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ITEA 3 is a EUREKA strategic ICT cluster programme

Exploitable Results by Third Parties

18039 EMBRACE

Project details

Project leader:	Lena Buffoni
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Name: Modelon

Input(s):	Main feature(s)	Output(s):
▪ Ideas ▪ Plan ▪ Design	▪ Methodology and Modelica library functionality tailored to conceptual system design, enabling conscious choice of model fidelity developed by Modelon. Exemplary methodology, use case implementation and evaluation on aircraft vehicle systems. ▪ Large scale massive M&S support with parallelization and distributed simulation and optimization.	▪ Simulation results ▪ Optimization ▪ Support for decision making

Unique Selling Proposition(s):	▪ Parallel simulation methods for cloud-based multi-simulation and post-processing in Modelon Impact in the browser. With the support for the Multi-scale execution in Modelon IMPACT, Modelon will be able to reach and provide solutions to customers and industries that previously was not possible.
Integration constraint(s):	▪ Modelon IMPACT is available through the browser.
Intended user(s):	▪ For all stakeholders in the organization
Provider:	▪ Modelon
Contact point:	▪ Jim Claesson, Modelon AB
Condition(s) for reuse:	▪ Commercial license, mostly as yearly license.

Latest update: 2022-11-14

Name: REUSE

Input(s):	Main feature(s)	Output(s):
▪ Ideas ▪ Plan ▪ Design ▪ Implementation	▪ Test Case Generation ▪ CRML Connector with interoperability ▪ A||G Contracts with Rhapsody Connector ▪ OpenModelica Connector and simulation ▪ Traceability Module	▪ Test case results ▪ Knowledge ▪ Simulation ▪ Traces

Unique Selling Proposition(s):	▪ Full digitalization of the Life Cycle. ▪ Connectivity to the main tools in the market: Requirements management, MBSE, Simulation, PLMs, ALMs… ▪ Implementation of the concept Authoritative source of Truth (ASoT). ▪ Traceability and interoperability among all the tools connected to our connectivity hub.
Integration constraint(s):	▪ REUSE IMPACT is available through the SES ENGINEERING Studio commercial tool.
Intended user(s):	▪ For all stakeholders in the organization and future clients.
Provider:	▪ REUSE.
Contact point:	▪ Jose Fuentes.
Condition(s) for reuse:	▪ Commercial license.

Latest update: 2022-11-16

Name: Embrace.ssp

Input(s):	Main feature(s)	Output(s):
▪ Measured or synthetic data on altitude and mach number ▪	▪ Simulator application consisting of several different coupled executable model ▪	▪ Simulated Quantities of interest related to aircraft sub-systems ▪

Unique Selling Proposition(s):	▪ Captures industry grade requirements on simulator applications expressed through the FMI and SSP standards. ▪ Incorporates information from: ▪ H/W modeling, S/W modeling, Geometry modeling, and architectural modeling
Integration constraint(s):	▪ Needs FMI and SSP supporting modeling and/or simulation tool for investigation and/or execution
Intended user(s):	▪ Tool vendors and standardization organizations
Provider:	▪ Saab Aeronautics
Contact point:	▪ Robert Hällqvist
Condition(s) for reuse:	▪ Open-source conditions according to OSMC: https://openmodelica.org/home/consortium. Publically available on github: GitHub - OpenModelica/OMSimulator-testsuite: Test suite for OMSimulator
	Latest update: 2022-11-15

Name: RapidSSP		
Input(s):	Main feature(s)	Output(s):
▪ Geometry model expressed in CATIA compatible format	▪ Extracts information on selected parameters, from CATIA geometry model, and expresses the information in the format specified in the SSP standard	▪ System Structure Values file

Unique Selling Proposition(s):	▪ 3rd party toolbox for automated extraction and expression of parameter values according to the SSP standard. Provides interoperability between the domain of geometry modeling and any other M&S domain supporting SSP.
Integration constraint(s):	▪ The methodology is general but a significant portion of the toolbox requires geometry modeling in CATIA.
Intended user(s):	▪ OEMs using CATIA for geometry modeling ▪ Tool vendors
Provider:	▪ Saab Aeronautics
Contact point:	▪ Robert Hällqvist, Raghu Munjulury
Condition(s) for reuse:	▪ Commercial license to be negotiated, a free license can be provided for research purpose

Latest update: 2022-11-17

Name: CRML language specification		
Input(s):	Main feature(s)	Output(s):
▪ None	▪ Detailed specification of the CRMLlanguage	▪ None

Unique Selling Proposition(s):	▪ CRML (Common Requirement Modelling Language) is a new language for the formal modelling of requirements. ▪ CRML has a close to natural language to be legible by experts from different disciplines and stakeholders from different domains. ▪ CRML is a functional, object-oriented and set language to express time-dependent multidisciplinary operating constraints on CPS (cyber-physical systems). ▪ CRML supports the complete design lifecycle, from early to detailed design. ▪ CRML supports traceability and multiple design architectures. ▪ CRML supports co-simulation with behavioral models to perform automatic verification of design vs. requirements.
Integration constraint(s):	▪ The specification is self-supporting but must be utilized with a CRML compiler.
Intended user(s):	▪ Tool vendors ▪ CPS engineers
Provider:	▪ EDF, University of Linköping
Contact point:	▪ Daniel Bouskela (EDF), Audrey Jardin (EDF), Lena Buffoni (University of Linköping)
Condition(s) for reuse:	▪ Under open-source license to be defined

Latest update: < >

Name: Support of Variable Scale structures in OpenModelica		
Input(s):	Main feature(s)	Output(s):
▪ Modelica models with extensions	▪ Modelica simulations in which the model structure can dynamically vary at runtime	▪ Simulation results
Unique Selling Proposition(s):	▪ Current available Modelica tools do not support dynamic variable structure systems. Having support for such features allows efficiently simulating system in which new objects are created or destroyed. The available prototype allows experimentation and validation of the Modelica language extensions.	
Integration constraint(s):	▪ The software is delivered as a Julia package.	
Intended user(s):	▪ Modelers and engineers, tool developers	
Provider:	▪ LiU/RISE ▪ https://github.com/JKRT/OM.jl	
Contact point:	▪ Adrian Pop <adrian.pop@liu.se>	
Condition(s) for reuse:	▪ open source software for non-commercial use ▪ license for commercial use	

Latest update: 2022-11-16

Name: OMSimulator

Input(s):	Main feature(s)	Output(s):
▪ FMU components or SSP composite models	▪ Integration and support of the SSP standard with extensions.	▪ Simulation results

Unique Selling Proposition(s):	▪ Support for System Structure and Parameterization (SSP) allows easy integration of models from different tools. The tool can also be used as a library to integrate with other tools.
Integration constraint(s):	▪ Linux, Windows or Mac system
Intended user(s):	▪ Modelers, engineers, tool developers and integrators
Provider:	▪ LiU/RISE ▪ https://github.com/OpenModelica/OMSimulator
Contact point:	▪ Adrian Pop <adrian.pop@liu.se>
Condition(s) for reuse:	▪ open source software for non-commercial use ▪ license for commercial use

Latest update: 2022-11-16

Name: OpenModelica

Input(s):	Main feature(s)	Output(s):
▪ Modelica models	▪ Open-Source Modeling and Simulation environment for cyber-physical systems. Export of models using FMI standard.	▪ Simulation results ▪ FMUs

Unique Selling Proposition(s):	▪ Prototype for handling of large scale models via support for non-expanded arrays in the compiler ▪ Automatic parallelization of simulation code
Integration constraint(s):	▪ Linux, Windows or Mac
Intended user(s):	▪ modelers, engineers, tool developers and tool integrators
Provider:	▪ LiU/RISE ▪ www.openmodelica.org
Contact point:	▪ Adrian Pop <adrian.pop@liu.se>
Condition(s) for reuse:	▪ open source software for non-commercial use ▪ license for commercial use

Latest update: 2022-11-16

Name: CRML Compiler

Input(s):	Main feature(s)	Output(s):
▪ CRML model	▪ Grammar specification based on the CRML specification documents in ANTLR and parser generation ▪ Translation of CRML to Modelica ▪ A library of basic blocks to help with CRML-Modelica mapping	▪ Modelica model

Unique Selling Proposition(s):	▪ Prototype for generating Modelica models based on CRML models, so that requirement models can be simulated together with physical models
Integration constraint(s):	▪ The compiler is developed in Java, so it needs a JRE to run and generates Modelica files that can be used in any Modelica tool
Intended user(s):	▪ Modelers, engineers, tool developers and integrators
Provider:	▪ LiU/RISE
Contact point:	▪ Lena Buffoni lena.buffoni@liu.se
Condition(s) for reuse:	▪ open source software for non-commercial use

Latest update: 2022-11-15

Name: Turbine Characteristics

Input(s):	Main feature(s)	Output(s):
▪ Calculations containing pressures, temperatures, and velocities in gas turbine at different operation conditions	▪ Estimating pressures, temperatures and velocities through gas turbine using only operational data	▪ Positional pressures, temperatures, and velocities

Unique Selling Proposition(s):	▪ Surrogate model based on polynomial calculation of the turbine section of a gas turbine. ▪ Making a polynomial of the data instead of interpolating between the input calculations proved a superior method.
Integration constraint(s):	▪ Requires a large (50-100) set of calculations of the turbine section of a gas turbine at different operating conditions
Intended user(s):	▪ Gas turbine simulation developers
Provider:	▪ Siemens Energy
Contact point:	▪ Viktor Thyberg, viktor.thyberg@siemens-energy.com
Condition(s) for reuse:	▪ In-house models only available for Siemens Energy

Latest update: 2022-11-15

Name: Dymola FMU

Input(s):	Main feature(s)	Output(s):
▪ Different sets of input parameters depending on if running a standard cycle or using measured data from site ▪ Examples of input are: ▪ Ambient conditions ▪ Power output set point ▪ Valve positions ▪ …	▪ The fmu uses the inputs and runs a transient cycle of the gas turbine. ▪ The cycle can be a pre-defined standard cycle, i.e. start, loading and stop or can mimic a cycle for a real engine, by using measured data ▪ After simulation a result file is generated, that can be used for different applications	▪ A large number of outputs are generated, but are the same regardless of if a standard transient cycle or a engine specific cycle has been simulated ▪ Examples of outputs are speed, pressure, temperature, mass flow etc.

Unique Selling Proposition(s):	▪ The idea was to merge two models (standard cycle model and engine specific cycle model) into one model to save time and facilitate development of new models. The current fmi standard did not support an easy way to do this. Two models are still used
Integration constraint(s):	▪ Component specific characteristic ▪ Control document ▪ Technical specifications of valves etc.
Intended user(s):	▪ Tools that use the transient gas turbine model
Provider:	▪ Siemens Energy
Contact point:	▪ Anna Sjunnesson, anna.sjunnesson@siemens-energy.com
Condition(s) for reuse:	▪ In-house models only available for Siemens Energy

Latest update: 2022-11-15