Software defined vehicles:

Driving the future of mobility and monetization

KPMG Center of Excellence

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Executive summary

Situation

Software-defined vehicles are shifting the industry from hardware-led products to software-driven platforms. Centralized computing, AI and over-the-air updates are making software a core source of competitive advantage and lifetime value. Industry forecasts indicate that SDVs could contribute up to $2 trillion in annual value by the mid-2030s, driven by connected services, digital features and automation.

Challenge

The path to SDV value is constrained by fragmented architectures, unproven monetization models and operating structures not designed for software at scale. For many OEMs, even deploying a simple over-the-air update still requires months of integration, validation and regional regulatory approval.

Three priorities to win in the SDV Market

Centralize vehicle architecture

- Central compute & unified software platforms
- Fleet-wide data & model governance
- Enhanced cyber, safety and regulatory

Scale recurring software revenue

- Feature subscriptions & digital services
- Data-driven offerings & predictive maintenance
- Clear value propositions and trusted data use

Transform the operating model

- Ecosystem-driven delivery with key partners
- Board-level cyber, safety and AI governance
- Product-based funding tied to lifecycle value

Owning the SDV platform enables recurring software revenue and ecosystem influence, but requires a shift to software-centric delivery and governance.

Introduction

Software-defined vehicles powered by AI are reshaping the automotive industry. Vehicles are moving from hardware-led products to digital platforms that improve over time. Centralized computing, real-time data and over-the-air updates allow vehicles to evolve long after delivery. Safety, performance and customer experience can now be updated weekly or monthly.

In recent years, SDVs have moved from pilot programs to large-scale deployment. OEMs are replacing dozens of isolated ECUs with centralized and zonal computing architectures. This reduces complexity and speeds up software development. Over-the-air updates have become a critical capability. They lower recall costs, shorten innovation cycles and enable recurring software revenue.

AI now acts as the core intelligence of the vehicle. It creates value in three main areas. Perception improves awareness through camera, radar and lidar fusion. Decision and control expand automation across more driving scenarios.

Experience improves interaction through voice interfaces, personalization and diagnostics. Connectivity extends these capabilities beyond the vehicle. Cloud platforms enable model updates, digital twins and fleet learning. Improvements can be delivered at scale without redesigning hardware.

Vehicles are no longer static products updated every few years. They are lifecycle businesses that require continuous operation and improvement. This shift changes how OEMs design vehicles, work with partners and manage cyber security, safety and data. It also reshapes how long-term value is created and captured.

> Software-defined vehicles drive next-gen auto architectures | Computer Weekly

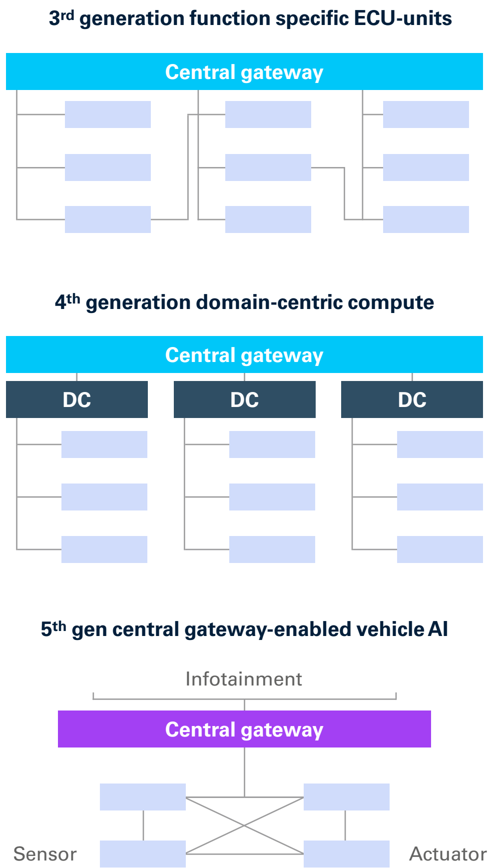
Architecture evolution SDVs to centralized compute

For decades new vehicle features were delivered by adding new ECUs. This approach created fragmented architecture. Systems became expensive to integrate. Software updates slowed down. Cybersecurity and safety have become harder to manage.

Modern functions such as ADAS and EV energy management often sit on top of legacy domains. They inherit existing constraints. This limits performance, updating speed and capture of value. AI changes this model. Advanced perception, autonomy and predictive control require access to vehicle-wide data in real time. Models cannot operate effectively inside isolated domains.

As a result, vehicle architecture must centralize. Computing moves to shared platforms. Software stacks become unified. Data flows across the vehicle. OTA pipelines become secure and synchronized.

This transition enables AI to scale. It also creates the foundation for faster innovation and recurring software-driven value. AI in vehicles depends on shared data and shared computing. Legacy vehicle architectures divide both across domains. Individual ECUs work with limited context. This constrains accuracy, robustness and scalability. Centralized architectures resolve these limits.



How AI capabilities are enabled

1. Deep sensor fusion (camera + radar + lidar)
2. Massive computer for autonomy models
3. Continual OTA model updates
4. Predictive control (energy, comfort etc.)
5. Vector-based data sharing

Required platform & architecture foundation

1. Data must be processed together, not inside separate domains
2. Requires GPU/AI accelerators & high-speed memory near the core
3. Software must be deployed across systems synchronously
4. AI must command multiple subsystems simultaneously
5. High-speed vehicle network with centralized control

> Zonal architecture in modern vehicle electronics: The shift from domain-based to zonal ECUs

Centralized vehicle architectures are becoming the industry standard

The shift toward centralized compute is now visible in the market. OEMs across regions are moving away from fragmented ECU-based designs toward centralized platform architectures.

Core processing is consolidated into one or a few central controllers. This simplifies system integration and reduces hardware redundancy. Software updates become faster and easier to manage.

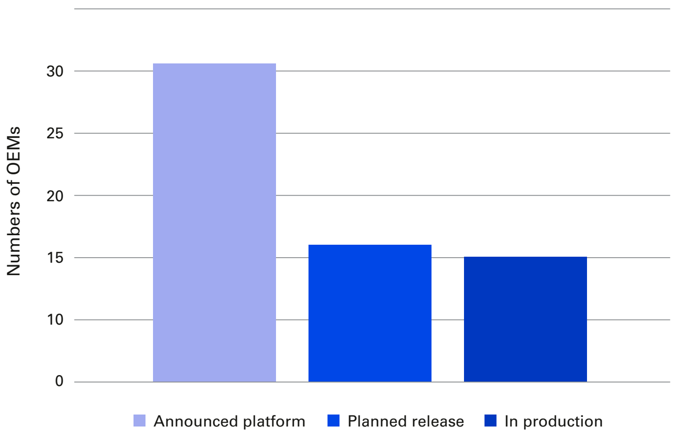
This transition responds to the need for AI-driven functions over-the-air delivery and vehicle-wide data processing.

Centralized architectures improve performance by enabling unified data handling and coordinated control across systems. OEMs can deploy features more quickly and manage complexity over the vehicle lifecycle.

This also creates the foundation for software-driven services at scale.

The distribution shown illustrates that adoption maturity differs by OEM. Even so centralized architectures are becoming the industry standard rather than concepts.

OEMs platform architecture centralization



Leading SDV brands are already in production, while other markets are trying to close the gap.

> GM is the latest carmaker to adopt a zonal architecture, but there's a dark side to it – autoevolution

Centralized vehicle platforms redefine value creation

Moving to a central vehicle brain is more than an engineering decision. It reshapes how OEMs work with suppliers and where value is created and captured.

Traditional vehicle development relied on distributed ECUs, detailed specifications and late-stage integration. Value was concentrated in hardware and system integration. Coordination effort was high and software iteration slow.

Centralized platforms replace this model. OEMs define common data models, software interfaces and platform rules. Partners contribute hardware, software and services into a shared environment. Integration becomes continuous and data-driven. Value increasingly shifts toward data, AI capabilities and the customer experience.

This shift forces OEMs to make a strategic choice: remain system integrators or take ownership of the vehicle platform that increasingly defines long-term value.

Once value shifts from components to the platform, AI becomes the operating system that makes this model work.

Old model: Integration by specification

- OEM defines detailed requirements per ECU
- Tier-1 builds hardware and software for a domain
- Integration occurs late with high coordination friction
- Value capture is mainly in hardware and system integration

New model: Integration by data and models

- OEM defines common data models and APIs
- Partners contribute models, services and hardware into the platform
- Integration is continuous through DevOps, simulation and fleet data
- Value shifts to those who own data, AI and the customer experience

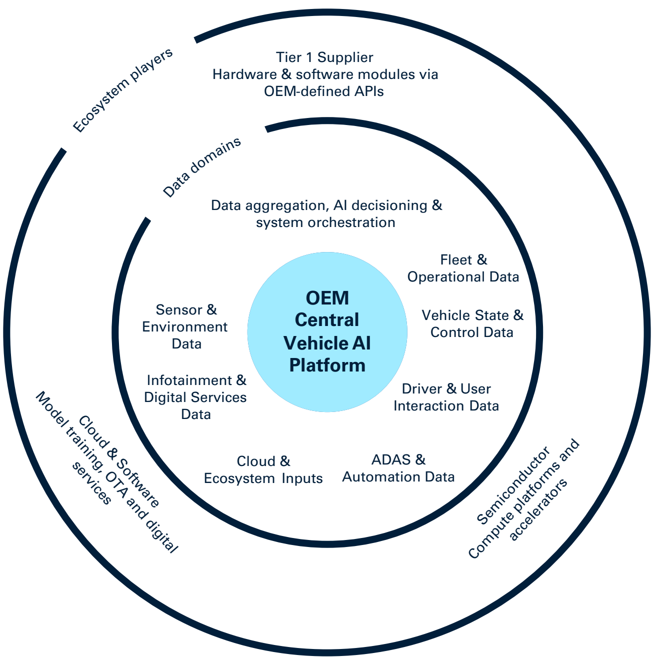
AI as the vehicle & ecosystem control layer

Centralized vehicle platforms place AI at the center of the vehicle and its ecosystem. An OEM-owned AI platform brings together sensor data, vehicle states, user interaction, and fleet feedback.

Shared models handle perception, decision-making, and control across the vehicle. This architecture changes ecosystem roles. Semiconductor, Tier-1, and cloud partners contribute compute, software, and services through OEM-defined interfaces.

Control of data, behavior, and updates stays with the platform owner. Integration shifts from components to the platform. AI enables this model in three ways. Shared models avoid duplicate development across functions. Automation lowers the cost of integrating many partners. Fleet-level monitoring and updates improve performance over time.

As control consolidates, strong governance for cyber, safety, and data use becomes essential. Value moves to the platform layer. Placing AI at the center changes ecosystem roles. Control now depends on who governs data, interfaces, and updates.



How AI & centralized platforms reshape OEM ecosystem models

As vehicle platforms centralize, OEMs are taking different positions on platform ownership. These choices determine how value is captured across the software-defined vehicle stack and how power is shared with technology and semiconductor partners.

SDV value spans five layers, from hardware and operating systems to applications, data services and ecosystem monetization. OEMs that control more of these layers retain greater control over data, updates and customer relationships.

The ecosystem models shown illustrate the trade-offs. Semiconductor-led and tech-led approaches accelerate speed and innovation but shift control outward. OEM-owned platforms require greater investment and transformation but enable deeper value capture and long-term differentiation.

Approach 1: Semiconductor-led:

Chipmakers provide the central compute platform.
Benefit: Fast + cost-efficient
Challenge: OEM: Carmakers loses platform control

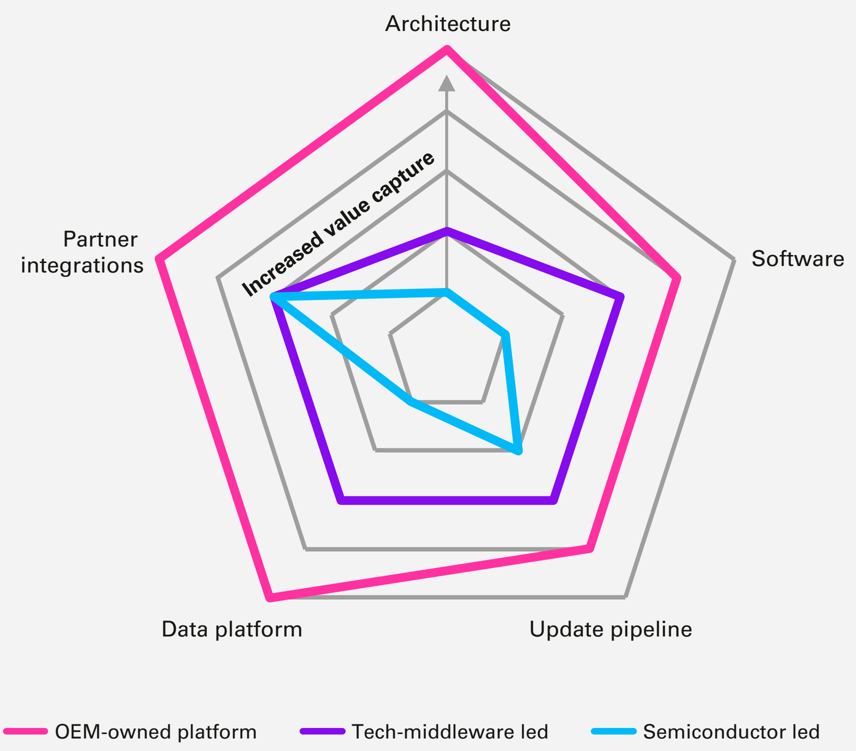
Approach 2: Tech-middleware-led:

Tech players supply Operating Systems + APIs.
Benefit: Faster software innovation
Challenge: OEM: Data + customer relationship shift to tech players

Approach 3: OEM-owned open platform:

OEM sets the platform rules and partners plug into it.
Benefit: OEM controls data + monetization
Challenge: OEM: Major software investment and transformation

OEMs Value Capture in different Ecosystem Models



Global OEM responses to the SDV shift

OEMs are responding to this shift in different ways shaped by regulation, market pressure, and ecosystem strength

USA
Innovation & ecosystem

- Tech-led players and SDV startups drive rapid OTA and in-house software development
- Fast experimentation with features such as Full Self-Driving beta and continuous OTA updates
- Fragmented regulation, with autonomy approvals varying by state (e.g., California vs. Nevada)

Europe
Regulation & premium

- Strong focus on safety, liability and data protection across OEMs and regulators
- Premium OEMs lead in certified ADAS (e.g., Level 3 Drive Pilot)
- Slower software rollout due to stringent EU and national approval processes

China
Speed, scale & integration

- OEMs rapidly deploy SDV and AI features at scale
- Tight integration of vehicle, smartphone and cloud ecosystems (e.g., Huawei partnerships)
- High consumer openness to digital services enables fast feature adoption and iteration

Conclusion: Business models in the software-defined vehicle era

The transition to centralized, AI-ready vehicle platforms marks a structural shift for OEMs. Vehicles are no longer built as collections of independent systems. They are operated as software platforms that evolve over time.

This shift moves value away from individual components toward the platform layer. Control of data, AI models, update pipelines, and customer interaction becomes the primary source of differentiation and long-term advantage. OEMs that retain this control can shape the ecosystem around them. Those that do not risk becoming hardware integrators in someone else's platform.

With centralized platforms in place, the strategic question changes. The challenge is no longer whether AI and software can be deployed at scale. The challenge is how these capabilities are translated into sustainable revenue while maintaining trust, safety, and regulatory compliance.

The next chapter focuses on that question. It outlines the revenue pools emerging from software-defined vehicles and explains how AI and centralized platforms enable new, recurring business models across the vehicle lifecycle.

SDV market potentials

Software-defined vehicles are reshaping the automotive profit model. Value is no longer realized only at the point of sale.

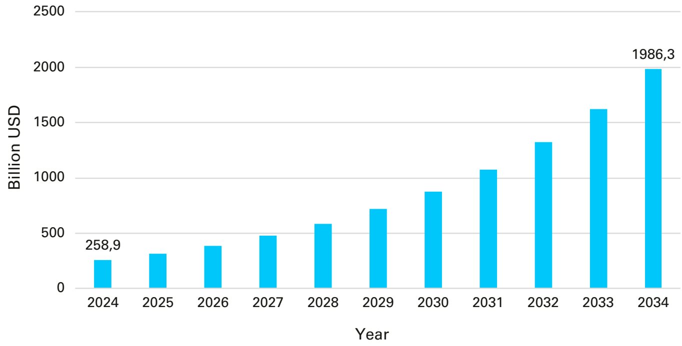
Centralized computing, connectivity, and AI expand value creation into software, electronics, and services over the vehicle lifecycle. This shift is increasingly reflected in market projections.

Industry estimates suggest the global SDV market represents approximately $250–300B today, with long-term projections indicating growth toward the high hundreds of billions or beyond $1T over the next decade, driven mainly by software and electronics content. Growth is expected to accelerate as centralized platforms scale across vehicle lines and fleets.

These projections highlight the strategic importance of SDV platforms. While exact outcomes remain uncertain, the direction is clear: value creation is migrating toward software-driven layers of the vehicle stack.

> Software defined vehicle market size, Forecast – 2034
> What will be the first big market success for SDVs? | Automotive World

SDV market size



Hardware
- Central computers
- Controllers
- Sensors
- Batteries
- AI accelerators

Software
- OS
- Middleware
- Application software
- ADAS
- Cybersecurity

Services
- Subscriptions
- Data-driven services
- Cloud services

Software and electronics key profit driver

SDV-related revenue growth is distributed across electronics and software, though the value dynamics differ.

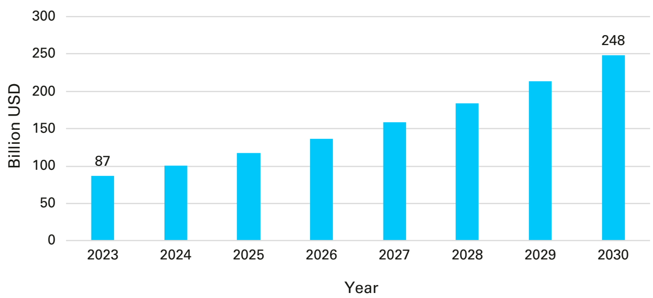
Industry estimates indicate revenue from automotive software and electronics could grow from roughly $80–100B today to $200–250B by the end of the decade, depending on adoption rates and regulatory and consumer acceptance. Electronics such as central computers, sensors, and connectivity provide the technical foundation but remain largely hardware-margin-driven.

Software contributes most of the incremental value. Operating systems, middleware, applications, cybersecurity, AI infrastructure, and digital services scale through updates and fleet-wide deployment. These revenues are recurring and extend across the vehicle lifecycle rather than resetting with each vehicle sale.

As SDV platforms mature, value is expected to shift toward software-enabled services and ongoing digital monetization. This sets the stage for the key business challenge: identifying which revenue pools can scale, and under what conditions they generate sustainable returns.

The following section examines these revenue pools and the role AI plays in their performance.

Revenue from software and electronics



Revenue parameters:

Software
- Middleware
- OTA software services
- OS
- Application software
- ADAS
- Cybersecurity
- Cloud services
- AI & data infrastructure
- DevOps
- Digital services & monetization

Electronics
- Computing hardware
- Sensors
- Architecture
- Connectivity & communication

Software features & subscriptions

Paid ADAS upgrades, performance boosts and comfort automation unlockable post-sale

Software-defined vehicles allow OEMs to monetize features beyond the point of sale. ADAS upgrades, performance enhancements and comfort functions can be activated post-delivery through software. Centralized compute and AI enable personalization based on driving behavior and usage patterns.

Successful subscription models depend on timing and clarity. Features must deliver clear, ongoing value and fit naturally into the vehicle lifecycle. Hardware-ready features unlocked later tend to perform better than abstract software add-ons.

Transferability across owners and compatibility with leasing and resale are also critical. AI improves retention by adapting features over time and predicting usage patterns.

However, transparency remains essential. Customers must understand what is unlocked, how long it lasts, and why it is worth paying for.

In-vehicle commerce & media

Paid integrated payments for charging, parking, tolling and digital content subscriptions

Centralized platforms enable in-vehicle payments, digital content, and productivity services. Common use cases include charging, parking, tolling, streaming, and app subscriptions.

AI simplifies interaction through voice control and contextual recommendations.

The key strategic question is payment and interface ownership. OEMs that control the in-vehicle interface and wallet retain customer insight and recurring revenue.

Those that rely on third-party platforms risk disintermediation and margin loss.

Usage depends heavily on context. Passenger use cases scale faster than driver-focused ones.

Acceptance also varies by region and regulation. Long-term success requires a clear ecosystem model, balanced revenue sharing, and strict safety boundaries.

Data monetization services

Usage-based insurance, fleet optimization analytics and infrastructure insights for cities and operators

SDVs generate continuous streams of vehicle, driver, and fleet data. These enable usage-based insurance, fleet optimization, and infrastructure insights for cities and operators.

AI translates raw data into predictive scores and actionable insights.

Monetization success depends on data governance. Consent management, explainability, and regulatory compliance are prerequisites. Most customers are unwilling to share raw data but accept outcome-based services tied to clear benefits.

Value shifts toward packaged data products rather than one-off data sales. APIs, recurring contracts, and decision-support services scale better than access-only models.

OEMs that control data models and access rules retain pricing power and long-term relevance.

Predictive maintenance & uptime

AI-based failure prediction, proactive service scheduling and uptime guarantees for fleets

Predictive maintenance enables OEMs to monetize uptime by moving from reactive repairs to AI-driven, proactive service. Continuous vehicle health monitoring enables early failure detection, optimized service scheduling, and reduced unplanned downtime.

Improved reliability directly increases customer lifetime value.

Fewer breakdowns, longer component life, and predictable performance strengthen trust with the customer. A longer customer lifecycle opens multiple opportunities to improve retention and extend subscription relationships over the vehicle lifecycle.

Warranty contracts can be tailored per usage and allow the customer higher transparency while giving the OEM better predictability about warranty costs.

For fleets, uptime can be offered as a contracted outcome. Data-driven service packages tied to availability and cost performance create recurring revenue while reinforcing long-term customer relationships.

Customer success & conclusion revenue generating SDVs

In software-defined vehicles, monetization depends on sustained usage after delivery. Customers activate and retain digital features only when the vehicle delivers continuous, tangible value over time.

Three elements are critical:

1

Trust and control

Vehicles must behave predictably and clearly communicate when AI influences driving decisions, especially in assisted and automated modes. Customers pay for intelligence they understand and trust, and that trust must be reinforced with every update.

2

Reduced effort and improved comfort

Software should simplify everyday mobility through reliable routing, seamless charging, intuitive voice interaction, and effortless parking. Personalized comfort that adapts to each driver reinforces that value continues to grow after purchase.

3

Brand-consistent digital identity

The digital experience must reflect the brand promise. Performance brands should feel sharper over time, while premium brands should feel smoother and more supportive. Consistency across physical and digital touchpoints strengthens loyalty.

In the SDV era, sustainable revenue comes from customer success. Continuous software value, fast updates, personalization, and trust are essential. The winners will be OEMs that sustain feature usage, because sustained usage is what sustains revenue.

Organizational enablers for SDV success

Technology is no longer the limiting factor in SDV adoption. What differentiates leaders is governance, data readiness, ecosystem execution and operating models. The next four capabilities determine whether OEMs can deliver software value on scale.

Cybersecurity and safety governance

Central computing & AI concentrate risk/governance must scale with capability.

Key actions:

- Secure-by-design central architecture
- AI-aware safety and validation approaches
- Fleet-level monitoring and incident response

If governance doesn't scale, every update increases liability.

Cloud and data foundation

Fleet data and OTA releases power SDV economics but without cost control and compliant data flow, scale collapses.

Key actions:

- Decisions on what runs in-vehicle vs edge vs cloud
- Data governance adapted to regional regulations (EU/ China)
- Scalable infrastructure and clear cost ownership

Data quality and cost discipline drive all downstream value.

Ecosystem orchestration

No OEM can own the entire SDV stack, but without control of data platform rules, margin leaks.

Key actions:

- Standardized APIs and interface guardrails
- Revenue-sharing aligned with customer value
- Dedicated partner success management

Platform governance = business power.

Target operating model and culture transformation

SDV success requires continuous delivery, with agile lifecycles incorporating frequent customer feedback loops.

Key actions:

- Product-centric organization model for software delivery
- Weekly release cadence anchored in telemetry
- "Fast learning" culture for Data & AI

Vehicles become living products the organization must adapt.

Conclusion

SDVs mark a fundamental shift from hardware-driven products to experience-driven mobility ecosystems. Winning OEMs will operate vehicles as continuously evolving digital platforms. Supported by open, modular, and secure architectures that unlock recurring revenue and strengthen brand loyalty over the entire lifecycle.

Success will require balancing three priorities:

- Technology scale through centralized compute and secure OTA delivery
- Ecosystem orchestration to accelerate innovation without losing control of data or customer relationships
- Organizational transformation toward product-based governance and continuous software delivery

OEMs that execute this transition early will shape digital customer expectations, capture higher lifetime revenue, and lead the next era of the automotive market.

The opportunity is clear, but so are the execution challenges.

Partnering with an experienced advisor can help accelerate operating model transformation, ensure regulatory confidence, de-risk AI adoption, and build the capabilities required to deliver software-driven business value at scale.

Our automotive and technology experts are ready to support OEMs in defining their SDV roadmap, building the right data and ecosystem foundations, and turning digital capabilities into sustained economic performance.

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How we can help:

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