilling, reaming, cutting, filing, shimming, etc., in addition to the normal application and methods of attachment. (MIL-HDBK-61A)
Required time	Is the time interval for which the user requires the item to be in an up state (available). (IEC 60050-191)
Routine inspection	Line maintenance of a product. Eg, on an aircraft: Daily- pre-flight, turnaround-/transit-, post-flight inspections. (S4000P)
Safety case	A safety case is a reasoned and supported argument, one way of documenting and providing assurance to the stakeholders that a system is acceptably safe. A safety case generally consists of the argument, usually based upon following a particular safety standard, and the supporting evidence, such as is summarized in or referenced by the hazard log. (DEF STAN 00-56)
Safety Case	A safety case is a structured argument, supported by a body of evidence, that provides a compelling, comprehensible and valid case that a system is safe for a given application in a given environment. (DEF STAN 00-56)
Scheduled maintenance interval	The (minimum) number of operational units (eg, rounds, miles, hours) between scheduled maintenance

Term	Definition
Self-diagnose	The ability to detect, react to and highlight an anomaly; where the anomaly could lead to a failure or a failure to perform as defined.
Self-checking	Built-in capability for detecting errors in its own function. (IEC 60050-191)
Self-testing	Built-in test capability for assessing internal system status. (IEC 60050-191)
Serial number	An identifying number consisting of alpha numeric characters which is assigned sequentially in the order of manufacture or final test and which, in conjunction with a manufacturer's identifying CAGE code, uniquely identifies a single item within a group of similar items identified by a common system-tracking base-identifier. (MIL-HDBK-61A)
Serialized item	Item that has been allocated an individual identifier by the OEM and/or end user so as to be able to track its individual life, status, condition and location.
Service Level Agreement (SLA)	A contract for the provision of a service that establishes a defined measure of the response time or level of service expected from the service provider.
Servicing	Any act of lubricating or any other servicing tasks like eg, washing, replenishment of consumables, etc., for the purpose of maintaining inherent design capabilities. (S4000P)
Sharable Content Object Reference Model (SCORM)	SCORM is a standard format that different authoring applications use to format content in such a way that the content can easily be imported into a learning management system.
Shop Loadable Software	Software that can be loaded into an LRU but requires the target LRU to be dismounted from its installation in the system where it is located. (S3000L)
Software	Computer programs and, possibly, associated documentation and data pertaining to the operation of a computer system. (RTCA DO-178B)
Standby time	Is the time interval for which a standby (non operating time) exists. (IEC 60050-191)
Status record	Record which describes an item at a given moment in time.
Support equipment	Equipment and computer software required to maintain, test, or operate a system or facility in its intended environment. (MIL-HDBK-61A)
System Configuration Documentation	A CI's detail design documentation including those verifications necessary for accepting system deliveries (first article and acceptance inspections.) Based on program production/ procurement strategies, the design information contained in the system configuration documentation can be as simple as identifying a specific part number or as complex as full design disclosure. (MIL-HDBK-61A)
System Effectiveness	Is the probability that the system can successfully meet an operational demand within a given time when operated under specific conditions. (IEC 60050-191)

Term	Definition
Task personnel resource labour time	Time expended within a task/subtask per required human resource.
Task total labour time	Total time expended within a task. Includes the labor time for all required personnel resources.
Technical data	Technical data is recorded information (regardless of the form or method of recording) of a scientific or technical nature (including computer software documentation.) (MIL-HDBK-61A)
Technical data package (TDP)	A technical description of an item adequate for supporting an acquisition strategy, production, engineering, and logistics support. The description defines the required design configuration and procedures required to ensure adequacy of item performance. It consists of all applicable technical data such as drawings and associated lists, specifications, standards, performance requirements, quality assurance provisions, and packaging details. (MIL-HDBK-61A)
Technical delay	Accumulative time necessary to perform auxiliary technical actions associated with but not part of the maintenance action. (IEC 60050-191)
Test	Procedure carried out to determine or verify one or more characteristics. (IEC 60050-191)
Testability	Degree to which an item facilitates the establishment of test criteria and the performance of tests. (IEC 60050-191)
Total Ownership Cost (TOC)	It consists of all elements that are part of LCC plus the indirect, fixed, linked costs. These latter may include items such as common support equipment, common facilities, personnel required for unit command, administration, supervision, operations planning and control, fuel and munitions handling. (NATO)
Training equipment	Items used in the support of training, such as trainers, operational equipment, and other associated hardware. (MIL-HDBK-61A)
Troubleshooting	Troubleshooting consists of localizing failed replaceable units when this is not obvious or previously done by other means, eg, built-in test. Troubleshooting is carried out after a failure has been detected. (S3000L)
Unexpected behavior	System behavior which is neither desired by the system designer nor by the system user but which however cannot be qualified as non-compliant
Use Case	A description of a system’s behavior as it responds to a request that originates from outside of that system. In other words, a use case describes "who" can do "what" with the system in question. The use case technique is used to capture a system's behavioral requirements by detailing scenario-driven threads through the functional requirements.
Useful Life	Under given conditions, the time interval beginning at a given instant of time, and ending when the failure intensity becomes unacceptable or when the item is considered un-repairable as a result of a fault. (IEC 60050-191)
Warranty	A warranty is an expressed or implied promise from the seller that certain facts about the items or services being sold are true and that a compensation will be provided if this proves to be not correct.

Term	Definition
Whole Life Cost (WLC)	It consists of all elements that are part of TOC plus indirect, fixed, non-linked costs. These latter may include items such as family housing, medical services, ceremonial units, basic training, headquarters and staff, academies, recruiters. In WLC all costs or expenses that are made by the organization are attributed to the systems or products they produce. (NATO)

4 Abbreviations and acronyms

Table 3 Abbreviations and acronyms

Abbreviation	Definition
A/C	Aircraft
AD	Airworthiness Directive
ADR	Alternative Dispute Resolution
AIA	Aerospace Industries Association
AOG	Aircraft On Ground
ARMP	Allied Reliability And Maintainability Publication
ASD	AeroSpace and Defence Industries Association of Europe
ATA	Air Transport Association
ATE	Automatic Test Equipment
BEI	Breakdown Element Identifier
BIT	Built-In Test
BITE	Built In Test Equipment
BOM	Business Object Model
CAA	Civil Aviation Authority (UK)
CAD	Computer-Aided Design
CAMO	Continuous Airworthiness Management Organization
C-BIT	Continuous Built-In Test
CBS	Cost Breakdown Structure
CDM	Common Data Model
CHAP	Chapter
CI	Configuration Item
COTS	Commercial Of The Shelf
CRM	Customer Relationship Management
D/L	Depot Level –also called ML3

Abbreviation	Definition
DB	Database
DEX	Data EXchange specification
DGAC-F	French Direction Générale de l'Aviation Civile
DIN	Deutsches Institut für Normung e.V.
DIR	Dispatch Interruption Rate
DMC	Direct Maintenance Cost
DMEWG	Data Modelling and Exchange Working Group
DOD	Department Of Defense (USA)
EASA	European Aviation Safety Agency
EBS	Equipment Breakdown Structure
ECCAIRS	European Co-ordination Centre For Accident And Incident Reporting Systems
EOSL	End Of Service Life
ERC	Engineering Record Card
ESG	Elektoniksystem- und Logistik-GmbH
ETOPS	Extended-range Twin-engine Operational Performance Standards
FAA	Federal Aviation Authority (USA)
FFR	Flight Fault Report
FMECA	Failure Mode Effect Criticality Analysis
GCBS	Generic Cost Breakdown Structure
GFF	Government Furnished Facilities
GFI	Government Furnished Information
HMD	Health Monitoring Data
HUMS	Health and Usage Monitoring System
HW	Hardware
I/L	Intermediate Level – also called ML2
I-BIT	Initiated Built-In Test
ICD	Interface Control Document
ICOR	Input, Control, Output, Resource
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IETP	Integrated Electronic Technical Publication
IFM	Integrated Fleet Management

Abbreviation	Definition
ILS	Integrated Logistics Support
ISMO	In-Service Maintenance Optimization
ISO	International Organization for Standardization
KPI	Key Progress Indicator
LCC	Life Cycle Cost
LRI	Liner Replaceable Item
LRU	Line Replaceable Unit
LSA	Logistics Support Analysis
LSAR	Logistics Support Analysis Report
LTB	Last Time Buy
MC	Maintenance Cost
MDT	Mean Down Time
ML	Maintenance Level
MMH	Mean Man-Hours
MMS	Maintenance Management System
MoD	Ministry Of Defence (UK)
MRBR	Maintenance Review Board Report
MRO	Maintenance, Repair and Overhaul
MRT	Mean Repair Time
MTBF	Mean Time Between Failures
MTBUR	Mean Time Between Unscheduled Removal
MTTR	Mean Time To Repair
NATO	North Atlantic Treaty Organization
NFF	No Fault Found
NSN	National Stock Number / NATO Stock Number
O/L	Organizational Level – also called ML1
OASIS	Organization for the Advancement of Structured Information Standards
OBS	Organisational Breakdown Structure
OCM	Original Component Manufacturer
OEM	Original Equipment Manufacturer
OMP	Obsolescence Management Plan
P/N	Part Number

Abbreviation	Definition
PARA	Paragraph
P-BIT	Power-on Built-In Test
PBL	Performance-Based Logistics
PCA	Physical Configuration Audit
PDF	Portable Document Format
PDM	Product Data Management
PHST	Packaging, Handling, Storage and Transportation
PIREP	Pilot Report
PLCS	Product Life-Cycle Support (ISO 10303-239)
PLM	Product Life-cycle Management
PM	Product Manufacturer
PMA	Product Maintainer
POL	Petroleum, Oil and Lubricants
PSM	Platform Specific Model
RAMCT	Reliability, Availability, Maintainability, Capability and Testability
RBS	Readiness Based Sparing
RMT	Reliability, Availability and Maintainability
RNAV	Area Navigation, Random navigation
RTCA	Radio Technical Commission for Aeronautics
S/N	Serial Number
SB	Service Bulletin
SCM	Supply Chain Management
SCORM	Sharable Content Object Reference Model
SE	Support Equipment
SHM	Structural Health Monitoring
SLA	Service Level Agreement
SM	Specific Means
SMR	Source, Maintenance and Recoverability
SMS	Safety Management System
SRU	Shop Replaceable Unit
SSG	Symbolic Stream Generator
STANAG	Standardization Agreement

Abbreviation	Definition
STEP	STandard for the Exchange of Product model data
SW	Software
TAT	Turn Around Time
TDP	Technical Data Package
TIR	Technical Investigation Report
TOC	Total Ownership Cost
UML	Unified Modeling Language
UOF	Unit Of Functionality
WBS	Work Breakdown Structure
WLC	Whole Life Cost
XML	EXtended Mark-up Language