EU AI Act in
Automotive Industry

Capgemini invent

Management-Summary

The automotive industry is currently undergoing a profound transformation, driven by the integration of Artificial Intelligence (AI), particularly Generative AI (GenAI). The rapid adoption of AI has the potential to reshape traditional processes, significantly boost efficiency, reduce costs, and improve customer satisfaction. Leading automotive manufacturers recognize the technology as a key innovation driver: 69% of companies view GenAI as an opportunity to increase sales and accelerate innovation. Despite growing investments, the automotive sector still lags behind other industries in terms of AI's share of overall IT spending, highlighting a need to bridge existing gaps to fully harness AI's potential.

The primary value of (Gen) AI lies in its ability to automate business processes, personalize customer experiences, and support strategic business objectives. AI enables automakers to optimize operations and swiftly respond to market changes—an essential capability in a highly competitive environment intensified by the rise of electric vehicles and aggressive strategies from new market entrants, particularly from China.

The benefits of AI in the automotive sector are already evident. AI-based process automation has led to productivity gains of up to 7.8% and cost reductions of approximately 4%. Companies leveraging AI along the value chain, including in areas such as supply chain management, human resources, and customer service, have achieved significant efficiency improvements. Additionally, GenAI plays a central role in personalizing customer interactions, enhancing customer satisfaction and loyalty through tailored recommendations and configurations.

Automotive companies are at various stages of AI implementation. These stages range from isolated pilot projects to strategic integration and finally to democratization, where all employees gain access to AI-powered tools to increase productivity. This final phase is crucial to fully realize AI's potential.

With the EU AI Act coming into effect in August 2024, stringent regulatory requirements for AI usage within the EU have become necessary. This legislation imposes substantial penalties for non-compliance, up to €35 million or 7% of annual turnover. Particularly for high-risk

applications, such as autonomous driving and AI-driven HR management, comprehensive measures are needed to ensure data transparency, privacy, and non-discrimination.

However, compliance with the EU AI Act presents several challenges. The technical complexity, especially in implementing explainable AI models to ensure decision traceability, poses significant hurdles. While less complex AI models can be made transparent through techniques like LIME or SHAP, more complex models require continuous real-time monitoring. Organizationally, clear role allocation and close interdisciplinary collaboration between IT, Compliance, and R&D are essential, facilitated by governance models like RACI. Centralized compliance systems help detect and manage risks early.

To meet data protection requirements and prevent potential AI-induced bias, robust anonymization procedures and regular audits are critical. Transparent data practices not only comply with the ethical standards of the AI Act but also build consumer trust.
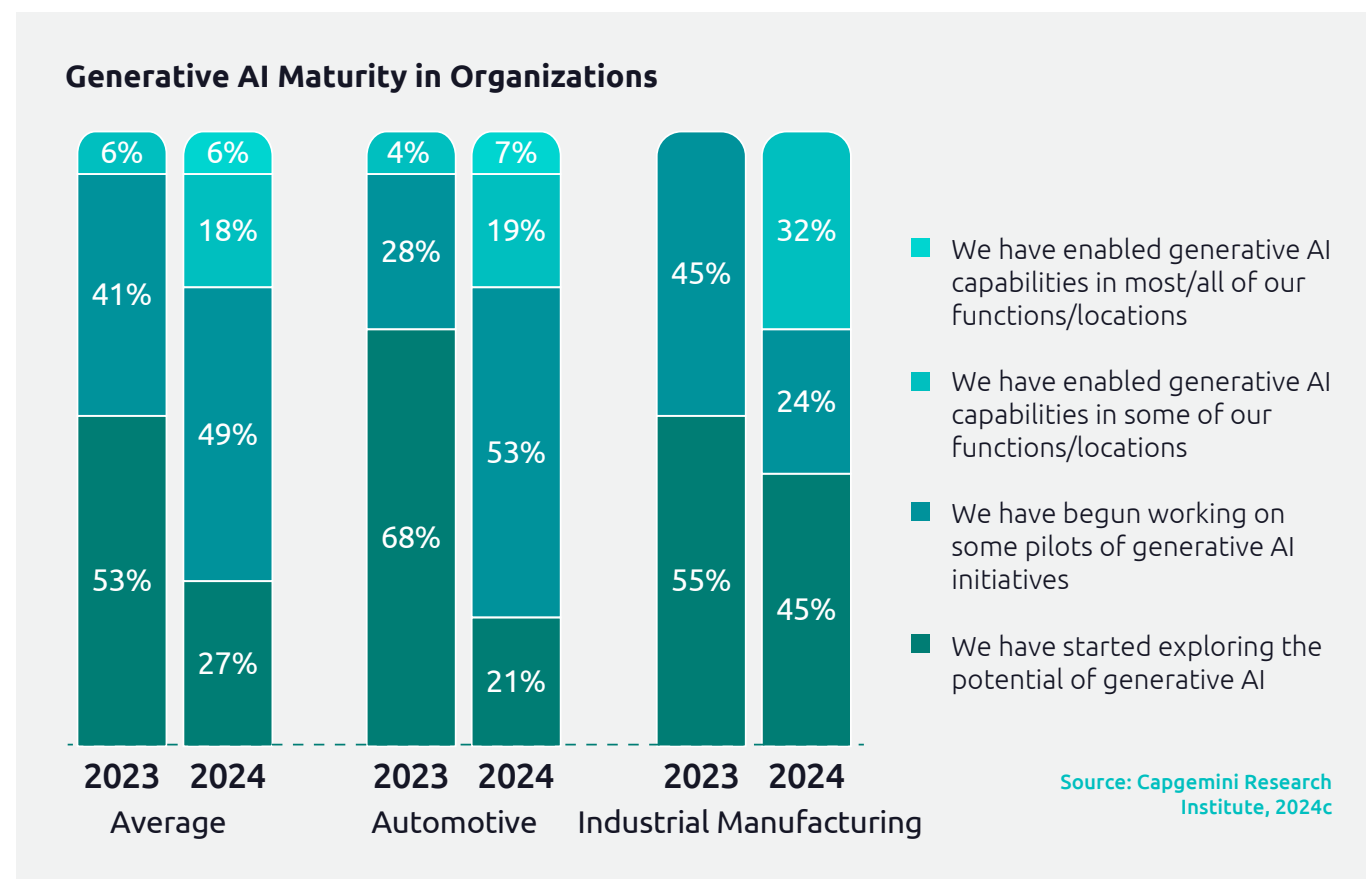
Key recommendations for the automotive industry include an immediate focus on AI compliance to secure competitive advantages and minimize risks such as reputational damage. Addressing the skills shortage through targeted partnerships with educational institutions and internal training programs is another priority, especially in high-risk areas like Advanced Driver Assistance Systems (ADAS). Furthermore, collaboration with strategic technology partners is essential to expedite AI implementation and ensure adaptability to evolving regulations.

The introduction of AI-driven processes offers immense opportunities for the automotive industry. Proactive adaptation to regulatory requirements and the strategic utilization of AI technologies are essential for ensuring long-term growth and competitiveness in a rapidly evolving market environment.

01.
Introduction

▶ 1.1. The rise of AI in the automotive industry

The automotive industry is undergoing a revolution that will not only change the way vehicles are produced, but also the way we use and experience them.

Generative AI Maturity in Organizations

Legend:
- ■ We have enabled generative AI capabilities in most/all of our functions/locations
- ■ We have enabled generative AI capabilities in some of our functions/locations
- ■ We have begun working on some pilots of generative AI initiatives
- ■ We have started exploring the potential of generative AI

Source: Capgemini Research Institute, 2024c

The rapid adoption of (Gen) AI is also making inroads into traditional industries such as automotive and has the potential to fundamentally transform the entire value chain and significantly accelerate the path to greater cost efficiency and growth. This has long since reached the boardrooms of leading automobile manufacturers, as the technology was quickly chosen as a strategic focus and 69% of companies (2024) in the automotive industry see Gen AI as an opportunity to increase sales and accelerate innovation ([source,](#) fig. 11). This is also reflected in the investment level that can be observed across all industries. 80% of companies have increased and the remaining 20% have at least kept the same Gen AI investment level compared to 2023. However, looking at the percentual portion of GenAI investments of the overall IT spendings, the automotive industry is lacking behind. While the industry average is 8.2%, that of the automotive industry is only 5.6% and that of German OEMs just 1.2%. This indicates a clear need to catch up for automotive OEMs. At the same time, the active use of Gen AI in the automotive sector has also increased from just 4% in 2023 to a whopping 26% in 2024 (fig. 2). The benefits are clear: Already in 2023, Gen AI boosted productivity on average by almost 8% and decreased costs by almost 4%. It is expected that these top and bottom line impacts will exponentially grow in the coming months and years, due to higher maturity of the implementation.

The automotive industry is at a crucial turning point in which, alongside of other key levers, AI and particularly GenAI play a key role in addressing the rising pressure from internal and external market dynamics. On the one hand, GenAI helps to tackle internal margin pressure. This is already happening in the vehicle design and development process or extensive HR efficiency gains such as in employee upskilling. On the other hand, GenAI is becoming even more important in view of the increased competition in a stagnating European market (source). Here, the pressure is further increased by the market entry of Chinese manufacturers, who are pursuing aggressive market strategies with innovative and cost-effective electric vehicles. Established manufacturers are facing enormous cost pressure due to increased competition, changing consumer behavior (demand for BEV & mobility services), regulatory requirements and global uncertainties (trade conflicts, supply chain problems and geopolitical tensions), forcing them to reduce their production costs while investing in new technologies to remain competitive.

1.2. Serving strategic goals

In this challenging environment, the importance of (Gen) AI for the automotive industry is becoming increasingly clear: It enables car manufacturers to react more agile to market changes and develop innovative products more quickly, thus proving to be a decisive factor in achieving strategic goals in all business areas. The question is no longer whether, but how (Gen) AI will be treated in the organization.

One key area in which (Gen) AI is already bringing enormous benefits is the automation of business processes. According to our study, automotive companies that already integrate (Gen) AI into their operations increased their productivity by an average of 6.3% within a year. These efficiency gains are achieved in particular by using AI agents that take on routine tasks and are even able to make complex decisions. Up to 88% of companies in the industry plan to use AI agents within the next one to three years. These include tasks such as writing code, analyzing data or writing business correspondence. In the supply chain and resource management, AI-supported forecast models enable demand-based production and minimize inventory, which leads to further efficiency gains. In addition, GenAI is leveraged in procurement to compare extensive tenders in the vendor selection process that safe time and ultimately

costs. These optimizations contribute significantly to reducing costs by shortening development times, making test scenarios more effective, and detecting errors at an early stage. Another advantage is the unprecedented individualization of the customer experience enabled by GenAI. By analyzing customer preferences, tailored product recommendations, individual vehicle configurations, and personalized service offers can be generated, which significantly increases customer satisfaction and loyalty. A whole new dimension of the customer experience in vehicle configuration is imminent, opening the opportunity to forge the deep customer relationships that will define the automotive landscape of tomorrow. As our study shows, OEMs that already use Gen AI were able to increase customer satisfaction by an average of 5.4% within one year. The automotive industry is currently navigating three phases in

the implementation of Gen AI. Initially, companies deploy GenAI in isolated projects to tackle specific problems. Some OEMs, however, are moving beyond this by strategically integrating Gen AI across their entire operations, optimizing processes and upskilling their workforce. The third and final "high impact" phase involves democratization through low-code/no-code solutions, enabling all employees to leverage the technology and unlock its full potential for productivity and cost efficiency. With many OEMs now in the second phase, this is a critical moment to establish proper implementation, including compliance with regulations like the EU AI Act. The next few years will be decisive – not just for gaining strategic advantage, but for winning the race in automotive innovation.

The introduction of the EU AI Act, which was passed by the European Parliament in March and came into force in August 2024, creates a comprehensive legal framework for AI in the EU, which classifies and regulates AI applications according to risk classes and in some cases provide for severe penalties for violations. The act aims to promote AI innovation while protecting the fundamental rights and security of EU citizens through strict standards. This increased regulation poses ethical and data

protection challenges for OEMs and investments in technology and employee qualifications, but also brings opportunities. Car manufacturers who rely on AI early on and integrate it responsibly in compliance with the EU AI Act will secure a clear competitive advantage in the medium to long term. They will benefit from increased efficiency (e.g. cut production costs through AI-powered automation), enhanced productivity (e.g., reduced downtime due to smart predictive maintenance), breakthrough innovations, and an optimized customer experience. The act is in effect, so now is the time to change gears and prepare accordingly! Success will hinge on implementing a sophisticated EU AI Act strategy that perfectly balances professional expertise, organizational readiness, and technical capabilities. OEMs must move with urgency to scale Gen AI across their operations, leveraging strategic (technology) partnerships to accelerate deployment. Those who hesitate risk being left behind in an industry where the gap between AI leaders and laggards grows wider each day. Accelerate your path to AI excellence by reviewing your integration plans, leveraging key partnerships, and strategically positioning yourself for long-term success.

▶ 1.3. Example use cases

When identifying (Gen) AI use cases along the value chain, a strategic approach is crucial to make the most of the technology's potential. Whether it's production optimization, personalized products, or improved customer service, the automotive industry must integrate (Gen) AI in a targeted manner to achieve maximum benefits.

Research & Development:

Development of autonomous driving systems that fall under the EU AI Act as high-risk AI systems. This requires strict regulations for safety, transparency, data quality and human control in order to minimize risks and ensure clear liability rules.

Supply Chain & Procurement:

Optimization of supply chains through predictive analyses in order to identify bottlenecks or changes in demand at an early stage. The EU AI Act comes into play here by ensuring transparency and traceability of AI decisions, particularly in automated procurement processes and risk assessments.

Production:

As an assistant for training scenarios & quality control, Gen AI provides real-time instructions for factory workers and improves quality assurance. Compliance with the EU AI Act ensures that the system does not make any mistakes that cause safety risks or production problems.

Marketing:

In customer journey management, Gen AI analyzes customer behavior and optimizes the customer journey through personalized recommendations. The EU AI Act requires transparency, data protection and the avoidance of discrimination or unfair treatment of customers.

Sales:

Gen AI enhances lead generation and qualification by analyzing data to identify potential customers and prioritize sales teams. The EU AI Act requires transparency and control over AI decisions in order to prevent discrimination and unfair market practices.

Service/ Aftersales:

Predictive maintenance for vehicle fleets harnesses Gen AI to analyze fleet data and detect maintenance needs early on to support the protection of the driver and passengers. As a high-risk AI, it must be ensured that the predictions are reliable, risks are minimized and there are clear responsibilities if the system makes wrong decisions.

HR:

Automated applicant selection, in which AI makes preliminary decisions based on profiles and data. The EU AI Act requires that such systems are transparent, do not cause discrimination and that human oversight remains guaranteed.

IT:

Automatic error diagnosis and correction: Gen AI identifies sources of errors in the code and offers suggested solutions. The EU AI Act ensures that AI solutions for error control are reliable and do not introduce undesirable risks.

02.
The EU AI Act for the automotive industry

▶ 2.1. Overview of the EU AI Act

2.1.1. Objectives of the regulation

The EU AI Act aims to strike a balance, fostering AI adoption while upholding individuals' rights to responsible, ethical and trustworthy AI use. It aims to regulate artificial intelligence (AI) to ensure better conditions for the development and use of this innovation technology. Its priority is to make sure that AI systems on the EU market or directed at citizens who are in the EU, are safe, transparent, traceable, non-discriminatory and environmentally friendly. It also wants to establish a technology-neutral, uniform definition for AI that could be applied to future AI systems. This EU regulation applies to anyone who makes, uses, imports or distributes AI system in the EU, regardless of where they are based.

2.1.2. Classification of AI systems

The Act introduces a risk-based framework, categorizing AI applications into 4 risk categories.

Unacceptable risk:

This covers AI systems that are considered a clear threat to livelihood, safety, and rights of people. This includes AI systems that exploit the vulnerability of people in need of protection and classify individuals.

Examples: Social scoring, biometric categorization to infer sensitive information, emotion recognition at work, exploitation of vulnerabilities of persons

High risk:

This includes AI systems used in critical infrastructure, educational training, safety components in products, employment/ management of workers, essential private/public services, law enforcement, migration management and administration of democratic processes.

Examples: Selection of job applicants, evaluation of learning outcomes in vocational trainings, emotion recognition (e.g., of customers)

Limited risk:

This covers AI systems interacting with humans, and AI systems that generate or manipulate image, audio, or video content.

Examples: Chatbots (e.g., Beetle Bot), generated design (e.g., FelGAN from Audi)

Minimal or no risk:

This contains all the AI systems which cannot be categorized under any other category. The Act allows free use of minimal risk AI systems.

Examples: Computer vision workbench

In addition, the Act considers systemic risks which could arise from general-purpose AI models, including large generative AI models (total computing power of more than 1025 FLOPs). If the AI model has high impact capabilities, determined by technical tools and benchmarks, or if it has similar capabilities or impact as decided by the Commission, it is considered to have systemic risk.

The Act also mandates human oversight, robust data management, and ethical use of AI, while promoting innovation through AI regulatory sandboxes and establishing an AI office to oversee compliance.

A graphic on these lines can be made:

2.1.3. Obligations for high risk AI systems

An AI system is considered high-risk if it falls into a certain area as defined by the ANNEX III of the AI act. For these high-risk AI systems, different requirements must be met, depending on the role of a certain actor.

Providers of high-risk AI systems must make sure their AI systems meet specific standards and display their contact information on the product or its packaging. They need to have Quality Management System and keep certain documents and logs. They also need to mark the product with a CE marking to show it meets EU standards. They must register the product in a central database, fix any issues, provide necessary information, and prove it meets standards if asked by authorities. The AI system must be accessible according to EU directives.

Importers must ensure that AI system meets all regulations like checking that the system has passed the necessary assessments, has correct documentation, and is marked with the CE symbol. Importers must also provide their contact details on the system or its packaging, ensure its stored and transported safely, and keep a record of its certification and instructions for 10 years.

Distributors must ensure is meets certain standards, including having a CE marking and a copy of the EU declaration of conformity. Distributors also need to ensure that the AI system remains compliant during storage or transport. Distributors must also cooperate with authorities and provide any requested information about the AI system.

Deployers of high-risk AI systems must ensure that AI systems are been used as per instructions, human oversight is assigned to ensure relevance of input data and monitoring the system's operation. Deployers must keep logs generated by the AI system for at least six months. Deployers must perform a data protection and fundamental rights impact assessments and cooperate with relevant authorities.

Criteria	Description	Examples	Obligations	Deadline
Unacceptable risk	AI-systems that are considered a clear threat to livelihood, safety, and rights of people. This includes AI systems that exploit the vulnerability of people in need of protection and classify individuals.	Social scoring, biometric categorization to infer sensitive information, emotion recognition at work, exploitation of vulnerabilities of persons	Prohibited system	February 2025
High risk	AI-Systems used in critical infrastructure, educational training, safety components in products, employment/ management of workers, essential private & public services, law enforcement, migration management, administration of democratic processes.	Selection of job applicants, evaluation of learning outcomes in vocational trainings, emotion recognition (e.g., of customers)	Certification obligations (e.g., risk management, data and data governance, documentation, transparency and provision of information, technical requirements)	(Annex 3) August 2026 (Annex 2) August 2027
Limited risk	AI systems interacting with humans, and AI systems that generate or manipulate image, audio, or video content.	Chatbots (e.g., Beetle Bot), generated design (e.g., FelGAN from Audi)	Transparency obligations (e.g., inform user about interacting with AI, marking of AI generated output)	August 2026
Minimal or no risk	Minimal risk AI systems contain all the AI systems, which cannot be categorized under any other category. The regulation allows free use of minimal risk AI systems.	Computer vision workbench	No mandatory requirements from EU AI Act	August 2026
Systemic risk (only for general-purpose AI models)	GPAI models trained using a total computing power of more than 1025 FLOPs, high impact capabilities evaluated based on appropriate technical tools & methodologies, classification by the AI Office.	GPT 4, Gemini	Strict obligations (e.g., risk assessment and mitigation, notification and incident reporting, state-of-the-art tests and model evaluations, cybersecurity)	August 2025

2.2. Impacts and risks of non-compliance

2.2.1. Legal consequences (comparison to GDPR act)

Like GDPR, non-compliance related to requirements on data or infringements on prohibited practices can result in fines up to 35 million EUR or 7% of a company's annual turnover. Non-compliance to any other requirements shall be subject to fines up to 15 million EUR or 3% of a company's annual turnover. Providing incorrect, incomplete or misleading information can result in fines up to 7.5 million EUR or 1.5% of a company's annual turnover.

Just as an random example: For an OEM, like Mercedes Benz Group AG, 1.5% of their 2023 revenues (achieved revenues of 153 billion in 2023) would mean up to 2.2 billion EUR as fine for non-compliance.

[Source: Mercedes Benz Group, Full Year Result and Annual Report, 2023.]

2.2.2. Reputational damage

Non-compliance to EU AI Act can cause significant reputational damage for organizations including:

Loss of Consumer Trust:

Customer may lose confidence in the safety, reliability and ethical standards of the company's AI products. Safety concerns or flaws in AI systems can make customer skeptical about the brand's commitment to safety, leading to reduced sales and hesitancy from future buyers. After the Volkswagen emissions incident in 2015, there was a significant dip in sales and it took around 2 years to mitigate the impact and the damages.

Negative Publicity:

Being publicly fined or sanctioned by EU authorities can lead to negative media coverage damaging brand image. This can significantly damage a company's brand, especially when safety, ethics and transparency are critical to their public image.

Impact on Partnerships:

Investors, business partners and stakeholders may distance themselves from non-compliant companies, fearing regulatory or reputational risks. Non-compliance could impact the OEM's ability to meet agreements and contractual obligations, leading to loss of confidence from key industry partners. In times where strategic partnerships are of utmost relevance for strategic competitive advantages, every OEM will avoid this.

Legal risks:

A non-complaint AI system might have legal risks like administrative fines, warnings and other non-monetary measures. The companies may face ongoing regulatory scrutiny and legal challenge further delaying their AI-related products.

2.2.3. Operational risks

Non-compliant organizations may face temporary suspension of AI system operations leading to delays or stoppages in delivering products or services that reply on AI.AI systems found non-compliant could lead to product recalls or suspension of system 's deployment. For example, if an autonomous driving AI is deemed unsafe, OEMs may need to recall vehicles or suspend certain AI functionalities until compliance is achieved. Non-compliance can delay AI product launches or rollouts due to need for retroactive fixes, re-certifcations, or redesigns to meet regulatory standards. This can result in missed market opportunities and lost competitive advantage.

▶ 2.3. Gen AI Use Cases Realization across Automotive functions

The EU AI act requires OEMs to assess and update their AI based applications to align with risk levels outlined by the act; unacceptable, high, limited, minimal or no risk and systematic risk. Those OEMs leveraging GenAI across multiple domains must prioritize compliance to avoid significant penalties. This section discusses real world AI applications within OEM functional units, understanding how each use case must adapt to regulatory standards and future proof operations.

This regulatory shift will urge OEMs to update their approach to IT development, governance and real time monitoring across all AI applications, transforming these use cases from what they are now to what they would need to be, with an emphasis on transparency, accountability and responsibility.

Unacceptable Risk:

Example use case: Emotion recognition in driver monitoring
Functional Unit: R&D and Safety

Many OEMs (Stellantis) are currently exploring driver monitoring systems that include emotion recognition to detect drowsiness or alertness levels. However, under the EU AI Act, emotion recognition within vehicles could fall under the 'Unacceptable Risk' category, especially due to concerns around user privacy, consent, and potential misuse of sensitive biometric data. Currently, these systems analyze facial expressions, but to align with the EU AI Act, Automotive companies must either modify the system to exclude emotion recognition or integrate clear, explicit consent mechanisms for data collection and processing. This will require R&D to pivot towards other driver behavior monitoring methods, like tracking steering or eye movement, that respect privacy standards. To future-proof, the Safety and R&D departments will need to set up continuous ethical and privacy reviews of AI systems and establish compliance checkpoints for any new AI features.

High Risk:

Example use case: Autonomous Driving
Functional Unit: R&D

Tesla and Volkswagen are at the forefront of autonomous driving and several other automakers are making huge strides in this space, leveraging GenAI to interpret sensor data and make real-time decisions whilst operating entirely independently without the need for human intervention. Autonomous driving is classified as high-risk under the EU AI Act, requiring rigorous safety and transparency measures. Presently, autonomous systems operate based on complex decision-making algorithms that lack consistent documentation of decision paths. Moving forward, R&D will need to implement comprehensive transparency in decision documentation and establish bias prevention measures. Additionally, OEMs that follow the development of autonomous driving must develop extensive testing protocols and a system for continuous algorithm validation to ensure decisions meet safety standards and ethical AI requirements. Future-proofing involves integrating machine learning governance frameworks that support real-time audits and compliance reviews, preempting regulatory non-compliance.

Example use case: ADAS (Advanced driver assistance systems)
Functional Unit: Quality Assurance

When considering ADAS, it's important to note that while it falls under the broader category of autonomous driving, its primary purpose is to assist drivers in operating their vehicles more safely and effectively. Many car manufacturers have and are incorporating some level of ADAS technology into their vehicles with a focus on enhancing safety and convenience for drivers such as adaptive cruise control and lane keeping assistance. However, these features and capabilities would fall under high-risk applications within the EU AI Act. Current systems provide real time responses to driving conditions but still lack detailed tracking of decision-making

pathways and may not always account for a wide range of environmental conditions. Moving forward, Quality Assurance functions across OEMS would need to be more transparent with risk management frameworks to document ADAS actions, such as when emergency braking is activated to verify compliance with the EU AI Acts transparency requirements. The QA teams must also perform frequent validation checks to ensure that these systems are reliable across a diverse range of scenarios. Future proofing ADAS includes implementing automatic safety updates and establishing data logs that record and review ADAS interventions, creating a self-monitoring and compliant ADAS ecosystem to avoid any regulatory backlash.

Example use case: Recruitment and HR systems
Functional Unit: Human Resources

Nearly all large organizations across industries are utilizing GenAI in recruitment and HR systems to streamline hiring processes, enhance candidate matching and improve employee engagement. The use of AI in HR is increasingly common with OEMs such as BMW using AI driven platforms for talent acquisition and Volkswagen using automated CV assessments and personalized candidate interactions through chatbots. Although companies are seeking to improve efficiency, recruitment AI is classified as a high risk under the EU AI Act due to potential biases that may disadvantage certain candidates. Currently, many of the recruitment systems prioritize efficiency and candidate-matching, often without real-time bias correction. To ensure this meets compliance, OEMs HR and IT departments must collaborate together to refine algorithms and embed mechanisms that would detect and correct any biases in real time. OEMs must provide clarity in how AI screening processes function and what the criteria candidates are evaluated. Future proofing for BMW and Volkswagen and many other organizations include developing a continuous improvement framework for HR, assessing the algorithms to verify whether diversity and bias metrics are employed and aligning

the recruitment process with the ethical AI practices of the regulatory requirements.

Limited Risk:

Example use case: Gen AI Enabled first level call center
Functional Unit: Customer Service

Several OEMs began leveraging the GenAI customer service technology to improve customer engagement, reduce response times and enhance overall service efficiency. The adoption of the Gen AI first level call centers represents a significant shift towards modernizing customer support in the automotive industry and enabling OEMs to meet the evolving expectations of their customers. For example, Nissan have utilized this technology known as 'Nissan Connect' featuring AI capabilities to assist customers with questions regarding their vehicles, from navigation to feature explanations. This AI system is classified as a limited risk application under the EU AI Act, as this system enhances operational efficiency by automating responses to FAQs and triaging more complex issues to human agents. Currently, Nissan's system provides basic responses but to ensure compliance with this act, the customer service department must be more transparent in how AI interacts with the customers. This includes clear communication with regards to the AI's capabilities and limitations as well as ensuring that customers have access to real human support when required. To future proof this initiative it would involve in continuous monitoring of AI's performance, observing and incorporating customer feedback to improve accuracy and responsiveness to safeguard any biases in service delivery. OEMs that adopt a Gen AI enabled first level call center will need to comply with regulatory requirements and equally must commit to reinforcing trust and providing reliable customer service.

Example use case: In-Vehicle infotainment system
Functional Unit: IT and Customer Experience

In-vehicle infotainment systems are an integral part of all modern vehicles providing drivers and passengers with a blend of entertainment, information and connectivity. This system is now a central part to the driving experience and leading automakers are continuously enhancing their systems and advancing the technologies to meet the ever-evolving customer demand for personalization, functionality and safety. A great example of this is the MBUX (Mercedes Benz User Experience) which features a sophisticated voice recognition system "Hey Mercedes" providing drivers and passengers with a seamless and personalized experience. This AI driven system allows users to interact with their vehicles via voice commands for navigation, climate control and media playback. While this application enhances the driver experience it does still fall under the limited risk category as defined by the EU AI Act. Currently, 'Hey Mercedes' personalizes the responses based on the drivers preferences but may not always be clear on how it collects and uses the data. To comply with this act, Mercedes would need to implement a robust and transparent measure that informs users on how the data is being processed and used. IT and customer experience departments would need to enhance their collaboration on transparency features providing clearer consent options and an easily accessible user interface that outlines how much data is being utilized. As many OEMs are adopting a similar feature, there are strategies to use to train the AI model to refine responses and enhance the systems ability to provide accurate and relevant information without the bias.

To future proof this, OEMs can integrate a feedback loop that collects user interactions to continuously improve the systems accuracy and responsiveness. Regular updates and compliance evaluations will help organizations adapt to evolving regulations and consumer expectations, ultimately fostering customer trust and reinforcing its commitment to ethical AI practices in its infotainment offerings.

Minimal or No Risk:

Example use case: Driver behavior coaching apps
Functional Unit: IT and customer experience

Driver behavior coaching apps are becoming increasingly popular among all OEMs.

These apps aim to improve and promote driver safety, eco-friendly driving habits and reduce accident rates through feedback and coaching. Most notably, Volkswagen implemented a driver behavior coaching app designed to offer personalized feedback to drivers. The app utilizes anonymized driving data such as acceleration, braking patterns and fuel efficiency to generate constructive insights without compromising personalized data, which deems this as a minimal risk. For those OEMs that adopt a similar application, the IT and Customer Experience teams would need make sure that there's a transparent data handling practice that clearly communicate to users what data is being collected and used. To align with the EU AI Act, OEMs like Volkswagen should implement consent mechanisms that would allow users to opt in for data collection while providing easy access to their data management options. Future-proofing efforts will need to include regular assessments of data handling practices, allowing for quick adjustments to privacy protocols as regulations change. By focusing on ethical data usage and enhancing customer engagement through personalized coaching, VW not only meets compliance requirements but also reinforces its commitment to driving safety and innovation in the automotive sector.

Example use case: Social Media Analytics
Functional Unit: Marketing and Communications

Social media analytics has become a critical tool for OEMs and companies looking to enhance their marketing strategies, understand consumer behavior and stay competitive in a rapidly changing market. It is commonly used to leverage AI to analyze customer sentiment and engagement on various platforms, enabling the company to fine tune its marketing strategies, classifying this to be a minimal to no risk. Hyundai is a great example of this use case as the tool they use processes publicly available data, such as posts, comments, and interactions related to Hyundai's products, to gauge consumer perceptions and preferences without accessing personal data or private accounts. Under the EU AI Act, the marketing and communications teams must still prioritize transparency and follow ethical data practices to ensure that the analytics tools only analyze, aggregate an anonymize data

to minimize any privacy concerns. For many OEMs like Hyundai that leverage AI in their marketing practices, they would need to still align with evolving regulations and user expectations, ensuring all data sources and methods maintain a focus on user consent and data protection

Systematic Risk:

Example use case: Dependency on third party vendors
Functional Unit: Supply Chain Management

The reliance of third party vendors for AI solutions have become increasingly popular due to the complexity of the technology but also reflecting a strategic approach to leverage specialized expertise, reduce costs, accelerate development and have access to cutting edge innovative technology. Using GM (General Motors) as an example, they rely on a third party vendor for their AI driven supply chain analytics to optimize their inventory management and logistics processes. While these analytics tools enhance efficiency by predicting the demand and improving operational responsiveness, they also introduce 'Systematic risks' under the EU AI Act. The main concern is that GM and other OEMs who rely on external vendors may expose the organization to non-compliance issues if these vendors fail to adhere to the data protection and AI governance standards. As many manufacturers previously operated with less oversight on vendor compliance, the EU AI Act will necessitate a comprehensive review of third party practices, requiring them to implement a stricter vetting process to ensure all vendor solutions align with the EU regulations on data privacy, transparency and accountability. More OEMs will need to be committed to establishing a robust framework for managing vendor relationships, including regular auditing and performance reviews to assess the compliance with the EU AI Act. This approach would not only mitigate the risks associated with any data breaches and algorithmic biases but also position them to response swiftly to regulatory changes. This will ensure secure operations while also enhancing trust with stakeholders.

2.3.1. Customer facing processes

As GenAI becomes the base for customer engagement strategies, OEMs will face a new reality where transparency and fairness are non-negotiable standards. With the EU AI act setting strict guidelines for how AI can influence pricing, financing and customer support, OEMs must adapt their customer facing processes to avoid any legal consequences and boost their customer trust. AI applications in areas such as personalized financing recommendations must now be both explainable and bias-free, marking a change from simply adjusting offers to ensuring full accountability.

An example use case is the AI powered Financing recommendations that enable OEMs and finance companies to offer highly personalized, efficient and flexible financing solutions. By leveraging customer data, market insights and predictive analytics, these systems benefit both car buyers and sellers contributing to faster and more streamlined financing processes. However as the EU AI Act takes effect, OEMs are compelled to re-evaluate this AI capability. If we look at Ford Credit, which employs AI driven financing recommendations to analyze a customer's profile, credit history and preferences; this personalization has historically streamlined the loan approval process resulting in higher customer satisfaction and increase of sales. However under the act, Ford Credit would need to ensure that these AI systems are not only effective but transparent and understandable to end users. There must be transparency on the criteria on how financing options are generated, ensuring there's zero discriminatory practices perpetuated. Many OEMs like Ford who adopt an AI powered financing recommendation would require to implement auditing mechanisms, monitor for any biases in the AI algorithms and establish clear communication with customers on how data is used and shared. Simply, OEMs will need to evolve from optimization to building systems that will prioritizing fairness and transparency to safeguard reputations.

The EU AI Act is a game changer for OEMs, urging them to assess and evaluate their AI applications across all functional departments. With a few real world examples highlighting the challenges of compliance from the high stakes world of autonomous driving to the field of customer service, its clear that transparency and ethical AI practices are no longer optional. OEMs will need to act decisively to implement governance and risk management frameworks that meet the regulatory requirements but also building customer trust. If OEMs embrace these changes now it mitigates risks, enhances operational integration and will allow them to be more agile for future AI innovation.
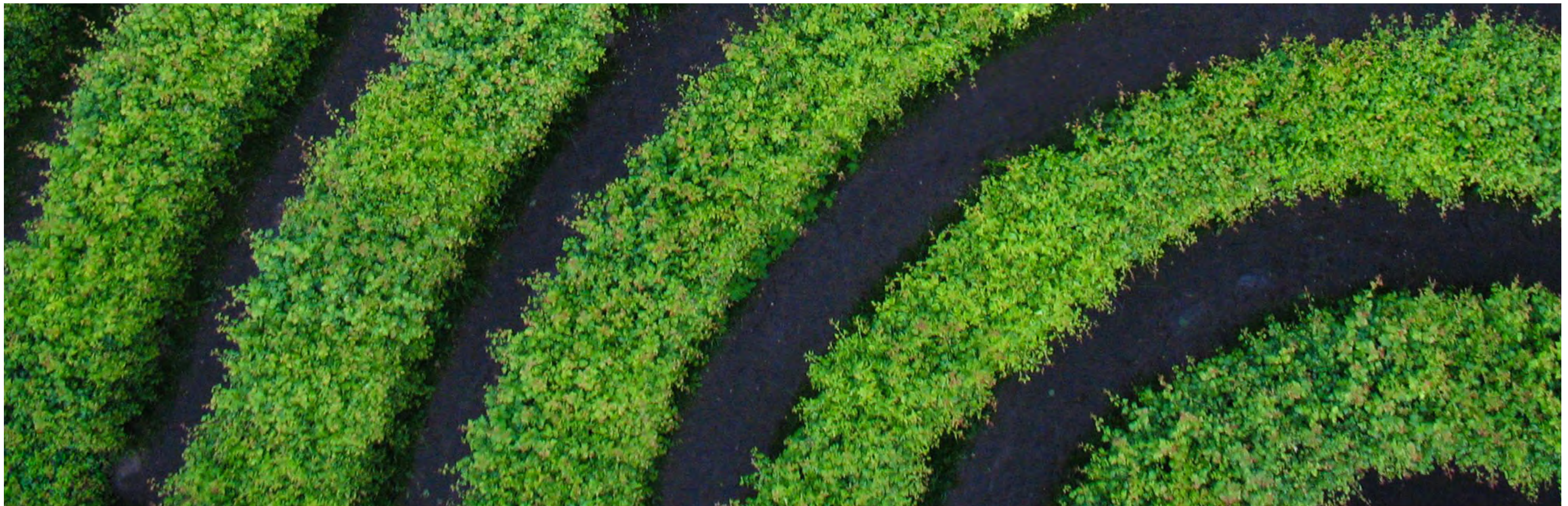
03.
Challenges in implementing the EU AI Act

3.1. Complexity and compliance hurdles

The introduction of the EU AI Act presents significant challenges for the automotive industry, as the regulation imposes particularly high requirements for transparency, safety, and ethical standards for AI applications such as autonomous driving systems and ADAS. Companies must ensure that their systems are not only technologically advanced but also compliant with the law. This requires comprehensive adjustments in technical, organizational, and strategic areas, as well as close collaboration among all relevant departments, such as legal, data protection, compliance, product safety, and IT security.

3.1.1. Technical challenges

Ensuring compliance with the AI Act requires the implementation of mechanisms for real-time monitoring and traceability of AI decisions. This is particularly challenging for highly complex "black-box" models such as deep learning algorithms, which are often difficult to explain. For classic machine learning models, tools such as LIME or SHAP can be used to represent decision-making processes in a comprehensible way. However, these methods are less suitable for more complex models such as large language models (LLMs) and other generative AI models. Instead, specialized techniques are required to make the decisions of these high-dimensional models transparent and interpretable. By using a Continuous Integration/Continuous Deployment (CI/CD) framework, continuous compliance can be ensured through regular automated testing and updates.

Robust data management is also essential, as the AI Act imposes stringent requirements on the storage and traceability of data. Companies must securely archive sensor data and decision logs and make them easily accessible for retrospective analysis or troubleshooting when needed. Regular data quality checks and bias control mechanisms help ensure that the datasets used are representative and free of distortions.

The protection of personal data is a core requirement of the EU AI Act. Training data must be anonymized or pseudonymized to ensure data privacy and avoid discrimination. Anonymization ensures that personal data is altered in such a way that tracing it back to an individual becomes impossible, while pseudonymization replaces identifiers like names but still allows traceability under specific conditions.

Example: An autonomous driving system processes data such as speed or road conditions, while personal information like driver IDs is removed to protect privacy, ensuring the model remains effective without compromising sensitive information.

Regular audits check that no personal data can be traced back and ensure continuous data security. Additionally, vulnerability assessments protect the model from manipulations, such as adversarial attacks, where, for instance, traffic signs could be intentionally altered to confuse the model. Tests are conducted to ensure the model functions correctly even with manipulated inputs.

These measures-anonymization, audits, and vulnerability assessments-not only ensure that AI systems comply with legal requirements but also safeguard them against cyber threats, thereby reinforcing user trust.

3.1.2. Regulatory uncertainties

Regulatory uncertainties present a significant challenge in implementing the EU AI Act, particularly when it comes to classifying AI systems as "high-risk." Since the exact criteria and definitions for this classification are often unclear, automotive companies face the difficult task of determining independently whether their AI applications, such as ADAS, fall under this category. Misinterpretations could lead to serious legal consequences, such as fines or the requirement to retroactively modify existing systems. For instance, a company might develop an ADAS feature without recognizing that it could be classified as high-risk, thereby requiring additional certification. This could result in costly delays if retroactive changes are needed to meet regulatory standards.

Moreover, there is uncertainty about how the AI Act integrates with existing regulations, such as UNECE WP.29 or ISO standards, which already govern many aspects of vehicle safety and software compliance. The challenge lies in aligning these different regulatory requirements. For example, an ISO standard might set specific safety criteria for autonomous driving functions that could conflict with the transparency requirements of the AI Act. To address these uncertainties, a flexible compliance strategy is essential, allowing companies to quickly adapt to new requirements and minimize legal risks.

Companies must continuously monitor regulatory developments and engage in dialogue with industry associations and regulatory bodies to gain clarity and respond promptly to changes (in particular, the delegated acts that we expect in 2025 must be monitored). Proactively exchanging insights with these entities helps reduce uncertainties and develop compliance best practices. In addition, agile risk management methods should be implemented to identify risks

early and adapt dynamically. One approach could involve the use of scenario analyses, simulating various potential regulatory developments and outlining the range of actions the company could take in response.

Furthermore, it is advisable to design modular and flexible compliance processes that can quickly adjust to changes. For instance, implementing a compliance management system that is regularly updated to meet new regulatory requirements without disrupting operations can be highly effective. Such systems provide continuous monitoring and adjustment of compliance standards, ensuring the company remains legally compliant while maintaining its innovative edge and responding swiftly to market developments.

By adopting these approaches-flexible processes, continuous monitoring, and proactive communication-automotive companies can successfully navigate regulatory uncertainties, ensuring that they meet legal requirements while preserving their ability to innovate.

3.1.3. Organizational challenges

The AI Act requires a comprehensive re(-) structuring of internal processes and responsibilities to ensure that all departments are involved in meeting the regulations. Clearly defined governance structures are essential to facilitate smooth collaboration between departments such as Research & Development (R&D), IT, Compliance, and Risk Management. A key tool in this process is the RACI model (Responsibility Assignment Matrix), which assigns specific roles such as "Responsible," "Accountable," "Consulted," and "Informed" to various teams. For instance, in implementing a new AI compliance solution, the IT department would be responsible for technical implementation, while the compliance team would be accountable for ensuring regulatory adherence. The RACI model helps avoid overlap or gaps in responsibilities, creating clear accountability and reducing misunderstandings and delays. This model also promotes faster decision-making and ensures a swift response to emerging regulatory issues, leading to more efficient compliance with AI Act requirements and enhancing overall collaboration across the company.

A centralized AI Compliance Navigator System provides a comprehensive platform for managing and monitoring all compliance processes, helping organizations efficiently meet the AI Act's complex requirements. Such a system automates essential tasks like risk analysis, reporting, and documentation, reducing the need for manual effort. Tools for automated risk identification and regular compliance checks allow early detection of potential issues. For example, if a specific AI model violates data protection requirements, the system can detect this through continuous monitoring and prompt immediate corrective actions. These systems often include dashboards to visualize compliance status and offer checklist

functions to ensure each compliance step is thoroughly documented.

Additionally, a comprehensive change management program is crucial to align the entire company with the new regulatory requirements. This program includes AI Act-specific training sessions and interactive learning modules that enable employees to continuously deepen their understanding of AI regulations. Training programs and career paths that focus on developing compliance expertise allow organizations to build and maintain this knowledge internally over the long term. For instance, an internal development plan might involve regular training for IT and data management teams on identifying and mitigating data protection risks. This helps foster a strong company-wide understanding of compliance requirements and raises overall awareness.

External partners and suppliers must also be actively involved in the compliance process, as many aspects of the supply chain are subject to the AI Act's requirements. This necessitates stronger oversight and clear communication of compliance expectations to external partners. Regular audits and compliance checks with suppliers are necessary to ensure all aspects of the supply chain meet the required standards. Where necessary, existing contracts should be revised to formally incorporate compliance with the AI Act's standards. Approaches such as creating specific compliance requirements in contracts or implementing a supplier selection process that factors in compliance can help. This ensures that compliance is upheld not only internally but across the entire supply chain, creating a holistic and robust approach to meeting the AI Act's stringent demands.

3.1.4. Data protection

The data protection challenges in connection with AI systems, which have already been briefly discussed in section 3.1.1, place particularly high demands on automotive companies. In addition to complying with data protection regulations, it is crucial to ensure that AI systems do not make discriminatory decisions. This is especially important because self-learning systems can amplify biases in data, particularly when trained on incomplete or unbalanced datasets. A robust data governance framework is essential to ensure that personal data is securely processed while meeting all data protection requirements of the EU AI Act.

Anonymization techniques, such as the complete removal or encryption of personal data, play a central role in this. For instance, driving data used to improve autonomous systems can be pseudonymized to ensure that the information cannot be traced back to individual drivers. This approach protects user privacy while still allowing the company to collect the necessary data to enhance its AI systems.

Regular bias tests and audits are also critical to ensure that AI systems do not produce discriminatory outcomes. In the automotive industry, this could mean that vehicle control models trained on driving data are checked for biases related to gender, age, or ethnicity. If a system is found to disadvantage certain groups, it must be re-adjusted and re-trained. This can be achieved by using representative and diversified datasets, ensuring that all relevant demographic groups are adequately represented.

Transparency in decision-making is another key factor, particularly for safety-critical applications like autonomous driving. Consumers and regulatory authorities must be able to understand how and why an autonomous vehicle made a particular decision, such as braking or swerving in an emergency. Technological solutions like explainable AI are useful here, enabling AI decision-making processes to be clearly illustrated. Tools like LIME or SHAP, as mentioned earlier, help visualize individual decision steps, making them accessible to non-technical stakeholders.

Frequent audits and the integration of such technologies not only enhance consumer trust in AI systems but also ensure that regulatory requirements are proactively met. By adopting these measures, automotive companies can comply with the strict requirements of the AI Act while maintaining ethical standards, allowing them to strengthen their market position through innovation. A proactive and responsible approach to data protection and ethics ensures that companies position themselves not only as technical leaders but also as moral pioneers in the industry.

3.1.5. Shortage of skilled personnel

The automotive industry faces a significant challenge in developing and overseeing high-risk AI systems, as this requires interdisciplinary teams with both technical expertise and a deep understanding of legal requirements. Particularly in the automotive sector, where Advanced Driver Assistance Systems (ADAS) are subject to the strict requirements of the EU AI Act, it is crucial for companies to attract and retain the right talent. To address this challenge, automotive companies must establish targeted partnerships with universities and external education providers. This approach allows them to expand their talent pool by training new professionals while ensuring that the latest regulatory and technological developments are incorporated into the curriculum.

An example would be the collaboration of an automotive manufacturer with universities to develop specialized AI compliance programs that prepare graduates for the specific demands of the industry. These programs could combine technical knowledge with legal understanding to equip students with the skills needed to tackle the unique challenges of developing AI systems in the automotive sector. Such close collaboration with educational institutions enables companies to identify promising talent early and recruit them for future roles within the organization.

In addition to external talent acquisition, internal employee development is a critical aspect of talent management. Targeted talent management programs offer opportunities to continuously upskill existing employees and prepare them for new compliance and AI-related requirements. Regular training sessions and development programs focused on the latest regulatory and technological advances ensure that teams remain up to date. This is particularly important as the requirements of the AI Act are dynamic and subject to ongoing changes.

A clear career path that emphasizes the development of skills in AI and compliance can help retain employees in the long term. However, it's equally important to foster AI literacy and enablement, particularly in key departments such as R&D and Sales. These teams must be well-versed not only in the technical aspects of AI systems but also in the regulatory and compliance requirements that govern their development and commercialization. By providing targeted training programs and learning resources, companies can ensure that R&D teams understand how to integrate compliance requirements into product development from the outset, while Sales teams can confidently communicate the legal and ethical standards met by their products to customers.

Companies that offer well-defined growth opportunities and focus on compliance literacy across all departments create strong incentives for employees to actively engage in both the implementation and oversight of AI systems. This not only boosts employee engagement but also fosters a compliance culture where ethical and legal considerations are embedded across the entire organization. By enabling all employees, especially in critical functions like R&D and Sales, to grasp both the technical and regulatory aspects of AI, companies ensure that their workforce takes responsibility for meeting legal requirements and actively managing the risks associated with AI systems.

04.
Our services and expertise

At Capgemini Invent, we offer comprehensive support to help automotive companies navigate the challenges of the EU AI Act. Our multidisciplinary approach ensures compliance without sacrificing innovation, addressing everything from strategic realignment to technical implementation.

Compliance requires more than adjusting AI and data strategies; it demands a reevaluation of business structures and models. We assist in adapting business models, assessing market positioning, and reviewing AI-supported offerings, such as autonomous driving features and ADAS, to ensure compliance and identify new opportunities for innovation.

We conduct scenario analyses to evaluate the Act's impact on long-term business goals and help you make informed decisions. Our solution phase includes redesigning your Target Operating Model (TOM) to meet compliance requirements, ensuring the entire supply chain is aligned.

To ensure successful implementation, we create clear timelines, assign responsibilities, and establish monitoring systems. Our expertise in governance helps define roles and responsibilities with a Responsibility Assignment Matrix (RACI) to ensure accountability and success control.

In the data and technology domain, we ensure high-quality, representative datasets, analyze AI models, and conduct audits to strengthen AI systems. Our risk management processes help identify and assess risks, supported by tools like our AI Compliance Framework.

We also focus on fostering an ethical culture by providing training and best-practice guides, promoting transparency, and ensuring that all stakeholders are well-informed about compliance measures.

Partnering with Capgemini Invent gives you tailored solutions to confidently comply with the EU AI Act, leverage AI responsibly, and maintain a competitive edge in the evolving automotive market.
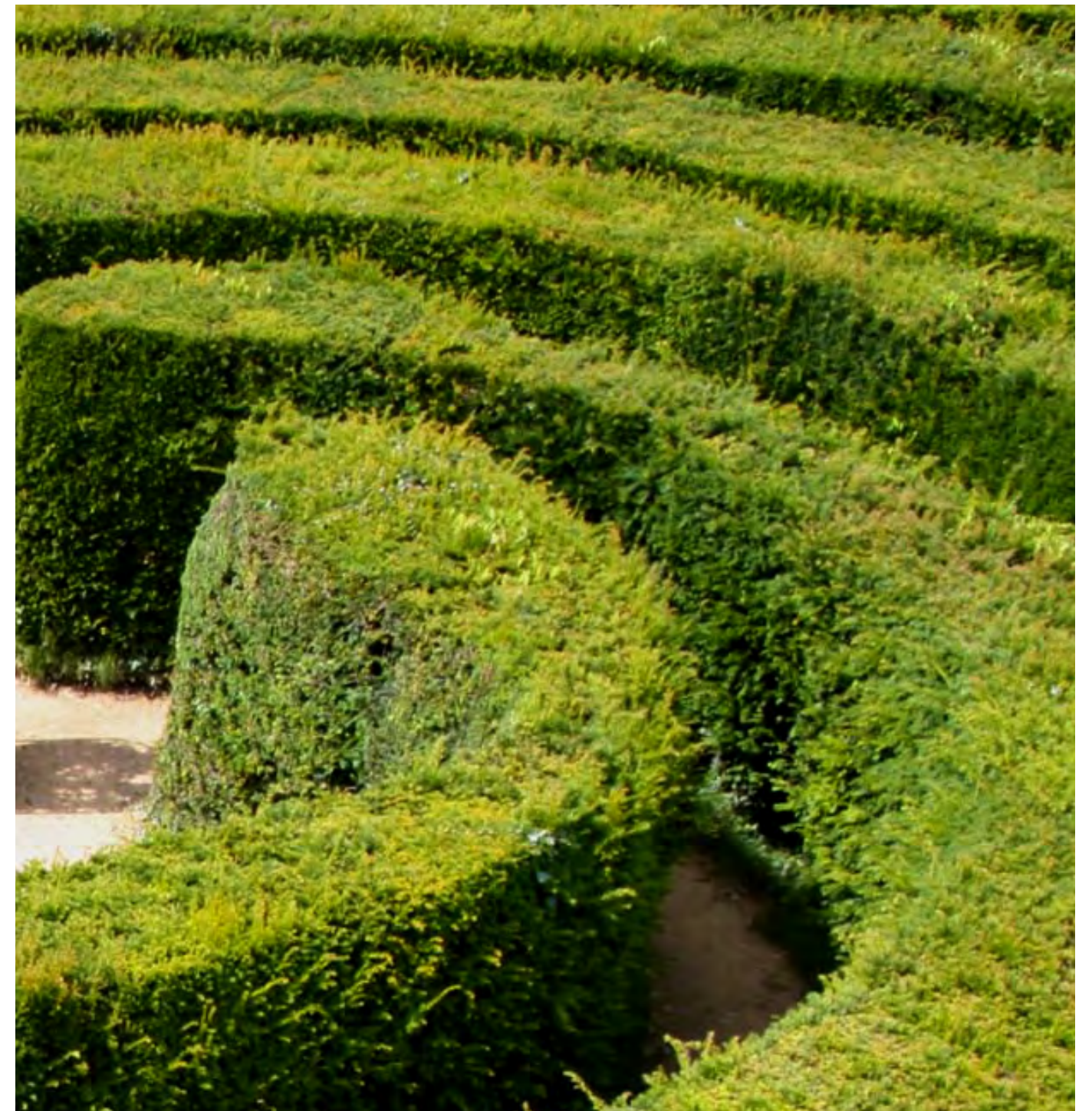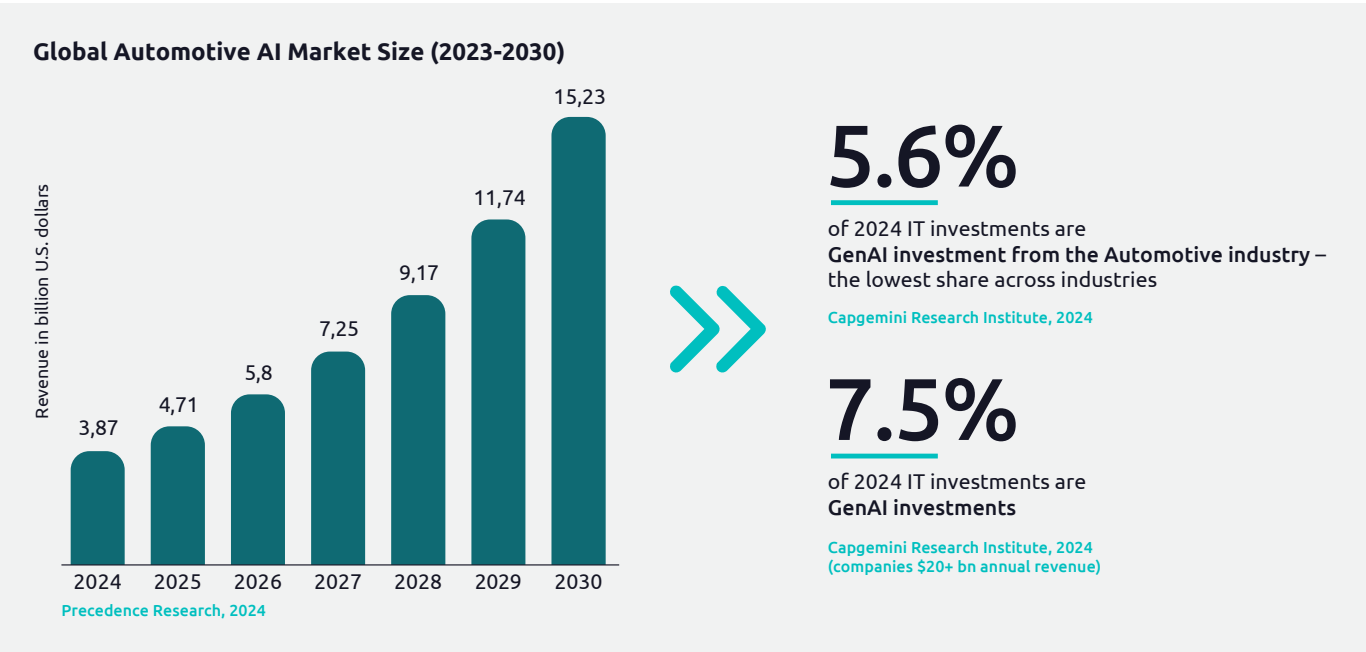
05.
Time to action

In summary, the rise of AI in the automotive industry brings accelerated (business, operative and technological) changes, stronger competition, cost pressures, and new legal implications.
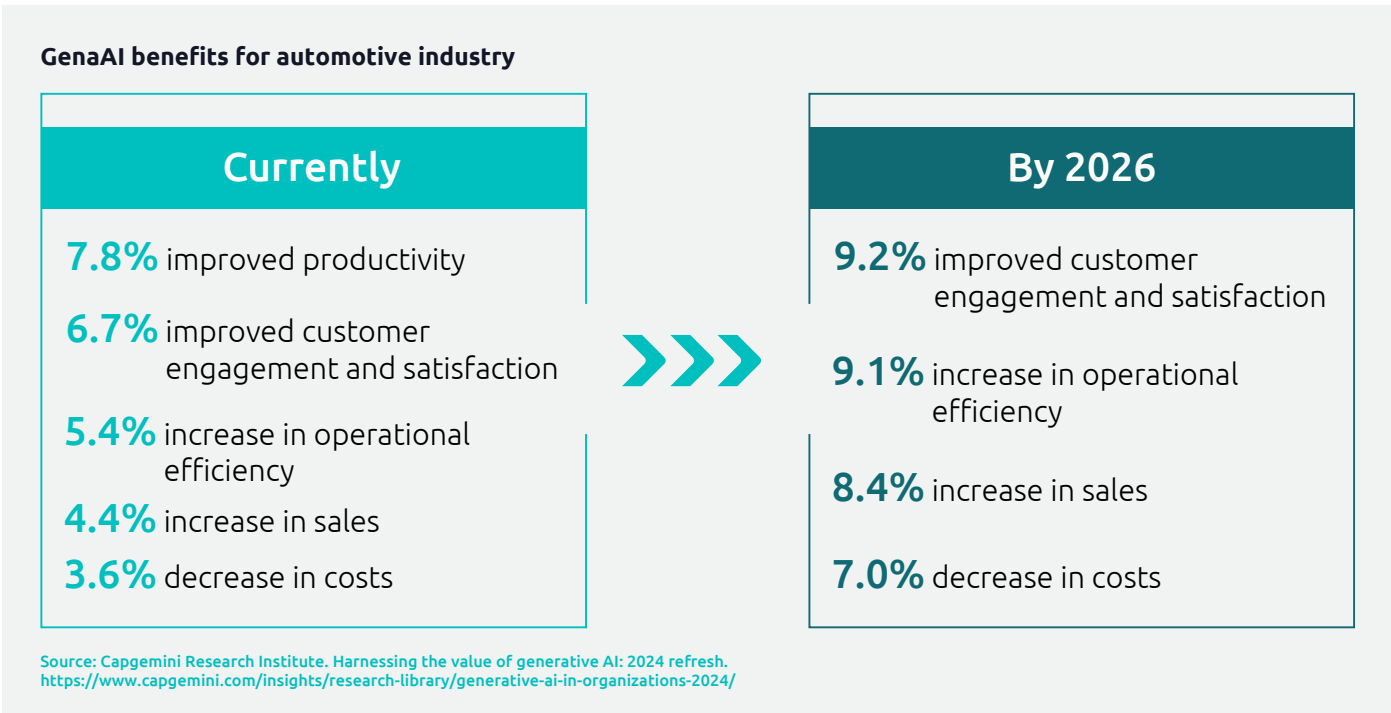
It's clear that any automaker, OEM or supplier wanting to stay competitive will have to adapt (see section 1.2 *"Serving strategic goals"*). Automotive AI capabilities are already crucial for Autonomous

Driving, Predictive Maintenance, Manufacturing and Production, In-car Assistants, ADAS, as well as supporting the OEMs in the areas of Marketing and Operations.

Global Automotive AI Market Size (2023-2030)

Revenue in billion U.S. dollars

Year	Value
2024	3,87
2025	4,71
2026	5,8
2027	7,25
2028	9,17
2029	11,74
2030	15,23

Precedence Research, 2024

5.6%
of 2024 IT investments are **GenAI investment from the Automotive industry** – the lowest share across industries

Capgemini Research Institute, 2024

7.5%
of 2024 IT investments are **GenAI investments**

Capgemini Research Institute, 2024 (companies $20+ bn annual revenue)

From a business perspective, the quickest organizations to advance through the 3 implementation phases (isolated projects, strategic integration and democratization of AI) will be able to secure key competitive advantages leveraging the full potential of AI. For instance, GenAI (which represents a fraction of the full AI landscape) can already bring substantial benefits.

GenaAI benefits for automotive industry

Currently	By 2026
7.8% improved productivity	**9.2%** improved customer engagement and satisfaction
6.7% improved customer engagement and satisfaction	**9.1%** increase in operational efficiency
5.4% increase in operational efficiency	**8.4%** increase in sales
4.4% increase in sales	**7.0%** decrease in costs
3.6% decrease in costs	

Source: Capgemini Research Institute. Harnessing the value of generative AI: 2024 refresh. https://www.capgemini.com/insights/research-library/generative-ai-in-organizations-2024/

From a legal perspective, the EU AI Act (in effect from August 2024) is the first big step towards the regularization of the new industry. By February 2025, we'll see the first prohibitions; and various rules, including those for governance, confidentiality, and penalties, will start to apply from August 2025. Any automaker, OEM or supplier that fails to comply, can face legal consequences, reputational damage, and operational disruptions among others.

Therefore, complying with the Act is imperative but, at the same time, presents several challenges such as technical hurdles, regulatory uncertainties, organizational issues, data protection concerns, and a shortage of skilled personnel. That's why finding the right partner to face those challenges should be a priority for your organization.

Capgemini Invent can help you navigate this complexity. With +300 Automotive GenAI use cases in realization, ready-to-use GenAI prototypes for scaling and +40.000 experienced data & AI experts, Capgemini Invent is the perfect key partner.

Only by taking proactive steps today, you can ensure your organization remains competitive, efficient, and well-positioned in the rapidly evolving automotive industry. Act now for a successful future! The cost of doing nothing is simply too high.

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About Capgemini Invent

As the digital innovation, design and transformation brand of the Capgemini Group, Capgemini Invent enables CxOs to envision and shape the future of their businesses. Located in over 30 studios and more than 60 offices around the world, it comprises a 12,500+ strong team of strategists, data scientists, product and experience designers, brand experts and technologists who develop new digital services, products, experiences and business models for sustainable growth.

Capgemini Invent is an integral part of Capgemini, a global business and technology transformation partner, helping organizations to accelerate their dual transition to a digital and sustainable world, while creating tangible impact for enterprises and society. It is a responsible and diverse group of 340,000 team members in more than 50 countries. With its strong over 55-year heritage, Capgemini is trusted by its clients to unlock the value of technology to address the entire breadth of their business needs. It delivers end-to-end services and solutions leveraging strengths from strategy and design to engineering, all fueled by its market leading capabilities in AI, cloud and data, combined with its deep industry expertise and partner ecosystem. The Group reported 2023 global revenues of €22.5 billion.

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Team Name_Date_Designer