# S*Metamodel Mapping
# for
# Cameo Systems Modeler
# Versions 2019-2024xR2

**Version 1.12.1**
**5/12/2025**



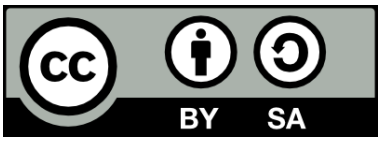

By: S* Patterns Community

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# Revision History

| Date | Version | Description | Author |
|---|---|---|---|
| November 01. 2013 | 1.0 | Initial Content | William Schindel, ICTT |
| January 19, 2015 | 1.1 | Updated detail mapping | Jason Sherey, ICTT |
| December 9, 2016 | 1.2 | Add S* Icon Table | Stephen Lewis, ICTT |
| January 23, 2017 | 1.3 | Table and Scope Edits | Stephen Lewis, ICTT |
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| June 24, 2021 | 1.10.1 | Updated mappings | Stephen Lewis, ICTT |
| January 12, 2022 | 1.11.1 | Changed “Physical System” language to “Design Component”, Changed Architectural Relationship and Architectural Relationship Role Mappings, Added Interface Element Relationship to S* Metaclass Mapping Details, Added Relates AR, Relates FI, Relates IO, Relates Sys to S* Metarelationship Mapping Details. Edited Mapping Strategy section. | Stephen Lewis, ICTT |
| October 12, 2022 | 1.11.2 | Updated Reference Details | Stephen Lewis, ICTT |
| February 10-13, 2023 | 1.11.3-4 | Risk Analysis Mappings | Stephen Lewis, ICTT |
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| February 16-28, 2024 | 1.11.6-12 | Section 4.3 creation, Sections 4.1-2 layout | Stephen Lewis, ICTT |
| May 12, 2025 | 1.12.1 | Cameo Systems Modeler Version Update | Stephen Lewis, ICTT |

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# 1 Document Overview

## *1.1 Document Scope*

This document describes the mapping between OMG SysML® and the S*Metamodel of the Systematica® methodology and its models and patterns. This document is further configured for Dassault Systemes MagicDraw/Cameo Systems Modeler Version 19. This mapping is implemented in version 05082023 of the Systematica Profile in MagicDraw/Cameo Systems Modeler.

## *1.2 Document Organization*

This document is organized in the following fashion:

1. **Document Overview:** Reviews the scope, organization and references for this document.
2. **Framework Overview:** Reviews basic OMG SysML schema structures and concepts.
3. **Mapping Overview:** Provides a high-level overview of how the schema configuration uses the structures and concepts described in Section 2 and their mapping to S*Metaclasses and S*Metarelationships.
4. **Detailed Mapping:** Lists each S*Metaclass and S*Relationship and describes how each is mapped into MagicDraw.

## *1.3 Applicable Documents*

The following are referenced or otherwise applicable to this document:

1. Friedenthal, S., et al.. *A Practical Guide to SysML*. Boston: Morgan Kaufmann OMG Press, 2012.
2. ICTT System Sciences. “Systematica Metamodel, Version 8.0.57.” Feb 2024.
3. ICTT System Sciences. “S*Metamodel to SysML Map.” *Visualizing and Understanding Systems Processes and Systems Pathologies, Volume I: Modeler’s Guide, V1.6.2*. INCOSE System Sciences Working Group, SP Modeling Team, December, 2013.
4. Object Modeling Group (OMG). “What Is SysML.” *OMG SysML*, 2018, omgsysml.org/what-is-sysml.htm. Accessed 18 Oct. 2018.

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# 2 OMG SysML Overview

"The OMG Systems Modeling Language (OMG SysML™) is a general-purpose graphical modeling language for specifying, analyzing, designing, and verifying complex systems" (OMG). Being a graphical modeling language, SysML uses elements on a variety of diagrams to model a system's requirements and designs.

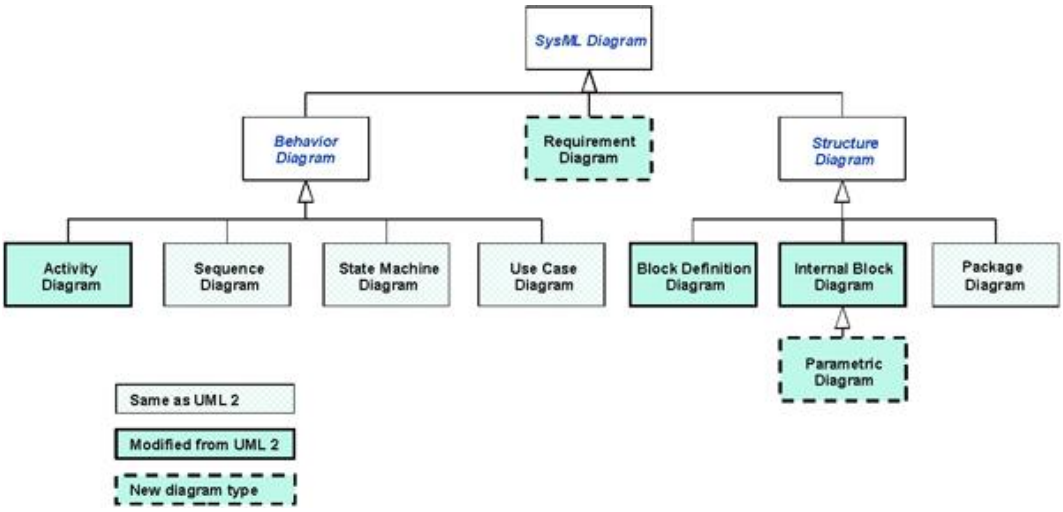



**Figure 1: SysML Diagram Types (www.omgsysml.org)**

"The «block» is the basic unit of structure in SysML and can be used to represent hardware, software, facilities, personnel, or any other system element. The system structure is represented by block definition diagrams and internal block diagrams. A block definition diagram describes the system hierarchy and system/component classifications. The internal block diagram describes the internal structure of a system in terms of its parts, ports, and connectors. The package diagram is used to organize the model" (OMG).

"The behavior diagrams include the use case diagram, activity diagram, sequence diagram, and state machine diagram. A use-case diagram provides a high-level description of functionality that is achieved through interaction among systems or system parts. The activity diagram represents the flow of data and control between activities. A sequence diagram represents the interaction between collaborating parts of a system. The state machine diagram describes the state transitions and actions that a system or its parts perform in response to events" (OMG).

"SysML includes a graphical construct to represent text-based requirements and relate them to other model elements. The requirements diagram captures requirements hierarchies and requirements derivation, and the satisfy and verify relationships allow a modeler to relate a requirement to a model element that satisfies or verifies the requirements. The requirement diagram provides a bridge between the typical requirements management tools and the system models" (OMG).

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“The parametric diagram represents constraints on system property values such as performance, reliability, and mass properties, and serves as a means to integrate the specification and design models with engineering analysis models” (OMG).

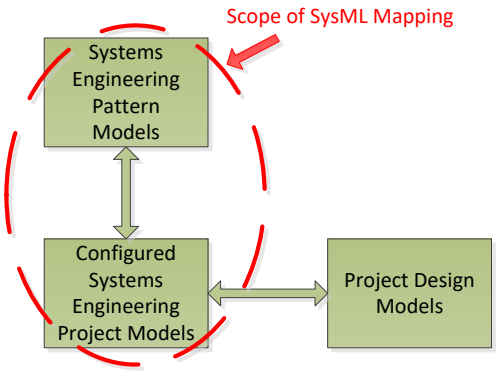
“SysML also includes an allocation relationship to represent various types of allocation, including allocation of functions to components, logical to physical components, and software to hardware” (OMG).

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# 3 Schema Configuration Overview

The mapping described in this document covers only systems engineering pattern and configured model spaces. Mappings for detail design models and any relationships between them and the configured systems engineering models are not contained in this document.

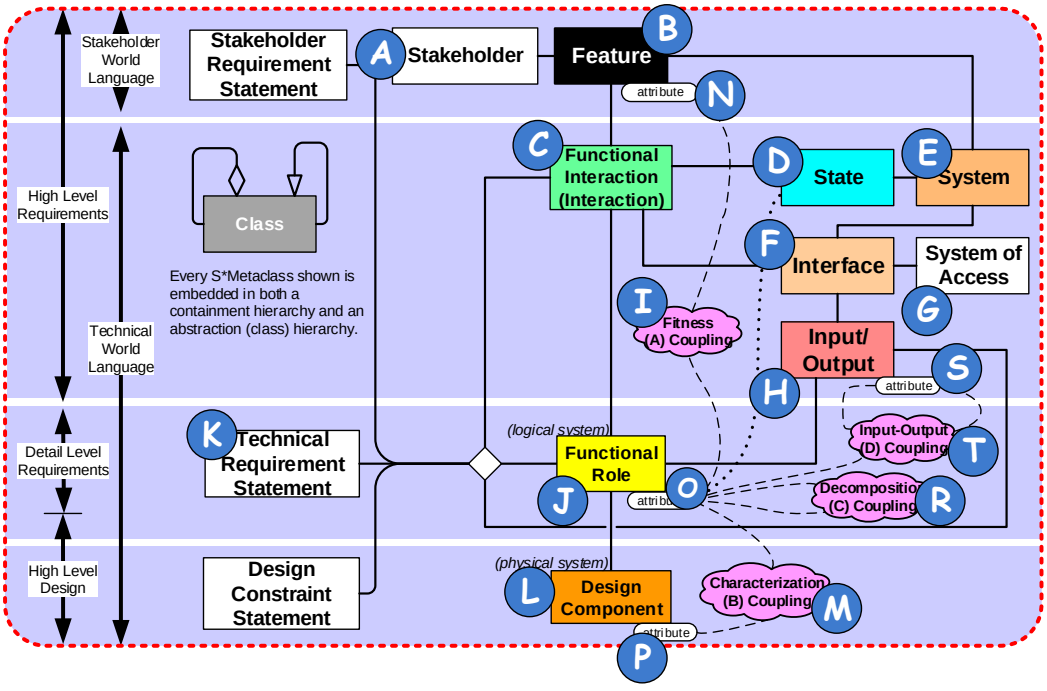
**Figure 2: Mapping Model Scope**




## 3.1 Mapping Summaries

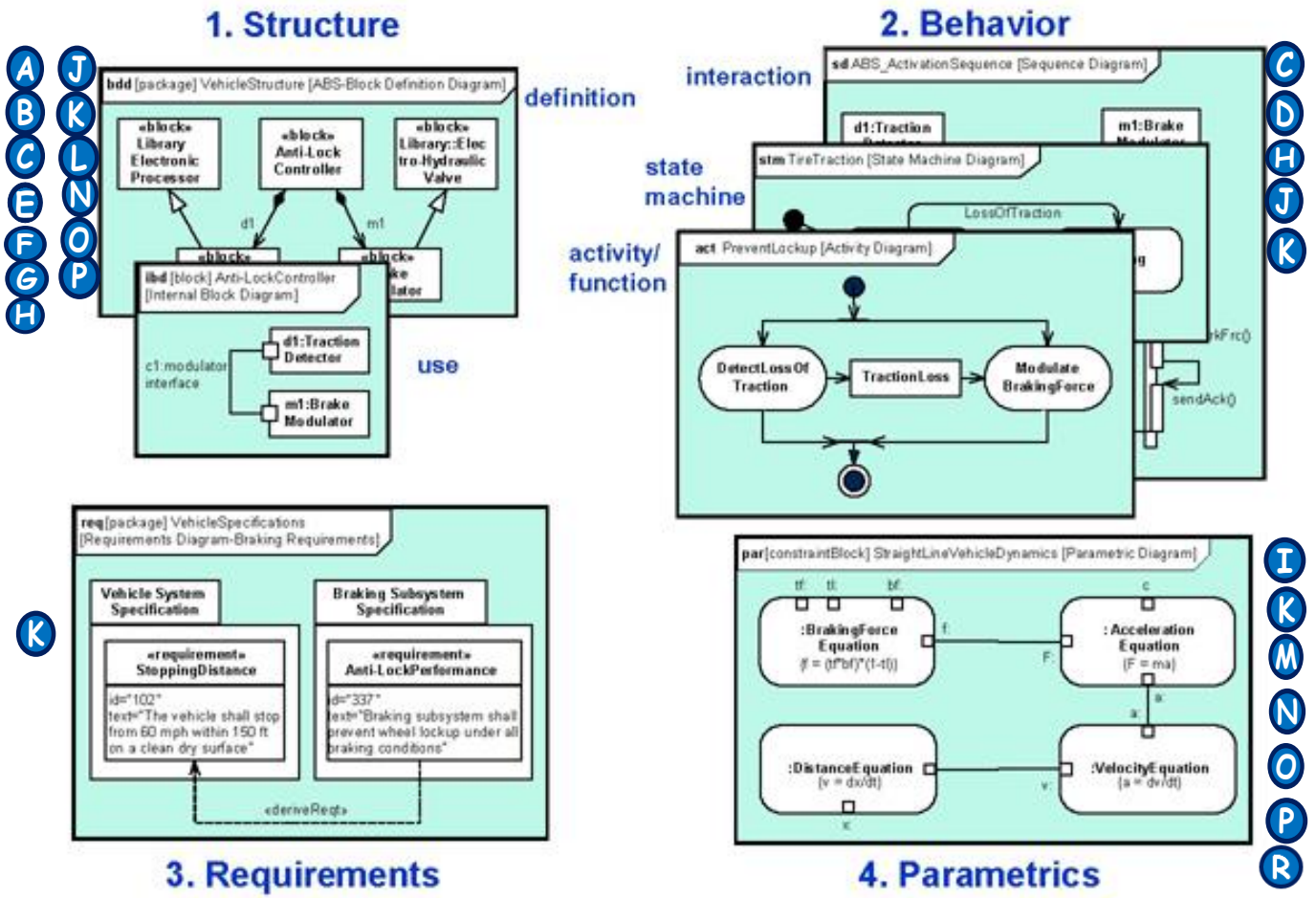
The mapping for using OMG SysML with Systematica can be summarized by the following mapping between the Summary S*Metamodel Diagram and the SysML Mapping Overview Diagram.

**Figure 3: Systematica Summary Meta-Model Diagram**




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**Figure 4: Systematica OMG SysML Mapping Overview Diagram**




Note that the Package and Use Case diagrams are not shown in this example, but are respectively part of the structure and behavior pillars

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A summary Systematica Metamodel mapping to OMG SysML is described by the following table including a legend for the letters shown in Figure 4 above:

| Mapping Letter | Systematica Metamodel Element | SysML Element Type |
|---|---|---|
| A | Stakeholder | Block with «Stakeholder» stereotype |
| B | Feature | Block with «Feature» stereotype |
| C | Functional Interaction (Interaction) | Activity with «Functional Interaction» stereotype |
| D | State | State with «State» stereotype |
| E | System | Block with «Logical System» stereotype |
| F | Interface | Proxy Port with «ifc port» stereotype typed by an Interface Block with an «Interface Definition» stereotype |
| G | System of Access | Block with «System of Access» stereotype |
| H | Input/Output | itemFlow that conveys a Classifier with an «Input_Output Definition» stereotype |
| I | Fitness (A) Couplings | Constraint Block with «Fitness Coupling» stereotype |
| J | Functional Role | Block with «Logical System» stereotype being referenced by an Interaction via a shared aggregation relationship with «Has Role» stereotype. |
| K | Requirement Statement | Requirement with «Requirement Statement» stereotype |
| L | Design Component | Block with «Design Component» stereotype |
| M | Characterization (B) Couplings | Constraint Block with «Characterization Coupling» stereotype |
| N | Feature Attribute | Attribute with «Feature Primary Key» or «Feature Attribute» stereotypes |
| O | Role Attribute | Attribute with «Logical System Attribute» stereotype |
| P | Design Component Attribute | Attribute with «Design Component Attribute» stereotype |
| R | Decomposition (C) Matrix Couplings | Constraint Block with «Decomposition Coupling» stereotype |
| S | IO Attribute | Attribute with «IO Attribute» stereotype |
| T | Input-Output (D) Coupling | Constraint Block with «Input Output Coupling» stereotype |

## *3.2 High Level Mapping Strategy*

The mapping was constrained to only map the classes and relationships of the S*Metamodel. The Systematica Process Views and Transactions are not mapped in this document.

The main mapping choices consisted of:

- Mapping most S* classes and relationships to standard SysML elements staying as close to the intended use of each SysML element as possible,
- Systematica Configured Model classes are mapped to SysML classes whose generalizations are the Systematica Pattern classes,
- Where no standard SysML element matches a Systematica class, a SysML “block” is used with a specialized stereotype,
- Where no standard SysML relationship matches a Systematica relationship, a SysML “dependency” is used with a specialized stereotype,
- Required, Capability, Baseline, Best In Class, or other value types of each Modeled Attribute are mapped to tags of those Modeled Attributes,

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- To allow for possible use of SysML Activity Diagrams, SysML Activities are used to model parts of S* Interaction-Role-Requirement relationships and classes even if no diagram is actually drawn,
- S* Architectural Relationships have been bifurcated into simple and reified cases for mapping. In the simple case, it is mapped to the Association relationship between systems and given an Architectural Relationship stereotype. This is a natural fit for the simple case because SysML associations are restricted to only 2 roles. In the reified case, which involves more than 2 roles, it is mapped to a block with Architectural Relationship Definition. That block is then able to participate in dependency relationships with the N number of Architectural Relationship Roles.
- Using SysML classes instead of parts or properties to model components and referenced classes. The components are modeled under the container's namespace and also participate in a composition with the container. This results in minimal use of the parts that occur from the association because Systematica emphasizes that a class is defined by its relationships across all of its uses as opposed to a class being defined as a library entity with independent contextual references.

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# 4 Detail Mapping

## *4.1 S*Metaclass Mapping Details*

The Systematica Class mappings to SysML is detailed by the following table:

| Systematica Modeled Class Name | SysML Element |
|---|---|
| Allowed Value | Block with «Allowed Value» stereotype |
| Architectural Relationship | Simple: Name of the Association relationship between systems with «architectural relationship» stereotype;<br>Reified: Block with «Architectural Relationship Definition» stereotype |
| Architectural Relationship Role | Simple: Association Target and Source Roles;<br>Reified: Dependency with «Has AR Role» stereotype |
| Attribute Coupling | Constraint Block with «Attribute Coupling» stereotype |
| Attribute Coupling Map | Constraint of a Constraint Block, Artifact referenced or linked to by Constraint |
| Attribute Role | Parameter of Constraint Blocks |
| Class | This is a superclass of other Metaclasses and is not mapped. |
| Counter Requirement | Requirement with «Counter Requirement» stereotype |
| Design Component | Block with «Design Component» stereotype |
| Design Component Attribute Role | Parameter of Constraint Blocks |
| Design Constraint | Requirement with «Design Constraint» stereotype |
| Design Constraint Statement | Requirement with «Design Constraint» stereotype |
| Design Coupling | Constraint Block with «Characterization Coupling» stereotype. |
| Design Coupling Map | Constraint within Constraint Block, Artifact referenced or linked to by Constraint |
| Domain | Block with «Domain» stereotype |
| Domain System | Block with «Logical System» stereotype aggregated within a Domain |
| Event | Trigger with «Event» stereotype |
| Failure Impact | Block with «Failure Impact» stereotype |
| Failure Mode | State with «Failure Mode» stereotype |
| Failure Mode Context Element | Block with «Failure Mode Context Element» stereotype |
| Feature | Block with «Feature» stereotype |
| Feature Attribute Role | Parameters of Constraint Blocks |
| Functional Interaction | Activity Block with «Functional Interaction» stereotype. |
| Functional Role | Block with «Logical System» stereotype and in Aggregation relationship with «Has Role» stereotype with Interaction Activity Block |

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| Systematica Modeled Class Name | SysML Element |
|---|---|
| Information Input-Output | itemFlow that conveys a Classifier with an «Input_Output Definition» stereotype |
| Input-Output | itemFlow that conveys a Classifier with an «Input_Output Definition» stereotype |
| Input-Output Attribute Role | Parameter of Constraint Blocks |
| Input-Output Coupling | Constraint Block with «IO Coupling» stereotype. |
| Input-Output Coupling Map | Constraint within Constraint Block, Artifact referenced or linked to by Constraint |
| Input Role | Action Pin on an Activity modeling a Requirement Relationship |
| Interface | Proxy Port with «ifc port» stereotype typed by an Interface Block with an «Interface Definition» stereotype |
| Interface Element | Block with «Interface Element» stereotype. |
| Logical System | Block with «Logical System» stereotype |
| Logical System (Advocate) | Logical System Block with «Advocate» stereotype that only participates in advocate-type relationships |
| Logical System (Stakeholder) | Logical System Block with «Stakeholder» stereotype that only participates in stakeholder-type relationships |
| Modeled Attribute (Feature Attribute) | Attribute with «Feature Attribute» or «Feature Primary Key» stereotypes |
| Modeled Attribute (IO Attribute) | Attribute with «IO Attribute» stereotype |
| Modeled Attribute (Physical System Attribute) | Attribute with «Physical System Attribute» stereotype |
| Modeled Attribute (Role Attribute) | Attribute with «Logical System Attribute» stereotype |
| Modeled Relationship | This is a superclass of other meta-classes and is not mapped. |
| Modeled Relationship Role | This is a superclass of other meta-classes and is not mapped. |
| Modeled Statement | This is a superclass of other meta-classes and is not mapped. |
| Output Role | Action Pin on an Activity modeling a Requirement Relationship |
| Physical Input-Output | itemFlow that conveys a Classifier with an «Input_Output Definition» stereotype |
| Port | Flow Property with «Input Output» stereotype. |
| Rationale | «allocate» dependency |
| Requirements Coupling | Constraint Block with «Fitness Coupling», «Decomposition Coupling», or «Input Output Coupling» stereotype |
| Requirements Coupling Map | Constraint within Constraint Block, Artifact referenced or linked to by Constraint |
| Requirement Transfer Function | Activity with «Requirement Transfer Function» stereotype |
| Requirement Statement | Requirement «Requirement Statement» stereotype |

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| Systematica Modeled Class Name | SysML Element |
|---|---|
| Role Attribute Role | Parameter of Constraint Blocks |
| Stakeholder Requirement | Requirement with «Need» stereotype |
| State | State with «State» stereotype |
| System | Block with «Logical System» stereotype. |
| System of Access (SOA) | Logical System block with «System of Access» stereotype. |
| Transition | SysML Transition with «Systematica Transition» stereotype. |
| Value | Required, Capability, Baseline, Best In Class, or other value types of each Modeled Attribute are mapped to tags of those Modeled Attributes |

## *4.2 S*Metarelationship Mapping Details*

The S*Metarelationship mappings to SysML can be summarized by the following table:

| Systematica Modeled Relationship Name | SysML Relationship | Source Class (mapped SysML element) | Target Class (mapped SysML element) |
|---|---|---|---|
| Advocates | Dependency with «Advocated_By (N-ADV)» stereotype | Logical System Block with «Advocate» stereotype that only participates in advocate-type relationships | Requirement with «Need» stereotype |
| Abnormal State Of | Dependency with «Abnormal State Of» stereotype | State with «Failure Mode» stereotype | Block with «Design Component» stereotype |
| Allocated To (Design Component-Functional Role) | Association with «Functional Role Allocation» stereotype for LS-DC | Block with «Logical System» stereotype | Block with «Design Component» stereotype |
| Allocated To (Modeled Attribute-Attribute Role) | Binding Connection for Attribute-Constraint Property or connection between Flow -Action Pin | Parameter of Constraint Blocks | Attribute with «Feature Attribute» or «Feature Primary Key» or «IO Attribute» or «Logical System Attribute» or «Physical System Attribute» stereotypes |

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| Systematica Modeled Relationship Name | SysML Relationship | Source Class (mapped SysML element) | Target Class (mapped SysML element) |
|---|---|---|---|
| Allocated To (Architectural Relationship Role-Functional Role) | The trace between a System and the end of a Connector that conveys «Architectural Relationship Definition» items, sometimes indirectly through an Interface port | Block with «Logical System» stereotype | Simple: Association Target and Source Roles;<br>Reified: Dependency with «Has AR Role» stereotype |
| Appears In | Aggregation between Domain and other classes represented as Blocks. | Any mapped S* class | Block with «Domain» stereotype |
| Benefits | Dependency with «Benefits (FTR-STK)» stereotype | Logical System Block with «Stakeholder» stereotype that only participates in stakeholder-type relationships | Block with «Feature» stereotype |
| Can Have Value | Dependency with «Can Have Value» stereotype | Attribute with «Feature Attribute» or «Feature Primary Key» or «IO Attribute» or «Logical System Attribute» or «Physical System Attribute» stereotypes | Block with «Allowed Value» stereotype |
| Causes Behavior | Dependency with «Causes Behavior» stereotype | State with «Failure Mode» stereotype | Requirement with «Counter Requirement» stereotype |
| Causes Impact | Dependency with «Causes Impact» stereotype | Requirement with «Counter Requirement» stereotype | Block with «Failure Impact» stereotype |
| Contains | Composition | Any mapped S* class | Any mapped S* class |
| Derived From | «trace» dependency | Any mapped S* class | Any mapped S* class |

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| Systematica Modeled Relationship Name | SysML Relationship | Source Class (mapped SysML element) | Target Class (mapped SysML element) |
|---|---|---|---|
| Emerges From | Dependency with «Resolves (IO-AR)» stereotype | Simple: Name of the Association relationship between systems with «architectural relationship» stereotype;<br>Reified: Block with «Architectural Relationship Definition» stereotype | itemFlow that conveys a Classifier with an «Input_Output Definition» stereotype |
| Exemplifies | Dependency with «Exemplified By (AR-IO)» stereotype | itemFlow that conveys a Classifier with an «Input_Output Definition» stereotype | Simple: Name of the Association relationship between systems with «architectural relationship» stereotype;<br>Reified: Block with «Architectural Relationship Definition» stereotype |
| Groups | «Input Output» flow property owned by «Interface Definition» interface block | Proxy Port with «ifc port» stereotype typed by an Interface Block with an «Interface Definition» stereotype | Flow Property with «Input Output» stereotype. |
| Has Advocate | Dependency with «Represents (ADV-STK)» stereotype | Logical System Block with «Stakeholder» stereotype that only participates in stakeholder-type relationships | Logical System Block with «Advocate» stereotype that only participates in advocate-type relationships |
| Has Attribute | Block-Block Attribute SysML relationship | Block with «Feature» stereotype | Attribute with «Feature Attribute» or «Feature Primary Key» stereotypes |

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| Systematica Modeled Relationship Name | SysML Relationship | Source Class (mapped SysML element) | Target Class (mapped SysML element) |
|---|---|---|---|
| Has Attribute | Block-Block Attribute SysML relationship | Block with «Design Component» stereotype | Attribute with «Physical System Attribute» stereotype |
| Has Attribute | Block-Block Attribute SysML relationship | Block with «Logical System» stereotype | Attribute with «Logical System Attribute» stereotype |
| Has Feature | Dependency with «Offered By (FT-SYS)» stereotype | Block with «Logical System» stereotype | Block with «Feature» stereotype |
| Has Previous | MagicDraw/CSM Configuration Management options | Any mapped S* class | Any mapped S* class |
| Has Role (Functional Role-Interaction) | Aggregation with «Has Role» stereotype between Interaction and Functional Role | Activity Block with «Functional Interaction» stereotype. | Block with «Logical System» stereotype |
| Has Role (Attribute Coupling-Attribute Role) | Constraint Block-Property composition | Constraint Block with «Attribute Coupling» stereotype | Parameter of Constraint Blocks |
| Has Role (Requirement Transfer Function-Input Role/Output Role) | Activity-Action Pin composition | Activity with «Requirement Transfer Function» stereotype | Action Pin on an Activity modeling a Requirement Relationship |

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| Systematica Modeled Relationship Name | SysML Relationship | Source Class (mapped SysML element) | Target Class (mapped SysML element) |
|---|---|---|---|
| Has Role (Architectural Relationship-Architectural Relationship Role) | Connector-Connector End relationship | Simple: Name of the Association relationship between systems with «architectural relationship» stereotype;<br>Reified: Block with «Architectural Relationship Definition» stereotype | Simple: Association Target and Source Roles;<br>Reified: Dependency with «Has AR Role» stereotype |
| Has Stakeholder | Dependency with «Serves (LS-STK)» stereotype | Block with «Logical System» stereotype | Logical System Block with «Stakeholder» stereotype that only participates in stakeholder-type relationships |
| Has State | Dependency with «Chronicles (ST-LS)» stereotype | Block with «Logical System» stereotype | State with «State» stereotype |
| Has Subject | Aggregation with stereotype «Has Subject» | Block with «Domain» stereotype | Block with «Logical System» stereotype |
| Has Value | value property's-tag value relationship | Attribute with «Feature Attribute» or «Feature Primary Key» or «IO Attribute» or «Logical System Attribute» or «Physical System Attribute» stereotypes | Required, Capability, Baseline, Best In Class, or other value types of each Modeled Attribute are mapped to tags of those Modeled Attributes |
| Has View (Requirement Transfer Function-Requirement Statement) | Dependency with «Satisfy» stereotype | Activity with «Requirement Transfer Function» stereotype | Requirement «Requirement Statement» stereotype |

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| Systematica Modeled Relationship Name | SysML Relationship | Source Class (mapped SysML element) | Target Class (mapped SysML element) |
|---|---|---|---|
| Has View (Requirement Transfer Function-IO Coupling) | Dependency with «Is Specified By (RTF-IO CPL)» between Requirement Transfer Function activity block and IO Attribute Coupling constraint block. | Activity with «Requirement Transfer Function» stereotype | Constraint Block with «IO Coupling» stereotype. |
| Impacts Feature | Dependency with «Impacts Feature» stereotype | Block with «Failure Impact» stereotype | Block with «Feature» stereotype |
| Interacts Through | «System»-«ifc port»-«Input Output» or «System»-«Input Output» containment/nesting | Block with «Logical System» stereotype | Flow Property with «Input Output» stereotype. |
| Is A Type Of | Generalization | Any mapped S* class | Any mapped S* class of same type |
| Is A Type Of (Pattern Element-Configured Element) | Dependency with «Is Configuration Of» stereotype indicates pattern sources of configured model classes | Any mapped S* Pattern class | Any mapped S* Configured Model class |
| Is Constrained By | «specifies» dependency between Design Constraint and other classes | Block with «Design Component» stereotype | Requirement with «Design Constraint» stereotype |
| Is Facilitated By Externally | «Facilitated By (Port-SOA)» dependency | Flow Property with «Input Output» stereotype. | Logical System block with «System of Access» stereotype. |
| Is Facilitated By Internally | «Facilitated By (Port-SOA)» dependency | Flow Property with «Input Output» stereotype. | Logical System block with «System of Access» stereotype. |

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| Systematica Modeled Relationship Name | SysML Relationship | Source Class (mapped SysML element) | Target Class (mapped SysML element) |
|---|---|---|---|
| Is Linked By Externally | Dependency with «Resolves (Port-AR)» stereotype | Flow Property with «Input Output» stereotype. | Simple: Name of the Association relationship between systems with «architectural relationship» stereotype;<br>Reified: Block with «Architectural Relationship Definition» stereotype |
| Is Linked By Internally | Dependency with «Resolves (Port-AR)» stereotype | Flow Property with «Input Output» stereotype. | Simple: Name of the Association relationship between systems with «architectural relationship» stereotype;<br>Reified: Block with «Architectural Relationship Definition» stereotype |
| Is Specified By | «allocate» dependency from «Requirement Transfer Function» activity block to Logical System block | Block with «Logical System» stereotype | Activity with «Requirement Transfer Function» stereotype |
| Is Triggered By | SysML transition-trigger association | itemFlow that conveys a Classifier with an «Input_Output Definition» stereotype | Trigger with «Event» stereotype |
| Is Used During | Abstraction with «Is Used During (IO-FI)» stereotype | Flow Property with «Input Output» stereotype. | Activity Block with «Functional Interaction» stereotype. |

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| Systematica Modeled Relationship Name | SysML Relationship | Source Class (mapped SysML element) | Target Class (mapped SysML element) |
|---|---|---|---|
| Perceives | Dependency with «Perceived By (N-STK)» stereotype | Logical System Block with «Stakeholder» stereotype that only participates in stakeholder-type relationships | Requirement with «Need» stereotype |
| Permits Architectural Relationship | Ownership between an Interface block with «Interface Definition» stereotype that owns a flow property with «Architectural Relationship» stereotype | Proxy Port with «ifc port» stereotype typed by an Interface Block with an «Interface Definition» stereotype | Simple: Name of the Association relationship between systems with «architectural relationship» stereotype;<br>Reified: Block with «Architectural Relationship Definition» stereotype |
| Permits Functional Interaction | Dependency with «Permits FI (IFC-FI)» stereotype | Proxy Port with «ifc port» stereotype typed by an Interface Block with an «Interface Definition» stereotype | Activity Block with «Functional Interaction» stereotype. |
| Permits Input-Output | Ownership between an Interface block with «Interface Definition» stereotype that owns a flow property with «Input Output» stereotype | Proxy Port with «ifc port» stereotype typed by an Interface Block with an «Interface Definition» stereotype | itemFlow that conveys a Classifier with an «Input_Output Definition» stereotype |
| Permits SOA | Dependency with «Permits SOA (IFC-SOA») stereotype | Proxy Port with «ifc port» stereotype typed by an Interface Block with an «Interface Definition» stereotype | Logical System block with «System of Access» stereotype. |
| Provides Failure Context | Dependency with «Provides Failure Context» stereotype | Block with «Failure Mode Context Element» stereotype | Activity Block with «Functional Interaction» stereotype. |

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| Systematica Modeled Relationship Name | SysML Relationship | Source Class (mapped SysML element) | Target Class (mapped SysML element) |
|---|---|---|---|
| Provides Failure Mode Context | Dependency with «Provides Failure Mode Context» stereotype | Block with «Failure Mode Context Element» stereotype | State with «Failure Mode» stereotype |
| Provides Context | Interaction activity owning a Requirement Transfer Function activity block | Activity Block with «Functional Interaction» stereotype. | Activity with «Requirement Transfer Function» stereotype |
| Provides Interface | Owns relationship between Block and Proxy Port with «ifc_port» stereotype, then follow Proxy Port type definition to Interface Block with «Interface Definition» stereotype | Block with «Logical System» stereotype | Proxy Port with «ifc port» stereotype typed by an Interface Block with an «Interface Definition» stereotype |
| Receives | The trace from a Flow Property with «Input Output» stereotype with an in setting to its owning proxy port with «ifc_port» stereotype to an itemFlow whose conveyed classifier is the same type as the Flow Property itself. | Flow Property with «Input Output» stereotype. | itemFlow that conveys a Classifier with an «Input_Output Definition» stereotype |
| Relates AR | Dependency with «AR-IE» Stereotype | Simple: Name of the Association relationship between systems with «architectural relationship» stereotype;<br>Reified: Block with «Architectural Relationship Definition» stereotype | Block with «Interface Element» stereotype. |
| Relates FI | Dependency with «FI-IE» Stereotype | Activity Block with «Functional Interaction» stereotype. | Block with «Interface Element» stereotype. |

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| Systematica Modeled Relationship Name | SysML Relationship | Source Class (mapped SysML element) | Target Class (mapped SysML element) |
|---|---|---|---|
| Relates IO | Dependency with «IO-IE» Stereotype | itemFlow that conveys a Classifier with an «Input_Output Definition» stereotype | Block with «Interface Element» stereotype. |
| Relates Sys | Dependency with «LS-IE» Stereotype | Block with «Logical System» stereotype | Block with «Interface Element» stereotype. |
| Replaces | Dependency with «Replaces» Stereotype | Requirement with «Counter Requirement» stereotype | Requirement «Requirement Statement» stereotype |
| Requires | «Abstraction» dependency from a State to Functional Interaction | State with «State» stereotype | Activity Block with «Functional Interaction» stereotype. |
| Satisfies | Dependency with «Satisfies (FT-N)» stereotype | Requirement with «Need» stereotype | Block with «Feature» stereotype |
| Sends | The trace from a Flow Property with an out setting with «Input Output» stereotype to its owning proxy port with «ifc_port» stereotype to an itemFlow whose conveyed classifier is the same type as the flow property itself. | Flow Property with «Input Output» stereotype. | itemFlow that conveys a Classifier with an «Input_Output Definition» stereotype |
| Transitions From | SysML state-transition relationship | SysML Transition with «Systematica Transition» stereotype. | State with «State» stereotype |
| Transitions To | SysML state-transition relationship | SysML Transition with «Systematica Transition» stereotype. | State with «State» stereotype |
| Uses_Functional_Interaction | Aggregation with «Uses Functional Interaction» stereotype | Block with «Feature» stereotype | Activity Block with «Functional Interaction» stereotype. |

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## 4.3 S* Attribute Mapping Details

This section of the mapping document maps Systematica Attributes of metaclasses and metarelationships, including specific pattern configuration rule attributes and common core attributes, into SysML properties, usually tags. Additionally, this section indicates which SysML element owns those properties. This section does not map the Systematica element to the SysML element. The details of those mappings are in Sections 1 and 2 and may differ from what is shown here, when an attribute is not mapped to the same owner that its metamodel owner is mapped to.

| Systematica Attributes | Attribute Owner Systematica Metamodel Element | SysML Properties | Property Owner SysML Element |
|---|---|---|---|
| Interaction Population Rule | Uses Functional Interaction (Relationship) | "FPK Value" tag | Aggregation with «Uses Functional Interaction» stereotype |
| Interaction PK Value Rule | | "IPK Rule" tag | |
| | | | |
| Role Population Rule | Has Role (Relationship) | "IPK Value" tag | Aggregation with «Has Role» stereotype |
| Role PK Value Rule | | "RPK Rule" tag | |
| | | | |
| Design Component Population Rule | Allocated To (Relationship) | "Configuration Rule" tag | Aggregation with «Functional Role Allocation» stereotype |
| Design Component PK Value Rule | | "IPPK Value" tag | |
| | | | |
| Requirement Population Rule-Interaction | Requirement Transfer Function (Class) | "IPK Rule" tag | Class with «Requirement Statement» stereotype |
| Requirement Population Rule-Role | | "RPK Rule" tag | |
| Requirement Statement PK Value Rule | | "RSPK Rule" tag | |
| | | | |
| State Population Rule-Interaction | Requires (Relationship) | "IPK" tag | Abstraction with «Requires» stereotype |
| State Population Rule-Role | | "RPK" tag | |
| State PK Value Rule | | "State PK Value Rule" tag | |

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| Systematica Attributes | Attribute Owner Systematica Metamodel Element | SysML Properties | Property Owner SysML Element |
|---|---|---|---|
| State Type | | "State Type" tag | |
| | | | |
| From State PK Matching Rule | Transition (Class) | "From State PK Matching Rule" tag | Transition with «Systematica Transition» stereotype |
| To State PK Matching Rule | | "To State PK Matching Rule" tag | |
| Transition PK Value Rule | | "Transition PK Value Rule" tag | |
| Transition Type | | "Transition Type" tag | |
| | | | |
| From State PK Matching Rule | Provides Event Context (Relationship) | "From State PK Matching Rule" tag | Transition with «Systematica Transition» stereotype |
| To State PK Matching Rule | | "To State PK Matching Rule" tag | |
| Event PK Value Rule | | "Event PK Value Rule" tag | |
| | | | |
| Interface Primary Key Value Rule | Interface Element Relationship (Class) | "Interface PK Rule" tag | Flow Property with «Input Output» stereotype. |
| IO Primary Key Value Rule | | "IO PK Rule" tag | |
| Port Primary Key Value Rule | | "Port PK Rule" tag | |
| SOA Primary Key Value Rule | | "SOA PK Rule" tag | |
| SOA Internal/External | | "SOA Internal or External" tag | |
| IO Direction | | "Direction" tag | SysML Flow Property |
| **Reified Architectural Relationships** | | | |
| AR Primary Key Value Rule | Interface Element Relationship (Class) | "AR Primary Key Value Rule" tag | Dependency with «Has AR Role» stereotype |
| AR Role Primary Key Value Rule | | "AR Role Primary Key Value Rule" tag | |
| AR Internal/External | | "AR Internal/External" tag | |
| AR Complexity | | "AR Complexity" tag | |
| **Simple Architectural Relationships** | | | |
| AR Primary Key Value Rule | Interface Element Relationship (Class) | "AR Primary Key Value Rule" tag | |

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| Systematica Attributes | Attribute Owner Systematica Metamodel Element | SysML Properties | Property Owner SysML Element |
|---|---|---|---|
| AR Internal/External | | "AR Internal/External" tag | Item Flow with «AR Item Flow» stereotype |
| AR Complexity | | "AR Complexity" tag | |
| | | | |
| Failure Impact Population Rule | Impacts Feature | "Feature PK Value Rule" tag | Dependency with «Impacts Feature» stereotype |
| Failure Impact Primary Key Value Rule | | "Failure Impact PK Value Rule" tag | |
| Counter Requirement Population Rule | Replaces | "RSPK Value Rule" tag | Dependency with «Replaces» Stereotype |
| Counter Requirement Primary Key Value Rule | | "Counter Requirement PK Value Rule" tag | |
| Failure Mode Population Rule | Abnormal State Of | "DCPK Value Rule" tag | Dependency with «Abnormal State Of» stereotype |
| Failure Mode Primary Key Value Rule | | "FMPK Value Rule" tag | |
| | | | |
| Author | All metaclasses and metarelationships | Not mapped | |
| Change Date | | Not mapped | |
| Change Description | | Documentation/Comments | Element |
| Class Level | | Not mapped | |
| Definition | | Definition | Element |
| ID | | Element ID | Element |
| Major Version | | Not mapped | |
| Minor Version | | Not mapped | |
| Name | | Name | Element |
| Organization Owner | | Not mapped | |
| Owner | | Owner | Element |
| Status | | Status | Element |
| Update Version | | Not mapped | |

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