Enterprise Architect

User Guide Series

Software & Systems Process Engineering Meta-Model (SPEM)

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Date: 2025-05-06
Version: 17.1

CREATED WITH ENTERPRISE ARCHITECT

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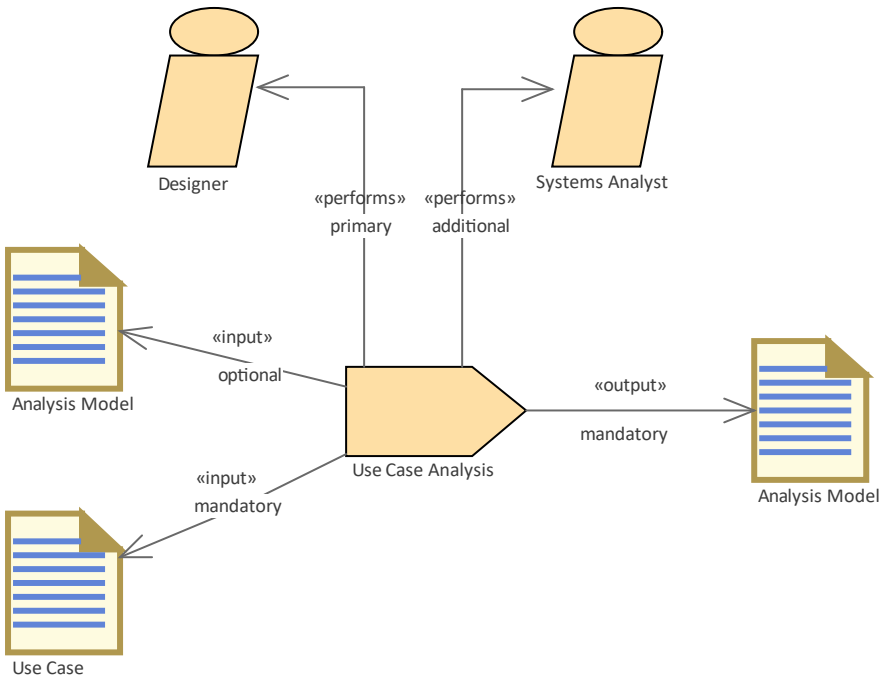
Software & Systems Process Engineering Meta-Model (SPEM)

Create Expressive Process Meta-models for Software and Systems Engineering Projects

You can create models of your software or system engineering processes to facilitate reuse and precision in the execution of projects in these disciplines. The process models that you define with the Software Process Engineering Metamodel (SPEM) are, as the name implies, meta-models. When you run a project the process model that is executed is an instantiation of the meta-model.

The main purpose of process models is to specify, describe and communicate processes to the stakeholders including all the analysts, architects and engineers engaged on a specific project and to ensure consistency between projects. The SPEM models can also be used for teaching and training purposes to ensure workers have a clear idea of the Activities, Tasks, Milestones and Work Products they need to produce as the process executes for a specific project. The use of process meta-models results in increased productivity of process engineers and an improved quality of the models they produce and in turn the systems that they develop or implement. Metrics can also be created to amend, elaborate and calibrate the process meat-models to ensure they continue to be fit for purpose.



SPEM model showing the key performers and input and output parameters for a Use Case Analysis task.

Access

Show the Diagram Toolbox using any of the methods outlined here.

On the Diagram Toolbox, click on to display the 'Find Toolbox Item' dialog and specify 'SPEM'.

Ribbon	Design > Diagram > Toolbox
Keyboard Shortcuts	Ctrl+Shift+3
Other	Click the » icon on the Diagram caption bar to display the Diagram Toolbox

SPEM Integration

Use	Discussion
SPEM in Enterprise Architect	Developing SPEM diagrams is quick and simple, using the SPEM 2.0 UML profile. The SPEM facilities are provided in the form of: • A SPEM diagram type, accessed through the 'New Diagram' dialog • A set of SPEM pages in the Diagram Toolbox, providing SPEM elements (stereotyped UML elements) • SPEM element and relationship entries in the 'Toolbox Shortcut Menu' and Quick Linker

Getting Started

SPEM 2.0 is one of the modeling tools integrated with Enterprise Architect.

"The Software and Systems Process Engineering Metamodel (SPEM) is a process engineering meta-model as well as conceptual framework, which can provide the necessary concepts for modeling, documenting, presenting, managing, interchanging, and enacting development methods and processes. An implementation of this meta-model would be targeted at process engineers, project leads, project and program managers who are responsible for maintaining and implementing processes for their development organizations or individual projects."

(Quoted from the Object Management Group (OMG) Software & Systems Process Engineering Meta-Model Specification (Version 2.0, April 01 2008))

SPEM is a Profile of UML, which uses UML as a notation and takes an object-oriented approach. To accommodate UML 2, the SPEM specification was upgraded to 2.0 in April 2008. SPEM 2.0 focuses on providing the additional information structures that you require for processes modeled with UML 2 Activities or BPMN/BPDM, to describe an actual development process.

Selecting the Perspective

Enterprise Architect partitions the tool's extensive features into Perspectives, which ensures that you can focus on a

specific task and work with the tools you need without the distraction of other features. To work with the Software & Systems Process Engineering Meta-Model you first need to select the Perspective:

<perspective name> > Management > SPEM

Setting the Perspective ensures that the SPEM diagrams, their tool boxes and other features of the Perspective will be available by default.

Example Diagram

An example diagram provides a visual introduction to the topic and allows you to see some of the important elements and connectors that are created in specifying or describing a Software or System Engineering method or process including: Process Activities, Milestones, Team Profiles, Work Product Definitions, Steps, Tool and Task Definitions Guidance Metrics and more.

Language Overview

This topic introduces you to the main concepts of the language including its structure, architecture and the elements and connectors that are used to create SPEM models.

Toolbox Pages

The Toolbox pages contain the palette of elements and connectors that can be used to create software or system process engineering metamodels. When you create a process metamodel you will use these items to create drawings of the process you are defining.

More Information

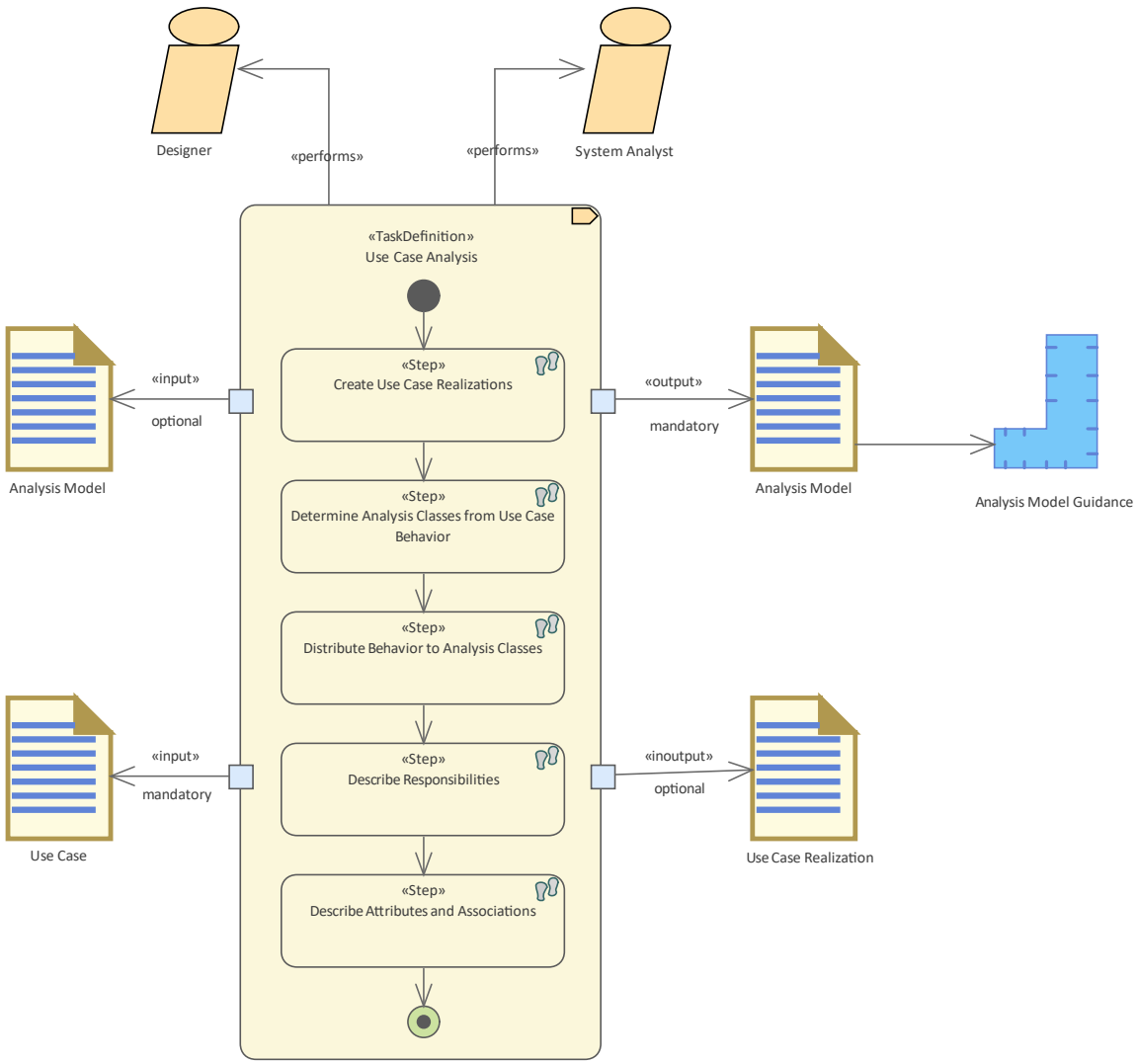
This section provides useful links to other topics and resources that you might find useful when working with the Software & Systems Process Engineering Meta-Model tool features.

Example Diagram

You can model the development processes underpinning software and business process modeling using SPEM diagrams, and the wide range of specialized elements and connectors provided in the 'SPEM' pages of the Diagram Toolbox.

Example Diagram

SPEM diagrams allow you to visualize a software or system engineering process and communicate the details of the process to your team members. In this example diagram the steps required for Use Case Analysis have been defined and the inputs and outputs to the Task Definition are shown using Work Product Ports. Guidance for the Analysis Model has also been included to indicate that there is information to assist the performers with this Work Product.



SPEM Element appearance

Every SPEM stereotype can be presented in one of two ways:

- Iconic presentation, where the shape is the object's icon (as shown for Designer, which has the Role Definition icon shape), or
- Textual presentation, where the shape is a rectangular outline with the object's icon as a decoration in the top right corner (as shown for SPEM_TaskDefinition)

To set the presentation format for an element, use the iconstyle Tagged Value. To use:

- Iconic presentation, set the iconstyle Tagged Value to True
- Textual presentation, set the Tagged Value to False

Access

Display the 'Diagram Builder' using any of the methods outlined in the table below. Then, in the 'Diagram Builder', click on the icon and choose the perspective 'Construction > SPEM'. In the 'Select From' panel, select 'SPEM' and then select the Diagram Type 'SPEM_DP'. Finally, click on 'Create Diagram' to create the new diagram.

Ribbon	Design > Diagram > Add Diagram
Context Menu	Browser window | Right-click on Package | New Diagram
Keyboard Shortcuts	
Other	Browser window header bar : | New Diagram

Language Overview

You will use the Software & Systems Process Engineering Meta-Model (SPEM) to define software and systems development processes and the components that they are made up of including: Activities, Tasks, Milestones and Work Products. The scope of SPEM is intentionally limited to the minimal elements necessary to define any software and systems development process. Features for particular development domains or disciplines (for example, Project Management, Analysis) have been deliberately excluded. The focus of SPEM is squarely set on development projects with the goal to create a facility useful for a large range of development methods and processes of different styles, cultural backgrounds, levels of formalism, life-cycle models, and communities.

SPEM is not a generic but rather a highly flexible process modeling language, and does not attempt to provide its own behavior modeling concepts. The language rather defines the ability for the implementer to choose the generic behavior modeling approach that best fits their needs. It also provides specific structures to enhance such generic behavior models that are characteristic for describing development processes. SPEM defines the additional elements and information structures that you need for engineering processes modeled with UML 2.0 Activities or BPMN/BPDM to describe a production development process. The SPEM 2.0 meta-model is structured into seven main meta-model packages.

The structure partitions the model into logical units. Each unit extends the elements it depends upon, and in turn provides additional structures and capabilities to the elements defined lower down in the structure. The UML Package merge mechanism is used to realize a gradual extension of the capabilities modeled unit by unit, effectively meaning the lower Packages are used for more specialized processes.

SPEM Toolbox Pages

The SPEM pages of the Diagram Toolbox provide a wide range of specialized elements and connectors for modeling development processes on SPEM diagrams. To create elements and relationships on a SPEM diagram, you can drag the appropriate icons from the Toolbox pages.

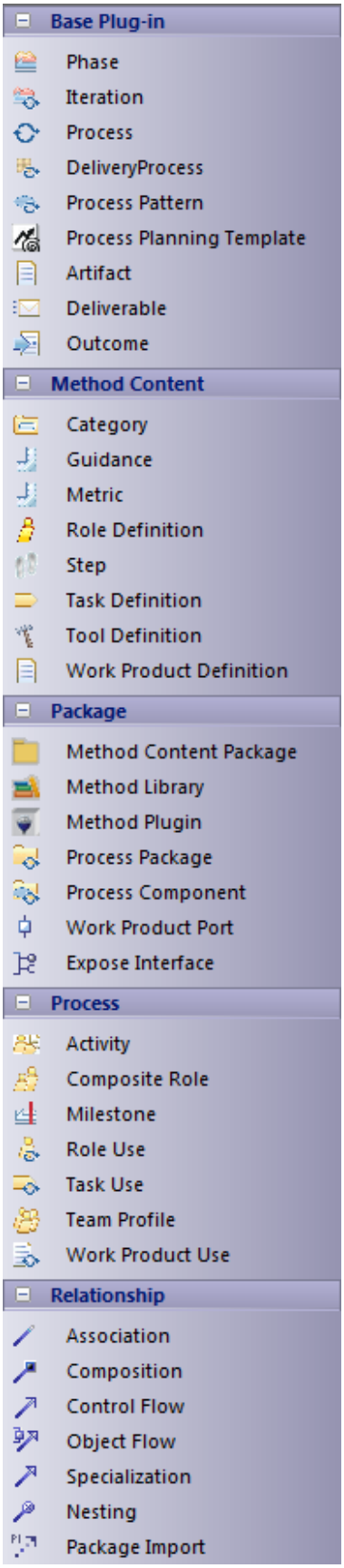
Access

Show the Diagram Toolbox using any of the methods outlined here.

On the Diagram Toolbox, click on to display the 'Find Toolbox Item' dialog and specify 'SPEM'.

Ribbon	Design > Diagram > Toolbox : to display the 'Find Toolbox Item' dialog and specify 'SPEM'
Keyboard Shortcuts	Ctrl+Shift+3 : | SPEM
Other	Click the icon on the Diagram caption bar to display the Diagram Toolbox

Toolbox Pages


Base Plug-in
Phase
Iteration
Process
DeliveryProcess
Process Pattern
Process Planning Template
Artifact
Deliverable
Outcome
Method Content
Category
Guidance
Metric
Role Definition
Step
Task Definition
Tool Definition
Work Product Definition
Package
Method Content Package
Method Library
Method Plugin
Process Package
Process Component
Work Product Port
Expose Interface
Process
Activity
Composite Role
Milestone
Role Use
Task Use
Team Profile
Work Product Use
Relationship
Association
Composition
Control Flow
Object Flow
Specialization
Nesting
Package Import

Each element and connector provided in the SPEM Toolbox pages is described in this table.

Base Plug-in Toolbox Page

Object	Action
Phase	Create a predefined special Activity representing a significant period in a project.
Iteration	Group a set of nested Activities that are repeated more than once. Typically, Iteration is an Activity for which the default value of the isRepeatable attribute is True.
Process	Represents a special Activity that describes a structure for particular types of development project, or parts of them.
Delivery Process	Represent a special Process describing a complete and integrated approach for implementing a specific project type.
Process Pattern	Represent a special Process to describe a reusable cluster of Activities in a general process area that provides a consistent

	development approach to common problems.
Process Planning Template	Represent a special Process that is prepared for instantiation by a project planning tool.
Artifact	Represent a Work Product Definition that provides a description and definition for tangible work product types.
Deliverable	Represent a Work Product Definition that provides a description and definition for packaging other Work Products, and that can be delivered to an internal or external party.
Outcome	Represent a Work Product Definition that provides a description and definition for non-tangible work products.

Method Content Toolbox Page

Object	Action
Category	Categorize content based on the user's criteria.

Guidance	Identify reference items such as Guidelines, Templates, Checklists, Tool Mentors, Estimates, Supporting Materials, Reports and Concepts.
Metric	Define a standard measurement for instances of Method Content elements.
Role Definition	Define a set of related skills, competencies, and responsibilities.
Step	Represent parts or subunits of a Task Definition.
Task Definition	Describe an assignable unit of work. Every Task Definition is assigned to specific Role Definitions. A Task is associated with input and output Work Products.
Tool Definition	Describe the tools that are recommended or necessary for completing a specific Task.
Work Product Definition	Define any forms of document, report or outcome that are consumed, produced or modified by Tasks.

Package Toolbox Page

Object	Action
Method Content Package	Create a physical container to organize the Method Content elements.
Method Library	Create an overall physical container for all SPEM 2.0 elements.
Method Plug-in	Create a physical container for Method Content Package and Process Packages. It can be used stand-alone as well as extended to many other Method Plug-ins.
Process Package	Create a physical container that contains different kinds of Process element.
Process Component	Offers the choice of creating a Process Component Package - a special type of Process Package that provides the mechanism of encapsulation - or a Process Component element.
Work Product Port	Defines the Work Products input and output for a Process Component. A Work

	Product Port identifies one type of Work Product for one Process Component, and defines whether the Work Product type is to be required (input) or supplied (output) by the Process Component, and whether this input or output is optional or not.
Expose Interface	Represents a required or supplied interface to identify the fact that the element provides or requires an interface. A small dialog displays on which you type or select the name of the interface and whether it is provided or required.

Process Toolbox Page

Object	Action
Activity	Define basic units of work within a Process as well as the Process itself.
Composite Role	Represent an aggregation of Role Definition references for an Activity.
Milestone	Represent any significant events in a development project.

Process	Create a special Activity that describes a structure for particular types of development project.
Role Use	Represent a Role Definition in the context of one specific Activity.
Task Use	Represent a Task Definition in the context of one specific Activity.
Team Profile	Define a nested hierarchy of teams and team members.
Work Product Use	Represent a Work Product Definition in the context of one specific Activity.

More Information