Improving the transition and modularity of the virtual commissioning workflow with AutomationML

Dr.Ing. Anton Strahilov, EKS InTec GmbH, Weingarten, Germany
M.Sc. Ender Yemenicioglu, tarakos GmbH, Magdeburg, Germany
Dipl.-Ing. Mario Thron, IFAK, Magdeburg, Germany
Dipl.-Ing. Holger Zipper, IFAK, Magdeburg, Germany
Dr.-Ing. Matthias Riedl, IFAK, Magdeburg, Germany
Dipl.-Inf. Ulf Zimmermann, TWT GmbH, Stuttgart, Germany
Dipl.-Ing. Ireneus Wior, TWT GmbH, Stuttgart, Germany
M.Sc. Sebastian Süß, Daimler AG, Germany

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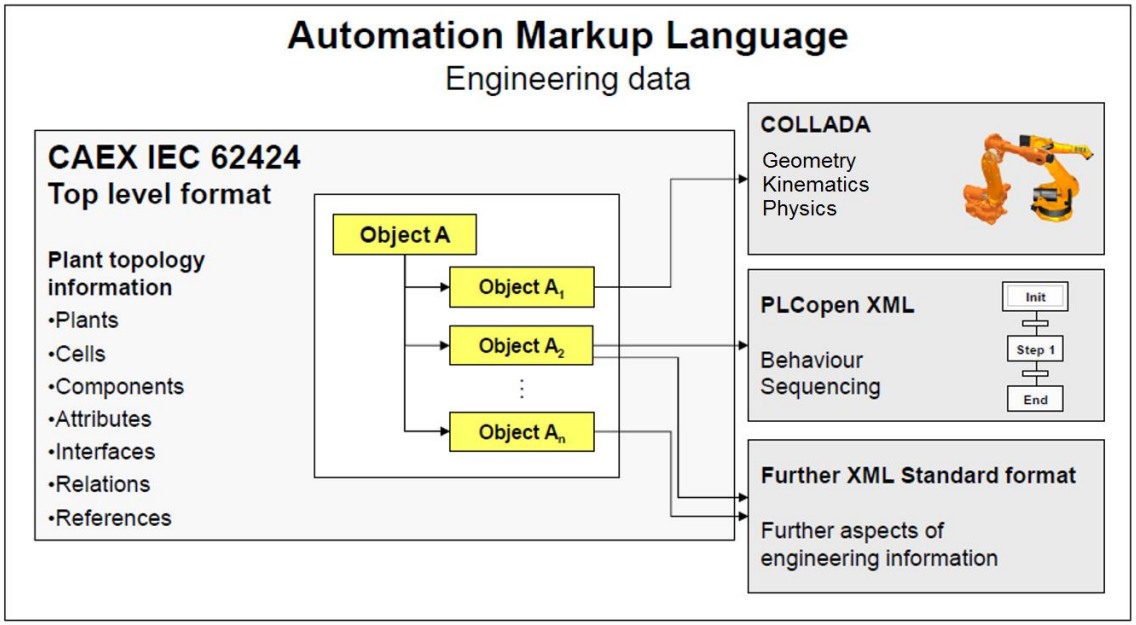
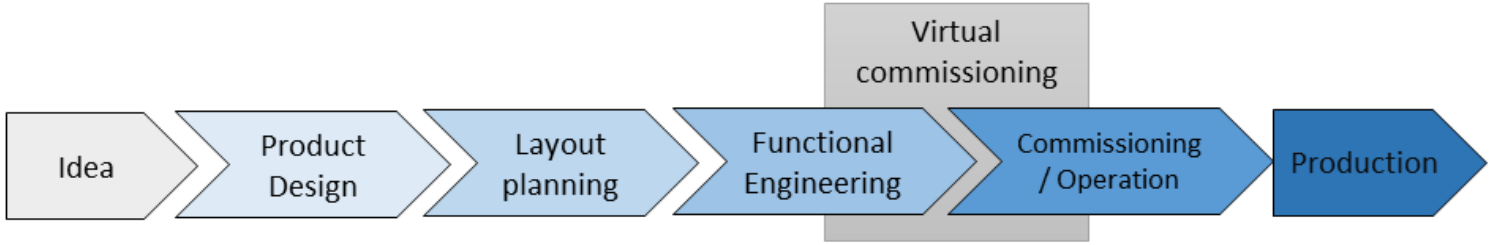
Motivation

- Engineering information in simulation -> geometry, kinematics, other physical attributes, automation-relevant aspects like pneumatic and electric plans and other information types.
- Enhance the level of maturity in VC -> physical based simulation, improved behavior models, automatic derivation of tests and data exchange solutions.
- AutomationML (AML) -> topology, geometry, kinematic, logic and other possible XML-based standards (usage of FMI in AVANTI)



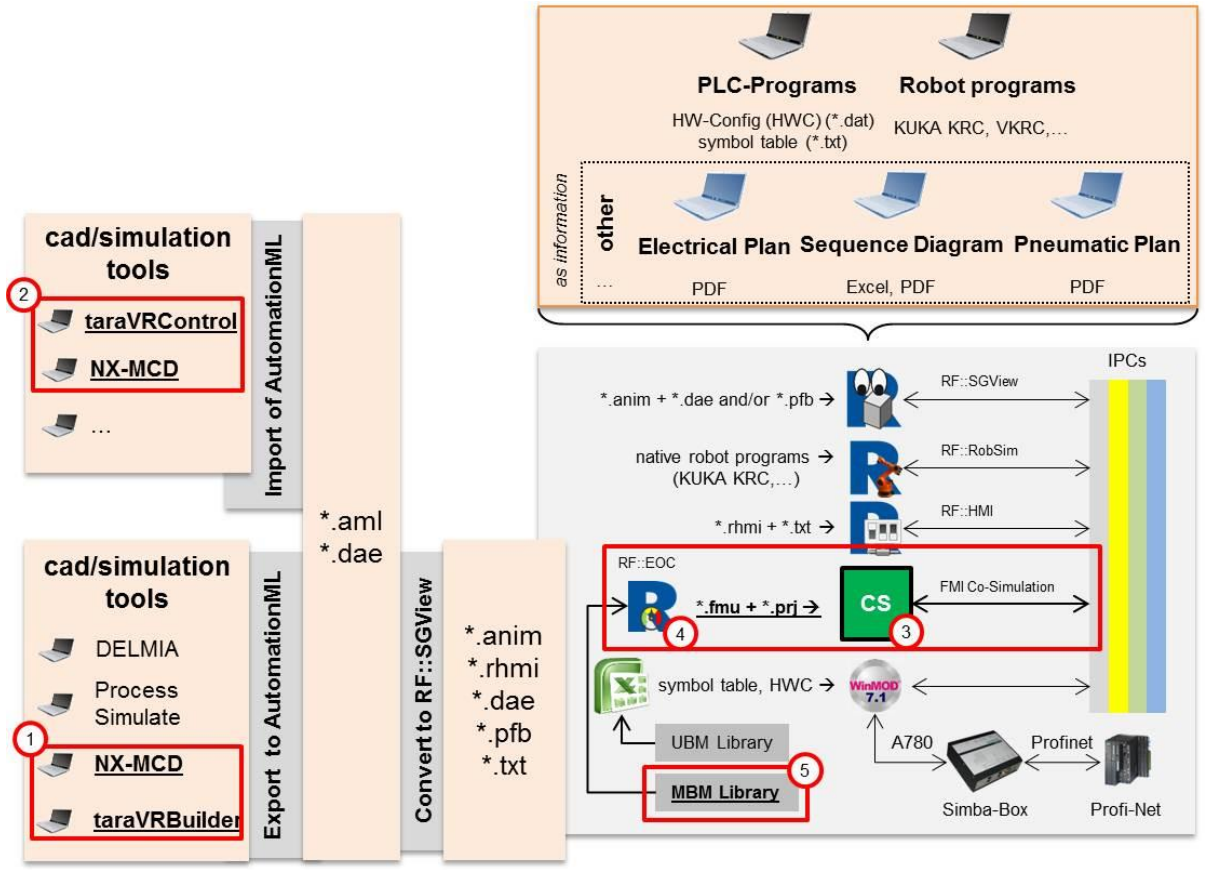
Toolchain of Virtual Commissioning

- Phases in mechatronical engineering process beginning with the product design, continuing with layout planning, functional engineering and ending with commissioning and production
- VC starts during/after the mechanical and electrical design and proceeds concurrently to the software design.
- A virtual model of the whole production system is prepared based on data generated in these phases of the engineering process.
  - Behavior model
  - Geometry model
  - Emulation of robot controller



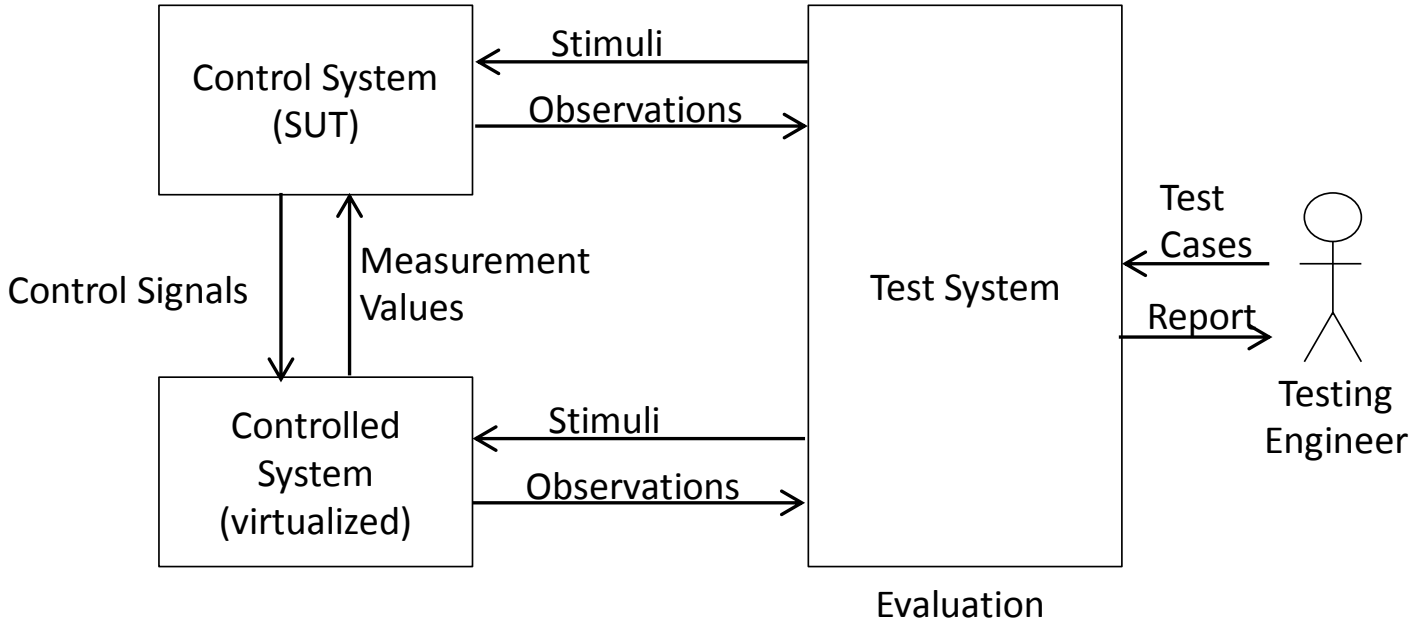
Toolchain of Virtual Commissioning

- Toolchain of VC of productions systems for the automotive industry before and after the AVANTI project. The AVANTI project extended the toolchain with the parts highlighted by red boxes.



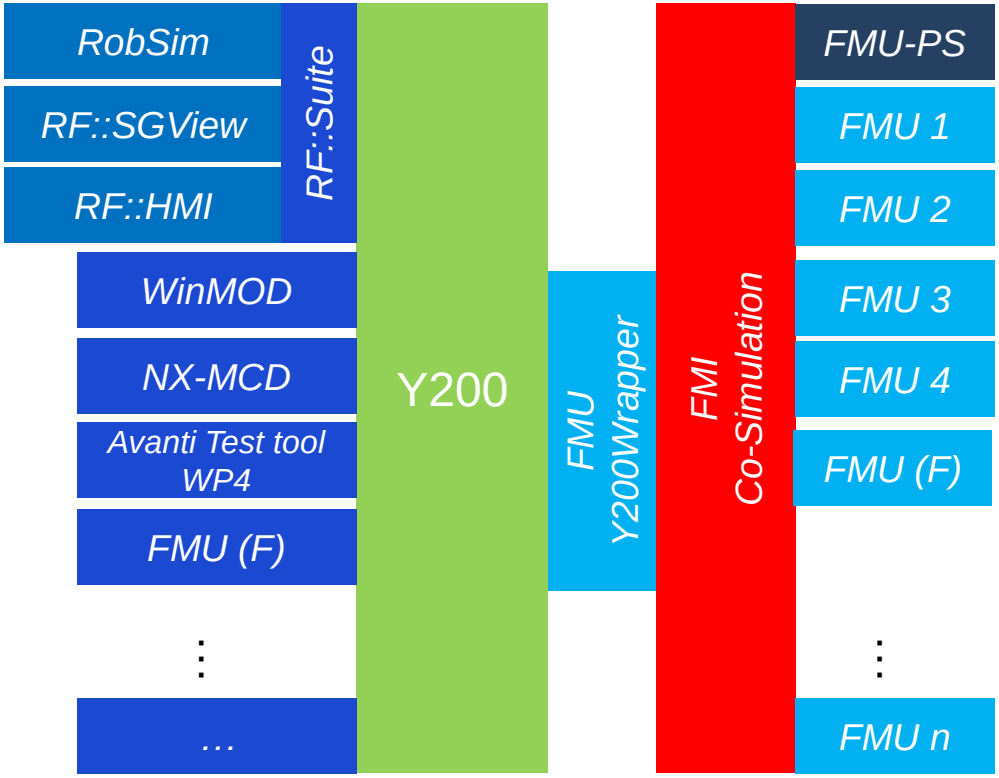
Automated test generation

- Structure of an automated test bed for the VC

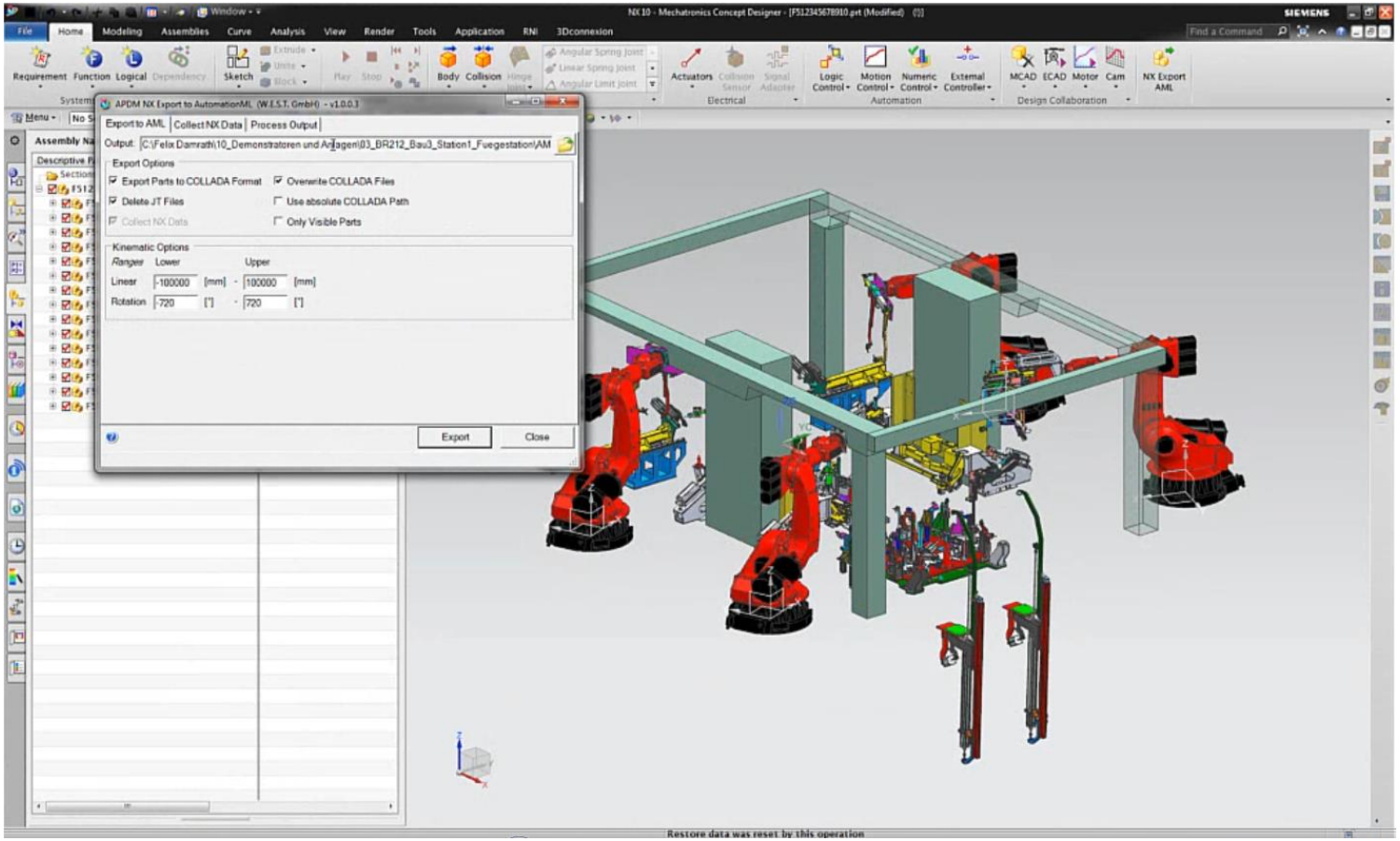


Implemented functionalities

- Y200-FMI Connector



- NX-MCD Export



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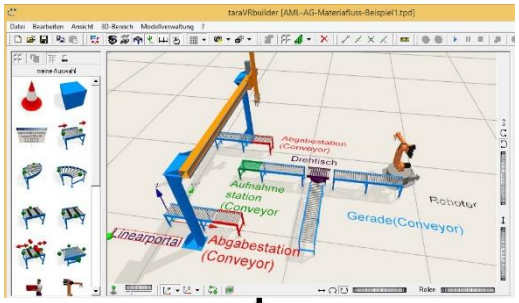
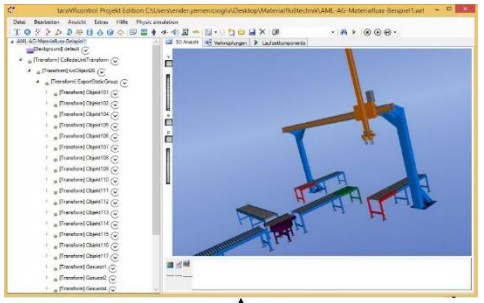
EUREKA

- tarakos export/import

taraVRBuilder



taraVRControl



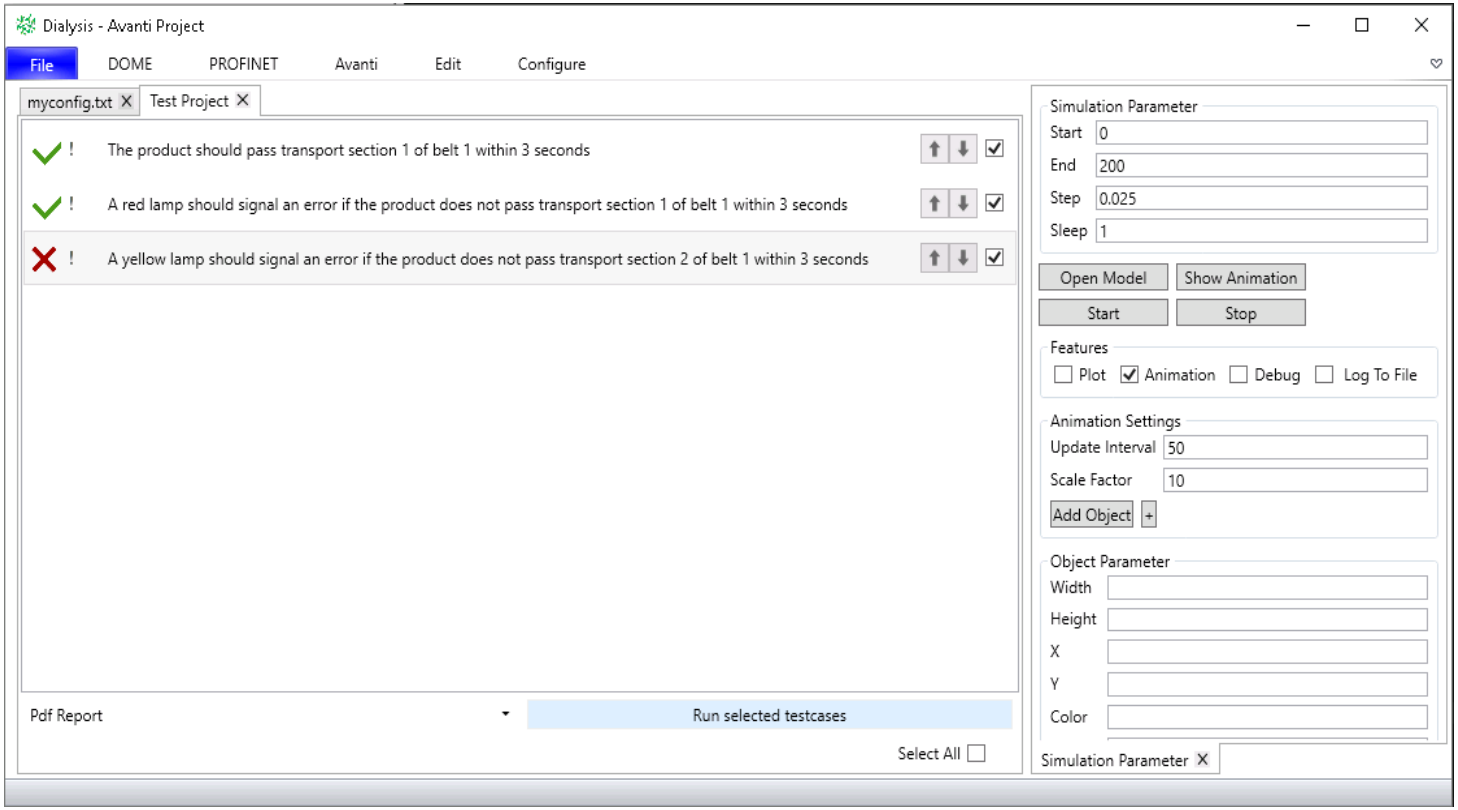
<AutomationML/>

Simulation tools

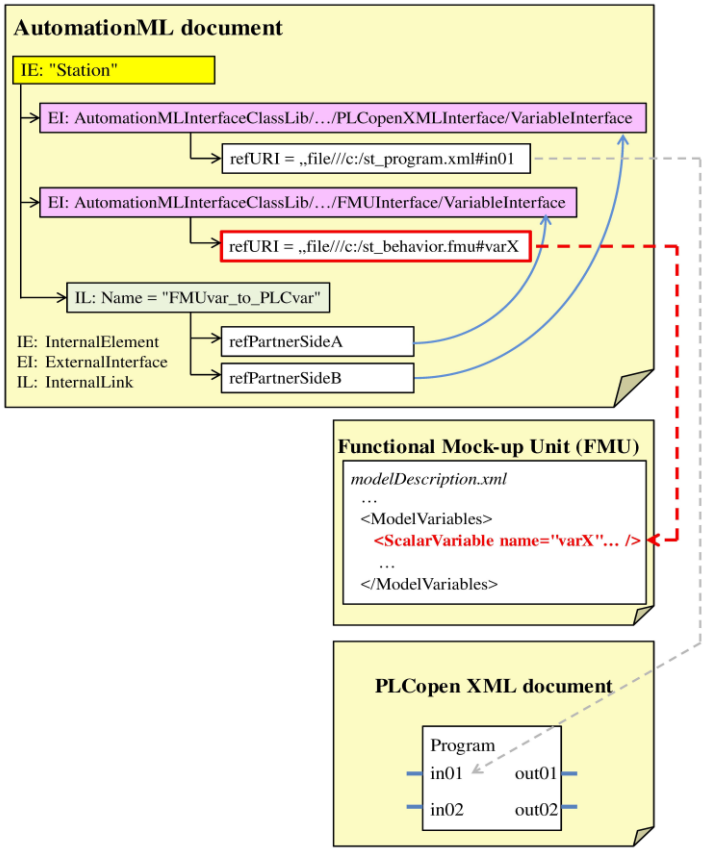
Robot programming

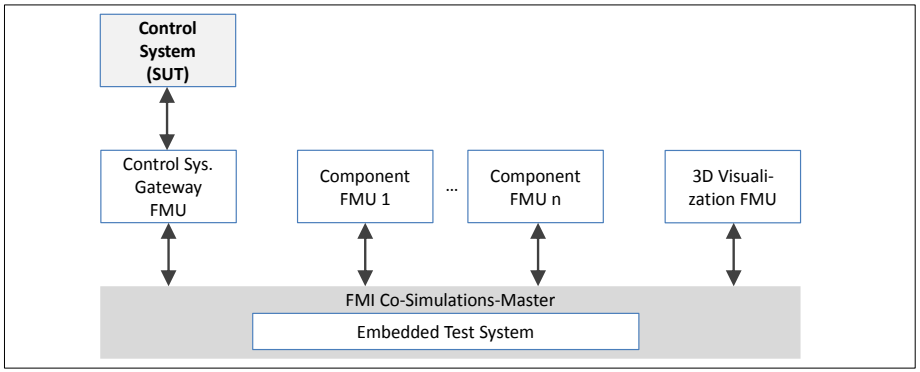
Virtual commissioning

- Automated test generation tool



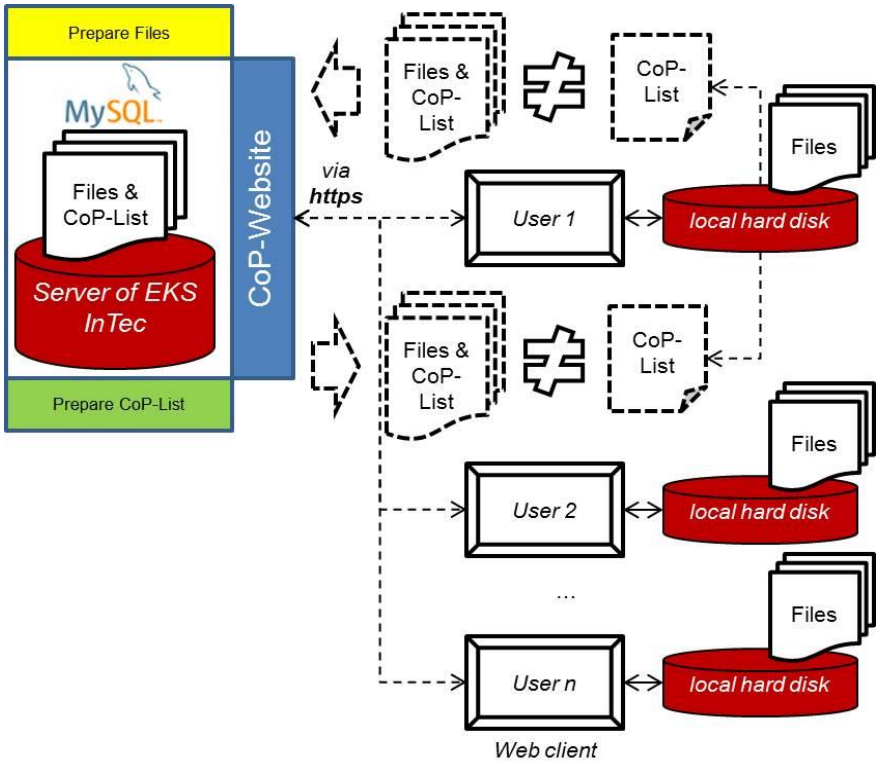
- Interconnection of behavior simulations to PLC programs within AutomationML through FMI





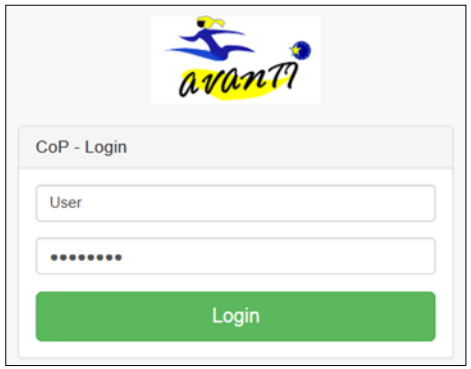
Communication platform - Overview

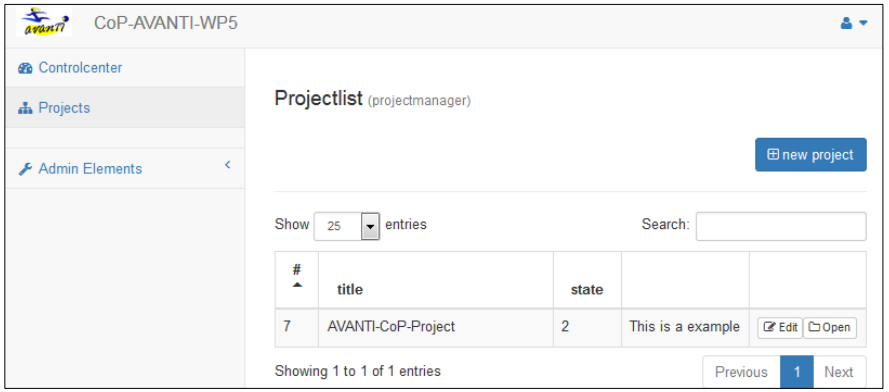
- The CoP is a web-based software system to allow shared access to model data. The essential functionality of the COP is the data exchange of project information regardless of the location. It also provides some necessary services like version management, data security, and role management.

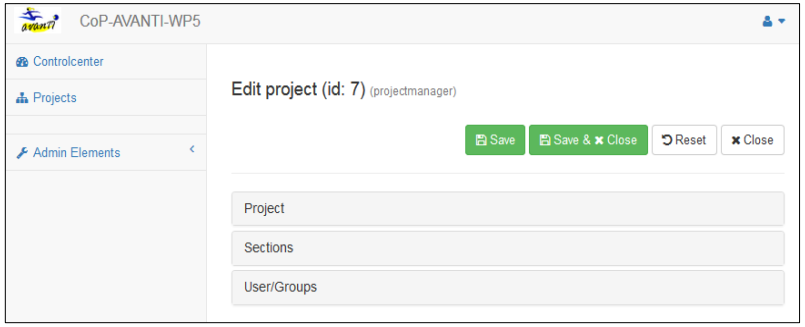


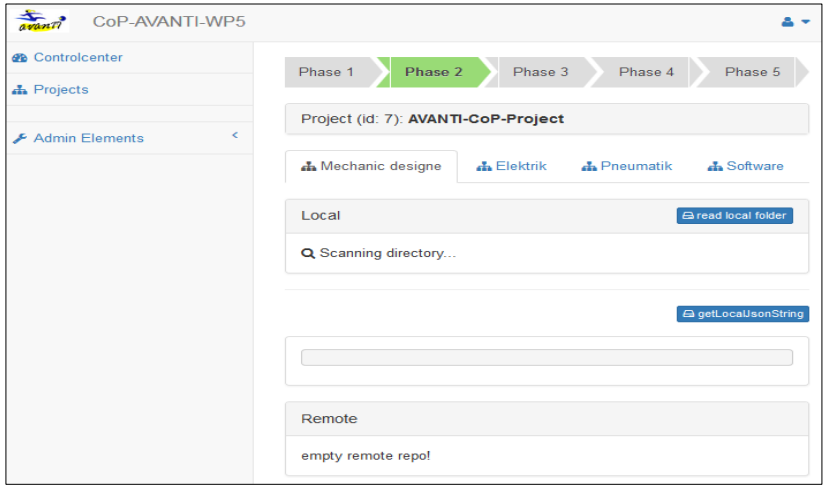
Communication platform - Implementation

- The web interface of COP is the tool, the user interacts with and where file exchanges with the server are realized.









- A standardized, easy to use, and reliable distribution channel for the component behavior models.
- Reusable physical component models and the existence of data exchange interfaces reduce engineering effort in the simulation process.
- Based on improved VC models and more precise requirement specifications the tester can guarantee and sell higher test safeguarding and test coverage. An automatic test execution becomes possible for better test coverage.
- The Communication Platform provides an environment to exchange data during the development process of production systems. The primary role of CoP is to provide various project partners with different backgrounds, e. g. Mechanical engineers, electrical engineers, software engineers, etc., with a tool for a reliable data exchange.

Questions?
Thank you for your attention.