

# From Secure Business Process Modeling to Design-Level Security Verification (Artifact Paper)

Qusai Ramadan\*, Mattia Salnitri<sup>†</sup>, Daniel Strüder\*, Jan Jürjens\*<sup>‡</sup> and Paolo Giorgini<sup>†</sup>

\*University of Koblenz-Landau, Koblenz, Germany

Email: {qramadan, strueber, juerjens}@uni-koblenz.de

<sup>†</sup>University of Trento, Trento, Italy

Email: {mattia.salnitri, paolo.giorgini}@unitn.it

<sup>‡</sup> Fraunhofer-Institute for Software and Systems Engineering ISST, Dortmund, Germany

**Abstract**—We present the artifact submission for our paper of the same name, to be presented at the MoDELS conference 2017 in Austin, TX. Our submission includes the model transformation from SecBPMN2 to UMLsec models as well as four example models from the Air Traffic Management System case study. We explain the process of using the transformation, and the verification of the generated UMLsec models using the CARiSMA tool.

## I. INTRODUCTION

In this paper, we present the artifact submission for our paper of the same name [1], to be presented at the MoDELS conference 2017 in Austin, TX. Our submission includes the model transformation from SecBPMN2 [2] to UMLsec [3] models as well as four examples models from the Air Traffic Management System case study. The models created for the case study are provided online at <https://github.com/dstrueber/secbpmn2umlsec-casestudy>. We explain the process of using the transformation, and the verification of the generated UMLsec models using the CARiSMA [4] tool.

In Fig. 1, we show framework involves two automated tasks. The first one is an automated model transformation from SecBPMN2 models to corresponding UMLsec structural diagrams (i.e., deployment and class diagrams), using the model

transformation language Henshin and its associated toolset [5]. This task is implemented using a set of transformation rules (.henshin) files and some Java code for rules orchestration. In the henshin files, we define a set of Henshin transformation rules. The rules are defined graphically and applied to the input models (i.e., SecBPMN models) via an interpreter engine provided by Henshin. The output of this task is a UMLsec models, and a trace model. The trace model links the SecBPMN2 and UMLsec models. Using the trace models, one can check whether a UMLsec security stereotype is in place for each security annotation specified in the SecBPMN2 model.

In the second task, we use CARiSMA to automatically verify the generated UML models against UMLsec policies. The output of this process is a text file that summarizes the results of the verification process. More details description about how to use our approach is provided in Sect. II.

## II. USAGE

**Prerequisite.** We recommend using Eclipse Neon, Modeling Tools distribution [6], with an installed nightly build of Henshin and CARiSMA. These softwares plug-ins can be installed on your Eclipse (Help → Install New Software...) from the the following update sites: for CARiSMA use <http://carisma.umlsec.de/updatesite>, while for Henshin one can use <http://download.eclipse.org/modeling/emft/henshin/updates/release>.

**Performing the transformation.** To execute the transformation from SecBPMN2 to UMLsec models, please mind the following instructions. More details are available in the *ReadMe* file [7].

- Import our project package "myexample" to your local Eclipse workspace [8], via File → Import → From Archive File...
- Right click on the main class *BpmnToUml.java* → Run As *JUnit Plug-in Test* to perform the transformation. By default, our transformation takes the *example1.bpmn* file as input. To change the input file, first copy the name of one of the BPMN files that are provided in the *myexample*

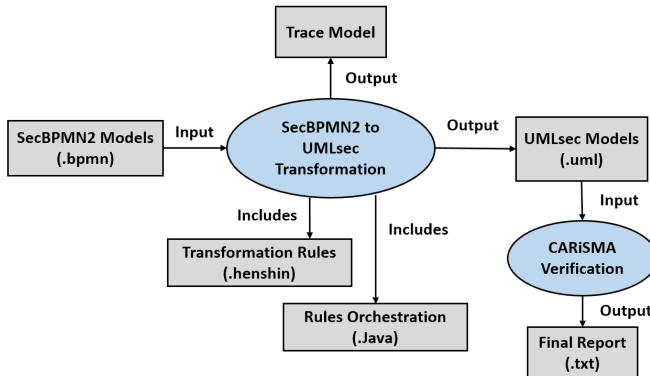


Fig. 1: Process with involved tasks and artifacts

→ *src* → *my.example* directory. Second, find the following line of code (**public static final String EXAMPLE = "example1.bpmn";**) in the *BpmnToUml.java* file (line no. xyz) and replace the file name "*example1*" with the name of the selected BPMN file.

- After executing the *BpmnToUml.java*, you should see console output informing you about the generation process.
- The results of the transformation process (.uml file) will be stored to the *myexample* directory. The name of the UML file is *Transformed\_serialized\_profile*.

**Performing the verification.** In this step, we use CARiSMA checks to verify the generated UML models against UMLsec security policies.

- Right click in the *Project Explorer* view → New → Other → CARiSMA → Analysis → Next in the dialog, select the file that is generated from the last step (i.e., *Transformed\_serialized\_profile.uml*) and then click finish.
- From the dialog, click on *add checks to the list* icon → select the check that you want to perform (e.g., *secure links UMLsec check* and *secure dependency UMLsec check*) then click run. For «abac» policy, you have to select both *RABACsec: Create transformation input* and *RABACsec: Use transformation input* checks. The former allows you to select the role that you want to verify his accessibility to the system operations, while the later return the set of operations that the selected role has an access to them. More details about the execution of CARiSMA checks are provided in the ReadMe file [7]. Other information can also be found in the user manual of CARiSMA. After installing CARiSMA, the manual is available under: Help → Help Contents → CARiSMA.
- The result of the verification is provided in the *Analysis Results view*. One can also right click on the result and select *create a report for selected analysis*. The report will be stored to the *myexample* directory.

## REFERENCES

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