



Product Life Cycle Support Version 1.0

Committee Specification Draft 01

12 March 2013

Specification URIs

This version:

<http://docs.oasis-open.org/plcs/plcslib/v1.0/csd01/plcslib-v1.0-csd01.html> (Authoritative)

<http://docs.oasis-open.org/plcs/plcslib/v1.0/csd01/plcslib-v1.0-csd01.pdf>

Previous version:

N/A

Latest version:

<http://docs.oasis-open.org/plcs/plcslib/v1.0/plcslib-v1.0.html> (Authoritative)

<http://docs.oasis-open.org/plcs/plcslib/v1.0/plcslib-v1.0.pdf>

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This prose specification is one component of a Work Product which also includes:

- PLCS Platform Specific Model: EXPRESS information model: http://docs.oasis-open.org/plcs/plcslib/v1.0/csd01/data/PLCS/psm_model/plcs_psm.exp
- PLCS Platform Specific Model: XML Schema: http://docs.oasis-open.org/plcs/plcslib/v1.0/csd01/data/PLCS/psm_model/plcs_psm.xsd
- PLCS Platform Specific Model: OWL Reference Data: http://docs.oasis-open.org/plcs/plcslib/v1.0/csd01/data/PLCS/psm_model/refdata/plcs-psm-en.owl
- PLCS OWL Reference Data: <http://docs.oasis-open.org/plcs/plcslib/v1.0/csd01/data/contexts/OASIS/refdata/plcs-rdl-en.owl>

Related work:

This specification replaces or supersedes:

- http://docs.oasis-open.org/plcs/dexlib/cs01/oasis_cover.htm

This specification is related to:

- ISO 10303-239:2012 "Industrial automation systems and integration -- Product data representation and exchange -- Part 239: Application protocol: Product life cycle support"

Declared XML namespaces:

- <http://docs.oasis-open.org/plcs/ns/plcslib/v1.0/data/contexts/OASIS/refdata/plcs-rdl>
- <http://docs.oasis-open.org/plcs/ns/plcslib/v1.0/data/plcs/plcs-psm/refdata/plcs-psm>
- <http://docs.oasis-open.org/plcs/ns/plcslib/v1.0/data/plcs/plcs-psm/xml-schema/plcs-psm>

- <http://docs.oasis-open.org/plcs/ns/plcslib/v1.0/data/plcs/plcs-psm/xsd/plcs-psm>
- <http://docs.oasis-open.org/plcs/ns/plcslib/v1.0/data/plcs/plcs-psm/express/plcs-psm>

Abstract:

The purpose of the OASIS Product Life Cycle Support (*PLCS*) standard is to establish structured data exchange and sharing capabilities for use by industry to support complex engineered assets throughout their total life cycle. The OASIS Product Life Cycle Support (PLCS) standard is defined by Data Exchange Specifications (*DEX*) that are based upon ISO 10303 (*STEP*) Application Protocol 239 Product Life Cycle Support.

The scope of the information content of ISO 10303-239 covers:

- The identification and composition of a product design from a support viewpoint;
- The definition of documents and their applicability to products and support activities;
- The identification and composition of individual products;
- Configuration management activities, over the complete life cycle;
- Activities required to sustain product function;
- The resources needed to perform such activities;
- The planning and scheduling of such activities;
- The capture of feedback on the performance of such activities, including the resources used;
- The capture of feedback on the usage and condition of a product;
- The definition of the support environment in terms of people, organizations, skills, experience and facilities.

The business goals of the OASIS PLCS DEXs are to satisfy three significant requirements for owners/operators of complex products and systems such as aircraft, ships and power plants, namely:

- Reduction in the total cost of ownership;
- Increased asset availability;
- Effective information management throughout the product lifecycle.

Status:

This document was last revised or approved by the OASIS Product Life Cycle Support (PLCS) TC on the above date. The level of approval is also listed above. Check the Latest version location noted above for possible later revisions of this document.

Technical Committee members should send comments on this specification to the Technical Committees email list. Others should send comments to the Technical Committee by using the [Send A Comment](#) button on the Technical Committees web page at <http://www.oasis-open.org/committees/plcs/>.

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Citation format:

When referencing this specification the following citation format should be used:

[PLCS v1.0]

Product Life Cycle Support Version 1.0. 12 March 2013. OASIS Committee Specification Draft 01. <http://docs.oasis-open.org/plcs/plcslib/v1.0/csd01/plcslib-v1.0-csd01.html>.

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Table of Contents

- 1 Introduction
 - 1.1 Terminology
 - 1.2 Normative References
 - 1.3 Non-Normative References
 - 1.4 Components of the standard
- 2 Conformance
 - 2.1 PLCS Platform Specific Model (PLCS PSM)
 - 2.2 Reference Data Ontologies
 - 2.3 PLCS Templates
- Appendix A. Acknowledgments
- Appendix B. Revision History

1 Introduction

The purpose of the ISO Product Life Cycle Support (*PLCS*) standard is to support complex engineered assets such as planes and ships throughout their total life cycle. It puts particular emphasis on the in-service phase of the product and, in particular, it supports the seamless transition from design and manufacture through to product support and feedback of usage and change.

The data needed is often distributed over multiple IT systems and organizations, and historically has been difficult to access and consolidate. The PLCS standard provides a large, integrated information model covering the whole lifecycle. The PLCS standard provides the basic mechanisms enabling neutral file exchanges between IT systems and organisations. This helps remove delays and costs for both the end user of the product and the supplier, and is particularly important for service-based contracts such as "power-by-the-hour".

The PLCS information model is larger than any single existing application, and needs detailed application rules in order to be used uniformly by different users and supported by different software applications. This standard, "Product Life Cycle Support Version 1.0" defines the usage of the PLCS information model through the use of Data Exchange Specifications (*DEXs*) that specify how it can be used to directly support real life business processes. It builds the DEXs from reusable components (s) that guarantee uniform interpretation of PLCS between different DEXs, and adds extensible business terminology (*Reference Data*) to the model. Each Data Exchange Specification (DEX) provides data exchange and sharing capabilities for a focused set of transactions based upon the integrated data model of (*DEX Application Protocol* 239 (Product Life Cycle Support).

Note: No DEXs are included in this version of the standard, "Product Life Cycle Support Version 1.0", but will be included in future releases.

The information content of PLCS covers:

- The identification and composition of a product design from a support viewpoint;
- The definition of documents and their applicability to products and support activities;
- The identification and composition of individual products;
- Configuration management activities, over the complete life cycle;
- Activities required to sustain product function;
- The resources needed to perform such activities;
- The planning and scheduling of such activities;
- The capture of feedback on the performance of such activities, including the resources used;
- The capture of feedback on the usage and condition of a product;
- The definition of the support environment in terms of people, organizations, skills, experience and facilities.

The business goals of the OASIS PLCS DEXs are to satisfy three significant requirements for owners/operators of complex products and systems such as aircraft, ships and power plants, namely:

- Reduction in the total cost of ownership;
- Increased asset availability;
- Effective information management throughout the product lifecycle.

1.1 Terminology

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [RFC2119].

1.2 Normative References

- [RFC2199] S. Bradner, *Key words for use in RFCs to Indicate Requirement Levels*, <http://www.faqs.org/rfcs/rfc2119.html>, IETF RFC 2119, March 1997.
- [OWL] *OWL Web Ontology Language Reference*, W3C Recommendation 10 February 2004, <http://www.w3.org/TR/owl-ref>, OWL, 2004.
- [XMLSchema] *W3C XML Schema Definition Language (XSD)*, <http://www.w3.org/standards/techs/xmlschema>.
- [Schematron] *ISO/IEC 19757-3:2006 - Information technology -- Document Schema Definition Languages (DSDL) -- Part 3: Rule-based validation -- Schematron*, Schematron, 2006.

1.3 Non-Normative References

- [XMI] *MOF 2.0/XMI Mapping Specification, v2.1*, <http://schema.omg.org/spec/XMI/2.1>, 2005.
- [SysML] *OMG Systems Modeling Language(OMG SysML™), Version 1.2*, <http://www.omg.org/spec/SysML/1.2/>, SysML, 2010.
- [10303-11:2004] *Industrial automation systems and integration - Product data representation and exchange: Part 11: Description methods: The EXPRESS language reference manual.*, ISO 10303-11, 2004.
- [ISO 10303-239:2012(E)] *Industrial automation systems and integration - Product data representation and exchange: Application Protocol: Product life cycle support*, ISO 10303-239, 2012.

1.4 Components of the standard

The Product Life Cycle Support Version 1.0 comprises the following components:

- **Contexts:** http://docs.oasis-open.org/plcs/plcslib/v1.0/csd01/sys/context_index_base.html
A *Context* identifies a domain or business purpose area for which DEXs are defined;
- **DEXs:** http://docs.oasis-open.org/plcs/plcslib/v1.0/csd01/sys/dex_index_base.html
A *DEX* identifies and documents a subset of the ISO 10303-239 (PLCS) information model required for a specific business purpose;

Note: No DEXs are included in this version of the standard, "Product Life Cycle Support Version 1.0", but will be included in future releases.
- **Templates:** http://docs.oasis-open.org/plcs/plcslib/v1.0/csd01/sys/template_index_base.html
The usage of the PLCS information model by a DEX is defined through *Templates*. The templates provide a precise specification of how the model is used to represent a given concept;
- **Model Usage Guides:** http://docs.oasis-open.org/plcs/plcslib/v1.0/csd01/sys/sys/model_ug_index_base.html
Model Usage Guides provide guidance on how the information model and templates should be used.
- **Reference data:** http://docs.oasis-open.org/plcs/plcslib/v1.0/csd01/sys/refdata_index_base.html
Reference Data provides a tailorable vocabulary that adds business specific semantics to the information model.
- **Concept model:** http://docs.oasis-open.org/plcs/plcslib/v1.0/csd01/data/PLCS/concept_model/model_base.html
A high level model of the main concepts used in ISO 10303-239. It is intended to be used to introduce on a single page the scope that PLCS addresses.

- **Activity model:** http://docs.oasis-open.org/plcs/plcslib/v1.0/csd01/sys/activity_model_index_base.html
The ISO 10303-239 Activity Model that illustrates the business activities that are supported by ISO 10303-239;
- **PLCS PSM:** http://docs.oasis-open.org/plcs/plcslib/v1.0/csd01/data/PLCS/psm_model/model_base.html
The PLCS Platform Specific Model (*PLCS PSM*) that is used as the data exchange form for all DEXs. The *PLCS PSM* is a *SysML* model with an derived XML Schema;

For a summary of these components and inter relationships, see [DEX technology overview](#).

2 Conformance

This edition of the OASIS PLCS standardizes the components described below.

Not every implementation will use all the components.

Implementations shall conform to those components used as specified in the following sections.

2.1 PLCS Platform Specific Model (PLCS PSM)

The [PLCS Platform Specific Model \(PLCS PSM\)](#) is used as the data exchange form.

The PLCS PSM is represented in EXPRESS, SysML and XML Schema with the XML Schema being derived from the EXPRESS and SysML models.

Implementations shall conform to the XML Schema.

The following models are provided for explanatory purposes:

- PLCS Platform Specific Model [EXPRESS](#);
- PLCS Platform Specific Model canonical [SysML XMI](#).

The PLCS PSM exchange format, to which implementations shall conform, is represented as the following XML Schema with an associated set of Schematron rules:

- PLCS Platform Specific Model XML Schema [common.xsd](#);
- PLCS Platform Specific Model XML Schema [plcs_psm.xsd](#);
- PLCS Platform Specific Model [Schematron](#).

2.2 Reference Data Ontologies

[Reference data](#) provides a tailorable vocabulary that adds business specific semantics to the information model.

The Reference Data is represented in OWL.

The following OWL ontologies are standardized and implementations shall conform to them:

- PLCS PSM Reference Data [plcs-psm-en.owl](#)
- PLCS Reference Data [plcs-rdl-en.owl](#)

2.3 PLCS Templates

The usage of the PLCS information model by a DEX is defined through [Templates](#). The Templates provide a precise specification of how the model is used to represent a given concept.

Implementations shall conform to the specific Templates used.

The following Templates are standardized:

- Template: ActualActivity
- Template: ActualMission
- Template: ActualMissionItem
- Template: ActualProductUsage
- Template: Applicability
- Template: Baseline
- Template: Breakdown

- Template: Breakdown
- Template: BreakdownElementRealization
- Template: BreakdownStructure
- Template: Catalog
- Template: CatalogItem
- Template: CatalogItemRealization
- Template: CatalogItemStructure
- Template: ClassCode
- Template: Classifier
- Template: Collection
- Template: Contract
- Template: DatedEffectivity
- Template: Descriptor
- Template: DirectedActivity
- Template: Document
- Template: EffectivityAssertion
- Template: Envelope
- Template: EnvironmentDefinition
- Template: EnvironmentObserved
- Template: EventReport
- Template: EventReportItem
- Template: Fleet
- Template: FleetItem
- Template: FunctionalBreakdown
- Template: FunctionalBreakdownStructure
- Template: FunctionalElement
- Template: Identification
- Template: IndividualCode
- Template: Justification
- Template: MeasuredProperty
- Template: Message
- Template: Name
- Template: Observation
- Template: Organization
- Template: Part
- Template: PartAssembly
- Template: Person
- Template: PersonInOrganization
- Template: PhysicalBreakdown
- Template: PhysicalBreakdownStructure

- Template: PhysicalElement
- Template: PlannedActivity
- Template: ProductConfiguration
- Template: ProductConfigurationOptionRelationship
- Template: ProductConfigurationStructure
- Template: Project
- Template: PropertyValueNumeric
- Template: PropertyValueText
- Template: ProxyItem
- Template: RealizedPart
- Template: RealizedPartAssembly
- Template: Requirement
- Template: ResourceOrder
- Template: ResourceOrderAcknowledgment
- Template: ResourceOrderDelivery
- Template: ResourceOrderDeliveryReceipt
- Template: ResourceOrderLineItem
- Template: ResourcePool
- Template: ResourcePoolItem
- Template: Scheme
- Template: SchemeEntry
- Template: StateAssertion
- Template: StateAssessment
- Template: StatePrediction
- Template: StockItem
- Template: SystemBreakdown
- Template: SystemBreakdownStructure
- Template: SystemElement
- Template: Task
- Template: ViewDefinitionContext
- Template: WorkDone
- Template: WorkOrder
- Template: WorkRequest

Note: Future versions of this standard, "Product Life Cycle Support Version 1.0", will extend the number of DEXs, Templates and Reference Data, as well as other parts to facilitate the adoption of the PLCS standard.

Appendix A. Acknowledgments

Participants:

The following individuals have participated in the creation of this specification and are gratefully acknowledged:

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Appendix B. Revision History

Revision	Date	Changes Made
plcs-plcslib-v1.00-csprd01	2013-03-12	<p>Product Life Cycle Support Version 1.0 Committee Specification Draft 01 Public Review Draft 01</p> <p>Republication for plcs-plcslib-v1.00-csd01 for ballot as Committee Specification Draft 01 Public Review Draft 01</p>
plcs-plcslib-v1.00-csd01	2013-03-12	<p>Product Life Cycle Support Version 1.0 Committee Specification Draft 01 Public Review Draft 01</p> <p>Initial release for review</p> <p>PLCS PSM</p> <p>The following issues have been addressed against the PLCS PSM:</p> <ul style="list-style-type: none"> Issue: 185 "Effectivity assignment should apply to RelationshipObjects" Issue: 186 "ContractAssignmentSelect - Need to be able to assign a contract to Collection" <p>Templates</p> <p>The following issues have been addressed against the Templates:</p> <ul style="list-style-type: none"> Issue: 286 "OASIS:StockItem id should be ids[1..*]" Issue: 287 "OASIS:WorkOrder id should be ids[1..*]" Issue: 288 "OASIS:WorkRequest id should be ids[1..*]" Issue: 289 "OASIS:Task id should be ids[1..*]" Issue: 290 "OASIS:WorkDone id should be ids[1..*]" Issue: 291 "OASIS:PropertyValueNumeric incorrect private properties" Issue: 292 "OASIS:ActualProductUsage - Incorrect binding between product and ActivityAssignment" Issue: 293 "OASIS:Envelope - Wrong use of reference data" Issue: 294 "OASIS:Justification - ids should be [1..*]" Issue: 295 "OASIS:WorkRequest: Use Justification template " Issue: 296 "OASIS:Applicability - call deprecated Individual template" Issue: 297 "OASIS:Envelope id should be ids[1..*]" Issue: 298 "OASIS:Message id should be ids[1..*]" Issue: 299 "OASIS:Justification classify JustificationSupportAssignment and JustificationAssignment" Issue: 300 "OASIS:StockItem - wrong type for property resourceItemSelect" Issue: 301 "All templates: Incorrect / missing reference data constraints" Issue: 302 "OASIS:EventReport - Need to be split into EventReport and EventReportItem"

		<p>Reference Data</p> <p>The following issues have been addressed against the Reference Data:</p> <ul style="list-style-type: none">• Issue: 76 "Create Event_report_membership class"
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