Graph Editor

Version 6 provides separate editors for the creation and editing of structures, function nets and failure nets.

It became more and more obvious in connection with Mechatronics FMEA and Functional Safety that a solution to overcome restrictions in these editors is necessary.

We were looking for a feasible solution together with the users. And we have found it: the Graph Editor is available as of version 6.5. It provides you with unique possibilities, some of which will be introduced in the following.

For a start, there is the expected icon for the new editor in the Personal Desktop's Editor toolbar and the respective menu item.
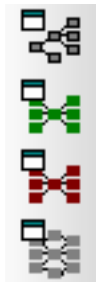

Figure: Editor toolbar with icons for: Structure Tree, Function Net, Failure Net, and Graph Editor

The icon chosen for the Graph Editor illustrates the representation of a complex net consisting of nodes and edges in an editor.
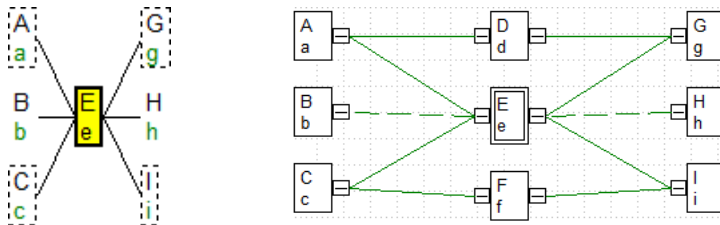

Figure: Function Net with incomplete, truncated representation and Graph Editor view

In the above figure, the Function Net Editor shows a situation of relationships between functions that cannot be fully represented in this editor. In contrast, all the net connections are visible in the Graph Editor. The example was chosen, because it relates to the Graph Editor icon.
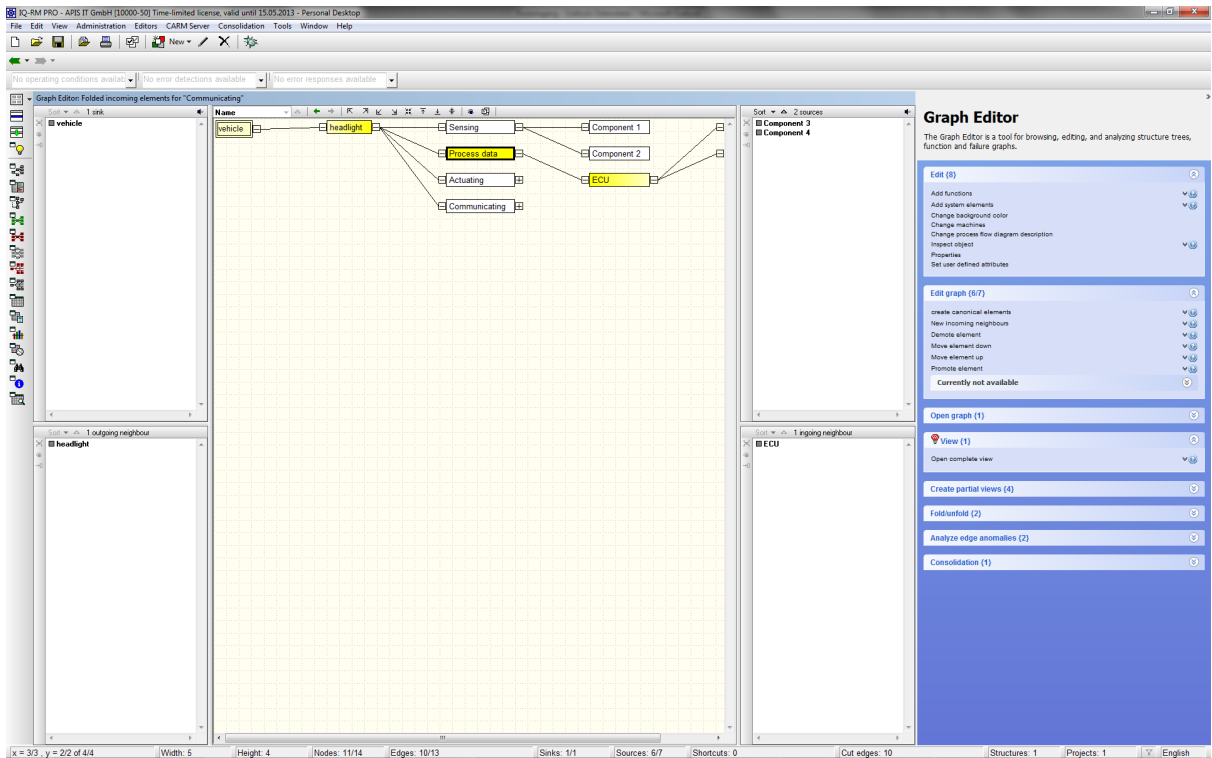
Figure: Graph Editor – the user interface using the example of a Structure Tree

In addition to the central area, the Graph Editor comes with lateral lists providing additional information. In the above figure, there are two lateral lists respectively on the right and the left side. They show various further details in connection with the selected object.

The "task list" on the very right, which is highlighted in blue, shows clearly arranged possible actions. Each of the displayed details can be used for control and is therefore an alternative to the respective menu item, icon, or shortcut.

Structure with system elements

The direct comparison to the Structure Editor shows that the Graph Editor represents identical information in a new way.
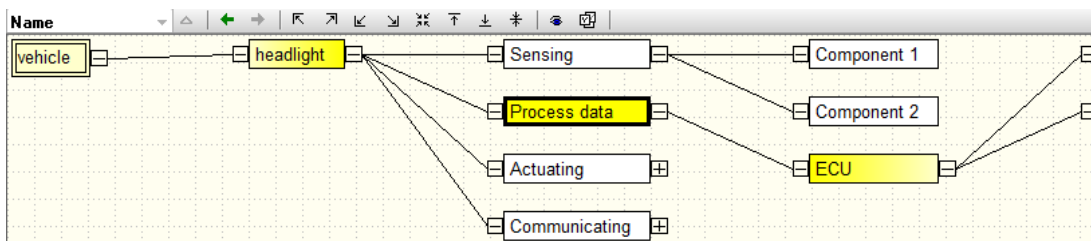

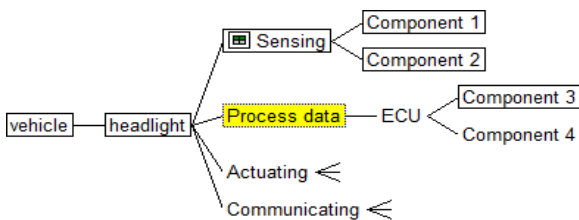Figure: Graph Editor – "Headlights" product structure

Figure: Structure Editor – "Headlights" product structure

Function Net with functions, requirements, product and process characteristics

The Graph Editor can also illustrate situations in Function Nets and Failure Nets, which could not be represented so far.
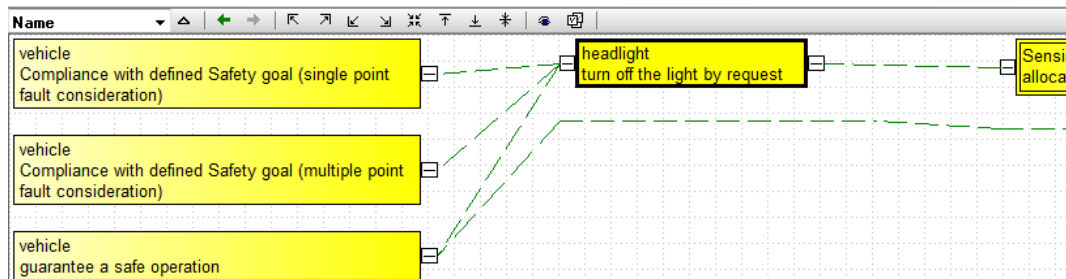

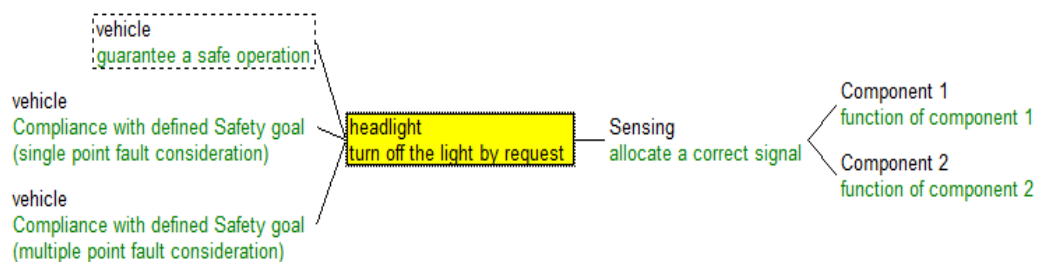Figure: Graph Editor – Function graph "Turn off lights when prompted"

Figure: Function Net – Focus function "Turn off lights when prompted"

This simple example already illustrates the advantages of the Graph Editor. You can immediately see that another connection is available for one of the top-level functions. In the Function Net, a dashed line around the top-level function merely implies that there are further details available, which are not visible though.

Failures Net with failures, operating conditions, failure detection, and failure reaction
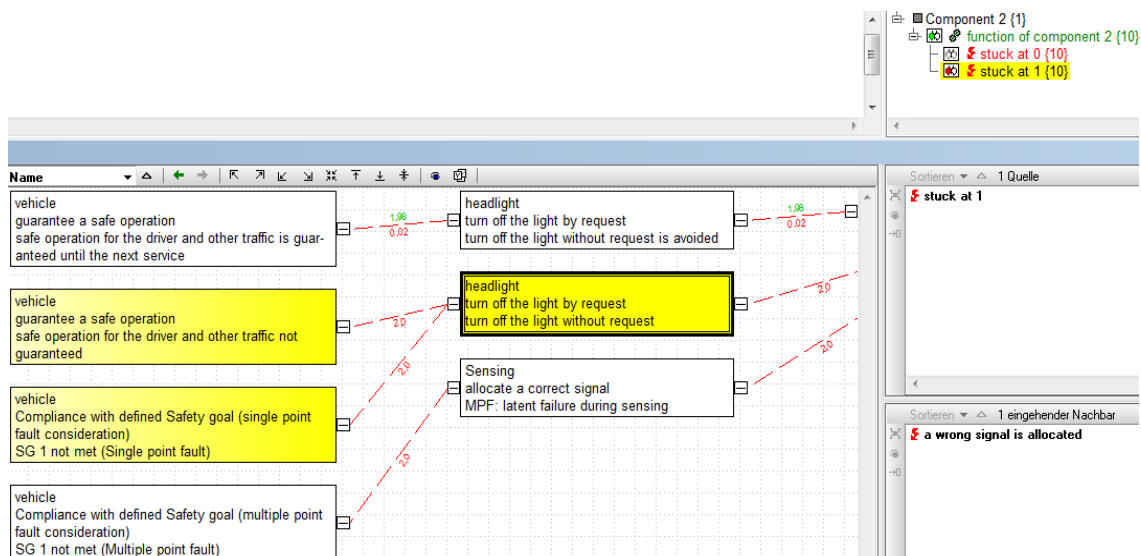
Failure Nets can also be represented in a graph.

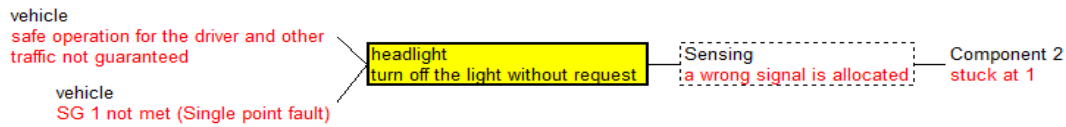Figure: Graph Editor – displays source – synchronized failure in Structure Editor in list view

Figure: Failure Net – focus failure "Lights turned off unprompted"

This example makes clear that the base failure is not visible in the Graph Editor's main window, but in one of the configurable lateral lists. From there, it can be synchronized e.g. with the usual list view in the Structure Editor.

We can not and do not want to go into all the details of the Graph Editor with its rather comprehensive functionality. It should be mentioned though that it is also possible to display information relevant to the user at the connecting lines between failures, i.e. the edges between two nodes in the graph, e.g. displaying the failure rates as it is required for Functional Safety.
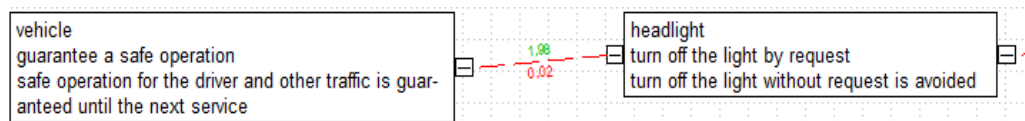

Figure: Graph Editor – labeled edge: Failure rate

Task list

The task list, which can be shown, provides the user with details on the technical options and the current impossibilities. If desired, additional explanations on what happens in detail and why particular things are impossible are provided.

Figure: Graph Editor – task list for selected failure "Lights turned off unprompted"

Figure: Graph Editor – available option with shown explanation / unavailable option with shown explanation

As mentioned above, the task list is an alternative to already available control options (menu item, icon, shortcut). In the field of Functional Safety, it became evident though that the control with more and more and additional classical operating tools can not be target-oriented at all, as far too many options are required. In the above example, you can see what the solution looks like that helps users to keep track of even extremely complex circumstances.

Workflow support

The concept of "auto-filters", which is already known from version 6, is supported by the Graph Editor in a modified and highly improved way. Based on that, a workflow can be realized to handle things in an elegant and convenient manner that are otherwise difficult to handle and take much time.

The workflow is to be illustrated by means of a familiar example, which is not too complex but known to any user. This is about the question, whether all top-level events have an S rating.

Step 1: Context menu "Analysis of target values (FMEA) – S ratings unavailable"

Step 2: List box "Define S ratings"

Step 3: Input of S ratings in dialog in a tabular view

For complex situations in the field of Functional Safety, a great many of workflow support tools were already realized to reach the goals in a simple manner.
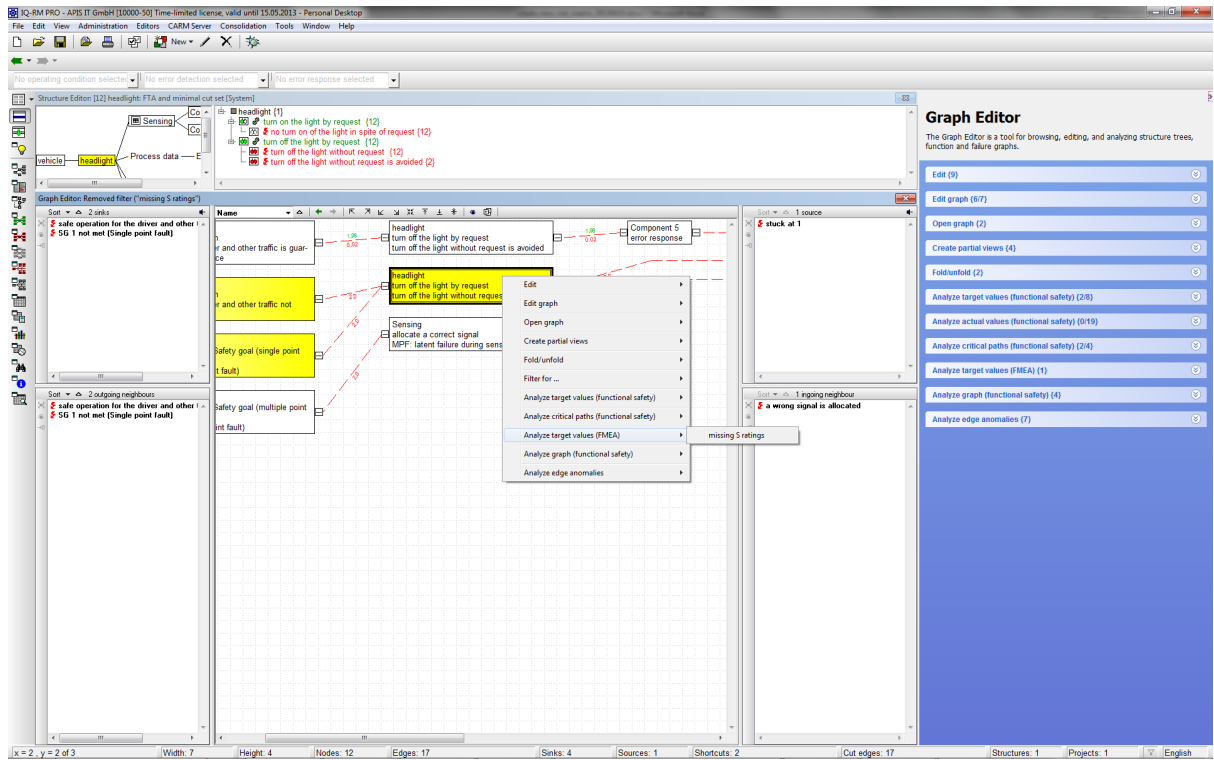
Figure: Context menu "Analysis of target values (FMEA) – S ratings unavailable" (step 1)
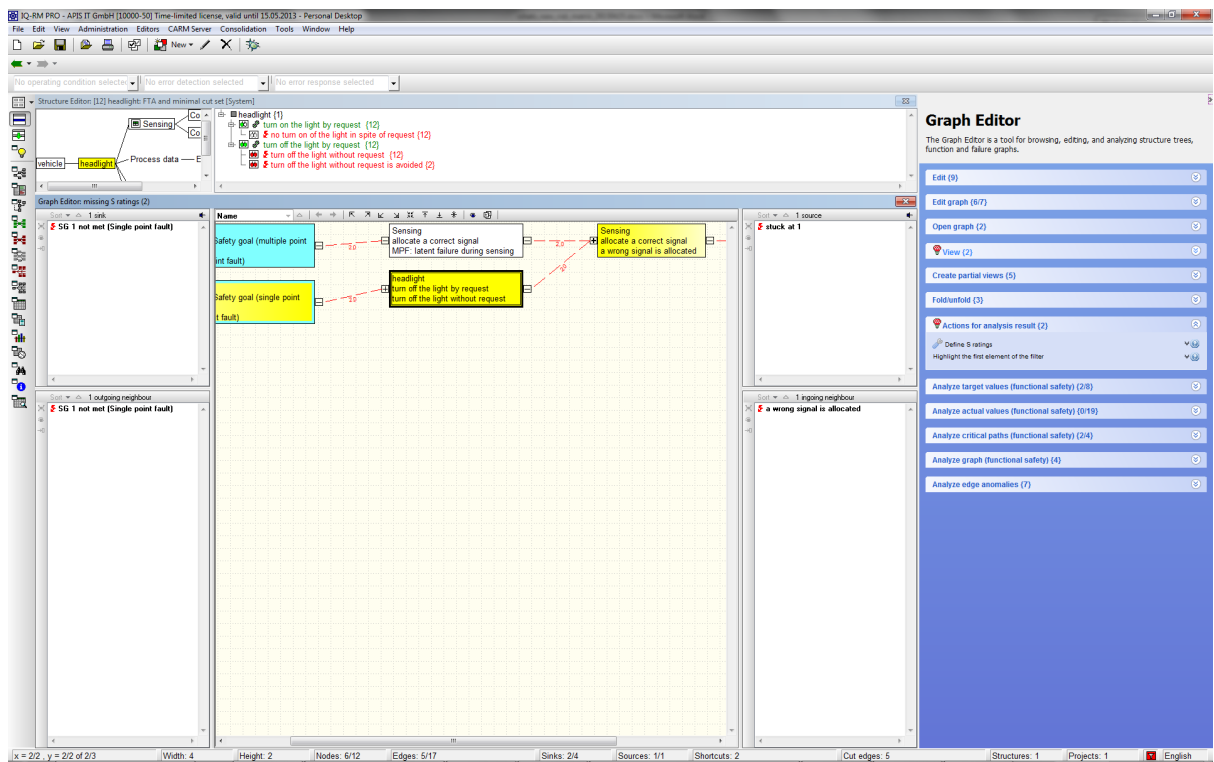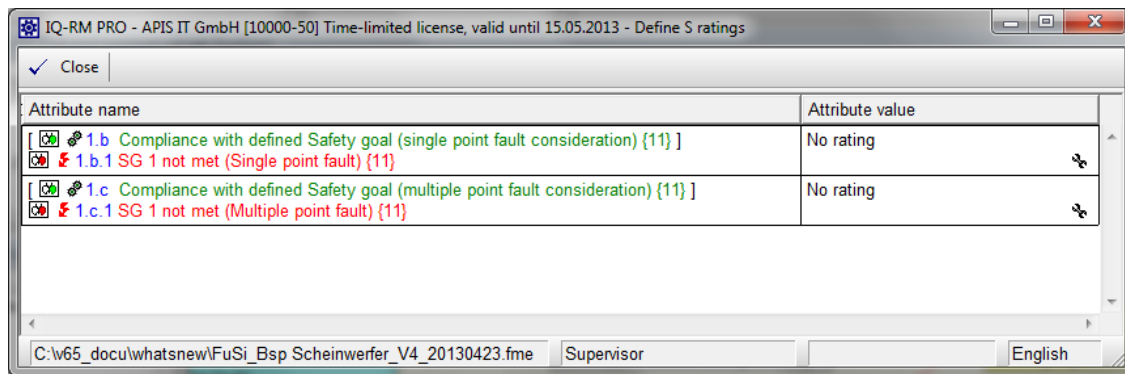

Figure: List box "Define S ratings" (step 2)

Figure: Input of S ratings in dialog in a tabular view (step 3)