

19.0 LTR SP3 Version News

Magic Systems of Systems Architect

Released on: November 21, 2019

The 19.0 SP3 release comes with a new Resources to Capability mapping matrix improved BPMN compliance support, enhanced switching between perspectives and project conversion, and a convenient way to create Process Flow diagrams from a defined Process composition. Also, we implemented a number of Gantt Chart improvements, including highlighting Capabilities when their Sub Capabilities are removed, creating Legends, and some usability improvements.

The 19.0 SP3 release is packed with a number of new capabilities and improvements. Now you can export SysML models and diagrams to Simulink, Stateflow, S-functions, Simscape, and Modelica. Simulink and FMU models can be imported or updated using a new import dialog with optional ports and property selection. Other noteworthy features include contextualized relationships in diagrams and matrices, flows, ports and instances management enhancements, structural text copy/paste as nested structures in IBD and more.

Also the release adds significant improvements to existing features: 1) the **Product Line Engineering** plugin and **Suspect Links** are expanded by implementing new capabilities; 2) we have introduced a brand new **ISO 26262 Functional Safety Plugin**; 3) users can now create **Custom Hierarchy in Tables**; and finally, 4) the latest modeling tool version comes with bug fixes and many new enhancements to other features.

Collaborative modeling capabilities are extended with the main focus on work efficiency and agile modeling. The **Lock-Free model editing** mode and the **Disconnected Team Collaboration UI** are presented in this release. Additionally, other improvements have been made to enhance usability in **Merge, Change Sets, Hidden Packages**, and other collaboration-oriented features.

UAF Features

- **Methods and Standards**
 - Smart Perspectives
 - New Resources to Capability Mapping matrix
 - BPMN Compliance Mode improvements
- **Diagramming Improvements**
 - Top Capability display conditions
 - Easy Process Flow Diagrams Creation
 - Legends in Gantt Charts
- Usability Improvements

SysML Features

- SysML model transformation to Simulink and Modelica
- Simulink Import
- Contextual Relationships
- Flow Management Improvements
- Instance Improvements
- Other SysML features

Modeling and Infrastructure

- Model-Based Product Line Engineering
- ISO 26262 Functional Safety Plugin
- Custom Hierarchy in Tables
- Suspect Links
- Further Improvements

- **Collaboration**
- **Other Features**

Methods and Standards

Smart Perspectives

Switching between perspectives was significantly improved for this release. Now when you change the perspective, the project is not converted to another framework. Only the graphical user interface changes. If you intend to convert the project, you need to do that manually.

[Learn about converting a project >>](#)

New Resources to Capability Mapping matrix

Resources to Capabilities Mapping (Rs-Tr) addresses the direct and indirect linkage between Resources (Enterprise Phase, Operational Agent, Resource Performer, Service Specification, Actual Enterprise Phase, Actual Enduring Task) described in the Resources domain and Capabilities specified in the Strategy domain.

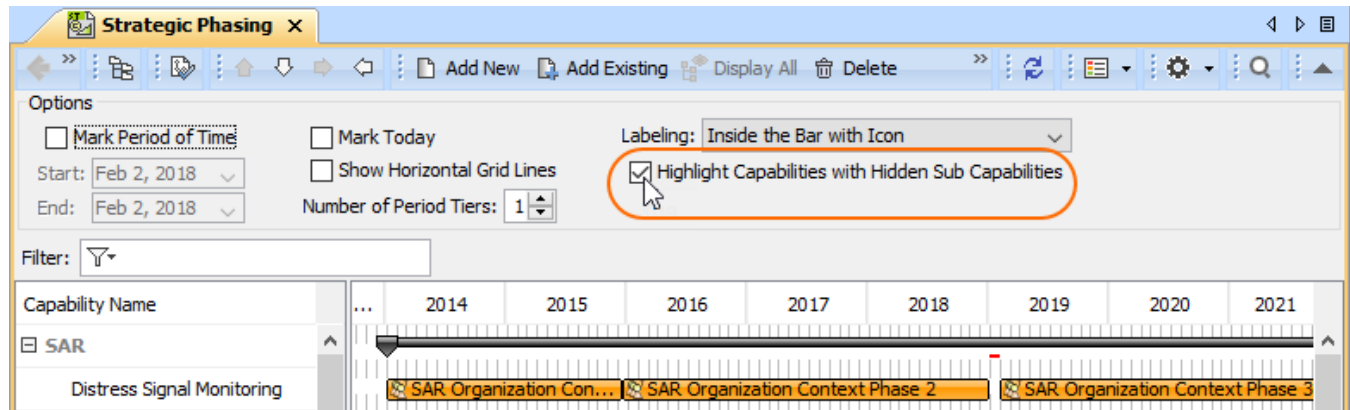
BPMN Compliance Mode improvements

The BPMN Compliance Mode improvements are as follows:

- When you turn the mode on in a UAF project, BPMN stereotypes are applied to all UAF elements.
- The BPMN Traceability matrices, maps, and tables are included in the UAF project.
- Improved reports.

Diagramming Improvements

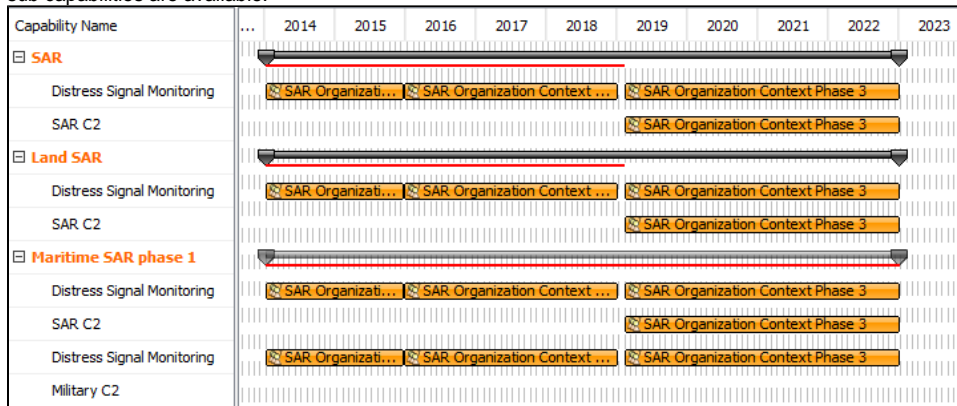
In the Phasing Gantt charts, you can choose to highlight Capabilities when their Sub Capabilities were removed from the chart. You can also choose the highlight color.



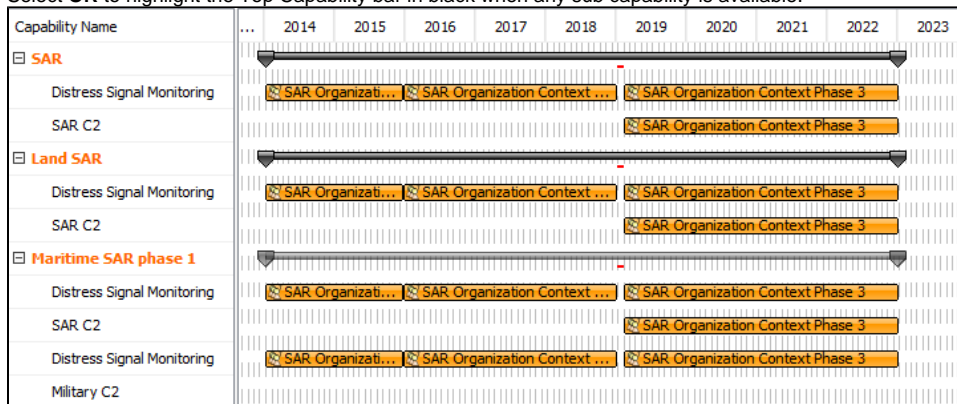
Top Capability display conditions

In the **Chart Properties** dialog, you can now choose a condition to highlight the availability of capabilities. There are two available options:

- Select **AND** condition to highlight the Top Capability bar in red when any capability is unavailable in that period of time, and in black when all sub capabilities are available.

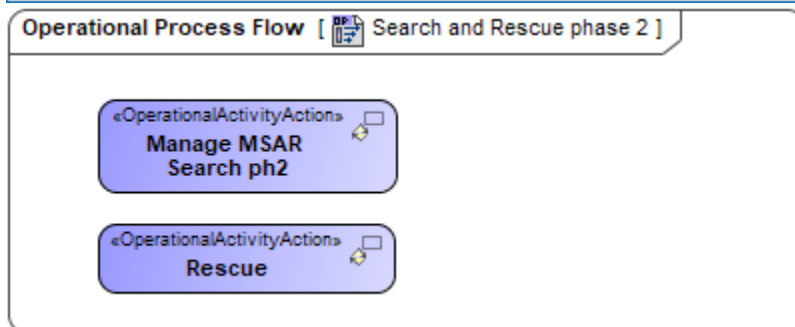
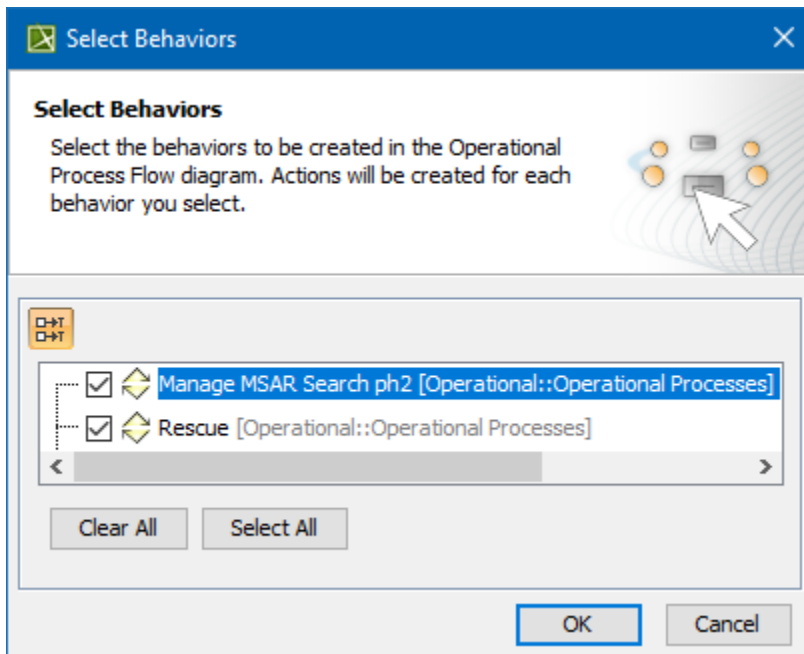
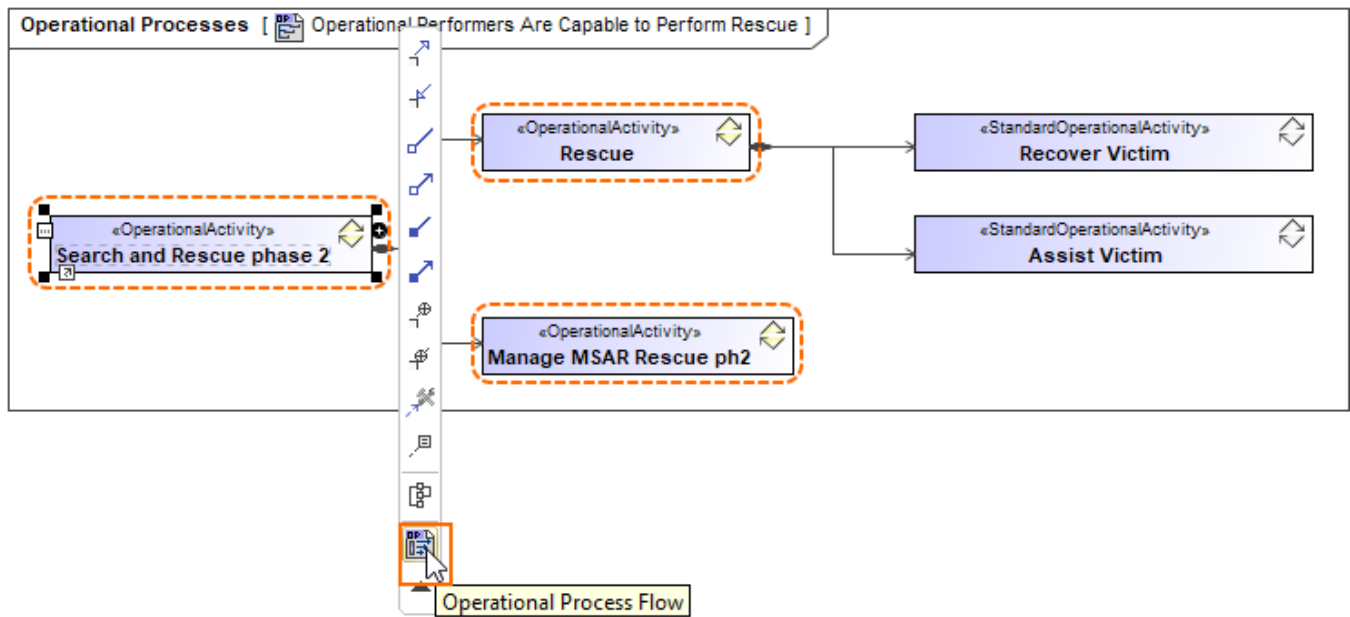


- Select **OR** to highlight the Top Capability bar in black when any sub capability is available.



Easy Process Flow Diagrams Creation

Now you can conveniently create Process Flow diagrams from the Process diagram with the defined aggregation/composition of activities/functions.



[Learn about creating Process Flow diagrams >>](#)

Legends in Gantt Charts

Beginning with this version, you can use legends in the Gantt Chart diagrams to increase their readability.

[Learn about using legends >>](#)

[Back to top](#)

Usability Improvements

- Zooming in all Gantt Chart diagrams has been updated to be consistent with zooming in diagrams. Now the Ctrl+Scroll up or down will zoom the entire Chart and Shift+Scroll will control the timeline.

[Back to top](#)

SysML Features

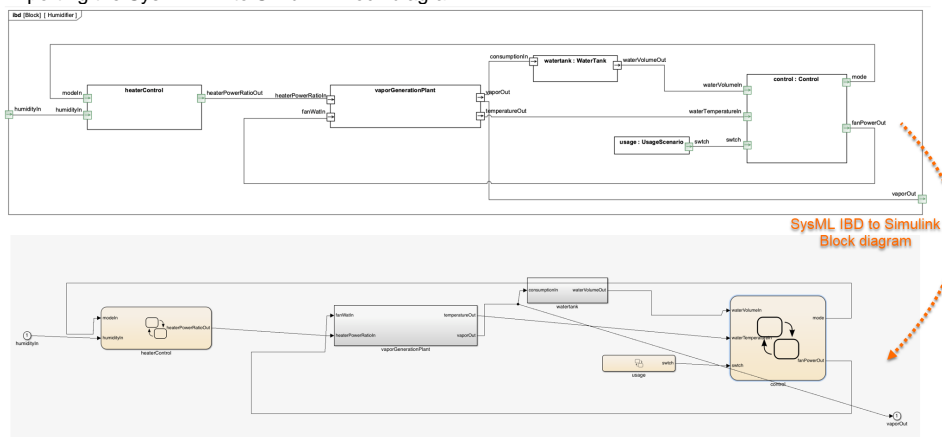
SysML model transformation to Simulink and Modelica

19.0 sp3 version allows users to export standard SysML models into Simulink (incl. Stateflow, Simscape) and Modelica models based on a standard mapping provided by new OMG SysPhS specification (SysML Extension for Physical Interaction and Signal Flow Simulation).

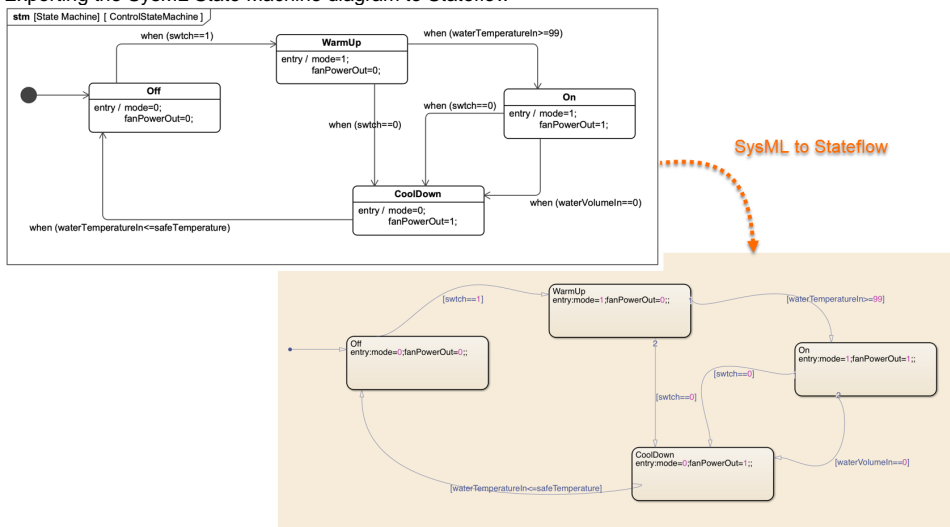
This one-way transformation supports both black-box or full implementation which includes parametrics, statemachines, internal structures with ports, interfaces and connectors.

Examples of Simulink export

- Exporting the SysML IBD to Simulink Block diagram.



- Exporting the SysML State Machine diagram to Stateflow

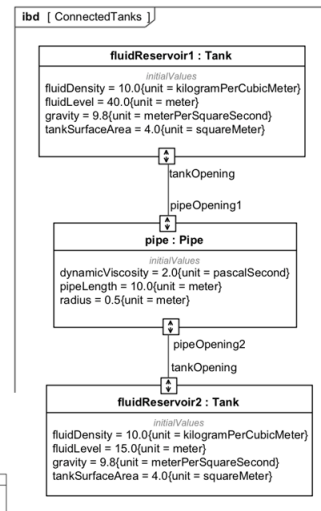
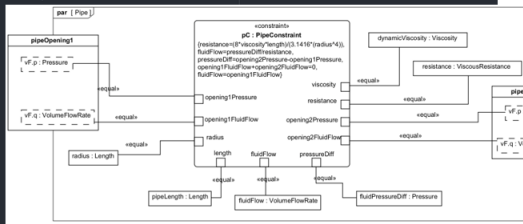
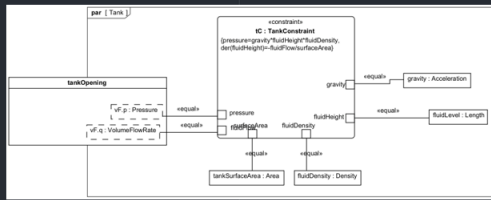


Example of Modelica export

```

model ConnectedTanksModel
  ConnectedTanks _ConnectedTanks;
  model ConnectedTanks
    Pipe pipe(pipeLength.start=10.0, pipeLength.fixed=true, radius.start=0.5, radius.fixed=true, dynamicViscosity.start=2.0)
    Tank fluidReservoir1(fluidLevel.start=40.0, fluidLevel.fixed=true, gravity.start=9.8, gravity.fixed=true, tankSurfaceArea.start=4.0)
    Tank fluidReservoir2(fluidLevel.start=15.0, fluidLevel.fixed=true, gravity.start=9.8, gravity.fixed=true, tankSurfaceArea.start=4.0)
    equation
      connect(pipe.pipeOpening1, fluidReservoir1.tankOpening);
      connect(fluidReservoir2.tankOpening, pipe.pipeOpening2);
    end ConnectedTanks;
  connector VolumeFlowElement
    flow VolumeFlowRate q;
    Pressure p;
  end VolumeFlowElement;
  type Pressure=Real(unit="Pa");
  type VolumeFlowRate=Real(unit="m³/s");
  model Tank
    VolumeFlowElement tankOpening;
    parameter Area tankSurfaceArea;
    parameter Acceleration gravity;
    parameter Density fluidDensity;
    Length fluidLevel;
  equation
    tankOpening.p=gravity*fluidLevel*fluidDensity;
    der(fluidLevel)=tankOpening.q/tankSurfaceArea;
  end Tank;
  type Length=Real(unit="m");
  type Density=Real(unit="kg/m³");
  type Acceleration=Real(unit="m/s²");
  type Area=Real(unit="m²");
  model Pipe
    VolumeFlowElement pipeOpening1;
    VolumeFlowElement pipeOpening2;
    VolumeFlowRate fluidFlow;
    Pressure fluidPressureDiff;
    parameter Length pipeLength;
    parameter Length radius;
    parameter Viscosity dynamicViscosity;
    ViscousResistance resistance;
  equation
    resistance=(8*dynamicViscosity*pipeLength)/(3.1416*(radius^4));
    fluidFlow=fluidPressureDiff/resistance;
    fluidPressureDiff=pipeOpening2.p-pipeOpening1.p;
    pipeOpening1.q+pipeOpening2.q=0;
    fluidFlow=pipeOpening1.q;
  end Pipe;
  type ViscousResistance=Real(unit="N·s/m⁵");
  type Viscosity=Real(unit="Pa·s");
end ConnectedTanksModel;

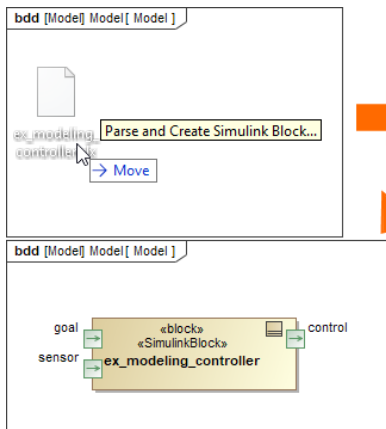
```



SysML to Modelica

Simulink Import

The SysML plugin has undergone some major improvements. Simulink model files can now be imported and represented as SysML Blackbox Blocks. Once the file is imported, you can select input and output ports to be represented as Flow ports on the Block. Additionally, the imported Simulink model can be simulated using the Cameo Simulation Toolkit.



Simulink Import Options

Select which features and how to import them from the Simulink file. Specify a Block name and select which Simulink variables to import as value properties or ports. Inputs and outputs are imported as ports by default. If you drop the Simulink file onto an existing Block as implementation, you can also select which Simulink variables map and redefine Block properties. You can attach the Simulink file to a project for a more effective team

Block name:

#		Direction	Name	Type	Description	As Port
1	<input checked="" type="checkbox"/>	in	goal			<input checked="" type="checkbox"/>
2	<input checked="" type="checkbox"/>	in	sensor			<input checked="" type="checkbox"/>
3	<input checked="" type="checkbox"/>	out	control			<input checked="" type="checkbox"/>

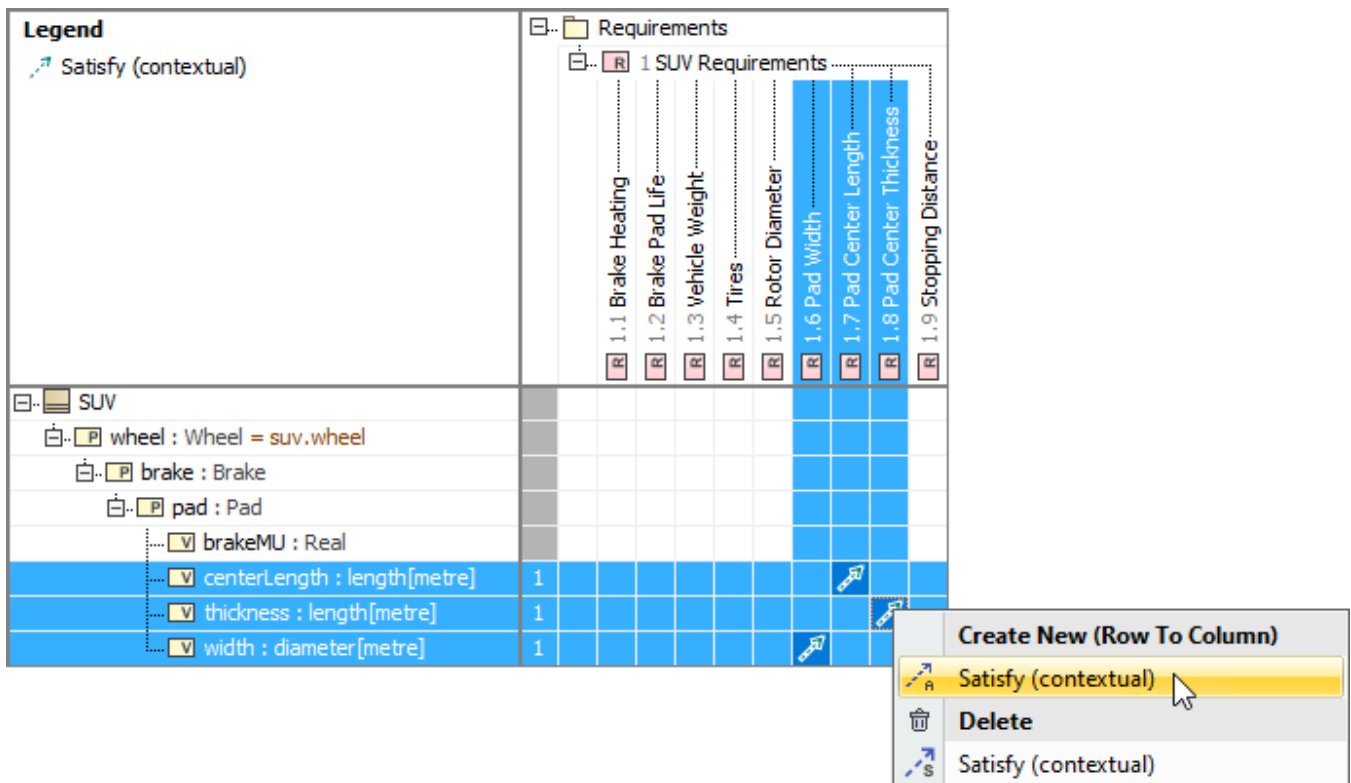
☐ Attach file to the project

Importing external Simulink model

[Learn more about Simulink import >>](#)

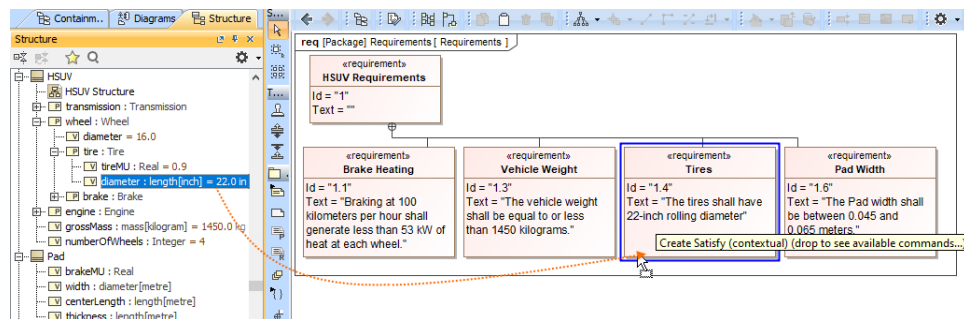
Contextual Relationships

- Enhance your modeling experience – contextualize Allocate, Refine, Satisfy, Trace, and Verify relationships to consider the context the connected properties are used in. Beginning with this release, users can more easily create and keep contextual relationships up to date in diagrams and matrices.



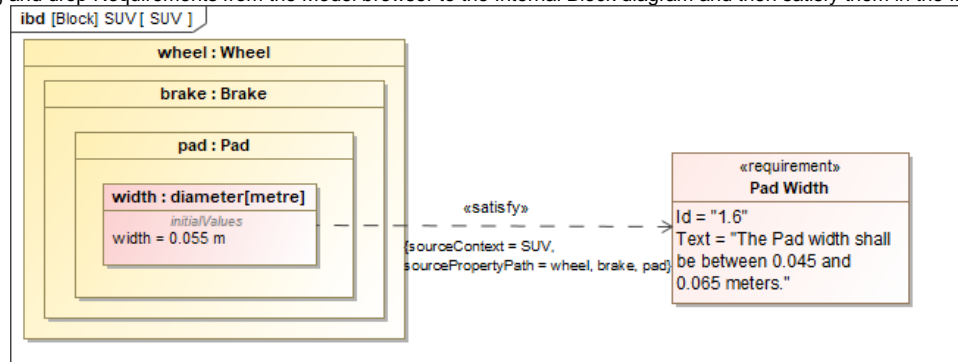
Creating contextual relationships to define the context they are used in

- You can now drag and drop the property directly on the Requirement shape in the symbol diagram to create the contextual Satisfy relationship automatically.



Creating the contextual Satisfy relationship by dragging-and-dropping it directly on the Requirement

- You can now drag and drop Requirements from the Model browser to the Internal Block diagram and then satisfy them in the IBD context.



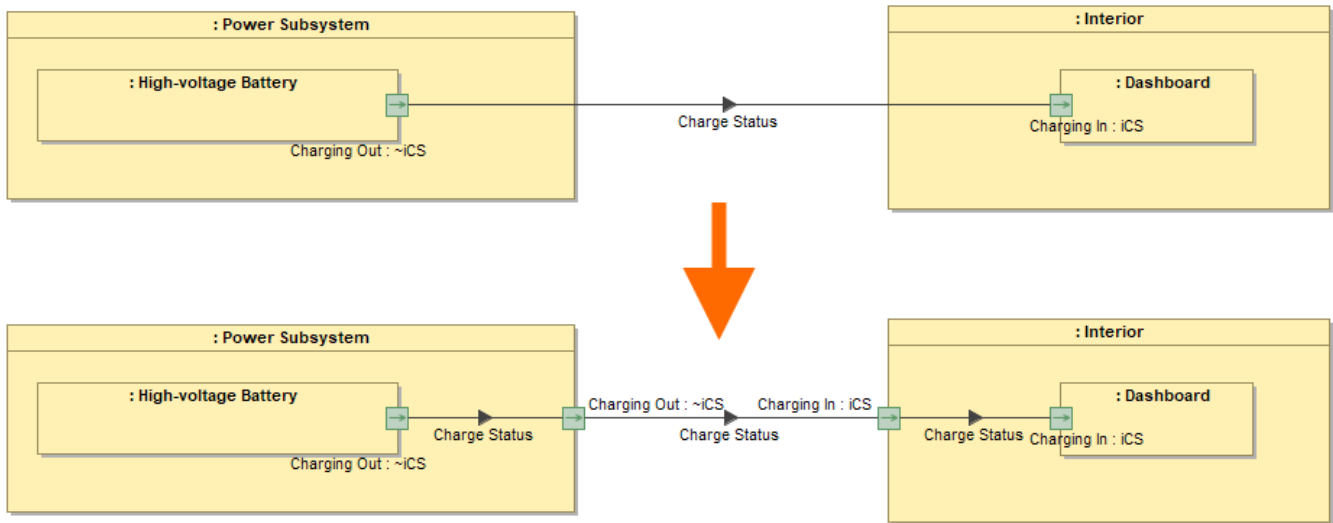
Displaying and satisfying Requirements in the Internal Block diagram

[Learn more about Contextual Relationships >>](#)

Flow Management Improvements

In the SysML Internal Block Diagram, the automatic delegation functionality:

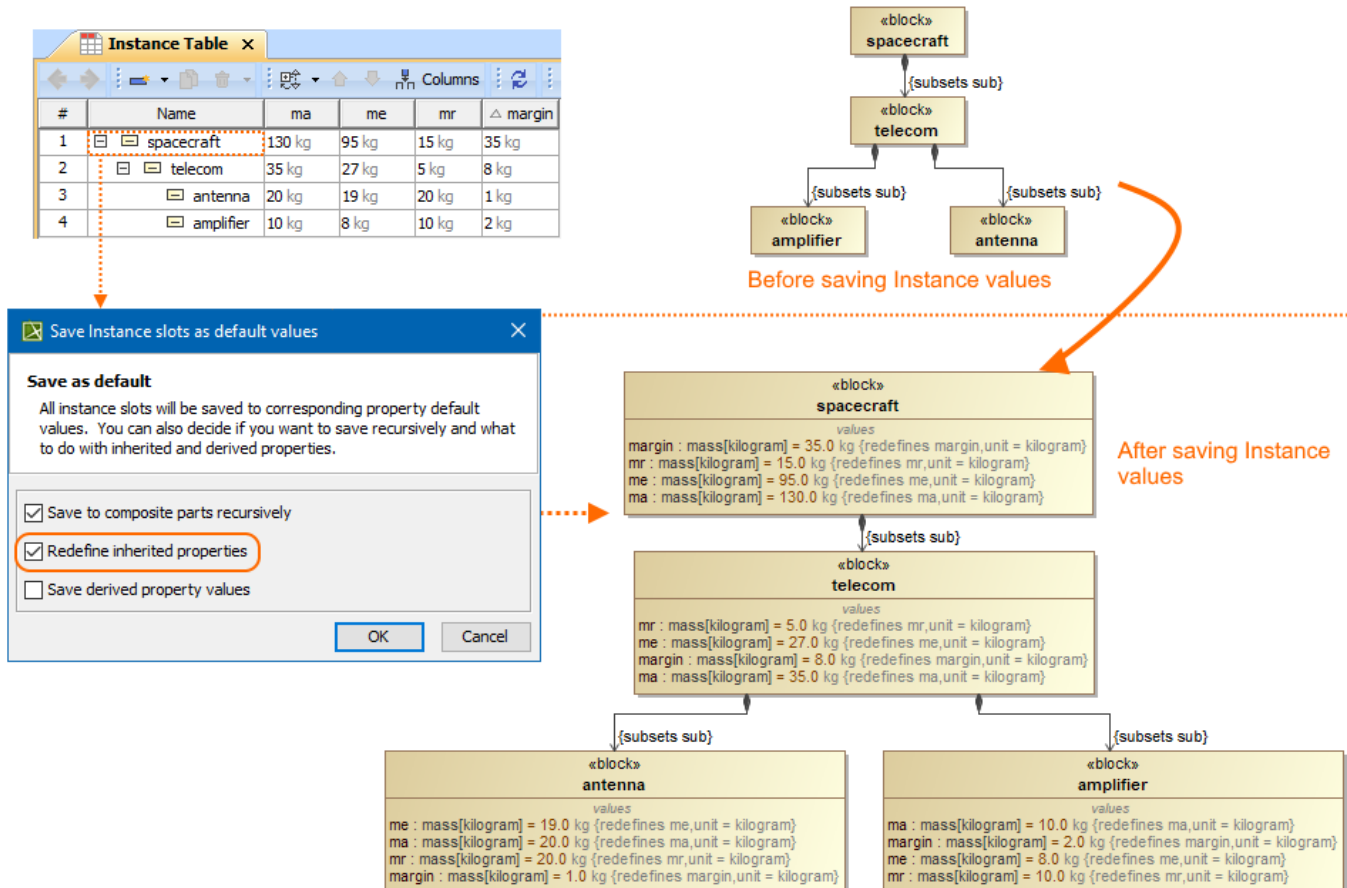
- creates a connector from the port to the nearest border.
- creates connectors with relevant ports between the ports of the nested parts (delegate).
- realizes the existing flows on the newly created connectors.



[Learn more about automatic delegation >>](#)

Instance Improvements

- Now you can save instance values to Blocks as default values. [Learn more >>](#)

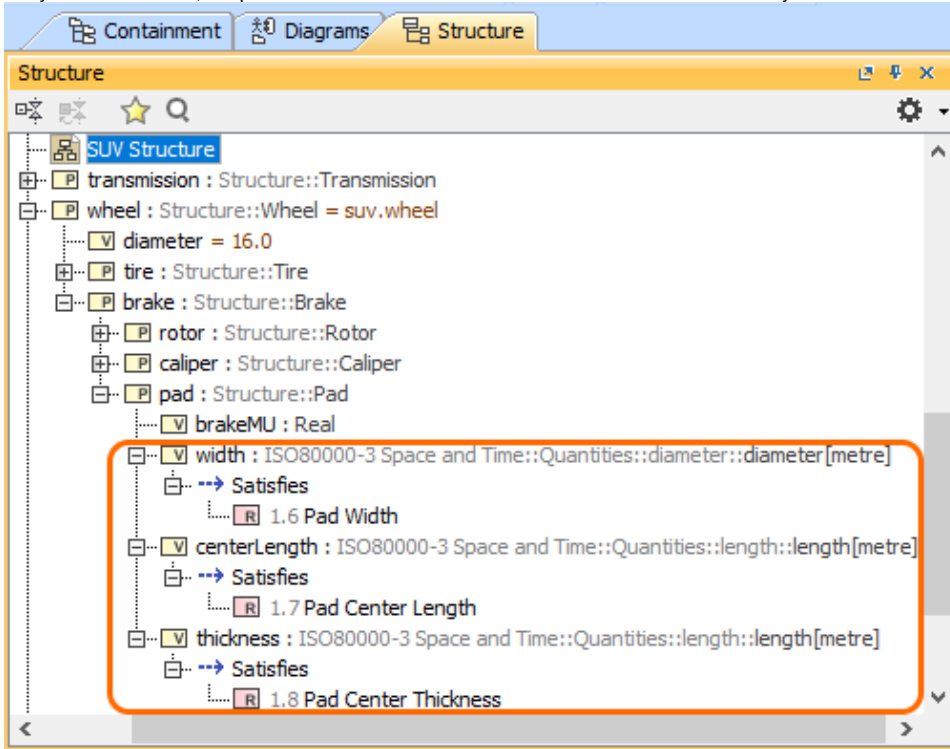


- The naming of the nested parts created by Create Instance wizard or in the Instance Table is improved.

- The new **Clone with parts** action in the Instance Table toolbar and selected row's shortcut menu copies not only the selected Instance but its nested parts as well.

Other SysML features

- Pins for the Opaque Actions can now be created automatically. [Learn more >>](#)
- For your convenience, Requirements are now also shown within the elements that satisfy them in the Structure tree.



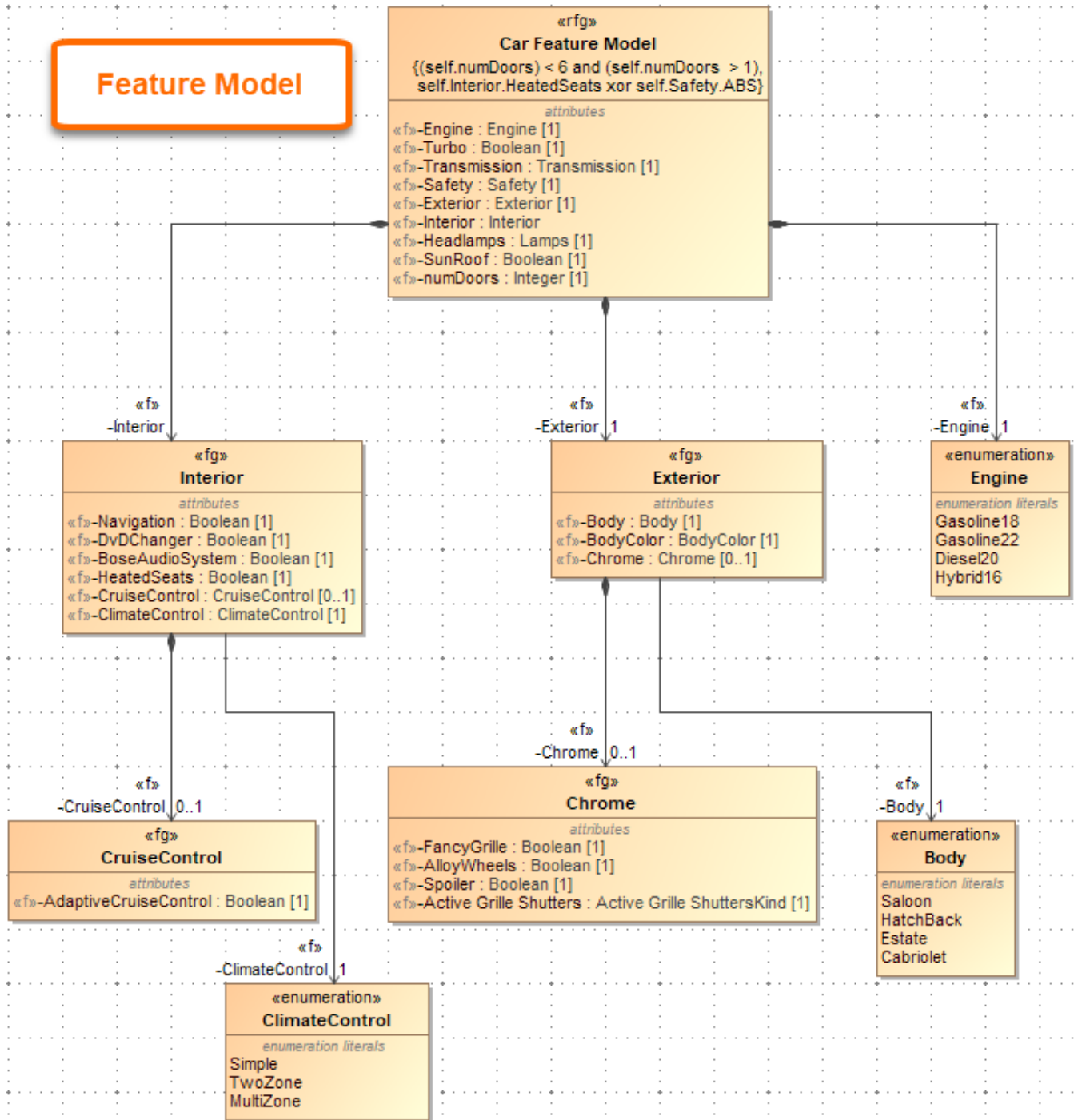
[Back to top](#)

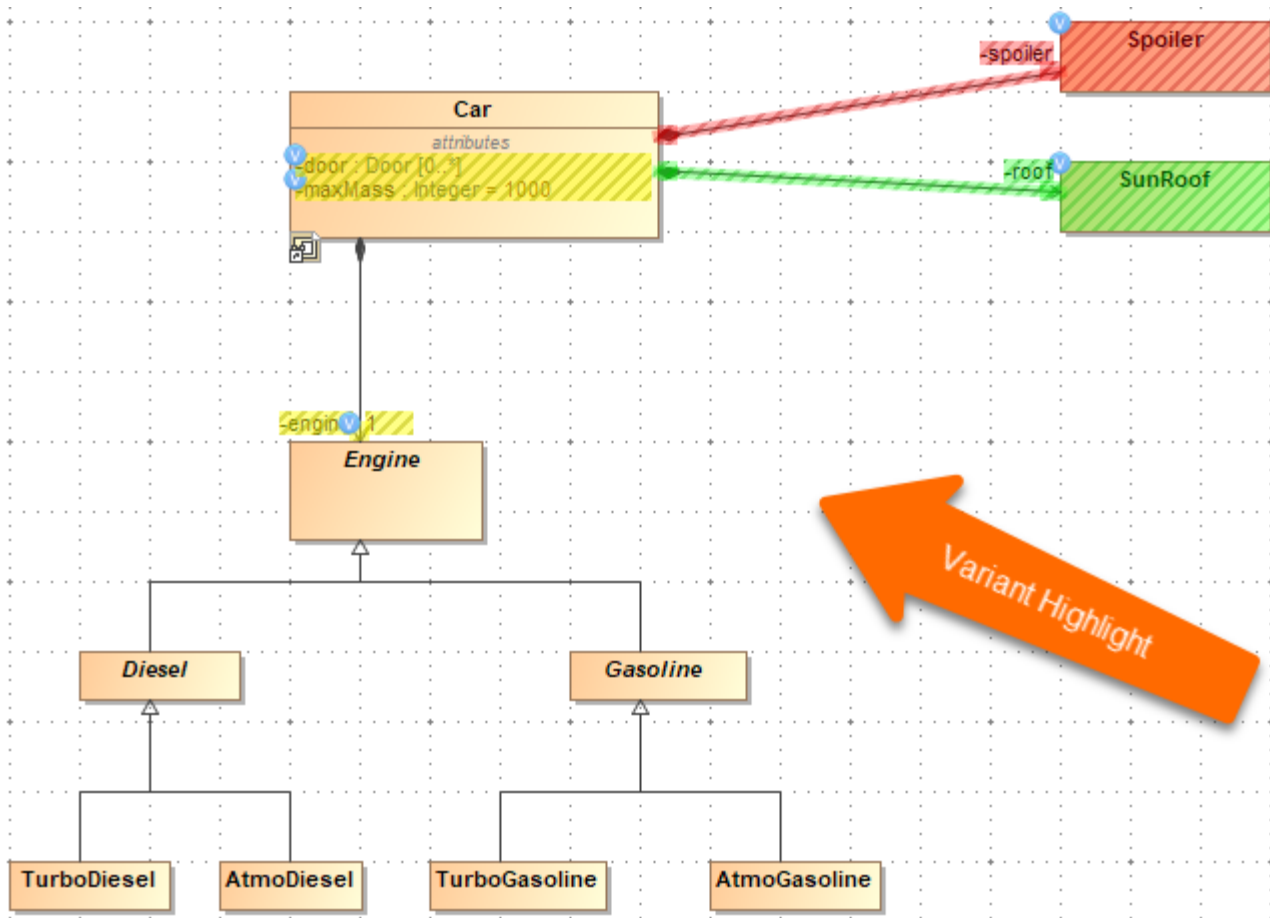
Modeling and Infrastructure

Model-Based Product Line Engineering

Product Line Engineering has been significantly extended by implementing the Model-Based Product Line Engineering (MBPLE) capability. In addition to integration with PLE tools (Big Lever Software Gears and Pure Variants), it is now possible to perform PLE in modeling tools without using third-party tools.

Feature Model





[Learn more about MBPLE >>](#)

ISO 26262 Functional Safety Plugin

We are proud to introduce the brand new ISO 26262 Functional Safety Plugin. This plugin tightly integrates functional safety with MBSE (requires SysML plugin or Cameo Systems Modeler) and supports the ISO 26262 standard (the adaptation of IEC 61508) designed to comply with needs specific to the application sector of Electric & Electronic (E/E) systems within road vehicles. The ISO 26262 Functional Safety Plugin provides end-users with the means to perform hazard analysis and risk assessment:

- Define Malfunctioning Behaviors for each Function
- Specify an Operational Condition Library
- Define Operational Situations as a combination of Conditions
- Combine Malfunctioning Behaviors with Operational Situations to define Accident Scenarios
- Specify a Hazard Library
- Define System Level and Vehicle Level Effects
- Combine Hazards, Effects, and Accident Scenarios into Hazardous Events

The plugin also provides a way to define functional safety concepts (safety requirements and perform ASIL decomposition) as well as generate safety reports.

HARA

Add Sibling
Add Nested
Add Existing...
Delete
Remove From Table
Nest
Unnest

Criteria
Element Type: Situation
Scope (optional): HazardousEvent
Filter:

#	Name	Accident Scenario	Hazard	Vehicle Level Effect	System Level Effect	ASIL	Safety Goal
1	HazardousEvent						
2	Steering Hazard	Potential for vehicle to depart the intended path/lane and collide with oncoming traffic or roadside objects before driver is able to control the situation. If steering produced unintended yaw momentum, could cause loss of control of the vehicle	Unintended Loss of Vehicle Lateral Motion Control Unintended Vehicle Lateral Motion/Unintended Yaw	Vehicle body tilts in wrong direction. Vehicle center of gravity is shifted towards the outside of the curve. High speed collision with another vehicle or object(s)	The steering system provides torque actuation unexpectedly when there is no driver request	D	1 Prevent Unintended Vehicle Lateral Motion
3	Delayed Tilt - Normal driving in curve	Vehicle entering a slight curve at approx. 0 degree vehicle body tilt angle. Low tilt angle is required but provided tilt is delayed.	Degraded Vehicle Stability	Vehicle body does not tilt (at first). Vehicle center of gravity does not move towards the center of the curve.	System tilts vehicle body after it is required	QM	
4	Inverted Tilt - Normal driving in curve	Vehicle entering a slight curve at approx. 0 degree vehicle body tilt angle. Low tilt angle is required but provided tilt is in opposite direction.	Degraded Vehicle Stability	Vehicle body tilts in wrong direction. Vehicle center of gravity is shifted towards the outside of the curve.	System tilts vehicle body in wrong direction.	A	

Show the description area to see all information about a Hazardous Event in one place

Delayed Tilt - Normal driving in curve

System Function

Tilt the Vehicle Body

Malfunctioning Behavior

Delayed

vehicle body tilt

Guide Word

Late

Hazard

Degraded Vehicle Stability

System Level Effect

System tilts vehicle body after it is required

Vehicle Level Effect

Vehicle body does not tilt (at first). Vehicle center of gravity does not move towards the center of the curve.

Safety Goal

ASIL QM

C1

Since the curve is minimal, it is relatively easy to maintain vehicle stability. Driver can recognize the lack of immediate vehicle tilt and reduce speed.

E2

Driving at high speed on slightly curvy roads is part of normal driving

S3

Vehicle may hit obstacles at high speed

Vehicle Usage	Traffic And People	Location	Road Condition	Environmental Condition
Normal driving in curve				
Driving at Speed	Traffic Free Flow	Highway City Roads	AnyRoadCondition	AnyEnvironmentalCondition

Filter is not applied. 4 rows are displayed in the table.

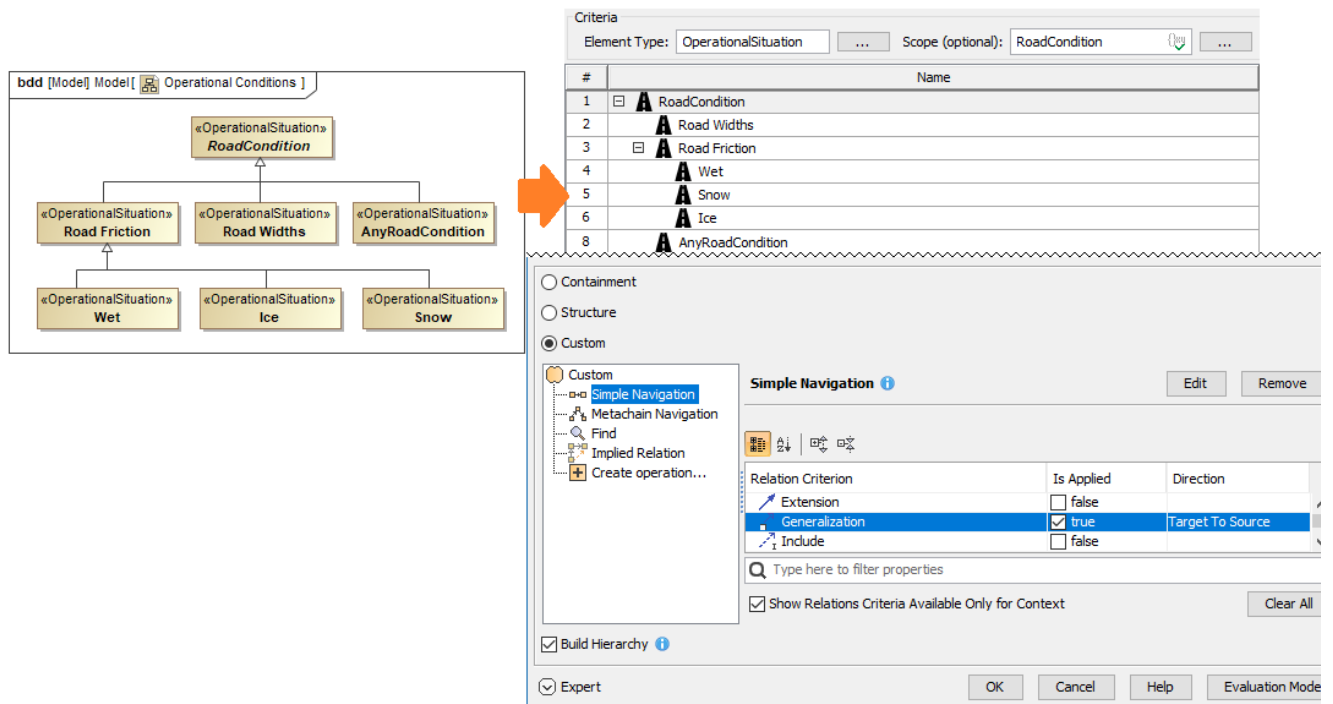
A HARA Table allows you to define Hazardous Events as a combination of Hazards, Effects, and an Accident Scenario. The description area shows all the information about the selected Hazardous Event.

[Learn how to use the ISO 26262 Functional Safety Plugin >>](#)

Custom Hierarchy in Tables

Modelers now have more freedom to decide how to organize elements in tables. Simply choose one of the tree-view options to display elements hierarchically and see the changes in the table structure reflect the criterion you have specified:

- **Containment:** displays the decomposition of elements related by Containment.
- **Structure:** displays the decomposition of Part properties related by Composition.
- **Custom:** displays the decomposition of elements related by any specified criteria.

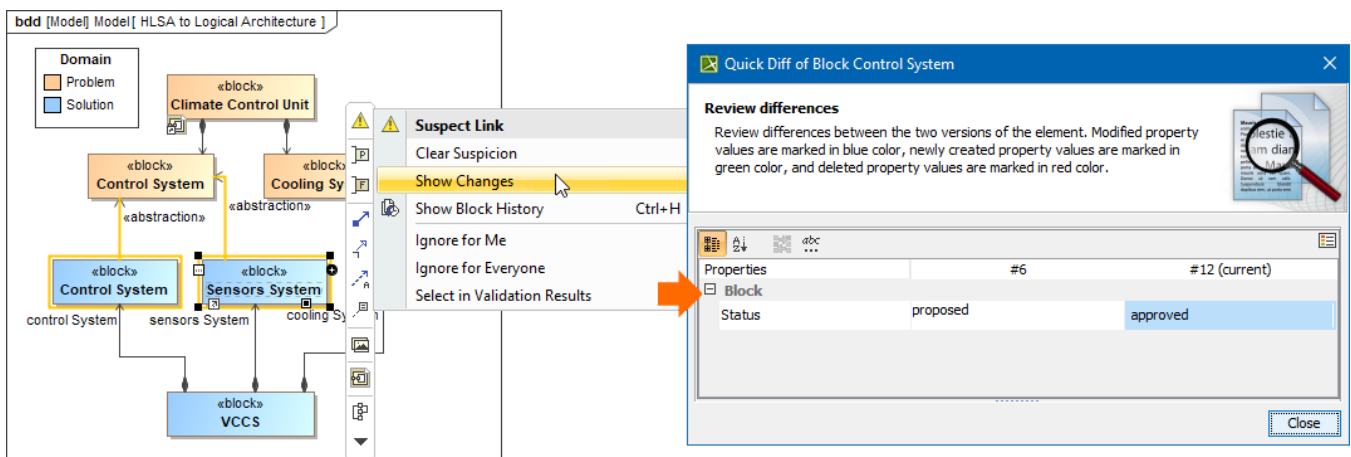


Building a custom hierarchy in a table

[Learn more about building Custom Hierarchy in tables >>](#)

Suspect Links

Stay up to date with the changes in your model by enabling the Suspect Links tracking. You can now track the changes applied to requirements linked to other model elements, as well as keep track of the changes that affect the selected model elements at the chosen end (source or target) of the specified dependencies.

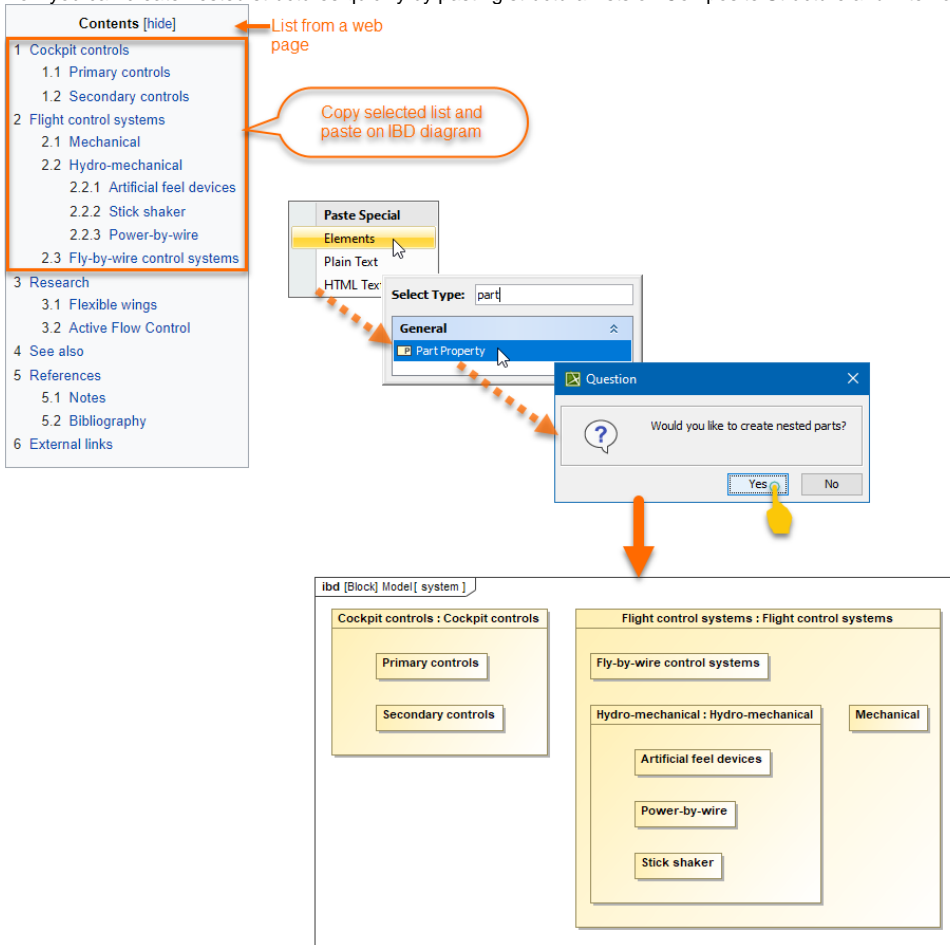


Configuring Suspect Links tracking in the model

[Learn more about customizing Suspect Links tracking >>](#)

Further Improvements

- Now you can create nested structures quickly by pasting structural lists on Composite Structure and Internal Block diagrams.



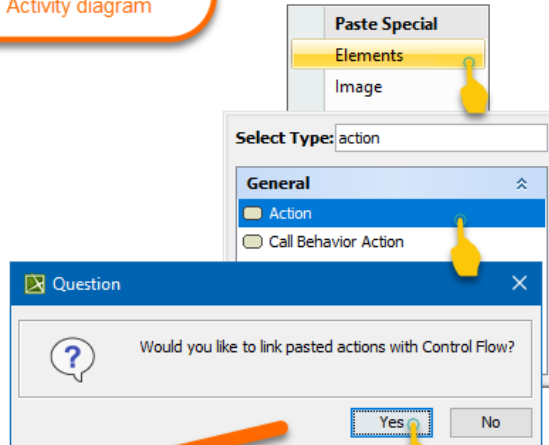
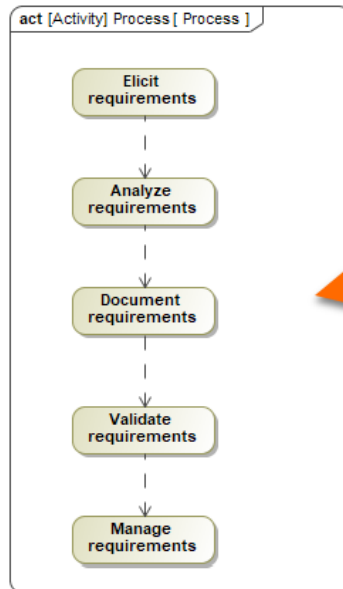
- To quickly create Activity Actions you can simply paste a copied list from any source of information. The Actions will be created and connected.

A list from the PowerPoint slide

Key Activities

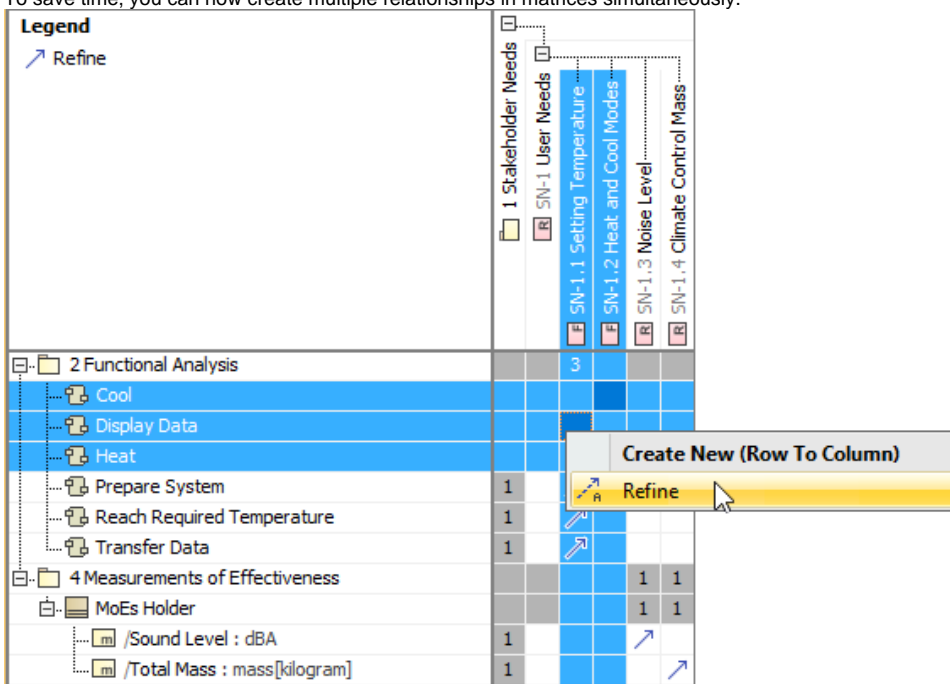
1. Elicit requirements
2. Analyze requirements
3. Document requirements
4. Validate requirements
5. Manage requirements

Copy and paste on
Activity diagram

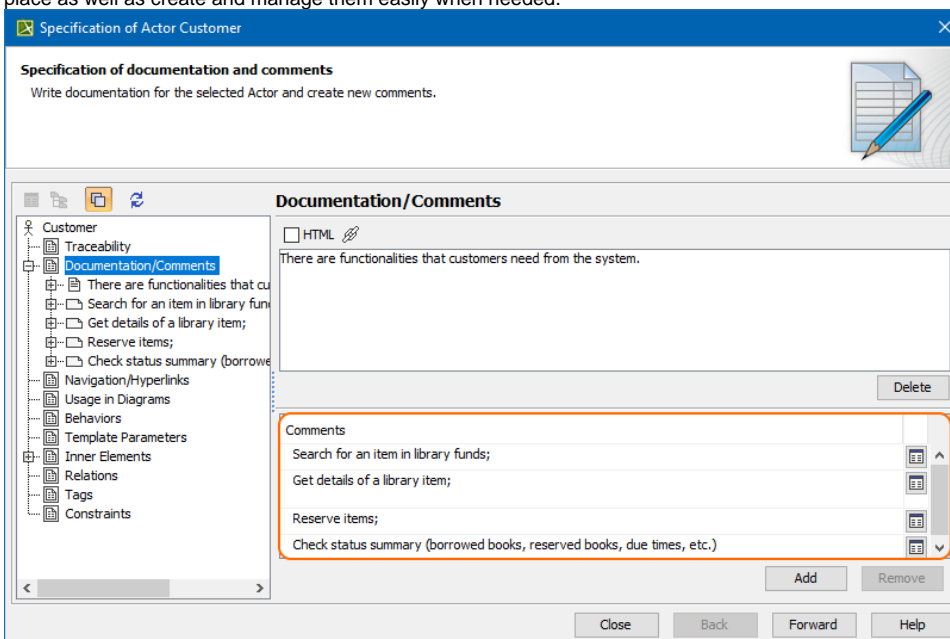


- ReqIF import/export has been improved as well. From now on, all existing images are attached to the model upon ReqIF import and added to the ReqIF file upon export.
- ID prefixes no longer come with the applied HTML styles. Instead, all IDs are imported/exported as plain text.
- It is now possible to specify the element properties to be shown on the shape by default in a few clicks.
- You can now wrap long text into multiple lines to display all of it in a table cell.
- The modeling tool now allows entering an unlimited number of entries into the table cell to enable displaying multiple values/plain text lines in a table cell.

- To save time, you can now create multiple relationships in matrices simultaneously.



- The redesigned Documentation property group in the Specification window allows you to have all comments annotating model elements in one place as well as create and manage them easily when needed.

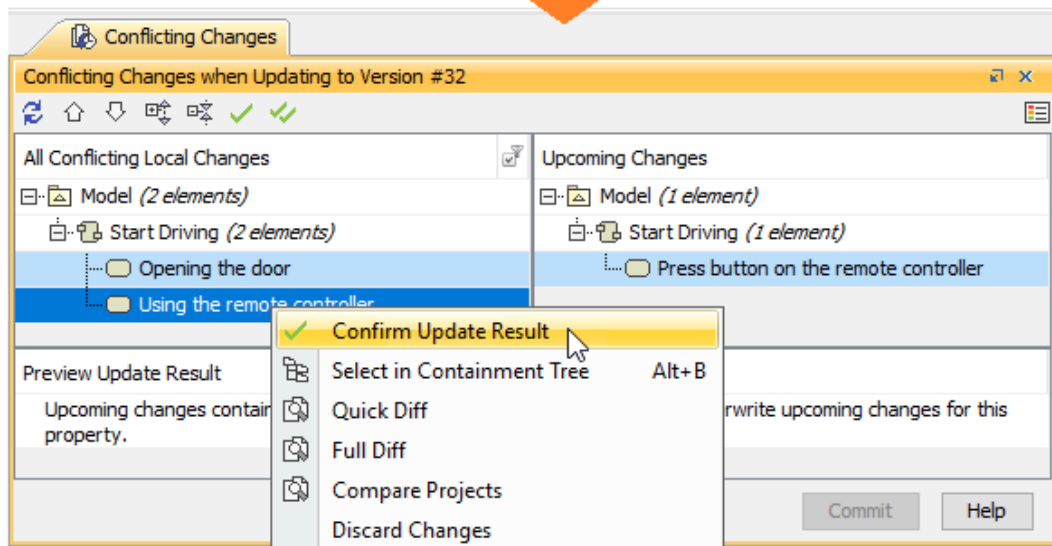
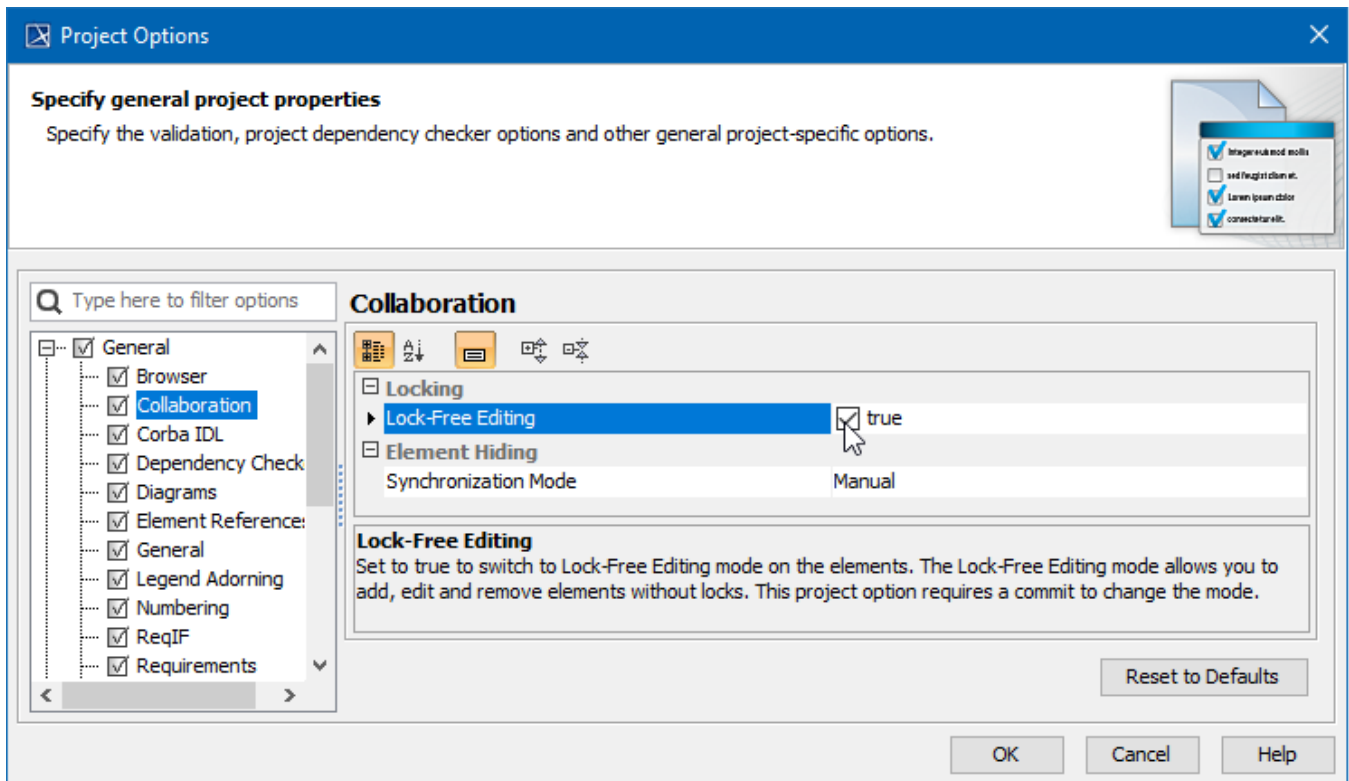


Collaboration

Lock-Free Model Editing

Locking elements prior to modifying them is now a thing of the past with the introduction of the Lock-free model editing mode (a.k.a an optimistic locking). You can continue using locks if that is what suits your team's needs best; however, the Lock-Free editing mode is a simple yet effective way to boost modeling productivity.

To start using the Lock-free editing mode, first enable it in the project, after which you can work on model elements freely, without locking them. Consequently, there is no need to wait until locks are released by other users to work on the same or related parts of the model. If conflicting changes occur, you can handle them in the Conflicting Changes panel to prevent data loss.



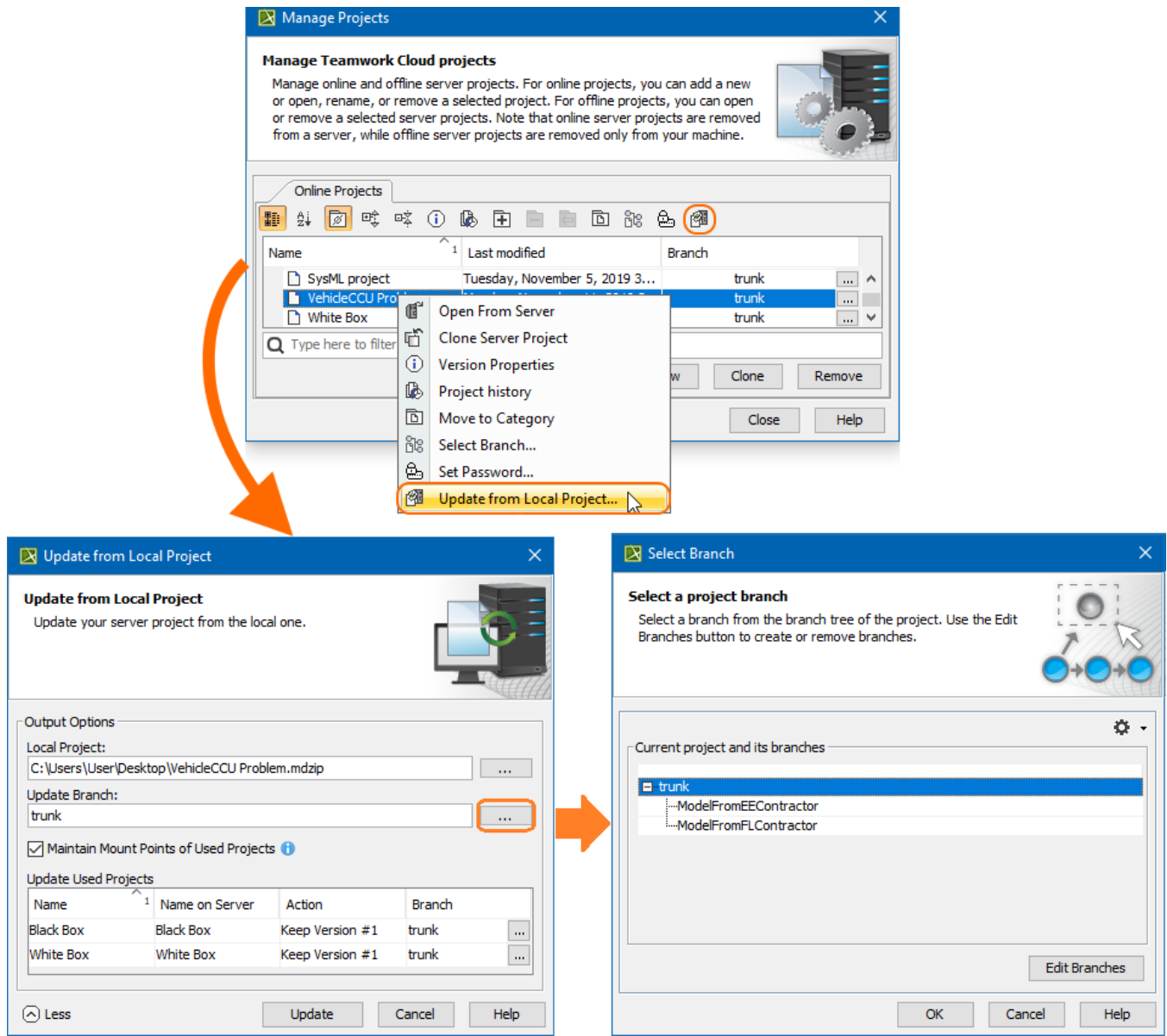
Handling conflicting changes in the Lock-free Editing mode

[Learn more about Lock-Free Editing mode >>](#)

Disconnected Team Collaboration Usability

The Disconnected team collaboration UI has been rebuilt from the ground up. The improved feature usability allows distributed teams working on the same server project to update it with the changes from the locally exported .mdzip file more conveniently and with a significantly reduced amount of manual steps.

Not only can you now update projects without having the target ones open in the modeling tool, you can also manage used project changes more easily. Additionally, the newly-implemented smart branch selection algorithm ensures configuration-aware update of server projects and smoother project merging in the future.



Updating a server project from a local .mdzip file

[Learn more about Disconnected Team Collaboration usability >>](#)

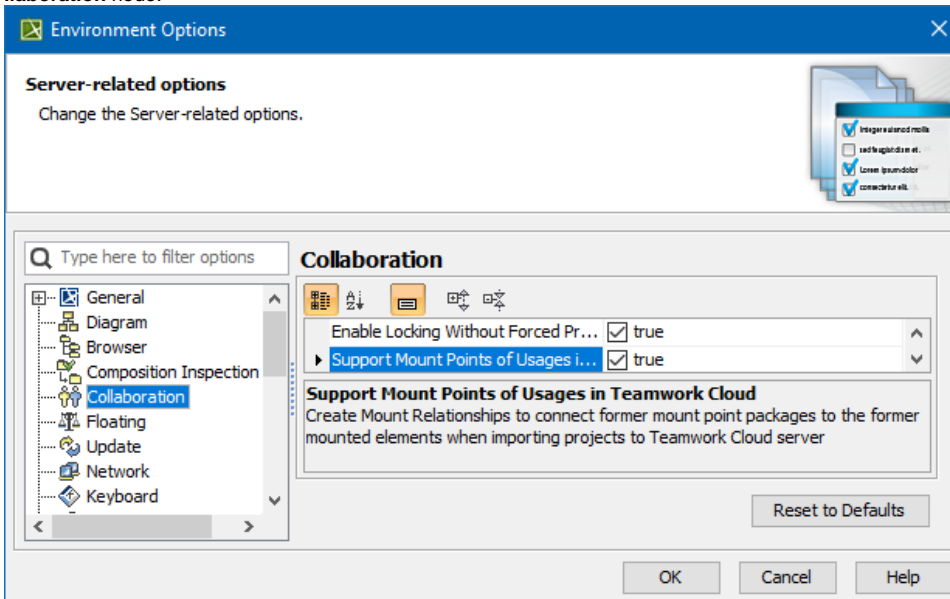
Further Merge Usability Improvements

Along with improved Merge usability and bug fixes, the 19.0 SP3 release adds adjustments to common ancestor calculation algorithm rules. As a consequence, subsequent project merging iterations can be carried out more effectively without the need to repeat previously made merge decisions.

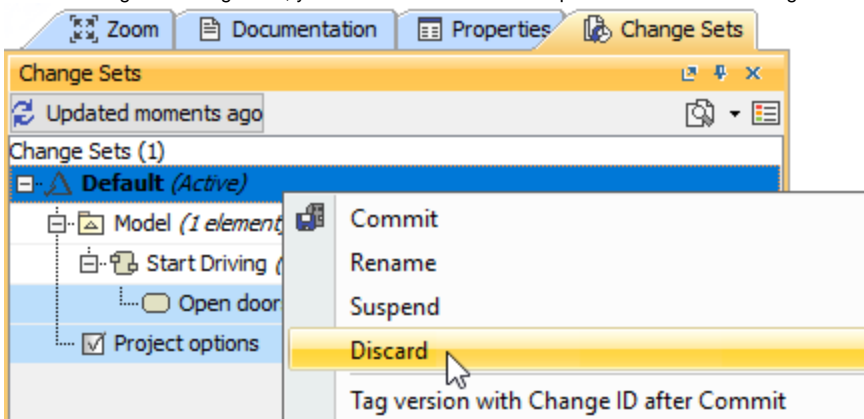
[Learn more about Model Merge >>](#)

Other Enhancements

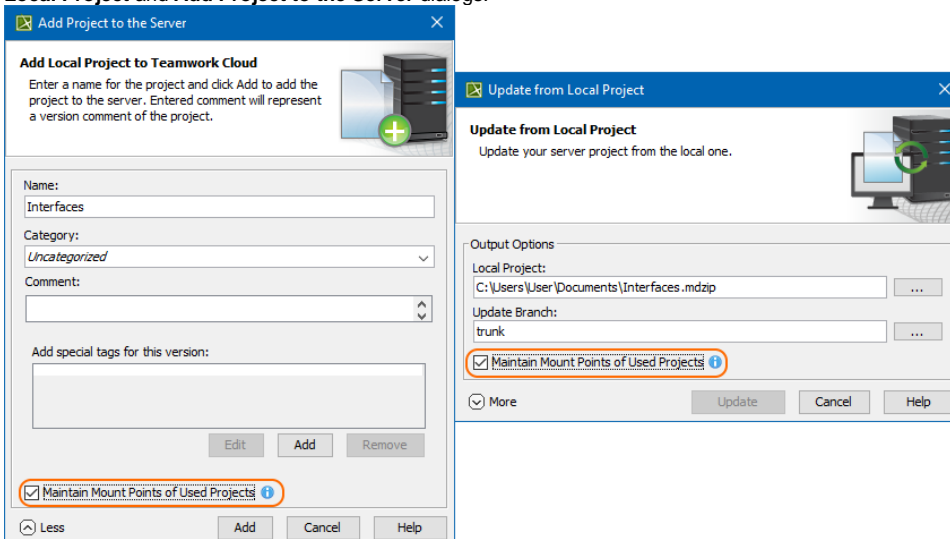
- For your convenience, we have moved an environment option **Support Mount Points of Usages in Teamwork Cloud** from **Save/Load** to the **Collaboration** node.



- When working with change sets, you can now discard both suspended and all local changes in an active change set.



- The **Maintain Mount Points of Used Projects** option can now be accessed even more conveniently. It has been added to the **Update from Local Project** and **Add Project to the Server** dialogs.



- Indirectly used projects can now be hidden or unhidden automatically together with directly used projects when their status changes, such as upon the used project update, remove, or merge.

Other Features

Report Wizard enhancements

- The Report Wizard allows selecting first and last hyperlinks in HTML text from cells in XLSX reports to apply them to the cells through a new Report Wizard Environment Option. [Learn more how to use template.xlsx.html.link report property >>](#)
- You can use curly brackets with the **#else** directive followed by text to include. [Learn more about this style of code >>](#)
- It is now possible to export images for TXT and HTML templates with or without returning relative paths or absolute paths. [Learn more how to handle paths of exported images >>](#)
- The **-leaveprojectopen** parameter helps reduce memory when loading or closing any large-size project for property files by leaving the project open per property file after generating reports. [Learn more how to deploy this command for multiple report generation >>](#)
- The new **template.docx.ignorechildstyle** report property for the DOCX template is now available for ignoring template styles to be included into generated reports and applying matching styles in the main template instead. [Learn more about this report property >>](#)

Key issues fixed

The following key issues have been fixed with this version:

- Sending Resource and Receiving Resource not being set in the Realized Resource Exchange
- Resources to Operational Activities Mapping (UAF), SV-5b (DoDAF2.0) matrices not displaying all relations
- The TWC project is no longer corrupted after switching perspectives
- Specific symbols are now displayed correctly after saving and reloading the project
- An empty PDF was printed even though the diagram was fully filled
- The GanttChart diagram became empty after model obfuscation
- The SVG export did not export IDs for elements in a diagram preview
- The comments panel did not appear when the HTTP Protocol was used
- When it was impossible to create the symbol for DurationConstraint using API
- Project loading from TWC
- The Lost Message could not be created using Open API
- The MBPLE variant overwrite protection did not work on TWC
- Some expressions were not recalculated after reloading the project
- Documentation in the Properties tab could be updated only after the project reload
- There was a delay when the element was renamed in the diagram
- The error message (java.lang.IllegalStateException: No UUID map object after save) no longer appears after cloning the project

[Back to top](#)