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Automotive software: every day a new car

The power of cloud-enabled software-defined vehicles

Over the past decade, traditional original equipment manufacturers (OEMs) have struggled in adapting a digital mindset and techniques for their research and development in the pursuit of a software-defined vision. Too often progress stalls as inefficient, hardware-engineering-driven ways of working and outdated methods remain the status quo.

But elsewhere in the market, we see that the vision of a software-defined vehicle is possible. The meteoric rise of challenger OEMs and new entrants shows that software-defined vehicles have the power to make continuous innovation possible.

The core capabilities that enable digital product transformation and monetization are cloud native like in-vehicle computer platforms, the migration of car software across domains to a function-orientated architecture, and the ability to use microservices and containerized deployments. With frequent over-the-air updates and a focus on product development, not just bug fixes, the aim is for vehicle feature releases multiple times a week. Improving the timeliness of in-vehicle updates, data collection, and management can keep a car digitally relevant and secure for 10+ years.

As an example, Tesla can deploy hotfixes within 24 hours, including full integration testing and OTA updates across 80 percent of the fleet. Thanks to their software-first approach in product engineering and the vehicle architecture platform, they can regularly, and remotely, update models launched more than 10 years ago like telcos update mobile industry products. For this new breed of tech players, the ability to make real-time technical improvements not only increases the longevity of products, but it also unlocks new revenue streams through the monetization of applications, infotainment, and other software-enabled features while driving brand loyalty through customer-centric development and technology leadership.

Recent research of global manufacturers shows that cloud leaders adopt the cloud not just for cost savings, but also to grow revenue, accelerate innovation, improve teamwork, and shorten time to market.

Quantifying the performance gap: Software companies achieve more for less

While it's true that traditional OEMs regularly manage to present new models with one or two innovative software features, these can come at a 50 to 70 percent higher cost and effort than the leading digital players. This is because there are typically between 30 and 40 different computer platforms integrated within these vehicles, many of which cannot be updated remotely thus limiting the ability to continuously deploy new software and enable pervasive monetization.

Several other factors make pushing the limits of domain architectures too costly for traditional OEMs. The variety of chips and dependencies, also fueling the semiconductor crisis, with more than 100 electronic control units on 30+ chipsets each with a heavily customized base operating system drives the implementation workload.

Outdated ways of working result in large and inefficient, often still hardware-dominated software R&D organizations.

These organizations might have as many as 3,000 developers only developing 20 to 30 percent of the software for the vehicle inhouse and sourcing the rest from tier 1 or 2 suppliers. In stark contrast, benchmark examples typically have 1,500 developers developing 80 percent of the software across all domains inhouse. Lastly, slow and hierarchical working cultures lead to losses in the war for software talent needed to fuel innovation. Classic OEMs know that change is necessary but may be lacking the knowledge, mindset, and partnerships to make the shift.

Bridging the gap: Automation as key enabler along the software toolchain

As a first step, organizations should act to improve efficiencies within and at the interfaces between research, design, and development phases.

Our recent benchmark study has shown that traditional OEMs can realize up to 30 percent Reduction in the test and integration error rate, as well as a 20 percent decrease in time to market by reducing complexity through design simplification, validation via digital prototypes, automated engineering processes, and enabling the end-to-end responsibility of developers in a collaborative environment.

When it comes to software testing, integration, and homologation, organizations should take advantage of installed fleets to test new software pre-release.

Challenger OEMs and tech giants—such as Microsoft with its Insider program—use a "shadow mode" capability to pilot new software in the real world, and analyze performance before a final release. Continuous integration testing and the reduction of hardware prototypes through digital twins and simulation can improve validation efficiency by a 30 percent reduction in cost.

Leapfrog the competition: Three approaches to develop the software-defined vehicle

There are three options for traditional OEMs to develop the software-defined vehicle: stepwise transformation over multiple architectures with the support of tier 1 suppliers, partnering with a strong tech company to drive the innovation process, and a greenfield approach to create an entirely new, cutting-edge platform.

Figure: Traditional OEMs have three options for developing the software-defined vehicle

	Tier 1 suppliers	Tech partner	Greenfield
Description	Electric/electronics transformation of architecture over multiple generations	Partner with major tech player to deliver future platform and adapt the rest to it	Cut legacy relations and create a state-of-the-art platform, way of working, toolchain, and organization
Speed	10–15 years →	5 years →	3 years →
Costs	2–3 major platforms	2 platforms and licensing	1 platform
Pros	• Low technical risk • Moves along with original equipment manufacturer transformation speed	• Balanced in risk and innovation • Fast capability uplift • Ecosystem orchestration and change management provided by partner	• Bold approach • Best practices can be used from new electronic vehicle players • Leapfrog existing players with newest approach
Cons	• Competition continues to pull away • Low degree of innovation • Costs of an extra 1-2 platforms in between	• Vendor lock-in • High degree of outsourcing and potential knowledge loss	• Higher initial invest • Complex cut-over phase into all models • Requires ringfenced organization and best experts in the market

Source: Kearney analysis

Considering an automotive software-defined future?

Partnering with a technology company will help you keep pace with challengers while maintaining a low risk profile and with reliance on the partner to simplify and orchestrate a complex ecosystem. However, to truly leapfrog the existing state of vehicle IT, it's time to use the full potential of proven cloud technologies.

Cut the threads to legacy and develop your future platform, enabling you to deliver a new car every day.

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