

# AI in PLM: A Game Changer with Obstacles

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**Integrating artificial intelligence (AI) into product lifecycle management (PLM) offers significant benefits – from increased process efficiency to better lifecycle optimization. Despite advances in AI, particularly in machine learning and natural language processing (NLP), barriers such as data availability, cost, and implementation complexity remain. While industries like automotive have embraced AI for areas such as infotainment, other sectors are more cautious. A gradual rollout in non-critical areas, combined with a strong focus on data quality, and employee engagement, is essential for successful AI adoption in PLM.**

## INTRODUCTION

Integrating AI into PLM offers significant benefits—from increased process efficiency and quality to new opportunities to optimize the product lifecycle. The potential is enormous, but there are still many obstacles to rapid implementation.

AI technology has made tremendous progress recently, particularly in the areas of ML and NLP. The focus has been on large-scale language models such as ChatGPT, which have demonstrated impressive capabilities in processing and generating content. These are also very useful in the PLM context for data structuring and further use in co-pilot applications or intelligent assistance systems.

AI holds tremendous long-term promise, but in the short to medium term, several challenges remain. These are largely driven by three key factors: data availability, clearly defined use cases, and cost. To unlock AI's full potential as a tool for decision support and data analysis, it must be integrated to work in a way that complements human expertise—working alongside people to support industry needs and driving meaningful optimization.<sup>1</sup>

There is still a gap between aspiration and reality. For example, market research and analysis firm Gartner predicts that by 2025, generative AI will play a role in 70% of text- and data-intensive tasks, compared to less than 10% in 2023. By 2026, generative AI capabilities are expected to be implemented in 50% of PLM vendors' solutions, up from only 5% today. Several obstacles will need to be overcome to realize these expectations, including regulatory requirements, privacy policies, and security concerns.

The inflated expectations were evident with the emergence of ChatGPT around the turn of the year 2022/2023, when numerous AI test groups were set up in companies. Initial interest was high. However, internal review processes - particularly in the areas of legal and compliance - led to significant delays. The result: actual use of AI has fallen short of expectations. As a result, the road to widespread adoption in PLM is proving to be much longer than initially anticipated.

## AN UPTURN IN THE "HYPE CYCLE"

This reflects the classic technology adoption "hype cycle": where an initial wave of exaggerated enthusiasm is often followed by a period of disillusionment as the real difficulties and obstacles come into focus. However, pressure—particularly from tech-advanced competitors from East Asia or the US—is likely to drive progress in Europe and Germany. In the long term, even traditionally conservative industries that are currently struggling with AI adoption are expected to come on board. The speed at which AI is penetrating the industrial landscape varies greatly by sector. IT-focused companies in the automotive industry are already actively using AI in areas such as infotainment systems, voice assistants, and even autonomous driving. In these areas, the value proposition is clear—and in the case of infotainment and voice systems, implementation is relatively straightforward, with fewer security concerns. More traditional industries, such as engineering or certain segments of manufacturing, are much more cautious. There are often concerns about intellectual property and proprietary data, which are seen as critical assets that need to be protected.

## HARVESTING THE "LOW-HANGING FRUITS" WITH AI

Introducing AI into vehicles through infotainment is an example of "low-hanging fruit"—easy-to-implement applications in non-critical areas. Similarly, incorporating AI in PLM can begin with straightforward use cases that don't risk exposing sensitive business data. One example is user manuals. AI can assist in the creation of these documents by collecting and structuring information through PLM interfaces and even providing multilingual output. This improves the quality of the manuals and increases the value to the end user. The insights gained from these "simple" AI

**Figure 1.**  
AI applications in the infotainment system: Intuitive user interfaces and intelligent technologies are widely used in the automotive industry



applications can then serve as a foundational experience, allowing for the gradual integration of the technology into more sensitive and complex business processes.

AI applications incorporated with PLM solutions can also act as virtual assistants, supporting tasks such as scheduling meetings, organizing tasks, or automating change processes. These systems lend themselves to customer service and technical support, providing interactive guidance and intelligent assistance. AI can also improve the usability of PLM solutions: intuitive and AI-personalized user interfaces increase efficiency and simplify the use of PLM software.

To implement AI incrementally, companies should start with areas that offer quick wins and minimal risk. This approach allows for, the step-by-step optimization of operational processes along the product lifecycle can be successively optimized, resulting in more efficient workflows over time.

Another application area is planning and forecasting. AI-enabled planning systems can analyze complex data such as configurations, supply chain information, and demand forecasts to optimize product and portfolio development. By combining various technologies such as the Internet of Things (IoT), ML and NLP, AI systems in PLM can ensure a holistic flow of information. Selecting the right technology is critical – whether it is NLP for analyzing product documents or computer vision for automatically processing, analyzing, and interpreting visual information such as videos, CAD drawings, or product images.

## **DATA QUALITY AS A CENTRAL ISSUE**

AI systems can only produce valid results when the data is clean and consistent. This is especially challenging in industrial environments, where data often comes in a variety of formats and from multiple sources. All the more reason for organizations to prioritize data hygiene from the start and establish clear, consistent data preparation processes.

A real-world example of how AI-driven data standardization is its ability to detect and correct variations in entries—such as inconsistent spellings of city names or part numbers—that can lead to data inconsistencies. By ensuring a consistent data standard across the enterprise, AI enhances data quality, delivering long-term value in areas such as service and customer support.

Technical infrastructure also plays a critical role. Powerful hardware, scalable cloud solutions, and flexible software architecture are needed to integrate AI with existing PLM solutions. Companies need to ensure that their IT infrastructure can meet the increased demands for computing power and data storage.

## OPEN INTERFACES SIMPLIFY AI INTEGRATION

Available interfaces are a critical factor in integrating an AI application into the existing system landscape. Flexible PLM solutions, such as Aras Innovator®, offer the advantage of standardized and easily adaptable connectivity options to enable targeted (and secure) data access. In contrast, interfaces tailored to proprietary PLM systems make it difficult to connect external systems and applications. This can result in AI applications having limited access to the data they need, which can significantly reduce functionality due to blocked data sources and prevent seamless AI integration.

The benefits of open and flexible PLM solutions are evident in the example of a German defense contractor. This company is using Aras Innovator not as a traditional PLM solution with a connection to a product database, but as a platform to map internal company processes. Because the platform can exchange data via interfaces with other systems such as Enterprise Resource Planning (ERP) or Customer Relationship Management (CRM), and also provides tools for visualizing and modeling business processes, it enables structured processes mapping and serves as a foundation for optimization. This is particularly powerful when combined with AI, which can analyze patterns in vast amounts of data and identify opportunities for improvement that might otherwise go unnoticed by a human.

## ALL RELEVANT INFORMATION IN REAL TIME

The integration of AI into PLM solutions is closely tied to the development of the IoT in smart manufacturing. IoT devices and sensors enable real-time data collection and analysis, leading to improved asset monitoring, more accurate quality control, and data-driven decision making. The challenge is to ensure interoperability between different devices and communication protocols, while implementing robust security measures to protect sensitive data.

Another area where AI is enabling significant advances in manufacturing is predictive maintenance. By continuously monitoring and analyzing machine data, AI applications can detect anomalies in equipment operation and recommend timely maintenance or replacement parts. As a result, unplanned downtime is reduced, and operational efficiency is optimized. However, the use of such systems also requires a high level of data security to protect sensitive production data from unauthorized access and manipulation.



Figure 2. Smart manufacturing: IoT sensors and AI optimize processes, reduce resource use, and strengthen sustainability in production

The more organized and optimized the production process, the more it contributes to sustainability. By optimizing processes, reducing waste and minimizing energy consumption, companies can reduce their environmental footprint. The ability to develop innovative and sustainable products is further enhanced by AI-enabled design and development processes. However, as always, only high-quality data is truly useful for training AI models and developing and evaluating sustainable practices. In many application areas, this data is still lacking.

## HUMANS REMAIN CENTRAL TO AI IMPLEMENTATION

An often overlooked but critical factor in adopting new technologies is company culture. The integration of AI into PLM solutions often leads to significant changes in workflows and decision-making processes. In this transformative environment, which upends many established habits and behaviors, it is essential to foster a culture that is open to technological innovation and to engage employees at all levels in the change process. Training and development are essential to allay fears and build the necessary skills.

The implementation of AI can be perceived as a threat, but it can also free employees from monotonous tasks - leading to greater job satisfaction and productivity. Tasks such as comparing large documents or writing technical manuals are often time-consuming and tedious. With AI as a supporting tool, the work becomes much faster and easier.

Acceptance of technology within an organization depends heavily on how it is introduced. It is important to demonstrate the benefits to employees and actively involve them in the change process. With the right approach, concerns can be eased and motivation to adopt AI can grow. This

type of change management is particularly important in less technology-oriented industries such as traditional mechanical engineering.

## CLOSE COLLABORATION AMONG ALL STAKEHOLDERS

Interdisciplinary collaboration plays a key role in AI integration. Only through close cooperation between data scientists, engineers, product managers and IT specialists can an enterprise-wide solution be developed. By harnessing the synergy of different areas of expertise, AI solutions can be tailored to the specific needs of the company and its PLM ecosystem.

Companies must also consider the ethical considerations of this new technology. While AI can make highly efficient decisions, those decisions may not always align with social or human values. That's why it's essential to deploy AI with ethical standards in mind. As AI becomes more deeply embedded in processes and decision making, the role of an "ethics council" within the organization will become increasingly important. This body can ensure that AI not only makes economically viable decisions, but also socially responsible ones.

In production environments, it's especially important to balance efficiency gains with the realities of the human work environment. AI-driven workflow optimizations must always consider the actual working conditions to ensure changes are both effective and sustainable.

## AI INTEGRATION IS DEEPENING ACROSS THE SYSTEM

The current integration of AI into PLM solutions is just the beginning. We are still in the "AI Assist" phase, where AI assists humans in interaction and decision making. Soon, however, we'll move to the "AI Suggest" phase - where AI will increasingly make independent suggestions, guiding users to action rather than merely assisting them. Humans will still be central, but the interaction will become more efficient through AI-driven recommendations.

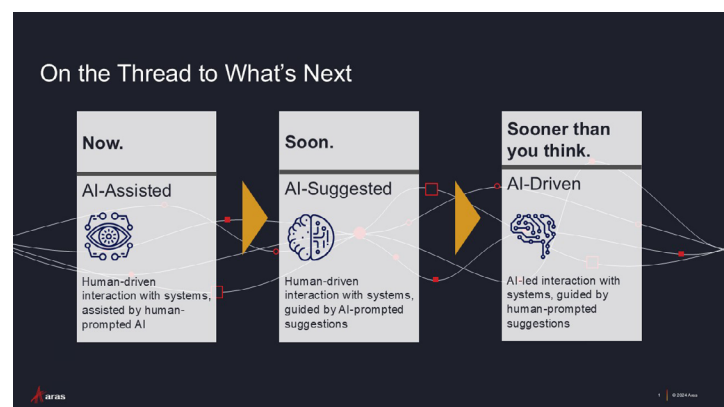


Figure 3. AI is playing an increasingly important role in the manufacturing process

In the near future, we will move to the “AI-driven” phase, where AI takes the lead in system interactions. Human input will then primarily act as a trigger, with AI making near-autonomous decisions based on that input. This shift promises to significantly increase the efficiency and accuracy of PLM processes – elevating the human role from operational interaction to higher-level decision making.

## CONCLUSION

Artificial Intelligence will fundamentally change the way businesses operate. It has the potential to significantly increase the efficiency, productivity, and quality of industrial processes – while also driving innovation and competitiveness. AI opens up new opportunities for previously reluctant industries to optimize their processes and fully exploit the potential of modern technologies. By gradually implementing AI in non-critical areas, focusing on data quality, and communicating effectively with employees, companies can build a strong foundation for successful adoption.

Industry has a wealth of data, often hidden in legacy systems and untapped data reserves. By making intelligent use of this data and combining different technologies, the full value of AI-enabled PLM can be unlocked. Ultimately, the question is not if AI will be used in PLM, but when and how it will be used most effectively. The path to greater efficiency, sustainability, and innovation inevitably leads through the meaningful integration of AI into the product lifecycle. Companies should have the courage to take the first steps toward AI, harvest the low-hanging fruit, and prepare for a future with AI in PLM.

## References

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