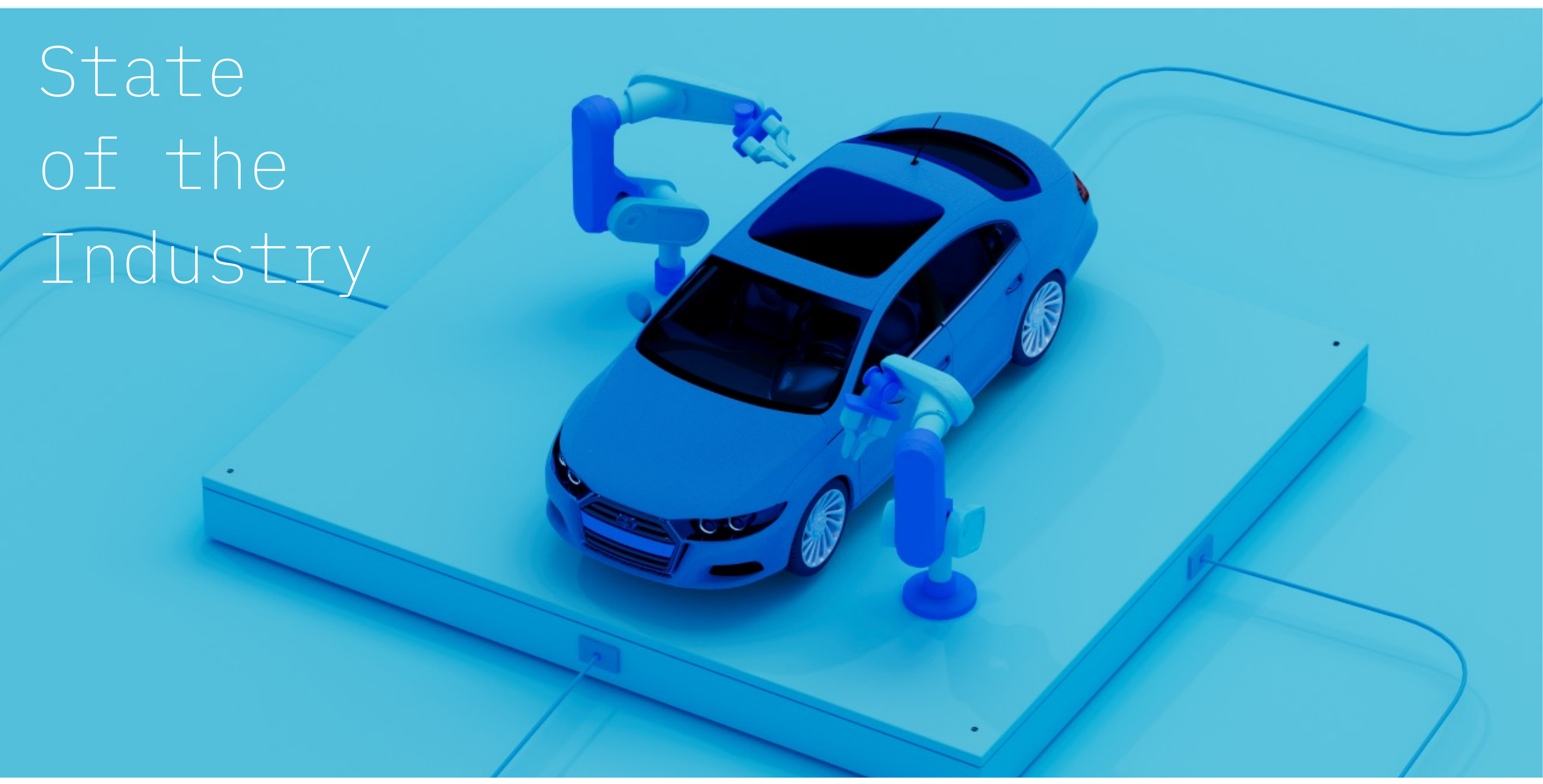
State of the Industry



Automotive

Contents

Executive summary

The automotive industry faces its most fundamental restructuring in decades. Global economic turbulence and shifting trade dynamics are forcing supply chain overhauls and resource reallocation. But the real transformation comes from software-defined vehicles (SDVs), electrification, and AI-powered services that are rewriting competitive rules entirely.

The stakes are massive. Over half of future revenue will come from technology-driven services by 2035, not traditional manufacturing. This isn't evolution. It's a complete business model revolution.

Success demands operational reinvention, strategic partnerships, and leadership bold enough to reimagine the entire industry playbook. Technology enables transformation. Bold leadership and strategic alliances deliver it.

Electric and software-defined vehicles aren't just new products. They're entirely new operating models. Core processes that worked for decades are being rewritten completely.

Digital service revenue models are being tested across customer and product lifecycles to create recurring streams. Clear winners haven’t emerged yet.

Software-driven products require digital-first organizations and ecosystems. Culture, supplier networks, and productivity metrics must all be completely reimagined.

Note: unless otherwise indicated, data points within this asset reflect responses from automotive markets survey respondents.

Market & technology trends

Macro trends

Converging forces pressure automotive to move faster.

Technology advancements[1]

Software-defined vehicles will revolutionize driver and passenger experiences.

Automakers are nearly tripling R&D investments in software-defined products, jumping from 21% today to 58% by 2035.

74%
of automotive executives say vehicles will be software-defined and AI-powered by 2035[2]

Consumer expectations[3]

75% of industry executives say software-defined experiences will be the core of brand value in 2035.

Consumers will expect exceptional experiences: personalized settings, immersive entertainment, and predictive diagnostics.

65%
of automotive executives say customers will expect autonomous driving features by 2035[4]

Economic factors[5]

Geopolitical tensions are reshaping global trade, forcing OEMs to rethink production strategies entirely.

Shareholder pressure is driving SDV and electrification initiatives, while emerging players disrupt with competitive pricing models.

In 2025, supply chain leaders cite global trade tensions as their
2nd biggest challenge[6]

Sustainability[7]

By 2035, 82% of new cars are projected to be electrified. Current policies fall short of 2050 net-zero goals.

Despite political headwinds, sustainability remains a long-term priority for governments and automakers alike.

82%
of new cars are expected to be electrified in some way (full EVs or hybrid) by 2035[8]

Macro trends

Trade tensions expose automotive industry's vulnerability.

The auto industry faces an unprecedented tariff storm. Trade tensions and geopolitical shifts are forcing OEMs to completely rethink global operations. While the sector has survived similar challenges before, today's disruption comes with a powerful advantage: AI.

AI-powered foresight lets automakers simulate trade scenarios, quantify cost impacts, and identify alternative supply routes before disruption hits. This predictive capability enables faster responses and builds operational resilience.

Agility now separates winners from casualties. Sourcing adjustments, logistics optimization, and intelligent tools have become the foundation of competitive advantage.

Macro trends

Tariffs on imported auto parts and vehicles are driving up manufacturing costs and exposing supply chain vulnerabilities.

Suppliers, especially smaller players, are feeling the strongest impact.

Automakers reshape strategies and supply chains for trade resilience.

Production and capacity adjustments

Automakers are rethinking production plans, redistributing capacity across plants, and adjusting product mixes to navigate tariffs effectively.

AI-powered analytics enable smarter, data-driven decisions that balance cost management with market responsiveness.

Absorbing tariff costs

Companies are countering tariffs by adjusting margins, raising prices, restructuring supply networks, and leveraging free trade zones strategically.

Advanced analytics and scenario modeling help automakers evaluate tariff outcomes across regions and identify optimal cost strategies.

Global supply chain visibility

Automotive supply chains span thousands of components across multi-tier vendor networks. Visibility becomes critical for identifying bottlenecks and mitigating exposure.

AI enhances supply chain transparency, optimizes logistics flows, monitors emerging risks, and simulates disruption scenarios effectively.

Realignment of manufacturing locations

Realigning manufacturing locations requires strategic planning, substantial capital investment, and comprehensive workforce development. Government incentives can help offset costs.

New facilities create opportunities to deploy advanced technologies and establish data-driven manufacturing operations from the ground up.

Key challenges and opportunities

Automotive reinvents its business model.

Software-defined vehicles[1]

Modern vehicles are evolving into SDVs, embedding software and AI into core functions and operations.

This shift demands moving from legacy E/E architectures to centralized, high-performance computing with software-first development approaches.

SDVs unlock new opportunities to deliver AI-powered technologies faster, with significantly reduced lead times for users.

48%
of automotive OEMs and suppliers cite technical difficulties separating software and hardware layers as a key SDV challenge[2]

A bumpy road to electrification[3]

Vehicle electrification momentum has slowed in some regions due to political headwinds, but progress continues through hybrid approaches.

Electrification requires cross-industry collaboration to expand charging infrastructure, generate cleaner energy, and integrate with grids.

It also opens opportunities to realign supplier networks and redefine core competencies.

2041
Complete phase-out of Internal Combustion Engines (ICE), according to executive forecast[4]

Manufacturing transformation[5,6,7]

Automotive manufacturing represents a highly complex system refined over decades to ensure consistent quality and safety standards.

Introducing new technologies into established processes often creates significant perceived operational risk for manufacturers.

AI and advanced technologies create possibilities to build data-driven, highly automated, next-generation facilities.

62%
of automotive executives expect generative AI to improve production quality and optimization[8]

New revenue sources[9]

The industry is betting on recurring digital service revenues while exploring alternative ownership models like vehicle subscriptions.

These shifts create new customer touchpoints for automotive brands but require robust data and technology infrastructure foundations.

The biggest hurdle involves designing viable business models, as clear success patterns remain elusive across the sector.

$269 autonomous driving

$170 immersive in-car entertainment

Expected monthly fees paid by customer (2035)[10]

Key technologies and their impact

Strategic technology adoption fuels transformation.

Secure by design

A secure-by-design approach embeds security throughout product development, IT systems, and enterprise operations from inception.

In automotive manufacturing, IT/OT security integration helps ensure operational continuity and production stability.

Connected car and edge security must meet regulatory standards to enable vehicle safety and fortify consumer trust.

Only 32%
of organizations are implementing, operating, and optimizing security by design[1]

Data, automation, and AI

Automotive organizations build data advantages through core competencies such as product development, manufacturing, and supply chain management.

As products shift to SDVs, EV/HEVs, and digital services, new data challenges emerge requiring specialized datasets.

Organizations are collecting new data (for example, training data for autonomous driving and factory automation) to accelerate meaningful AI adoption.

72%
of automotive CEOs say proprietary data is key to unlocking the value of generative AI[2]

Hybrid cloud by design

"Hybrid cloud by design" provides the foundation for comprehensive digital transformation across automotive operations.

It breaks down silos, enables real-time data flow, simplifies IT/OT complexities, and accelerates software-led innovation.

In manufacturing, hybrid cloud supports AI, IoT, and edge computing to enhance production outcomes.

71%
of IT professionals agree that without a hybrid cloud strategy, it's difficult to realize the full potential of a digital transformation[3]

Quantum

Quantum computing solves complex problems beyond classical computing systems and traditional processing limitations.

Automakers explore quantum potential in materials discovery, vehicle simulations, and supply chain optimization.

It offers breakthroughs in battery chemistry and autonomous driving by processing massive datasets efficiently.

82%
of automotive executives expect quantum + AI to see technological breakthroughs by 2030[4]

Select industry key performance indicators

Selected key metrics track automotive transformation progress.

Digital sales metrics

Automotive brands are expanding digital channels such as virtual showrooms, online configurators, and fan apps to accelerate sales growth.

Digital platforms now generate a growing share of total revenue, highlighting their critical importance for competitive positioning.

Median
30%
Digital commerce revenue as a percentage of overall revenue

Digital product engineering metrics

Modern vehicles integrate advanced digital systems including infotainment, ADAS, and companion mobile applications for enhanced user experience.

Unlike physical products, digital features deploy faster through over-the-air updates, dramatically streamlining time-to-market cycles.

Median
10 weeks
Average cycle time in weeks for new digital product features, from ideation to launch

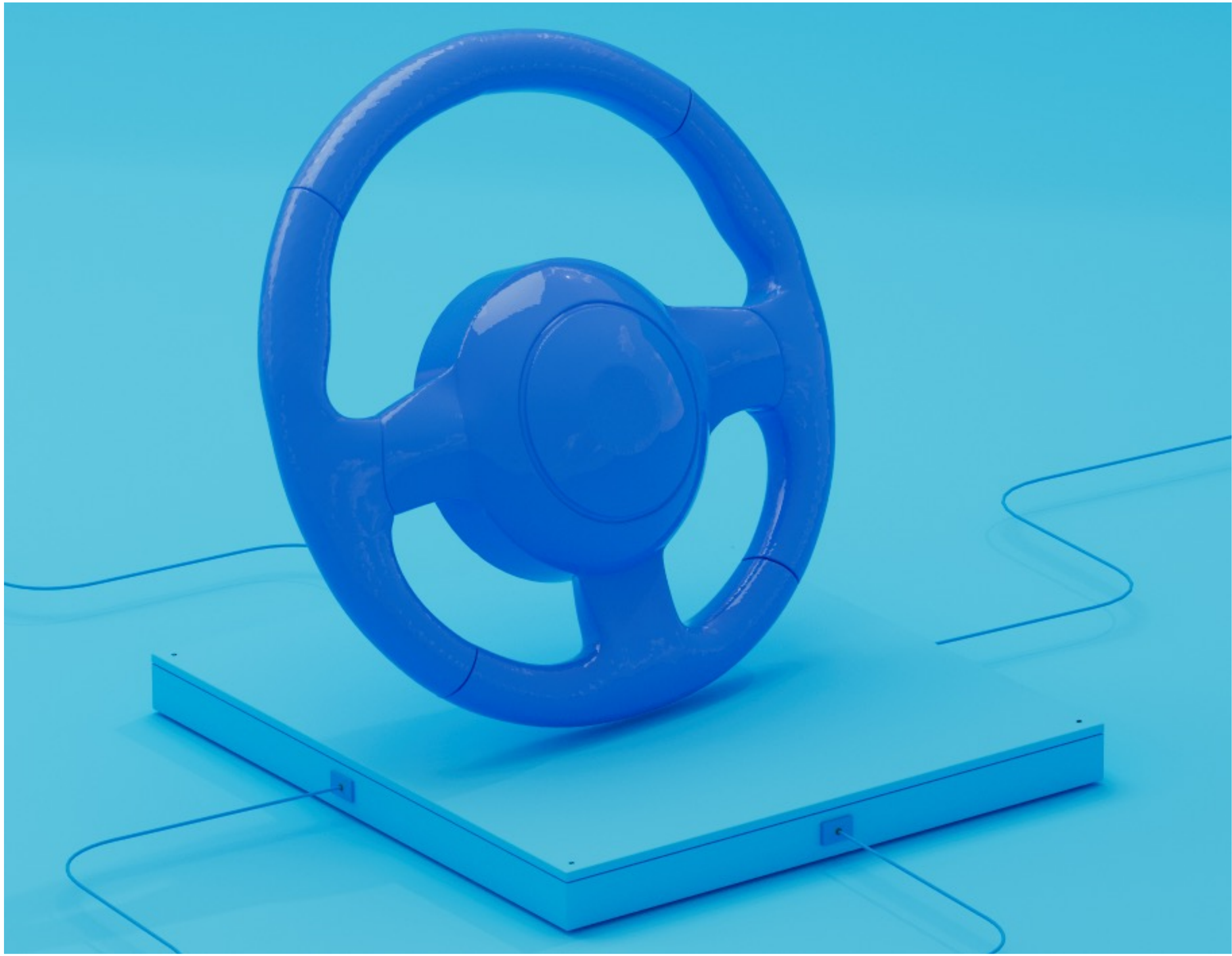
Supply chain metrics

Automotive supply chains involve thousands of components across multiple tiers, creating significant complexity for manufacturers.

Reducing costs as a share of revenue strengthens margins, enhances operational resilience, and supports just-in-time manufacturing.

Median
13%
Total annual supply chain cost as a percentage of revenue

Strategic imperatives



What to know
Business model innovation

Automotive brand value will shift from products to experiences, and business models should adjust.

Emerging players are reshaping markets with disruptive propositions: low-cost EVs, feature subscriptions, and electric grid integration. In some instances, vehicle hardware and digital features are decoupled: traditional automakers supply white-label cars while digital providers own customer interactions.

Legacy brands are redefining value around user experience, with SDV transformation at the core. This transition is complex and takes time, requiring fundamental organizational change.

Organizations are pivoting from product-centric to data-driven, service-led approaches. Traditional IT systems, siloed operations, and low digital maturity create barriers. Industry leaders estimate this transformation could take a decade to complete.

74%

of industry executives say their mechanical-driven culture is very strong and difficult to switch, a key challenge in SDV transformation[1]

What to do
Business model innovation

Auto executives say monetization potential exists in the following areas by 2028:[1]

77% Voice/virtual assistants

70% Vehicle subscription

69% Fleet management

Toward 2028, auto executives expect to use AI to increase the perceived value of products by

22% and the perceived value of digital services by 37%[2]

Business model innovation requires organization-wide commitment.

Continue SDV transformation

Digital architecture and platforms can deliver seamless mobility experiences.

- **Invest in robust OTA infrastructure immediately, in sync with SDV development.** Scalable OTA systems will create direct paths to vehicles and users.

Strengthen aftersales capabilities

Most recurring digital revenue happens after the car leaves the lot.

- **Make value transparent.** Fleet customers need clear ROI. Individual drivers need solutions to actual pain points. Think vehicle lifetime value (VLV).
- **Deploy AI to expand revenue pools.** Bundle services for personalized offerings and manage sales funnels with agentic AI and automation.
- **Delegate tasks to AI and automate operations wherever possible.** Physical parts and labor logistics can be heavily supported by AI and automation.
- **Empower dealers by including them in the data ecosystem.** Share relevant vehicle diagnostics so they deliver reliable service and create seamless brand experiences. Ensure independent providers get appropriate access too.

Key consideration: Auto companies must define their competitive advantage across the digital mobility value chain, determining where they'll lead versus where they'll partner in vehicle hardware, user experience platforms, applications, and data.

What to know
Product and service innovation

SDVs unlock customer experience-driven value opportunities.

Automotive OEMs are pouring resources into SDVs and electrification for product innovation. The vehicle itself remains critical as passenger cars still command $20K to $100K selling prices. Software value share in a vehicle cost will grow from today's 16% to 24% by 2035.[1]

Vehicles serve as the installed base for delivering services throughout the product lifecycle. Cars often operate for more than 10 years across multiple owners. Connected features become essential for delivering ongoing services to vehicles and users.

Carmakers must invest in developing service businesses throughout the ownership cycle. Promising domains include fleet management, vehicle subscriptions, and AI assistants. However, unless there's clear ROI for users, superior experience isn't enough. Service experiences must be compelling and indispensable, working seamlessly with other devices users rely on daily.

47%

of auto industry executives estimate that SDV program spend will increase by 47% by 2035, and

74%

of vehicle program cost will be SDV related[2]

79%

of automaker executives expect progress on SDV innovation in the next three years, with AI seen as a significant contributing factor to this progress[3]

What to do
Product and service innovation

By 2035, executives expect to spend

61%

more on EVs than now, and to cut ICE allocations in half[1]

Top challenges for AI-driven innovation[2]

1. AI talent & skills shortage
2. Integrating complex data for AI training
3. Legacy IT infrastructure

To stay competitive, automakers must innovate in key areas of product and service development.

Customer experience

Modern buyers expect hyper-personalized, connected experiences.

- Use AI for real-time personalization in infotainment, navigation, and driver assistance systems.
- Leverage telematics for predictive service alerts and tailored in-car experiences.
- Integrate voice assistants and adaptive smart features seamlessly.

Software innovation

Software plays a central role in delivering exceptional customer experiences.

- Build modular, cloud architectures for OTA updates and rapid new feature deployment.
- Use generative AI to automate coding, diagnostics, and comprehensive testing processes.
- Shift from distributed ECUs to centralized computing for scalable SDV platforms.

Hardware innovation

Electrification and autonomy demand fundamentally new design approaches.

- Develop zonal architectures to simplify wiring and standardize components.
- Co-design hardware and software for adaptability across multiple vehicle models.
- Invest in edge AI chips and sensor fusion for real-time decision-making.

The bottom line: Connected experiences are reshaping automotive, with AI central to redefining the complete driver and passenger journey, from initial design through lifetime engagement.

What to know
Efficient and productive operations

Rising productivity demands drive operational change.

Automotive organizations expect 30% of their workforce to be AI-enabled by 2026, up from just 8% in 2024.[1] 70% say agentic AI is critical to their organization's future.[2] Expectations for organizational productivity gains are exceptionally high.

Productivity doesn't come only from individual performance improvements. Legacy processes built around mechanical engineering must be completely revisited. OEMs need agile, digital-first operations for faster innovation, integrated supply chains, and OTA service delivery. Strategic alliances provide access to new technologies, accelerate digital capabilities, and share risks in high-investment areas.

Fragmented IT systems and siloed teams create significant barriers to progress. Unlocking value requires upskilling talent, breaking down organizational silos, and embedding software, data, and connectivity across the entire vehicle lifecycle, enabling smarter, more adaptive products and services.

50%

of automotive COOs say the potential productivity gains from automation and AI are so great that significant risk must be accepted to stay competitive[3]

57%

of automotive COOs say cutting-edge technologies have been implemented to improve operations[4]

What to do
Efficient and productive operations

AI-powered supply chain and logistics optimization is projected to deliver a 36% ROI by 2027, yet only 24% of organizations report high maturity, signaling untapped potential for early adopters[1]

AI and automation deliver operational efficiency gains.

Product development

Accelerate innovation and reduce time-to-market with AI-powered, software-driven approaches across design and engineering.

- Use AI simulations and virtual prototypes to shorten validation and cut testing costs.
- Apply generative design and digital twins to optimize performance and sustainability.
- Embed SDV architecture early to enable updates and OTA enhancements.

Manufacturing and supply chain

Transform factory operations and supply networks to improve resilience, quality, and responsiveness.

- Use predictive analytics and AI for scheduling, downtime reduction, and throughput.
- Automate quality checks, maintenance, and logistics using computer vision, IoT, and robotic process automation (RPA).
- Integrate supply chain platforms for real-time tracking, demand-supply sync, and risk mitigation.

Marketing, sales, and after-sales

Drive loyalty, conversion, and lifecycle value through personalized, data-driven engagement.

- Use customer intelligence and AI segmentation to tailor campaigns and buyer journeys.
- Apply real-time data to optimize pricing, offers, and conversion rates.
- Redesign after-sales strategies to sustain profitability, leveraging EVs' 50% lower maintenance costs.[2]

The bottom line: Despite major digital investments, most automakers haven't captured full efficiency gains.

Legacy systems, fragmented supply chains, and silos impede progress, but AI, automation, and hybrid cloud increase uptime, accelerate development, and improve experiences, building the foundation for service-driven models.

What to know
Regulatory compliance

Technology transforms regulatory compliance management.

The automotive industry operates under strict regulation because vehicles directly impact safety, environment, and consumer rights. Unlike many industries, automotive non-compliance often stems from product design or engineering flaws. A technical defect can cause injury or death. Regulators demand rigorous compliance demonstration.

Industry challenges include rapid technology evolution, fragmented regulations across markets, supply chain complexity, escalating software and cybersecurity risks, plus intense cost and time pressures.

Technology can dramatically strengthen regulatory compliance by improving traceability, automation, and verification across design, production, and supply chains throughout the vehicle lifecycle.

66%

of automotive CEOs say inconsistent standards and regulations are inhibiting their ability to grow their business[1]

Only **25%**

of automotive organizations say they are well prepared for regulatory changes and compliance issues[2]

What to do
Regulatory compliance

86%
of auto executives agree that security, assurance, and trust are brand attributes that differentiate their organizations[1]

63%
of supply chain and operations leaders say integrating sustainability and circularity into workflows is a key reason their organization is investing in automation[2]

Regulatory readiness calls for a proactive, cross-functional approach.

Safety

As vehicles become more autonomous and software-driven, safety compliance requirements intensify across all systems.

- Align with global Functional Safety and cybersecurity standards (ISO 26262, ISO/SAE 21434).
- Integrate safety validation and scenario-based testing into development processes.
- Maintain accountability across engineering, manufacturing, and partner networks.

Security (IT, operational, and product)

SDVs and connected ecosystems multiply cyber and operational risks exponentially.

- Establish integrated risk frameworks for IT, plant operations, and embedded systems.
- Monitor vulnerabilities across the lifecycle, from code development to OTA updates.
- Enable real-time threat detection and standardized response protocols.

Environment

Fuel economy and emissions standards remain a core focus across global markets.

- Track emissions, resource use, and material sourcing across entire supply chains.
- Build audit-ready processes for sustainability reporting and regulatory inspections.
- Embed environmental compliance into design, production, and end-of-life strategies.

The bottom line: A proactive, cross-functional approach reduces exposure, ensures readiness for emerging mandates, and builds long-term operational resilience across regulatory domains.

What to know
Strategic flexibility

Agile, ecosystem-ready hybrid cloud platforms provide foundational capabilities for strategic flexibility.

By building flexible, distributed IT and digital ecosystems, automakers gain agility to navigate technical complexity, shifting demand, and regulatory change while maintaining competitiveness.

Hybrid and cloud-based IT platforms

- Enable faster localization and compliance across diverse geographies.
- Support investment pivots, AI model integration, and adaptation to varying adoption rates.
- Streamline IT operations, enhance cybersecurity, improve supplier collaboration, and reduce cost-to-serve.

Flexible operating models

- Use real-time data for agile adjustments in manufacturing, supply chain operations, and vehicle intelligence.
- Adapt product development tools and processes to manage continuous vehicle software updates.

Collaborative ecosystems

- Foster innovative business models, joint investments, and shared experimentation with partners.
- Open access to nontraditional partners, co-create mobility services, and expand growth beyond core value chains.

65%

of organizations cite an increase in infrastructure scalability and flexibility as the primary objective for moving applications to the cloud[1]

35%

of automotive organizations' mission-critical workloads are deployed on the cloud[2]

49%

of automakers struggle to choose between solutions that deliver value quickly and those that maximize future flexibility[3]

What to do
Strategic flexibility

Organizations with a higher AI investment in supply chain operations report revenue growth

61%
greater than their peers[1]

23%
of automotive organizations have established clear guidelines and guardrails for the use of AI in automated decision-making[2]

The automotive industry should modernize technology foundations, leverage cloud for scale, and build adaptive operating models.

To gain agility for faster responses to regulatory changes, market demands, and evolving customer expectations, automakers need proactive strategies.

Modernized applications and data platforms

Migrate core workloads to hybrid cloud to modernize operations and boost agility.

- Migrate enterprise, engineering, sales, marketing, supply chain, and manufacturing workloads for improved efficiency.
- Apply comprehensive security and compliance controls to meet regulatory and data protection requirements.

Real-time data and market intelligence for decision-making

Leverage real-time data and market intelligence to make informed, strategic decisions.

- Use AI-assisted forecasting to optimize production planning and supply chain planning.
- Integrate regulatory updates, consumer insights, and market indicators into strategic decision models.

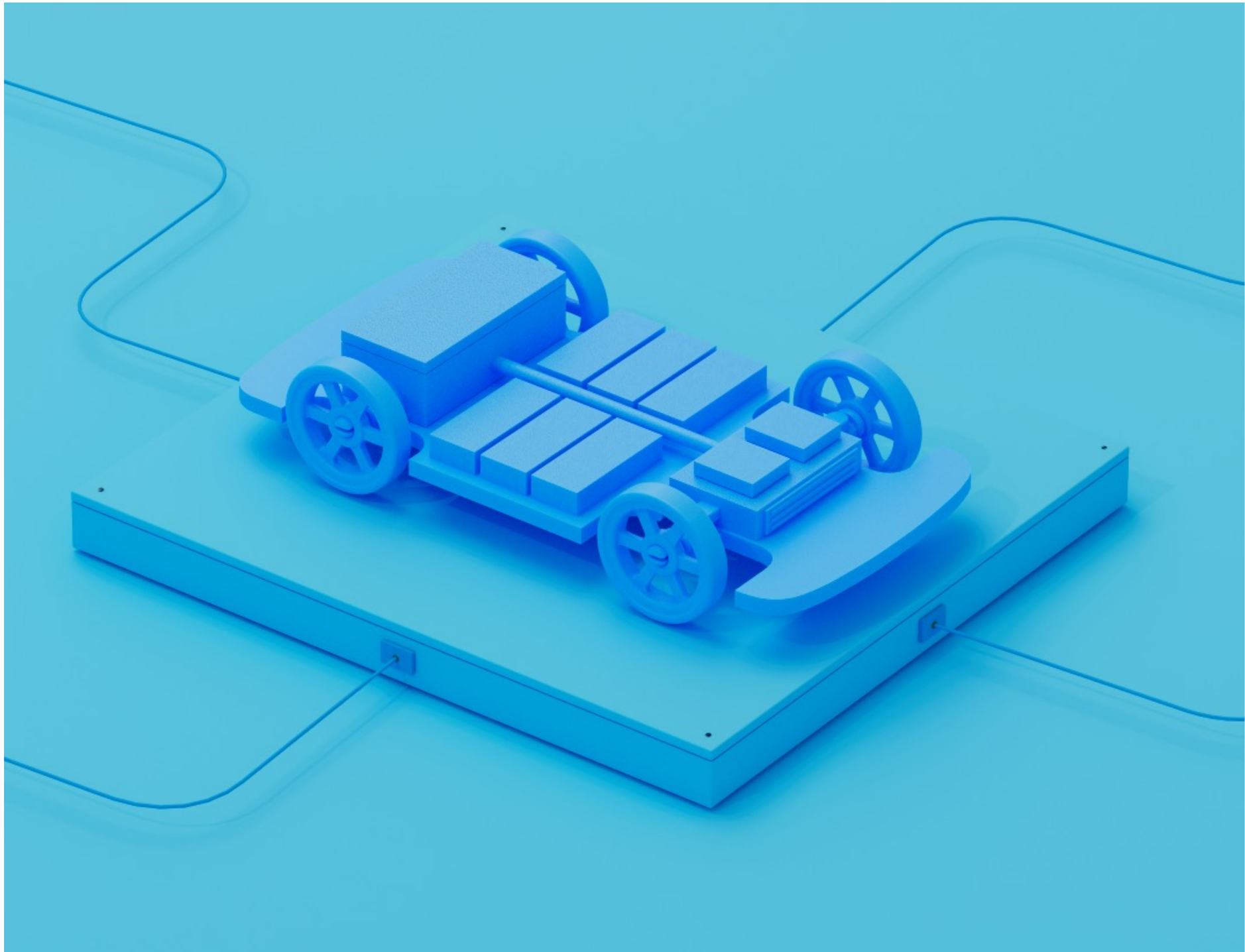
Data standardization and open-source technologies

Standardize approaches and adopt open-source tools to accelerate innovation and collaboration.

- Identify noncompeting domains and invest in standardization with industry partners.
- Use open-source technologies in noncompeting areas to focus resources on differentiating capabilities.

The bottom line: Solid technology foundations help automakers adapt to market, regulatory, and supply chain shifts. Combining cloud scalability, modular production, and real-time insights enables faster strategic pivots and strengthens competitiveness in connected, autonomous, and electrified vehicles.

Transformational technologies



The future SDV architecture

Automotive transformation demands strategic technology investments that create next-generation mobility ecosystems.

These foundations optimize operations, accelerate innovation, and deliver personalized connected experiences while ensuring safety, sustainability, and resilience across the value chain.

Next-generation mobility architecture drives sustainable automotive growth through software-defined platforms and AI.

Automakers are moving to a simplified SDV architecture that supports more efficient vehicle development and updates.[1]

	Vehicle architecture	Edge architecture	Cloud architecture	Development tools	
Applications	In-vehicle applications	Edge (vehicle to X) applications	Connected vehicle backend	Engineering & data management tools / Enterprise IT applications	Security
AI and data platform	Foundation models, governance, data platform				
Hybrid cloud platform	Middleware		Cloud services/automation platforms		
	In-vehicle OS	Edge OS/container orchestration	Enterprise OS/container platform		
Computing hardware	High-performance computing unit	Edge devices	Public and private cloud; on-premises servers		

Source: IBM Global Technology and Red Hat

Technologies
Hybrid cloud by design

71%
of IT professionals agree that without a hybrid cloud strategy, it’s difficult to realize the full potential of a digital transformation[1]

Mobility modernization starts with enterprise architecture transformation.

What to know

Cloud is critical for modernizing automotive operations. It delivers the scalability, speed, and data integration legacy systems cannot match. On-premises infrastructure can't handle the scale or pace of real-time data, AI deployment, and software delivery required today.

Cloud platforms enable faster development cycles, centralized data access, and efficient collaboration across global operations. Hybrid-by-design integrates public, private, and edge environments so each workload runs where it performs best. This helps ensure control, manage compliance, and drive cost efficiency while maintaining unified orchestration. Hybrid operations give automakers the flexibility and resilience needed for effective modernization and continuous innovation.

What to do

A hybrid-by-design approach brings agility and integration to automotive operations.

Automakers must

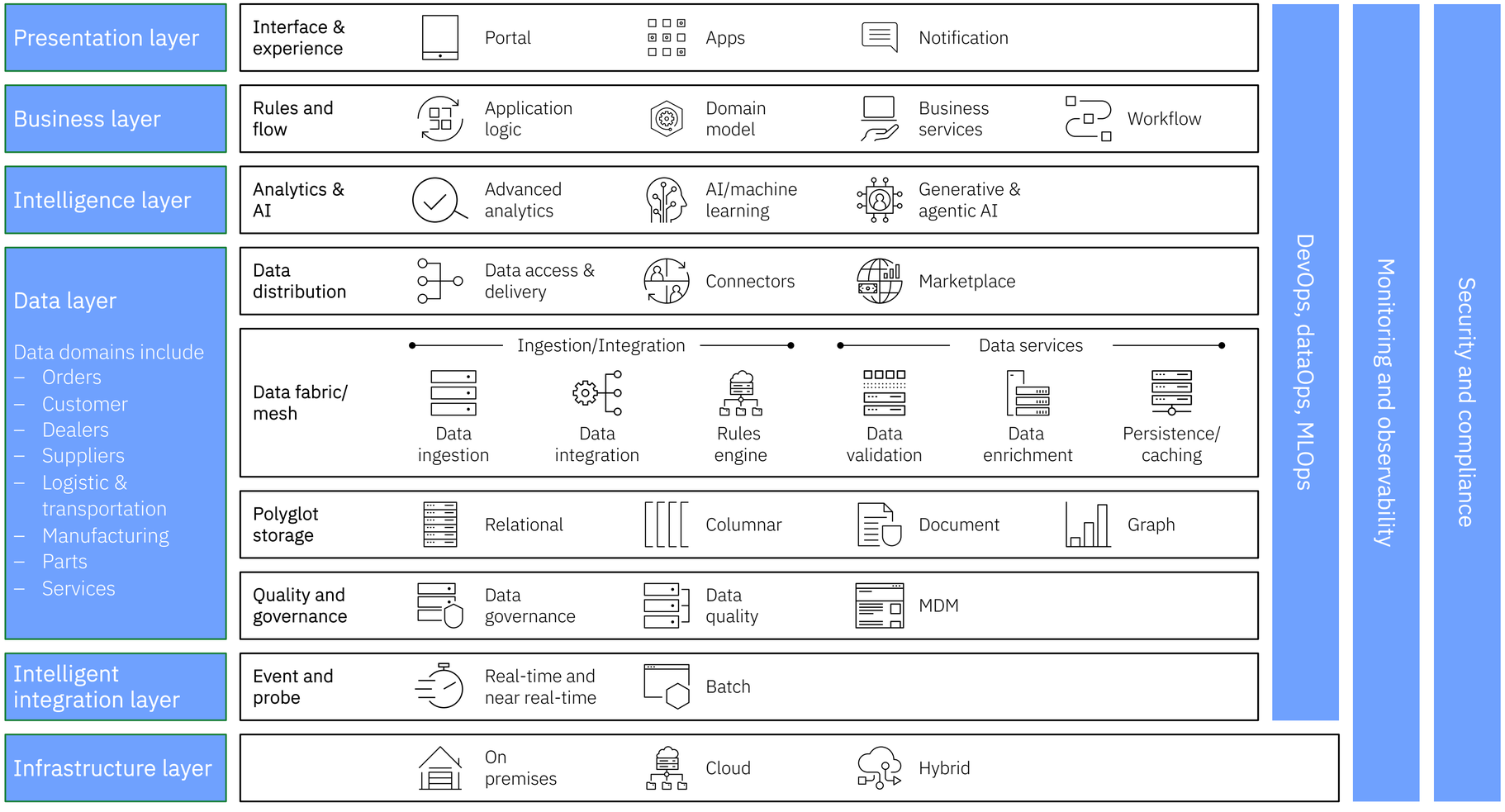
- **Integrate vehicle technology architecture.** Orchestrate vehicle, edge, network, and cloud environments for real-time data exchange, low-latency functions, and coordinated software updates.
- **Build hybrid-by-design manufacturing operations.** Integrate cloud, edge, and on-premises systems to unify IT and OT, synchronize production data, and apply AI analytics for enhanced visibility and efficiency.
- **Develop hybrid-by-design customer platforms.** Combine CRM, retail, and finance data across cloud environments to deliver consistent, personalized customer experiences.

Technologies
Hybrid cloud by design

Hybrid cloud by design embeds cloud-native principles across infrastructure, data, integration, workflows, and AI applications from the ground up.

Unified architecture enables automakers to scale operations, accelerate innovation, and seamlessly connect supply chains, manufacturing, logistics, and customer platforms. Built-in governance and monitoring help ensure resilience and manage security throughout the enterprise.

Hybrid cloud by design delivers agility, scalability, and secure innovation across connected operations.[2]



Technologies
Secure by design

86%
of automotive leaders agree that security, assurance, and trust are brand attributes that set their organizations apart[1]

53%
of consumers would prefer brands that offer superior privacy and cybersecurity in autonomous and shared mobility[2]

Comprehensive security design protects the enterprise, factories, vehicle fleets, and operations.

What to know

The shift toward software-defined, connected vehicles creates an explosion of digital endpoints, massively expanding attack surfaces. While most automotive organizations have security strategies, fewer than half actively execute them. With vehicle-to-everything (V2X) communication, OTA updates, and increasing edge connectivity, vulnerabilities span both physical and digital domains.

Lack of organizational alignment, common tools, and resources slows progress significantly. As future mobility depends on security-enabled services such as autonomy and remote diagnostics, ignoring embedded security today can mean losing consumer trust tomorrow.

What to do

Integrating cybersecurity into product lifecycles and operations helps OEMs and suppliers manage complexity, reduce risk, and build brand value.

Automakers must

- **Embed security and privacy by design.** Make them default features, not add-ons to existing systems.
- **Operationalize security strategies.** Deploy cross-functional collaboration, common tools, and clear governance frameworks.
- **Secure digital and physical supply chains.** Leverage shared standards and strategic ecosystem partnerships.
- **Leverage AI and automation.** Enhance threat detection, incident response, and secure OTA update capabilities.
- **Design for future value.** Treat security and privacy as competitive differentiators when building business cases for next-generation mobility platforms.

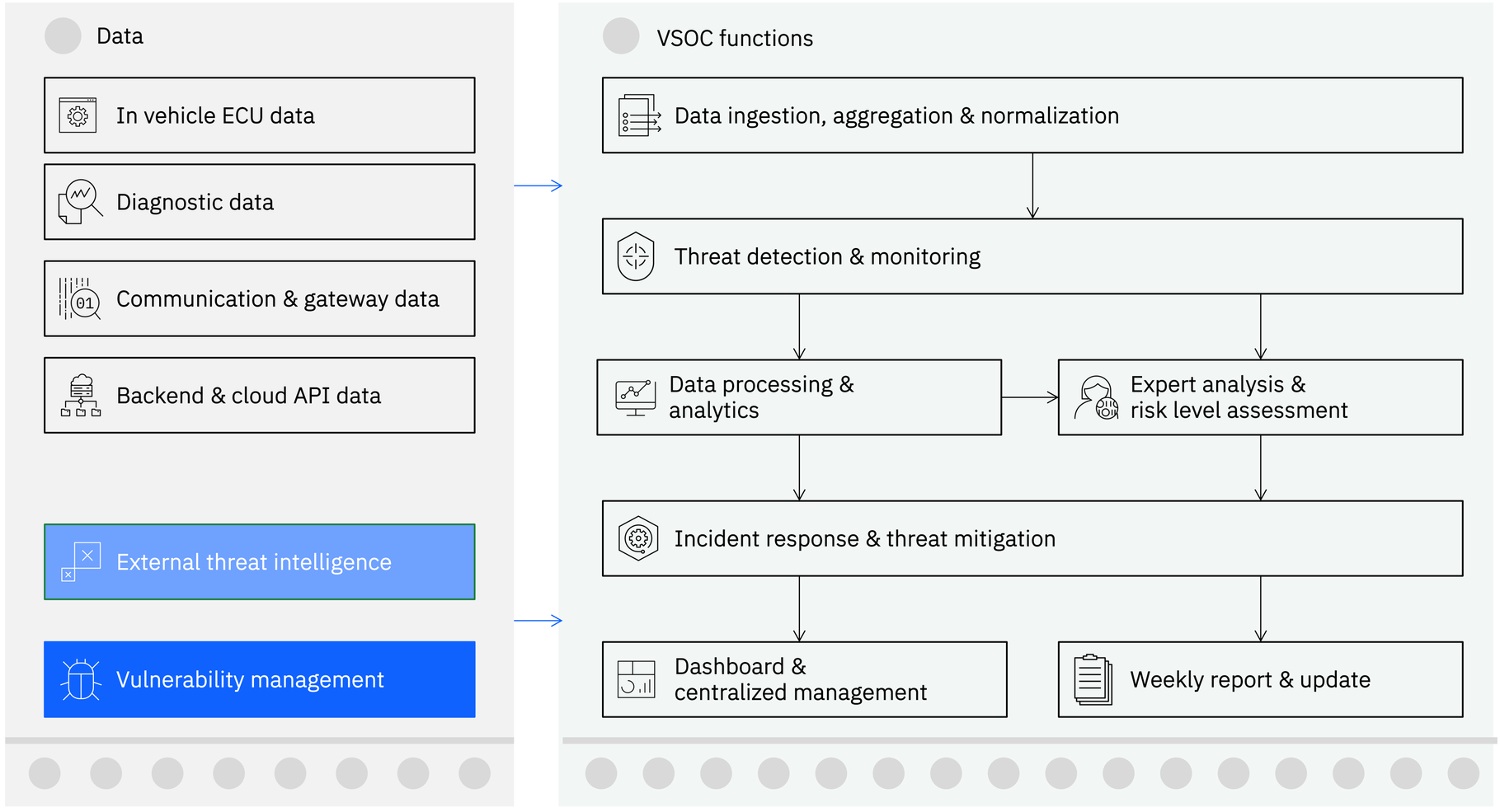
Technologies
Secure by design

“Secure by design” embeds cybersecurity throughout the vehicle ecosystem, from ECUs to cloud APIs.

Vehicle Security Operations Centers (VSOCs) enable real-time threat detection and rapid response. Centralized dashboards and updates help ensure operational resilience, manage regulatory compliance, and fortify customer trust.

A secure-by-design approach across vehicles, data, and platforms helps ensure trust, resilience, and safe innovation in connected automotive ecosystems.[3]

Data flow through VSOC (Vehicle Security Operations Center)[1]



Technologies
Data

64%
of automotive and industrial data leaders are using data investments to unlock new sources of value, enabling innovation across connected vehicles, smart factories, and predictive maintenance[1]

Data management unlocks value from connected mobility and AI.

What to know

As vehicles become increasingly intelligent and connected, data volumes explode, from telematics, sensors, infotainment systems, and supply chains. This growth is exponential.

For automotive enterprises, data growth creates a dual challenge: managing data securely while translating it into real-time business value.

Data is no longer just about efficiency or compliance. It's foundational to innovation in autonomous driving, predictive maintenance, personalized customer experiences, and smarter supply chains.

Automotive data leaders recognize that competitive advantage lies in how quickly and responsibly they process, analyze, and act on that data.

What to do

Managing vehicle and operational data is critical for delivering innovation and trust at scale. Automotive leaders must transform raw data into actionable insights while safeguarding integrity and accessibility.

Automakers must

- **Establish real-time data architecture.** Enable processing and insights from connected vehicles and operations.
- **Align data governance with digital transformation.** Ensure consistency, privacy, and security from R&D to dealership.
- **Apply AI and machine learning.** Build predictive capabilities in product development, quality assurance, and customer engagement.
- **Break down data silos.** Enable end-to-end visibility and accelerate innovation across functions.
- **Invest in data literacy.** Drive smarter, faster decisions across all organizational functions.

Technologies
Automation

68%
of automotive CEOs say the potential productivity gains from automation are so great they must accept significant risk to stay competitive[1]

Intelligent automation redefines automotive operations.

What to know

Automation in the automotive industry is evolving from rule-based systems to agentic AI, enabling autonomous operations across IT, manufacturing, logistics, and aftermarket services.

As supply chains grow more complex and vehicles become increasingly connected, OEMs and suppliers embed AI into core operations to increase flexibility, precision, and resilience.

AI agents now orchestrate critical tasks: dynamic sourcing, intelligent quality control, autonomous warehousing, and real-time demand forecasting. These systems execute tasks, learn from data, simulate potential disruptions, and autonomously adjust production and distribution strategies.

What to do

Redesign operations by delegating repetitive tasks to AI agents for 24x7 automation in production, logistics, and maintenance. Equip teams to oversee intelligent systems, make strategic decisions, and respond faster to disruptions.

Automakers must

- **Automate plant-floor workflows.** Use AI-enabled robotics and vision systems for quality checks, machine health monitoring, and assembly optimization.
- **Enable autonomous supply chain adjustments.** Deploy AI agents to reroute shipments, manage inventory, and negotiate with suppliers.
- **Empower workers.** Reskill teams to oversee automation systems and make high-impact, data-driven decisions.
- **Embed automation in vehicle lifecycle.** Apply automation from design and procurement through production, aftermarket, and connected services.

Technologies
Traditional and generative AI

65%
of auto OEM executives say they have a clear approach to integrate AI into long-term innovation strategy[1]

72%
of automotive CEOs say competitive advantage depends on who has the most advanced generative AI[2]

Artificial intelligence serves as the engine of automotive transformation.

What to know

AI is becoming central to automotive industry reinvention, powering advances in autonomous driving, smart manufacturing, and hyper-personalized customer experiences.

Traditional AI and generative AI are reshaping the entire vehicle lifecycle, from R&D and production to aftersales and mobility services. Emerging agentic AI, capable of autonomous decision-making, enables real-time driving decisions, dynamic pricing models, and intelligent fleet operations.

Automakers that succeed integrate AI seamlessly across platforms, foster digital-native cultures, and ensure transparency and trust in AI-driven decisions throughout the automotive value chain.

What to do

To capture AI's transformative potential, automotive leaders should align strategies across three critical dimensions.

- **Horizontal: Enterprise-wide transformation.** Embed AI across engineering, manufacturing, supply chain, and customer service to automate defect detection, forecast demand, and enhance engagement through conversational agents.
- **Vertical: Vehicle and service innovation.** Enable AI-driven enhancements inside vehicles (driver assistance, infotainment personalization) and beyond (predictive maintenance, smart mobility services).
- **Foundational: AI-ready tech infrastructure.** Invest in scalable platforms, digital twins, and data pipelines for continuous learning and rapid iteration. Equip teams with AI tools while managing governance, ethics, and cybersecurity.

Technologies
Agentic AI

69%
of auto executives expect agentic AI to be disruptive to the industry[1]

68%
agree they need to adopt agentic AI quickly to keep up with competitors[2]

73%
agree agentic AI will be important to the future of their organization, so it is essential to integrate agentic AI into workflows and applications[3]

Agentic AI powers intelligent customer engagement and autonomous operations.

What to know

Agentic AI advances artificial intelligence by combining autonomy with decision-making capabilities, enabling proactive action on behalf of automakers.

Unlike traditional AI, which delivers insights for human action, agentic AI can reason, plan, and execute across workflows, managing warranty renewals, upselling services, or guiding drivers with predictive care recommendations.

For automotive leaders, this capability enables scaled personalized customer engagement, optimized revenue generation, and sustained long-term loyalty throughout the ownership journey.

What to do

To unlock agentic AI's potential, automakers should focus on three key areas.

- **Proactive lifecycle engagement.** Anticipate customer needs across the ownership journey, triggering timely actions such as warranty renewals and targeted service offers.
- **Autonomous multichannel orchestration.** Select optimal outreach methods like email, SMS, or phone, based on urgency and context to reduce customer drop-offs.
- **Revenue and loyalty growth.** Personalize post-sales interactions to extend service contracts, upsell care packages, and strengthen long-term customer relationships.

Technologies
Quantum computing

>60%
of quantum-ready organizations actively engage in quantum ecosystems for use cases, educational programs, or hardware access[1]

Quantum computing creates new efficiencies in automotive operations.

What to know

The automotive sector faces complex engineering, supply chain, and manufacturing challenges that require advanced computational power. Quantum computing delivers faster simulations, real-time optimization, and enhanced decision-making capabilities.

From next-generation batteries and lightweight materials to factory operations and traffic flows, quantum computing accelerates development, boosts efficiency, and reduces costs significantly.

While large-scale deployment remains years away, quantum advantage is expected by 2026.[2] Automakers are piloting product design, mobility, and logistics use cases to secure early-mover competitive advantage.

What to do

Develop a quantum roadmap to identify high-value use cases and build cross-functional expertise through targeted proofs-of-concept.

- **Battery design and materials.** Use quantum simulation to accelerate R&D of efficient batteries and lightweight materials, reducing vehicle weight and improving EV range performance.
- **Manufacturing optimization.** Apply quantum algorithms to streamline production scheduling, reduce downtime, and optimize complex supply chain operations.
- **Traffic and route optimization.** Leverage quantum computing to enhance fleet routing efficiency, reduce urban congestion, and improve transportation networks.

In closing

The bottom line: Industry dynamics are shifting rapidly. What was once a competitive advantage no longer guarantees market leadership, or even survival. Ten years from now, the leading players could look entirely different.

Automotive companies must innovate at unprecedented speed.

Five key actions accelerate automotive transformation success.

Software-defined vehicles

The shift to electric and software-defined portfolios demands a complete overhaul of product development, manufacturing, supply chain, and sales operations. With intensifying competitive pressure, stay focused, patient, and agile to adapt quickly.

Cost and operational efficiency

Rising SDV-related R&D costs require creative approaches and technology breakthroughs. Leverage AI and automation across all operations while pursuing high-margin digital service revenue streams.

New digital revenue streams and business model innovation

Strengthen technology infrastructure with modern data platforms. Expand connected vehicle base and OTA capabilities. Define digital revenue streams like vehicle OS, apps, infrastructure through in-car experiences, third-party partnerships, advertising, or data monetization.

Supply chain resilience and risk management

Address global disruptions through diversification, nearshoring, and digital control towers to strengthen operational resilience and help ensure business continuity.

Invest in workforce skills

Prepare your workforce for new business realities. Preserve core strengths in supply chain management, integration, and manufacturing while building capabilities in AI, automation, and emerging technologies.

Automotive

Case studies

Honda + IBM
Strategic imperative: Efficient and productive operations

IBM helps boost Honda's efficiency with AI-driven knowledge extraction, expecting to slash documentation modeling time by 67%

Honda struggled with an efficient knowledge transfer initiative that involved implementing an Advanced Expert System (A-ES) to transfer skilled engineers' knowledge to younger personnel, starting with the review process for collision-safety vehicle development. IBM transformed Honda's knowledge modeling with generative AI, applying LMM and LLM. An IBM watsonx.ai® pilot validated the feasibility. Generative AI streamlines Honda's documentation, reducing time and enhancing efficiency.

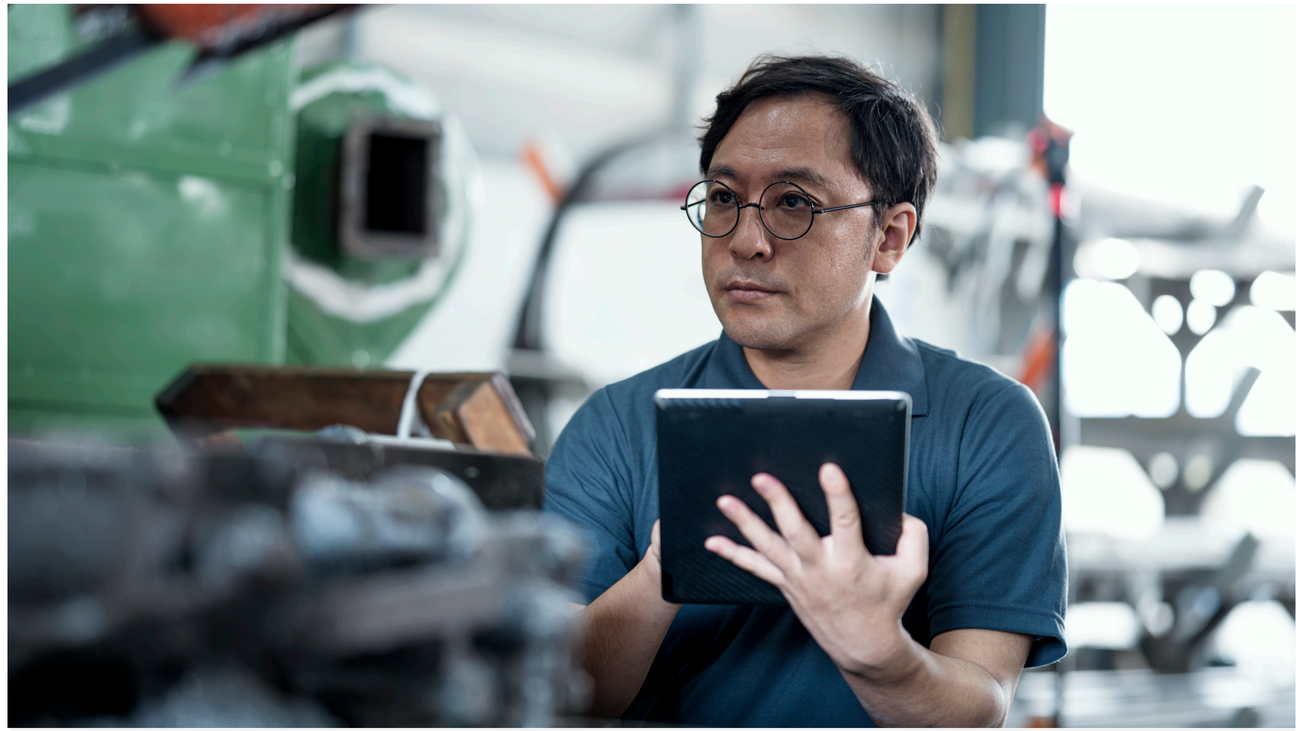
Outcomes

- **67%** reduction in documentation modeling time
- **30%–50%** savings in development and planning work

Solution components

- IBM watsonx.ai
- IBM Watson® Discovery

Read the full story →



"IBM's innovative solutions and the platform that securely leverages our vast amount of development information are contributing to our dream of delivering more value to our customers. We look forward to further cooperation."

Mr. Shigeto Yasuhara
General Manager, Senior Chief Engineer
BEV Development Division- I
BEV Automotive Development Unit
Electrification Business Development Operations BEV Development Center

Mitsubishi Motors Philippines Corporation and IBM
Strategic imperative: Efficient and productive operations

MMPC drives toward a bright future with streamlined core business functions

Mitsubishi Motors Philippines Corporation (MMPC) was too reliant on manual processes, which hindered its ability to make data-driven decisions and stay competitive. To address this, MMPC collaborated with IBM Consulting® to implement a digital transformation strategy, leveraging SAP S/4HANA to streamline core business functions. IBM created custom objects to tailor the environment to MMPC's specific requirements, enabling end-to-end visibility of vehicle data across the value chain. By integrating SAP solutions with MMPC's assembly line control systems and dealer portal, the company can now make more informed decisions and drive business efficiency.

Outcomes

- Decreased risk of losses due to unplanned downtime, potentially saving millions of dollars per day
- Met planned deadlines and budgets for all initiatives completed so far
- Extended plant operations, leading to more manufacturing jobs nationwide

Solution components

- IBM Consulting
- SAP S/4HANA

Read the full story →

"To bring our ambitious plans to life, we wanted a top-tier partner that could offer local support. They had to understand our business and objectives and be able to deliver on challenging timelines. We were also looking to take the first steps in our cloud journey. For the project to succeed, we needed the right driving force behind us."

Takeshi Hara
CEO and President

Nobo Automotive Systems Co., Ltd. and IBM
Strategic imperatives: Efficient and productive operations + Regulatory compliance

Nobo Technologies joins hands with IBM to co-create a new generation of digital R&D management that empowers future vehicle design

Nobo Technologies faced critical software development challenges: poor process control and inability to visualize information across projects. IBM deployed its Engineering Lifecycle Management (ELM) solution to create a seamlessly integrated digital platform. The results transformed Nobo's operations: improved work efficiency, optimized costs, and alignment with international automotive development standards. IBM ELM enabled collaborative infrastructure, streamlined test case management, and achieved bi-directional traceability between requirements and tests. Nobo now delivers higher product quality with reduced development cycles.

Outcomes

- 10% reduction in cost investment through ELM
- 50% of the basic output requirements for product development have gone online
- 80% of ASPICE processes are now online
- 95% of the information that was managed offline in word processing and spreadsheets, now managed through ELM
- 70 forms rolled out for online process
- Test results uploaded and refreshed daily versus two weeks to a month
- Real-time, two-way synchronization of defect work items between ELM and Jira

Solution components

- IBM Engineering Lifecycle Management (ELM)

Read the full story →

"Integrating with international R&D management and becoming a mainstream OEM supplier is an important goal of Nobo. We hope to use tool and platform innovation to help improve R&D capabilities, management level, and work efficiency."

Qiao Xianguang
Vice President

Scuderia Ferrari
Strategic imperative: Product and service innovation

Ferrari fuels a new era of fan experience with IBM and AWS

Scuderia Ferrari HP, with its vast and passionate fan base, needed to evolve its fan engagement strategy. The team's existing app lacked the interactivity and personalization required to connect with a new generation of digitally native fans while honoring the team's legacy.

To meet this challenge, Ferrari partnered with IBM Consulting® to completely reimagine their mobile app. The collaboration leveraged IBM watsonx® technology and a hybrid cloud infrastructure to create a dynamic, AI-enhanced platform. The new app delivers an immersive experience with features like AI-generated race summaries, rich historical insights, and personalized content, bringing fans closer to the action on and off the track.

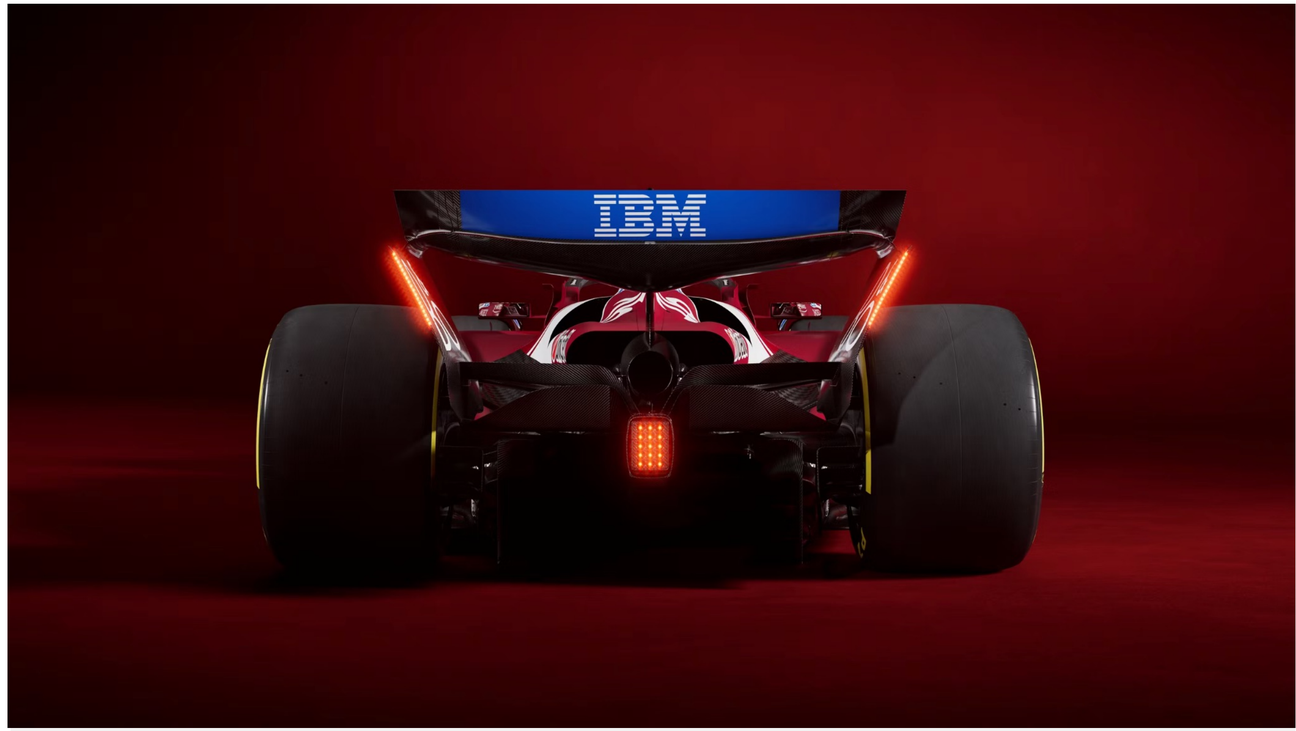
Outcomes

- 2x increase in daily active users
- 35% increase in average time spent in-app

Solution components

- IBM Consulting & AWS
- watsonx.data®
- watsonx.ai®
- watsonx.governance®
- IBM Granite®
- watsonx Code Assistant®

Read the full story →



"This is the app that Ferrari fans deserve. Literally race day in your pocket."

Lewis Hamilton
Scuderia Ferrari HP Driver

smart Europe + IBM
Strategic imperative: Business model innovation

IBM helps smart Europe deliver smart answers to customers

IBM worked with smart Europe to help the company transition to a direct-to-consumer (D2C) business model. IBM Consulting® and IBM Client Engineering worked to create an MVP to handle case management for customer support tickets. They integrated IBM watsonx.ai® and Salesforce to automate various processes. The system, running on the IBM Cloud®, processes customer tickets before human intervention, saving agents time and ensuring consistent, branded, and customer-focused responses.

Outcomes

The MVP demonstrated

- 30% improvement in the accuracy of case categorization and prioritization
- 3 times faster resolution time for recurring issues
- 60% increase in first-contact resolution
- 97% agent acceptance rate

Solution components

- IBM Consulting
- IBM Client Engineering
- IBM watsonx.ai
- Salesforce
- IBM Cloud
- IBM Watson® Discovery

Read the full story →

“With the power of generative AI, we’re striving to solve challenges more efficiently while making each customer engagement more personalized and meaningful.”

Aymen Ismail
Head of Customer Engagement Solutions smart Europe

Yanfeng Auto and IBM
Strategic imperatives: Efficient and productive operations + Regulatory compliance

IBM helps Yanfeng Auto improve R&D efficiency and accelerate experience-driven transformation

Yanfeng Electronic Technology, part of Yanfeng Auto, struggled with R&D traceability and inefficient tools such as spreadsheets. To meet Automotive SPICE certification, they adopted the IBM Engineering Lifecycle Management (ELM) platform. Using ELM's modules for requirements management, design, and workflow, Yanfeng improved traceability, product quality, and efficiency. This led to passing Automotive SPICE Level 1 in 2019, advancing their goal of a more integrated and sustainable R&D system.

Outcomes

- Reduced costs
- Increased efficiency

Solution components

- IBM Engineering Lifecycle Management

Read the full story →

Automotive

Additional information

Lead IBM expert contributors

Rami Ahola

Partner and Global Industry Leader
Industrial Manufacturing
IBM Consulting
linkedin.com/in/ramiahola

Rami leads IBM Global Industrial Manufacturing, a unit that provides innovation, industry-differentiated solutions, and consulting services worldwide. With more than 30 years of experience, Rami combines deep industry knowledge with first-hand experience in R&D, manufacturing, supply chain, and marketing processes to help clients with their business strategies, processes, and execution.

Mardan Namic Kerimov

Associate Client Partner
Mobility Industry
IBM Consulting
linkedin.com/in/mkerimov

Mardan, a renowned figure in automotive and mobility, champions CASE & AI technologies for industry transformation. Collaborating with key players, he forges ecosystem partnerships to pioneer mobility's future. His extensive 17-plus-year career includes roles in research, design, development, manufacturing, testing, and aftersales with leading companies in North America, Europe, and Asia.

Mohan Bachhav

Partner and Industry Leader
Automotive, Aerospace and Defense, Electronics
CIC India, IBM Consulting
linkedin.com/in/mohanbachhav

Mohan leads the automotive, aerospace and defense, and electronics industries at IBM's Client Innovation Center in India, and is a recognized thought leader in the automotive industry. Mohan has more than 27 years of consulting and IT experience across diverse leadership roles in delivery, consulting, sales, pre-sales, and solutioning for global manufacturing clients.

Noriko Suzuki

Global Research Leader
Automotive and Electronics
IBM Institute for Business Value
linkedin.com/in/ norikosuzuki

Noriko is responsible for developing thought leadership for the automotive, electronics, and energy industries. She has more than 20 years of experience working with global manufacturing customers on technology strategies and implementation. Her expertise includes Industry 4.0, digital transformation of operations, mobility solutions, and sustainable transportation.

Lead IBM expert contributors

Sankalp Sinha

Automotive, Aerospace & Defense
Industry Thought Leader
IBM Consulting
linkedin.com/in/sankalp-sinha

As the business development executive and subject matter expert for the automotive industry, Sankalp leads business development, asset & solution development, deal responses, delivery account management, growth, and industry skilling. An awardee of the prestigious Business World 40 under 40, Sankalp spearheads the industry thought leadership and external eminence for the automotive industry at IBM.

Gabriele Compostella

Global Lead
Quantum Industry Applications for Automotive
linkedin.com/in/compostella

With a PhD in particle physics and more than 10 years spent in academic research at Fermilab and CERN, Gabriele has led multiple initiatives and teams with a focus on AI, machine learning, and quantum computing at the Volkswagen Group. Now at IBM Quantum®, he supports automotive companies globally in their journey toward quantum utility in industrial applications.

Sujay Nandi

Associate Partner and CTO
AI & Analytics, IBM Consulting India
Global Industry Architect, Industrial Manufacturing
linkedin.com/in/sujay-nandi

With 25 years of experience, Sujay is a thought leader in AI and data-led transformation in automotive, manufacturing, and supply chain. Sujay is an enterprise architect and has led multiple transformation programs involving disruptive technologies and connected data on hybrid cloud. He is an IBM Industry Diamond and focuses on technology and architecture in solving strategic business problems.

Key supporting contacts by geography

Rami Ahola
EMEA
Partner and Global Industry Leader
Industrial Manufacturing
IBM Consulting

linkedin.com/in/ramiahola

Jorge Malibran
USA
Senior Partner
Manufacturing Industry Leader
IBM Consulting

linkedin.com/in/jorge-malibrán-ángel-544b823

Yuhko Nakamura
Japan
Japan Industry Leader
IBM Consulting

YUKONK@jp.ibm.com

Peter Schel
DACH
Senior Partner
Automotive Sector Lead DACH,
Lead Client Partner for BMW Group
IBM Consulting

linkedin.com/in/peterschel2020

Biswajit Bhattacharya
India
Partner
Industrial Manufacturing
IBM Consulting

linkedin.com/in/biswajitbhattacharya

Karl Chadwick
UK
Senior Partner
Industrial Sector
IBM Consulting

linkedin.com/in/karl-chadwick-0328281

Olivier Payraud
France
Senior Partner
Industrial and Communication
IBM Consulting

linkedin.com/in/olivier-payraud-4432281

Luigi Menzio
Italy
Client Partner
Stellantis, Iveco, CNH, Leasys, Ferrari
IBM Consulting

linkedin.com/in/luigi-menzio

Jun Tang
China
Partner
Automotive Sector Leader
IBM Consulting

linkedin.com/in/jun-tang-b3b71085

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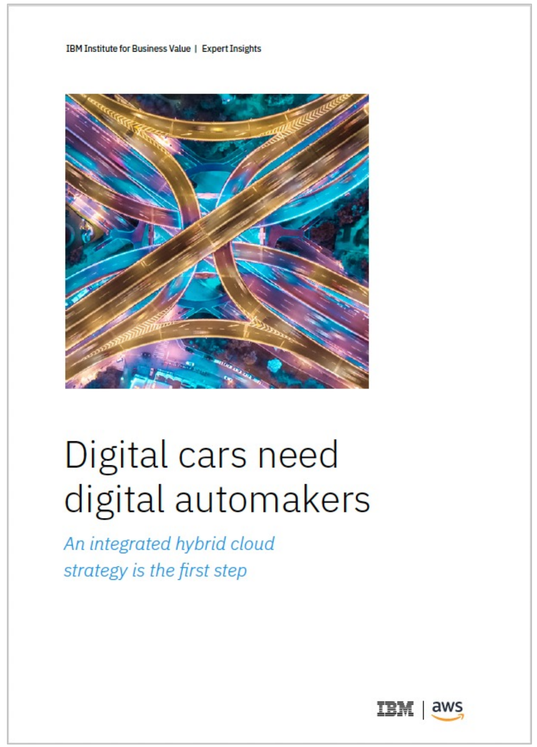
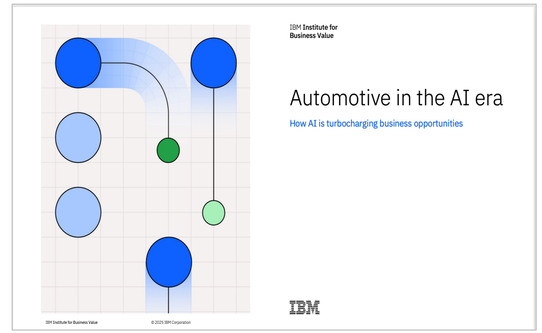
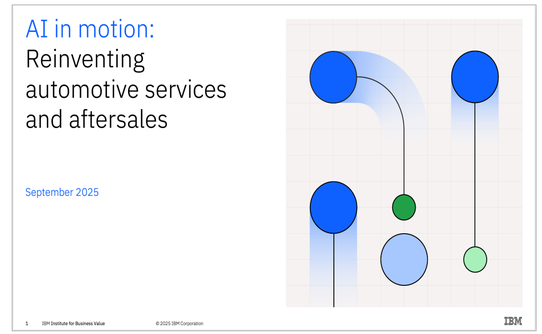
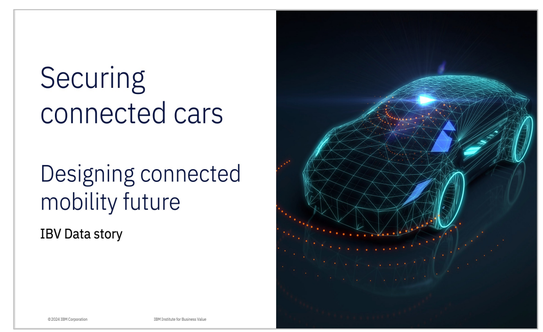


Digital cars need digital automakers







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IBM Corporation
New Orchard Road
Armonk, NY 10504

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