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SOLVING SDV COMPLEXITY: WHY FOUNDATIONAL SOFTWARE MATTERS

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Solving SDV Complexity: Why Foundational Software Matters

A more-challenging, ever-shifting development environment requires increased focus and stability to succeed.

Designing, developing, and deploying software can be a wildly complicated task at the best of times. Add on the complexities of the automotive world, and that whole process just gets exponentially harder. The famous Silicon Valley adage of "move fast and break things" doesn't work so well when you're coding for a device tasked with carrying people's families around.

It's a uniquely challenging development environment that just keeps getting harder. Expectations for more advanced in-car experiences keep climbing, thanks to the explosion of capability within the mobile devices that we all carry in our pockets or purses. Meanwhile, an ever-denser web of global regulations threatens to strangle even the best-laid development processes.

As the automotive and software worlds have become increasingly conjoined over the past 20 years, the results have not always been seamless. A recent study that [QNX](#) commissioned shows increasing frustration from software developers globally. Stymied developers can lead to late, unreliable code, the sort of situation that can delay product launches.

What's causing all this frustration, and how might a new combination of two existing products provide a solution? Let's dig into the details.

Increased Complexity and Regulation in the SDV Era

The rise of software-defined vehicles (SDVs) has numerous benefits for consumers and manufacturers alike, enabling the creation of ever-more capable machines featuring advanced features that grow over time to keep up with a rapidly evolving vehicular landscape.

Previous approaches to automotive development based purely on integrated systems are incapable of keeping up with that pace of evolution. But, while SDVs enable new levels of system capability plus long-term product evolution, an unwanted side-effect is an increasingly complex mesh of interconnecting and overlapping standard interfaces.

Additionally, increased scrutiny and concern for customer data protection and overall safety and security have resulted in an ever-widening set of mandates. 2024 alone saw 500 new regulations proposed or added to the mix, with those related to cybersecurity causing the most concern.

A critical one is the European Union's Cyber Resilience Act (CRA). This regulation, set to go into effect in 2027, not only defines new standards for consumer data protection, but requires frameworks both for initial

assessment and for ongoing lifecycle security. Tackling this, then, means more than just code: It requires an organizational shift.

Some of these same concepts are covered in ISO/SAE 21434, another major regulation focused on automotive cybersecurity, requiring the definition of a Cybersecurity Management System (CSMS) to continuously monitor and address security risks.

These are not trivial changes, and they are having some significant impacts. According to the Under the Hood: SDV Developer report commissioned by [QNX](#), which surveyed 1,100 global embedded automotive software developers, one-third of respondents saw delays in development timelines in 2024 due to the introduction of regulations like these.

More Recalls, More Frustrations

Delays aren't the only impacts of this increase in complexity and regulation. Quality is also suffering. According to JD Power's U.S. Initial Quality Study 2025, there were 202 software-related recalls in 2024. That's nearly double the 112 software-related recalls in 2023.

The majority (58%) of developers surveyed said their processes and methodologies have been impacted by this trend. Many felt stymied by development environments that are, according to the survey, merely rated as "good" or "average." A sub-optimal software development environment means sub-optimal performance from software developers.

Add to that a [major talent shortage](#), and it's clear that the commingling trends of increasing development complexity and heightened consumer expectations are not sustainable. Even though most developers (91%) predict that AI will have a major impact on development within the next five years, the vast majority of those surveyed say that the best way forward is to focus development efforts on the places where it can have the most impact — the application layer.

Optimizing Innovation at the Application Layer

Fast-changing regulations and cybersecurity demands are having immediate impacts on software complexity and the product landscape. Porsche's 718 and its gas-powered Macan were both prematurely removed from the European market thanks to their lack of compliance with local regulations.

How to handle this increasingly onerous situation? The best solution might be to let someone else handle the heavy lifting. Eight out of ten of the developers surveyed said that auto manufacturers should shift their focus to application-level development — the features and capabilities that customers actually see — as opposed to getting bogged down in the foundational software infrastructure. This is precisely where a solution jointly developed by [QNX](#) and [Vector](#) comes into play — combining [QNX](#)'s proven OS capabilities with [Vector](#)'s deep expertise in embedded software architecture and middleware integration.

The Foundational Vehicle Software Platform

Between the touchscreen covered in fingerprints and the silicon chips buried down in the chassis lies layer upon layer of software and other interfaces. For all that to create a satisfactory user experience, all those layers must work together seamlessly.

This delicate dance is a vastly complicated one, made all the more so by the variety of integrated hardware sometimes found across a single model from a single manufacturer. This makes initial software development plus ongoing maintenance a massively complicated task.

[Alloy Kore](#) - the Foundational Vehicle Software Platform is a joint effort of [QNX](#) and [Vector](#) to simplify that, combining both a low-level hardware abstraction layer plus a comprehensive middleware suite handling much of the messiness around software integration that so often challenges OEMs with the best of intentions.

Pre-integrated, lightweight, and certified to the automotive industry's highest functional safety (ISO 26262 ASIL D) and security (ISO 21434) standards, this Foundational Vehicle Software Platform is simple by design, performant by nature, and able to scale vehicle-wide, making it easier than ever for automakers to accelerate their SDV development efforts.

Importantly, this Foundational Vehicle Software Platform is not about replacing OEM software stacks; it's about accelerating them. By enabling tighter integration, faster certification, and scalable deployment, the platform supports OEMs without locking them into a specific architecture.

In other words, software developers can focus on creating powerful, reliable user experiences and worry less about the nuts and bolts of system integration.

Optimization Through Prioritization

The trend of rising complexity and expanding regulation is not going away. It will only grow as demands increase for both more comprehensive user experiences and more secure application environments. A standardized framework behind the scenes to streamline both development and certification efforts will free developers from implementation and regulation surprises. Less time sweating over those headaches means more time spent building experiences that surprise and delight, which is what this game — and ride — should be all about.

You can find more information about the sponsorship at our website: www.vector.com/motortrend

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About Vector

[Vector](#) has been a leading partner in the development and networking of embedded electronics for over 35 years. With more than 4,500 employees at 32 locations worldwide, the company supports manufacturers and suppliers in industries such as automotive, MedTech, IoT, and aerospace. A comprehensive ecosystem of tools, cloud services, a professional software factory, and engineering services forms the foundation for building safe and high-performance embedded systems. Driven by a passion for technology, Vector develops solutions that ease engineers' demanding tasks and is actively engaged in education, research, and social responsibility.

About QNX

[QNX](#), a division of [BlackBerry](#), enhances the human experience and amplifies technology-driven industries, providing a trusted foundation for software-defined businesses to thrive. The business leads the way in delivering safe and secure operating systems, hypervisors, middleware, solutions, and development tools, along with support and services delivered by trusted embedded software experts. QNX technology has been deployed in the world's most critical embedded systems, including more than 275 million vehicles on the road today. QNX software is trusted across industries, including automotive, medical devices, industrial controls, robotics, commercial vehicles, rail, and aerospace and defense. Founded in 1980, QNX is headquartered in Ottawa, Canada.

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