OSLC Adapter for the Functional-Mockup-Interface

Hubertus Tummescheit

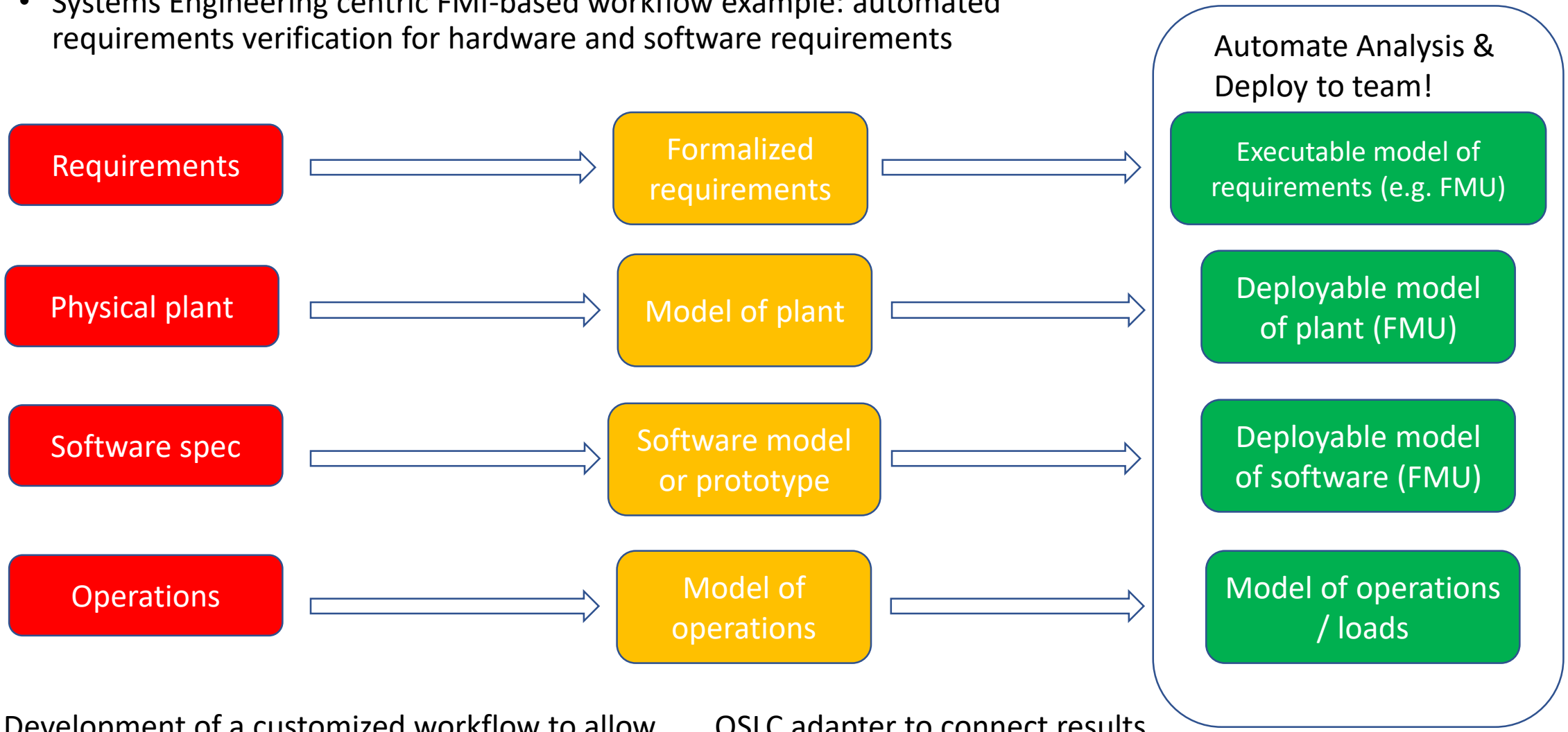
Modelon

Overview

- Motivation
- FMI – brief recapitulation
- FMI-OSLC adapter – architecture
- What can be done?

Motivation: Automated Requirements Verification

- Systems Engineering centric FMI-based workflow example: automated requirements verification for hardware and software requirements



Development of a customized workflow to allow rapid iterations of plant & software configuration

OSLC adapter to connect results to triple-store in RDF format

FMI: THE OPEN STANDARD FOR MODEL EXCHANGE

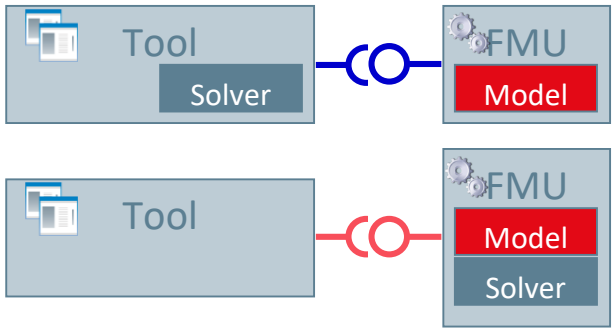
FUNCTIONAL MOCK-UP INTERFACE

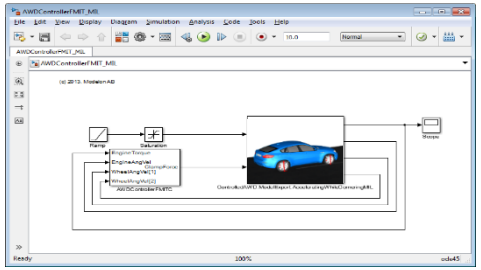
FMI® is:

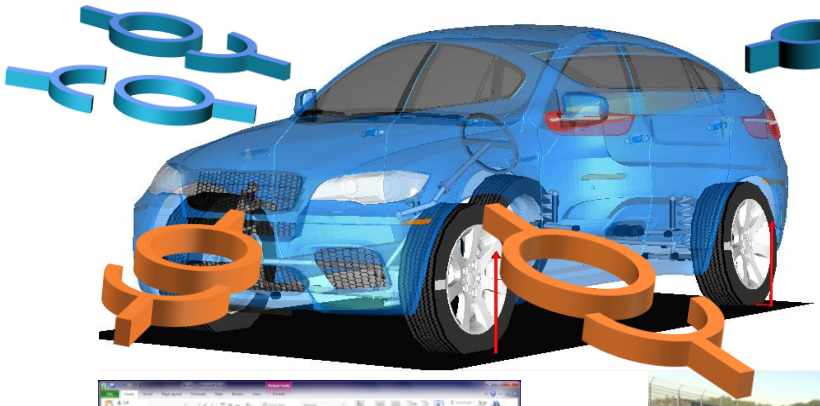
- Tool independent standard for model exchange and co-simulation
- Currently supported by more than 95 tools
- Strong support from automotive industry

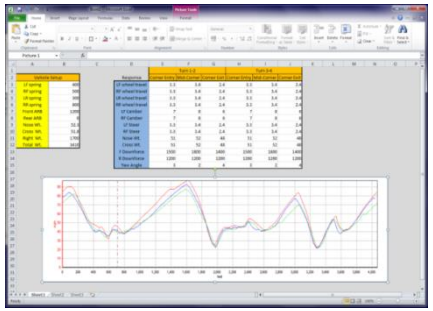
FMI® enables:

- Model-sharing and IP protection
- Deployment in different applications
- Streamlined tool connectivity







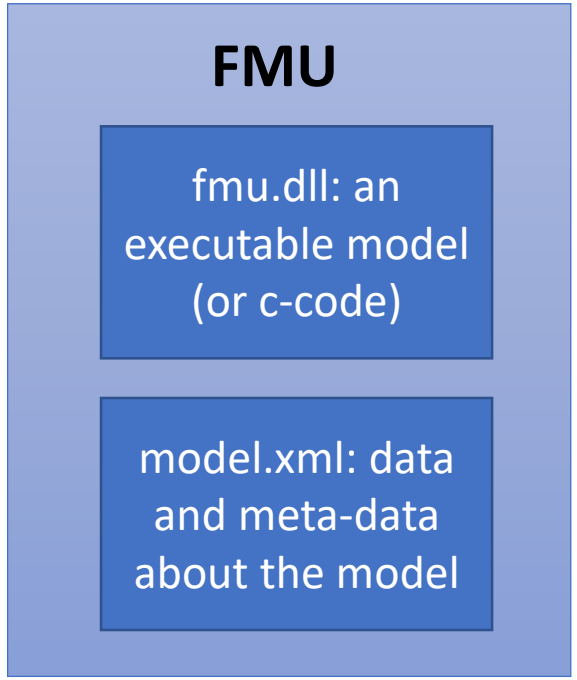


WWW.FMI-STANDARD.ORG

FMI is short for Functional Mockup Interface
FMU is short for Functional Mockup Unit

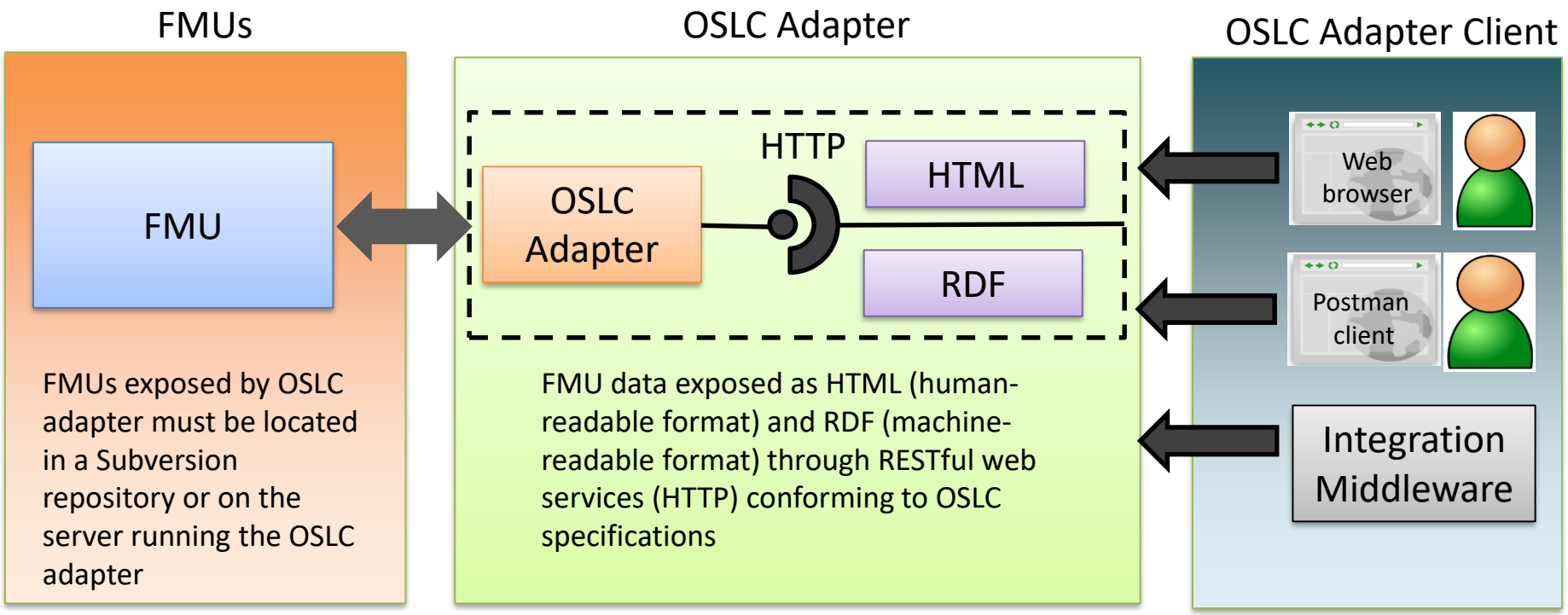
FMU: A MODEL WITH STANDARD INTERFACE

- A component which implements the FMI standard is called *Functional Mockup Unit (FMU)*
- Separation of
  - Description of interface data (XML file)
  - Functionality (C code or binary)
- A FMU is a zipped file (*.fmu) containing the XML description file and the implementation in source or binary form
- Additional data and functionality can be included
- Information & Interface specification: www.fmi-standard.org
- The OSLC adapter interacts with the xml part of the fmu.



From the official FMI presentation (adapted)

Architecture of FMI OSLC Adapter



The OSLC adapter can perform both GET (for everything) and UPDATE (where applicable) operations on the FMU

Main building blocks: FMI-Library by Modelon and OSLC4J by Koneksys

Example output from FMU ModelDescription in html

FMI2.0_ME_ControlledTemperatureIO.fmu

This document:
http://localhost:8686/oslc4jfmi/services/FMI2.0_ME_ControlledTemperatureIO/ModelDescription

Nested OSLC resources

DefaultExperiment
ModelExchange
CoSimulation
ModelVariables
UnitDefinitions
TypeDefinitions
VendorAnnotations

Attributes

FmuPath	conf\fmi\fmu\FMI_2.0_CS_ControlledTemperatureIO.fmu
TmpPath	conf\fmi\temp\FMI_2.0_CS_ControlledTemperatureIO.fmu
FmiVersion	2.0
ModelName	ControlledTemperatureIO
Guid	{7f4e9e78-51f2-4363-9052-d5ab91a16b05}
Description	Control temperature of a resistor
Author	
Version	
Copyright	
License	
Kind	ModelExchange
GenerationTool	Dymola Version 2016 (32-bit), 2015-04-15
GenerationDateAndTime	2016-07-13T12:50:19Z
VariableNamingConvention	null
NumberOfContinuousStates	1
NumberOfEventIndicators	6

List of FMI Resource shapes

FMI Resource Shapes

This document: http://localhost:8686/oslc4jfmi/services/resourceShapes
Adapter Publisher: modelon
Adapter Identity: com.modelon.oslc

- Enumeration Resource Shape
- ScalarVariable Resource Shape
- ScalarVariableType Resource Shape
- ModelStructure Resource Shape
- CoSimulation Resource Shape
- ModelVariables Resource Shape
- BaseUnit Resource Shape
- Annotation Resource Shape
- FMU Resource Shape
- DefaultExperiment Resource Shape
- TypeDefinition Resource Shape
- ListingAlias Resource Shape
- BaseUnitDefinition Resource Shape
- VendorTool Resource Shape
- TypeDef Resource Shape
- InitialUnknown Resource Shape
- ListingDirectDependency Resource Shape
- Output Resource Shape
- Derivative Resource Shape
- ModelDescription Resource Shape
- SourceFile Resource Shape
- VendorAnnotation Resource Shape
- ModelExchange Resource Shape
- UnitDefinition Resource Shape

More information

- Code and documentation: https://github.com/ld4mbse/oslc-adapter-fmi
- Presentation from INCOSE IW 2017: http://www.omgwiki.org/MBSE/lib/exe/fetch.php?media=mbse:procter_modelon_trc_incose_iw_2017.pdf
- Short blog article about motivation: http://www.modelon.com/blog/articles/integrating-executable-requirements-to-accelerate-design-iterations/