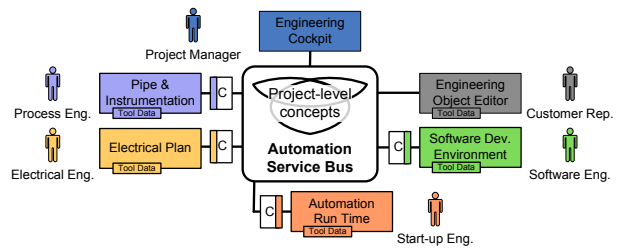


Making Collaborative Engineering more efficient



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.

An example where efficient tool collaboration can reduce risks and effort is the change of a level sensor on an oil tank by the mechanical engineer, which may require adjustments at the partner electrical engineer regarding the wiring and at the partner software engineer regarding the control logic due to changes in the sensor measurement range.

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 Wien has developed the **Automation Service Bus® (ASB)** concept to integrate the “Engineering Polynesia” based on improving the well-established enterprise service bus approach from business IT for the engineering context.

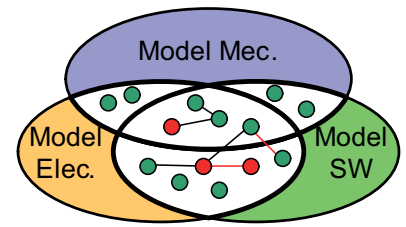
The “Engineering Babylon” has been addressed by modeling the common concepts, which the engineers use to cooperate, and their mappings to the local representations in the software tools. This approach makes the **common concepts understandable for machines** and enables the automation of engineering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

Based on the **common concept “signal”**, which links the mechanical, electrical, and software engineers, the relevant software tools and their data can be efficiently integrated. This integration enables propagating changes regarding the example level sensor on the oil tank automatically to the right engineering partners. Therefore, integration reduces the risk of not addressing an important change and also reduces the cost of change management and quality assurance in the project team.

At **ANDRITZ HYDRO**, a waterpower plant engineering company, automated change propagation across domains with the ASB allows introducing **comprehensive versioning of engineering models** in shorter cycles and therefore **find and correct defects much earlier** than before.

Based on process analysis data, derived from the change propagation, the “**ASB-Engineering Cockpit**” can provide the project manager with information about the **project progress, arising risks** and data to be used for **claim management**.

By linking common concepts like signals across domains, users can **efficiently navigate between different tools** preserving the context they want to investigate.



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 inter-disciplinary communication.
- **Flexibility** by enhancing the benefits of existing software tools instead of demanding new tools.
- **Quality assurance** due to systematic and standardized integration instead of fragile ad-hoc integration.
- **Fit for engineering** as engineers can work offline, on site, and still efficiently reconcile their changes with the versioned data basis in the engineering team.
- **Low risk** with incremental introduction of the integration.

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