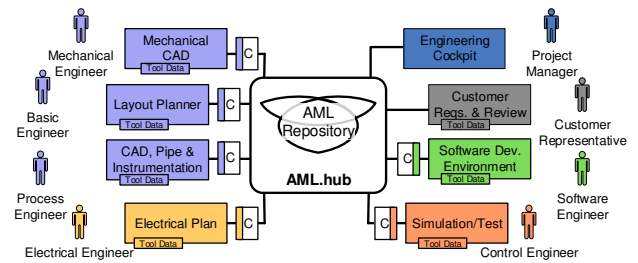


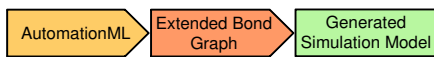
# From AutomationML to Generated Simulations



**Industry 4.0** applications require new methods for designing simulation models. Using *AutomationML* plant models for designing virtual test-beds can reduce the development time by up to 40%.

## Goal

Simulation models are used in various engineering disciplines. However, their design phase poses a time- and cost-consuming task, which limits simulation use and benefits in practice.



The goal is to make the design phase of simulation models efficient and fast. The main idea is to assemble a simulation model from simulation components semi-automatically according to an existing CAD description. The CAD schema is imported in the *AutomationML* format. Measurable criteria used for an evaluation are reductions of time and effort needed for the simulation design as well as reductions of design-time errors.

## Solution Approach

The developed solution implements the following process:

1. The CAE/CAD data are represented in *AutomationML* as a generic input data format for the method.
2. The *AutomationML* file is processed by the *AML Analyzer*, developed at the *CDL-Flex* research laboratory.
3. Engineering data are combined with the description of available simulation components, their interfaces, and parameters.
4. The well-proven *Bond-Graph theory* is extended to reflect the current needs for computer-assisted design of component-based simulations.
5. The executable simulation model is generated in a process simulator.

When the real industrial plant is changed, the virtual simulation model can be re-generated easily. The use of *AutomationML* thus improves flexibility and reuse. Version control on all levels of the aforementioned workflow can guarantee traceability and efficiency.

## Implementation

The prototype of the simulation generator was developed at the *CDL-Flex* research laboratory at *TU Vienna*. It was implemented in cooperation with the industrial partner *CertiCon*.

The implemented prototype proved that the time and effort needed for the design of simulation models can be reduced up to 40%. The approach also mitigates up to 50% of design-time errors.

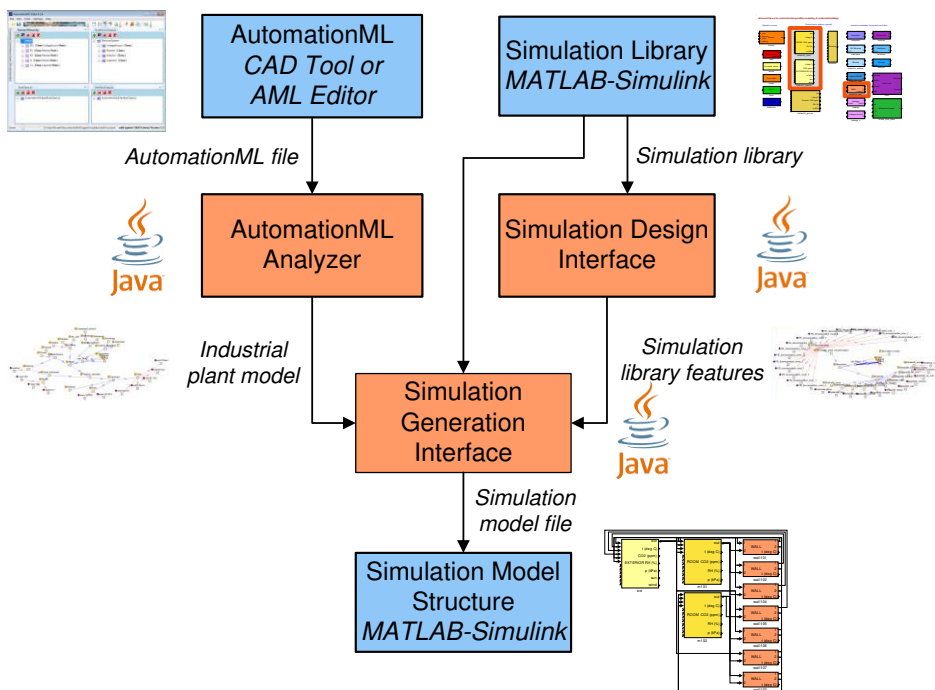
The current version of the prototype is focused on the simulation model structure, but can be easily extended to support configuration of coupled simulations.

## Technical Specification

- Modular service-oriented architecture implemented in *Java*.
- Data management with *AML Analyzer* and *AutomationML Hub*.
- *Bond-Graph* method and *Matlab*.

## Benefits for Customers

- Simulation experts, control engineers, or quality assurance experts can share *AutomationML* files as a basic way for describing the **structure of a real industrial system**.
- **Simulation models** are semi-automatically generated from simulation components re-used among different projects.
- **Effort and cost reduction** for development and testing of simulation models and simulation execution.



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