Factsheet

Industrial metaverse

What is the industrial metaverse?

The metaverse is often described as the next iteration of the internet. It will be an immersive real-time digital world. There are three different "sectors" in the emerging metaverse:

- the **consumer metaverse** for retail and entertainment
- the **enterprise metaverse** for virtual workspaces and office collaboration
- and the **industrial metaverse** that combines the real and the digital worlds.

The industrial metaverse will be a place to collaborate, experience and interact with the digital twin of real-world assets – from individual machines and products to entire factories, buildings, cities, grids and transportation systems.

In this digital realistic environment, people can:

- visualize the digital twin and gain new insights
- meet in real-time to work collaboratively on the digital twin
- continuously simulate, evaluate and predict different scenarios
- and monitor, analyze and manage the real assets connected to the digital twin.

The industrial metaverse will emerge from the convergence of different technologies. By linking multiple representations of the **digital twin** companies will build the backbone of the industrial metaverse, supported by technologies like **artificial intelligence (AI), blockchain, Internet of Things (IoT) and edge and cloud computing**.

What is the value and purpose of the industrial metaverse?

By the end of this decade, the industrial metaverse is **expected to be a $100-billion market**, which will grow faster than the consumer and enterprise metaverse combined. But even more importantly, it will be one of the greatest forces **driving sustainability and the digital transformation** of businesses and entire industries.

This digital world has the potential to create new levels of productivity, innovation and sustainability. These are some of the main use cases for industries:

- **accelerating innovation:** a wide range of scenarios can be tested virtually, resulting in faster development of new products, a more efficient design of new facilities and the early integration of circular economy principles into product and facility design.
- **improving design and engineering:** interactive collaboration will engage all stakeholders, enabling faster and better product development and market entry. Simulations facilitate risk-free iterations, empowering everyone to contribute as inventors or experts – from design to operation and recycling.
- **enhancing operations:** by simulating a factory or other workplace, team members can continuously analyze and improve operations, without interrupting production. They can travel to the past to analyze the root causes of a problem and to the future to detect problems before they arise – from a single machine to global supply chains.
- **access to talent and training:** the industrial metaverse offers remote access to expert skills and virtual training, overcoming geographical limitations. It fosters skill development, supports training in diverse scenarios and addresses labor shortages in an aging society.
- **Enabling sustainability:** an energy-efficient metaverse powered by renewable sources will help companies become more sustainable by enabling smarter and faster decision-making, integrating circular economy principles into design and operation and improving energy and resource efficiency.

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How are we going to build the industrial metaverse?

The industrial metaverse is still emerging. It will be the result of the evolution and convergence of technologies like digital twin, AI, IoT, blockchain and edge and cloud computing. To bring these together and build a digital world in which all assets collaborate as seamlessly as in the real world requires interoperability, connectivity and the right skillset.

- **Connectivity:** industrial environments require fast and reliable connectivity for seamless operations and real-time collaboration. Persistent, immersive and end-to-end connectivity is essential for the industrial metaverse to thrive.
- **Interoperability:** many legacy systems lack standard interfaces or connectivity, hindering data sharing and communication. Adopting open application programming interfaces (API), compatible data formats and standard protocols is crucial for seamless collaboration. Interoperable solutions enable concurrent real-time interactions within the industrial metaverse.
- **Skills:** the global skills shortage presents a significant challenge. By 2030, the shortage is expected to total 85 million highly skilled workers. Fewer than three out of ten companies will find the right candidates without difficulty.

Why will Siemens play a unique role in the industrial metaverse?

The industrial metaverse is an evolution of what Siemens does today – **combining the real and the digital worlds**. We have the hardware and software technologies, the unique domain knowhow and the ecosystem to help our customers accelerate their digital transformation and enable the industrial metaverse.

- **Technologies:** Siemens provides many of the foundational technologies to enable the metaverse, such as IoT, AI, 5G, blockchain, edge computing, cybersecurity and the physics-based digital twin.
- **Domain knowhow:** we know how the real world of buildings, power grids, manufacturing processes and transport systems work, and we know how to leverage data and software to make this world work better.
- **Ecosystem:** Siemens works closely with many companies that provide the complementary technologies we need to develop metaverse offerings. In our partnership with Nvidia in particular, we're working together to create AI-driven digital twin technology that will help bring industrial automation to a new level.

Siemens Xcelerator enables customers to access a digital business platform, which offers the latest technology for accelerating their digital transformation. Siemens Xcelerator also enables the industrial metaverse: hard- and software solutions that are interoperable, work as plug-and-play and are offered as a service, which makes them easily adaptable and scalable for companies of all sizes.

Additional sources

- **Keynote:** "Why the industrial metaverse is closer than you think", by Roland Busch, President and CEO of Siemens AG
- **Report:** "The emergent industrial metaverse", with MIT Technology Review
- **Opinion piece:** "The industrial metaverse: the way is the goal", by Peter Körte, Chief Technology Officer and Chief Strategy Officer of Siemens AG
- **Article:** "What is the industrial metaverse – and why should I care?"
- **Glossary** on "All things industrial metaverse"
- **Interview:** "Bringing AI engineers to the industrial metaverse", with Michael May, Head of Data Analytics and Artificial Intelligence at Siemens AG