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MCKINSEY CENTER FOR FUTURE MOBILITY

HOW TO WIN TOMORROW'S CAR BUYERS – ARTIFICIAL INTELLIGENCE IN MARKETING & SALES

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INTRODUCTION AND KEY INSIGHTS

"Artificial intelligence (AI) is here today in automotive and can provide tremendous value for OEMs" – what we described in our AI in automotive report[1] is now particularly true and relevant to automotive marketing & sales (M&S). Especially since in many industries,[2] leading companies are already effectively utilizing AI in their M&S activities and taking their M&S performance to new levels (see Text Box 1 "AI in M&S") by:

- Utilizing rapidly expanding data availability. These companies are, e.g., drastically increasing their marketing efficiency through programmatic advertising with AI at its core.

- Drawing from data connected throughout their customers' entire journeys. These companies are using AI with other tools and technologies to personalize their sales efforts to up- and cross-sell to customers with individualized offers and personalized pricing.

- Deploying AI to all M&S operations. These companies most notably are demonstrating how AI can be used to automate and optimize M&S operations, such as sales forecasting, product configurations, stock allocation, or after-sales operations.

In this context, today we can offer a comprehensive perspective for automotive players on three high-priority questions concerning the "AI-enabled new normal," which are already emerging in other industries:

- What is an automotive OEM's starting point – i.e., where do these organizations stand as they face emerging new realities in automotive and adjacent industries' M&S – and which value-capturing opportunities does AI in automotive M&S provide?

- What are the key contexts, use cases, and enablers for introducing the "AI-enabled new normal in M&S" from adjacent industries to automotive and how can these be turbocharged?

- Which steps should automotive OEMs take right now to lay the foundation for and facilitate fast and substantial AI-enabled performance improvements in their M&S?

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1 AI – automotive's new value-creating engine, McKinsey Center for Future of Mobility, January 2018.
2 Travel and tourism, financial services and insurance, or traditional.

Text Box 1 – "AI in M&S"

AI is the ability of a machine to perform the cognitive functions that we associate with human minds, such as perceiving, reasoning, learning, interacting with the environment, problem solving, and even exercising creativity. Examples of technologies that enable AI to solve business problems are robotics and autonomous vehicles, computer vision, virtual agents, and machine learning.

AI is already used in numerous sectors, particularly consumer businesses, which have been collecting large volumes of diverse customer data for a considerable amount of time, allowing the development of particularly effective AI systems.

Emerging trends

AI is driving three megatrends in M&S – automation, forecasting, and personalization – representing the areas in which marketing leaders should focus their energies on building capabilities:

- Automation allows machines to make decisions, or at least to assist human decision makers. Typical examples include dynamic pricing and systems for product recommendations. Automation is currently particularly relevant to online retail and has clear disruptive potential. This will only become more pronounced as technology evolves to make completely independent decisions.

- Forecasting depends on having a strong set of historical data to feed AI, which can then find patterns and develop models of future scenarios. In this way, we can predict typical customer behavior, such as purchasing decisions or patterns of fraud. These systems are not static; they are always learning and adapting to new data contexts.

- Personalization refers to the application of forecast results to tailored customer segments and individuals. Using comprehensive customer information, the system analyses each person to make carefully targeted, personalized promotions, products, and price offers. AI is particularly powerful in this context because it is able to execute such a scenario on a large scale, meaning it can deliver personalized marketing to every consumer.

Accordingly, the AI-enabled use cases that we discuss in Chapter 2.2 address the trends of automation, forecasting, and personalization and their related challenges/ pain points in automotive M&S.

At the heart of our research is a detailed discussion of the AI-enabled use case landscape along the automotive M&S value chain. In the course of the discussion, we quantify the impact of all major AI-enabled use cases in M&S by comparing the status quo of a typical automotive OEM's relevant M&S performance with the target state following full AI application. The main sources of our insights include:

- The McKinsey "Auto 2030" market model, which is based on scenario-tested developments of the disruptive ACES trends (autonomous driving, connectivity, electrification, shared mobility)

- More than 100 discussions with AI experts, mobility executives, and M&S experts

- Relevant market reports on digital disruptions, AI, and automation as well as annual reports from all major automotive OEMs

- More than 15 analyses of specific industry perspectives, e.g., how OEMs are investing their resources and what margins are expected to be achieved.

In our attempt to answer the questions above, we drafted four key messages concerning the value and application of AI in automotive M&S. Each of these statements will be explained in more detail in the following three chapters:

AI's M&S value comes from improved customer experience, higher sales, and lower costs. M&S teams of automotive OEMs and their franchised retailers can capture massive value if they can translate AI's potential – and that of its increasingly sophisticated techniques and tools – into concrete change. This value is primarily generated in three dimensions: 1) improved and consistent customer experience, which is becoming increasingly important, especially since customer experience is expected to soon beat brand loyalty when it comes to determinants of customer decision making; 2) higher sales, resulting from more relevant offers to customers and an increase in customer satisfaction; and 3) reduced M&S costs.

AI in M&S is not just a competitive advantage but benefits the entire automotive industry. The benefits of this technology transformation will be, on the one hand, valuable to the entire industry, in that the efficiency of media budgets, tactical sales budgets, and margin improvements from more customer-centric packages and pricing are improved. The industrywide benefit of those effects is estimated to reach USD 44 billion by 2025 or up to 2 percent of the total operating margin. On the other hand, applying AI to automotive M&S is expected to be a crucial differentiating factor between automotive OEMs and between incumbents and new, digital competitors.

AI can and should be deployed in all areas of M&S, from marketing to sales and operations. AI is at the heart of future-proofing technology, turbocharging M&S organizations. We propose a three-faceted approach to deploying AI in automotive M&S:

- **Exploring AI in automotive marketing** to reach customers at the right moment with a tailored, individual message. Through programmatic advertising, with AI at its very core, automotive players can let AI determine which customers they should target, with which messages, at what time, and via which channel.

- **Integrating AI into automotive sales** to make selling consistent and personal. In connecting sales to previously used marketing data sets, automotive players can utilize AI for more effective sales. For example, AI can be employed to automate lead management activities, predict products to most likely be up- and cross-sold to customers throughout their life cycle, and enable personalized and dynamic pricing.

- **Transforming all M&S operations through AI** to improve M&S insights and the efficiency of its functions. Automotive players can apply AI throughout all automotive M&S operations to significantly improve sales forecasting or vehicle configuration and distribution. AI's ability to extract meaning from unstructured data (text, sound, images, video) can be used to automate and optimize after-sales operations, e.g., through chatbots and virtual assistants or by automating the visual inspection and residual value (RV) calculation of returned used cars.

To facilitate an AI transformation of M&S organizations, three steps are key:

- **Understanding the individual starting point.** Creating an understanding of where and how AI will deliver the most value to the organization and the capabilities and enablers required

- **Piloting/building first AI-enabled use cases.** Developing and implementing the most promising use cases to test, learn, and demonstrate the value AI can provide and, finally, to develop a personal AI strategy

- **Conducting a holistic AI transformation.** Transforming the organization, building the required AI capabilities to scale up AI-enabled use cases, and utilizing the value of the technology in every function, process, and aspect of a business.

1

NEW REALITIES AND SUBSTANTIAL AI-ENABLED VALUE OPPORTUNITIES EMERGING IN AUTOMOTIVE M&S

1.1 With online as the number one M&S channel for cars, automotive players now have the ideal conditions for deploying AI

Customers' paths to purchasing a car have changed substantially over the last few years. Online is now the number one M&S channel for cars, making an automotive organization's digital skills more and more important. 80 percent of car buyers research online when looking for a new car (approximately 14 hours on average) and more than two-thirds of customers make their purchasing decisions online.[3] By the time these customers arrive at the dealership, they already have the information they need and are ready to make a transaction.

Additionally, customers see fast and seamless digital experiences as the new normal and expect targeted, tailored offers in all categories and services. If a brand does not provide a seamless online/offline experience, customers might turn away. No longer solely dependent on the product, customer satisfaction is now based on the overall experience — from research to ownership. In fact, the experience has become so important to the customer that it challenges the loyalty that many brands have relied upon. This is also – and possibly even more – true for well-established brands.

The ACES trends (autonomous driving, connectivity, electrification, shared mobility) will accelerate these developments even further, with customer touch points changing from rare yet high-value interactions (vehicle purchase, after-sales appointments) to high-frequency, almost-daily interactions (use of shared-mobility offers).

1.2 New competitors in the automotive space are already successfully deploying AI to better understand and sell to customers

Digital disruptors in the automotive industry are already successfully addressing these consumers' changing expectations. From Carvana's online used-car platform to NIO's and Tesla's direct-to-consumer sales model, digital native players have emerged recently and are growing quickly because they are not slowed down by their legacy assets (e.g., ageing dealer content management systems, data-sharing limitations, heavy structures). Next to these disruptors, multicategory players are also entering the space. Amazon Vehicles, e.g., achieved USD 5 billion in auto parts sales in 2017 and has piloted online car sales in selected markets, and Alibaba sold over 100,000 cars on China's Singles' Day alone and now has a car vending machine in Guangzhou, like the ones operated by Carvana in 16 US cities.

These "frictionless online retail players" benefit from the capabilities they have built in other industries and are thus fueled by new tools and technologies, allowing them to take their M&S efforts to new levels. Drawing on rapidly expanding data availability, they have drastically increased their marketing efficiency through programmatic advertising, building on AI. With data connected throughout their customers' entire journeys, they employ AI to personalize their sales efforts, thus targeting the right customers with the right offer

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3   Innovating automotive retail, McKinsey, February 2014.

at the right time. Beyond this, leading companies outside the automotive industry show how AI can be used to automate and optimize M&S operations, such as sales forecasting (e.g., flu and cold medicine), product configurations (e.g., travel packages), stock allocation (e.g., airline seat capacity and pricing), or after-sales operations (e.g., tire service chain pure players).

1.3 Deploying AI in M&S will significantly help automotive OEMs defend their market leadership and enable them to gain substantial value opportunities

New entrants are taking the lead in revenues and margins – and while their gains are noticeable across the value chain, they are showing particular dominance in high-margin areas. Similar to traditional retail, where this "Amazon effect" has hit incumbents hard, such a scenario would also significantly impact already stressed automotive OEMs and their franchised retailers. The average profitability of a dealership is at roughly 1 to 2 percent. A simulation conducted for a German premium OEM showed that a dealership typically breaks even financially at 89 percent of their full-year revenues (considering new and used-car sales, parts, and services). Accordingly, an 11-percent decrease in a dealer's total revenues, or a 25-percent decrease in new and used-car sales (at stable parts and service revenues) would suffice to make the average dealership unprofitable. The rise of stronger, more agile digital-native competitors could quickly affect sales at these proportions, thus reducing dealer profitability even further. Additionally, longer-term, after-sales-related activity could decline due to both a smaller installed base of vehicles and a growing share of electric vehicles (requiring less substantial maintenance), which would further affect profitability.

In order to avoid such a scenario and turn their prospects around, automotive OEMs can apply AI and seize the game-changing opportunity it provides. In our previous publication[4], we quantified the AI-enabled value opportunity for automotive OEMs across the entire automotive value chain. We identified a total accumulated value potential of USD 215 billion for automotive OEMs worldwide (Exhibit 1).

Interestingly, discussions with industry experts on this value opportunity suggested that while the opportunities in procurement or manufacturing are tremendous, they are also expected to eventually become more of a hygiene factor. For example, as is the case with lean manufacturing today, AI-enabled manufacturing can be expected to eventually become an industrywide standard. To the contrary, applying AI to automotive M&S is expected to be a crucial differentiating factor between automotive OEMs and between incumbents and new digital competitors. The M&S opportunities that AI offers to the automotive industry are evident on two levels:

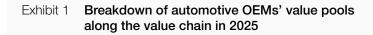**Industrywide value opportunities.** A value potential of approximately USD 44 billion or up to 2 percent of total operating margins can be expected of the automotive industry as a whole in 2025. Specifically, these industrywide value opportunities are driven by two effects:
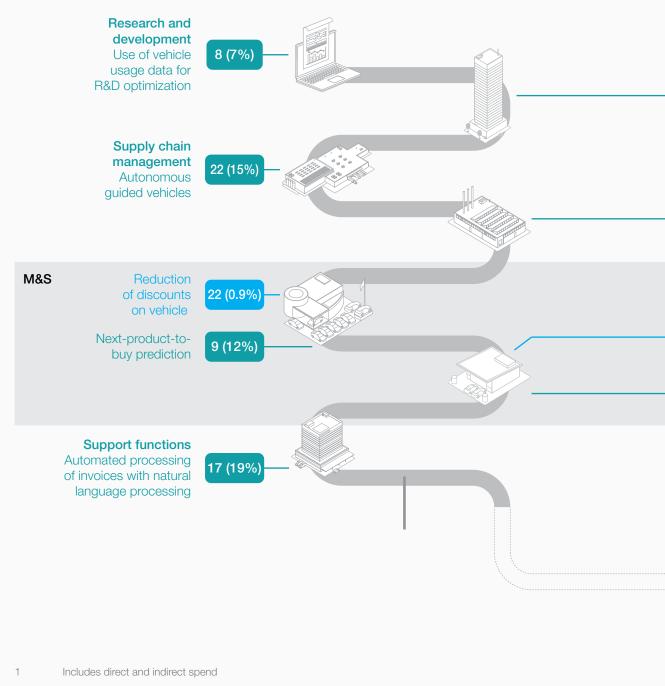
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4   Artificial intelligence – automotive's new value-creating engine, McKinsey Center for Future of Mobility, January 2018.

- **A top-line impact from additional revenue of approximately USD 30 billion or 0.7 percent.** This top-line impact is based on reducing rebates given to customers and improving the up- and cross-selling of vehicles, options, and services. AI can, e.g., be used to reduce discounts by better understanding customer demands and optimizing vehicle production and vehicle-to-dealer allocation, accordingly.

- **A bottom-line impact through cost reductions of approximately USD 14 billion or a 10-percent improvement.** This bottom-line impact is based on using marketing spend more efficiently through programmatic advertising or on automating processes and communication through AI-powered chatbots and virtual assistants or image-recognition-based visual inspection of returned used cars.

OEM-specific value opportunities. More specifically, individual automotive players will further reap the benefits of AI by using the technology as a means to outperform competitors. Automotive OEMs could, e.g., use AI to offer a superior digital customer experience or to be able to more actively participate in the emerging mobility market. Accordingly, market share shifts between established OEMs and new pure-EV players, franchised retail and point after-sales pure players, or OEM-branded and new independent-mobility service providers are at stake. While it is difficult to quantify the OEM-specific impact, we expect this AI-enabled differentiation to be of critical importance to future market leadership.

Keeping this in mind, Chapter 2 will deal with what AI means for M&S in general, to what extent it has already been rolled out in automotive M&S – also in comparison to other industries and functions –, and which AI-enabled use cases in particular can be expected to deliver the value discussed.

Exhibit 1 **Breakdown of automotive OEMs' value pools
along the value chain in 2025**

Research and development
Use of vehicle usage data for R&D optimization

8 (7%)

Supply chain management
Autonomous guided vehicles

22 (15%)

M&S

Reduction of discounts on vehicle

22 (0.9%)

Next-product-to-buy prediction

9 (12%)

Support functions
Automated processing of invoices with natural language processing

17 (19%)

1   Includes direct and indirect spend

SOURCE: McKinsey

| Part of the value chain
Example for optimization
through AI | ■ Value potential from
bottom-line effects
USD billions (as share of costs in
corresponding part of the value chain) | ■ Value potential from
top-line effects
USD billions (as share
of total revenue) |
|---|---|---|

51 (4%) **Procurement**[1]
Advanced spend intelligence

61 (15%) **Manufacturing**
In-line quality measurement
by vision or sound

Aftersales and services

8 (0.3%) Pulling customers to
licensed garage for
service and spare parts

5 (5%) Assortment and storage
level optimization for
spare parts

**USD
44 billion**
combined total

∑ ~ **USD 215 billion**

~ 9 EBIT percentage points
or an average annual
productivity increase
of approximately 1.3%

12 (0.5%) **Driver/vehicle features**
Autonomous obstacle avoidance
and next-generation navigation

2

TURBOCHARGING AUTOMOTIVE M&S ORGANIZATIONS THROUGH AI

2.1 How and why AI will turbocharge today's automotive M&S organizations

AI is the ability of machines and systems to perform functions typically associated with human cognition (such as perceiving, reasoning, learning, and problem solving). Where traditional programming is based on the logic that "input + algorithm = output," with a human designing the algorithm, AI turns this logic around to "input + desired output = algorithm." To this end, a human defines the desired input and output, but does not need to find and constantly update the "right" calculation in a changing environment. This is a tremendous advantage in the very dynamic environments in which we operate and is especially true in today's world of M&S, which deals with very fast-changing customer demands. AI is already able to outperform humans in speed, efficiency, and endurance.

Additionally, AI is finally starting to deliver real-life business impact. The ingredients of this breakthrough are threefold: first, computing power is growing significantly, with the costs of data storage and processing tumbling. Second, mathematics and algorithms are becoming more advanced (e.g., in the field of deep neural networks). Third, data – the fuel that powers AI – is increasing rapidly, with billions of gigabytes of data being created every day. Consequently, some AI experts are predicting an impact compared to that of the steam engine or electricity. Investments in AI are also growing quickly. The McKinsey Global Institute estimates that in 2016, companies spent USD 26 to 39 billion on AI alone. Today, more and more companies are building their business model around this technology.

Accordingly, the adoption of AI is taking hold of global businesses. A recent survey of the McKinsey Global Institute looked at the level of adoption of AI across various industries and particularly at the specific business functions in which that technology is being implemented (Exhibit 2).[5] To some degree, AI is present in most business functions – from service operations to corporate finance – throughout global industries. Notably, when it comes to AI in M&S, the adoption rate is the lowest among automotive companies. This untapped potential is particularly significant because automotive OEMs possess valuable and proprietary data sets (e.g., from their own websites, online car configurators, their dealers' CRMs). Embracing AI can help them use these assets to secure their market leadership.

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5   AI adoption advances, but foundational barriers remain, McKinsey Global Institute, November 2018.

Exhibit 2   **Adoption of AI across industries and functions**

Share of respondents, percent

	Service operations	Product and/ or service development	M&S
Retail	23	13	52
Telecommunications	75	45	38
Professional services	38	34	36
High tech	48	59	34
Financial services	49	26	33
Travel, transport, and logistics	51	34	32
Pharmaceutical and medical products	31	31	27
Healthcare systems and services	46	28	17
Electric power and natural gas	46	41	15
Automotive and assembly	27	39	15

SOURCE: AI adoption advances, but foundational barriers remain; McKinsey Global Institute, November 2018

	Supply chain management	Manufacturing	Risk	Human resources	Strategy and corporate finance
	38	7	9	8	0
	26	22	23	17	15
	19	11	15	16	11
	23	20	17	21	17
	7	6	40	9	14
	18	4	4	2	3
	13	28	3	6	4
	21	9	19	18	13
	14	19	14	15	14
	11	49	2	8	6

2.2 Automotive players stand to benefit from utilizing AI-enabled use cases in three facets of their M&S organization

Deploying AI in an automotive M&S organization **is a transformational process** comprising three facets of AI-enabled use cases, which differ not only in their application area – marketing, sales, and operations – but also in data requirements and the extent of their required deployment efforts (Exhibit 3).

In the following, we describe in greater detail these three facets and their most relevant use cases. This is done to elaborate on the specific context and pain points that AI addresses, provide insights into the technology and methods that can be applied, and demonstrate the typical impact already achieved as well as the foundations and key requirements for embedding these use cases in an automotive M&S organization.

Exhibit 3 Overview of an automotive M&S organization's AI transformation, including exemplary key use cases for each of its three facets

I MARKETING
Exploring AI in automotive marketing

II SALES
Integrating AI into automotive sales

III OPERATIONS
Transforming all M&S operations through AI

AI-enabled[1] use cases

MARKETING	SALES	OPERATIONS
Programmatic advertising (bidding and buying)	Lead management automation	Sales/demand forecasting and trendspotting
Cross-channel budget planning/allocation	Life cycle omnichannel up- and cross-selling	Build-to-stock configuration and distribution
Personalized marketing (e.g., creative customization)	Personalized, dynamic pricing	Chat bots and virtual assistants
Data-driven attribution on ... ... lead level / ... sales level		Aftersales and services (e.g., predictive service offers)
		Visual inspection and RV calculation for returned used cars
		Dealer footprint optimization
		Product marketing (e.g., contenting, specifications)

Technical/operational foundation

Full ad tech stack, incl. measurement, future-proofed (e.g., GDPR, ITP 2.0) Digital talent agenda Partnership ecosystem able to serve dealers	Cloud-based, real-time CRM and DMS integrated to ad tech stack Broken-down organizational silos and data silos (e.g., dealer-OEM data-sharing policies)	Customization of AI/ML solutions (incl.,e.g., image or voice APIs) Entire organizational design shaped around digital and data capabilities

◄──── Brilliant basics (e.g., fast mSites, synergetic OEM-dealer advertising, ────►
online lead and call tracking and conversion)

1   Many of the use cases can also work without using AI in the early stages

MARKETING

Exploring AI in automotive marketing to reach customers at the right moment with the right message

Programmatic advertising
(bidding and buying)

Data-driven
attribution
on lead level

Cross-channel budget
planning/allocation

38%

62%

Personalized marketing
(e.g., creative
customization)

Ad

Context	Consumers are becoming increasingly demanding and impatient. With today's overflow of information and consumers' attention spans decreasing, advertisers need to engage them at the right moment, with the right message, and in the right environment to market effectively and efficiently. Therefore, marketers are relying increasingly on programmatic advertising. This online marketing technology refers to the automation of online media-buying activities. It includes real-time bidding on advertising spaces, optimization of marketing campaigns, and displaying individualized advertisements ("creatives") based on customers' individual characteristics. By 2022, programmatic advertising is expected to make up 71 percent of global digital advertising spend.[6]

Pain points. From a car buyer's perspective, this ambition might seem rather far-fetched. Online, customers often encounter OEMs' advertisements, even if they are not in the market to buy a car – sometimes even because they just bought a car from the advertising OEM. They can also sometimes be offered advertisements for a model that does not align with their current needs, such as getting offered a sporty cabriolet while looking for a family-friendly SUV, or they receive an e-mail from an OEM, suggesting that the OEM is unaware of their recent offline dealership visit.

AI-enabled use cases	To improve the effectiveness (scale) and efficiency (ROI) of their marketing campaigns, OEMs can use AI to determine which customers to market to, through which marketing channel, with which message, and at what time. By employing *programmatic advertisement*, which is based on AI at its very core, OEMs can utilize AI's ability to continuously make these complex, split-second decisions based on vast amounts of data.

For example, *bidding and buying* tools take into consideration multiple factors in order to determine how much each advertisement impression is worth – depending on who looks at an advertisement, on which device, and on which website. Advertisers, who have invested in a good integrated programmatic data platform, consider various data from digital media campaigns (including display, video, search, social, desktop, as well as mobile) as well as consumers' behavior on their own websites. For example, an AI system might identify a consumer as in the market for a car based on recent visits to different websites and, as a result, make sure to bid enough to be able to show the consumer an advertisement. Forward-looking, advanced tools might not only optimize the marketing spend on one channel but improve *cross-channel budget planning/allocation*. That is, they prescribe how marketing spend should be distributed across channels, such as display, search, or video.

6   https://adexchanger.com/agencies/magna-programmatic-video-and-mobile-grow-up/

Applying these bidding, buying, and cross-channel budget planning tools can significantly improve OEMs' media budget efficiency, as "waste" is eliminated through much more targeted media campaigns.

Programmatic advertising can also include tailoring the communicated message or the "creative" (i.e., the pictures or videos shown) to the individual consumer viewing the advertisement. This *personalized marketing* is made possible by AI segmenting customers based on where they are, what they are interested in, or how they navigate an advertiser's website, and then testing and determining which individual content works best. An AI system could predict that a consumer might have just transitioned into a new life stage, which often signals the opportunity to promote a tailored offer. As a result, a customer who, e.g., repeatedly searched for pregnancy-related terms is specifically targeted with advertisements promoting car models popular among young families, such as a new crossover or SUV. Such personalized offers not only increase click-through rates and overall marketing efficiency, they are also perceived as less intrusive by the customer compared to "one size fits all" messaging.

Also, consumers' purchase journeys are getting more complex. A car customer might first click on an OEM's paid advertisement when researching for general information on car models in the market, then a few days later be shown a video advertisement on the OEM's newest model, before eventually making their way to the OEM's car configurator after clicking on a display advertisement retargeting the customer. To define how effective an individual advertisement is, attribution modeling needs to distribute the credit for successfully reaching a desired goal (e.g., a completed online vehicle configuration) among the different advertisements involved. In this way, OEMs can make use of *data-driven attribution,* with AI at its core, to determine the relevance of each digital touch point based on the "best fit" of the data. This approach allows for optimizing media spend beyond what is typically possible with rules-based approaches, such as attributing all the credit to the last interaction or splitting credit evenly across all involved touch points.

Impact. OEMs are starting to make use of this. Nissan, e.g., recently automated their programmatic bidding to generate more qualified visits to their website (i.e., visits where customers view multiple websites, use the car configurator, or watch a video, indicating a greater intent to purchase). The employed system uses machine learning approaches to predict the right bids based on a variety of signals, such as the user's device, location, language, operating system, or remarketing lists and the time of day. Compared to previously conducted manual bidding, this approach realized a 33-percent improvement in cost-per-qualified-visit and a 67-percent increase in conversion rate.[7] Skoda employed programmatic

7   https://marketingplatform.google.com/about/resources/omd-revs-up-high-value-traffic-for-nissan-display-and-video-360/

advertising to create a more relevant and engaging customer experience. By using personalized advertisements that target specific audience segments, they managed to increase the relevance of advertisements to each user. As a result, the OEM realized a 53-percent increase in conversion rate and a campaign nine times less expensive than the average.[8]

Foundations and key requirements	While programmatic advertising has been consistently on the rise over the past years, many of today's applications of programmatic advertising do not make full use of the data and the off-the-shelf AI that is available. To reap the full benefit of applying AI in marketing, OEMs need to put the right technology, data, and organizational capabilities in place.

This starts with integrating the different tools used across channels to create a single, more accurate view of the customer. OEMs should select an AdTech provider with a future-proof foundation as rising customer expectations of data privacy, regulatory changes (e.g., GDPR, California Consumer Privacy Act), and technology changes (e.g., browsers, cross devices) are challenging the existing advertising technology ecosystem and putting pressure on systems relying on third-party data. The different data sources from advertisers' media campaigns (i.e., AdTech, including the advertisement server, DSP, and search tools) as well as from interactions on their own websites (i.e., MarTech, including on-site measurement) should then be connected between these tools. This ensures that OEMs make AI capabilities, such as data-driven attribution, much more powerful and that they can precisely control how many people they reach and how often they address them during their purchase journey. Consequently, OEMs can reach more unique users with the same investment and save time by simplifying their workflow.

Finally, the full potential will be achieved as OEMs become smarter and create their own, custom intelligence. By deeply analyzing data throughout all campaigns and adding their own website and CRM data, data scientists can unlock valuable insights on audiences to target and how much overall value to attribute to each customer interaction, which can then be applied to future campaigns. For example, self-owned intelligence will be necessary to identify what the media perceives as niche but is highly valuable to a specific OEM, e.g., discovering that people with a common interest in a particular sport have a higher interest in interacting with the OEM or discovering specific customer interests that were previously unknown.

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8 https://www.thinkwithgoogle.com/intl/en-gb/marketing-resources/programmatic/ programmatic-allows-skoda-to-build-more-relevant-and-targeted-creative/

II

SALES

Integrating AI into automotive sales to make selling consistent and personal

Life cycle omnichannel up- and cross-selling

Lead management automation

CUSTOMER X

Personalized, dynamic pricing and packaging

-17%   -13%

Data-driven attribution on sales level

Context	**Pain points for customers.** From a customer's point of view, the act of buying a car can be incredibly stressful. Aside from the much-dreaded price haggling, customers are often put off by slow or nonexistent answers to contact requests or the difficulty of getting ahold of a sales person once arriving at the dealership. Customers are also overwhelmed by the complexity of today's vehicle offers. Irrespective of the proliferation of car lines, an individual car line often comes with three to ten trim lines; dozens of engines, packages, and colors; and up to 50 options or more. Furthermore, it is often tedious to carry over the vehicle exactly as it was configured online into the physical sales process at the dealership.
	Pain points for OEMs/dealers. On the other hand, dealers and their now often down-scaled sales teams have a hard time keeping up with managing the customer leads that exist in their own CRMs or the leads they receive through customer calls or e-mails, OEMs' or their own websites, and their local marketing efforts. Consequently, sales-boosting measures, such as taking the opportunity to offer new cars or additional services to customers that come to the dealership for a service appointment, are typically well understood but rarely executed consistently. This is even more critical, as the number of showroom visits is now at an all-time low. In the direct interaction with car buyers, sales reps are then often equally overwhelmed with the complexity of today's vehicles and offer structures. This can lead to missing out on high-margin upselling opportunities, as the right option or package that could wow a specific customer might not get promoted or appropriately explained.
AI-enabled use cases	Within automotive sales, OEMs can use AI to win additional customers (e.g., through more consequent lead management) and increase the revenue that is realized with each customer (e.g., through up- and cross-selling). AI can be used to make the lead management process much more consistent. E-commerce players, with their end-to-end data ranging from online marketing and website interactions to the actual sales, already showcase AI-enabled *lead management automation.* These players let AI systems analyze their data sets to predict which customers are most likely to close or to churn and direct their M&S activities accordingly. They learn from every interaction and sale and constantly optimize user experience and M&S activities. Similarly, OEMs could employ AI to score incoming leads and prioritize M&S activities accordingly.
	AI can additionally be used to personalize the sales experience. By analyzing customers' demographics, transaction histories, and online activities, AI can help generate individualized product recommendations. These "next-product-to-buy" recommendations are most popularly used by companies such as

Netflix or Amazon. However, first automotive OEMs are also experimenting with AI-enabled up- and cross-selling. They compare a customer's specific configuration with historic configurations to identify similar configurations and predict which additional vehicle feature a customer would be most likely willing to buy. This feature can then be proposed to the customer during the sale or even after the initial purchase. While such next-product-to-buy predictions can also be generated by traditional methods, such as collaborative filtering, AI typically improves the accuracy of predictions significantly. Going beyond the one-off sale, OEMs could follow this approach throughout the entire customer life cycle, incorporating new-car sales, financial services, and aftersales alike. This AI-enabled *life cycle omnichannel up- and cross-selling* could automatically offer a discounted roof box to a customer who just bought a car ahead of the next holiday season or present timely offers to existing customers who come by the dealership for a service appointment or are approaching the end of their lease. Typically, next-product-to-buy recommendations that target individual customers can lead to a twofold increase in the rate of sales conversions.[9] In early experimentation with AI-based upselling, we saw OEMs realizing uptake rates of about 30 percent, which, given the high margin of most options, translated into significant bottom-line impact.

In addition to personalized product recommendations, AI can also be used to enable *personalized dynamic pricing.* Already today AI is widely applied by mobility service providers to tailor their pricing to any given ride-sharing situation. To this end, AI systems dynamically set prices based on a multitude of factors, such as the consumer need (distance, time to travel), contextual factors (intensity of demand in the area, time of day), or the local price elasticity (income level, traffic patterns). Similar approaches could be deployed in other areas, e.g., in aftersales or used-car sales, where the amount of data generated by the volume of transactions enables AI-powered dynamic pricing based on inventory levels or garage space availability, customer demand for specific services or used-car configurations, and competitive pressure down to a certain dealer area. For car models with high sales volumes, collected data on a consumer (e.g., website visits, type of configuration desired, relative interest in car brand) could help optimize new-car pricing or offer real-time individual rebates.

Forward-looking, new forms of ownership, such as subscription models and pay-per-use services, and increased vehicle connectivity will provide new opportunities for AI-powered up- and cross-selling and dynamic pricing. AI's ability to predict, understand, and personalize will give OEMs and mobility providers the possibility to offer products and services in-car by anticipating

9   Notes from the AI frontier: applications and value of deep learning, McKinsey, April 2018.

and responding to occupants' needs and commands, using in-vehicle sensors and data on consumer preferences from multiple digital domains, including social media, connected home, and connected office.[10] An in-car assistant could propose scheduling a soon-due service appointment or ordering a new set of tires or offer additional services based on the known user profile (e.g., personalized music playlists) or context (e.g., recommendations for restaurants). The developments of conversational intelligence will enable live interaction through voice and gestures, allowing for a constant dialog with the vehicle.

Impact. Today, companies that make the best use of digital and analytics in their sales process typically see 5- to 10-percent revenue growth with the same or improved margins. And they see many of those benefits quickly, often within a few months.[11]
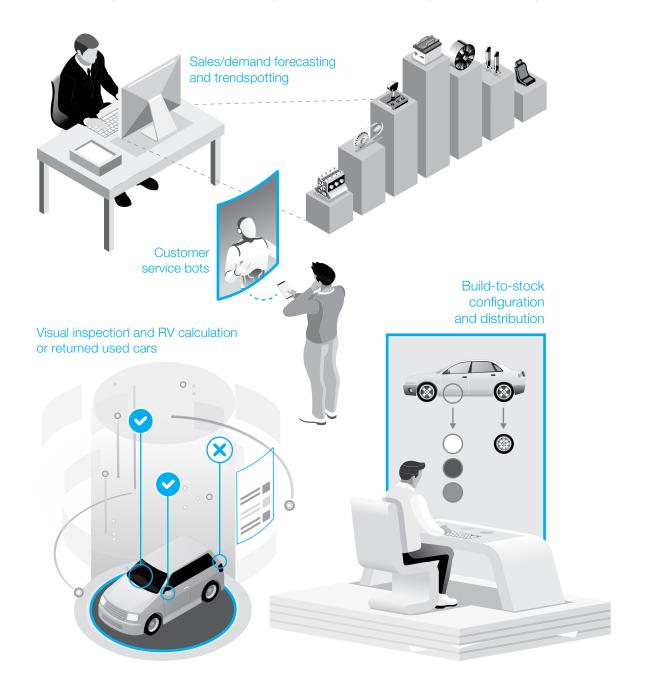
Foundations and key requirements	To fully enable these use cases, OEMs need to connect their data silos. Specifically, they need to link data from online interactions captured by the digital marketing tech stack (e.g., OEM and dealer website traffic, media data across channels) to sales data from CRM and DMS systems (e.g., customer purchase history), typically existing at the dealer level, and inventory and ordering information within their ERP (e.g., inventory of build-to-stock vehicles). This will provide AI systems with the data needed to analyze the full loop from online customer journeys down to the sale and aftersales. This includes data-driven attribution on a sales level, which means automatically optimizing marketing spend not only based on on-site behavior (e.g., completed online configurations), but on real car sales at the dealership. Furthermore, OEMs can then draw on readily available solutions, which use AI to personalize sales activities, e.g., to automatically show personalized cross- and up-selling offers on OEM/dealer websites based on a customer's historical on-site behavior and purchasing data.

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10 Setting the framework for car connectivity and user experience, McKinsey, November 2018.

11 Boosting your sales ROI: how digital and analytics can drive new performance and growth, McKinsey, February 2018.

III

OPERATIONS

Transforming all M&S operations through AI to improve M&S insights and efficiency

Sales/demand forecasting
and trendspotting

Customer
service bots

Build-to-stock
configuration
and distribution

Visual inspection and RV calculation
or returned used cars

Context	Behind the activities directly related to the customer-facing car sale lie many operational tasks that automotive OEMs' M&S departments are carrying out. To begin with, both the demand for car lines as well as for individual trim lines, drivetrains, and options need to be carefully forecast.

Pain points. This is critical to an OEM's success – a higher demand than anticipated for a particular car model means a missed revenue opportunity; a lower demand means that cars must be stocked and potentially sold with a high rebate. For such built-to-stock cars, sales departments must also define in which configuration to build a particular car model and how to physically allocate these vehicles across markets and dealers – today, a task often conducted based on gut feel.

After a sale, many laborious tasks need to be carried out. From handling the order, to getting a car produced and delivered, to scheduling service appointments throughout the vehicle's lifetime, to inspection and valuation of returned off-lease vehicles, many manual activities tie up M&S teams' resources, both at OEMs and dealerships.

AI-enabled use cases	AI offers a threefold potential to optimize such M&S operations: it can significantly improve the accuracy of predictive tasks (e.g., forecasting or trendspotting), automate resource-intensive tasks (e.g., the inspection of returned off-lease vehicles), and improve the customer experience (e.g., through personalized customer service interactions).

More accurate *sales/demand forecasting and trendspotting* is one core use case fueled by AI's ability to analyze disparate data and automatically adjust to new information. This ability allows forecasting based on the current, causal drivers of demand rather than on historical outcomes. Especially in retail, AI-enabled forecasting is taking hold.

Impact. The German retailer Otto, e.g., uses an AI system that provides 90-percent accuracy in forecasting what the company will sell over the next 30 days. The forecasts are so reliable that Otto now builds inventory in anticipation of the orders AI has forecast, letting the technology order 200,000 items a month from vendors with no human intervention.[12] Similarly, a grocery retailer implemented AI to forecast 150,000 products across 80 locations, each prediction relying on more than 100 input variables, including promotion campaign details, price changes, data on other products with potentially cannibalizing effects, time dimensions, and macroeconomic factors. To digest these complex inputs and their interdependencies and derive meaningful predictions,

12 How Germany's Otto uses artificial intelligence, The Economist, April 12, 2017.

a deep-learning AI system was set up. After training the model based on 3 years of transaction data, the model was able to forecast grocery demand with 80-percent accuracy. In effect, the retailer realized comprehensive savings by reducing waste, inventory levels, and supply chain cost. Automotive OEMs could reap similar benefits by having AI systems derive insights from analyzing diverse data ranging from online car configurator or social media activity to customer data and vehicle inventories in dealers' CRM and DMS systems, their own and competitor historical sales, as well as macroeconomic factors.

Depending on the granularity of available data, this could not only improve speed and accuracy of sales forecasting, but also optimize *build-to-stock configuration and distribution*. A better match between car production and customer demand could significantly reduce the need for rebates and strengthen OEMs' and dealers' top and bottom lines.

AI's ability to understand unstructured data such as pictures or audio recordings can be used to automate a company's resource-intensive processes. Based on its image recognition capabilities, AI could, e.g., be used to automate the *visual inspection of and RV calculation* for returned used cars. An AI system could be trained to automatically recognize a car's make, model, and version as well as potential interior and exterior damage. Combining this with vehicle metadata (e.g., age, mileage, configuration) and the current market environment (e.g., recently realized used-car prices on online market places), such a system could then automatically and with improved accuracy determine a car's RV.

Impact. As a result, OEMs could save 50 to 80 percent of the related fixed costs while significantly shortening used-car standing, which typically translates to a more than USD 10 increase in contribution margin per car and per day.

AI's ability to understand unstructured data can be also used to improve consumer interactions. AI-enabled *chatbots and virtual assistants* can fulfill the needs of increasingly impatient consumers, who expect to get their questions answered quickly, at any time, and through digital channels. AI allows these virtual agents to converse with customers through natural, open-ended questions instead of sending them through lengthy phone trees. In real time, they can assess a customer's history, monitor sentiment, and source the most suitable answers to cut wait times for customers. Furthermore, when calls are forwarded to a live agent, they can assist the agent with AI-driven insights to personalize the customer experience and offer customer-specific upselling proposals.

Impact. Today, a well-designed chatbot could resolve about 80 percent of customer interactions, reducing costs by freeing up agent resources. By implementing chatbots for their most critical customer journeys, a European utility provider managed to reduce their cost to serve by 20 to 30 percent while decreasing the time their customers had to spend on certain service inquiries from over half an hour to under five minutes. Besides chatbots, AI-powered personal assistants are progressively becoming a key channel for lead generation and customer relationship management, such as for convenient appointment booking via devices like phones or smart speakers.

| Foundations and key requirements | AI applications in M&S operations typically require joint data lakes, combining data from online marketing with sales and customer data that is today mostly available at the dealership level only. However, depending on the individual use case, much more and much different data can be needed to train and operate meaningful AI systems. These can be macroeconomic data or web scrapings of online marketplaces to analyze the current market environment and enhance demand forecasting or even pictures of cars to train an AI system to visually inspect returned used cars through supervised learning. Also, while first AI providers are offering off-the-shelf solutions for direct M&S use cases, many operations use cases require significant customization. |

As these use cases often completely transform how M&S operations are designed, they also require shaping the entire organization around digital and data capabilities. This includes conquering the "last mile," which entails integrating the output of AI models into workflows and making sure the superior insights provided by AI are reflected in the behavior of the people and processes of an organization.

3

AUTOMOTIVE PLAYERS SHOULD PURSUE A THREE-STEP AI TRANSFORMATION OF THEIR M&S ORGANIZATIONS

To successfully conduct AI transformations of their M&S organizations, OEMs need to simultaneously build the required AI capabilities (e.g., AI-specific talent, integrated data access, partner ecosystem) and the credibility within their organization required to successfully implement AI and deliver real business value. To this end, OEMs can follow three steps for a full AI transformation: understanding the individual starting point, piloting/building first AI-enabled use cases, and conducting a holistic AI transformation (Exhibit 4).

Exhibit 4   **We believe that OEMs can capture the value of AI in three ways**

UNDERSTAND

PILOT/BUILD

HOLISTICALLY TRANSFORM

UNDERSTAND	PILOT/BUILD	HOLISTICALLY TRANSFORM
AI workshop Understand AI beyond just buzzwords **AI readiness self-assessment (AIR)** Analyze an organization's AI capabilities, yielding immediate AI starting points **Impact assessment** Evaluate organization-specific AI potential, impact per use case, and immediate improvement levers **Go-and-see visits** Gain insights into success stories and inspiration for your own business **Pitch night** Listen to experts and observe pitches from AI start-ups together with companies in a similar position	**Pilot use cases** Develop and implement selected AI flagship use cases to prove technical and commercial potential, test and learn ■ Business understanding ■ Data understanding ■ Data preparation ■ Modeling ■ Evaluation ■ Deployment **Develop an AI strategy** Craft an AI strategy based on organization-specific use cases, incl. ■ Comprehensive assessment of options (make or buy or partner) ■ Decision on providing vs. using ■ Validation of impact assessment ■ Concrete recommendations on path forward	**Full-scale transformation** Implement AI in all processes in scope and build organizational capabilities, making sure to ■ Align on strategy ■ Build the right foundations of data, technologies, and people ■ Conquer the last mile by embedding AI into decision making and processes

3.1 Understanding the individual starting point

To efficiently launch an AI transformation, our experience shows that a thorough understanding of the technology, potential value, and necessary enablers vs. the current state of an organization is tremendously helpful. These facts separate the actual business value from the hype.

It is crucial to understand what it takes to get the AI engine started in one's own business. To this end, OEMs can evaluate whether critical AI enablers – such as availability of "AI-ready" data sets in the right quality as well as the high quantity required, access to AI experts, or a powerful tech stack – are already in place or still need to be established.

3.2 Piloting/building first AI-enabled use cases

An early implementation of AI-enabled use cases can demonstrate the value that AI provides and act as a training ground to identify how structures, processes, talents, or partnerships need to adapt. The development of an AI-enabled use case should aim at a minimum viable product (MVP) rather than directly going for a comprehensive, can-do-all solution that might take years to develop. A typical implementation follows an iterative, six-step process (Exhibit 5):
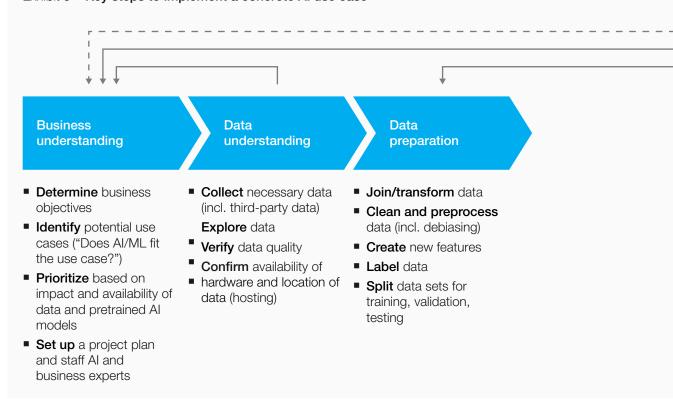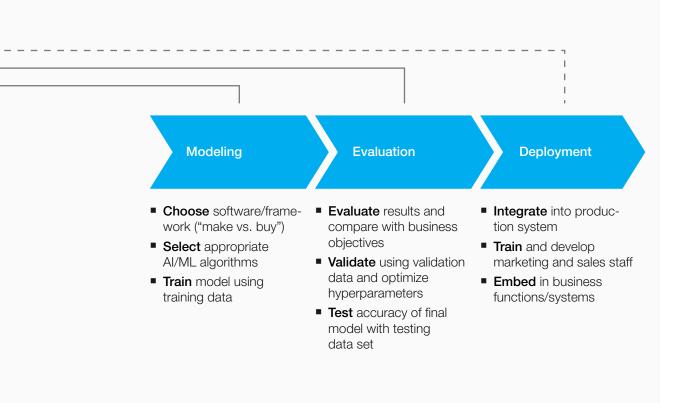
Exhibit 5   **Key steps to implement a concrete AI use case**

Business understanding
- **Determine** business objectives
- **Identify** potential use cases ("Does AI/ML fit the use case?")
- **Prioritize** based on impact and availability of data and pretrained AI models
- **Set up** a project plan and staff AI and business experts

Data understanding
- **Collect** necessary data (incl. third-party data)
- **Explore** data
- **Verify** data quality
- **Confirm** availability of hardware and location of data (hosting)

Data preparation
- **Join/transform** data
- **Clean and preprocess** data (incl. debiasing)
- **Create** new features
- **Label** data
- **Split** data sets for training, validation, testing

Business understanding. To not lose sight of the economics, organizations need to assess what impact potential AI can bring to their specific organization. As building an actual business case is much easier said than done, what often helps is pragmatically prioritizing potential use cases. Organizations should focus on use cases that are not only expected to have a high impact, but for which they can also draw on sufficient available data or where providers of AI solutions exist today. To ensure the AI system is solving the right business problem and will be adapted by the front line, it is crucial to have a joint team of AI talent and M&S personnel.

Data understanding. It is impossible to develop efficient AI systems without the right quantity and quality of data. Consequently, data needs to be collected from both internal and external sources. For automotive OEMs, this means collecting data from their own systems (e.g., online marketing data, online vehicle configurator data) as well as from dealers (e.g., DMS/CRM data) and third parties. It is important for data scientists to familiarize themselves with the data, identify potential data quality problems, and gain first insights. Also, this allows them to recognize potentially distinctive types of data or data subsets that can lead to a competitive edge in AI systems.

Data preparation. The collected data needs to be transferred into a joint data lake and made usable. This entails the identification of outliers, missing values, or potential biases in the data and then deciding how to handle them. For AI models based on supervised

Modeling
- **Choose** software/framework ("make vs. buy")
- **Select** appropriate AI/ML algorithms
- **Train** model using training data

Evaluation
- **Evaluate** results and compare with business objectives
- **Validate** using validation data and optimize hyperparameters
- **Test** accuracy of final model with testing data set

Deployment
- **Integrate** into production system
- **Train** and develop marketing and sales staff
- **Embed** in business functions/systems

learning approaches, this step also includes labeling the data (i.e., adding a tag to each piece of the data to inform the AI system about its meaning, e.g., indicating whether a picture of a returned off-lease vehicle reveals damage or not). Finally, the data needs to be split into subsets to train, validate, and test the AI model. Often, data preparation is the most time-consuming step in the implementation of an AI-enabled use case.

Modeling. To analyze the collected data, an initial, basic AI model needs to be built. This starts with developing basic heuristics, then choosing one or multiple AI models to iteratively test and refine. The model is then trained and incrementally improved based on the training data.

Evaluation. Subsequently, the model's performance is evaluated against the validation data set, which was not used for training, and further improved. This "hyperparameter tuning" optimizes the structure of the AI model and how it is trained.

Deployment. To convert the results produced by the AI system into real-world impact, the AI model needs to be deployed and embedded into the business functions it affects. This includes the initial training and ongoing development of the "traditional" sales and marketing employees. Often, it is necessary to train the staff on data analysis in order to establish enough trust in the AI model. With sufficient trust in the model, staff are more likely to actually make decisions and take actions based on the model's predictions.

3.3   Conducting a holistic AI transformation

While the implementation of AI use cases should be conducted in an agile, test-and-iterate way of working – one in which it is fine to fail fast – it is also crucial to avoid getting stuck in "pilot mode." A recent McKinsey survey suggests that only 8 percent of companies with analytics initiatives engaged in effective scaling practices.[13] Based on our experience, there is no one-size-fits-all, plug-and-play approach to AI transformations – every company, function, and process typically requires a tailored transformation logic. Nevertheless, companies that conduct a successful, holistic AI transformation typically exhibit best practices in three categories:[14]

Aligning on strategy. Successful AI transformations are systemic business transformations. They require substantial decisions driven by a true, cross-functional change agenda that needs to start from the top and make AI a corporate priority. To be truly impactful, AI needs to be integrated into all operations (marketing, sales, aftersales) and sales tiers (national, regional, local/dealerships). Structures, processes, and partnerships need to reflect this cross-functional commitment, and talent must adopt this perspective. Tech decisions cannot be made in isolation anymore. Accordingly, leading AI/analytics companies are twice as likely as their peers to report that their leadership team is completely aligned on an AI/analytics vision and strategy.

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13 Ten red flags signaling your analytics program will fail, McKinsey Quarterly.

14 Breaking away: the secrets to scaling analytics, McKinsey, May 2018.

Building the right foundations of data, technologies, and people. A consistent data and AI infrastructure is the common enabler of all successful AI transformations. A joint data infrastructure not only enables customer experience improvements, but also makes new AI systems available at scale. Breakaway organizations are 2.5 times more likely than their peers to have a clear data strategy, and twice as likely to have strong data governance practices that allow them to identify and prioritize data. For automotive OEMs, this includes data from their own systems, owned retail, and franchised retail – with third-party data becoming increasingly critical with more cybersecurity and data privacy concerns and tighter regulations, such as GDPR. Furthermore, organizations need a variety of new AI talent that goes well beyond classic data scientists, including roles such as data and machine-learning engineers, designers, or analytics translators. The battle for this talent is fierce: according to a recent McKinsey survey, 42 percent of executives cite lack of AI talent as their most significant organizational barrier in adopting AI.[15] Consequently, successful companies are pursuing a multifaceted approach that includes building capabilities in-house, hiring external talent, and establishing an ecosystem of business and technology partners to source technologies and close knowledge gaps. Many of the partners will be new entrants to the automotive market that bring important, highly specialized capabilities to the industry. In this context, automotive players will also need to find answers to questions concerning data ownership and cybersecurity.

Conquering the last mile by embedding AI in decision making and processes.
To achieve real business impact, leading companies make sure their AI-driven insights are turned into actions by embedding AI in their decision making in two ways: first, they include AI in defined sales workflows in order to ensure insights are available at the time they are most valuable. For example, integrating deal-scoring algorithms or upselling recommendations into sales tools and related processes, such as deal approvals, enables salespeople to use that information during customer interactions. This typically requires a combination of the right technical tools (e.g., API-enabled middleware) and support tools, such as intuitive dashboards, recommendation engines, and mobile apps. Second, they embed AI-based decision making in their corporate culture through change management in the form of clear communication, incentives, training, and performance management. Most importantly, AI talent should not work in an "ivory tower setup" or "digital garage" but should be incorporated in the M&S functions they affect. Accordingly, core leaders from the classic functions are equally important members of successful AI teams.

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15 AI adoption advances, but foundational barriers remain, McKinsey, November 2018.

OUTLOOK – THE TIME TO MOVE IS NOW

Throughout all industries and categories, we have seen how incumbent players have prevailed and prospered through AI-enabled M&S innovation. For example, as much of the retail world struggles to compete, Best Buy has managed to thrive by understanding their customers and embracing key challenges, resulting in a tripling of their share price since 2014.

Leading auto retailers such as Asbury Automotive Group and Arnold Clark have begun their AI transformations and have already started to reap significant rewards. New, pure EV brands such as Tesla and NIO are building their M&S customer experiences into a world-class, frictionless online retail experience in a greenfield manner from the start. Importantly, all these companies – incumbent retailers and new OEMs alike – have one thing in common: early on, they clearly recognized AI as a key enabler and foundation of their future business success and have been acting on this premise with leadership and consequence ever since.

Yet, with their valuable customer relationships and proprietary data sets, it is actually traditional automotive OEMs and their franchised dealers that are best positioned to reap significant value from implementing AI in their M&S processes and to secure their market leadership. A deep and systemic business transformation takes time, however, so starting it should not be delayed. What are you waiting for?

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