

The Functional Mockup Interface - seen from an industrial perspective

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The demand for model exchange between development partners will grow during the next years. The Functional Mockup Interface (FMI) [1] is a well received tool independent approach for model exchange. The Original Equipment Manufacturers (OEM) have committed themselves to support FMI as exchange format for simulation models. Therefore, the FMI is a promising candidate to become the industry standard for model exchange and cross-company collaboration.

There are two complementary approaches for modeling complex systems:

- *White box modeling*: Modeling the entire system with one modeling language.
- *Black box model exchange*: Defining an interface for model exchange for standardized, tool-independent exchange format for simulation.

In this paper, the black box model exchange with FMI is evaluated from an industrial perspective. Requirements on such an interface for industrial applications are standardization of the model interface, availability of a significant number of supporting tools, easy-of-use of the interface, adoption of the standard, accompanying documentation and the maturity of such an interface. The paper focuses on the maturity of the FMI standard or the maturity of the implementation respectively.

In the MODELISAR project, requirements for FMI were derived from the beginning and tested for industrial applications. The Performance of the FMI approach was demonstrated in 24 industrial applications. In 2012, an internal benchmark at Bosch with three exporting tools and five importing tools showed quite different results. The test examples range from a “model” containing a sine generator only, a bouncing ball, a spring-damper system, an RC circuit to a thermal network. While some combinations worked quite well, other combinations did not work at all. The challenges encountered in the benchmark are classified and ordered with increasing maturity of the FMI standard. The maturity issues of FMI-based simulation were addressed to the FMI community at the MODELICA/FMI meetings beginning early 2012. The discussions and input from other companies and users resulted in the call for quotation of an FMU Compliance Checker and later of FMI Cross Checking rules. In the future, FMI Cross Checking should be extended to more tools and for multiple FMUs. The (co-)simulation techniques for importing tools should be improved and the improvements of FMI standard 2.0 should be implemented soon.

While FMI as a technical standard is right on track, there are other points to be addressed such as model exchange process and accompanying documentation. FMI is the best available approach for tool-independent model exchange and co-simulation. FMU Compliance Checking and FMI Cross Checking address technical problems that existed in the past. FMI Cross checking should be extended to more complicated examples. Then, FMI can become the technical basis for model-based collaborative engineering in a heterogeneous tool environment with different partners.

References

- [1] Blochwitz, T. et al., The Functional Mockup Interface for Tool independent Exchange of Simulation Models, In: Proceedings of the 8th International Modelica Conference 2011, Dresden, Germany