Physical AI and Industrial AI Cloud – The Path to AI Sovereignty

Physical AI and Industrial AI Cloud accelerate development, production and service. How can Europe remain competitive?

The better the question. The better the answer.
The better the world works.

Shape the future with confidence

Physical

Europe is at a decisive turning point at which the course for the future of industry and technology is being reset.

The rapid convergence of Physical AI, industrial metaverse technologies and AI computing infrastructure is revolutionizing how products are developed, manufactured and operated. The industrial metaverse acts as a simulation and digital twin layer where products, processes and factories are virtually validated and optimized.

What was once rooted in digital AI systems is now opening the door to a new era of embodied intelligence. In this future, robots, sensors and cyber-physical systems work seamlessly together, supported by advanced simulations and agent-based automation.

Traditional industrial operating models are facing increasing pressure. Demographic change, rising labor costs, fragile supply chains and growing expectations for personalization, speed and sustainability are driving the need for transformation.

In early February 2026, the world's first industrial AI factory was launched in Munich, Germany. This innovative facility combines engineering data, simulations and real-time factory intelligence to strengthen Europe's competitiveness and digital sovereignty.

The Industrial AI Cloud enables companies to virtually plan and simulate entire factories and production facilities before they are actually built. For example, a mid-sized company can develop prototypes and robotics using a digital 3D twin while preserving data sovereignty in a local cloud environment. The digital sovereignty of the local cloud is maintained, ensuring the protection of sensitive data.[1]

1 *Germany builds AI sovereignty: the new industrial AI cloud – DIGITAL X Magazin*

What is Physical AI?

Physical AI also unlocks the potential for self-learning, multifunctional robots that will not only transform the way we work but also create entirely new industries and jobs. Europe's strong industrial heritage, combined with a solid data foundation, provides an advantage. However, holistic, transformative thinking and rapid action are required, as current competitive leadership positions are at risk.

In a world where AI agents are increasingly deployed during off-peak hours, innovation capability, interdisciplinary execution speed, and creativity will become the most critical human competencies.

Today, robots are no longer programmed step by step, but instead solve complex tasks through parallelized learning – initially in virtual environments across a wide range of scenarios. As a result, they will surpass human learning progress in a very short time and increasingly collaborate with both humans and machines.

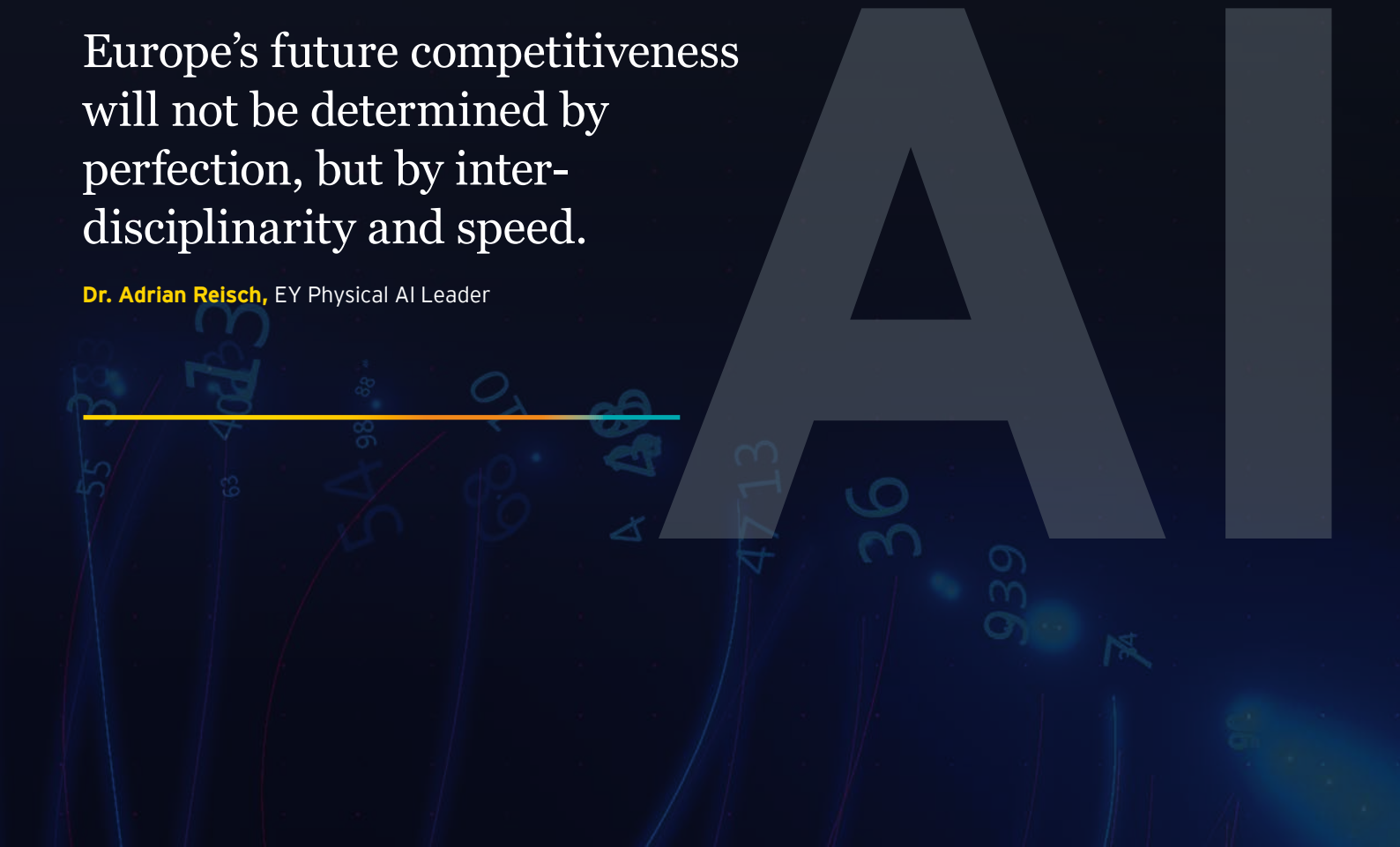
Machine self-learning is currently advancing at breathtaking speed, and in the future, anything that moves can potentially be converted into robotic solutions. Investments in these technologies are reaching unprecedented levels, particularly in Asia and the United States. As a result, Europe has only a very limited window of opportunity and restricted fields of action in which it can still succeed.

The term is often used abstractly, but today executives need a clear understanding of what Physical AI means for shaping their own future – and what opportunities the combination of robotics, sensors, simulation, and self-learning systems offers in order to already lay the foundations for the coming months and years and remain competitive.

Physical AI combines robotics, sensor technologies, simulation, and self-learning control systems that operate in the physical world – flexibly and without the need for traditional specialist coding.

It thus forms the foundation for autonomous systems in production, logistics, and services.

> "Europe's future competitiveness will not be determined by perfection, but by interdisciplinarity and speed.
>
> **Dr. Adrian Reisch,** EY Physical AI Leader



Executive Takeaways: What CEOs, COOs and CIOs need to do in the next six to twelve months

Physical AI and the Industrial AI Cloud are no longer a topic of the future – they will become a decisive factor for competitiveness, productivity, and resilience over the next six to twelve months. This creates clear implications for action for top management:

1 From strategy to execution: Start lighthouse projects now

Over the next six to twelve months, it will become clear which companies are building practical experience with Physical AI – and which are falling behind. What matters is not achieving the perfect end state, but getting started early through value-driven pilot projects ("lighthouses"), for example in simulation, robotics, maintenance, or logistics. Companies that act now gain learning curve advantages, data and talent head starts, while later followers will only be able to react.

2 Infrastructure becomes a board-level matter

Access to sovereign, scalable AI infrastructure is evolving into a strategic management decision – comparable to production capacity or supply chain resilience. In the coming year, boards must address the following questions:

- How and where will industrial data, simulations, and AI models be operated?
- How will digital sovereignty be ensured?
- What role will an Industrial AI Cloud play as the backbone for innovation and scaling?

Companies without clear answers risk dependencies and constraints on innovation.

3 Make data actively usable – not just managed

European companies have a unique advantage: decades of engineering, production, and service data. Over the next six to twelve months, CEOs and CIOs must ensure that this data is systematically prepared, standardized, and made usable for industrial AI models. Those who merely archive data instead of operationalizing it are giving up a key competitive advantage.

4 Rethinking operating models: the AI-native industry

COOs are facing a structural shift: value creation is moving from hardware-centric processes to software- and data-driven optimization cycles. Physical AI, digital twins, and simulation enable continuous, real-time adaptation – from R&D through manufacturing to operations. Over the next year, operational excellence programs must be reimagined and more closely integrated with IT and data strategy, as process optimization through human effort alone has reached its limits.

5 Robotics as a Service is changing investment logic

In an environment of constrained budgets and high uncertainty, OpEx models are gaining importance. Robotics as a Service (RaaS) enables rapid scaling without high upfront investments, while reducing both risk and time to value. For boards, this means rethinking investment decisions, challenging traditional CapEx logic, and increasingly viewing automation as a scalable service.

Why Physical AI is the Answer

6 Leadership and culture become the bottleneck – not technology

The biggest barrier to Physical AI is not the maturity of the technology, but mindset and organization. Over the next six to twelve months, leaders must actively foster a culture that:

- accepts 80% solutions,
- rewards experimentation and learning, and
- strengthens interdisciplinary teams.

Without this cultural shift, investments will remain ineffective. Speed comes from trust, not from perfection.

7 Recognizing the window of opportunity: Those who wait lose the ability to shape outcomes

The coming year will be a limited strategic window of opportunity. Patents, production capacities, talent, and platforms are being allocated now. Companies that act today will help define standards and ecosystems. Those that hesitate will later have to adapt to platforms built by others. Physical AI therefore becomes a matter of sovereignty – not just efficiency.

For decades, industrial automation relied on rigid, programmed systems. This worked well for high volumes with limited product variation. However, today's environment requires agility: shorter product cycles, customized orders, and rapid changeovers. Static robots can no longer keep up.

Physical AI is changing the game

Robots can:
- program themselves,
- handle flexible parts, and
- adapt to new tasks – without weeks of reconfiguration.

This means:
- economical production with high product variability,
- drastically reduced setup times,
- and robots expanding beyond assembly into service, maintenance, and logistics.

Europe is facing demographic pressure: over the next ten years, millions of skilled workers will retire. Physical AI is not optional – it is a strategic necessity. AI is transformative and will impact everyone's lives. The United States is currently leading – particularly in hyperscalers and large language models (GenAI). They have a significant head start and substantially more capital. However, Europe has a unique advantage: legacy data. Decades of experience in high-quality engineering, manufacturing, and product usage provide a strong foundation. Training AI on this data enables the development of powerful industrial foundation models. This is Europe's opportunity – its unique value proposition. At the same time, time is running out. China is catching up rapidly. Even without comparable legacy data, it is investing heavily in the development, production, and deployment of new products, generating data at a much faster rate.

Europe's opportunity lies in leveraging its legacy data to build industrial AI models. At the same time, demographic change continues – baby boomers are retiring, and fewer people must achieve more.

To restore competitiveness, Physical AI is inevitable. It is about bringing products to market faster, achieving more with fewer resources, and capitalizing on trends such as autonomous driving, software-defined manufacturing, and humanoid robotics.

The transformation has already begun

1 From information systems to embodiment

Industry is evolving from purely digital AI agents toward AI that acts in the physical world. Humanoid robotics, warehouse automation, and autonomous systems are scaling rapidly – following growth curves that are redefining work models and productivity. The next state of the art technology will emerge in this space over the coming months and years.

2 Das Industrial Metaverse als Katalysator

Virtual testing environments, AI-powered digital twins, and industrial simulation platforms enable companies to:

- validate products and processes before making physical investments,
- reduce risks and resource consumption, and
- significantly shorten time to market.

This is not a vision – it is already reality: virtual AI factories are emerging in which companies, research institutions, and startups develop, simulate, and scale new robotics and AI solutions.

3 Infrastructure determines competitiveness

Europe's competitiveness will largely depend on access to large-scale, sovereign AI infrastructure. Industrial AI Clouds and AI factories – powered by tens of thousands of GPUs and 100% renewable energy – represent a new economic reality: in the future, a nation's competitiveness will be measured as much by its AI computing capacity as by its manufacturing capabilities.

4 The shift toward the AI-native industry

Hardware-centric business models are increasingly being complemented by software-driven value creation – across the entire value chain:

- digital business models
- R&D and product development
- manufacturing and operations
- customer experience
- workforce optimization
- logistics and supply chains

Physical AI and the industrial metaverse enable continuous improvement cycles, data-driven decision-making, and dynamic real-time adaptation.

5 Robotics as a Service unlocks new economic models

RaaS enables companies to:

- scale robotics without high upfront investments,
- deploy innovation faster,
- reduce costs and risks, and
- automate even in variable, unstructured environments.

Reinforcement learning, digital twins and "digital cousins," as well as remote simulation, are opening up application areas that were previously inaccessible.

The hockey-stick moment

Let's look at the numbers: patent filings in AI, robotics, IoT, and extended reality have surged – and are reinforcing one another. The accuracy of generative AI has increased from 3.3 to over 40 points in just 18 months.[2]

Humanoid robots? Analysts[3] forecast annual growth of 60% and a total installed base of more than 650 million units by 2050. Mass production of humanoid robots is expected within the next two to four years,[4] with initial prototypes already in use today. Costs will decline, and adoption will accelerate. Those who wait will find themselves playing catch-up, while competitors secure talent, platforms, and market share.

In Europe – especially in Germany – we place a strong emphasis on reliability and quality and often over-perfect solutions before implementing them. While this careful approach has long delivered benefits, it will slow us down going forward. To remain competitive, we must embrace agility. This does not mean accepting imperfection, but rather testing and iterating variants and alternatives digitally. Successful companies thrive because they start early and continuously optimize in an interdisciplinary, digital manner. The traditional European focus on perfection and existing organizational structures can no longer deliver the required speed.

Robotics as a Service

We recommend embracing the EY mindset: shape the future with confidence and conviction. If you do not take control of your future, someone else will. As a united region, Europe represents the world's largest economy, and Germany still holds a leading global position. We have all the resources we need and a highly attractive location for talent – we simply need to act.

A compelling example comes from a service company that maintains industrial equipment. Traditionally, revenue growth is linear: more contracts require more employees. With RaaS, however, once the infrastructure is in place, a trained robot can scale instantly to thousands of units. This could translate into a significant margin opportunity.

Why RaaS will dominate
Cash is king. CapEx constraints are real. Subscription models that scale tend to win – as seen with video streaming platforms or app stores.

What RaaS offers
RaaS provides:

- lower upfront investment,
- scalable implementation,
- continuous updates,
- shared learning, and
- hardware-independent capabilities across entire fleets.

Combined with Europe's strengths in manufacturing – precision, reliability, and system integration – this creates a major opportunity. But only if we act quickly.

Analysts[2] predict

60%

annual growth and a total installed base of more than 650 million humanoid robots by 2050.

2 EY article
3 Citigroup-Study The Rise of AI Robots; December 2024
4 Humanoid robots 2026: The convergence moment | Roland Berger

Disruption across all industries

In the coming years, Physical AI will become an integral part of everyday life and work. We will see the rise of cognitive robotics – robots that can adapt, learn, and train themselves. These robots will take over service tasks that are increasingly difficult to fill with human labor – such as assembling components in factories, cleaning offices, restocking coffee machines, or handling waste disposal.

In healthcare, humanoid robots will support facility management – sorting laundry, ensuring cleanliness – while freeing up skilled workers for more specialized tasks. Even if these developments will not yet be mainstream in 2026 or 2027, widespread adoption can be expected before 2030.

Physical AI will extend far beyond manufacturing. Many use cases are likely to affect sectors such as logistics, healthcare, energy, and retail. Imagine robot dogs performing patrols, drones monitoring pipelines and power lines, or humanoids assisting in care facilities. The market is vast, and the transformation will span the entire economy – it will not stop at industry or sector boundaries.

Preparation starts at the top: establishing a bold vision, defining target states, and launching "lighthouse" initiatives – small, value-driven pilot projects aligned with strategy. This is essential, as the transformation toward Physical AI is not linear but unfolds across clearly distinguishable stages of maturity.

Roadmap for the implementation of Physical AI and the Industrial AI Cloud

Phase 1

Speedboats – learn and simulate before perfecting

Objective: Build practical and digital experience, accelerate learning curves, and remove organizational barriers through tangible examples.

Time horizon: Short term (start immediately, impact within months)

In the first phase, the focus is not on a "big bang," but on targeted, value-driven pilot projects ("lighthouses"). These "speedboats" deliberately operate outside traditional line organizations in order to gain speed and generate real-world insights for the future.

Focus for top management:

- Define clear strategic questions (e.g., productivity, time to market, talent shortages)
- Prioritize two to five concrete use cases (e.g., simulation, robotics, predictive maintenance, logistics)
- Enable interdisciplinary teams (OT, IT, data, business)
- Align success metrics with value contribution and digital learning progress rather than perfection

Outcomes of this phase:

- Validated use cases with measurable business impact
- Initial operational experience with Physical AI, simulation, and data integration
- The organization learns to work with digital twins and "digital cousins," continuously improving results through iterative development

Phase 2

Platformization and data models – from speedboat to scalable digital capability

Objective: Consolidate individual initiatives, create reusability, and prepare for scaling

Time horizon: Medium term (six to twelve months)

Following the initial successes, it becomes clear whether Physical AI remains a one-off project or evolves into a core capability. In Phase 2, technical and organizational foundations are consolidated.

Focus for top management:

- Build an Industrial AI Cloud as a shared platform for data, simulation, and AI agent models
- Define standardized, domain-specific data models (engineering, production, service, robotics)
- Clarify governance topics: sovereignty, security, and ownership
- Embed Physical AI capabilities into IT, data, and operating models

Typical management decisions:

- Centrally organized platforms vs. federated make-or-partner strategies within the ecosystem
- Investment prioritization between infrastructure, talent, and use cases

Outcomes of this phase:

- Enterprise architecture instead of isolated solutions
- Data becomes actively usable and AI-agent-enabled
- The foundation for enterprise-wide scaling is established, with core capabilities clearly defined

The human factor

Phase 3

Scaling and new business models – rethinking value creation

Objective: Establish Physical AI not only as a driver of efficiency gains, but as a catalyst for growth

Time horizon: Strategic (from 12 months onward, building on Phases 1 and 2)

In the third phase, the focus shifts from efficiency to new forms of value creation. Physical AI becomes an integral part of the operating model – opening the path to new business models.

Focus for top management:

- Scale proven use cases across sites, plants, and regions
- Introduce Robotics as a Service (RaaS) and software-based revenue models
- Monetize data, models, and platforms
- Build and orchestrate ecosystems (partners, startups, research)

Strategic impact:

- Transition from CapEx-driven to service- and software-based models
- Significantly higher scalability and margins
- Stronger customer retention through continuous, data-driven services

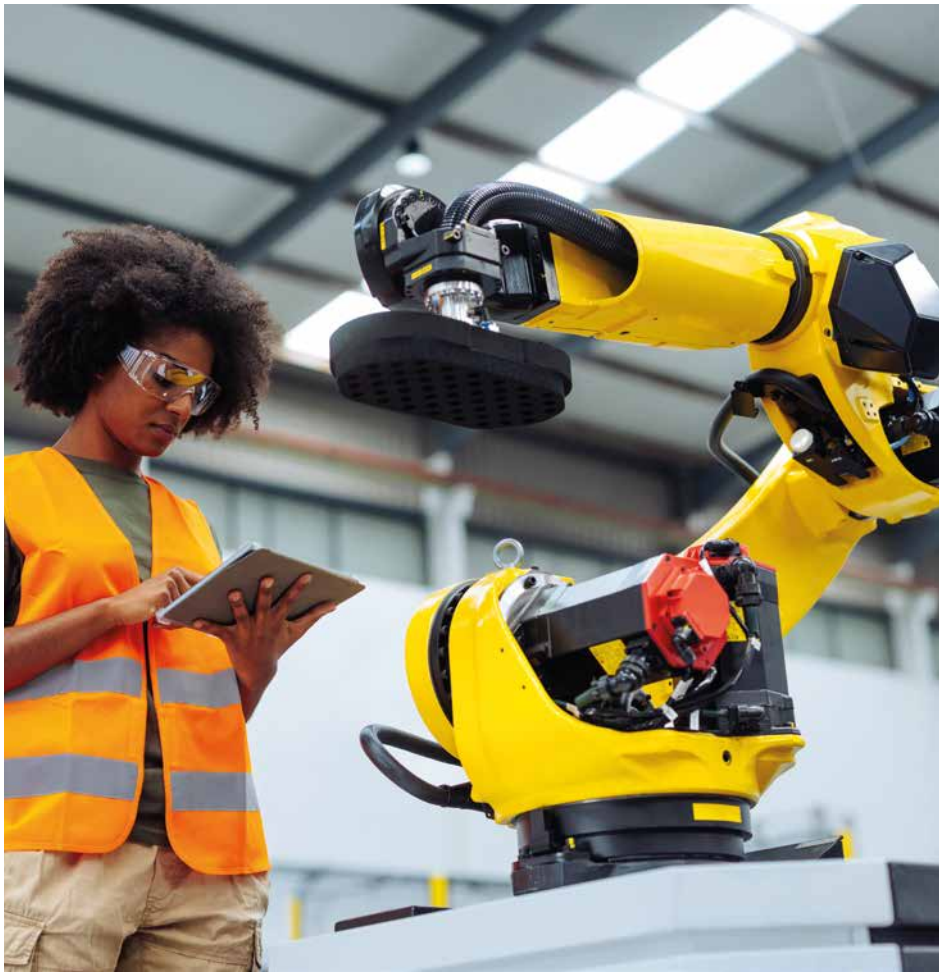
Outcomes of this phase:

- Physical AI is no longer a project, but an integrated core capability
- The company defines standards rather than following them
- Competitiveness is structurally secured

Culture beats fear – technology alone does not win; confidence and optimism are decisive.

High performance is achieved through trust, collaboration, and a sense of enjoyment – not through fear or blame. Innovation thrives where teams feel safe enough to try new things. Physical AI is uncharted territory – there is no playbook. Leaders must create environments where curiosity outweighs caution and the fear of making mistakes – much like in Formula 1 under Zak Brown.

The greatest challenge is cultural transformation: establishing a mindset that allows for mistakes, encourages experimentation, and prioritizes learning over perfection. Business can – and should – be both successful and fulfilling. Rapid progress is driven by a tolerance for failure, fast learning cycles, and iterative approaches. Success in Physical AI also requires interdisciplinary teams. You cannot simply turn an engineer into an AI expert – or vice versa. True progress comes from teams working closely together, even when they speak different professional languages.



Creativity, empathy, and innovation

The window is closing – are you ready?

Physical AI will transform industries, jobs, and business models. It is not about replacing people, but about freeing them from routine work. Ultimately, it is the human capabilities that machines cannot replicate that matter most: creativity, empathy, and the power of innovation driven by true consciousness.

For Europe to lead, the right foundations are required:

- standardized data models across industries, for example for manufacturing and service logs,
- incentives for cross-industry data sharing without losing competitive advantages, and
- investments in the industrial metaverse to enable scalable adoption.

A coordinated political and ecosystem-driven approach will determine who defines platforms, attracts talent, and leads the next industrial revolution.

Regulation and governance: guardrails as a design parameter, not a constraint

Especially in Europe, regulation and governance are not an after-the-fact compliance issue, but a central design parameter for Physical AI. Those who establish clear guardrails early accelerate implementation, build trust, and reduce future scaling risks.

AI Act, safety, and liability: considerations from the outset
The European AI Act, along with existing safety and liability regimes, requires transparency, traceability, and risk classification – particularly where AI has a physical impact. For companies, this means that Physical AI systems must be safe, verifiable, and controllable by design. Integrating regulatory requirements early into architectures, data models, and operating processes helps avoid friction and creates a robust foundation for scaling.

Clearly assigning responsibility in autonomous systems
As autonomy increases, the question is no longer whether responsibility must be organized, but how. Successful companies define early:

- clear responsibilities between humans, systems, and the organization,
- transparent decision-making and intervention logic, and
- governance models that combine technological innovation with corporate accountability.

Autonomous systems require clear accountability – not maximum restriction. Governance thus becomes a means of building trust among customers, employees, and regulators – while at the same time ensuring speed.

Key message for top management
Regulation does not determine whether Physical AI will be implemented, but how well it is implemented. Companies that treat governance as an active design responsibility are able to scale faster, build trust, and secure sustainable competitive advantages.

ISO/IEC 42001 provides an internationally recognized framework for this: as the first certifiable standard for AI management systems, it defines clear guardrails for the responsible, safe, and compliant use of AI and supports the practical implementation of the EU AI Act. Thanks to its harmonized structure, it can be seamlessly integrated into existing management systems such as ISO 27001.

Outlook

Europe stands at a strategic inflection point in its industrial AI transformation. To secure technological sovereignty, remain globally competitive, and unlock the next wave of growth in robotics and autonomy, industrial AI must now scale much faster. While the United States and China currently dominate in software-driven AI and platform effects, Europe's structural advantage lies in its strong industrial base, deep engineering capabilities, and extensive installed base among mid-sized companies. The window of opportunity is narrow – but the potential value is significant: productivity gains, greater resilience, and sustainable growth across the entire industrial value chain.

The winners will be companies that act early and define a clear target vision. Successful frontrunners identify their strategic core capabilities in AI and automation and invest specifically in four key levers:

1 | Modern, sovereign, and integrated AI infrastructure
2 | Physical AI (e.g., adaptive robotics, autonomous systems) as a differentiating core capability
3 | Development of strong ecosystems comprising industrial partners, software providers, research institutions, and cloud players
4 | Systematic use of industrial metaverse technologies

Industrial AI Clouds and interoperable data platforms will become prerequisites for deploying AI beyond pilots in a secure, scalable, and IP-protected way.

Companies that invest in Physical AI and Industrial AI Clouds today will gain a sustainable competitive edge. They will accelerate development and innovation cycles, increase flexibility in production and supply chains, and become more resilient to external shocks. The convergence of virtual factories and digital twins, self-learning robotics, sovereign data and computing infrastructure, and strong, orchestrated ecosystems will form a new industrial operating system. This operating system will determine cost structures, time to market, and adaptability – and ultimately the competitiveness of European industry over the coming decade.

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