AUTOSAR X SystemWeaver®

Success Story: Scalable Software Lifecycle Management in Mixed AUTOSAR Architectures

Accelerating SDV development by achieving modularity, traceability, and compliance

by **Dr. Ahmed Majeed Khan, Vice President, System Design**

Objective Statement

The move toward Software-Defined Vehicles (SDVs) brought new technical challenges: managing system complexity, ensuring full lifecycle traceability, and enabling modular and agile development across distributed teams. Engineering groups needed to manage mixed AUTOSAR Classic and Adaptive Platform configurations while complying with ISO 26262, ISO 21434, and ASPICE—often under tight timelines and with evolving architectures. The objective was to implement a scalable software product lifecycle management (S-PLM) solution that supports system-level design, multi-domain collaboration, and traceable software lifecycle management in a single platform.

Approach Taken

A domain-specific, model-based platform was adopted to support systems engineering, configuration management, and traceability across abstraction levels:

- Architecture Evolution: Teams migrated from legacy setups to HPC/Linux-based environments, where containerized services (AUTOSAR AP) were integrated alongside existing Classic Platform ECUs. This required standardized abstraction layers, robust API definitions, and modular software architecture.
- Signal Interface Optimization: Centralizing signal and interface data reduced redundancy and streamlined version control. In some cases, signal loop durations were cut by over 50% – from 9 to 5 weeks – by eliminating manual handoffs and improving data consistency.
- Global Collaboration Support: With abstraction-level access control, over 150 users spread across the globe could contribute simultaneously across different domains (e.g., cybersecurity, safety, diagnostics), while maintaining a consistent system baseline and avoiding integration delays.
- End-to-End Traceability: Requirements, safety artifacts (TARA, HARA, FMEA), system models, and AUTOSAR configurations were stored in one repository. This enabled engineers to trace impacts from top-level requirements to SW-Cs, calibration parameters, and test cases.
- Documentation Reuse & Agile Compliance: Product documentation was aligned with agile workflows. Instead of treating code as the primary artifact, the system enabled the reuse of architectural patterns and documentation across programs, reducing the time and effort for audits.

Outcome

- Mixed AUTOSAR CP/AP integration achieved with consistent architectural support and version control
- Interface cycle time reduced by 56%
- Improved modular reuse across projects, leading to faster platform ramp-up
- Live traceability views provided real-time insight into system status for developers, architects, and project leads
- ISO 26262 and ASPICE documentation reuse, accelerating audit readiness

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Key Takeaways

- A tool-agnostic S-PLM core that supports both AUTOSAR variants enables future scalability.
- Full-stack traceability – from requirements to implementation – is essential for managing SDV complexity.
- Reusing architectural assets, not just code, drives efficiency across programs.
- Compliance deliverables should be built into the process, not added later.

Advice to Practitioners

Start with a strong meta-model and ensure all abstraction layers – requirements, design, implementation – are connected early. Tooling must support collaboration, traceability, and compliance natively to scale across domains and platforms.