

FEV Signature Solutions Virtual Validation Software-in-the-Loop (SiL) Testing



Accelerate your development, master SW complexity and lower costs

FEV offers

- › Development of software-in-the-loop (SiL) setups based on your requirements and specifications
- › Extensive benchmark datasets from our past projects, complex physical models for high-accuracy and application-specific SiL setups
- › Integration of SiL environment in your software development process
- › Detailing and implementation of the individual process steps, from functional testing and calibration to system validation.
- › State-of-the-art software testing toolchain

Why FEV

- › **Proven expertise:** 45+ years of automotive engineering excellence, trusted by global OEMs and Tier-X suppliers to deliver innovative, production-ready solutions with deep domain expertise
 - 25+ years of hands-on OEM software expertise
 - Deep propulsion-domain know-how embedded into SiL setup and validation logic
- › **Complete SW lifecycle support:** From concept to series maturity, including simulation, prototyping, implementation, testing, validation and calibration
- › **Customer-centric solutions:** Transparent and customizable, enabling you to extend, integrate, and scale your own development

Reference project FEV propulsion

Demonstration of Virtual Powertrain Calibration

VIRTUAL CALIBRATION PROJECT FOR TOP TIER GERMAN OEM

- Implementation of virtual calibration of the powertrain in customer toolchains

FEV involvement

- Initial selection of calibration use cases with high potential for prototype reduction
- Prioritization of use cases by cost reduction and model feasibility
- Implementation and execution of virtual calibration use cases for powertrain
- Training of customer engineers in SIL environment



Highlight

Reduction of 20+ Prototypes



Highlight

Highly automated procedure



Reference project FEV propulsion

OBM Calibration and Function Development supported by SiL

PROJECT FOR TOP TIER ASIAN OEM

- › Calibration and further development of OBM for passenger vehicle families with support of virtual environment

FEV involvement

- › Integration of developed OBM functions on virtual control unit (vCU)
- › Early testing and validation of new ECU functionalities in the SiL
- › OBM emissions model calibration with SiL environment
 - › Multiple reiteration of reference tests on SiL has led to major reduction of dyno tests
- › State of Health investigation
 - › Fault injection in SiL to validate emission degradation
- › Condition of Use Validation with SiL
 - › Reiteration of stress testing, validation of calibration boundaries
 - › Replay real drive cycles



Highlight

Creation of developed functions in vCU



Highlight

Reduction of physical tests



Highlight

Early testing of new ECU functionalities

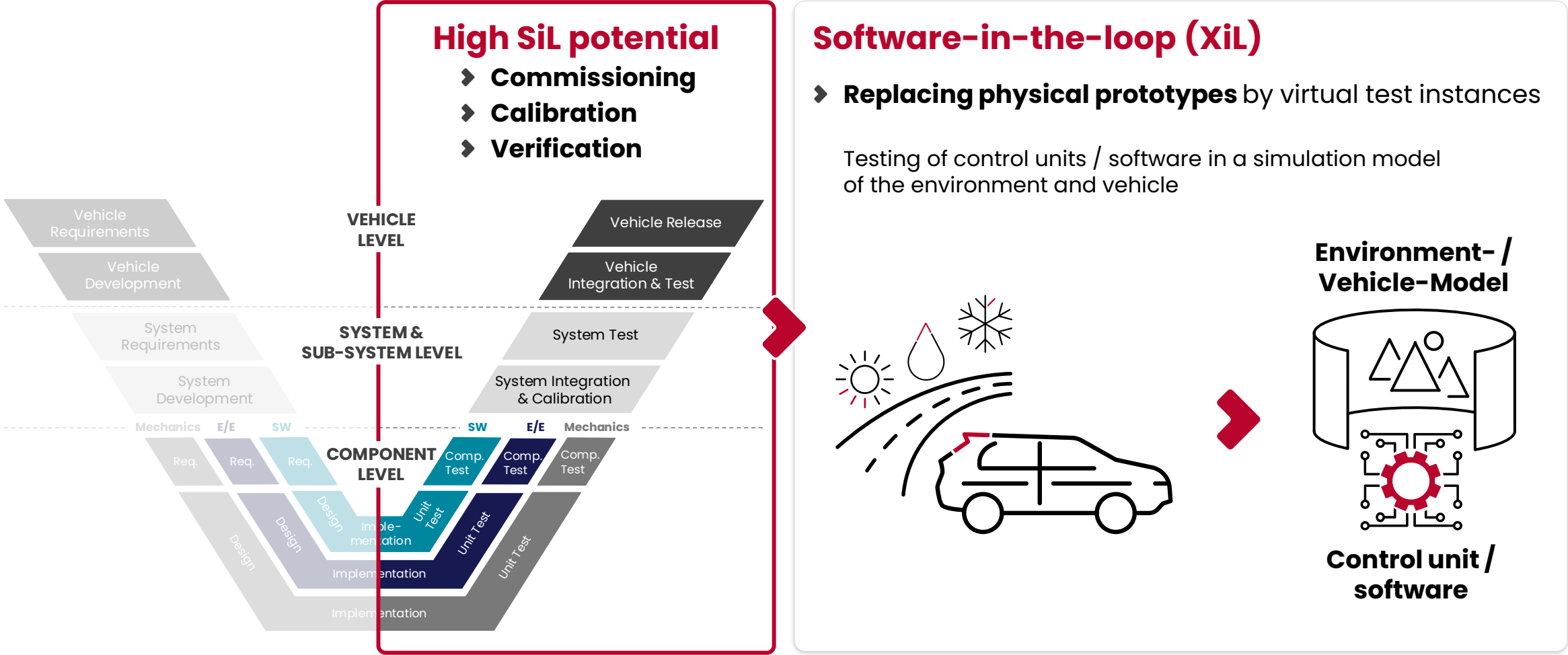


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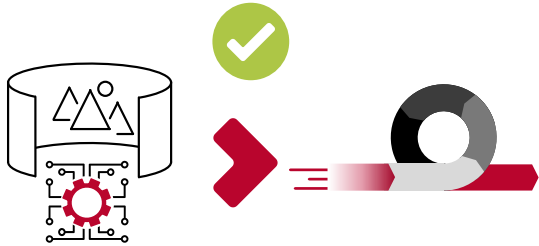
Accelerated development



SW-in-the-loop (XiL): working on new control software in virtual vehicles instead of physical prototypes



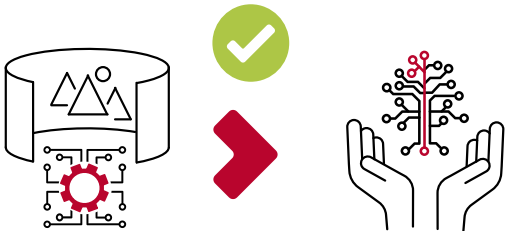
Your benefits when relying on our SiL approach



SiL accelerates the development
by enabling shorter feedback loops

Reasons

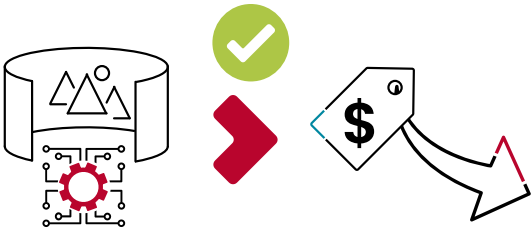
- › SW is created & changed faster than HW
- › Automation enables parallelization



SiL masters SW complexity
by addressing issues early

Reasons

- › Numerous scenarios can be tested early & automatically
- › Simulation enables more iterative development



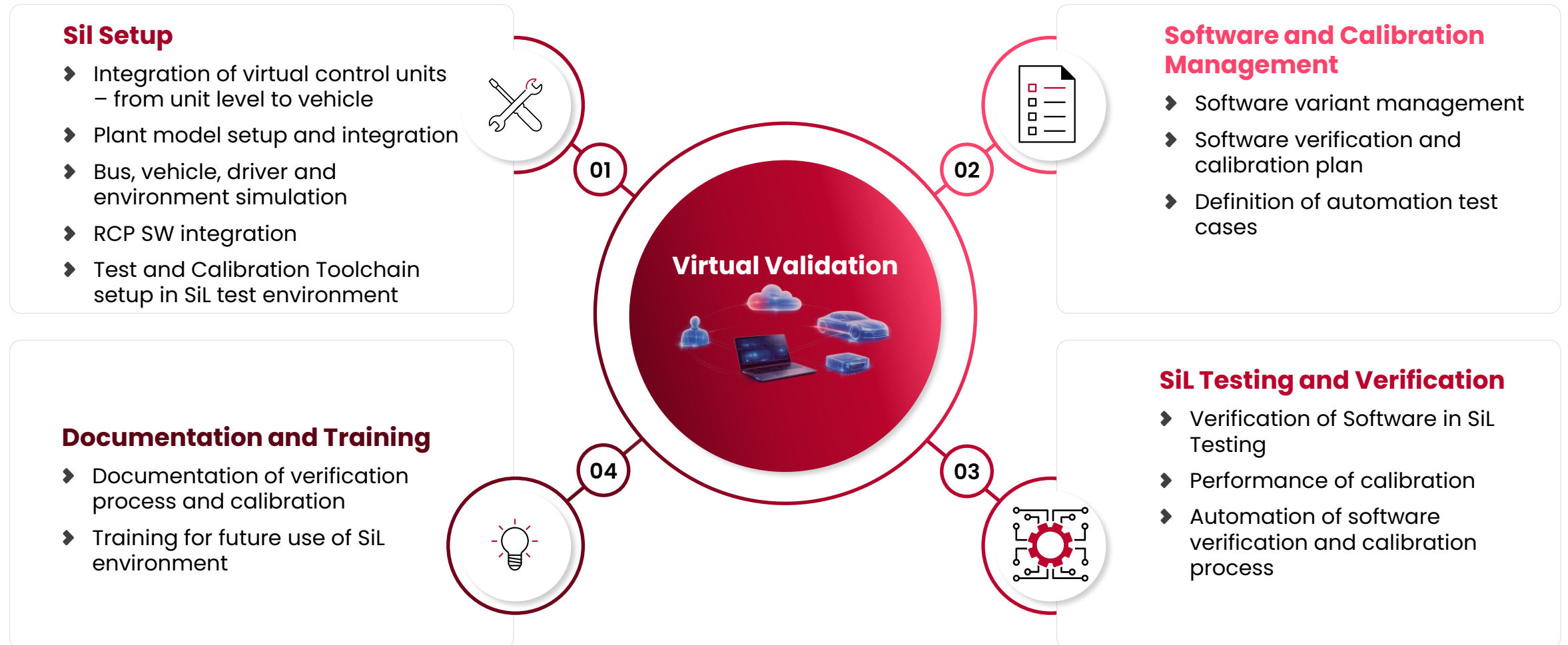
SiL lowers costs
by reducing the need for physical tests

Reasons

- › Virtual vehicles replace physical prototypes
- › Test conditions are easily controllable/reproducible

FEV's Virtual Validation Toolchain covers the complete software product cycle from software verification to calibration (incl. documentation)

OUR SCALABLE VIRTUAL VALIDATION PLATFORM



Get in touch with us for further information



[www.fev.com/en/
signature-solutions](http://www.fev.com/en/signature-solutions)