Deloitte.

2023 SDV Survey

Surveying the road: Exploring the transition to software-defined vehicles in the automotive industry

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Content

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Introduction

01 | Introduction

The automotive industry is undergoing a profound transformation. Redefining traditional norms, cars are moving from a combustion-powered, mechanical means of transportation to software-defined vehicles (SDVs). Deloitte's recent study entitled Software-defined vehicles: Engineering the mobility revolution[1] provides an overview of the essential factors automotive players need to consider if they want to thrive in an era of software-driven mobility. It highlights the ways in which the technology and transportation landscape is evolving and the strategic approach embracing innovation, collaboration and adaptability that it demands... But how is the automotive sector putting these theories into action? To answer these questions and more, we conducted a comprehensive SDV-focused survey in summer 2023 with 141 experts from original equipment manufacturers (OEMs) and automotive suppliers based in Germany, France and the United Kingdom (details of the sample can be found in the appendix). The real world experiences of the automotive companies we surveyed offer a more holistic understanding of the way the industry is evolving, allowing us to evaluate how that evolution lines up with prevailing theories.

What are the latest SDV trends?

What strategies are companies embracing as the industry shifts to SDVs?

What challenges exist to achieve scale?

What are the catalysts accelerating the SDV transition?

[1] Deloitte, Software-defined vehicles:Engineering the mobility revolution, September 2023.

With the firsthand experiences and perspectives of today's automotive suppliers, our survey goes deeper into the practical implementations of SDV technology and the strategic maneuvers driving the transition. It not only reveals how companies are shaping the journey towards a software-driven future, but also provides an initial assessment of their contributions to the future SDV market. How quickly they implement these strategies and roll out their transformation will have a considerable impact on the unfolding software-driven transition. As we examine these critical factors, it is important to note that market developments and incentives are already shaping the strategies of these companies today. An astonishing 89% of the companies in our survey confirmed that SDVs are already playing a substantial role in their overall corporate strategy (for more details, see the "Transformation Strategy" section), demonstrating the immediate impact and relevance of SDVs in the automotive space. This study also gives automotive players important insights into their own transformational progress relative to the industry average, while also highlighting the trends in the strategic and operational choices they are making. Finally, the survey outlines the obstacles along the way and what can be done to overcome them. As a roadmap, it can help industry players navigate the complexities of this new era.

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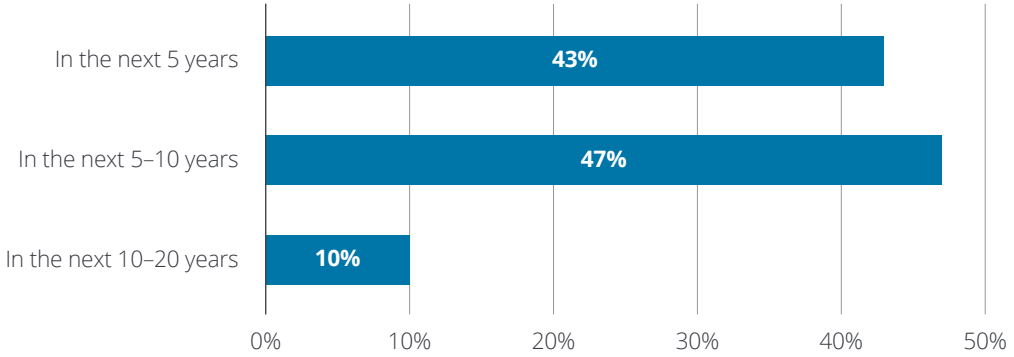
Navigating the Future

The automotive market has undergone a profound transformation, and the pace of change in vehicles has increased exponentially compared to the last 20 years thanks to the rise in in-vehicle software. With the rapid proliferation of electric mobility, we have seen a new, compelling connection emerge between electric vehicles (EVs) and interconnected in-vehicle digital services.[2] The demand for a diverse range of software-driven experiences is rising across various consumer segments, ranging from personalized in-cabin features and connected applications to driver assistance and entertainment features. And as the software-defined era evolves, over-the-air (OTA) updates will become more prevalent for vehicles with continuous onboard and offboard capabilities. These emerging technologies bring with them new requirements in terms of safety, data security and regulatory approval processes that vary in different regions. Looking ahead to the future of SDVs, automotive players are at a critical juncture. Based on our survey data, the following responses provide an overview of changing market dynamics, emerging business opportunities and preferred transformation strategies to prepare for the software-driven future.

SDV market dynamics

We are seeing major changes in the software-defined vehicle market thanks to technological advancements, changing consumer attitudes, innovative business models, regulatory developments as well as new focus on geographical markets. With such a wide variety of influences at play, the question is: when will SDVs be the status quo? Figure 1 shows that 43% of respondents believe widespread adoption of SDVs is possible within the next 5 years. 47%, on the other hand, believe it will take longer, somewhere between 5 and 10 years. Overall, the companies in our survey expect adoption of SDVs to be mainstream in an average of 5.7 years. This aligns with the market forecasts putting adoption of SDVs at 90% or more of the automotive market by 2029 (up from 2.4% in 2021).[3] Traditional vehicle business is likely to decrease as a result,[4] encouraging industry players to take action now to remain competitive. Adapting to the software-defined market is no longer a luxury for automotive players; it is a necessity.

Fig. 1 – Speed of transformation and widespread adoption
Q12: When do you expect software-defined vehicles to achieve widespread adoption? Sample size: n = 139



[2] Deloitte, 2023 Global Automotive Consumer Study, January 2023
[3] Mike Ramsey et al., Predicts 2023: Automotive and smart mobility, Gartner, 2022.
[4] Goldman Sachs, Software is taking over the auto industry, November 8, 2022.

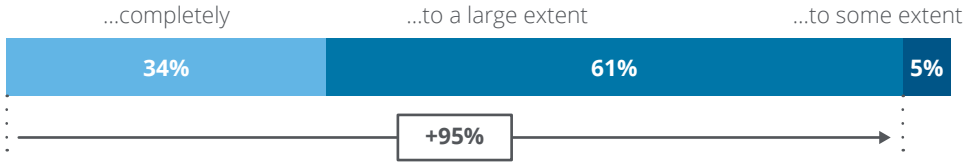
Business opportunities

The significant reduction in product lifecycles over the past two decades – down from 8 years in 2000 to 4 years in 2020 – is expected to continue moving forward.[5] In response, companies are introducing new development structures, strong software platforms and more efficient methodologies; in short, organizations are embracing flexible, more dynamic practices in the shift to SDVs and dismantling traditional structural hierarchies to unlock the efficiencies buried in traditional, hardware-driven R&D architecture and methodologies. When asked about these opportunities (Figure 2), the vast majority of respondents agree that the SDV shift provides opportunities in efficiency and development speed. 83% of respondents believe SDVs help reduce time-to-market, while 95% say they will help improve efficiency.

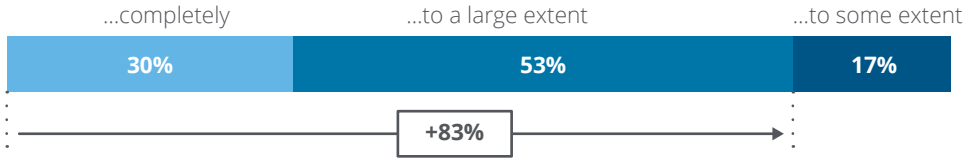
Agile methods, which complement the classic waterfall model across the entire product lifecycle, play a key role in creating opportunity. We also see traditional hierarchies being challenged when hardware is decoupled from software. These newly created central vehicle architectures open up major potential for development, more efficient operations and greater adaptability.

Fig. 2 – Software-defined vehicles provide opportunities...
Q13: To what extent do software-defined vehicles provide opportunities to improve efficiency?
Q14: To what extent do software-defined vehicles provide opportunities to speed up time to market? Sample size: n= 139

2 a)
Software-defined vehicles provide opportunities to improve efficiency...



2 b)
Software-defined vehicles provide opportunities to speed up time to market ...



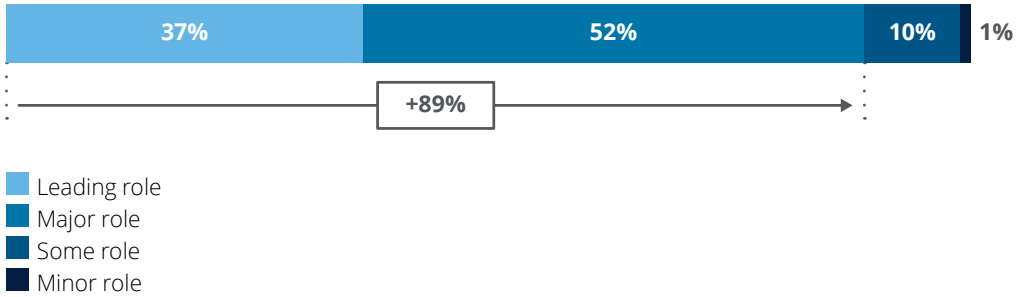
[5] Proff et al., Autonomous driving: Moonshot project with quantum leap from hardware to software & AI focus.

Transformation Strategy

The companies in our survey are implementing strategies in response to market developments and the incentives these business opportunities provide. Based on forecasts predicting widespread adoption of SDVs by the end of the decade, 89% of respondents confirm that their software strategy already plays at least a major role in their overall corporate strategy. Another 10% report that this is true to at least some extent, while only 1% say it plays only a minor role. This underlines how important SDVs have already become, and how automotive companies are well on their way to preparing for the future and the shift to SDVs.

Fig. 3 – The role of software-defined vehicles in overall corporate strategy

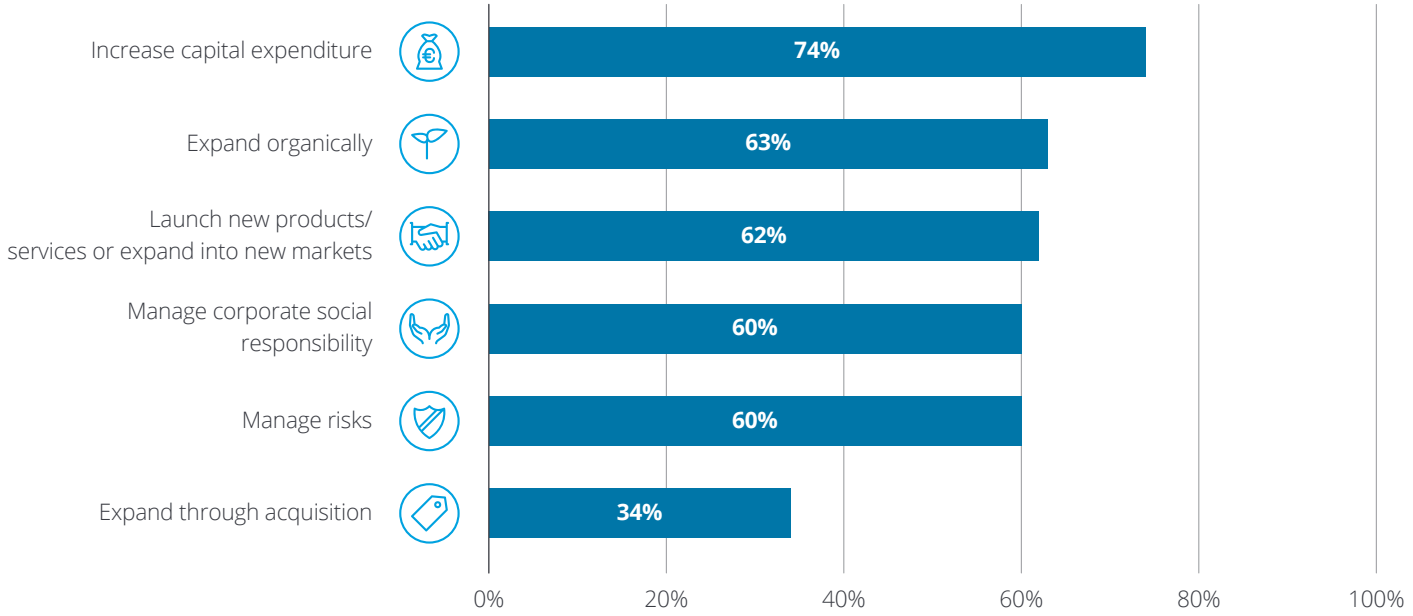
Q11: To what extent does the shift to software-defined vehicles play a role in your company's overall strategy? Sample size: n= 139



As previously mentioned, many automotive suppliers have already recognized the need to incorporate SDVs into their strategies and keep pace with the ongoing software-led shift in the industry. The responses to questions about future business strategies over the coming 12 months show that the companies in our survey are engaging across a broader set of priorities. As 74% of respondents cite increasing capital expenditure as the highest priority, companies clearly recognize the need for substantial investments. The transition to SDVs demands advanced software functionality, sensor integration, connectivity solutions and cybersecurity measures, and automotive players are starting to allocate resources to strengthen their competitive positions. This surge in capital expenditure underscores the industry's commitment to stay at the forefront of innovation and remain agile in adapting to the changing landscape. What is striking is the hesitation some European countries exhibit when it comes acquisition spending, which is the highest priority for only 34% of respondents. With the priority level of the other strategies virtually the same, companies appear to be taking a multi-pronged approach as they prepare for the new era in the automotive industry.

Fig. 4 – Business strategies with a high priority over the next 12 months

Q16: Which of the following business strategies is a priority for your company over the next 12 months? Sample size: n= 137
Participants could select multiple responses. The numbers in the chart represent the total selection for each option.



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Leading the Way

Companies in the automotive industry need to figure out how to make the most of the numerous opportunities in SDVs, especially considering the huge amount of data available today. Efficiency is a central theme here. It involves careful analysis and planning to execute a robust SDV strategy and to turn possible use cases into revenue. The following results highlight the opportunities that the companies in our survey are embracing and how much they are already investing in the new market. Hardware-focused vehicles require minimal maintenance, while software often needs ongoing updates and bug fixes in addition to the potential in software-based R&D and operations. The following chapters will shed light on the methodologies companies find useful in SDV development, the potential of SDVs to optimize the electric vehicle powertrain and the ways in which automotive suppliers intend to keep vehicles updated 24/7.

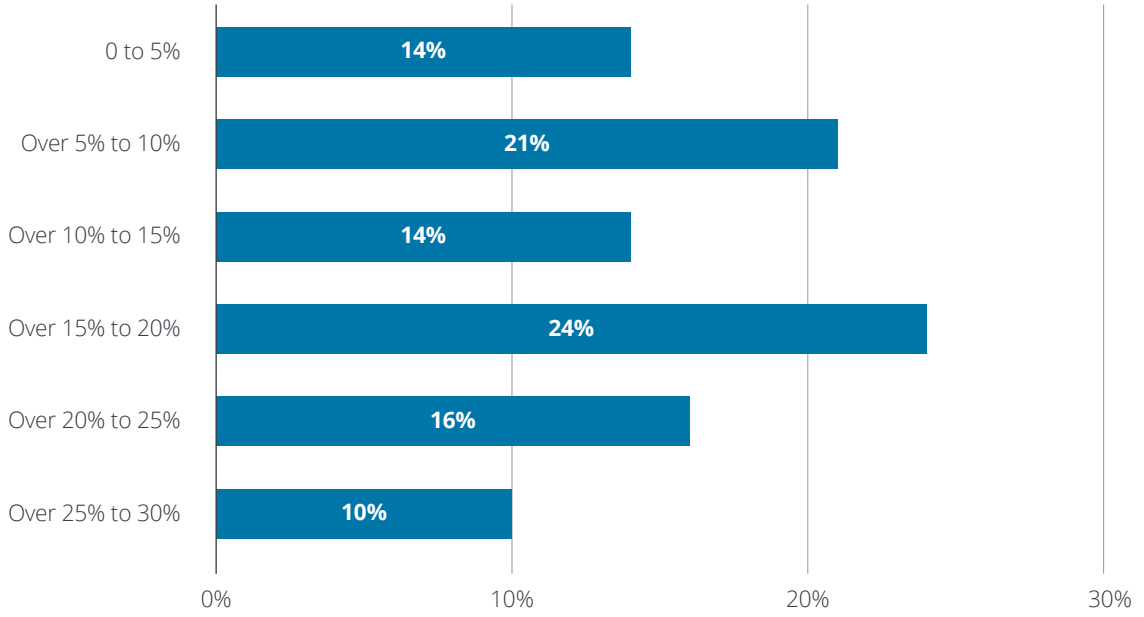
Seizing opportunity

What sets the SDV revolution apart is not just the vehicles themselves, but rather the massive amount of untapped opportunity on offer. The influx of data from interconnected vehicles and vehicle fleets can be used to harness new revenue streams. To name just a few examples: recurring subscriptions, entertainment enhancements, improved security, performance features and predictive maintenance, mobility-as-a-service and the 24/7 updates that make workshop appointments obsolete. Figure 5 shows the growing number of companies that are seizing some of these opportunities. Most of the respondents say they are already tapping into this market. For 50%, their effective strategy for leveraging SDVs accounts for at least 15% of total revenue. For 10%, revenues from SDV initiatives account for almost a third of total revenues (25% to 30%). Market forecasts back up these responses, above all a significant increase in the profit pool from SDVs within the automobile industry, which amounted to USD 315 billion in 2020 and is expected to soar to USD 405 billion by the year 2030.[6]

Fig. 5 – Share of SDV revenue in total revenue

Q19: Please provide some information about the financial significance of Software Defined Vehicle. Please give your assessment to the following statement: Share of Software Defined Vehicle revenue as a percentage of total revenue. Sample size: n= 135

Note throughout: Sum of the values in selected charts may not add to 100% due to rounding.



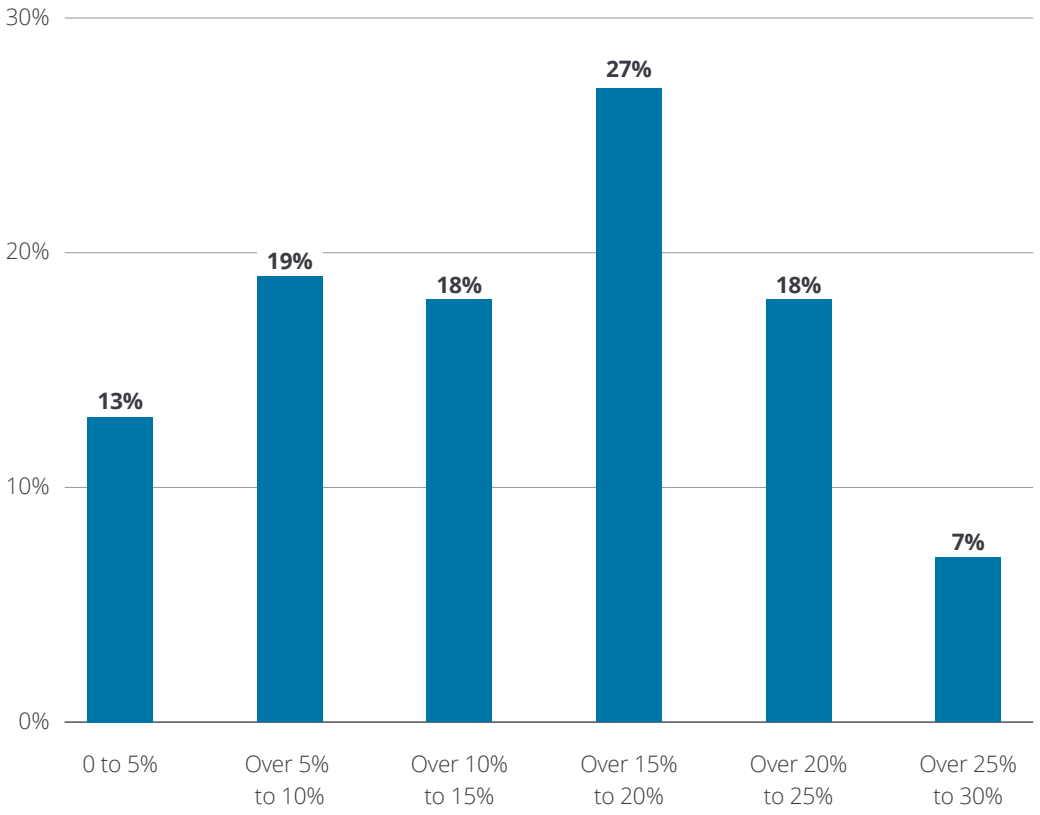
[6] Goldman Sachs, "Software Is Taking Over the Auto Industry", November 2022.

The complexity of the technology architectures, traditional development processes and rigid operational structures can lead to significant inefficiencies. And since the scope of the SDV transition is so vast, companies have to make intelligent investments on a wide range of fronts. They need to develop and recruit talent, to introduce the right tech infrastructure and reshape key supplier relationships in a rapidly emerging software-centric automotive ecosystem to scale software capabilities. Setting up an in-house software unit, for example, can cost upwards of USD 2.7 billion annually,[7] but there are a growing number of funding opportunities on offer: Subsidies, government grants, venture capital and joint ventures can reduce the financial burden. Companies have to make some key strategic choices, whether it is choosing specific in-house investments or engaging external partners to optimize efficiency and find creative ways to finance their initiatives. Looking at the overall automotive landscape, 52% of the respondents in our survey have earmarked more than 15% of their total investments for SDV (Figure 6). To succeed in the transition to SDVs, companies need to remain committed to doing whatever it takes to achieve a significant return on these substantial investments, preferably by unlocking efficiencies buried in traditional, hardware-driven R&D architecture and methodologies.

Fig. 6 – Share of SDV investment in total investment

Q18: Please provide some information about the investments associated with the shift to software-defined vehicles and indicate roughly how much of your total investment is dedicated to SDV development. Sample size: n= 135

Note throughout: Sum of the values in selected charts may not add to 100% due to rounding.



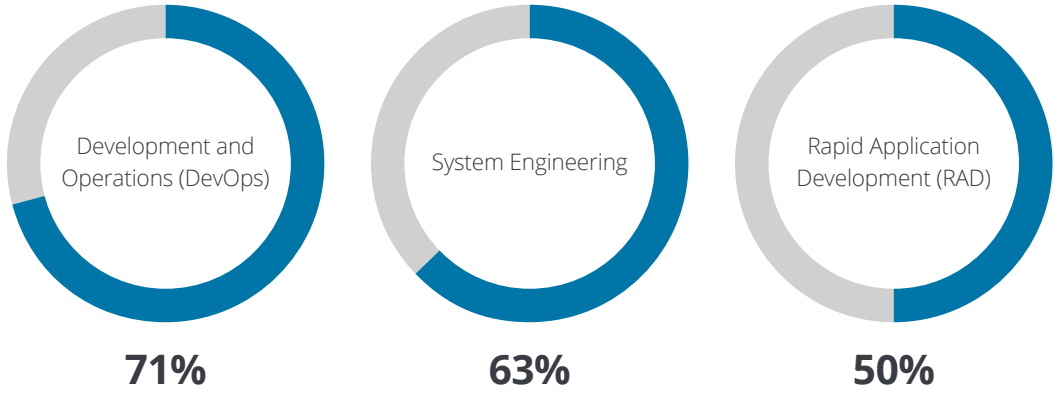
[7] RND, VW invests billions in software subsidiary Cariad, April 30, 2021.

SDV operations and execution

Companies that want to remain competitive on the new dynamic SDV landscape will have to embrace more efficient methodologies. Taking a cue from tech companies, agile methodologies are the key to rapid iterations and faster product development cycles, while also increasing overall efficiency for OEMs as well as suppliers. We asked respondents to assess various current methodologies, and 71% agree that DevOps[8] could have a significant impact on SDV development in terms of boosting the speed and quality of software development. When it comes to systems engineering[9] and rapid application development (RAD),[10] the opinions diverge, as only 63% and 50%, respectively, believe they can have a major impact.

Fig. 7 – Methodologies with the biggest impact on SDV development

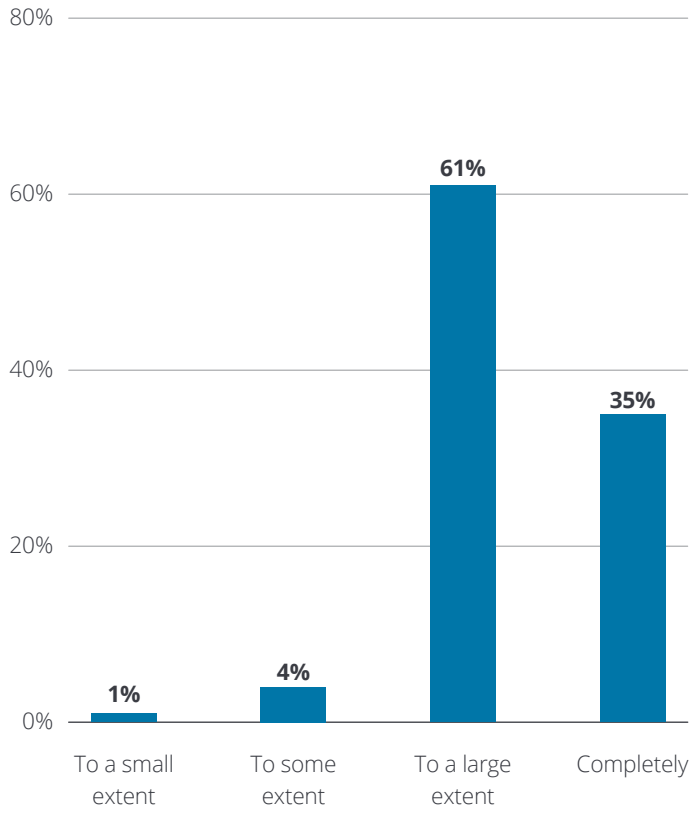
Q34: Which methodologies will have the biggest impact on software-defined vehicle development? Sample size: n= 131
Participants could select multiple responses. The numbers in the chart represent the total selection for each option.



[8] The term "DevOps" refers to processes and tools used to develop software applications faster than with a traditional development approach thanks to automation, collaboration, fast feedback and iterative improvement.
[9] Systems engineering is an approach used to design, integrate and manage large-scale systems and projects. It takes the entire system lifecycle into account, from concept and operation to retirement. It ensures that all components and subsystems of a project work seamlessly together.
[10] RAD focuses on creating functionality quickly by minimizing planning and emphasizing rapid prototyping and iterations. The goal is to produce a working version of the software in a shorter timeframe compared to traditional methods.
[11] CI/CD ensures that software is always in a deployable state, allowing for faster and more reliable releases and enhancing overall software quality and agility.

In terms of optimizing powertrains, OEMs need to develop broad-based strategies covering a variety of essential technologies. Over 96% agree that SDVs have the potential to optimize electric vehicle powertrains, at least to some extent. This is mainly because SDVs give OEMs the flexibility to control and customize powertrain components and adapt them for optimal efficiency, range and overall performance based on specific driving conditions and user preferences. Continuous collection of battery life data enables OEMs to produce vehicles that modify performance to optimize energy usage, extend battery life and maximize overall efficiency using real-time information. Predictive analytics and machine learning algorithms can help anticipate driving patterns, road conditions and energy requirements. Analyzing this data allows the powertrain to adapt operations proactively and deliver better performance and maximum range. Lastly, over-the-air updates improve powertrain performance and efficiency on a continual basis without requiring manual intervention, ensuring that the powertrain reaps the full benefit of ongoing advancements and optimizations.

Fig. 8 – The potential of SDVs to optimize electric vehicle powertrains
Q29: Do you think software-defined vehicles have the potential to improve or optimize electric vehicle powertrains? Sample size: n= 138
Note throughout: Sum of the values in selected charts may not add to 100% due to rounding.



Vehicle updates

The advantages of OTA updates have become too compelling to ignore for today's car manufacturers, prompting many to actively embrace this shift. On the downside, numerous manufacturers are still hesitant to implement OTA updates (especially for vehicle safety features) due to the complexity of conforming to regulatory standards as they evolve. The main obstacle for OEMs is figuring out how to incorporate future-ready type approval processes within the production development cycle. Having better approval processes would be good news for automotive players, though policymakers will have to establish a clear regulatory framework to get there – and that process is currently underway in some regions. What is more, a lot of today's OEMs are unable to perform updates outside the infotainment system, even though consumers clearly want them. The key question is whether to pursue a proprietary solution or to collaborate with partners to solve this problem. As shown in Figure 9, 39% of the respondents plan to build their own solutions, while 30% choose to partner with tech players. 24% prefer to work with automotive partners, while only 7% intend to fully outsource their update operations. This may indicate that companies would rather build in-house capabilities so they can gain in-house expertise and better prepare for the future.

Fig. 9 – Preferred method of developing 24/7 over-the-air vehicle update capabilities

Q25: How do you plan to provide in-vehicle software updates on a global basis? Sample size: n= 137

39%
... by building our own systems

30%
... by partnering with tech players

24%
... by partnering with automotive players

7%
... by outsourcing

Overcoming Future Obstacles with SDVs

04 | Overcoming Future Obstacles with SDVs

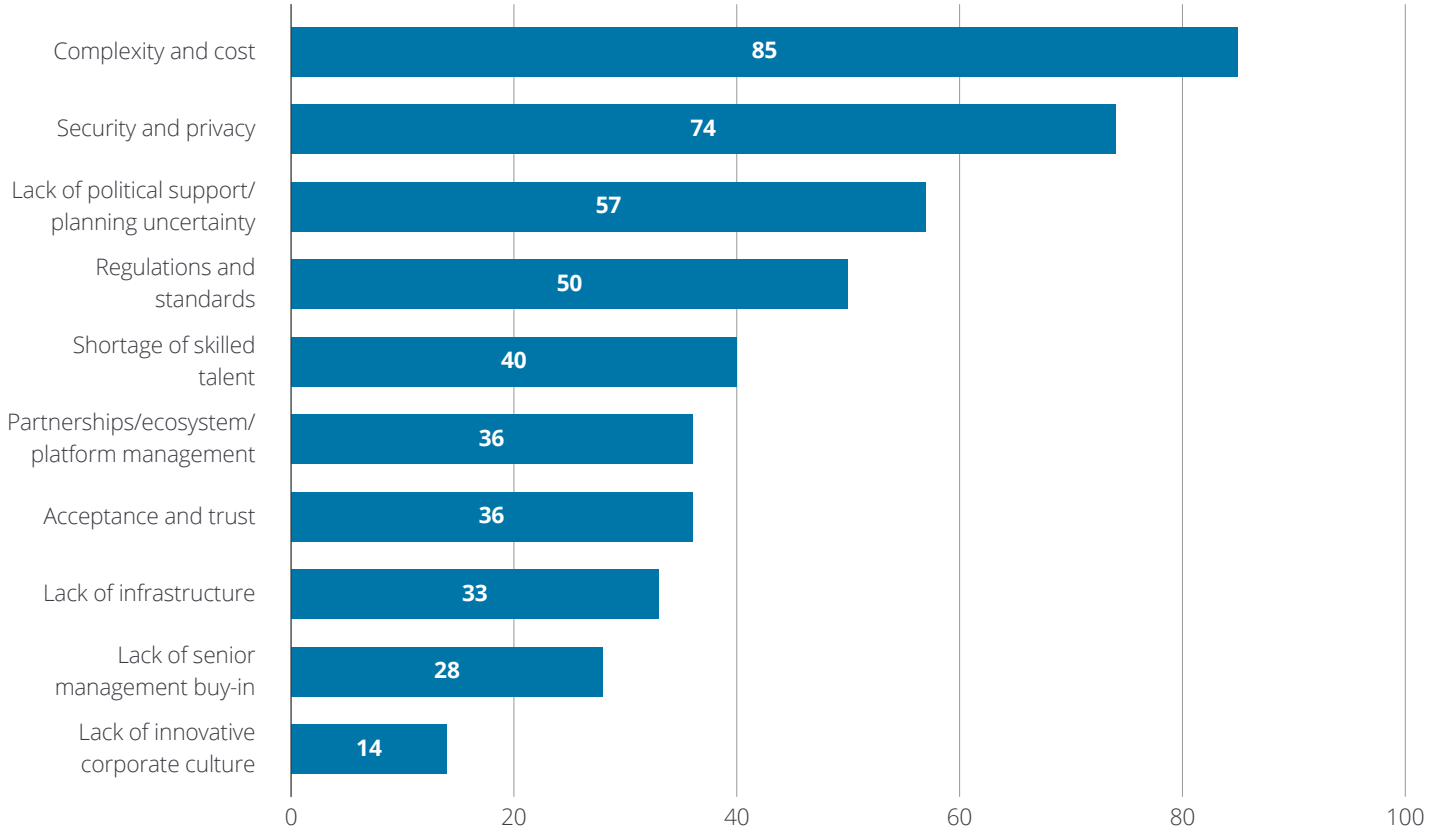
To remain competitive, automakers may need to progress on multiple fronts at the same time. Incumbent players see adapting to new technology as a relatively minor hurdle, while traditional companies will have to re-direct their focus from mechanical parts and find ways to deal with distributed software, complex structures with decentralized accountabilities as well as uncertainty in terms of scaling strategies. Overcoming challenges and navigating potential hurdles in the transition to SDVs can make or break the success and sustainability of this transformative technology. After assessing the main barriers to achieving scale and the key cost drivers, the following questions look at reducing complexity and recognizing the benefits of collaboration before moving on to the growing challenges of talent management and the required skill set for tomorrow's talent pool.

Assessing challenges and risks

It is vital for companies to address the scalability challenges and for manufacturers to invest in R&D, forge partnerships, devise transformation plans, evaluate business models and stay up to date with evolving regulations. The responses to a multiple-choice question in this context highlight the barriers to scaling SDV solutions. As indicated in Figure 10, 85 respondents cite complexity and cost as the biggest hurdle. The complexity of R&D in the SDV space and the substantial financial investments involved can make progress more difficult and require broader-based solutions. The second significant barrier, cited by 74 respondents, relate to security and data privacy concerns. As SDVs rely heavily on data-driven technologies, it is imperative to safeguard all sensitive information. The potential risks associated with cyberattacks, data breaches and unauthorized access pose challenges to scaling that companies have to address in order to build trust among consumers and stakeholders. The third barrier is the perceived lack of political support and planning uncertainty, cited by 57 respondents. Automotive companies need a favorable regulatory environment and coherent policies to take SDVs to scale. Political indecision and a lack of clear guidelines can interfere with long-term planning and investments, creating a sense of uncertainty that undermines progress. Dedicating resources to addressing complexity, managing costs and fortifying security protocols can alleviate the primary concerns. To address the third barrier, manufacturers should engage in advocacy efforts to obtain political support and influence policymaking. A multi-pronged approach is key to overcome scaling challenges. Championing integration with a broader software ecosystem can help manufacturers enhance collaboration and innovation. Another critical factor in achieving scale would be introducing a more comprehensive set of business models with a suitable framework.

Fig. 10 – Main barriers to the effective use of and the ability to scale SDV

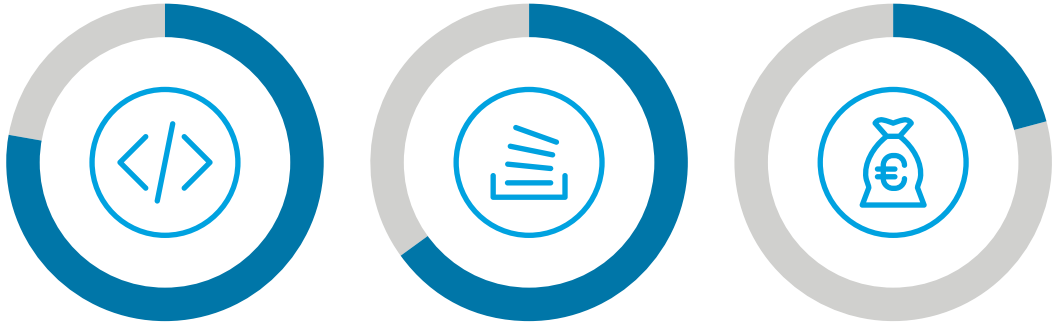
Q22: In your opinion, what are the main barriers to the effective use of and the ability to scale software-defined vehicles? Sample size: n= 141
Participants could select multiple responses. The numbers in the chart represent the total selection for each option.



78% of respondents believe that Research and Development is the main cost driver for SDVs (Figure 11). The SDV development process, which requires complex integration of advanced technologies, stands out as a major cost contributor.

For 65% of the respondents, managing and maintaining proprietary operating systems account for a substantial share of SDV project costs, highlighting the need for cooperation and standardized solutions. Only 21% of the respondents, by contrast, cite telecommunication costs for network operators as a key cost driver. The complex networking required for SDVs comes at a serious financial cost, particularly for network operators managing data transmission, but they do not play a major role.

Fig. 11 – Main cost drivers for SDV are...
Q30: What are the main cost drivers for software-defined vehicles? Sample size: n= 141
Participants could select multiple responses.



78%
Research and Development

65%
Proprietary operating systems

21%
Telecommunication for network operators

Drivers and enablers

As more and more new technology players enter the automotive space, a software-centered ecosystem is taking shape. Collaboration among various stakeholders can drive innovation and create value with the potential to share R&D costs. Alliances and ecosystems are critical, enabling different market players to pool resources, share expertise and deliver value to their customers. Where alliances are strong, members of the ecosystem have access to a wide range of resources that will allow them to deliver customer services and solutions that stand out. OEMs have struggled with this in the past, and it is now time to shift the mindset from top-down "supplier steering" to more of a "partnership on equal footing". 92% of respondents agree at least to a large extent that SDV development needs collaboration to share development costs (Figure 12).

Fig. 12 – Collaboration helps to share SDV development costs

Q26: To what extent does software-defined vehicle development rely on collaboration to share development costs? Sample size: n= 137

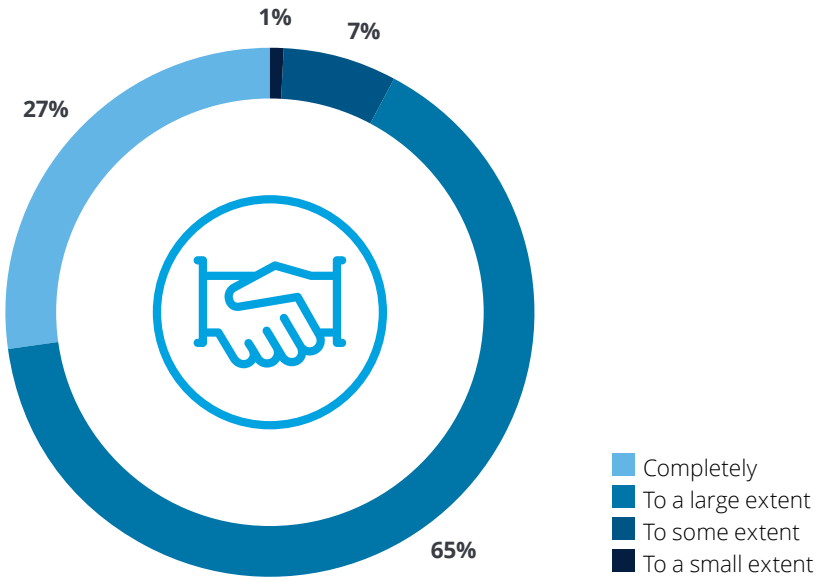
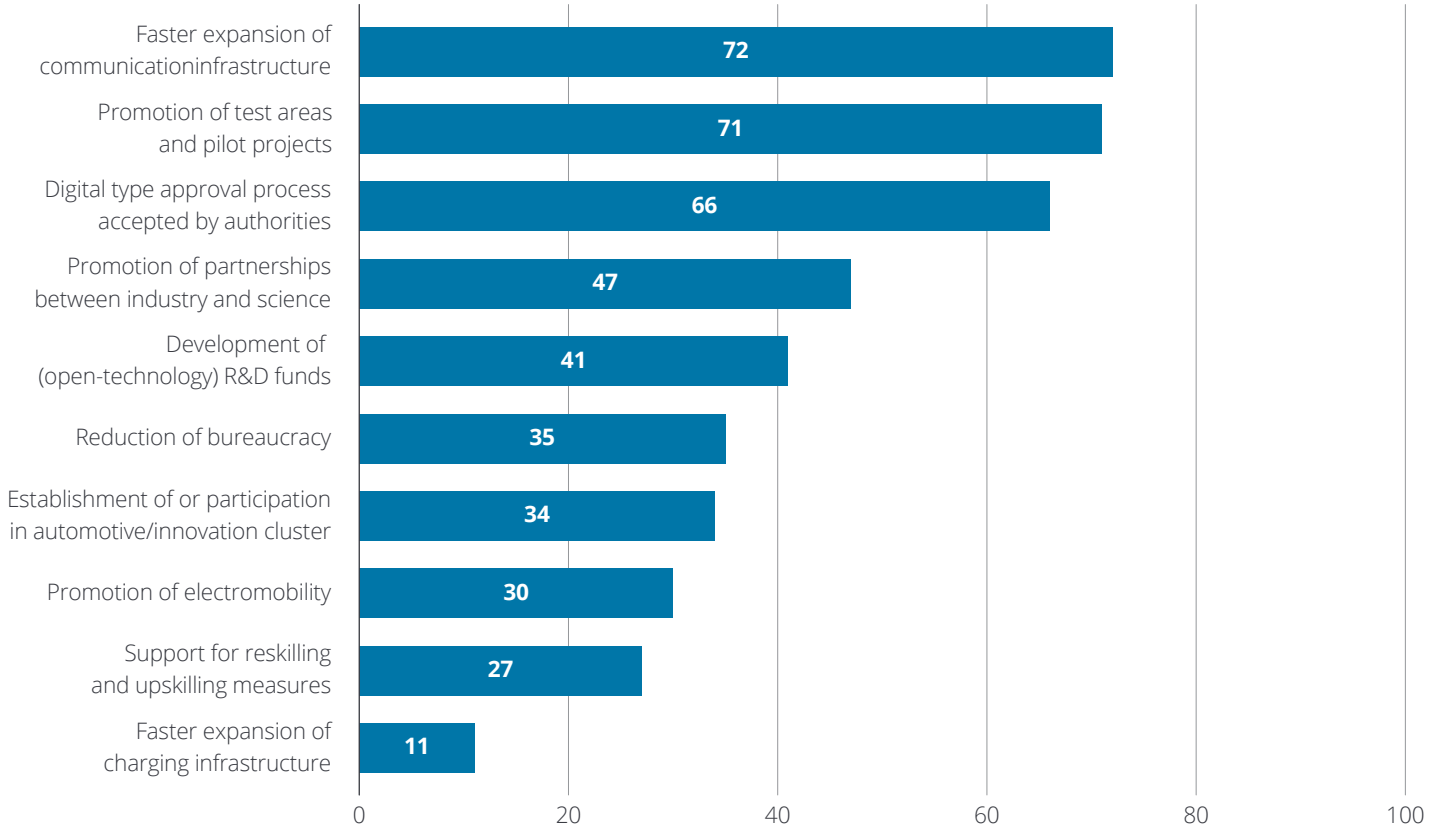


Figure 13 outlines ten areas where economic policy can play a role in scaling and accelerating SDV development and adoption. They rely heavily on complex software systems, and having a robust communication network is vital for the seamless exchange of data (e.g., vehicle-to-vehicle or vehicle-to-everything). Resilient communication networks form the bedrock for the OTA updates that allow companies to upgrade and improve in-vehicle software without the need for manual intervention. The responses to our survey support this view, with 72 participants citing faster expansion of communication infrastructure as an area where they would like to see new economic policies. Having the right test sites and a well-defined type approval process to test and approve novel systems is an important measure for 71 and 66 respondents, respectively.

Fig. 13 – Potential economic policy measures to support SDV development and adoption
Q23: What are some potential economic policies that could support the development and adoption of software-defined vehicles? Sample size: n= 141 Participants could select multiple responses. The numbers in the chart represent the total selection for each option.

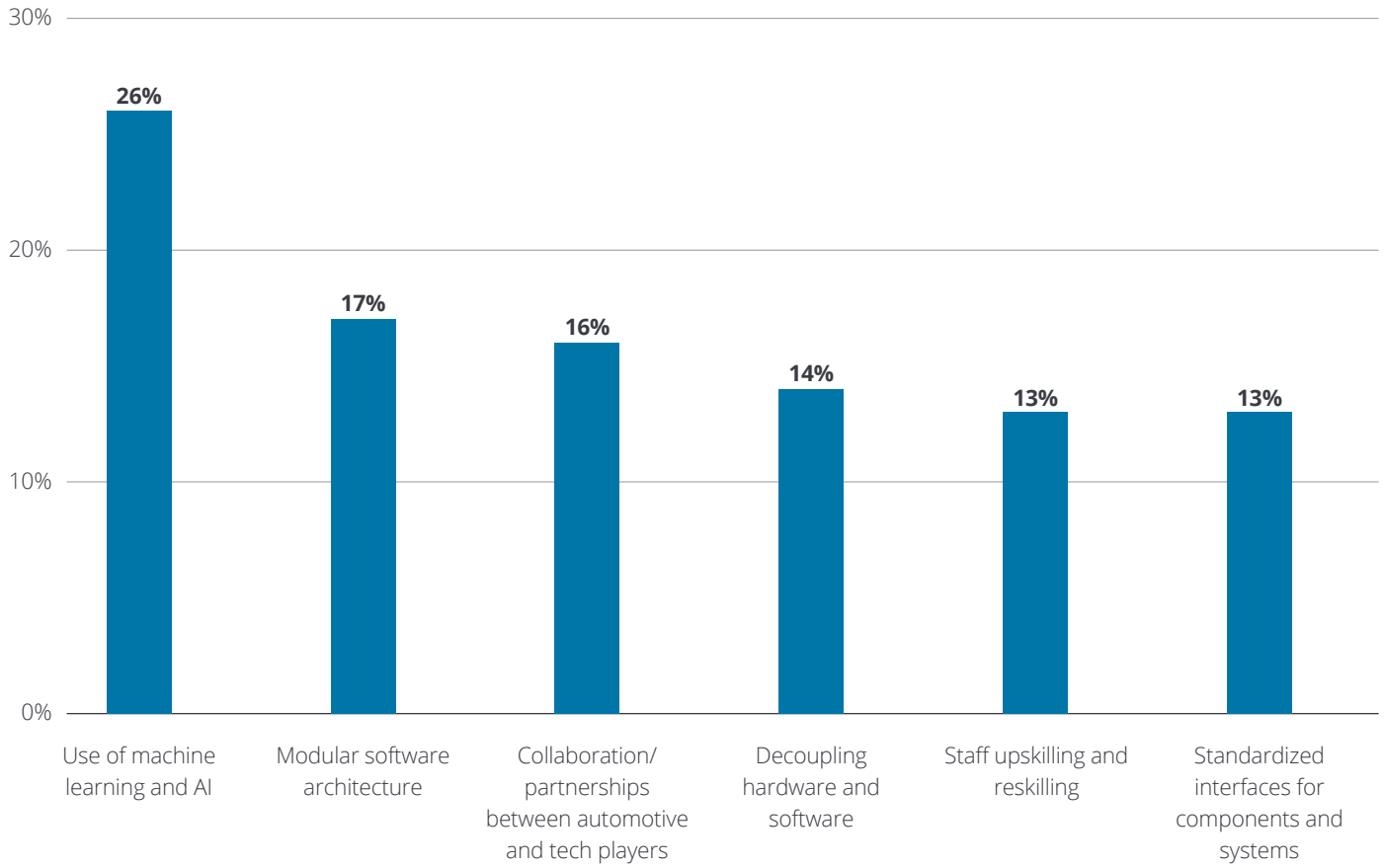


Reducing complexity

In a rapidly evolving landscape where complexity seems to pose an ever-present challenge, businesses across the globe are trying to find innovative ways to streamline their operations and enhance efficiency. We asked respondents to rank their preferred solutions to reduce complexity and 26% put machine learning and artificial intelligence (AI) at the top (see Figure 14). As more and more AI use cases come to the fore, the respondents are hopeful this will help reduce complexity. All other possible responses are ranked pretty evenly, with only 4% variation, paling in comparison to the hype around AI. It is worth noting, however, that companies are still hesitant to embrace decoupling software and hardware as a potential solution – only 14% gave this the top ranking. Companies appear to be reluctant here, because they do not believe that decoupling hardware and software can reduce complexity if the number of software solutions and features keep increasing at the current rate.

Fig. 14 – Reducing current complexity as part of the shift to software-defined vehicles

Q24: Which of the following measures are most important when it comes to reducing complexity in the current shift to software-defined vehicles? Sample size: n= 141 Note: For reasons of clarity, the results show only the most important measures ranked number 1 by respondents. Participants gave each option an individual ranking from "1" (highest rank) to "6" (lowest rank).



Talent management

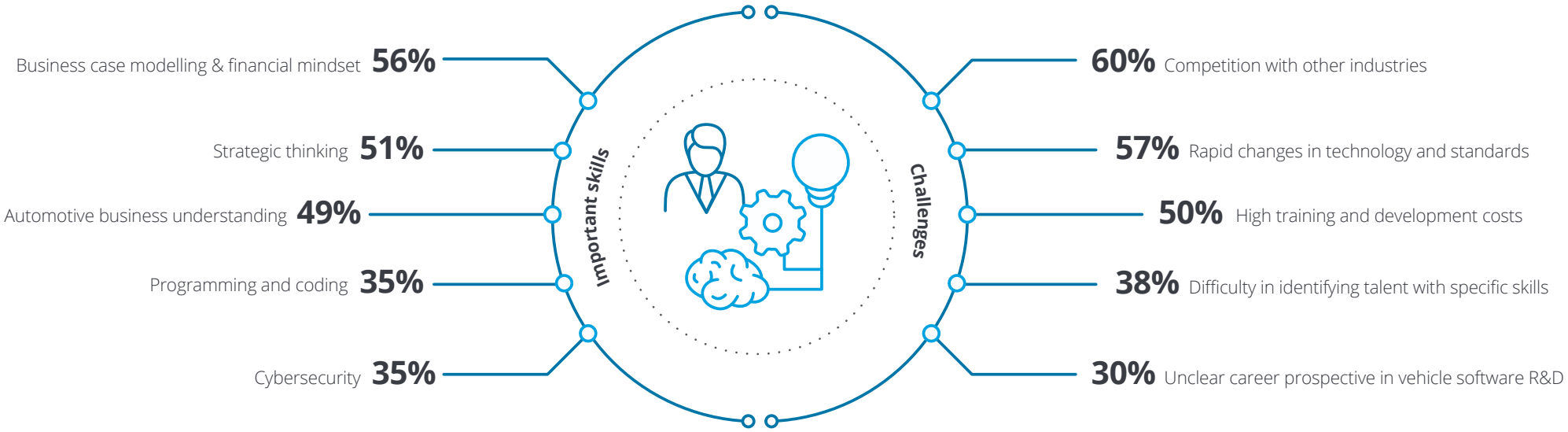
Though technical expertise remains a cornerstone for certain roles, the fact that 56% of the respondents place a premium on business and management skills shows how much things are changing. This strategic shift to SDVs is clearly about more than just technology; it requires a combination of innovation and business acumen. 51% also cite strategic thinking as a valued skill. In an environment where rapid technological advancement is redefining the playing field, the ability to envision and execute long-term strategies is critical.

At 49%, automotive business understanding is another key factor that enables professionals to bridge the gap between technical innovation and industry dynamics.

However, there are obstacles to developing this type of talent. 60% of the respondents highlight competition with other industries as a major challenge. The allure of SDVs goes beyond the automotive space, making competition for top-tier talent fierce across a range of sectors. Rapid changes in technology and standards place a close second, with 57% of respondents citing this challenge. SDVs require an agile workforce with the right skills to embrace transformation in a timely manner. The concern about rising training and development costs complicates matters somewhat according to 50% of respondents. While the quest for mastery is vital, the financial investment required to acquire this expertise poses a substantial challenge. Companies are clearly facing a "battle for talent" as demand for highly qualified professionals escalates, making it all the more imperative to nurture, attract and retain the best minds.

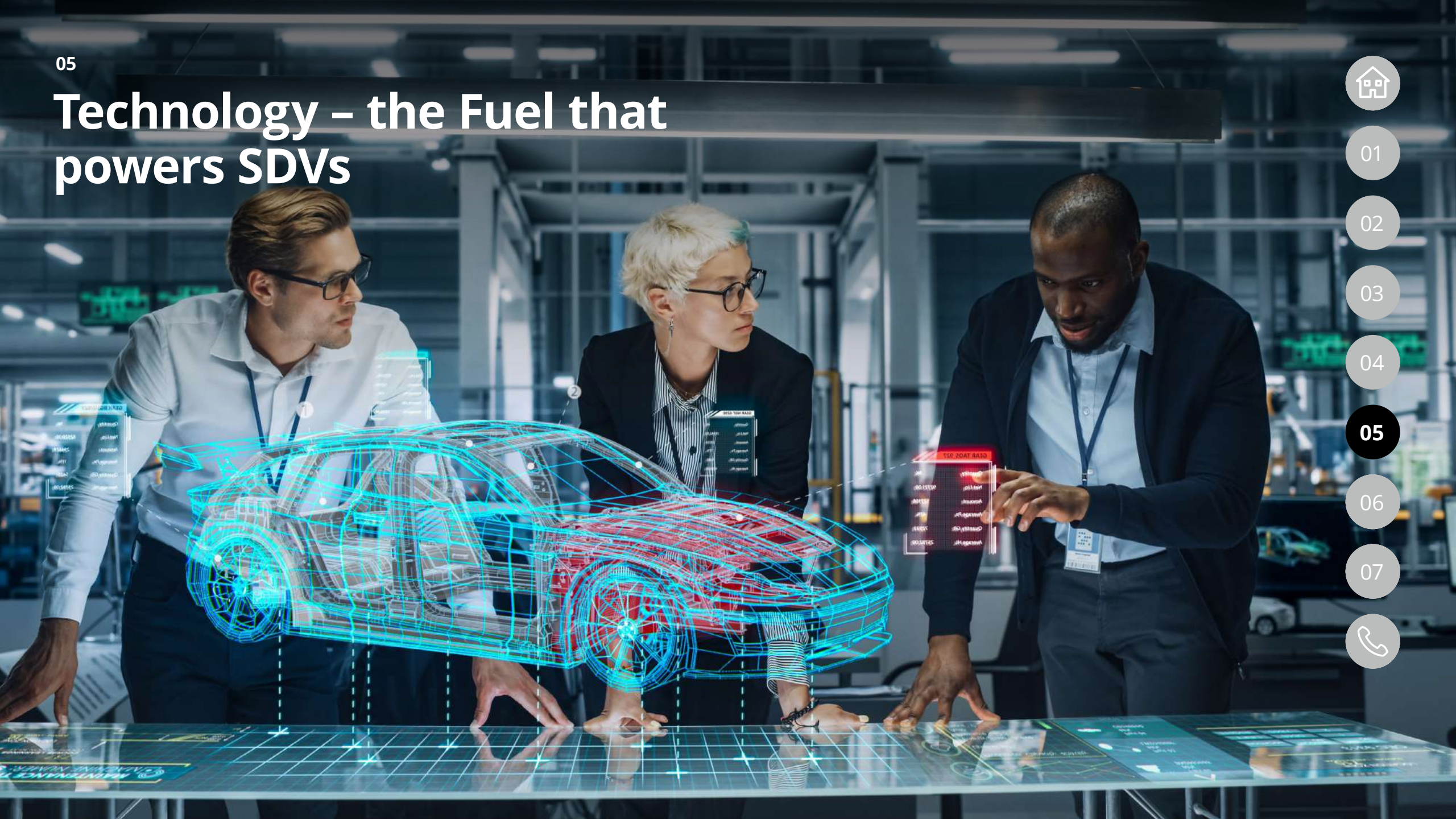
Fig. 15 – Most important skills required and key challenges in talent development

Q35: What skills do you consider most important in talent development for software-defined vehicles?
Q36: What challenges do you see in talent development for software-defined vehicles? Sample size: n= 141 Participants could select multiple responses.



05

Technology – the Fuel that powers SDVs



In this section, we delve into the technologies and tools that companies prioritize in the transition to SDVs. What are the most pivotal technologies or tools for the vehicles of the future? In connected cloud-based ecosystems, we are seeing rapid progress in vehicle-to-vehicle communication, predictive maintenance, augmented reality and other active safety systems. The findings of our survey highlight the areas that are likely to have the biggest impact on SDVs as well as possible AI applications in this space.

Technology trends for SDV

The SDV landscape is evolving rapidly. When we asked companies about the driving force behind this transformation, AI is the most common response. 62% of the respondents see AI as the linchpin powering the shift to SDVs. This is hardly surprising, considering the profound impact AI is having in multiple industries. It will most certainly play a significant role in the improvement and evolution of SDVs as well. AI has a unique ability to analyze large amounts of data, recognize patterns and make intelligent decisions, which will enable vehicles to optimize their performance and adapt to ever-changing requirements.

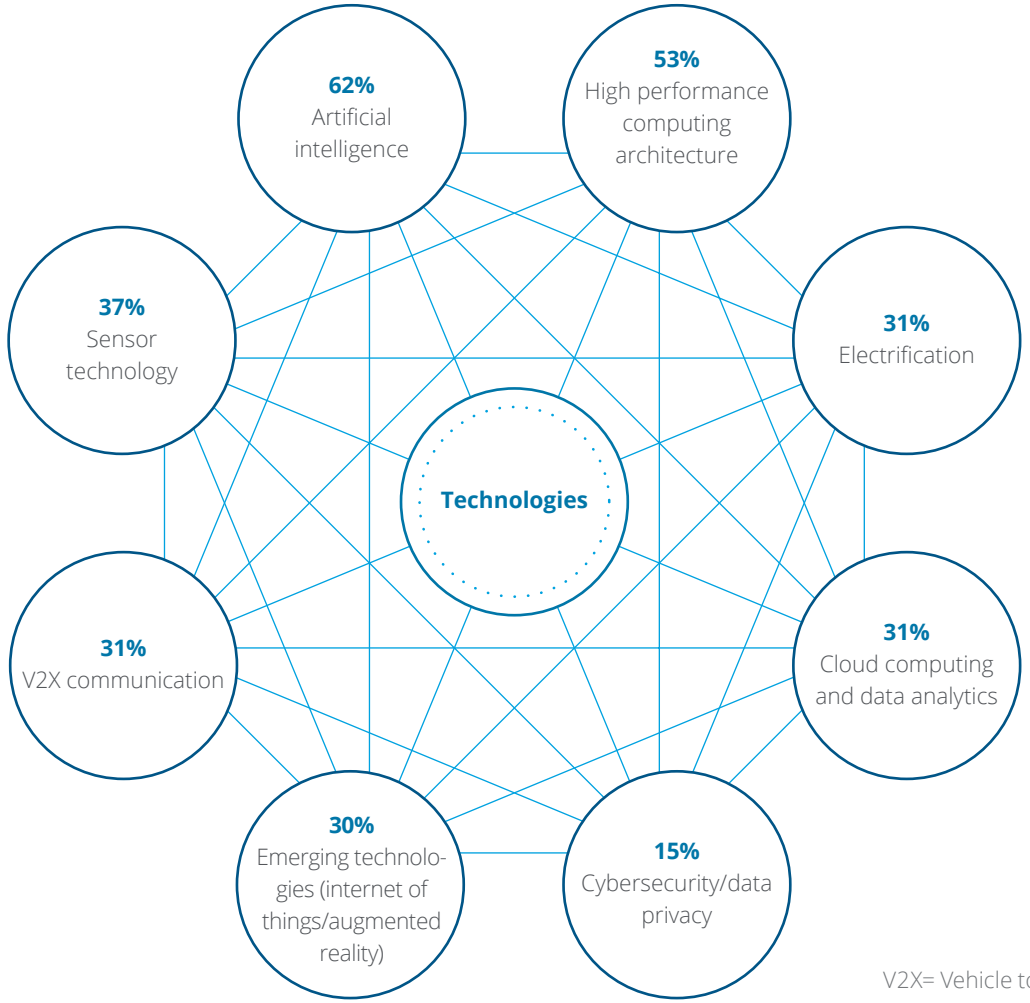
However, it is important to emphasize that AI is only one component of the overall system driving the software-focused future of automobiles. While AI can enhance vehicle performance and features, it is still only one "gear" in a complex mechanism. SDVs require an integrated approach, with different technologies and disciplines working seamlessly together. Battery technology, energy management, vehicle control systems and connectivity must all work in harmony to allow the vehicle to realize its full potential. Factors such as vehicle safety, legal and regulatory frameworks as well as widespread adoption can make or break SDV success. AI can certainly help address these challenges, but it cannot solve all of them on its own.

The survey shows that high performance computing (HPC) architecture is a major factor as well, with 53% of participants citing its importance. HPC provides the computational power for processing the vast amount of data you need to run complex algorithms and conduct simulations. It is also the key to the real-time responsiveness that improves the safety, reliability and performance of autonomous and connected vehicles.

At 37%, sensor technologies are the third most decisive component for respondents. Sensors play a fundamental role in gathering real-time data, making them another cornerstone for informed decision-making in SDVs. Vehicles will not be able to gain a comprehensive understanding of their surroundings without them, which is vital for autonomous driving.

While respondents seem to be fully aware of the importance of cybersecurity, only 15% of them believe it will have a significant impact on SDVs in the next two years.

Fig. 16 – Technologies with the greatest impact on SDV
Q27: Which technologies do you think will have the biggest impact on software-defined vehicles over the next two years?
Sample size: n= 141 Participants could select multiple responses.

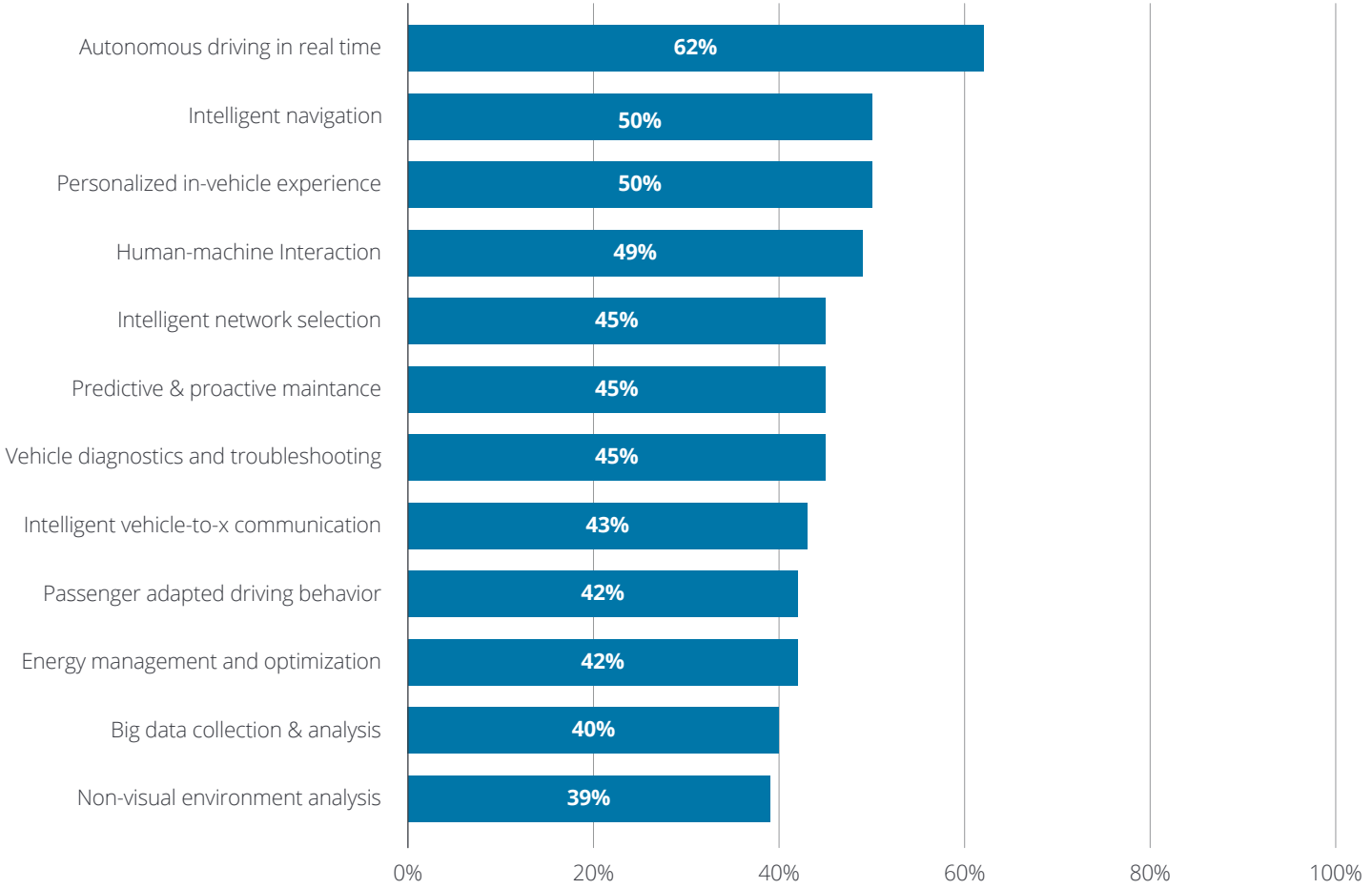


V2X= Vehicle to Everything

AI use cases

AI has emerged as a transformative technology in the automotive industry, particularly in the context of software-defined vehicles. Our survey shows that the automotive sector is embracing AI across a spectrum of applications, with autonomous driving in real time – the top response for 62% of respondents – as the frontrunner. Intelligent navigation follows as a close second, with 50% of participants recognizing its potential to revolutionize the driving experience with optimized routes, real-time traffic updates and enhanced route planning. The personalized in-vehicle experience has garnered significant attention as well, with 50% of respondents endorsing AI-driven solutions that adapt to the consumer's preferences, driving styles and comfort. Respondents rank human-machine interaction and intelligent network selection at 49% as well. Using AI in this context promises to create seamless communication between drivers and vehicles, as well as smart selection of network connectivity to enhance the in-vehicle infotainment and safety features.

Fig. 17 – Potential of artificial intelligence use cases for SDVs.
Q28: What use cases do you see in the area of artificial intelligence (AI) and machine learning (ML) for software-defined vehicles? Sample size: n= 141 Note: For reasons of clarity, the results show only the AI use cases with the highest potential. Participants were asked to rate each option on a scale from "1" (strongest potential) to "4" (not applicable).



06

Looking Forward

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04
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Our research findings reveal significant trends within the market, shedding light on the strategic and operational priorities of automotive stakeholders during the SDV revolution. Looking ahead, we believe the global SDV market will continue to expand, shaped by new business models but also uncertainty. Managing the entire vehicle lifecycle, embracing agile methodologies and using digital features to enhance decision-making and execution are the factors that will set the frontrunners apart from the rest of the field. The automotive companies that proactively navigate this all-important transition by enhancing performance and functionality and by investing in key transformation initiatives will far outperform those that do not. The findings of our survey can serve as a roadmap as you benchmark your own position and make an action plan for the future.

Overall, the study shows just how rationally the automotive players in our survey are behaving. They often choose responses that line up exactly with theoretical implications and market forecasts. The hype around AI is clearly shaping technology trends, which can be beneficial for specific use cases but plays a rather minor role when it comes to achieving widespread adoption of SDVs on the road. Automotive executives have acknowledged that they need to take steps now to make the SDV journey a success. However, the fact that a majority of our respondents – despite major uncertainty – are already well on their way to transformation paints a positive picture and should put this urgency into perspective. As with all future progress, we expect the structure of the automotive industry in 2030 to be completely different than it is today, as evidenced by the SDV strategies already in progress today. The task before automotive players now is to strengthen and maintain their own positions through the transformation.

07

Appendix


E-MOTOR ROTOR
database
properties
extended_properties
attributes
E-MOTOR STATOR
file_content
file_library
code_check
policy_settings
structure
ELECTRIC POWER CONTROL UNIT
E-MOTOR HOUSING
library
temp
$folder."/".$filename
resourses
temp
VEHICLE CHASSIS FRAME
VEHICLE SUSPENTION CONSTRUCTION

The survey was conducted by Deloitte with the support of CLEPA using an online questionnaire. To ensure a representative sample, we surveyed 141 OEMs and automotive supply experts with a focus on SDVs from Germany (49), France (39) and the United Kingdom (53), mainly senior executives, directors and board members.

The case numbers may vary for individual questions for two main reasons. Firstly, a small number of companies in our survey develop and manufacture products that are not affected by the shift to SDVs. Secondly, respondents were not obliged to answer every question, which leads to minor deviations in the number of responses to individual questions. The exact case numbers can be seen in the charts.

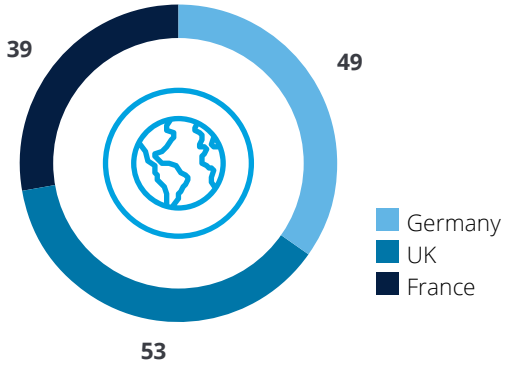
The study participants fall into different size categories: 9% have more than 10,000 employees, while the majority (89%) have 500 to 10,000 employees (Figure 18d). Annual revenues range from USD 100 million (21%) to more than USD 50 billion (4%) (Figure 18c).

According to their own statements, three-quarters of the study participants are strongly focused on developing products and/or services for autonomous driving/mobility (Figure 18b), among other business activities. These companies are also focused on electromobility (71 responses), safety technology (71 responses) and the automotive aftermarket (70 responses). This lines up with current industry trends, as many companies choose this focus to meet the changing demands and expectations of consumers and to shape the future of mobility. The fact that we received multiple replies per company shows that they are prioritizing a broad range of interconnected products and services.

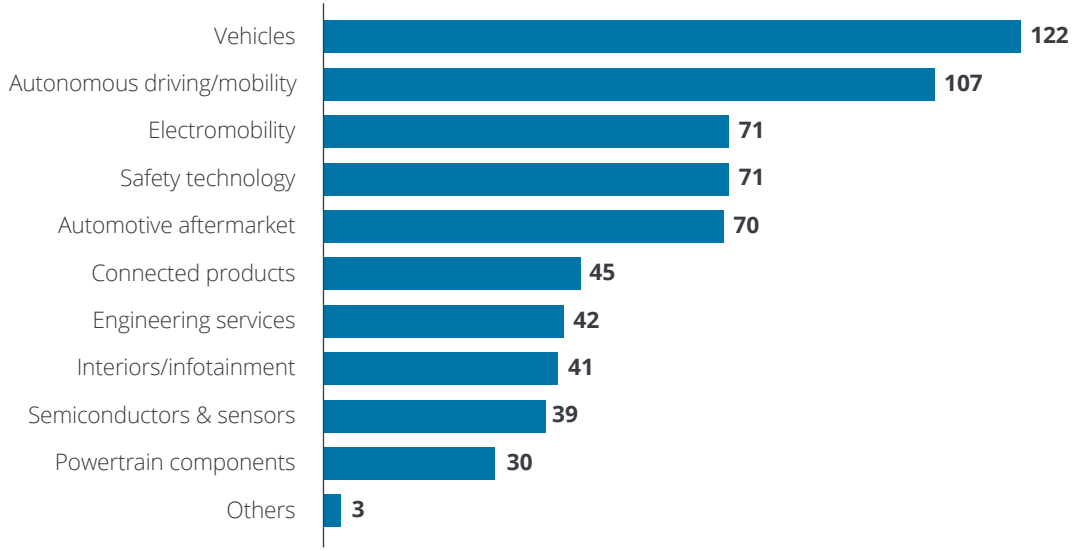
Fig. 18 – Breakdown of respondents by region, size, annual revenue and product and/or service segment

Sample size: n= 141 Note throughout: The sum of the values in selected charts may not add up to 100% due to rounding. In Figure 18b, participants could select multiple responses.

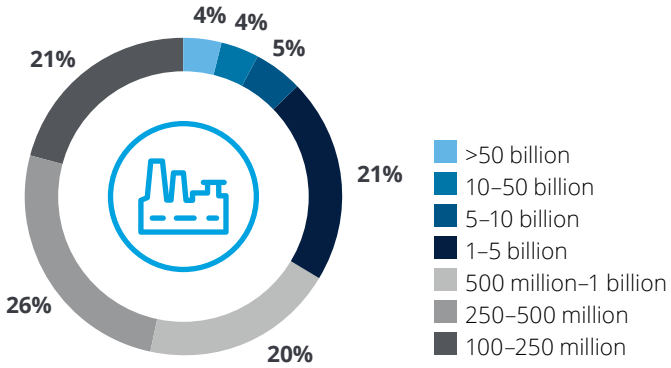
18a) Region



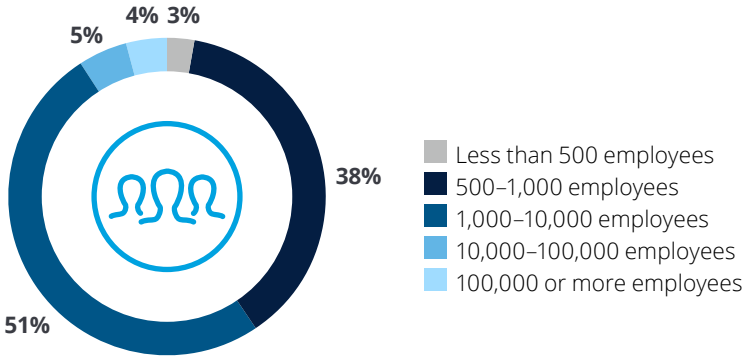
18b) Product and/or service segment*



18c) Annual revenue (in USD)



18d) Number of staff



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Issue 10/2023