A Novel Proposal on how to Parameterize Models in Dymola Utilizing External Files under Consideration of a Subsequent Model Export using the Functional Mock-Up Interface

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This paper shall deal with a topic not yet intensely discussed by the Modelica community but of central importance for industrial use cases: Parameterization of models, considering a subsequent model export and the handling of data in this case.

During model export the parameters are either assigned with values directly or they are linked to external data-files. If the design of models or libraries is done without considering how data is handled in an exported model, e.g. Functional Mock-Up Unit (FMU), those concepts are often mixed, resulting in an inconsistent data management which is cumbersome or even error prone for the user.

In Modelica it is common to specify parameter values in records. The parameterization can either be done by coding values into the record or by reading the data from an external file. Both solutions have their pros and cons and are absolutely justifiable.

In this paper we will focus on the export of Functional Mock-Up Units (FMUs) from Dymola, discussing different use-cases in which the FMU is utilized after the export. Depending on the particular use-case the model export underlies different requirements regarding convenient data handling. To our experience the following use-cases cover most of the applications used in industry today:

1. Parameter values are stored inside the FMU.
2. Parameters are stored in an external data-file. The FMU reads the parameter values during initialization of the simulation.
3. The data-file is stored inside the FMU's `resources` folder, i.e. the FMU reads the parameters during initialization, but no external files are necessary.

Each of those use-cases requires a different implementation - in terms of model parameterization:

1. Parameters are assigned in the record directly
2. Read data from file during model translation
3. Read data from file during model initialization
4. Read data from file during model initialization with data in the FMU

Whereas use-case 1 can either be accomplished by implementation 1 or 2. For this reason all of them will be discussed in detail in the paper.