# Exploring Modeling Pragmatics with Ptolemy and KIELER

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Graphical model-based system design is very appealing and a natural evolutionary step following from machine code over assembler to higher level textual programming languages. Graphical modeling languages have been in existence for several decades now, and much progress has been made regarding their syntax and semantics. However, graphical modeling is still not the rule in system design. We believe that one explanation is the so far rather limited exploration of *modeling pragmatics*. This area includes the actual editing process, the visualization of complex graphical models, visualization of model *behavior*, and user interaction, *i.e.* the *mechanics* of model editing, browsing and simulation.

The Kiel Integrated Environment for Layout for the Eclipse RichClientPlatform (KIELER) is a test bed for the exploration of modeling pragmatics. A guiding principle is to avoid effort-prone manual tasks in the graphical layouting that instead can be done automatically by the modeling environment. The automatic synthesis of graphical model layouts enables a wide set of novel modeling paradigms that help the developer to cope with the complexity of real-world applications.

The predecessor of KIELER used built-in simulation engines for a small set of graphical modeling languages. KIELER aims to broaden the approach and to support a wide set of graphical Domain Specific Modeling Languages (DSMLs). To this end, we are currently investigating how to leverage the wide range of capabilities and DSMLs already offered by Ptolemy. Concretely, Ptolemy may serve as a simulation backbone for multiple different DSMLs. In short, one may say the Ptolemy provides the modeling semantics, and KIELER supports the pragmatics; accordingly, we refer to this project as KIELER leveraging Ptolemy semantics (KlePto).

Conversely, we would like to make the technologies employed in KIELER available to Ptolemy users as well. KIELER is composed into modules such that some of them might be used by the Ptolemy community to enhance the Ptolemy user interface. For example we develop special automatic layout algorithms that respect port constraints for actor-oriented data-flow diagrams with ports and result more appealing layouts than standard graph layouters.

We will present the current state of the KIELER project. A focus will be laid on the visualization of model behavior, *e.g.* by introduction of a generic simulation engine for different model types. We try to find a mapping between an arbitrary graphical DSML, such as Statecharts, Matlab/Simulink or SCADE, to a Ptolemy model. This mapping can hardly be generally applicable to any graphical formalism but requires precise knowledge of the exact semantics of the graphical language. Hence for each language this knowledge needs to be provided to the mapping engine prior to the transformation from the DSML to an equivalent Ptolemy model. We will present the current state of the first approach of creating formal *meta-models* for both, the DSML and Ptolemy, and perform the mapping by a *model-to-model transformation* with the semantics information provided in form of transformation stylesheets into the process.