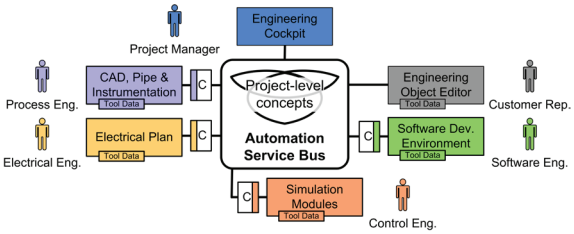
Make Collaborative Engineering More Efficient



The **parallel engineering of industrial plants** demands the effective and efficient collaboration of domain experts, such as mechanical, electrical, and software engineers, and of their specialized software tools. While there are attempts to impose fixed sets of software tools, which work well together, the reality in most projects is a "best of breed" collection of software tools that were not designed to cooperate seamlessly.
For existing plant, which have been automated in a traditional way, the integration of engineering is valuable and important. However, for Industry 4.0 solutions, which are to be changed repeatedly along their life cycle, this integration is indispensable, since only machine-processable lifelong documentation of all systems enables their evolution.

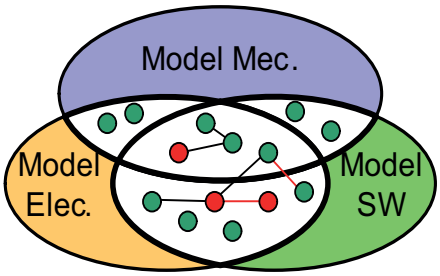
We can observe a kind of **"Engineering Polynesia"** of tool islands with interfaces that do not fit seamlessly and an **"Engineering Babylon"**, in which engineers use common project-level concepts, which are, unfortunately, represented in various ways by their tools. As a consequence domain experts have to cooperate in person to conduct repetitive engineering tasks that should be mostly done by cooperating tools, e.g., the propagation of changes across tools, quality assurance between engineering models, or progress reporting on engineering tasks.

The CDL-Flex research laboratory at TU Vienna has developed the **Automation Service Bus®** (ASB) concept to integrate the "Engineering Polynesia" systematically based on improving the well-established enterprise service bus approach from business IT for the engineering context.

The "Engineering Babylon" has been addressed by modeling the common concepts, which the engineers use to cooperate, and their mappings to the local representations in the software tools. This approach makes the **common concepts understandable for machines** and enables the automation of engineering tasks.

This approach mitigates the risk of not sufficiently addressing important changes and also reduces the cost of change management and quality assurance in the project team.

At **ANDRITZ HYDRO**, a hydro power plant engineering company, and at further industry partners, automated change propagation across domains with the ASB allows introducing **comprehensive versioning** of engineering models in shorter cycles, e.g., with the **"Semantic Dropbox"**, and therefore **finding and correcting defects** significantly earlier than before. In tool networks, which use the AutomationML standard for describing the data to be exchanged, the AutomationML Hub offers the efficient integration of data views, **versioned storage and analysis for advanced engineering processes**, such as test automation. To support continuous improvement processes, an adjusted **improvement process according to VDI 3695** allows the focused analysis of organizations or engineering projects and helps identifying customer-specific candidates for improvement.



Benefits of Software Engineering Integration for flexible Automation Systems

- **Cost Savings** by means of improved inter-disciplinary communication.
- **Reduction of down-times** by means of improved use of engineering documents
- **Quality assurance** due to traceable systematic tool networks.
- **Flexibility** by enhancing the benefits of existing software tools.
- **Fit for automation engineering** as engineers can work offline, on site.
- **Low risk** with incremental introduction of the integration as needed.

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