

The impact of FMI on In-house Tool Development

Bright Prospects for OpenModelica?

Agenda

1. High demand on dynamic simulation tools due to market needs.
2. FMI
3. Exemplary usage of FMI in DYNAPLANT
4. Major OpenModelica improvements needed
5. Conclusion

FMI: Motivation and Background

Background and Meaning of Mock up

SIEMENS

M

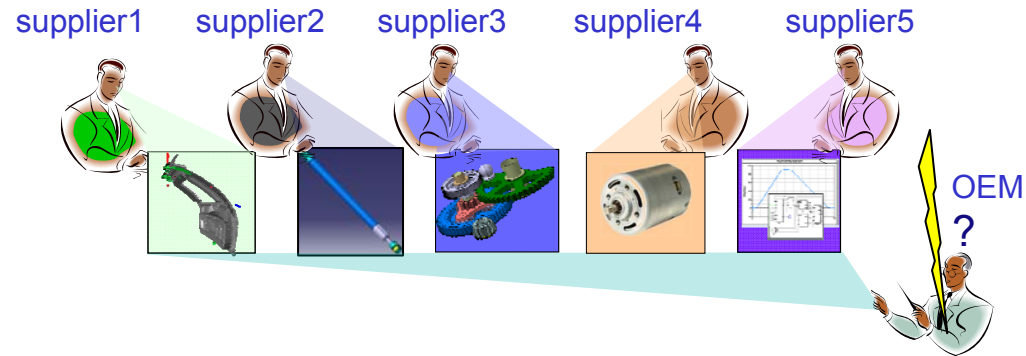
Au



Functional Mock-up Interface (FMI) - Motivation (1)

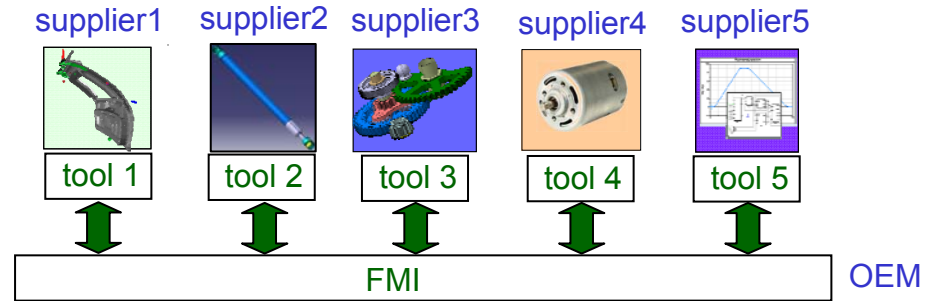
Problems / Needs

- Component development by supplier
- Integration by OEM
- **Many different simulation tools**



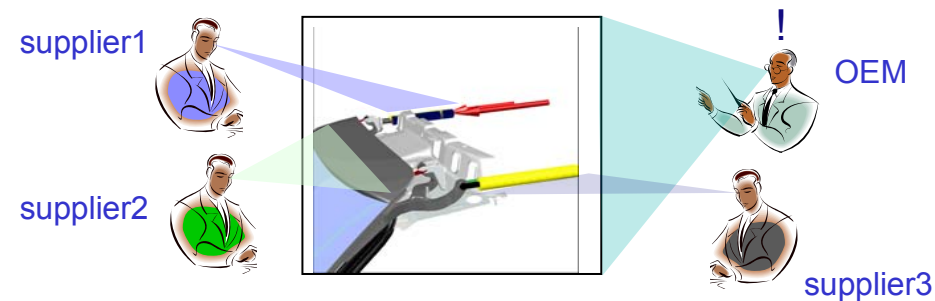
Solution

- Reuse of supplier models by OEM:
 - DLL (**model import**) and/or
 - Tool coupling (**co-simulation**)
- Protection of model IP of supplier



Added Value

- Early validation of design
- Increased process efficiency and quality



slide from Nick Suyam, Daimler (adapted)

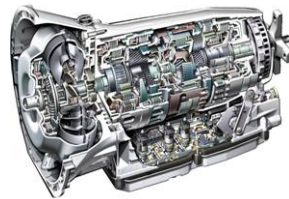
FMI – Overview

The FMI development is part of the ITEA2 MODELISAR project (2008 - 2011; 29 partners, Budget: 30 Mill. €)

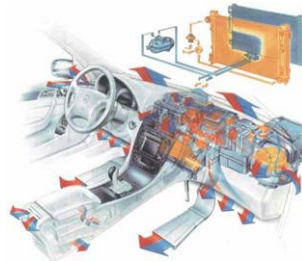
- FMI development initiated, organized and headed by **Daimler** AG
- Improved Software/Model/Hardware-in-the-Loop Simulation, of **physical** models from **different vendors**.
- **Open Standard**
- **14 Automotive Use-Cases** to evaluate FMI.



Engine with ECU



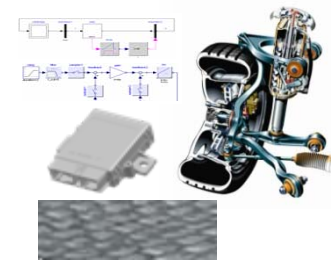
Gearbox with ECU



Thermal systems



Automated cargo door



Chassis components, roadway, ECU (e.g. ESP)

etc.

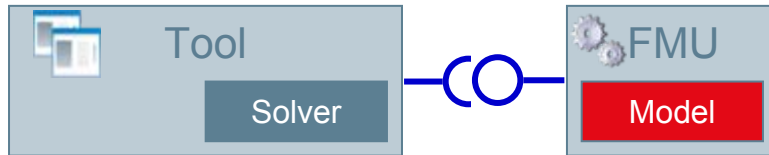
functional mockup interface for model exchange and tool coupling

courtesy Daimler



FMI - Main Design Idea (1)

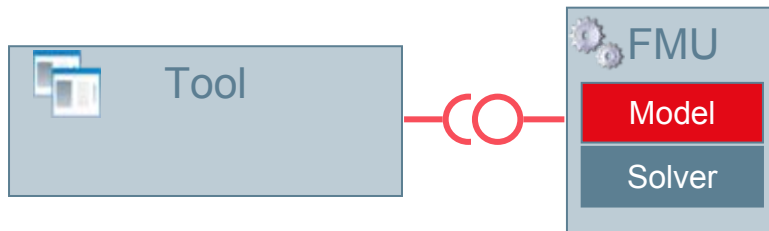
➤ FMI for Model Exchange:



➤ Version 1.0 released in January 2010

➤ FMI for Co-Simulation:

➤ Reuses as much as possible from FMI for Model Exchange standard

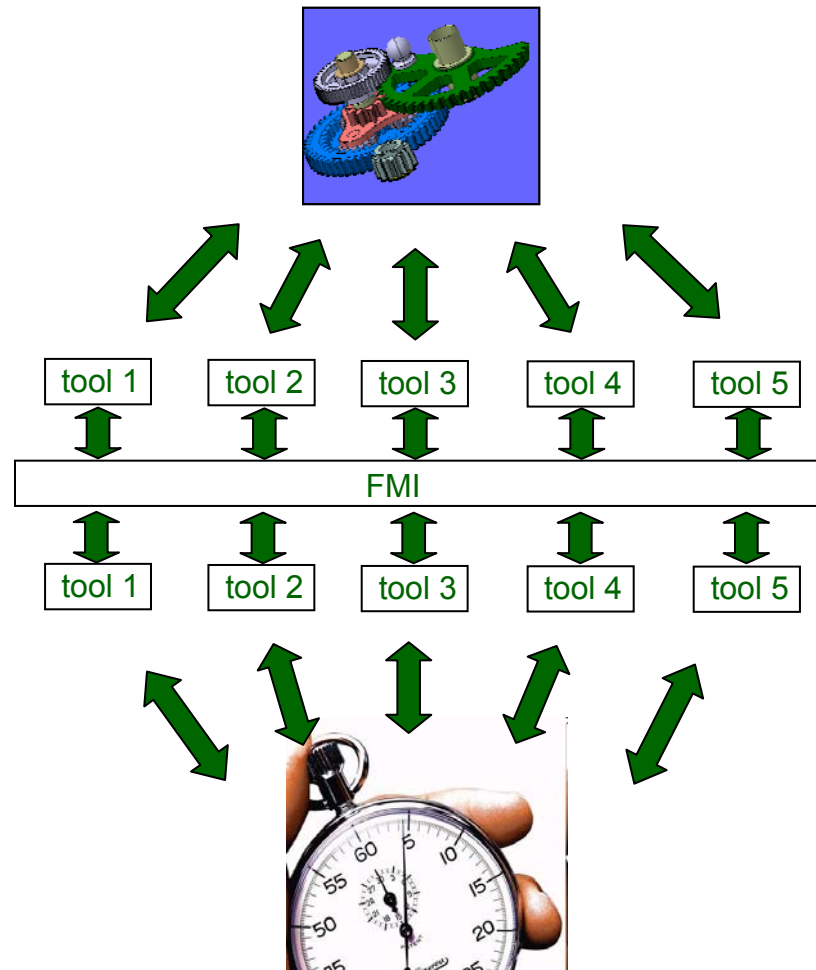


➤ Version 1.0 released in October 2010

FMI as a basis for tests

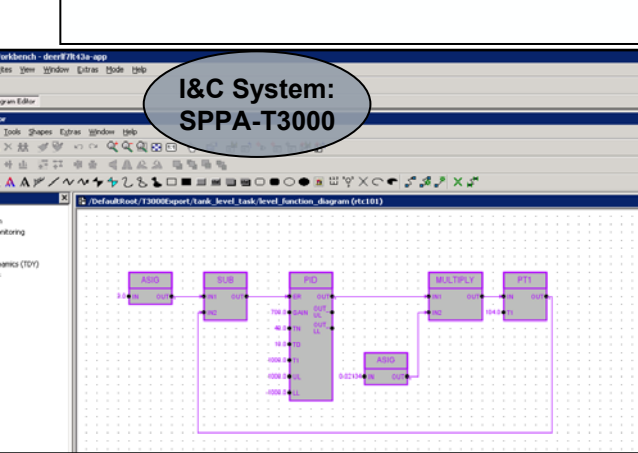
FMI test scenarios

- test FMUs of different tools regarding:
 - Performance.
 - Modelica compliance.
 - Accuracy.
- Run automated tests on compiled models.
- Combine different FMUs with different solvers and runtimes.
- Use your own proven solver and runtime.

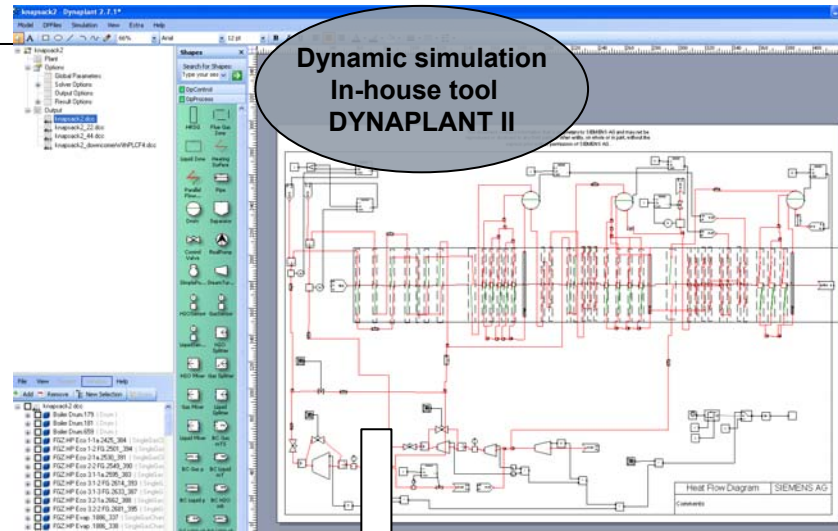


Potential industrial OpenModelica Use Cases

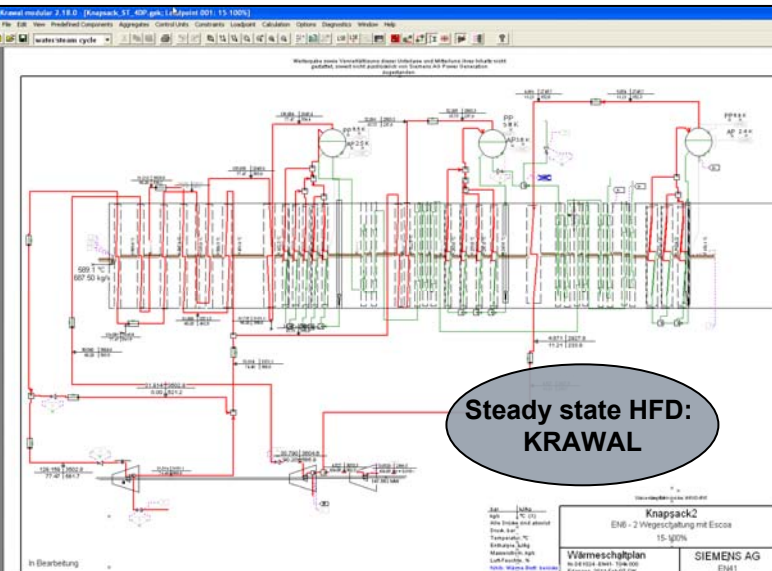
FMI Workflow for in-house plant modeling



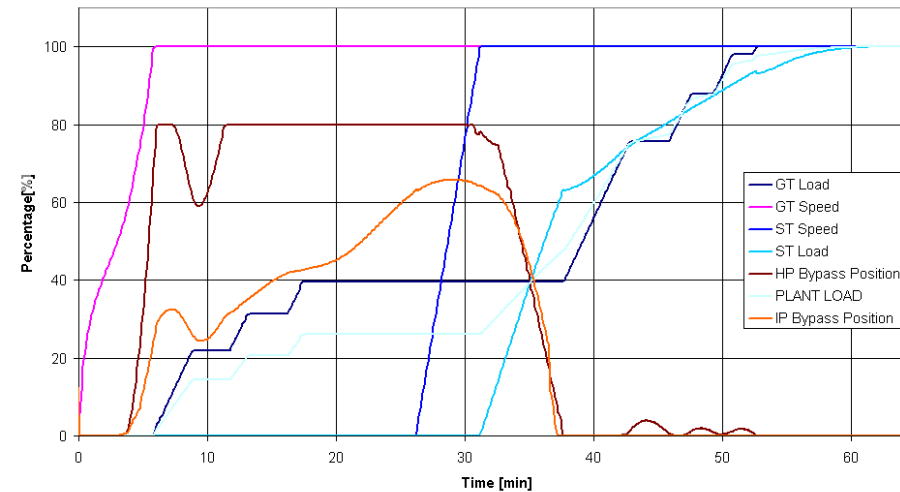
Semi automatic generation of FMUs



Plant Start-up



Transfer data from HFDs



For internal use only!

Energy F ES EN PTEC PE

Manual generation of FMUs

This document contains information that is proprietary to SIEMENS AG and may not be reproduced or disclosed to any third party or other entity, on whole or in part, without the express prior written permission of SIEMENS AG.

Load FMU

Generation of a FMU

YFR 0CJA00DP100/... V035

Model DPFFiles Simulation View Extra Help

106% Arial 12 pt

Toul_SimpleBoilerNew2 - Dymaplan 2.7.1.4

Model DPFFiles Simulation View Extra Help

DymolaWork\ControlFMU

Tools Help

Search Folders

paces\DymolaWork\ControlFMU

Compliance CTI Advanced - Login DataCenter Web EBP Enterprise Portal - Home

Name	Type	Date M
PresControl.Fmu	FMU File	03.02

0 bytes My Comp

File View Export Window

Add Remove

Package Browser

Components

SiemensPower.Control.BlockControl.PlantControl.PresControl

- SteamFlow
- MinUpPresMarginDrum
- BypassPosition
- PresHRSG
- GTexhaustTemp
- STvalve
- PresSetPoint
- STPresSetPoint
- FirePresReached
- SetpointAdjuster

const 1

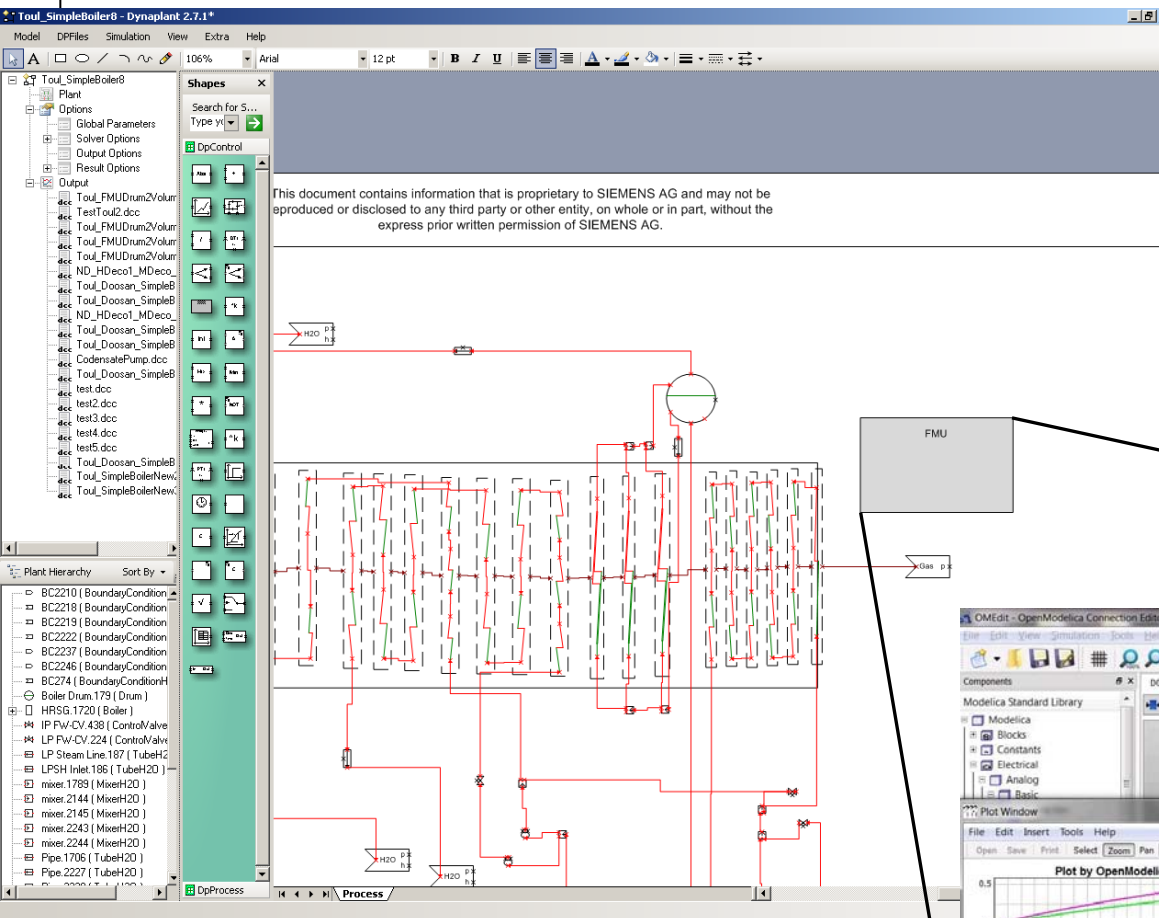
allowedDecrease

SteamStatus

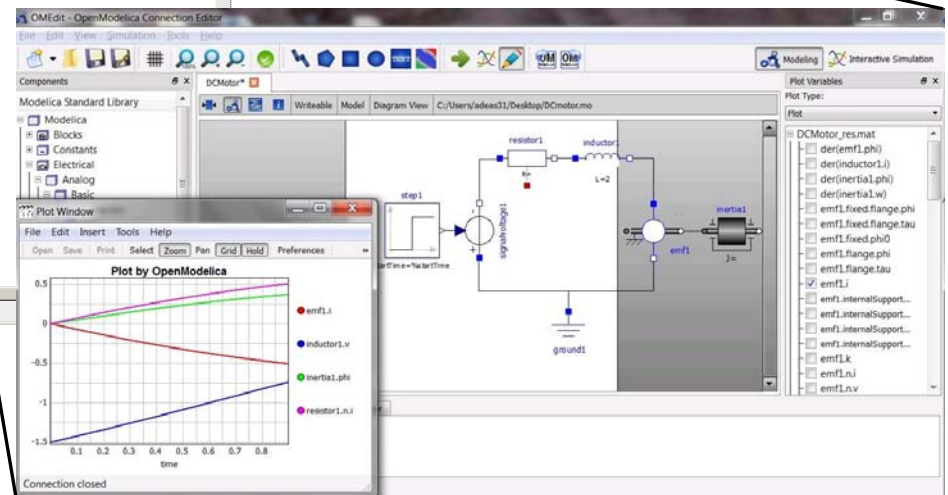
setpointAdjuster

Modeling Simulation

Ideal Workflow for in-house plant modeling



Generate FMUs based on arbitrary Modelica code on the fly.



Conclusion

- The demand on specific modeling solutions will increase dramatically not only in the energy business.
- FMI simplifies the integration of Modelica in in-house tools.
- Open source Modelica environments are highly attractive for the utilization in in-house tools.
- The potential for industrial funding (e.g. OSMC level 2 membership) is huge, but might be even larger if:
 - the development has a stronger application focus.
 - better communication of achievements and shortcomings.
- Powerful interfaces and scripting are key features.

Your Feedback

Thank you for your attention!

