

Factory of the Future

Achieving digital excellence
in manufacturing, today



Transforming manufacturing beyond Industry 4.0

A look at the pioneers who are making the factory
of the future a reality today

Far from just a concept based on longstanding aspirations of Industry 4.0, the factory of the future means going beyond the walls of production to transform the entire connected manufacturing ecosystem.

Where we once imagined a factory focused on the digital, robot-driven production floor, reality has transcended the factory floor to include the entire manufacturing ecosystem—connecting employees, processes, machines, data, and customers—far beyond what was once envisioned.

Manufacturers have already invested \$100M in smart factory initiatives, with those who have implemented smart factories seeing 17-20% productivity gains.¹ Yes, the “factory of the future” involves machines, products, and factories. But contrary to past fears of automation and robots replacing people, the factory of the future is actually empowering people, including:

- **Manufacturing business leaders** using data from hyperconnected networks to develop customized, meaningful products and services
- **Factory workers** using continuous insights to predict and prevent machine failures and improve operational effectiveness
- **Customers** providing real-time usage data and experiential sentiment to inform how manufacturers innovate to support valuable experiences

“20 years ago, you were required to sell a machine. 15 years ago, you were required to sell a machine and automation, and now you are required to provide the complete package. You must provide the machine, but you must also provide the solutions to use them: properly, effectively, and for a long time easily. The only way to do it is with digital and technical solutions.”

- **Carlo Scalmana**,
President and CEO, Italtipresse Gauss

Empowering digital leaders in manufacturing

Connected intelligent machines and IT systems provide continuous insights, enabling manufacturing leaders to make better informed decisions with objective, up-to-date market data; manage inventory in near-real time; and revise processes and drive new innovations to meet demand. Such hyperconnected networks of free-flowing data will enable manufacturers to work with shorter lead times, forge a tighter link between supply and demand, develop new business models as market demand and opportunities arise, and accelerate new product introductions to market.

Empowering manufacturing leaders hinges on supporting real-time insights, and one way Microsoft

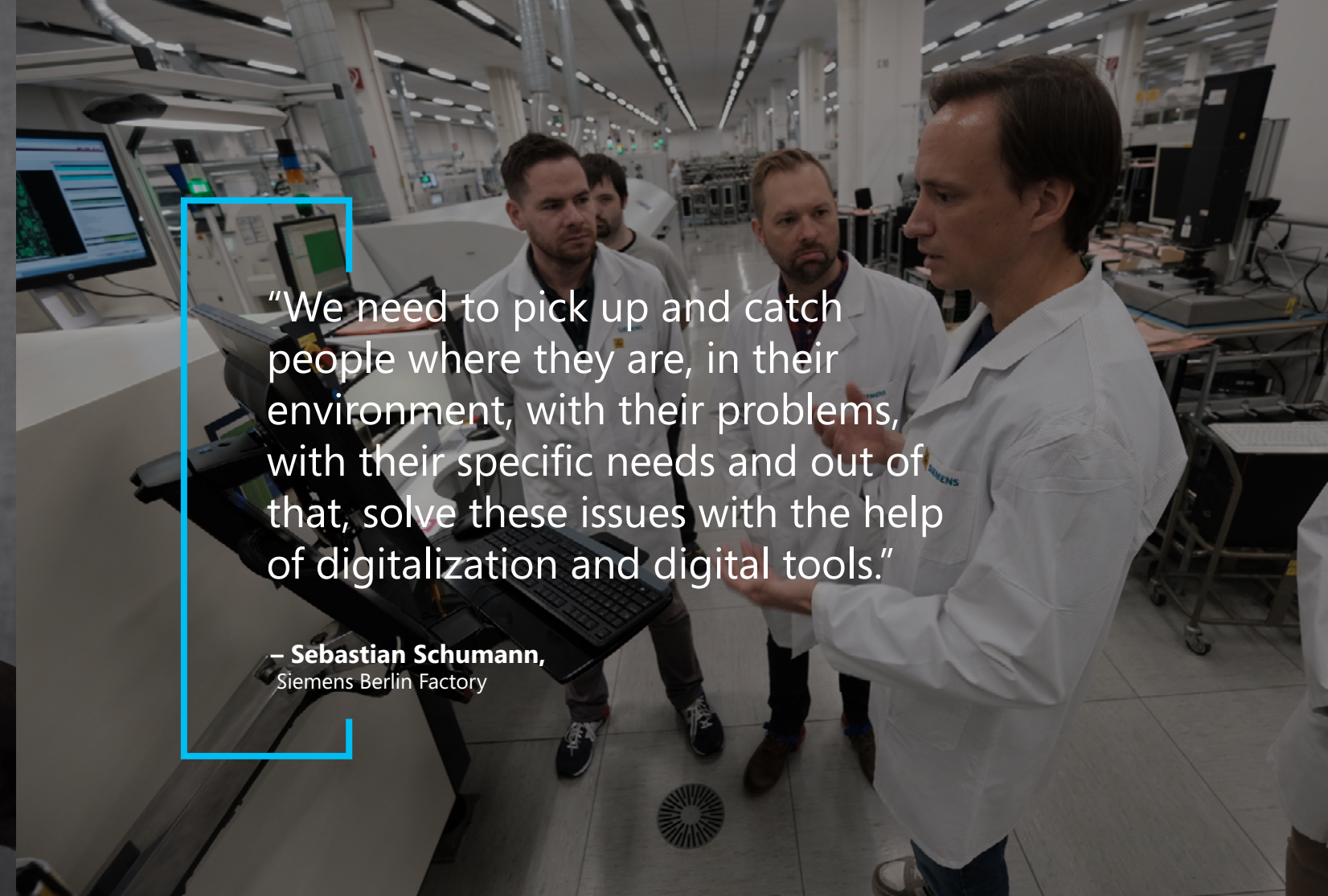
enables this is [Remote Monitoring](#). Developed for the Microsoft Azure platform, Remote Monitoring enables manufacturers to make targeted improvements to business processes by getting real-time use, performance, and asset health updates from nearly anywhere, and use that data to optimize performance securely, anticipate problems and solutions, and boost customer satisfaction.

The result? Improved visibility to support proactive response across the business; the ability to make targeted improvements to business processes to save time, money, and resources; and new business insights to spot trends and opportunities to advance the business.



"We need to pick up and catch people where they are, in their environment, with their problems, with their specific needs and out of that, solve these issues with the help of digitalization and digital tools."

– Sebastian Schumann,
Siemens Berlin Factory




Connecting specialists in new ways across the organization

Today, immersive human-to-machine collaboration and advanced analytics are enabling specialists—from R&D, to the production floor, to logistics and supply chain management—to prototype new designs faster and more affordably, build more useful products faster, and continually support meaningful customer experiences. In fact, 85% of manufacturing executives expect human-to-machine-centric environments to be commonplace by 2020,² with an estimated 40% of operational processes being self-healing by 2022.³

One technology at the heart of this vision is the digital twin, enabling manufacturers to simulate and iterate through the end-to-end stages of design, production, and service with a digital representation of the plant floor, supply

chain, and product lifecycle. What used to be considered technologically abstract or out of reach is now tangible and available, supporting advanced problem-solving and reasoning with machines, simultaneous work across virtual and physical models, and effective cross-team collaboration on a global scale.

Microsoft is redefining the digital twin through [HoloLens](#), which allows users to interact with and improve full-scale models in immersive mixed reality. Now, manufacturing teams can create flexible, safe holographic training scenarios in the real world, give clients 3D prototypes to visualize and inspect, and identify and address problems before work starts. Processes that once took weeks can now take days through this reduction in physical prototyping.



"The introduction of HoloLens to our operations will empower over 20,000 field service engineers in doing their job better and more efficiently, and increasing the availability of elevators and escalators makes the job safer and more fun for our people."

– **Andreas Schierenbeck**,
CEO, ThyssenKrupp Elevator



Developing a truly customer-centric manufacturing process

According to Accenture, 95% of business leaders expect their company to use the Industrial Internet of Things (IIoT) in the next three years⁴; while Gartner estimates that hundreds of millions of things will be represented by digital twins in the next three to five years.⁵

While factory workers, machines, processes, data, and other elements of production support smart factories, empowering transformative customer experiences is truly at the heart of the factory of the future. The desire to adapt to quickly-evolving customer demands is nothing new, except now technology trends such as AI and IoT are being adopted and integrated into ways that finally deliver on this real-time, customer-centric vision.

One example of how the customer experience is being completely transformed is [Predictive Maintenance](#), in which manufacturers boost equipment reliability and stay ahead of the unexpected issues that can easily derail production. By capturing customer sentiment, usage, and other data and analyzing it with machine-learning algorithms, manufacturers can gain the insight to fine-tune processes and make modifications that improve product quality and increase customer satisfaction. Going forward, IoT-driven data and AI will bring new levels of performance insight directly from customers for customer-driven product design and faster innovation cycles.

“The Microsoft Azure platform makes it a lot easier for us to deliver on our vision without getting stuck on the individual IT components. We can focus on our end solution and delivering real value to customers rather than on managing the infrastructure.”

– **Richard Beesley,**
Sr. Enterprise Architect – Data Services, Rolls-Royce



From our factory to your factory of the future

Through a robust technology platform, preconfigured solutions, and longstanding experience as both a services provider and manufacturer, Microsoft is empowering humans to capitalize on the unprecedented opportunities of the factory of the future in three fundamental ways.

First, empowering organizations to achieve breakthrough productivity with

intelligent, mixed reality, and cognitive services by bringing together humans, machines, and AI. Second, building broader ecosystems through partnerships that include telecommunications, network, hardware, and software partners. And third, delivering a highly-flexible, robust software platform that allows the hyperconnected world to operate in hybrid models, supporting IoT, people, and services working together.



"Jabil has seen at least an 80 percent accuracy rate in the prediction of machine processes that will slow down or fail."

– **Clint Belinsky,**
Vice President of Global Quality, Jabil

To learn more about Microsoft smart factory solutions and the growing number of manufacturers innovating with them:

Watch our [Delivering Digital Excellence in Manufacturing - Factory of the Future & Connected Factory Solution](#)

Demo our [IoT Connected Factory](#)

Check out Microsoft Partner solutions on [AppSource](#)

This eBook is based on Microsoft analysis of third-party data. Sources include:

¹Capgemini: Smart Factories: How can manufacturers realize the potential of digital industrial revolution. 2017.

²Eric Schaeffer et al., Machine Dreams: Making the most of the connected industrial workforce. Accenture. February.

³DC FutureScape: Worldwide Digital Transformation 2017 Predictions Jan 2017 Doc # US42259317 Web Conference By: Michael Versace.

⁴Connected business transformation: how to unlock value from the Industrial Internet of Things. Accenture. February, 2017.

⁵Gartner: Gartner Identifies the Top 10 Strategic Technology Trends for 2017. 2016