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# Artificial Intelligence Experience Report.

AI Applications in Marketing, Sales  
and Product Management.

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## Key statements.

- 1 13 use cases identified for AI usage in marketing, product management and sales show, artificial intelligence is a **key technology** and can help to significantly increase efficiency and effectiveness. The focus of AI applications currently is on marketing.
- 2 **Various ways** of getting started with the topic of AI are shown for companies.
- 3 The surveyed organizations are looking closely at how AI can be used, it has so far been put to **productive use** in half of the identified use cases.
- 4 Three out of four surveyed experts say that AI currently serves in particular as a **business-process automation tool**, increasing efficiency rather than sales.
- 5 AI provides the marketing function with deep insights into **customer behavior** and can thereby support organizations in optimizing their customer approach.
- 6 In sales, AI is used for the **automation of processes**, allowing companies to save resources and increase their sales success.
- 7 For the product management function, AI proves to be particularly useful for **analytics**. Customer needs are automatically identified and products and services are adjusted accordingly.
- 8 Involving **third-party AI service** providers can facilitate entering the technical side of developing AI use cases.
- 9 Among the key challenges in terms of AI application are poor **data quality, regulatory requirements** for the processing of customer data, as well as **ethical concerns**.
- 10 The successful application of AI requires enterprises to strategically **adjust their organizational processes**, create the **technical prerequisites**, and develop know-how. Business leaders need to have a **basic understanding of AI**.



# Introduction.

Focus on artificial intelligence.

**Artificial intelligence (AI) is one among the key enabling technologies of the 21st century and is playing an increasingly important role in enterprises of various sizes and across industries (Brynjolfsson and McAfee 2017). Artificial intelligence can help with opening up new sources of income and making different areas of business activity more efficient and effective (Hessenmetall 2021). The large amounts of customer data in marketing, sales and product management present particularly promising potentials for AI.**

This Experience Report highlights the growing potentials and identifies 13 promising use cases in marketing, product management and sales. These include, for example, the automated evaluation of customer sentiment, the implementation of intelligent demand generation management or individualized assortment design. Despite the considerable opportunities, the development and use of artificial intelligence currently still poses many challenges. These challenges create insecurity and have so far prevented AI systems from being productively used in these three functions. They include, for example, an inadequate data basis, technical and organizational problems, a critical attitude towards artificial intelligence, and pending questions regarding regulatory and ethical aspects.

The backgrounds and recommendations in this report are intended to provide companies with guidance on best practices. To this end, in-depth interviews were conducted with 20 AI-experienced professionals and executives from different business functions and industries such as the automotive sector, the book trade and the software industry. These experts provide deep insights into the use of AI in marketing, sales and product management across the different industries. Based on these insights, guidelines can be derived that will pave the way for the successful implementation and use of artificial intelligence despite all challenges.



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# What is AI?

A brief explanation of artificial intelligence.

The term artificial intelligence describes an interdisciplinary field of research that deals with the design of intelligent machines. It interfaces with other areas such as computer science, psychology, and linguistics. The term artificial intelligence is also commonly used to describe the result of such research, i.e. the intelligent machines. The goal is to simulate human intelligence processes by machines. At this point in time, however, AI is still a long way from being able to replicate the problem-solving skills and broad capabilities of the human brain. Rather, it is a “narrow” intelligence and focuses on solving specific problems (Russel and Norvig 2021, Meskó and Görög 2020).

One method used to implement artificial intelligence has received particular attention in recent years – machine learning<sup>1</sup> (ML). It enables computers to learn based on experience. Developers draw on complex algorithms and large amounts of problem-specific data to implement this ability to automatically learn and improve from experience. The special feature of ML is that no explicit if-then rules are programmed. Instead, algorithms are used to detect patterns in the data and derive models from them. These models are applied to solve a problem through an automated process (Mitchell 1997). As the availability of data, algorithms and inexpensive computing capacity has greatly increased in recent years, ML has increasingly been finding its way into companies (Buxmann and Schmidt 2021). For example, it is already being used for detecting quality defects in workpieces, automatically recognizing credit card fraud, or forwarding customer inquiries to the relevant contacts.

## Types of machine learning (ML)

ML can be divided into three subtypes:

- 1) **Supervised learning,**
  - 2) **unsupervised learning, and**
  - 3) **reinforcement learning**
- (Mitchell 1997, Buxmann and Schmidt 2021).

**Supervised learning** uses sets of data in the form of input variables and output target values (e.g., image of a workpiece + description of condition) and looks for recurring connections between input characteristics and the resulting outputs.

In **unsupervised learning**, the data is available only in the form of an input and there is no output variable (e.g., characteristics of credit card transactions). In this case, the algorithm looks for similarities in input characteristics and, for example, identifies deviations “from the norm”.

**Reinforcement learning** is based on algorithms that autonomously learn a problem-solving strategy through “trial-and-error” methodologies by providing rewards or penalties for the actions performed by the machine based on the end goal (Buxmann and Schmidt 2021).

<sup>1</sup> When we speak of “artificial intelligence” below, we refer to AI based on machine learning (ML) methods.





# Methods.

About this study.

Artificial intelligence offers potential especially for areas of activity where large amounts of data are available. Due to the intensive exchange with customers and the storage of data on current market events and buyer behavior, a large amount of data is generated in a company's marketing, sales and product management departments. Here, the use of artificial intelligence promises optimized performance in a wide range of application areas.

Qualitative interviews were conducted between March and July 2021 with 20 professionals and executives with relevant exper-

tise in the three business functions. Based on the interviews, potential use cases for the application of artificial intelligence in marketing, sales and product management were developed, associated challenges were identified and recommendations for action for companies interested in using artificial intelligence in these functions were derived. The experts come from various industries, with a focus on the software industry. Our interview partners work mainly in Germany, two experts are based in England and Hungary, respectively. The average duration of the interviews was 67 minutes. The table below provides an overview of the interviews.

ID	Industry	Size of enterprise	Function	# of experts	Position
I-1	Automotive	Large enterprise	Sales, after-sales	1	Tech professional
I-2	Book trade	Large enterprise	Marketing	1	Tech professional
I-3	Information technology	Large enterprise	Marketing	3	Executive, professional, professional
I-4	IT services provider	Medium-sized enterprise	Marketing, sales	1	Professional
I-5	IT services provider	Medium-sized enterprise	Marketing, sales	1	Managing director
I-6	Aviation	Large enterprise	Marketing	1	Executive
I-7	Software	Large enterprise	Marketing, sales	4	Executive, executive, executive, Executive
I-8	Software	Large enterprise	Sales	1	Professional
I-9	Software	Large enterprise	Marketing	1	Executive
I-10	Software	Large enterprise	Marketing, sales	1	Executive
I-11	Software	Large enterprise	Product management	1	Professional
I-12	Software	Large enterprise	Sales	1	Professional
I-13	Transport	Large enterprise	Sales	1	Professional
I-14	Insurance industry	Large enterprise	Product management	1	Executive
I-15	Insurance industry	Large enterprise	Product management	1	Executive

Overview of interviews



# AI in marketing, product management and sales.

Use cases for using artificial intelligence.

A total of 13 different use cases were developed based on the expert interviews. Approximately half of these are already used productively. The remaining use cases are currently still at an early stage, i.e., at a stage focused on understanding the business and the data. The identified use cases are aimed in particular at increasing efficiency in the areas of application. This is what three out of four experts say.

Thus far, most enterprises have been concerned with simply automating processes. However, focusing on improving customer satisfaction or increasing sales would be just as promising. A large share of the use cases mentioned were identified in marketing, while slightly fewer use cases fall into the areas of sales and product management.

The use cases are not just applicable to one specific area, but also hold great potential for other areas. Figure 1 shows an overview by business activity.

“Cutting costs and saving time seem to be more important than generating more sales.” (I-5)

Marketing	Interface between marketing and sales	Sales	Product management
<b>Sentiment analysis</b> Analysis of responses to image campaigns and headlines by customers, partners and competitors.	<b>Chatbots</b> Chatbots are used for promoting products and answering sales questions quickly and automatically without involving human contact.	<b>Automated generation of offers</b> Automated generation of offers based on customers' speech inputs.	<b>Damage event forecasting</b> Analysis of damage events and provision of corresponding supporting information as well as actions to be taken by the customer.
<b>Content creation</b> Holistic creation of texts for corporate websites as well as automated matching and cross-referencing of such content.	<b>Data-based customer segmentation</b> Classification of customers by characteristics and optimization in terms of providing superior search results, personalized offers, predicting purchasing behavior.	<b>Automated request verification</b> Automated review of requests/claims to detect fraud as well as billing errors and speed up processes.	<b>Intelligent portfolio design</b> Personalized adjustment of product range and further development of product offerings based on it.
<b>Campaign monitoring</b> Automated analysis and control of marketing campaigns according to cost as well as success criteria.	<b>Intelligent product recommendation systems</b> Recommendation systems assess how strong the interest in certain products is based on previous orders from the shop and also searches for products that might interest the user.	<b>Demand generation management</b> Analysis of sales data to leverage sales activities in a more targeted manner.	<b>Usage analytics</b> AI-based evaluation of user behavior for the purpose of designing future products.
		<b>Automated routing of sales inquiries</b> Processing of inquiries and automated routing to the competent persons.	

Figure 1 – Identified use cases in the business functions



# Artificial intelligence in marketing.

Effortlessly understand your customers.

**Using artificial intelligence in marketing in particular provides deeper insights into customer behavior in order to optimize the approach to potential customers. Targeted analyses can be used to design customized marketing measures and thereby sustainably improve marketing performance (e.g., Abidar et al. 2020).**

The statements made by the experts in this report show that the use of artificial intelligence is becoming increasingly commonplace in the marketing field. Use cases such as sentiment analysis, chatbots, content creation, data-based customer segmentation or intelligent product recommendations are no longer a rare feature. For example, one of the experts describes how

intelligent sentiment analysis can help capture and analyze customer sentiment concerning a company or a particular product or service on a large scale (I-3). In this way, companies can take appropriate measures if a product or service regularly receives poor ratings. In addition to text comprehension, artificial intelligence can also generate natural language content. For example, an AI-based chatbot can interact with a potential customer and provide an overview of the product range, answer specific questions about products, and recommend particularly popular products (I-4). In addition, artificial intelligence will increasingly be able to also create entire content for websites and marketing activities (I-9). Modern AI systems are getting better and better at creating even complex text on selected topics.

“

Looking at these three fields now [...], and based on my gut feeling, I would say that I currently see most use cases in marketing or that this area has the most relevance at this point in time. There, it is especially about the question of: How well do I know my customers? What can I offer them?” (I-10)

To better understand the different customers, artificial intelligence can also segment them by behavioral patterns and determine customized marketing measures based on this segmentation. Netflix, Amazon, and China's Alibaba, for example, employ AI-based recommendation systems using image recognition techniques (e.g., images of similar products in the product range) or data-based analyses to propose similar products to customers based on previous purchases (I-2, I-7). In this regard, one of the experts describes how the company's marketing department automatically recommends new books based on an analysis of general market data (e.g., ranking of current books) and individual customer data (e.g., preferred genre, books last read). Readers get these book recommendations based on their personal rhythm, for example, shortly before finishing a book or

based on previous purchasing behavior. The advantage is that each new input (e.g., click on the recommendation, purchase) in turn produces feedback for the AI model, and the AI model autonomously improves its own performance through machine learning.



## Artificial intelligence in sales.

Automating processes – generating sales.

**In the field of sales, artificial intelligence can be used to match pricing models to individual customers, create customized offers, and predict the sales potentials of own products and services. In this way, sales activities are focused and resources are saved accordingly (e.g., Eitle and Buxmann 2019).**

Based on the survey among these experts, we were able to identify in particular those use cases that deal with the optimization of sales process. For example, fundamental efforts are already under way to automate and simplify the processing of non-digital documents. Using intelligent image and text processing, inquiries on paper are converted to a digital format and their contents is identified. The contents are then automatically classified by topic (e.g., request to purchase a product) and forwarded to the competent contacts in the company (e.g., those responsible for a product) (I-15, I-9).

In the context of demand generation management, artificial intelligence can be used to identify particularly promising prospective clients (“leads”) and analyze their willingness to buy. The goal is to make reliable predictions about which qualified contacts have an actual willingness to buy (“opportunity”) and which opportunities will in turn lead to closing a sale. This makes it possible to target those leads who hold the most promise for closing a sale. Here, artificial intelligence serves to support the sales staff in order to save time and expenses when approaching potential customers (I-8, I-12). In addition to internal process optimization, artificial intelligence can also improve the interaction with customers. For example, one of the companies surveyed is working on using AI to process voice inquiries, picking suitable products in response to an inquiry, and offering them to customers in an automated process (I-13).



# Artificial intelligence in product management.

The right product at the right time.

**Artificial intelligence can be used in product management to analyze data from different phases of the product lifecycle. Products and services can thus be improved and adjusted to customer needs, for example in terms of quality, functionality, and user-friendliness (e.g., Kwong et al. 2016).**

In addition, AI can customize the product portfolio according to customer preferences. What feedback is available from product reviews? Are certain products frequently purchased together with other products? What external factors—such as the Covid-19 pandemic or the weather—influence shoppers' usage behavior? To answer these questions and best address customers' needs with regard to products and services, data can be collected from various sources (e.g., online trading sites, apps, forums) and analyzed using artificial intelligence (e.g., Xu et al 2019).

The experts surveyed also recognize the potential of artificial intelligence for product management, even though it is still early days for its application in this business function. One of the use cases identified in this study comes from the insurance industry.

Some insurance companies offer customized insurance services and supplementary products that are based on their customers' personal health information (I-14, I-15). By comparing data on recovery trajectories and successful treatment plans for specific conditions, targeted health programs can be offered to the insured. For example: If it has been shown that the recovery trajectory in a chronic illness has been significantly more successful as a result of a particular health program, this program will also be recommended to other insured persons with the same or a similar medical condition. The goal is to create more personalized services for groups of medical conditions to support a faster and more effective recovery process (I-15).

Artificial intelligence is also being used in the automotive industry to improve services around the vehicle experience. In this context, an expert explains how the company works at predicting the possibility of a damage event and offer preventive service or ensure prompt assistance after the damage event has occurred. Again, the key topic here is the customization of support so that the personal interests of the car owner, for instance, can be taken into account when a replacement vehicle is needed (I-1).





# How enterprises can optimally use AI.

Challenges and recommendations for action.

As can be seen from the use cases described above, artificial intelligence can be used for a wide range of applications in marketing, sales and product management. To be able to realize this potential, companies need to look at various problems that have prevented the extensive use of artificial intelligence to date.

The challenges identified based on our interviews are described in detail below, and appropriate recommendations for action presented. The description is structured according to five dimensions: (1) Data, (2) Technology, (3) Organizational processes, (4) Professionals, and (5) Regulatory & ethics.



Figure 2 – five dimensions





# Data.

The basis needs to be right.

**The basic prerequisite for the application of artificial intelligence is the availability of sufficient high-quality data that is representative for the respective use case.**

Many of the interviewed experts say that they generally have a sufficient amount of data for their respective areas of activity (I-6, I-9). However, quantity alone is not sufficient to effectively implement artificial intelligence. It also needs to be ensured that the **quality of the data** is sufficient for meaningfully mapping the processes to be automated or supported using AI (I-10). Poor data quality is one of the most frequently mentioned obstacles. In the different functions, this is often due to the fact that no strategy has been put in place to manage the data in a consistent manner (I-1). This short-term perspective can result in data being incomplete, uncommented, contradictory, or even incorrect (I-1, I-5). To prevent this problem from occurring and ensure that high-quality data are gathered, it is essential to define data collection and data maintenance stan-

dards at an early stage (I-8). This means that all employees should be given a common guideline on what data is to be filed and how this is to be done.

In addition to the lack of data strategy, external factors such as seasonal fluctuations or crises can also contribute to a decline in the quality of data over time. Here is how one of the experts describes how the pandemic has distorted their data basis in marketing:

**“We rely heavily on data to predict customer behavior. But now customer behavior has changed massively as a result of Covid-19.” (I-6)**

If only incorrect, obsolete, or inadequate data is used to train the AI, it will ultimately also produce poor results (I-14). In order to ensure that the training basis is reliable, data should not be used without context. Instead, the period of time during which

historical data were recorded should be evaluated and possible external factors taken into account. For example, it may be useful to use in particular data recorded since the start of the pandemic to predict current purchasing behavior. On the other hand, if customer behavior in general, i.e. beyond the pandemic, is to be analyzed, it may be useful to look at a longer time period (e.g., 24 months) (I-6).

Another important aspect, which according to the experts, often still leads to problems in the business functions surveyed is the **merging of data** from various in-house and third-party sources, such as click streams or product ratings. In the surveyed business functions, many organizations still find it difficult to continuously merge their data in real time:

**“But we definitely struggle—as many other companies probably also do—with the fact that data are accumulating in a plethora of operational applications and somehow need to be merged and prepared in a central repository to facilitate working with these data.” (I-6)**

It is therefore important to devote resources (e.g., staff resources for data engineers) to creating a centralized, cross-departmental repository for the accumulated data. Concepts such as data warehouses or the data lakes provide a centralized data repository. This will allow the marketing department, for example, to access data from the sales department to identify previously unknown contexts and refine their analyses (I-1, I-2).



## Technology.

Different approaches to starting to work with artificial intelligence.

In the early stages of AI development, the question arises as to whether AI services—for example, from major providers such as Microsoft, Google, IBM or Amazon—should be used to facilitate the implementation of use cases.

Various types of services can be considered in this regard, which are characterized by different degrees of abstraction. Some **services** allow you to customized AI models, for example, through the option to adjust parameters. Other services merely access the company's database. At a very high level of abstrac-

tion, using pre-trained AI models without including own data may be an option. Such pre-trained models are used in particular for standard applications in functions that are identical or hardly differ from one company to another. This is the case, for instance, for speech and image recognition (e.g., using Microsoft Azure Speech Recognition Services or Google Image Recognition). This is an application that can be particularly important in marketing, especially when it comes to addressing customers in a personalized manner.

“So we're not only using in-house developed AI models, but also managed services for the translation of {images or texts in tags}. The reason for this is simple: If you have a {third-party} solution that works and that you can use at reasonable cost, then we first use a third-party service or a managed service in the transition period.” (I-7)

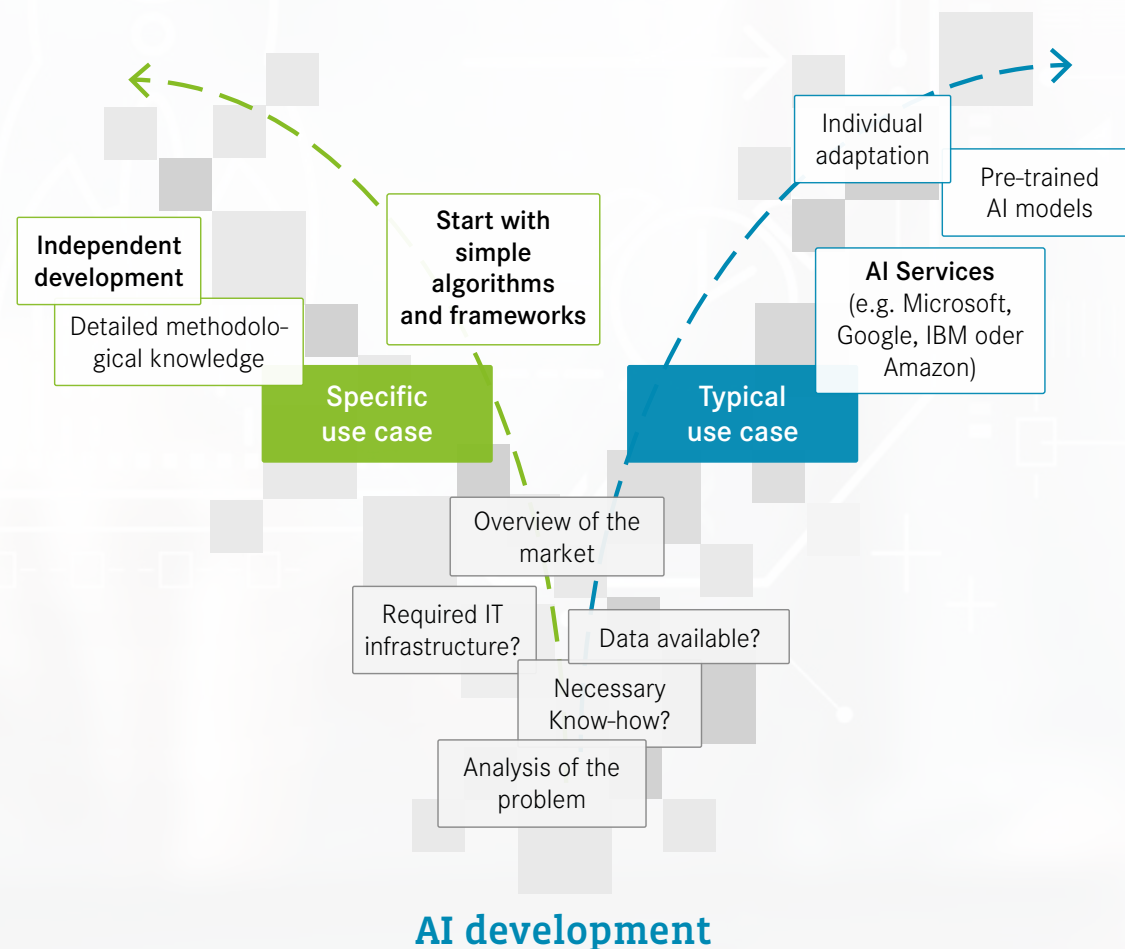


Figure 3 – Different approaches to starting to work with artificial intelligence



According to the surveyed experts, AI services can help to quickly generate initial successes (I-7). However, it is costly to use and involves the risk of creating dependency between the users and the providers of the service (I-10, I-7). It is therefore useful to start with getting an overview of the market (I-9): Which AI services are already available? What IT infrastructure is required for it? What know-how is required to operate the services? At the same time, the problem to be solved using artificial intelligence should be analyzed. In particular, it should be analyzed whether it is a typical use case, such as speech transcription or image recognition, or a use case that is highly specific to the processes in the respective area of activity (I-10, I-13). If the latter is the case, developing an independent, customized solution is often unavoidable:

“If it's just about automatically transcribing speech using an algorithm, it'll work just fine. I won't need a special component for it. But if it's a rather specific use case, [...] an off-the-shelf solution may not offer sufficient flexibility.” (I-10)

For these cases, dedicated proprietary AI models need to be developed and this requires working with appropriate programming languages (e.g., Python, R) and various frameworks (e.g., TensorFlow, Scikit-Learn) (I-10). Since these frameworks work at a lower level of abstraction than AI services, more in-depth method knowledge is required for implementing the AI. A company with limited AI expertise can start with comparatively simple algorithms and frameworks to develop a “feel” for the implementation. After all, not all problems require advanced algorithms and frameworks to be solved.

“In fact, a lot of the cases can be handled with simple methods – no rocket science required.” (I-1)

Another decisive factor for the independent development of artificial intelligence and its successful implementation is the availability of sufficient memory and computing capacity, because large amounts of data need to be handled to train artificial intelligence. Traditional office computers are often not suited for this purpose, as they lack the necessary high-performance computing capacity (I-1). Many enterprises are therefore taking **recourse to the cloud**. The experts surveyed also state that they are increasingly using cloud services from vendors such as Microsoft, Google, IBM, Amazon and others (I-14).

However, not all enterprises and business functions are at the stage where they are able to operate entirely in the cloud (I-6). The use of clouds is complicated in particular by the fact that many providers are based in the US. However, the General Data Protection Regulation (GDPR) requires (customer) data to be stored and processed in Europe (I-4). To still be able to work with sensitive customer data, the large providers often offer the option of hosting the clouds on European servers. In addition, the data stored in the cloud can also be encrypted to prevent unauthorized use by a third party. One of the experts also stressed that customers should be informed that a service of a U.S. provider is being used (e.g., cloud application or AI service) so that they can choose if and how they want to use the AI system (I-4).







## Organizational processes.

For a prepared, agile and diligent approach.

Various resources need to be allocated and strategic decisions made in order to develop and use artificial intelligence. The development of artificial intelligence is often a long-term process and requires significant human resources. As a result, the management level needs to actively support the necessary measures (I-9, I-14). Executives therefore need to have a basic understanding of how artificial intelligence works.

“First of all, they need to properly understand what artificial intelligence is, so that those who make decisions – the management – know what they're deciding upon.” (I-14)

Various approaches can be considered to promote the **understanding of artificial intelligence** among executives. Wide-ranging educational resources on relevant platforms such as Coursera or LinkedIn Learning can be used as a starting point for educating the management (I-12).

It is also important to consider who in the company will be responsible for the development of AI systems. In principle, most of the development work can be allocated to a **center of excellence** that is separate from the business functions and the existing IT. This type of organization allows for a fast and focused development. On the other hand, the experts point out that centers of excellences often operate in isolation from the actual business functions such as marketing, sales and product management.

“The problem is that a center of excellence is excellent at algorithms but doesn't really understand and know the business model and the processes involved.”(I-14)

Another option is for artificial intelligence to be developed on a **decentralized** basis in the respective functions. The downside is that the necessary AI know-how is often not available in the specialist departments. While a company is still at the very beginning of AI development, it therefore usually makes sense to bundle the niche competencies in a central function. It creates the necessary focus on the technology (I-8, I-13). Various steps can be taken to build a bridge between a center of excellence and the business functions such as marketing and make sure that the business processes are understood. Among them are fixed consultative meetings in the context of which the functions can present their ideas of use cases to tech professionals. At the very beginning of AI development, interviews can be conducted with the functional managers to better understand the problem. In addition, it can be helpful to appoint a person to liaise between tech professionals and business units. This could be a sponsor from the marketing, sales or product management function, for example, to whom the status of AI development is reported at regular intervals so that the sponsor can review it in the light of their professional background (I-8).



This approach can also support centers of excellences in identifying worthwhile processes that will be of real benefit to the future end-users. Especially in the case of human-to-human interactions in marketing and sales, there needs to be a professional assessment as to whether the use of AI systems makes sense at all. If, for example, a chatbot is used in customer communication, it should be checked in advance whether it is suitable for the company's target group. Older people in particular, i.e., those who are not digital natives, might find it difficult to use such a system.

In addition, organizational processes also need to be adjusted to enable the implementation of artificial intelligence. An important aspect here is the experimental nature of AI development.

“Machine learning and AI development is all about running a lot of experiments.” (I-10)

Many departments in a company – including IT – still work based on sequential process models. Projects are planned linearly in advance and processed step by step without any iterative feedback cycles. However, this often results in problems, because when the development of artificial intelligence is started, it is not at all clear whether and how it will ultimately be able to achieve the desired performance.

“Especially in the development of functions based on machine learning, an incredibly large number of assumptions is made in the development process: What exactly the problem is, how the problem is perceived, what the consequences of the problem are, how a solution to the problem could work, what the framework conditions have to be for this solution to work.” (I-10)

The success of artificial intelligence depends strongly on the combination of data and algorithms, the probability of success of which can only be assessed to a limited extent before the development begins. (I-10). The only criterion is usually whether the decision to be automated has a gray area that can complicate its use (I-1). It is therefore necessary to convert the linear processes in the company to **agile development methods**. These allow feedback to be collected even during AI development.

“What I would never do is develop a product and say: ‘Okay, let’s look at it in 2 years’ time and see if it generates any value.’ [...] That's why agile frameworks like Scrum or Kanban also work in this direction: ‘By dividing my product into small iterations, I try to minimize risk in order to identify what adds the most value for customers’.” (I-10)

#### Expert tip:

Consequently, the implementation of agile methods is a basic prerequisite for the development of artificial intelligence. According to one of the experts, agile thinking and working should be embedded in employees’ mind-sets. The point is not to formalize the agile processes too much, but to create a culture in the fields of activity – for example, by using change management with a long-term focus (I-14).



# Professionals.

AI know-how is a rare commodity.

Different groups of people are involved in the development and use of artificial intelligence. Among them are executives, data scientists, software engineers (often called “ML engineers” in this context), data engineers, and domain experts from the operations areas.

There is a particularly high demand for data scientists and software engineers. While data scientists are in charge of training the AI models, software engineers are needed to convert the AI models into an applicable form and integrate them into the existing IT landscape. This is essential because users, for instance in marketing or sales, should be able to interact with artificial intelligence as smoothly as possible. According to the experts, the role of software engineers should therefore not be underestimated:

“You could also say that 80 percent of machine learning is software engineering.” (I-10)

For the implementation of an AI system to be successful, companies should decide at an early stage who will be involved in its development (I-7, I-14). The specialist departments, such as marketing or sales, often do not themselves have the human resources with the technical knowledge in the field of data science or software engineering that is required for implementing artificial intelligence. Therefore, it should initially be reviewed whether the relevant tech professionals are available in-house, for example in a center of excellence. However, both data scientists and software engineers are in high demand and can mostly choose their employer (I-14, I-15):

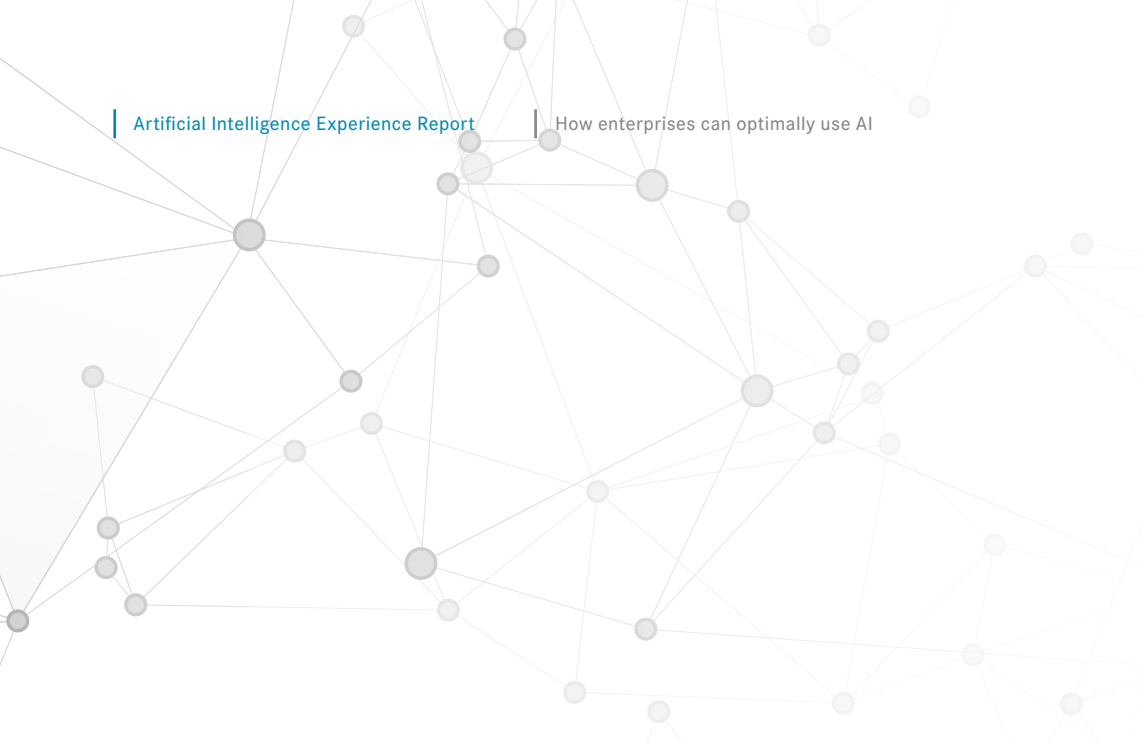
“Our problem is that there is a shortage of data scientists in the job market or they are extremely expensive.” (I-14)

As a result, the required talent is often not available in a company and enterprises need to look at how they can develop AI competencies in-house. There are various ways of doing this, for example through the strong commitment of an organization to training and continuing education. In this context, one of the interviewed experts explained how dual degree programs can be used to bind tech professionals to a company as early as possible.

“That's why we started offering a dual master's degree program, to retain data scientists as early as possible, while they are still students.” (I-14)







Another option are in-house further education courses. Some companies are already offering in-house learning platforms, training courses and workshops for all employees (I-1, I-12). Forums for exchanges between employees or discussion platforms about current AI developments can also support the transfer of knowledge on artificial intelligence (I-15). This allows interested professionals who have already worked in the field of statistics, for example, to qualify as so-called “citizen data scientists” and helps companies fill gaps in the human resources they need (Tapadinhas and Idoine 2016). If it is not possible to develop in-house know-how, there is always the option to involve third party service providers. In this case, but also beyond, it is particularly important for the successful development of AI to support the collaboration between (in-house or third-party) tech professionals and the business departments (I-14).

Improving the understanding and knowledge of AI is also useful for those working in the application domain. This will enable employees to identify potentials, but also contribute to mitigate concerns. Artificial intelligence offers tremendous potential to drive automation in areas of business activities (I-5, I-14, I-6). AI might, for example, in future take over part of the customer contacts and make personalized product offers based on previous purchases (I-4, I-6). This automation potential can contribute to increasing the efficiency of these business areas. On the other hand, (some of) the tasks performed by employees today might also be taken over by artificial intelligence and this has the potential to lead to conflicts and a hostile attitude. Furthermore, artificial intelligence is based on statistical learning and therefore does not always produce faultless, comprehensible results. This may result in a low confidence in AI among potential end users:

“We are having acceptance discussions because many people are not comfortable relying on the models and instead say: ‘But I know what my target group looks like: They are women between the age of 40 and 55 from the Greater Hamburg area.’” (I-6)

“I believe that—especially when it comes to the topic of [artificial intelligence]—it is way more efficient to build cross-disciplinary, agile teams with a clear understanding to produce a [kind of] chain reaction. [...] Let me put it like this: Don’t expect one large-scale event to bring about change.” (I-14)

#### Expert tip:

Since AI systems include probabilistic features, do not always provide correct predictions, and may lack transparency, it is particularly important that the designated end users understand and accept them. Only if they learn to also accept that the AI system can also make mistakes and actively provide feedback can the system improve in the long term and deliver the desired performance. Effective change management is essential to enable this shift in thinking

(I-1, I-14). This is not just about presenting your workforce with the potentials of artificial intelligence in a ‘train and explain’ session. Instead, the experts we interviewed recommend highlighting the long-term benefits of artificial intelligence and making them tangible. One of the experts suggests supporting a digital mindset through structures that allow for long-term cross-disciplinary interaction.





# Regulatory aspects & ethics.

Acting in compliance with the GDPR and moral values.

**One of the challenges with regard to the development and use of artificial intelligence most frequently mentioned by the interviewed experts is data protection.**

Since the personal data of customers is used to train AI in the marketing, sales and product management functions, this aspect should indeed be explicitly emphasized (I-6). In the light of the GDPR, in particular, data protection has received increased attention in these business functions (I-6, I-9). Companies are faced with the challenge of verifying which data may be lawfully used at all, what measures should be taken to make it possible to use them and how sensitive data should be anonymized to ensure that they no longer include identifiable elements.

“Purely from a marketing perspective, all privacy topics are very much driven by the GDPR. [...] What am I allowed to do, what data do I share, what [data] am I allowed to collect, what consents do I have to obtain with regard to data storage or marketing communications?” (I-9)

For this reason, the data to be processed, which will serve as the basis for training the artificial intelligence, should always be reviewed in the light of the data protection laws and regulations before actually starting the development (I-13). The business functions can easily reach their limits when it comes data privacy or data protection laws and a close cooperation with the legal and data protection functions is therefore recommended (I-2, I-13). If specific information cannot be processed for data protection reasons, there is also the option to use anonymized or synthetic data (I-6, I-15). This means data where potentially identifying features are either deleted from the dataset or where the data set is artificially recreated to have statistical properties that are as similar as possible to those of the original data. These procedures often go along with a considerable investment in terms of time and resources. However, they make it possible to be able to continue to use some of the information included in the data.

In addition to the legal aspects, the respondents also raised the issue of ethical challenges. Artificial intelligence has enormous potential, but it also has limitations. In this context, one of the experts points out that artificial intelligence can only know the aspects actually included in the data used for training it (I-15). This means that AI that creates personalized offers for health products, for example, could well provide inaccurate or erroneous information if the database for training the AI system was not representative of the customers addressed. AI should therefore be treated with caution when used to fully automate processes that might be critical for a person (I-15).

From an ethical perspective, it is also important to consider the issue of transparency in the application of AI systems. Entrepreneurial decisions generally require a certain degree of transparency to ensure that they can be understood, not only by those who work for an organization, but also by potential customers. Oftentimes, regulatory requirements (e.g., in the insurance industry) make it necessary to present the decision-making process and the results of a decision in a transparent

manner. However, organizations are faced with the challenge that both users and developers are often not able to explain the exact functioning of AI systems and how AI models come to their decisions. When considering whether or not to supplement or replace a process with artificial intelligence, it is therefore necessary to analyze what level of transparency is required for the decision-making. For example, a certain degree of transparency should be available for processes where the cost of errors is high (e.g., personalized proposals of healthcare services, verification of warranty claims) (I-1). AI algorithms providing more transparent results (e.g., decision trees) or explainable AI can be used for this purpose. Methods available to this end include approaches such as LIME or SHAP. They can explain AI-generated results in a manner that is understandable to humans (e.g., Ribeiro et al. 2016, Lundberg and Lee 2017). In addition to these specific procedures, however, even simple measures can already increase transparency for users. It might, for example, be an option to inform users of the database used for training the AI model or of the performance achieved by the AI system in general (e.g., accuracy, F1 score). It should also be noted in this context that not every use case requires a high level of transparency. Taking the step towards personalized marketing may, for instance, already increase sales without triggering inquiries from potential customers—even if not everyone gets a perfectly fitting product or service recommendation.



## Conclusion.

Artificial intelligence can increase the efficiency and effectiveness of business processes and sustainably drive their optimization. In the discussed three application domains – marketing, sales and product management, 13 use cases have been identified where AI opens up new opportunities to personalize products and services, improve customer approach and ensure a smooth customer journey. Use cases are currently still mainly implemented in areas of activity aiming to increase their process efficiency. Organizations should also consider use cases outside efficiency gains to realize the full potential of artificial intelligence in marketing, sales and product management. Because artificial intelligence can also increase customer satisfaction and boost sales—as can be seen on the example of intelligent product recommendations in marketing.

The development and use of artificial intelligence currently still pose major challenges, with questions and concerns mainly relating to the data basis, the technology behind AI systems, organizational adjustments, the lack of skilled

professionals, as well as ethical and regulatory concerns in connection with these systems. This report therefore discussed common obstacles to the use of artificial intelligence in marketing, sales and product management and derived initial recommendations for handling them. They serve as a first reference point for businesses approaching the concept of AI.

Organizations should start with familiarizing themselves with the aspects they need to take into account in developing and applying artificial intelligence. For example, possible use cases for the organization's processes need to be identified and individually assessed from the very beginning. Next, the question of whether to use third-party AI services or train an AI model to suit the specific needs of a company must be clarified. From there, agile methods and sustained support by the management will enable professionals in the various domains to implement the measures necessary to use artificial intelligence successfully.



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