

Functional Mockup Interface News

INCOSE/NAFEMS SMSWG

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Overview

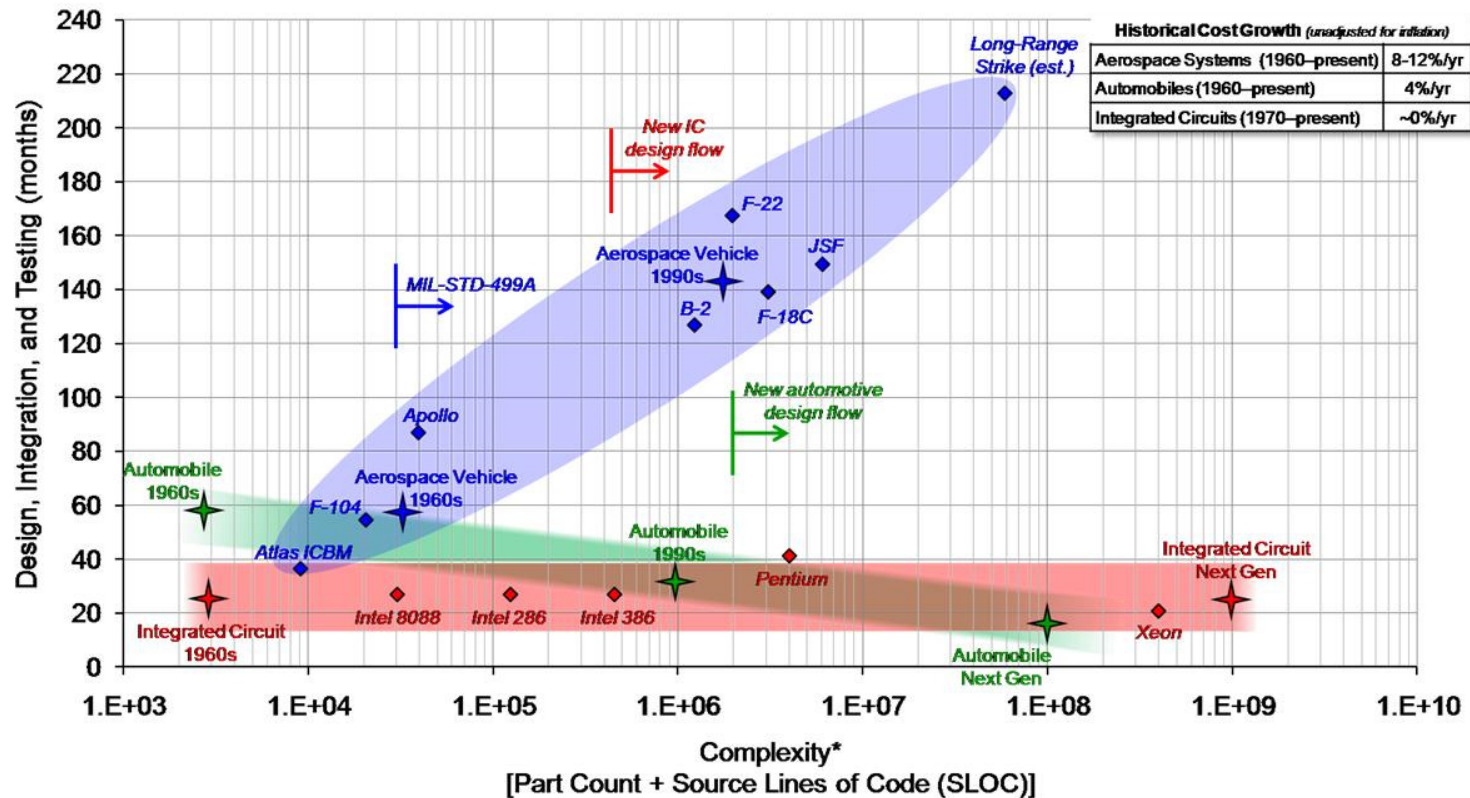
- Background and Motivation
- FMI tool support and adaptation
- Summary of news presented at the 10th Modelica conference in Lund, Sweden in March
 - FMI Version 2.0 now released: what's new?
 - Highlights from tool releases & applications
- Updated status of standard and available tools
 - Available tools and libraries
- Outlook

History

- FMI for model exchange V 1.0 released in Q1 2010
- FMI for co-simulation V 1.0 released in Q4 2010
- First beta-version of unified FMI V 2.0 in Q4 2011
- Stewardship of FMI-standard transferred from Modelsar EU-project to Modelica association: 2012
- Release of FMI 2.0 in July 2014
 - Ongoing implementation by at least 8 tools with intensive cross-testing ongoing
 - Most Major FMI tools will support FMI 2.0 in Q1 2015

System complexity

- System complexity increases
- Required time to market decreases (most industries)
- Without disruptive changes, an impossible equation to solve.



FMI in automotive

- FMI development initiated, organized and headed by Daimler AG during Modelisar R&D project
- Ongoing automotive industry initiative to push FMI standardization
- Published usage by OEMs (Ford, BMW, Volvo) and Tier 1 suppliers at FMI Tech Day in Detroit and latest Modelica Conference
 - ▶ GAAG Meeting , Munich Oct. 23 2012

- New FMI-based initiative of automotive OEMs (started Sep 12)
 - BMW, Daimler and Ford initiate establishment of standard processes for simulation model exchange between OEMs and suppliers based on FMI



- GM, Isuzu and Toyota already support this initiative



- Accompanying 'Smart Systems Engineering' project at ProSTEP IVP started in October



ORGANIZATIONS SUPPORTING FMI

- Modelica Association (MA), non-profit
 - FMI: sub-project of MA
- GAAG: Global Automotive Alliance group
 - Group of 15 automotive OEM supporting and pushing FMI
- ProStep e.V.
 - Known for developing the STEP CAD standard
 - Now working for interoperability & standards in PLM

FMI-Compatible Tools (from FMI [website](#)) > 60

	Export	Import	Slave	Master	
Adams		Planned	Available	Available	High end multibody dynamics simulation software from MSC Software
AMESim	Available	Available	Available	Planned	Modelica environment from LMS-Imagine
ANSYS Simplorer		Planned	Planned		ANSYS Simplorer is a multi-domain, multi-technology simulation program from ANSYS .
ASim - AUTOSAR Simulation	Available		Available		AUTOSAR product from Dassault Systèmes
Atego Ace		Available		Available	Co-simulation environment with AUTOSAR and HIL support
@Source	Available				Simulink via @Source
Building Controls Virtual Test Bed				Available	BCVTB is a Software environment, based on Ptolemy II , for co-simulation of, and data exchange with, building energy and control systems.
CarMaker				Available	CarMaker is an open test- and integration-platform for MIL, SIL and HIL.
CATIA	Available	Available	Available	Available	JavaFMI Planned Available JavaFMI is a Java wrapper for the Functional Mock-up Interface Windows 32 & 64 bit OS.
ControlBuild	Available	Available	Available	Available	JFMI Available Available A Java Wrapper for the Functional Mock-up Interface, based on
CosIMate		Available		Available	JModelica.org Available Available Available Available Open source Modelica environment from Modelon
Cybernetica CENT		Available		Planned	LMS Virtual.Lab Motion Available Planned Available Virtual.Lab Motion is a high end multi body software from LMS In
Cybernetica ModelFit		Available		Available	MapleSim Available Planned Planned Planned Modelica-based modeling and simulation tool from Maplesoft
DSHplus	Planned		Planned		MESSINA Available Planned Planned MESSINA is a test platform for model-based ECU function develo
Dymola	Available	Available	Available	Available	MWorks Available Planned Planned Planned Modelica environment from Suzhou Tongyuan
EnergyPlus			Planned	Available	NI LabVIEW Planned Graphical programming environment for measurement, test, and National Instruments
FMI Add-in for Excel				Available	OpenModelica Available Available Planned Available Open source Modelica environment from OSMC
FMI add-on for NI VeriStand		Available			OPTIMICA Studio Available Planned Planned Planned Modelica environment from Modelon
FMI Blocksset for Simulink				Available	Ptolemy II Planned Software environment for design and analysis of heterogeneous
FMI Library		Available		Available	PyFMI Available Available Available For Python via the open source package PyFMI from Modelon . A JModelica.org platform.
FMI Target for Simulink Coder			Available		RecurDyn Planned Planned Planned Planned High End Multi Flexible Body Dynamcis Software from FunctionB
FMI Toolbox for CarMaker		Available		Available	Reference FMUs Planned Planned Reference FMUs supplied by enthusiasts and volunteers to show features
FMI Toolbox for MATLAB	Available	Available	Planned	Available	SCADE Display Planned Planned SCADE Display facilitates embedded graphics, display and HMI d code generation for safety-critical displays from ANSYS .
FMU SDK	Available	Available	Available	Available	SCADE Suite Available Available SCADE Suite is a model-based development environment with co safety critical embedded applications from ANSYS .
Hopsan	Available	Available			Silver Available Available Available Available Virtual integration platform for Software in the Loop from QTroni
ICOS "Independent Co-Simulation"		Available	Available	Available	SIMPACK Planned Available Planned Available High end multi-body simulation software from SIMPACK AG
					SimulationX Available Available Available Available Multi-domain simulation tool for design, analysis and virtual prototy by ITI .

News for FMI 2.0

Material from Torsten Blochwitz
FMI Project Leader

[NewFeatures FMI 2 0.pdf](#)

FMI TOOL NEWS

- Broad support by HIL/SIL platforms (automotive)
 - DSpace: support for Scalexio and DS1006 platforms'
 - Supported by most Bosch/ETAS tools
 - Concurrent real time: FMI support
 - NI VeriStand: FMI support
 - CarMaker: FMI support
 - OPAL-RT FMI support announced

FMI 2.0 STATUS UPDATE

- FMI-Checker tool updated to FMI 2.0
- BSD-licensed FMI Library updated to FMI 2.0
 - Used by many tool vendors
 - Used by companies for in-house tool support
- Many tools in RC-status for FMI 2.0 support
- Release of FMI 2.0 cross-check compatibility to public: scheduled for January 31st

OUTLOOK: POSSIBILITIES WITH FMI 2.0

- Tool interoperability:
 - Higher quality coupling due to availability of derivatives
 - Coupling with CFD tools
 - Coupling with more FEM tools
 - Co-simulation: improved initialization, better performance for FMI-ME couplings
- New Application Possibilities
 - Optimal control – multiple shooting algorithms
 - Observers
 - Optimization
- Positive feedback of current adaptation will lead to even more adaptation