



Overview on FMI Project

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Contents

- History
- Project Rules
- Groups and Members
- Current Activities
- Resources
- Other Activities related to FMI

History

EU Project Modelisar (2008 – 2011):

- Initiated by Daimler AG to develop a tool independent model exchange format
- 28 European partners, 26 Mill. €, 178 man years
- Release of FMI 1.0 in October 2010

Modelica Association Project (MAP) FMI:

- Modelica Association changed its bylaws to become an umbrella organization for projects related to model based system design
- Four projects:
 - Modelica Language
 - Modelica Standard Library (MSL)
 - Functional Mock-up Interface (FMI)
 - System Structure and Parameterization (SSP)

History

FMI 1.0:

- FMI for Model Exchange (January 2010)
- FMI for Co-Simulation (October 2010)

FMI 2.0 (July 2014):

- Unification and harmonization of Model Exchange and Co-Simulation
- Clarification and improvement of specification document
 - Classification of variables
 - Mathematical model, semantics, calling sequence
- New features for improvement of usability and performance of large models
 - Tunable parameters, improved unit handling
 - Save and restore FMU state
 - Detailed dependency information (inputs, outputs, derivatives, states)
 - Efficient interface for directional derivatives

Some Statistics

	2011 Modelisar	2012	2013	2014	02/2015	09/2015
FMI Tools						
Support	15	32	37	47	65	65
Planned		9	7	10	6	10
Steering Com.		9	11	12	12	12
Mailing Lists						
Design		49	89	110	124	131
Info		49	77	117	132	152

Project Rules

General conditions

- Results are owned by the Modelica Association (MA)
- Results are freely available under a copyleft license
- FMI MAP members need not to be MA members
- Meetings are open to the public

FMI Steering Committee

- Defines FMI policy, strategy, feature roadmap, releases
- Voting rights

FMI Advisory Committee

- Contribute to FMI design
- Access to FMI infrastructure (svn, trac, meeting minutes)

Groups and Members

Steering Committee

- Prove active FMI support by participation at 2 meetings in the last 24 months
- Support FMI or part of it in a commercial or open source tool, and/or active FMI usage in industrial projects
- Be accepted by Steering Committee with qualified majority

Advisory Board

- Prove active FMI support by participation at 2 meetings in the last 24 months
- No voting necessary

Guests

- Send e-mail to contact@fmi-standard.org for registration in mailing list

Groups and Members

Steering Committee

- Bosch, Daimler, Dassault Systèmes, dSPACE, IFP EN, ITI, Siemens Industry Software (LMS), MapleSoft, Modelon, QTronic, Siemens, SIMPACK GmbH

Advisory Board

- AVL, Armines, DLR, IBM, ETAS, Fraunhofer (IIS/EAS, First, SCAI), Open Modelica Consortium, Synopsys, TWT, University of Halle

Guests

- Altair Engineering, University of California, Equa Simulation, ESI, ...

Current Activities

Quality of tool implementations

- **FMI Cross Check Rules**
- Continuous maintenance of **FMI Compliance Checker**

Improvement of processes

- Adaption of FMI Project Rules to the current status
- **Definition of FMI Development Process**
- **Founding of FMI Working Groups**

Public relations

- FMI logo is finished, legal issues have to be solved before publication
- Rearrangement and new content of website (download, FAQ)

Current FMI Activities

Corporate Contributor License Agreement (CCLA)

- Contributors have to grant free copyright to their contributions and any existing patents that are needed to implement or use FMI
- Shall give some safety against patent lawsuits to MA, FMI-tool vendors and users
- Is a common procedure in standardization projects
- Needs to be checked by legal departments of the involved companies and organizations
- Member companies of Steering and Advisory Committees and listed contributors **have** to sign

Resources

Website: fmi-standard.org

- [FAQ](#)
- [Download](#) specifications
- [List of tools](#) and cross check results

Ambiguities in specification, feature requests etc.:

- Public error tracking system trac.fmi-standard.org
- Send e-mail to contact@fmi-standard.org
- Contact your FMI-tool vendor

Mailing lists:

- FMI-Info, used for public announcements, subscribe via [contact](#) page
- FMI-Design, for active developers, send e-mail to contact@fmi-standard.org

Activities related to FMI

MODRIO (Model Driven Operation)

- Extends state-of-the-art modelling and simulation environments based on open standards to increase energy and transportation systems safety, dependability and performance throughout their lifecycle
- 09/2012 – 05/2016, 38 partners
- <https://itea3.org/project/modrio.html>

ACOSAR (Advanced Co-simulation Open System ARchitecture)

- Standardized Integration of Real-Time Systems ensuring Modular and Consistent System Development
- 9/2015- 8/2018, 15 partners,
- <https://itea3.org/project/acosar.html>

Activities related to FMI

ProSTEP iViP Smart Systems Engineering Project

- Solutions for the cross-disciplinary and cross-enterprise exchange of behavioral models.
- Best practice recommendations for processes around model exchange
- FMI is basic technology
- 2012 - ..., 24 partners
- <http://www.prostep.org/en/projects/smart-systems-engineering.html>

NAFEMS – INCOSE **S**ystems **M**odeling & **S**imulation **W**orking **G**roup

- Advancement of engineering simulation and model based systems engineering
- mutual assistance and support for international standards and develop a joint approach for interfacing with other organizations in related professional areas
- Founded 2012, 58 members
- http://www.nafems.org/about/tech/systems_modeling/

Conclusion

FMI is a unique initiative for Model Exchange and Co-Simulation

- Tool independent
- Developed in close cooperation between leading CAE tool vendors
- Proof of concept in industrial use cases during development
- Open and free access to FMI specification and additional material
- Fast adoption by tool vendors
- Used in industry and research
- Continued maintenance as a Modelica Association Project