

**Integrating
IT and OT to
boost process
efficiency,
product
quality and
sustainability**



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Introduction

The convergence of Information Technology (IT) and Operational Technology (OT) has emerged as a critical factor for manufacturers seeking enhanced process efficiency, improved product quality, and sustainable operations. This integration of data-centric IT systems with physical device-controlling OT systems facilitates real-time data exchange, better decision-making, and streamlined operations.

However, many manufacturers are still in the early stages of their IT/OT convergence journey. As **Jouko Koskinen, Senior Director, Digital Factory at Fujitsu**, notes, *“Most manufacturers have initiated digitalization but have primarily focused on customer interfaces rather than manufacturing processes.”* This presents a significant opportunity for manufacturers to leverage IT/OT convergence to drive internal efficiencies and overall performance improvements.

This whitepaper explores the key drivers, challenges, and strategic advantages of IT/OT convergence, providing manufacturers with a comprehensive understanding of how to effectively implement these integrations and transform their operations for future success.

Section 1: Understanding IT/OT convergence

The convergence of IT and OT marks a significant evolution in the manufacturing industry, driving the shift towards smarter, more efficient, and integrated operations. Traditionally, IT and OT systems have operated in silos, each serving distinct purposes within an organization.

Distinct roles of IT and OT systems

IT systems are primarily focused on data-centric computing, managing information flow, data processing, and supporting business applications. These systems ensure that data is stored, processed, and made accessible to various departments, aiding in decision-making and strategic planning.

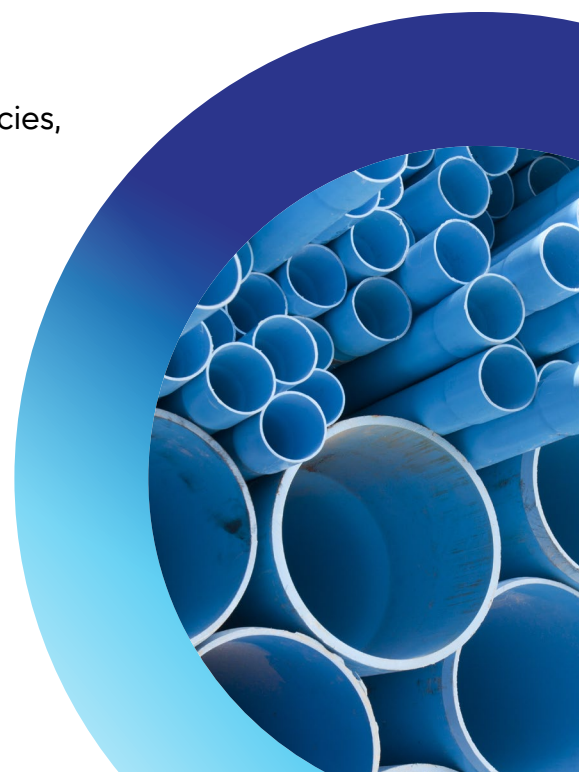
On the other hand, OT systems are designed to monitor and control physical devices and processes on the factory floor. These include machinery, production lines, and environmental controls, ensuring that manufacturing operations run smoothly and efficiently. OT systems gather real-time data from sensors and devices, providing critical insights into the performance and status of physical assets.

Inefficiencies from siloed operations

This separation of IT and OT has traditionally led to inefficiencies, as the lack of integration prevents seamless data flow and comprehensive visibility across operations. These silos result in delayed decision-making, reduced productivity, and increased operational costs.

“Factories often have siloed operations leading to suboptimal performance due to a lack of end-to-end visibility and unified KPIs.”

Jouko Koskinen



Technological drivers of convergence

The journey towards IT/OT convergence has been driven by major technological advancements that hold massive potential value for manufacturers. These include:



Internet of Things (IoT): IoT enables the interconnection of devices, allowing data from OT systems to be captured and shared across IT platforms. This interconnectivity facilitates real-time monitoring and control, enhancing operational efficiency.

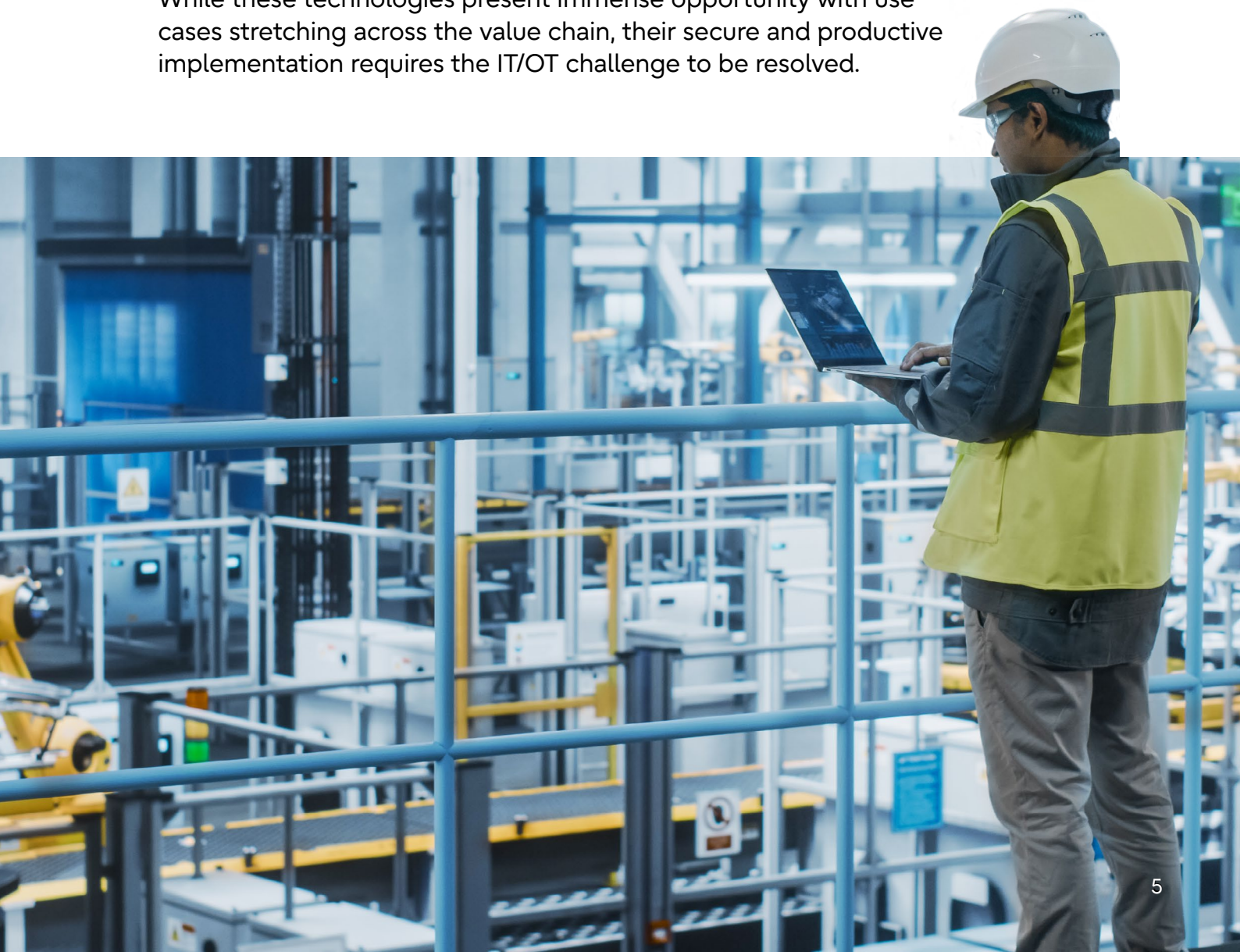


Big data analytics: Big data analytics processes vast amounts of information to uncover patterns, optimize processes, and predict future outcomes. By analyzing data from both IT and OT systems, manufacturers can make more informed decisions.



Digital twins: Digital twins create virtual replicas of physical systems, providing a holistic view of operations and enabling real-time monitoring and optimization. This technology allows manufacturers to simulate and analyze their operations, leading to continuous improvement.

While these technologies present immense opportunity with use cases stretching across the value chain, their secure and productive implementation requires the IT/OT challenge to be resolved.



Section 2: Strategic drivers and advantages for IT/OT integration

The convergence of IT and OT presents numerous strategic advantages for manufacturers. By bridging the gap between these traditionally siloed systems, manufacturers can achieve remarkable improvements in key areas across their operations.

Operational efficiency

One of the most compelling drivers for IT/OT integration is the significant boost in operational efficiency. Integrated systems provide real-time visibility into manufacturing processes, enabling better decision-making and faster responses to operational issues. This seamless integration minimizes downtime, optimizes resource utilization, and enhances overall productivity. Real-time data enables manufacturers to identify and address inefficiencies promptly, leading to streamlined operations and reduced operational costs.

“Enhanced data flow, PLC data model harmonization and integration from factory floors to enterprise systems are crucial to realizing an Industry 4.0 vision.”

Jouko Koskinen



Product quality

IT/OT integration plays a crucial role in improving product quality by driving towards closed-loop manufacturing processes. The integration allows for continuous feedback loops where data from production processes is analyzed in real-time to identify areas for improvement. This approach helps maintain consistent product quality and allows quick adjustments in response to any deviations. Real-time data capture and analysis support high standards of quality control, with early defect detection reducing rework and predictive maintenance minimizing disruptions. By maintaining product integrity and ensuring that quality issues are addressed promptly, manufacturers can deliver superior products to their customers.

Sustainability efforts

Sustainability is increasingly becoming a critical focus for modern manufacturers, and IT/OT integration significantly furthers these goals. By integrating IT and OT systems, manufacturers can optimize energy consumption, reduce waste, and improve resource efficiency. Real-time data combined with analytical capabilities allows for precise control over energy usage and material consumption. This integration supports initiatives to minimize environmental impact and achieve sustainability targets.

“IT/OT convergence helps in furthering sustainability goals by reducing waste, energy consumption, and unnecessary movements.”

Jouko Koskinen



Supply chain visibility

Enhanced supply chain visibility is another significant advantage of IT/OT integration. With integrated systems, manufacturers can gain real-time insights into their supply chains, from raw material procurement to finished product delivery. This visibility helps manage supply chain risks, improve delivery times, and enhance overall supply chain efficiency. It ensures that manufacturers can respond swiftly to changes in demand and supply conditions, maintaining smooth operations. Real-time insights enable proactive management of the supply chain, reducing the likelihood of disruptions and ensuring timely delivery of products.

Holistic benefits

Bridging IT and OT systems supports a seamless flow of information across manufacturing operations. This holistic approach not only enhances competitiveness but also ensures long-term viability as the industrial landscape evolves. IT/OT integration drives continuous innovation, allowing manufacturers to stay ahead in the industry by adopting new technologies and processes that further improve their operations.

Section 3: Overcoming obstacles in IT/OT convergence

While the benefits of IT/OT convergence are substantial, the journey to achieve this integration contains many challenges. Manufacturers must navigate several obstacles to successfully merge their IT and OT systems, ensuring that their operations are efficient, secure, and future-ready.

Cybersecurity risks

One of the primary challenges in IT/OT convergence is managing cybersecurity risks. The integration of IT and OT systems often involves creating a single IP network that spans from the office to the factory floor, with little to no segregation. This interconnectedness increases vulnerability as it broadens the attack surface for potential cyber threats. Legacy OT systems, which were not originally designed with modern security standards in mind, further exacerbate this risk. These systems often lack the necessary security protocols, making them susceptible to attacks and breaches.

Managing legacy systems

Legacy systems present another significant hurdle in the path of IT/OT convergence. Many manufacturing plants rely on outdated technologies that are incompatible with newer IT systems. Integrating these legacy systems with modern IT infrastructure can be complex and costly. Moreover, the need to maintain and support these aging systems can divert resources and attention away from strategic IT/OT integration initiatives. The challenge lies in finding cost-effective ways to upgrade or replace these systems without causing major disruptions to ongoing operations.

Overcoming organizational silos

Organizational silos are a common issue that manufacturers face during IT/OT convergence. These silos can exist between different departments, such as IT and operations, leading to communication gaps and misaligned goals. Bridging these silos requires a cultural shift towards greater collaboration and shared objectives across the organization. Encouraging cross-functional teams and creating an environment of open communication are essential steps in overcoming these barriers.





Types of convergence challenges

Manufacturers encounter various types of convergence challenges, including process, software/data, and physical convergence:

1. Process convergence

Aligning IT and OT processes is critical for seamless integration. This alignment often requires redefining workflows and responsibilities, which can be met with resistance from employees accustomed to traditional ways of working.

2. Software/data convergence

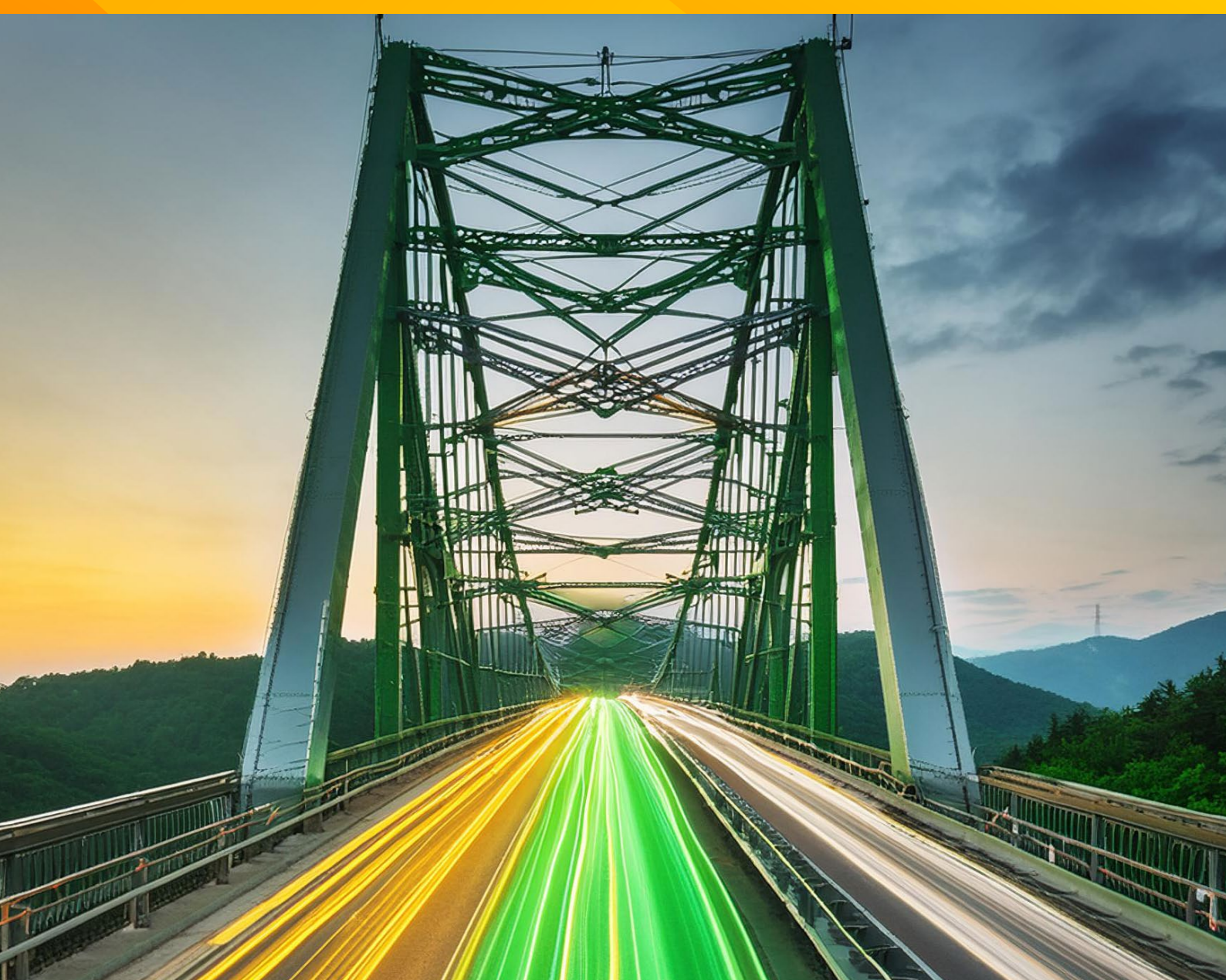
Ensuring that IT and OT software systems can communicate and share data effectively is another challenge. Differences in data formats, protocols, and standards can hinder seamless data flow and integration.

3. Physical convergence

Integrating physical infrastructure, such as machinery and network hardware, with IT systems requires careful planning and investment. This integration can be disruptive and requires significant resources.

“Process convergence and data management are proving (to be) the areas where manufacturing leaders are struggling the most. The complexity of aligning IT and OT processes, ensuring seamless data integration, and managing the vast amounts of data generated by modern manufacturing systems presents a significant hurdle.”

Jouko Koskinen



Implications of failing to bridge the convergence gap

Failing to effectively converge IT and OT systems can have several negative implications, including:

- **Operational disruptions:** Inefficient processes and poor integration can lead to frequent operational disruptions.
- **Increased costs:** Maintaining separate systems and dealing with integration issues can drive up costs.
- **Reduced productivity:** Ineffective convergence can hinder productivity due to inefficiencies and delays.
- **Siloed data:** Lack of integration results in siloed data, limiting visibility and decision-making capabilities.
- **Compliance risks:** Inadequate data management and security can lead to compliance issues. The rollout of [NIST 2.0](#) will have implications for setting the requirements for factories and IT/OT convergence solutions.

Section 4: Effective strategies for implementing IT/OT integration

Successfully integrating IT and OT requires a strategic approach, leveraging best practices to ensure seamless and effective convergence. Here are several key strategies for manufacturers to implement IT/OT integration effectively.





1. Phased approach starting with pilot projects

Starting with pilot projects allows manufacturers to test the integration on a smaller scale, identify potential issues, and refine their strategies before a full-scale rollout. These pilot projects serve as proof of concept, demonstrating the benefits and feasibility of IT/OT integration and providing valuable insights for broader implementation. By tackling integration in manageable phases, manufacturers can mitigate risks and ensure that each stage builds on the success of the previous one.

2. Cross-functional collaboration and continuous training

Cross-functional collaboration requires the alignment of various departments, including IT, operations, and management, to work towards common goals. Continuous training ensures that employees are well-equipped to handle new technologies and processes. This ongoing education creates a culture of innovation and adaptability, enabling teams to stay updated with the latest advancements and best practices. By promoting cross-functional teams and open communication, manufacturers can break down silos and ensure that all stakeholders are engaged and aligned.

3. Need for centralized, modular, and scalable infrastructure

A centralized, modular, and scalable infrastructure is the backbone of effective IT/OT integration. Centralization ensures that data and operations are unified, while modularity allows for flexibility and adaptability. Scalable infrastructure supports growth and accommodates future technological advancements, ensuring that the integration remains relevant and effective over time. This approach enables manufacturers to build a robust and future-proof foundation for their IT/OT systems, facilitating continuous improvement and innovation.

4. Overcoming resistance

Resistance to change is a common challenge in IT/OT integration. Overcoming this requires clear communication of the benefits, robust training programs, and the creation of a collaborative culture. It's essential to articulate the value of IT/OT convergence to all stakeholders, addressing their concerns and demonstrating how it will enhance their roles and the organization's overall performance. Robust training ensures that employees are confident in using new systems, while a collaborative culture encourages teamwork and shared objectives. By creating an environment of trust and cooperation, manufacturers can ease the transition and ensure successful integration.

Section 5: Our manufacturing success stories

ABB's Smart Factory journey

ABB, a global leader in industrial technology, needed to modernize its manufacturing processes to increase productivity and user satisfaction. The company sought to create real-time quality control and process automation orchestration to set a new benchmark for smart factories worldwide.

Solution

Fujitsu implemented modern SAP Digital Manufacturing and Cloud technologies, enabling ABB to achieve real-time quality control and process automation. The Fujitsu expertise in integrating these advanced technologies provided ABB with a robust framework for enhancing its manufacturing capabilities.

Outcome

The modernization significantly increased production productivity and user satisfaction at ABB. The successful implementation set a global benchmark for smart factory operations, showcasing the potential of digital transformation in manufacturing.

“ ABB's Smart Factory journey utilizing modern SAP Digital Manufacturing and Cloud technologies enabled the creation of real-time quality control and process and automation orchestration. This modernization significantly increased production productivity and user satisfaction and set a new benchmark for smart factory, globally. ”

Vesa Kandell, Group VP Head of Operations ABB Motion

Hunter Douglas' SAP migration and optimization

Hunter Douglas faced challenges in stabilizing its plant operations, which affected order fulfillment capabilities. The company required a new partner to rapidly deploy SAP Manufacturing Execution across its North American facilities to achieve better inventory visibility and operational stability.

Solution

On SAP's recommendation, Hunter Douglas partnered with Fujitsu to drive plant stabilization. Fujitsu spent 14 months migrating over 20 plants to the new SAP solution. This hybrid model included a combination of client teams, Fujitsu onsite support, and Fujitsu Global Delivery Center (GDC).

Outcome

The migration resulted in total visibility of inventory across multiple businesses, improved on-time delivery, and increased stability, leading to better availability and access to accurate real-time data and reports. Inventory levels were optimized by 30% through significant improvements in work-in-progress (WIP) reduction.

Fujitsu and Hunter Douglas spent 14 months migrating 20+ plants to the new SAP solution, optimizing inventory levels by 30% and significantly improving WIP reduction with enhanced visibility.



Section 6: Exploring the future of manufacturing with our solutions and consulting

“The journey doesn’t start without investing time and resources first in enabling technologies, architectures, and training.”

Josko Koskinen



Finding your way in the future of manufacturing requires navigating the complexities of IT/OT convergence effectively. Fujitsu is at the forefront of this transformation, offering comprehensive solutions and consulting services designed to help manufacturers optimize the efficiency of their operations and remain competitive.

Overview of our solutions and consulting services

As a leader in IT/OT convergence and digital transformation, Fujitsu acts as a strategic partner, providing the necessary tools and guidance to help manufacturers chart a forward course and transition smoothly into the future of manufacturing. Our expertise ensures that organizations can adopt advanced technologies, streamline operations, and drive continuous improvement.

Our solutions

1. Cybersecurity solutions

Fujitsu offers tailored cybersecurity services specifically designed for IT/OT environments. These services include OT assessment, cyber assessment, OT network transformation, and 24/7 OT managed monitoring. By leveraging advanced technologies and proactive monitoring, we ensure robust protection against cyber threats and safeguard critical manufacturing operations.



2. Digital Factory solutions

Fujitsu's Digital Factory solutions focus on transforming traditional manufacturing environments into smart factories. Key components include:

- **OT assessment and asset discovery:** Evaluating current operational technologies and identifying areas for improvement.
- **Cloud migration and transformation services:** Transitioning existing systems to cloud-based platforms to enhance scalability and flexibility.
- **Digital Kaizen:** Continuous improvement initiatives leveraging digital tools to streamline processes and reduce waste.
- **Proactive AI-based monitoring:** Transitioning from reactive and silo-driven approaches to proactive, AI-based monitoring. By leveraging AI, Fujitsu's solutions significantly reduce the mean time to resolve issues by over 50%, enhancing overall operational efficiency.

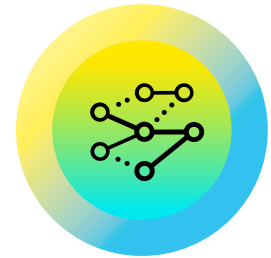


The Digital Kaizen initiative at the Fujitsu Japan factory improved cycle time by 33% and reduced unnecessary movements by 66%.

3. Digital Factory offerings

Our Digital Factory offerings enhance manufacturing efficiency and product quality through real-time data integration, analytics, and machine learning. These include:

- **OEE dashboarding:** Real-time monitoring of Overall Equipment Effectiveness (OEE) to identify and eliminate inefficiencies.
- **Factory MOC (Monitoring Operations Center):** AI-based proactive monitoring that correlates between services and understands their relationships, significantly improving mean time to resolve issues by over 50%, ensuring uptime and performance.
- **HCI Edge:** Harmonizing data from different PLC models, hosting necessary AI, applications, and databases, and serving as a single point of data intake to support analytics, visualization, and machine learning in conjunction with Azure data services.



The implementation of HCI Edge at a customer's facilities improved data collection and usage, leading to better factory OT maintenance and product quality.

“The Fujitsu HCI Edge solution helps improve customer factory data collection and usage, focusing on factory OT maintenance and product quality-related use cases.”

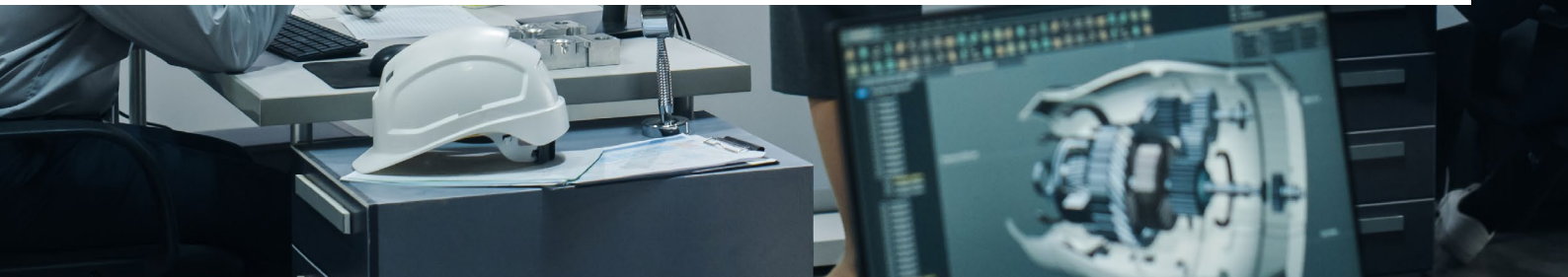
Jouko Koskinen

4. Strategic consulting for continuous improvement

Fujitsu's strategic consulting services guide manufacturers through digital transformation and change management, emphasizing a phased, modular, and scalable approach.

Key services include:

- **Digital transformation consulting:** Comprehensive assessments, strategic planning, and implementation support to adapt to technological changes.
- **Change management:** The Fujitsu [Wayfinders](#) program focuses on clear communication, employee training, and fostering a collaborative culture, ensuring that all stakeholders are aligned and engaged throughout the transformation process.



Preparing for future trends

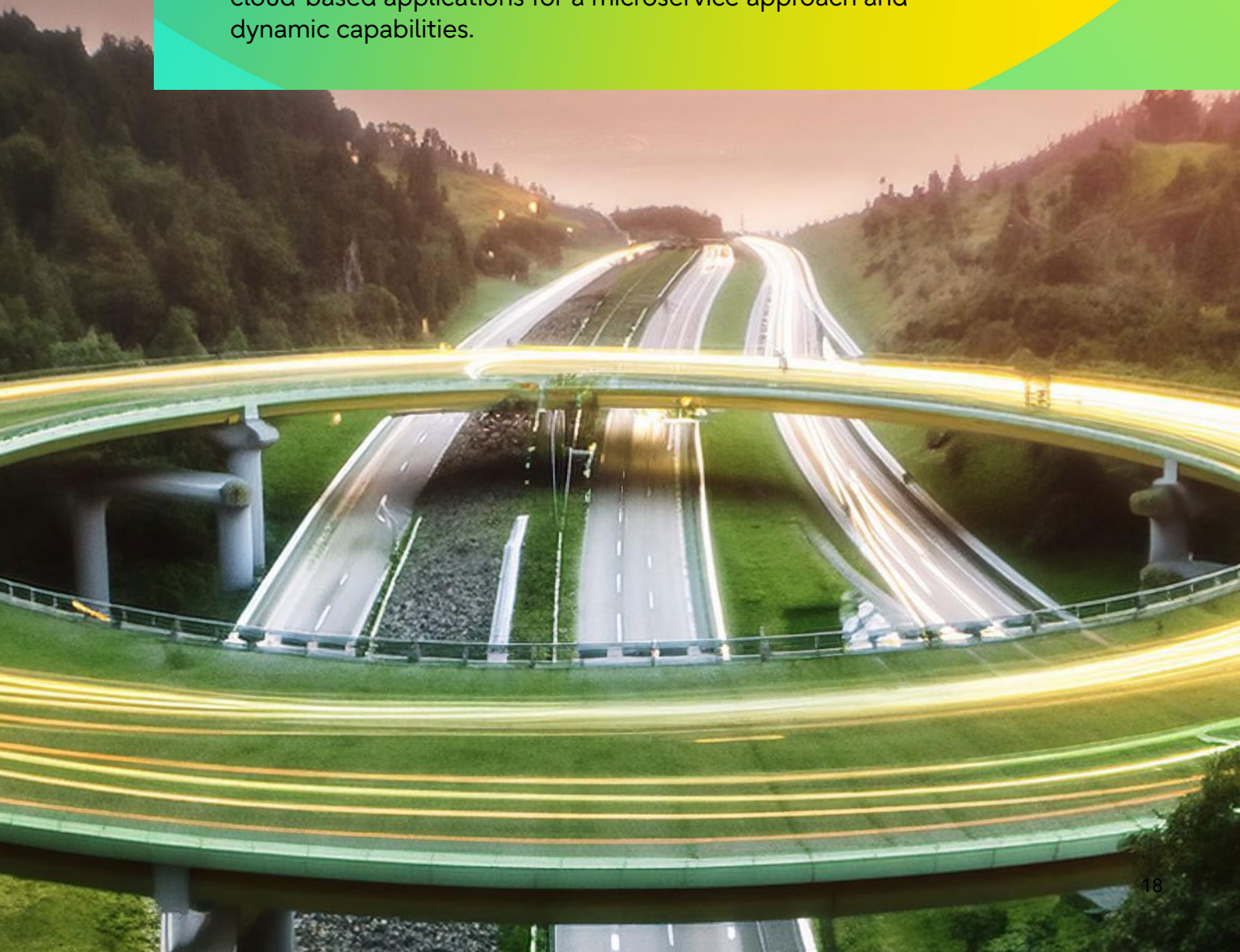
Fujitsu assists manufacturers in preparing for the future by offering innovative solutions and expert guidance. This includes helping manufacturers adopt scalable technologies such as advanced IoT, AI, and big data analytics, embedding a culture of continuous improvement, and providing insights on regulatory changes and emerging threats.

Shift towards close-loop manufacturing

By 2030, Fujitsu aims to have a closed-loop manufacturing solution integrated in real-time from equipment/product planning to supply chain management.

Taking the first step towards the future

Fujitsu assists manufacturers to prepare for their future environment by selecting strategic technologies (SAP, Microsoft, ServiceNow, Salesforce) and setting them up for use without large customization, utilizing cloud-based applications for a microservice approach and dynamic capabilities.



Embracing new possibilities through IT/OT Convergence

The convergence of IT and OT is a critical step towards achieving efficient and Sustainable Manufacturing. By integrating these domains, manufacturers can enhance operational efficiency, improve product quality, and drive sustainability efforts, ensuring agility and responsiveness in a changing manufacturing environment.

Fujitsu offers unmatched expertise and comprehensive solutions to help manufacturers navigate the complexities of IT/OT integration. With a proven track record in digital and smart factory solutions, cybersecurity, and strategic consulting, we empower organizations to realize the full potential of IT/OT convergence and take significant steps towards long-term success and resilience.

Drive your Sustainable Manufacturing forward by implementing IT/OT convergence strategies in your operations.



[Contact our Sustainable Manufacturing experts to find out more.](#)