



Project Profile

# OPENCPS

## Open Cyber-Physical System Model-Driven Certified Development

Cyber-physical systems put increasing demands on reliability, usability and flexibility; at the same time, lead time and cost efficiency are essential for industry competitiveness. With tool interoperability, vendor lock-ins and tool life-cycle support as major challenges, the ITEA 3 project OpenCPS focuses on interoperability between the Modelica/UML/FMI standards, improved (co-) simulation execution speed and verified code generation.

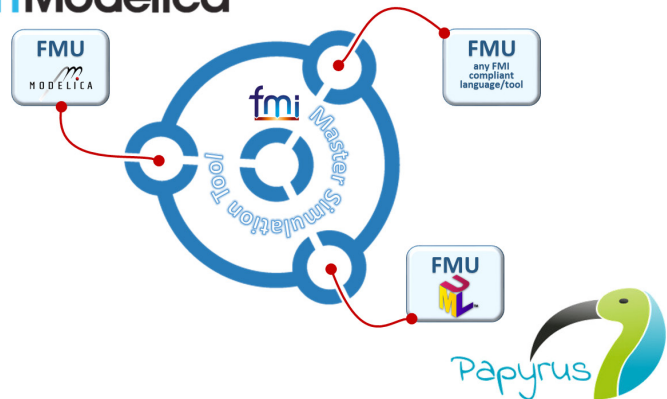
### ADDRESSING THE CHALLENGE

Extensive use of modelling and simulation throughout the value chain and system life-cycle is one of the most important ways to effectively target the challenges related to development of cyber-physical systems. As a result, development environments are becoming increasingly complex and critical for the industry. Open source tools allow more control of tool features and support along with increased cooperation and shared access to knowledge and innovations. In this context, the ITEA 3 project OpenCPS aims to increase the efficiency and quality of verification, validation and testing as well as establish interoperability of the key-technology standards and implement solutions to increase the speed of execution, simulation and dynamic optimisation of models through enhanced multi-core based technology.

### PROPOSED SOLUTIONS

The OpenCPS consortium represents the model-based development value chain and will focus on integrating executable behaviour concepts of UML/SysML and MARTE with Modelica and FMI in the context of an open-source, cyber-physical modelling, simulation and development environment. It will also leverage the advantages of using Modelica, a high-level modelling language, by developing and integrating sophisticated Verification and Validation (V&V) driven tool

### OpenModelica



The FMI Master Simulation Tool integrating Functional Mock-up Units (FMUs) based on Modelica and UML. The two leading Open Source tools OpenModelica and Papyrus will be significantly developed in OpenCPS.

support to ease the verification of generated code, reduce test times and deliver more reliable prototypes and products. The open-source modelling platform will be enhanced with efficient simulation techniques for handling the large number of events generated by co-simulation as well as debugging support for all the new features developed in the project. This is a very important step in ensuring that the platform is commercially usable.

### PROJECTED RESULTS AND IMPACT

Apart from a unique enhanced general open-source, cyber-physical modelling, simulation and development environment and eco-

system, the project's results will include an industry-grade FMI master simulation tool enabling highly efficient execution, simulation and dynamic optimisation. The results will be validated in a wide range of industry applications. Technology transfer within OpenCPS is assured by the industrial partners as enthusiastic users of the core technologies Modelica, FMI and UML/SysML. The partners will further industrialise the developed open-source tools and cooperative use of the underlying standards will provide opportunities for improvement.

**Project start**

December 2015

**Project leader**

Magnus Eek, Saab AB

**Project website**<https://www.opencps.eu>**Project end**

December 2018

**Project email**[magnus.eek@saabgroup.com](mailto:magnus.eek@saabgroup.com)

ITEA is a transnational and industry-driven R&D&I programme in the domain of software innovation. ITEA is a EUREKA Cluster programme, enabling a global and knowledgeable community of large industry, SMEs, start-ups, academia and customer organisations, to collaborate in funded projects that turn innovative ideas into new businesses, jobs, economic growth and benefits for society.