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Innovative software for companies with vision.

WHITEpaper



**More than just hype:
How AI is revolutionizing our world**

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Artificial intelligence has perfected vision and learned to understand: while computer vision captures the visible, LLMs and generative AI distil knowledge from it - a new era of digital intelligence has begun.

Read this white paper to find out how you can integrate AI into your processes and benefit from it.



AUTHOR
RENÉ KESSLER
rene.kessler@abat.de

In recent years, artificial intelligence (AI) has gained considerable attention and has become one of the key topics in the business world. But what is behind this hype? The origin lies in a combination of technological breakthroughs, growing data availability and increased computing power.

The surge in AI's popularity is largely driven by specific applications showcasing its powerful capabilities. ChatGPT, for instance, has transformed human-machine interactions by producing human-like text, enabling seamless natural language communication. AI can also be used in creative processes. Tools such as DALL-E or Stable Diffusion generate realistic or artistic images from text descriptions. Other AI tools can be used to compose realistic pieces of music based on texts and descriptions. But it is not only creative processes that can be supported in this way. AI has also found its way into the business world and is already optimizing stock levels in areas such as production and logistics, improving route planning and increasing efficiency in manufacturing. AI is also being used successfully in the financial sector for fraud detection and risk management, while in healthcare it supports diagnoses and creates personalized treatment plans.

A key advantage of AI is its ability to automate routine tasks and speed up everyday work processes. From automated data processing without media disruptions to intelligent support for everyday tasks, AI relieves employees of monotonous activities and allows them to focus on more complex and value-adding tasks.

These diverse applications show that AI is far more than just a theoretical gimmick - it is a technology with the potential to completely change the way we work, sustainably improve business processes and significantly increase efficiency in everyday working life.



What is AI anyway?

Artificial intelligence refers to the development of systems and applications that are capable of performing tasks that normally require human intelligence. These include recognizing patterns, solving problems, learning from experience and making decisions. In contrast to conventional software solutions that work according to fixed rules, AI systems can learn from data and adapt to changing conditions.

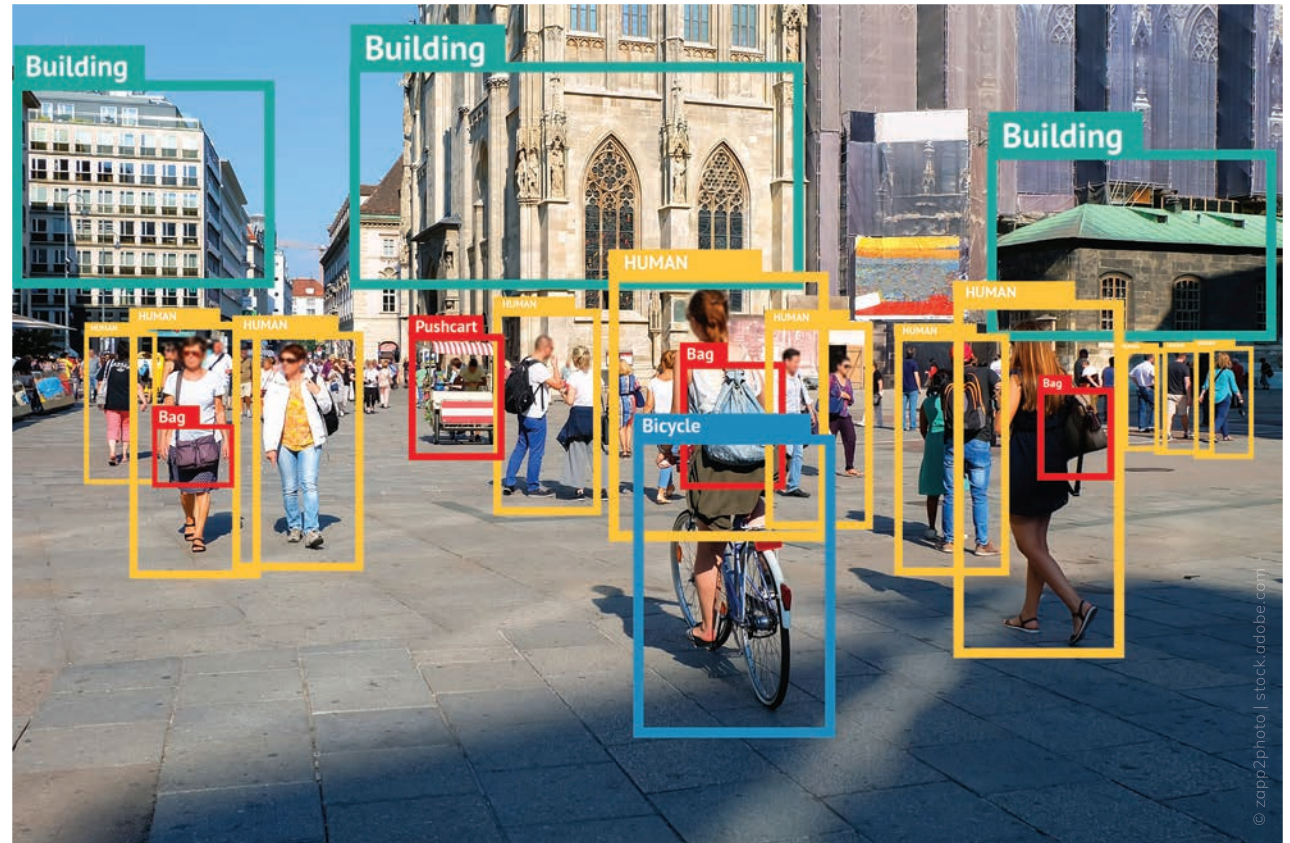
Artificial intelligence: disciplines, applications and surpassing human capabilities

AI is a broad field that encompasses various disciplines, each of which emulates different aspects of intelligence and can be used in specific applications:

1. Computer vision: This field focuses on algorithms' ability to interpret and comprehend visual data from the real world. Applications range from object recognition and image classification to the analysis of movements in videos. In production, for example, computer vision is used for quality assurance and the automation of inspection processes.

2. Large Language Models (LLMs) / Natural Language Processing (NLP): NLP is the field of AI that deals with the processing and understanding of human language. Large Language Models such as OpenAI's GPT4o are able to generate and translate natural language and answer complex questions. This technology is used in chatbots and digital assistants, automated customer services and for text analysis.

3. Reinforcement learning: Reinforcement learning is a method of machine learning in which agents learn to act by trial and error in a given environment. The agent receives rewards or punishments based on its actions and adapts its behavior accordingly to maximize its reward. This method is often used in robotics, autonomous systems and process optimization.



Example Computer vision



Illustration Reinforcement learning

4. Classic machine learning and deep learning: these are the fundamental disciplines that enable many AI applications. Machine learning focuses on the development of algorithms that can learn from data and make predictions, while deep learning uses deep neural networks to recognize particularly complex patterns and make decisions. These technologies are not only used for tasks such as image and speech recognition, but also for topics such as forecasting, where they enable precise predictions in areas such as demand planning, inventory management and market development.

The potential of AI becomes particularly clear when comparing the performance of algorithms with human performance. Even if AI is still reaching its limits in some areas, there are already some applications in which the performance of algorithms exceeds that of humans:

■ **Data processing:**

When it comes to analyzing large amounts of data in a short period of time and identifying patterns, AI is far superior to humans. This is particularly important in financial analysis, marketing and research, where huge data sets need to be processed in real time.

■ **Language processing:**

AI models such as GPT-4 can compose complex texts and respond to a wide range of topics. In specific tasks, such as translating languages or analyzing texts, AI already reaches or exceeds the level of human performance (measured by the time required).

■ **Precision tasks:**

In manufacturing and assembly, AI-controlled robotics can perform tasks with a precision and speed that is unattainable for humans. This applies in particular to repetitive tasks that require consistently high quality.

These examples illustrate that AI is already playing a key role in many areas and has the potential not only to complement human skills, but also to surpass them in some areas. AI is particularly effective when large amounts of data need to be analyzed in a short

space of time. In such scenarios, AI far surpasses human capabilities, as it can quickly penetrate huge data sets, recognize complex patterns and extract relevant information. Whether in the real-time analysis of customer data, the optimization of supply chains or the prediction of market trends - AI makes it possible to make well-founded decisions based on extensive amounts of data that would generally be almost impossible for humans to handle on their own, and impossible at all in the time of AI. This ability to process immense volumes of data efficiently makes AI an indispensable tool in the modern business world.

Our examples from practice

Efficient and traceable inventory through AI

Conventional inventory management relies on manual counting, which is both time-consuming and resource-intensive. In many companies, this process ties up considerable staff capacity and disrupts regular business operations. An innovative approach to overcoming this challenge is the use of AI and drone technology, which is radically transforming the inventory process.

Drones and AI working together: Inventory automation is based on a combination of drones that photograph the warehouse from different perspectives and AI algorithms that analyze these images. There are three key steps here:



Recognising products with computer vision

1. **Recognition:** The drones capture the warehouse both from a bird's eye view and from the front. The captured images are analysed by AI, which recognizes products and storage locations.
2. **Classification:** After recognition, the AI classifies the identified products. This enables precise allocation of the goods to the corresponding storage locations.
3. **Counting:** Finally, the AI counts the recognized and classified products to determine the exact stock level.



AI-supported information access with LLMs and RAGs

Large Language Models (LLMs) are powerful language models that have been trained on huge amounts of text data. These models use deep neural networks to understand the complexity of human language and generate realistic texts. Their ability to capture contextual nuances makes them particularly valuable in communication, as they can respond accurately to a wide range of requests.

However, one challenge of LLMs is that they sometimes struggle to provide very specific or in-house knowledge, as this knowledge may not have been part of their training material. This is where Retrieval Augmented Generation (RAG) comes into play. RAG combines the strengths of LLMs with the ability to retrieve specific information from internal company databases. In practice, this means that a digital assistant not only provides general answers, but also retrieves specific information from a company's existing data sources. This is done without the need for extensive training of the model.

The implementation of RAG-based systems in companies comprises three central components: Firstly, the Large Language Models (LLMs) play a crucial role as they form the heart of the system. These models are specialized in understanding and generating natural language, which is the basis for creating responses. The second component consists of so-called embeddings, high-dimensional vectors that are generated from the text data of a user query.

These embeddings make it possible to precisely measure the semantic similarity between the query and the information stored in a knowledge database.

Example measurement of bulk material

The use of this technology significantly reduces the amount of manual work involved in stocktaking. Instead of using several teams for counting, one drone operator is enough to take the necessary pictures. The actual counting is carried out entirely by the AI. This results in a saving of up to 90% of the previous effort

Another advantage is the complete documentation of the inventory process. The images taken are saved with a time stamp, which significantly increases traceability and transparency. This also enables a simple recount if necessary.

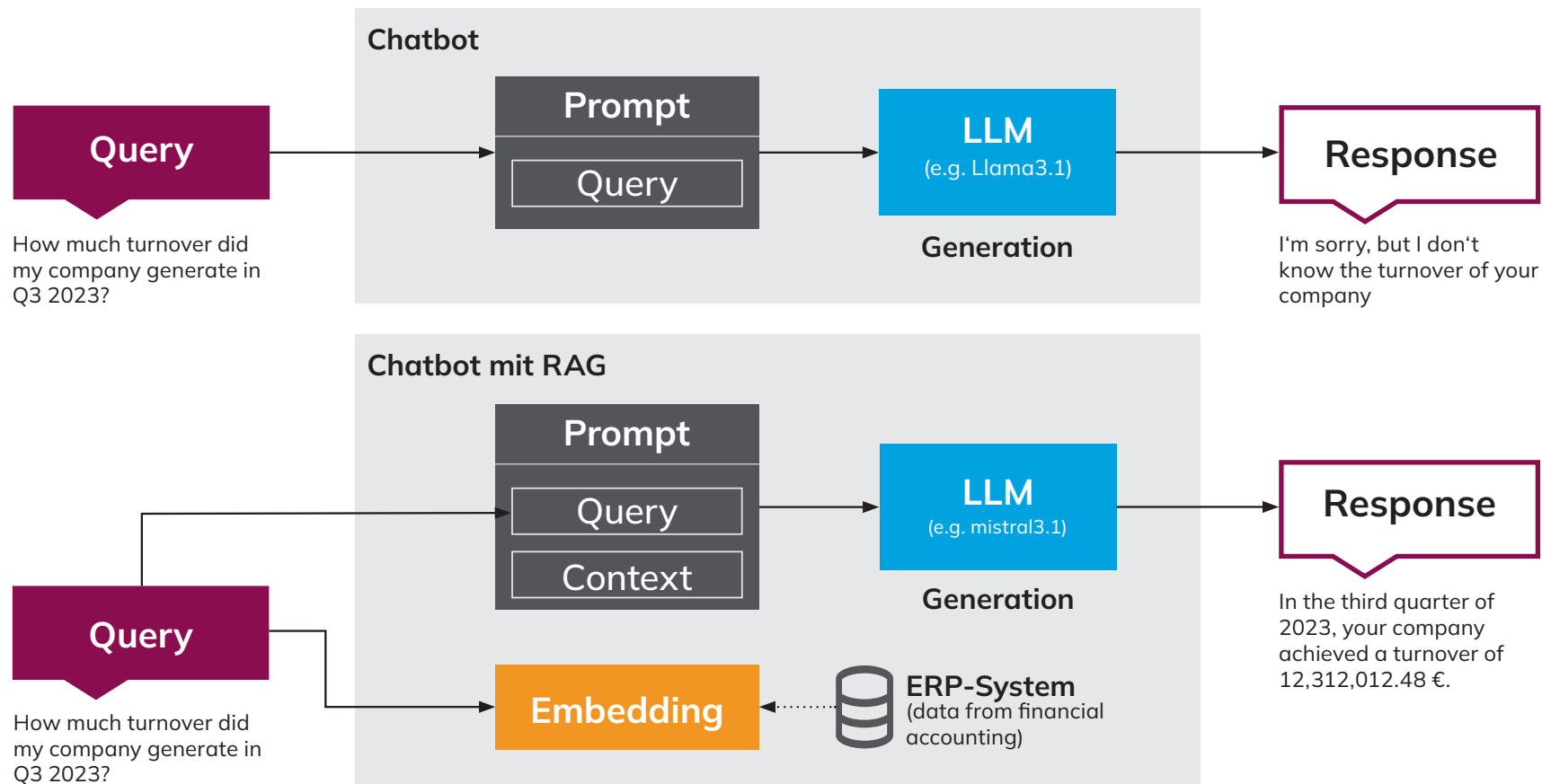
Automated stocktaking using drones and AI is not limited to specific warehouse situations. The solution can be flexibly adapted to different warehouse and product types, making it suitable for use in various industries and applications. At the same time, the AI approach can also be transferred to stationary cameras.

Another feature of the approach is the creation and use of digital twins of the warehouse. Instead of just recognizing and counting products, it is even possible to measure products. This opens up the possibility of measuring bulk goods, for example.

Finally, there are vector databases in which the vectorized information of a company's internal knowledge is stored. By comparing the vectorized query with this data, the most relevant information can be quickly identified and used by the LLM to generate a suitable response.

Numerous business processes can be optimized by integrating LLMs and RAGs into company systems. For example, customer service interactions can be automated, support tickets can be processed more efficiently and employees can be supported with fast, accurate information. These technologies make

optimal use of a company's internal knowledge without having to train its own LLM, which saves considerable resources.



What needs to be considered when developing and introducing AI applications?

Implementing AI solutions is a complex endeavor, demanding thorough planning and strategic consideration. The following points should always be taken into account during development:

1. Identifying the right use cases:

Before an AI solution is introduced, it is essential to identify the right use cases. This is not about using AI just for the sake of it, but about specifically selecting those areas in which AI creates real added value. This process requires a thorough analysis of business processes to identify those that can be significantly improved by AI.

2. AI projects are different from traditional software projects: :

In contrast to conventional software projects, the results and the best approach for AI projects often cannot be fully estimated in advance. AI development always involves exploratory components in which different approaches have to be tested and iteratively developed in order to find the optimal solution. These uncertainties require flexible project management and close collaboration between developers, data scientists and specialist departments. By taking these aspects into account, the development of AI applications can be controlled in a targeted manner in order to achieve maximum efficiency, effectiveness and acceptance.

3. Data quality and quantity:

The success of an AI application depends largely on the data used. It is crucial that the data used to train the AI is of high quality and

comprehensively covers the use cases. Incomplete or incorrect data can lead to unreliable results.

4. Acceptance and traceability:

User acceptance is a decisive factor for the success of an AI application. It is important to provide training and support to ensure that users understand how AI works and how it can be used optimally. A basis for acceptance is traceability and transparency of results and decisions. This is particularly important in regulated industries where the results of AI must be verifiable. Transparency also increases users' trust in the technology.

5. Scalability:

A successful AI application should be designed for scalability from the outset. This means that the application must be able to handle growing data volumes and increasing usage efficiently without compromising performance.

6. Maintenance and further development:

AI applications must be continuously monitored and updated. This is because the underlying data and requirements can change over time. Regular reviews and adjustments are necessary to ensure that AI remains accurate and relevant.

7. Integration into existing systems:

AI solutions must be seamlessly integrated into existing IT infrastructures and business processes. This often requires close collaboration between AI developers and business experts to ensure that the AI solution meets the company's specific requirements.

8. Ethics and responsibility:

Ethical considerations must be taken into account when developing AI applications. It should be ensured that AI is used fairly, impartially and for the benefit of society. Questions about privacy, discrimination and the handling of sensitive data must be addressed at an early stage.

Integration of AI solutions into existing systems and infrastructures

How do I implement AI in the first place - what hardware do I need?

The implementation of AI solutions requires both suitable software and the right hardware. The hardware requirements can vary depending on the use case and complexity of the AI application. In principle, the following hardware components are crucial:

- **Computing power (CPUs/GPUs):**

AI models, especially those based on deep learning, require significant computing resources during training. GPUs (Graphical Processing Units) are particularly effective for training large neural networks as they enable high parallel processing. For smaller applications or usage (after training), powerful CPUs may be sufficient, but for more extensive AI projects, specialized AI accelerators or cloud-based solutions based on GPUs or TPUs (Tensor Processing Units) are often the better choice.

- **Storage solutions:**

High-performance storage solutions such as SSDs or NVMe drives are necessary to speed up data access, especially for large amounts of data that need to be constantly loaded and processed.

- **Network infrastructure:**

A stable and fast network infrastructure is crucial, especially if AI applications are to be operated in the cloud or large amounts of data are to be processed in real time. High bandwidth and low latency times are required for efficient communication between components and fast access to data.

- **Memory:**

AI applications, especially those that process large amounts of data, require sufficient RAM to process data quickly and efficiently. In addition, a lot of memory is often required to store large data sets and trained models.

For companies that do not have the necessary infrastructure or wish to remain flexible, the use of cloud services is an option. Many providers offer specialized AI hardware or services, such as AWS, Google Cloud or Microsoft Azure or the SAP Business Technology Platform, to develop and scale AI applications without large upfront investments in hardware.



AI and SAP: how can the combination work?

SAP offers a range of integrated AI solutions that help companies optimize their business processes through artificial intelligence.

The combination of SAP's robust business applications with advanced AI technology enables companies to make data-driven decisions, automate processes and unlock new business opportunities. With tools and services such as SAP Business AI, SAP AI Core, SAP AI Launchpad and SAP Gen AI Hub, companies can seamlessly integrate AI applications into their existing infrastructures to realize the full potential of artificial intelligence.

SAP Business AI & SAP Joule

SAP Business AI comprises a collection of pre-trained AI models and services that can be integrated directly into SAP applications or are already an integral part of SAP applications (for example in the S/4HANA Cloud). These AI services are specifically geared towards business processes and enable companies to quickly and easily integrate AI functions into their SAP systems. One example is automated document processing with the Document Information Extraction Service in SAP BTP, where, for example, incoming invoices are captured and processed using AI-supported text and image processing algorithms, minimizing manual intervention.

SAP Joule is an AI-based assistant that simplifies and accelerates interaction with SAP systems. Joule provides context-based insights and automates tasks in various areas such as procurement, human resources and analytics. It improves business outcomes through customized content and supports users in decision making while keeping control over

data privacy and security. Joule integrates seamlessly with SAP solutions and optimizes business processes, from supply chain to code generation.

SAP AI Launchpad

The SAP AI Launchpad offers companies a central user interface for the management of AI projects and applications. It enables the management, monitoring and control of AI models and applications across the organization. The Launchpad offers features such as model management, versioning and model performance monitoring, making it easier for companies to effectively operate and continuously improve AI projects.

SAP Gen AI Hub

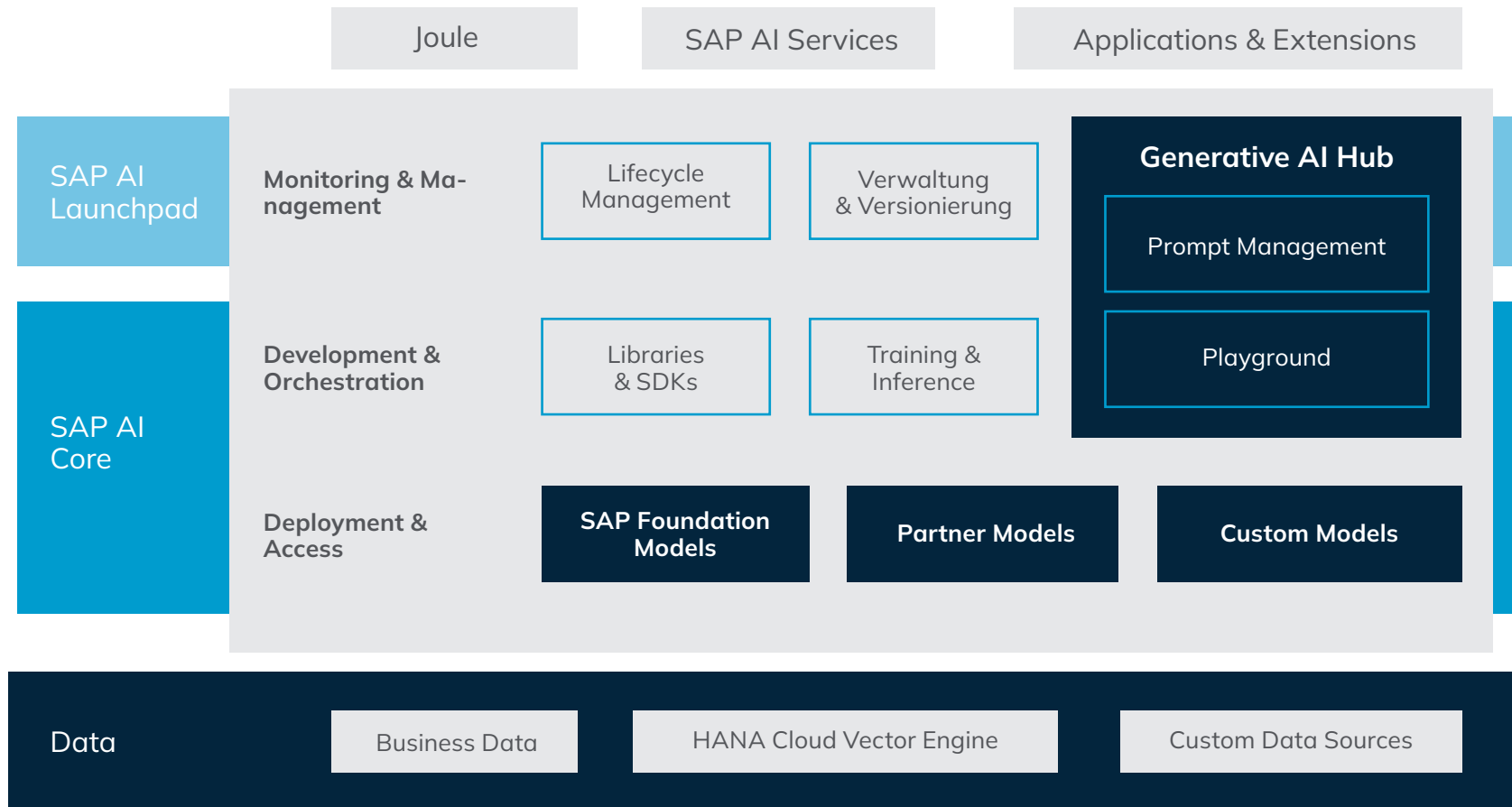
The SAP Gen AI Hub is a platform based on the SAP AI Core that specializes in generative AI models. This platform enables companies to use AI models that can generate content such as text, images or even designs. The Gen AI Hub offers companies the opportunity to integrate these generative models into their business processes, whether to support marketing campaigns, product development or individual customer communication. Various tools and functions are offered for this purpose, which enable the maintenance and management of prompts, for example.

SAP AI Core






SAP AI Core is the central component for the development and deployment of AI models within the SAP infrastructure. It is a scalable platform that enables developers to train, test and deploy AI models while leveraging the power and security of the SAP cloud.

SAP AI Core is specifically designed to ensure the seamless integration of AI models into existing SAP business processes. This enables new AI models to be implemented and trained directly in SAP BTP or

existing AI models to be provided and operated there. At the same time, this facilitates integration into SAP systems and applications.



5 reasons why you should start with the topic of AI now

-  **Automation of routine activities:**
AI automates repetitive tasks and creates space for value-adding activities.
-  **Processing unstructured data:**
AI can efficiently analyse and use not only structured but also unstructured data such as images and documents.
-  **Improved decision-making:**
With advanced analytics, AI enables informed decisions through real-time analyses of large amounts of data.
-  **Competitive advantage through innovation:**
Companies that invest in AI at an early stage can develop innovative solutions and secure competitive advantages.
-  **Error reduction:**
AI minimises human errors in processes.

CONTACT

René Kessler
Consultant AI

rene.kessler@abat.de

ABOUT US

abat

The abat Group, founded in 1998, is an SAP service provider, innovative software developer and provider of complete solutions for software-supported process optimization –

primarily in the core industries of automotive and discrete manufacturing as well as in logistics processes and production control. With our six service areas, we give companies the freedom they need for new ideas, efficient processes, and future-oriented solutions.

In the **consulting** service area, we advise and support you in all phases of an SAP project – from conception to implementation to operation of your SAP system. With abat **manufacture**, you receive digital, high-availability solutions for production control in the complex manufacturing industry. With abat **transform** we offer you innovative and unique solutions that make you special: from AI to cloud to X-Reality. The **PLM** area offers comprehensive process consulting with the goal of achieving a continuous data flow across PLM, ERP and MES. Offerings from the **protect** area help customers secure information and maintain the confidentiality, availability, and integrity of business relationships. Finally, our **sustain** experts advise on how sustainability and CSR reporting can be strategically and structurally anchored in the company.

abat | An der Reeperbahn 10 | 28217 Bremen | +49 421 43 04 60 | www.abat.de