AMADEOS Supporting Facilities

Current SoS design tools are complex and non-intuitive for general SoS designers; also, many of the existing tools expect designers to be well-versed with object-oriented concepts. The *AMADEOS Supporting Facility tool* simplify and provide means for rapid modelling of SoS using the SysML profile (meta-model).

In traditional modelling environment, large models have been known to be difficult to design and maintain; and often leading to spaghetti diagrams. The *supporting facilty tool* reduces the complexity by using collapsed views instead of lines to connect blocks. Also, it warns user of common mistakes during modelling and helps in quicker testing of SoSs through simulation. The s*upporting facility* simplifies the task of SoS modelling by reducing the prerequisites to start modelling. Once the supporting facility is installed on a web server, it can be accessed from any machine using a modern web-browser. The current version of tool can be accessed at: h**ttp://blockly4sos.resiltech.com**, It can also be used locally without the need of a web server.
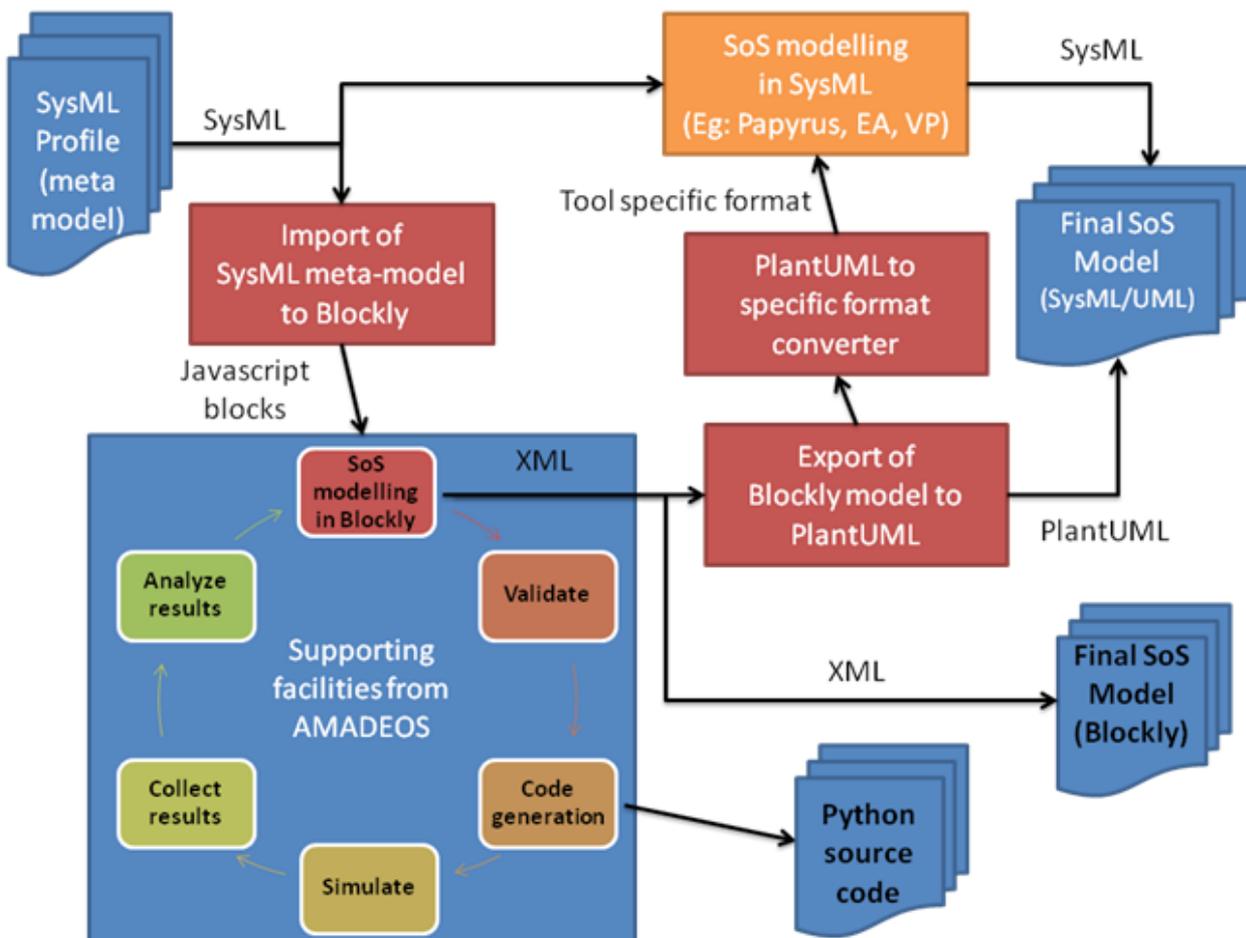
Figure 3 : MDE Flow with the supporting facility tool in blockly

The flow of model-driven engineering using the *supporting facility tool* is described in Figure 3. The starting point is the *SysML meta-model* that represents the key SoS concepts and their relationships as identified in the AMADEOS Conceptual Model (http://amadeos-project.eu/documents/public-deliverables/), which can be transformed to Google Blockly blocks. These blocks may be used in the *supporting facility tool* to create a *SoS model*. The *supporting facility* provides rapid modelling, validating, code-generation, and simulation facilities to the user. The Blockly model can be re-transformed in a SysML model for further refinements or analysis.

The supporting facility generates three outputs :
- The model in XML
- Python code-generated for the simulation
- SysML version of the model

The Python code generated by the tool can be further refined and also can be used to connect to other simulators or external systems for interaction while running simulation. Specificaly, the technologies used in the supporting facility tool are described below:

PlantUML
PlantUML is an open-source tool that enables users to draw UML diagrams using simple plain text. PlantUML is used in the "supporting facility tool" as an intermediately language during model transformation. As PlantUML is based on text, it makes debugging model transformation easier.

Xquery
XQuery is a query language generally used to query and transform XML data. XQuery is used for extracting data from SysML from Eclipse/Papyrus (which is internally a XML notation). XQuery script convertes SysML to PlantUML

Google Blockly
Blockly is a open-source client-side JavaScript library developed by Google for creating visual DSL blocks. It is a aimed at rapid creation of blocks with support for design time checks and code generation. It provides a fast and intuitive environment for modeling.