IDTA 02056-1-0 Data Retention Policies

June 2024

Submodel Template of the
Asset Administration Shell

Submodel Template
IDTA approved

- 100% AAS compliant
- Consistent & interoperable
- Released by the AAS experts

Imprint

Version history

Date	Version/Revision	Comment
2024-06-14	1.0	Release of the official Submodel template published by IDTA.

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1   General

1.1 About this document

This document is a part of a specification series. Each part specifies the contents of a Submodel template for the Asset Administration Shell (AAS). The AAS is described in [1], [2], [3] and [6]. First exemplary Submodel contents were described in [4], while the actual format of this document was derived by the "Administration Shell in Practice" [5]. The format aims to be very concise, giving only minimal necessary information for applying a Submodel template, while leaving deeper descriptions and specification of concepts, structures and mapping to the respective documents [1] to [6].

The target group of the specification are developers and editors of technical documentation and manufacturer information, which are describing assets in smart manufacturing by means of the Asset Administration Shell (AAS) and therefore need to create a Submodel instance with a hierarchy of SubmodelElements. This document especially details on the question, which SubmodelElements with which semantic identification shall be used for this purpose.

1.2 Scope of the Submodel

This Submodel describes a common representation of data retention policies that can be applied to elements in the Asset Administration Shell via semantic identifiers. Based on this information, it is possible to automate the reduction, archiving, or removal of data stored in the Asset Administration Shell. Such data can be, for example, raw sensor data, large images, sensitive data, or any data that becomes obsolete over time.

A data retention policy defines how long data must be stored before it may be deleted. It also provides information about the policy provider, the specific requirement or law that enforces the policy, and the timeframe between which the policy is in effect. Additionally, the authorship of each policy can be traced through an audit log, in which all changes to the policy are documented. Based on this information, an automated service can apply and validate each policy against the data stored in the Asset Administration Shell and reduce, archive, or remove the data as necessary.

This Submodel allows a set of policies to inherit from another set of policies so that an existing policy can be extended or adjusted to more specific use cases. For example, business policies may be overridden or extended by contracts with more specific policies or longer retention periods.

The enforcement of data retention policies described by this Submodel are outside the scope of this document.

1.3 Use cases, requirements and design decisions

Table 1: Use cases

Use Case	Description
Compliance with Legal and Regulatory Requirements	Different types of data are subject to different retention periods. Organizations must comply with regulations and maintain proper data retention and disposal policies.
Data Obsolescence	While data can be used for quality assurance, traceability, process improvement, and more, it will eventually become obsolete or inaccurate. However, not all data is subject to the same retention periods. Here, the interests of organizations may conflict with those of their customers or legislation. To ensure that obsolete or inaccurate data is being disposed, targeted parameterization of flexible retention periods is required.
Data Storage Strategies	The collection of data requires large amounts of storage space, which is very costly and limited. When the cost for storing the data outweighs its usability, the data must be removed to make space for new data. An organization may decide to keep data for a certain period before it is removed.

1.3.1 Design Decisions

Separation of Data Retention Policies and Data

This Submodel specifies data retention policies for data elements using their semantic identifier. This is necessary because a data retention policy may apply to data elements that don't exist yet or are created by third-party systems.

Using the semantic identifier of data elements allows targeted parameterization of retention policies without the need to annotate each data element individually, and new data elements can be created without prior knowledge of the data retention policy.

The use of semantic identifiers also makes it possible to define data retention policies for complex elements, like Submodels, Submodel Element Collections, and more.

Inheritance of Data Retention Policies

As described in use case "Compliance with Legal and Regulatory Requirements", organizations must maintain proper data retention policies. Since these policies can be different depending on when and where data was acquired and stored, it must be possible to define different sets of policies for the same kind of data (e.g., data that is subject to privacy regulations in the EU and US may be subject to different retention periods).

For this purpose, it is possible to define data retention policies based on an existing set of policies.

For example, there may be global policies that are enforced for the entire organization, and more specific policies for different countries, locations, customers, etc.
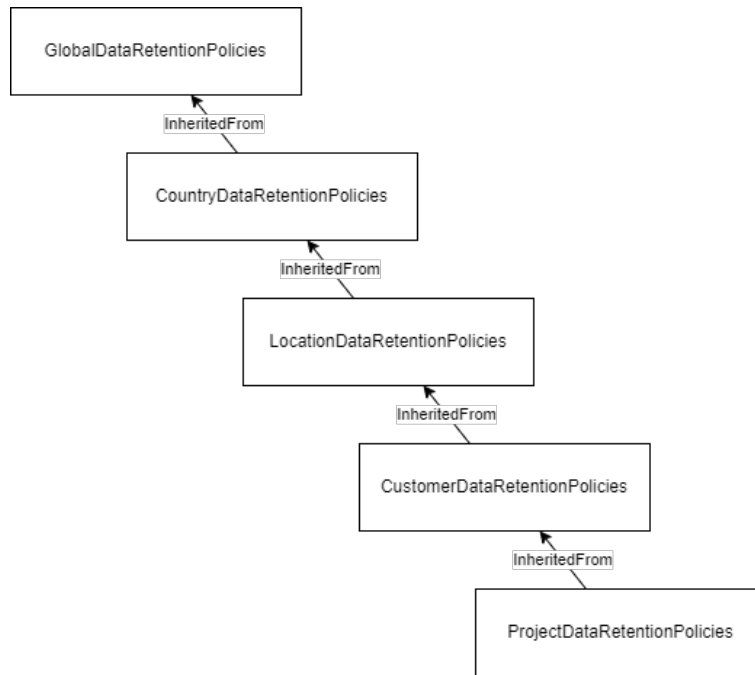
Figure 1: Inheritance of data retention policies.

Resolving conflicts in data retention policies

When evaluating data retention policies, different conflicts may occur.

Conflict	Expected Behaviour
A descendant element has a longer retention period than its ancestor, in which case the deletion of the ancestor would conflict with the data retention policy of its descendant.	The ancestor is not deleted until all its descendants have reached the end of their retention period.
The deletion of an element conflicts with its expected minimum cardinality.	The element is not deleted.

Removing a data retention policy Submodel

With the information provided in the data retention policy Submodel, it is also possible to determine when each of the policies can be removed. Based on the values of "EffectiveUntil" and "RetentionTime" the removal of the policy can be automated. For example, a policy with a retention time of 1 year that is effective until 31.12.2023 will be obsolete on 31.12.2024 (this is when the last element affected by the policy becomes obsolete).

2 Submodel Data Retention Policies

2.1 Approach

In this document, one Submodel for zero or more data retention policies is defined. The Submodel is usable in Asset Administration Shells for type and instance assets and may refer to another Submodel for data retention policies that the Submodel is based on. Each policy has an audit log with information about changes to the policy.
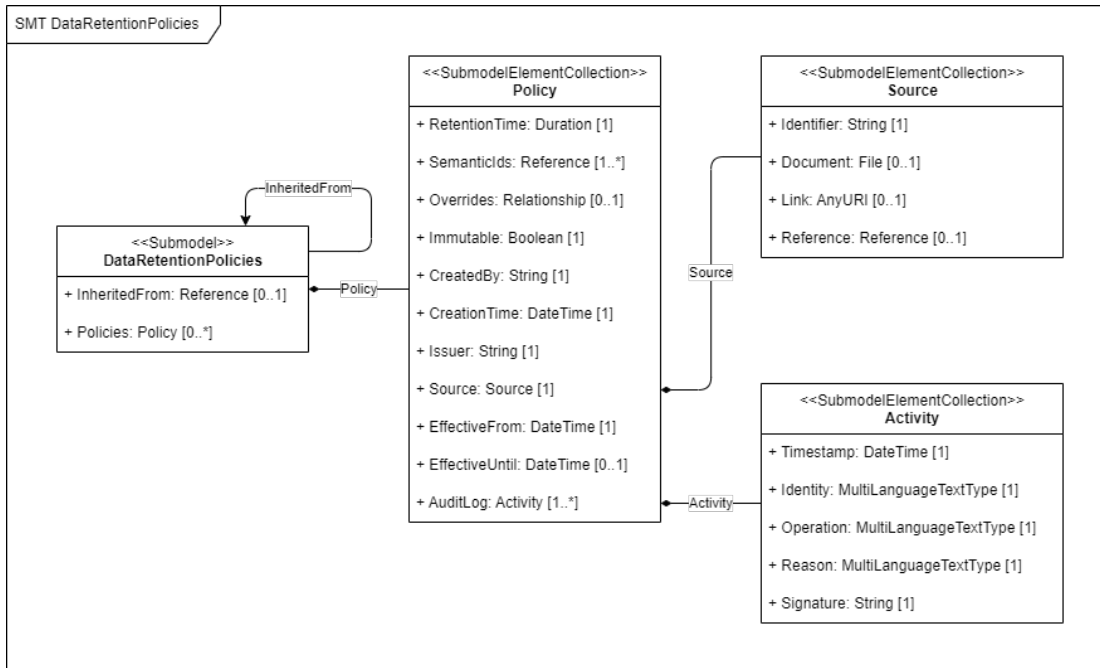

Figure 2: Data Retention Policies Class Diagram.

The following guidelines are defined for this Submodel:

- Data retention policies defined for an Asset Administration Shell of kind "Type" also apply to all Asset Administration Shells of kind "Instance" that are derived from it.
- A data retention policy may apply to one or more semantic identifiers.
- A data retention policy enforcement system may add qualifiers to target elements that define the policy source and deletion time.
  - o Qualifier "KeepUntil" = DateTime of deletion (e.g., "2024-12-31T23:59:59.999Z")
  - o Qualifier "PolicySource" = Reference to policy

2.2 Overview of Data Retention Policies

The data retention policies Submodel describes zero or more policies in the form of SMCs. Each SMC represents a data retention policy with information and metadata about the policy and an audit log to keep track of changes.

2.3 Elements of SM "DataRetentionPolicies"

Table 2: Elements of SM DataRetentionPolicies

idShort:	DataRetentionPolicies
	Note: the above idShort should be prefixed with a describing name (e.g., "GlobalDataRetentionPolicies")
Class:	Submodel
semanticId:	[IRI] https://admin-shell.io/idta/DataRetentionPolicies/1/0
Parent:	
Explanation:	Submodel containing data retention policies for data elements in the Asset Administration Shell.

[SME type]	semanticId = [idType]value	[valueType]	card.
idShort	**Description@en**	**Example**	
[Ref] InheritedFrom	[IRI] https://admin-shell.io/idta/DataRetentionPolicies/InheritedFrom/1/0 Reference to a DataRetentionPolicies Submodel whose policies are extended or changed by the policies defined in this Submodel. Note: A policy described in the referenced Submodel can be overwritten by policies described in the current Submodel, if the referenced policy is not marked as immutable.	n/a	0..1
[SMC] Policies	[IRI] https://admin-shell.io/idta/DataRetentionPolicies/Policies/1/0 Defines the set of policies.	[Policy] zeroToMany	1

2.4 Elements of SMC "Policies"

Table 3: Elements of SMC Policies

idShort:	Policies
	Note: the above idShort should be used as specified.
Class:	SubmodelElementCollection
semanticId:	[IRI] https://admin-shell.io/idta/DataRetentionPolicies/Policies/1/0
Parent:	DataRetentionPolicies
Explanation:	Defines the set of policies.

[SME type]	semanticId = [idType]value	[valueType]	card.
idShort	**Description@en**	**example**	
[SMC] Policy{00}	[IRI] https://admin-shell.io/idta/DataRetentionPolicies/Policy/1/0 Describes a single data retention policy.	[Policy]	0..*

2.5 Elements of SMC "Policy"

Table 4: Elements of SMC Policy

idShort:	Policy{00}
	Note: the above idShort should be used as specified.
Class:	SubmodelElementCollection
semanticId:	[IRI] https://admin-shell.io/idta/DataRetentionPolicies/Policy/1/0
Parent:	Policies
Explanation:	Describes a single data retention policy.

[SME type]	semanticId = [idType]value	[valueType]	card.
idShort	**Description@en**	**example**	
[Property] RetentionTime	[IRI] https://admin-shell.io/idta/DataRetentionPolicies/RetentionTime/1/0 Specifies how long an element must be retained before it can be deleted.	[Duration] 3 Years	1
[SML] SemanticIds	[IRI] https://admin-shell.io/idta/DataRetentionPolicies/SemanticIds/1/0 References to semantic identifiers of elements that this policy shall apply to. Order Relevant: No List Element Type: [Ref] List Element Semantic ID: [IRI] https://admin-shell.io/idta/DataRetentionPolicies/SemanticId/1/0	[Ref] oneToMany	1
[Rel] Overrides	[IRI] https://admin-shell.io/idta/DataRetentionPolicies/Overrides/1/0 Establishes a relationship with a policy that is being overridden by this policy.	[Rel]	0..1
[Property] Immutable	[IRI] https://admin-shell.io/idta/DataRetentionPolicies/Immutable/1/0 Specifies whether the policy is immutable. Note: An immutable policy cannot be overwritten.	[Boolean] True	1
[Property] CreatedBy	[IRI] https://admin-shell.io/idta/DataRetentionPolicies/CreatedBy/1/0 Legal name of the entity who created the policy.	[String]	1
[Property] CreationTime	[IRI] https://admin-shell.io/idta/DataRetentionPolicies/CreationTime/1/0 Timestamp of when the policy was created.	[DateTime] 2024-01-15T13:50:15.070Z	1
[Property] Issuer	[IRI] https://admin-shell.io/idta/DataRetentionPolicies/Issuer/1/0 Legal name of the entity that issued the policy.	[String] European Parliament	1

[SMC] Source	[IRI] https://admin-shell.io/idta/DataRetentionPolicies/Source/1/0 Identity of the policy source within the context of the issuer.	[Source]	1
[Property] EffectiveFrom	[IRI] https://admin-shell.io/idta/DataRetentionPolicies/EffectiveFrom/1/0 Date and time that the policy is valid from.	[DateTime] 2018-05-25T00:00:00.000Z	1
[Property] EffectiveUntil	[IRI] https://admin-shell.io/idta/DataRetentionPolicies/EffectiveUntil/1/0 Date and time until when the policy is valid.	[DateTime]	0..1
[SML] AuditLog	[IRI] https://admin-shell.io/idta/DataRetentionPolicies/AuditLog/1/0 Activity log of changes to the policy. Order Relevant: Yes	[Activity] oneToMany	1

2.6 Elements of SMC "Source"

Table 5: Elements of SMC Source

idShort:	Source Note: the above idShort should be used as specified.		
Class:	SubmodelElementCollection		
semanticId:	[IRI] https://admin-shell.io/idta/DataRetentionPolicies/Source/1/0		
Parent:	Policy		
Explanation:	Describes the source of a policy.		
[SME type]	**semanticId = [idType]value**	**[valueType]**	**card.**
idShort	**Description@en**	**example**	
[Property] Identifier	[IRI] https://admin-shell.io/idta/DataRetentionPolicies/SourceIdentifier/1/0 Identifier of the source (e.g., DOI).	[String] Regulation 2016/679	1
[File] Document	[IRI] https://admin-shell.io/idta/DataRetentionPolicies/SourceDocument/1/0 Reference to an external file representing the policy source (e.g., contract document).	n/a	0..1
[Property] Link	[IRI] https://admin-shell.io/idta/DataRetentionPolicies/SourceLink/1/0 Link to an external source (e.g., web page).	[anyURI]	0..1
[Ref] Reference	[IRI] https://admin-shell.io/idta/DataRetentionPolicies/SourceReference/1/0 Reference to a source in the same or an external Asset Administration Shell.	n/a	0..1

2.7 Elements of SML "AuditLog"

Table 6: Elements of SML AuditLog

idShort:	AuditLog		
	Note: the above idShort should be used as specified.		
Class:	SubmodelElementList		
semanticId:	[IRI] https://admin-shell.io/idta/DataRetentionPolicies/AuditLog/1/0		
Parent:	Policy		
Explanation:	Contains the activity log of changes to the policy.		
[SME type]	**semanticId = [idType]value**	**[valueType]**	**card.**
idShort	**Description@en**	**example**	
[SMC] <no_idShort>	[IRI] https://admin-shell.io/idta/DataRetentionPolicies/Activity/1/0 An activity related to the policy.	[Activity]	1..*

2.8 Elements of SMC "Activity"

Table 7: Elements of SMC Activity

idShort:	<no_idShort>		
	Note: there is no idShort for Submodel elements in lists (see Specification of the Asset Administration Shell Part1: Metamodel - Constraint AASd-120).		
Class:	SubmodelElementCollection		
semanticId:	[IRI] https://admin-shell.io/idta/DataRetentionPolicies/Activity/1/0		
Parent:	AuditLog		
Explanation:	An activity related to the policy.		
[SME type]	**semanticId = [idType]value**	**[valueType]**	**card.**
idShort	**Description@en**	**example**	
[Property] Timestamp	[IRI] https://admin-shell.io/idta/DataRetentionPolicies/Timestamp/1/0 Time when the change was made.	[DateTime]	1
[MLP] Identity	[IRI] https://admin-shell.io/idta/DataRetentionPolicies/Identity/1/0 Username or legal name of the entity that made the change.	n/a	1
[MLP] Operation	[IRI] https://admin-shell.io/idta/DataRetentionPolicies/Operation/1/0 Description of the action taken.	n/a	1

[MLP] Reason	[IRI] https://admin-shell.io/idta/DataRetentionPolicies/Reason/1/0 Reason for the change.	n/a	1
[Property] Signature	[IRI] https://admin-shell.io/idta/DataRetentionPolicies/Signature/1/0 Signature of the Policy after the change was made.	[String]	1

Annex A. Explanations on used table formats

1. General

The used tables in this document try to outline information as concise as possible. They do not convey all information on Submodels and SubmodelElements. For this purpose, the definitive definitions are given by a separate file in form of an AASX file of the Submodel template and its elements.

2. Tables on Submodels and SubmodelElements

For clarity and brevity, a set of rules is used for the tables for describing Submodels and SubmodelElements.

- The tables follow in principle the same conventions as in [5].

- The table heads abbreviate 'cardinality' with 'card'.

- The tables often place two informations in different rows of the same table cell. In this case, the first information is marked out by sharp brackets [] form the second information. A special case are the semanticIds, which are marked out by the format: (type)(local)[idType]value.

- The types of SubmodelElements are abbreviated:

SME type	SubmodelElement type
Property	Property
MLP	MultiLanguageProperty
Range	Range
File	File
Blob	Blob
Ref	ReferenceElement
Rel	RelationshipElement
SMC	SubmodelElementCollection
SML	SubmodelElementList

- If an idShort ends with '{00}', this indicates a suffix of the respective length (here: 2) of decimal digits, in order to make the idShort unique. A different idShort might be choosen, as long as it is unique in the parent's context.

- The Keys of semanticId in the main section feature only idType and value, such as: [IRI]https://admin-shell.io/vdi/2770/1/0/DocumentId/Id. The attributes "type" and "local" (typically "ConceptDescription" and "(local)" or "GlobalReference" and (no-local)") need to be set accordingly; see [6].

- If a table does not contain a column with "parent" heading, all represented attributes share the same parent. This parent is denoted in the head of the table.

- Multi-language strings are represented by the text value, followed by '@'-character and the ISO 639 language code: example@EN.

- The [valueType] is only given for Properties.

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