

27 October 2025

CSRM HTML Navigation

This provides the capability for a user to explore the CSRM with a browser instead of Cameo.

A link to an HTML version of CSRM:

<http://pulsar.orbitaltransports.com/csrn/>

The CSRM provides navigation by linking packages to package diagrams.

Cameo provides a useful but unsupported capability to generate a HTML version of the CSRM.

That allows someone to get acquainted with the CSRM using just a browser.

Some of the package - package diagram links may not survive the conversion to HTML.

However, navigation can be initiated in the containment tree.

What follows illustrates the relationship between the packages and package diagrams (in blue font).

The relationships are captured in links from the packages to the package diagrams.

Below are screen captures of the containment tree with arrows pointing to the package diagrams.

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01 - CubeSat System Reference Model

0 - CSRM Overview and Navigation

[PD1: CSRM Overview and Navigation](#)

1 - Stakeholders

[PD2: Stakeholders](#)

1.2 Mission Stakeholders

[PD3: Mission Stakeholders](#)

[PD4: Mission Stakeholders and Requirements - Population](#)

2 - Technical Measures

2.1 - Technical Measures - Specifications and Requirements - Population

[PD6: Technical Measures - Specifications and Requirements - Population](#)

3 - Behaviors

3.1 - Behaviors - Use Cases - Activities - Population

[PD7: Behaviors - Use Cases - Activities - Population](#)

4 - Requirements

[PD8: Requirements Hierarchy - Population](#)

5 - Architecture

[PD9: Architecture Hierarchy](#)

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Diagram Specification Appears in Mode: Standard

SysML Package Diagram CSRM Overview and Navigation

The diagram shows a package structure for CSRM. A large package labeled '01 - CubeSat System Reference Model' contains seven sub-packages: '1 - Stakeholders', '2 - Technical Measures', '3 - Behaviors', '4 - Requirements', '5 - Architecture', '6 - Validation Verification', and '7 - CSRM Population'. A note box on the right states: 'This package contains the CSRM core. Additionally, there are links to the examples and illustrations. You are free to use the elements or delete them if they do not apply to your design.'

CONTAINMENT

Diagrams

- Data
 - Relations
 - 00 - CSRM Start Here
 - 01 - CubeSat System Reference Model
 - 0 - CSRM Overview and Navigation
 - CSRM Overview and Navigation
 - This package contains CSRM example:
 - This package contains the CSRM core.
 - This package contains the extensions u
 - This package contains the glossary terr
 - This package is used by the Dassault S
 - This package is used by the Dassault S
 - 1 - Stakeholders
 - 2 - Technical Measures
 - 3 - Behaviors
 - 4 - Requirements
 - 5 - Architecture
 - 6 - Validation Verification
 - 7 - CSRM Population
 - 02 - CSRM Elements, Examples and Illustrati
 - 04 - Explore
 - CSRM Extensions
 - Derived Properties

Documentation Properties

Documentation of Diagram CSRM Overview and ...

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Package Diagram 1. CSRM Overview and Navigation

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Diagram Specification Appears in Mode: Standard

SysML Package Diagram Stakeholders

pkg [Package] 1 - Stakeholders [Stakeholders]

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graph TD
    1[1 - Stakeholders] --> 1.1[1.1 Regulatory Agency Stakeholders]
    1 --> 1.2[1.2 Mission Stakeholders]
    1 --> 1.3[1.3 CubeSat Deployer Systems]
    1.1 --> 1.1.1[1.1.1 - Regulatory Agency Stakeholders]
    1.1 --> 1.1.2[1.1.2 - Regulatory Agency Stakeholders Concerns]
    1.1.1 --> 1.1.1.1[1.1.1.1 - Regulatory Agency Stakeholders - Examples]
  
```

«Explanation»
There are two modeling efforts. One is the SSWG developing a CubeSat Reference Model with its logical architecture. The other is a team eventually taking the CubeSat Reference Model as a basis for its mission-specific logical and physical architectures.

«Explanation»
A stakeholder is any entity that has an interest in the system. Some are interested in the models themselves and others are interested in the missions that can be realized from the mission-specific instantiations of the model, and some have interests in both.

Documentation Properties
Documentation of Diagram Stakeholders

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Package Diagram 2. Stakeholders

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Diagram Specification Appears in

Mode: Standard

SysML Package Diagram Mission Stakeholders

pkg [Package] 1.2 Mission Stakeholders [Mission Stakeholders]

Mission Stakeholders

1 - Stakeholders

1.2 Mission Stakeholders

1.2.1 - Mission Stakeholders

1.2.2 - Mission Stakeholder Concerns

1.2.3 - Mission Needs

1.2.4 - Mission Objectives

1.2.5 - Mission Constraints

1.2.6 - Mission Rqts

1.2.1 - Mission Stakeholders - Examples

Mission Stakeholders - Requirements, Technical Measures, Use Cases - Illustration,

Mission Stakeholders and Requirements - Population

PD5

PD4

Documentation of Diagram Mission Stakeholders

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Package Diagram 3. Mission Stakeholders

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The screenshot shows a web browser window with the URL pulsar.orbitaltransports.com/csrm/. The browser tab is titled 'The MagicDraw Web Publisher'. The interface displays a SysML Package Diagram titled 'SysML Package Diagram Mission Stakeholders and Requirements - Population'. The diagram is organized into a table with columns for element names and their explanations. A blue arrow points to the 'Mission Stakeholders and Requirements - Pop' element in the left-hand containment tree.

Element Name	Explanation
Mission Stakeholders Table	Mission Stakeholders - Those with an interest in the mission-specific CubeSat space and ground system.
Mission Stakeholder Concerns Table	Stakeholder Concern - Interest in a system relevant to one or more of its stakeholders.
Concerns to Stakeholder	Mission Need - A concise description of a need or service that the system must provide.
Mission Needs Table	Mission Objective - A broad set of goals that must be achieved in order to successfully satisfy the stated mission need.
Mission Objectives Table	Mission Constraint - A limitation placed on cost, schedule, or implementation techniques.
Mission Constraints Table	Mission Requirement - Statements of fact and assumptions that define the expectations of the system in terms of mission objectives, environment, constraints, and measures of effectiveness.
Mission Rqts Table	

«HowTo»
Double-click on a table and add and delete elements as needed.
Click on Add New to add a new element to the containment tree and to the table.
Right click the new element in the table then left click Select in Containment Tree to navigate to the new element.
Select an element and click on Delete to delete from the element table and the Containment Tree.

Package Diagram 4. Mission Stakeholders and Requirements - Population

PD3

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Containment Diagrams

Diagram Specification Appears in

Mode: Standard

SysML Package Diagram Technical Measures - Specifications and Requirements - Population

pkg pkg [Package]2.1 - Technical Measures - Specifications and Requirements - Population

Technical Measures - Specifications and Requirements - Population

Technical Measures - Specifications Table

Technical Measures - Requirements Table

2.1.1 MOE

2.1.1.1 MOE Specifications

2.1.1.2 MOE Requirements

2.1.2 MOP

2.1.2.1 MOP Specifications

2.1.2.2 MOP Requirements

2.1.3 TPM

2.1.3.1 TPM Specifications

2.1.3.2 TPM Requirements

«comment»

A Technical Measure provides a stakeholder insight into the definition and development of a technical solution.

Verification activities provide data to the technical measurement process that is used to assess how well the technical measure is either projected to meet, or is meeting, its stated value.

Common terms for these measures are:

- MOE - Measure of Effectiveness
- MOP - Measure of Performance
- TPM - Technical Performance Measure
- KPP - Key Performance Parameter

«Explanation»

MOEs are operational measures of success closely related to the achievement of the mission objective in the intended operational environment under a specified set of conditions

«Explanation»

MOPs are measures that characterize physical or functional attributes relating to system operation, measured or estimated under specified testing and/or operational environment conditions

«Explanation»

A Technical Measure is incorporated in to CubeSat System Reference Model as a block value property based on the Technical Measure as specified by a stakeholder

A stakeholder is going to most likely "describe" their Technical Measure in a document. A stakeholder will communicate and negotiate their Technical Measure with the engineers and engineers will transform the description into a value property, and methods for calculating the value property.

The Technical Measures are captured in Technical Measures Specification packages and Technical Measures Requirement packages.

Technical Measures Specification package diagrams are used to establish the relationships of Specifications, Methods, and Requirements.

«Explanation»

The Technical Measures Methods document is part of the model and can be edited within the model.

It can be created externally and copy/pasted into a Technical Measure package diagram for population into the containment tree.

Documentation Properties

Documentation of Diagram Technical Measures - ...

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Package Diagram 6. Technical Measures - Specifications and Requirements - Population

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Containment Diagrams

Diagram Specification Appears in

SysML Package Diagram Behaviors - Use Cases - Activities - Population

pkg [Package]3.1 Behaviors - Use Cases - Activities - Population[Behaviors - Use Cases - Activities - Population]

Behaviors - Use Cases - Activities - Population

L1 Mission Rqts
Mission Rqts Table

L1_Enterprise
L1.1_Behaviors
L1.1.1_Enterprise Behaviors
Enterprise Behaviors Table
L1.1.2_Enterprise Use Cases
Enterprise Use Cases Table
L1.1.3_Enterprise Activities
Enterprise Activities Table

L2.1.1 CubeSat Rqts
L2.1.1 CubeSat Rqts Table

L2.1_Space Segment
L2.1.1_Behaviors
L2.1.1.1_CubeSat Behaviors
Cubesat
L2.1.1.2_CubeSat Use Cases
CubeSat Use Cases Table
L2.1.1.3_CubeSat Activities
CubeSat

The package provides artifacts for es behavior that refines the requirement

The behavior can be:
Expressed as a by text-based Behavior
Captured in a Use Case Diagram
Refined by an Activity Diagram.

A Behavior Description can be simple presented in our 2017 IEEE Aerospace Use Case Name Scope Stakeholder Precondition

At each level there are:
Behavior packages containing Beh
Use Case packages containing Use
Activity packages containing Activity

«Explanation»
As presented here, the CSRM has of population and relationships of r

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Package Diagram 7. Behaviors - Use Cases - Activities - Population

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Containment Diagrams

Diagram Specification Appears in Mode: Standard

SysML Package Diagram Requirements Hierarchy - Population

pkg [Package] 4 - Requirements Requirements Hierarchy - Population

4 - Requirements

L1 Mission Rqts

L2 Segment Rqts

L2.1 Space Segment Rqts

L2.2 Ground Segment Rqts

L2.1.1 CubeSat Rqts

L3 Subsystem Rqts

L3.1 CubeSat Subsystems Rqts

L3.2 Ground Subsystems Rqts

L4 Component Rqts

L4.1 CubeSat Subsystems Components Rqts

L4.2 Ground Subsystems Components Rqts

«Explanations»

The requirement elements reside in the containment tree. The requirement tables are views of the requirement elements. A table can be deleted but the requirement elements and their hierarchy remains.

Requirements are added to the table using "Add New" or "Add Nested" and the requirement ids are automatically updated.

«Explanations»

Requirement packages are numbered to be consistent with the corresponding architecture packages.

Individual requirements are numbered uniquely according to a prefix based on the name of the requirements packages.

«Explanations»

The modeler can easily change the prefix by Select a requirement in the containment tree and Select Element Numbering

«Explanations»

The requirement element properties include:

Rationale	Traced To	Traced From	Derived From	Verify Method
Verified By	Satisfied By			

«HowTo»

Double-click on the CubeSat, Ground Segment, CubeSat Subsystem, and Ground Subsystem requirement packages to navigate to the requirement tables.

«HowTo»

Double-click on table and add and delete requirements as needed

Click on Add New to add a new requirement to the containment tree and to the table.

Right-click the new requirement in the table then left-click Select in Containment

Package Diagram 8. Requirements Hierarchy - Population

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Containment Diagrams

Diagram Specification Appears in Mode: Standard

SysML Package Diagram Architecture Hierarchy

pkg [Package]5 - Architecture [Architecture Hierarchy]

5 - Architecture

- L0_Domain
- L1_Enterprise
- L2_Segment
 - L2.1_Space Segment
 - L2.2_Ground Segment
- L3_Subsystems
 - L3.1_CubeSat Subsystems
 - L3.2_Ground Subsystems
- Facilities
- L4.Components
 - L4.1_CubeSat Subsystems Components
 - L4.1.0_Shared Components
 - L4.1.1_Mission Payload Components
 - L4.1.2_Command and Data Handling Components
 - L4.1.3_Communication Components
 - L4.1.4_Attitude Determination and Control Components
 - L4.1.5_Guidance Navigation and Control Components
 - L4.1.6_Structures and Mechanisms Components
 - L4.1.7_Power Components
 - L4.2_Ground Subsystems Components
 - L4.2.1_Plan and Schedule Components
 - L4.2.2_Spacecraft Command Components
 - L4.2.3_Ground Equipment Control Components
 - L4.2.4_Space-Ground Communication Components
 - L4.2.5_Mission Data Processing Components
 - L4.2.6_Mission Data Dissemination Components
 - L4.2.7_Network Components

«Explanation»

The CRM provides a CubeSat logical architecture. The logical components are abstractions of the physical components that perform the system functionality without imposing implementation constraints.

The physical architecture defines physical components of the system including hardware, software, persistent data, and operational procedures.

The CRM logical elements are a starting point for a mission-specific CubeSat logical architecture, followed by the physical architecture and the CubeSat development.

The enterprise, segment, and subsystem packages contain packages for behaviors, structures. Behaviors include use case, activity, sequence, and state diagrams. Structures include block definition diagrams and internal block definition diagrams.

«Explanation»

The CubeSat and Ground subsystems are broadly defined as a starting point for the mission-specific CubeSat team.

The CubeSat team determines what subsystem capabilities are needed and whether they are provided by software, hardware, persistent data, or operator procedures.

Subsystems can be eliminated if not needed, e.g. Propulsion. Subsystems can be combined, e.g. Attitude Determination and Control subsystem and Guidance, Navigation, and Control.

Documentation Properties

Documentation of Diagram Architecture Hierarchy

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Package Diagram 9. Architecture Hierarchy

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