

Webinar “Integrating Safety and Reliability Analysis into MBSE Toolkit”

Questions and Answers

1. **What is the best way for a company to get started on this route to Reliability/Safety integration with MBSE?**

There is certainly more than one single way to get started on this route, although, we believe that following the outlined steps below would help achieve significant results:

1. Choose a pilot project that has reliability and safety analysis undergoing within the company. Get as much details from the safety and reliability analysis cross-functional teams to understand the needs for different artifacts and information bits to be reused in a model-based analysis approach.
2. Check out the Cameo Safety and Reliability Analyzer plugin and its capabilities that come out of the box.
3. Identify the differences between the pilot project and the default capabilities that our plugin has to offer.
4. Customize the plugin to cover the identified differences and suit custom needs.
5. Start using the customized plugin in the pilot project.
6. Once the needs get refined through plugin usage, introduce additional customizations like validation rules, reports etc.
7. Make an internal workshop to demonstrate the results of such model-based safety and reliability analysis approach to other people inside the company.
8. Adopt model-based safety and reliability analysis in other teams.

2. **Can we customize all columns?**

Yes, you can. We allow many customizations to be made, including changing the way how different scores are calculated in FMEA and Risk analysis table columns. Moreover, you can easily hide unneeded columns or create custom ones to include in a particular table.

3. **Can you customize likelihood to a number of enumerated values?**

Yes, this is possible. But that would involve some advanced customization steps through MagicDraw’s DSL engine. Hence, we would recommend reusing our current approach by automatically suggesting values from a predefined list. Users can be additionally enforced to only use the predefined values by introducing some custom OCL2.0 validation rules. For more information on creating and using OCL2.0 validation rules, see: <http://docs.nomagic.com/display/MD184/Create+OCL2.0+validation+rule>

4. **Can the data on risks, hazards, etc. be stored as data objects in TcUA?**

It would be possible if TcUA supports import from Microsoft Excel spreadsheets or CSV. This way you could export the data from MagicDraw first and import it to TcUA on a next step. For more information on the export functionality of generic MagicDraw tables, see: <http://docs.nomagic.com/display/MD184/Modifying+generic+tables#Modifyinggenerictables-Exportinggenerictable>

5. What was the metachain navigation used to create the traceability analysis?

Metachain navigation lets us specify the path through the model elements in order to create multilevel associations as dependency criteria for the traceability matrix. In this particular case, the metachain specifies the path from the FMEAItem metaclass to the supplier end of stereotyped dependency <<ItemRelation>>. As a result, we can see trace links between FMEAItem elements and the design elements referenced by dependency <<ItemRelation>>.

6. Can the reliability and safety probabilities, etc. be synced with say a value property of a block?

Under our current implementation, the values of the probabilities are plain String type properties, so there is no straightforward way to sync them with a value property of a block, unfortunately. On the other hand, this could be achieved by implementing a custom MagicDraw plugin or taking advantage of the Scripting support in the tool.

7. How customizable is the reliability analysis? For example, if we want to introduce equations that cost risks based on probability and occurrence categories, is that possible to add?

It is definitely possible. Risk calculations are fully customizable to allow implementation of user defined equations. This is achieved with the help of scripting language support in MagicDraw. To see how the equations could be implemented in JavaScript, please take a look at "Safety Analysis Configuration" element properties in one of our Cameo Safety and Reliability Analyzer plugin samples (Medical FMEA and Hazard Analysis.mdzip).

8. Can requirements identified in MagicDraw be integrated into an application lifecycle management tool (e.g. PTC Integrity)?

Yes, they can. MagicDraw supports requirement export to Requirements Interchange Format (ReqIF) files that can be later on imported into PTC Integrity or any other ReqIF-supporting tool. For more details on how the export mechanism works, see <http://docs.nomagic.com/display/CRMP184/Exporting+requirements>

No Magic also has a dedicated solution for requirement management called Cameo DataHub. It is aimed for requirement import, export and synchronization between different sources (tools, formats etc.) For more information on Cameo DataHub, see <https://www.nomagic.com/files/manuals/CameoDataHubUserGuide.pdf>

9. If our RMA engineers use other tools and don't plan to switch to MagicDraw, can we import that data so it becomes linked to modeling elements in MagicDraw?

It depends on the tools being used. MagicDraw supports Import functionality from CSV files and has a dedicated plugin for that (see <http://www.nomagic.com/files/manuals/CSV%20Import%20Plugin%20UserGuide.pdf>). So if the tools in question have an export to CSV capability, this could work in a semi-automatic way.

10. If we start building up on this free plugin, how can we be sure that: it will remain backward compatible and it will remain free of charge?

As we continue adding new features to the plugin, we cannot guarantee that it will remain backward compatible while it's in the technology preview state. However, we always help our clients to smoothly migrate to newer versions.

As far as the last part of the question is concerned, the answer is yes, we plan to keep it free of charge.

11. Do you integrate with established Reliability modeling tools such as IsoGraph?

No, not at the moment. However, since both tools support Import and Export functionality, this can be achieved to some extent using intermediate formats or tools like Microsoft Excel (CSV).

12. Can we hide columns - for internal use vs. export?

Yes, you can. Showing or hiding columns in generic MagicDraw tables are straightforward tasks (see <http://docs.nomagic.com/display/MD184/Modifying+generic+tables#Modifyinggeneric+tables-Addingorremovingcolumns>). The templates used for export can be easily customized to show or hide any columns in need as well. As a result, different table views can be used internally (in a MagicDraw project) and externally (within the Microsoft Excel reports).

13. Have you investigated availability analyses? Mean Time Between Failure and Operational Availability?

Our current efforts concentrate solely on safety and reliability analysis. Availability analysis is more concerned about the time it takes to restore the unit (or the whole system) after a failure – its maintainability. While an interesting topic as such, it hasn't been investigated in our Cameo Safety and Reliability Analyzer plugin yet. However, we would plan to research more on this topic depending on the interest from the community.

14. Suggestion: "Sequence of Events" could refer to an Activity or Sequence Diagram.

Actually, we are looking into possibilities to represent the value of this column in a more sequence-like way. Making it reference an Activity or a Sequence Diagram is one of the options. Your suggestion is much appreciated.

15. I assume that all the information in tables is exportable to CSV or MS Excel? For risk analysis, we do

Monte Carlo simulations, which we would have to do using an external engine, I assume.

Related question: Can you drive a Monte Carlo simulation from the MagicDraw model.... or at very least map the information into a 'simulation tool'

Currently our Cameo Safety and Reliability Analyzer plugin is not capable of running Monte Carlo simulations out of the box. Although, we are planning on integrating with another No Magic product – Cameo Simulation Toolkit (see <http://www.nomagic.com/products/magicdraw-addons/cameo-simulation-toolkit.html>), that would eventually let us enrich risk analysis with simulation capabilities. At the moment, the most reasonable way to run Monte Carlo simulations would be exporting the Risks data modeled within MagicDraw to MS Excel spreadsheet and employing an external engine for the actual simulation afterwards.

16. What format does it export to?

We currently support export of tables to Microsoft Excel spreadsheets and CSV.

17. Can you tie behavior (i.e. maintenance activities) to hazards?

A hazard is basically any potential source of harm. Currently you can directly specify the name of a Hazard element to whatever reflects the specific source of harm under consideration. Tying behavior activities to hazards at the model level could be easily achieved by creating a simple dependency relationship between them. Or you could take a more advanced route and make additional customizations to the Risks table (e.g. introduce a new dedicated column for that). Also, the Hazard element itself could be extended to allow specification of more of its properties. For more details on advanced customization, please see MagicDraw's UML Profiling and DSL user guide:

<http://www.nomagic.com/files/manuals/MagicDraw%20UMLProfiling&DSL%20UserGuide.pdf>