Accelerating digitalization in manufacturing with Nokia and Dassault Systèmes

Partnership brief

Manufacturers must strengthen their focus on digital transformation strategies

Manufacturing has evolved considerably over the last decade. Driven by the need to increase productivity, efficiency and quality, manufacturers globally have made selective investments in areas such as factory automation, workforce tools, supply chain and logistics, and operations systems. But the world never stops advancing. Today, manufacturers face new challenges they can't adequately address with their current mode of operation and production techniques, despite the many advances they've made.

Recent global events have made it increasingly difficult for manufacturers to deliver high-quality goods in a timely and cost-effective way. Transportation restrictions, sanctions and national security fears have severely disrupted global supply chains. The resulting shortages have driven prices for materials and critical components to new highs, delaying production schedules and preventing product launches.

At the same, manufacturers have faced mounting challenges on the customer side. Customer demand levels and requirements now fluctuate in ways that are far less predictable and more challenging to meet than they were previously. Ongoing shortages of skilled labor and delays in production make it extremely difficult for manufacturers to meet these demands, take advantage of new opportunities and grow their business.

Standing still is not an option

Together, these challenges have significantly increased the need for manufacturers to accelerate their adoption of Industry 4.0 technologies that will help them simultaneously:

- Accelerate product development
- Optimize manufacturing processes
- Enhance flexibility
- Improve quality
- Cut costs
- Increase profitability
- Reduce time to market
- Become more sustainable

The move to Industry 4.0 is already well underway and manufacturers across industries are actively implementing smart manufacturing solutions. These industry leaders recognize that adopting new technologies today allows them to address current challenges and position themselves to overcome future challenges.

Manufacturers that delay digitalization risk falling behind in their industry and becoming irrelevant. This has been the case throughout history across all industries. As manufacturers evolved from the earliest days of the Industrial Revolution through the shift to mass production and automated production, it's always been those who could exploit new advances to their fullest potential in the shortest timeframe that were most successful. The evolution to a smart factory is no exception.

"To address these disruptions, successful advanced industry companies are leveraging Industry 4.0 to achieve faster, more sustainable change, shown most dramatically at "lighthouse" manufacturers that have led the way in Industry 4.0 implementation."

- McKinsey & Company[1]

1 Transforming advanced manufacturing through Industry 4.0. McKinsey & Company, June 2022.

Nokia and Dassault Systèmes help manufacturers increase flexibility, efficiency and productivity

A wide range of wireless technologies co-exists today at manufacturing sites, with each technology providing specific characteristics that fulfill different application requirements. For example, Wi-Fi is well-suited to the connectivity needs in office environments where applications such as email, conferencing and web browsing dominate. In other areas, wireless technologies such LoRa, Bluetooth Low Energy (BLE) and Sigfox enable low power consumption on devices running applications that don't require high bandwidth and low latency.

While current wireless technologies might meet the security, performance and reliability requirements of their specific application, most were not designed to support business- or mission-critical applications that require military-grade security, ultra-reliable, extremely low latency and high throughput.

5G private wireless provides the foundation for digital transformation

5G wireless technology was designed to support most industrial requirements for wireless communications, including providing reliable, fast and secure connectivity in very challenging environments. When manufacturers deploy a 5G private wireless network, it is fully dedicated to meeting the connectivity needs of their own operations. Manufacturers have complete control over how the network is configured and used, and can rapidly scale the network to support new requirements at any time.

A 5G private wireless network gives manufacturers the pervasive, industrial-grade connectivity layer needed to enable Industry 4.0 use cases and support digital transformation strategies today and in the future:

- Ultra-high reliability ensures manufacturing operations are not interrupted and safety-critical systems are always available
- High bandwidth supports demanding, data-intensive applications
- Extremely low latency ensures machine-control and safety-critical systems always perform as expected
- Wide coverage areas with seamless handoffs between access points provide consistent connectivity with predictable performance to support widespread industrial IoT (IIoT) deployments and other industrial applications, such as autonomous mobile robots (AMRs) that require uninterrupted connectivity while in motion
- Built-in security features, including robust authentication, identity protection and encryption, protect networks and data

5G and private wireless are important to manufacturers

Many manufacturers already recognize the critical role a private wireless network plays in their evolution. In a 2022 ABI Research report for Nokia:

- 90 percent of more than 1,000 manufacturers surveyed said they're considering using a private 4G or 5G network to support their mission-critical manufacturing operations.
- More than 40 percent of respondents said they're focused on private 5G only.
- Ultra-reliable, low-latency communications (URLLC), the ability to support massive IoT device connectivity and precise indoor positioning are considered to be key benefits of a private 5G network.

Together, Nokia and Dassault Systèmes bring manufacturers solutions that leverage private wireless network connectivity to deliver important benefits across their operations.

Strategic benefits

- Operate reconfigurable factories and process manufacturing facilities
- Increase production throughput and reduce the cost of quality
- Maintain digital continuity between manufacturing planning and production departments
- Accelerate time to market for new products and solutions

Economic benefits

- Improve manufacturing efficiency
- Synchronize all production resources —man, machines, materials, methods and measurements — in real time to meet demand while reducing lead time and inventories
- Meet sustainability targets by improving quality, which reduces waste and consumption of limited resources
- Reduce costs compared to implementing wired network capabilities

Risk mitigation

- Validate, simulate and execute on potential production scenarios before they're implemented
- Simplify handling of different design models and high product variability
- Quickly react to production schedule and supply network events by capturing all real-time events in production

IT simplification

- Digitize and centralize all manufacturing data
- Connect and manage aging assets
- Harmonize the IT landscape and associated communications requirements
- Simplify operations by converging multiple wireless technologies into one network

A closer look at digitalization opportunities with Nokia and Dassault Systèmes

Our combined solutions target manufacturers' key challenges and top priorities for digitalization across their operations. Those include:

- Nokia 5G Private Wireless Network
- Nokia MX Industrial Edge
- Nokia Industrial Devices
- Nokia Digital Automation Cloud (NDAC) Applications
- Dassault Systèmes DELMIA Apriso Manufacturing Execution System (MES) and Manufacturing Operations Management (MOM) software
- Dassault Systèmes DELMIA Digital Manufacturing Applications
- Dassault Systèmes SIMULIA network simulation capability

Manufacturing operations management

Today, many manufacturers struggle with disconnected, or poorly connected machines, sensors and devices. With little ability to collect data from these assets, manufacturing operations management capabilities are often underutilized, making it difficult to optimize manufacturing quality, productivity and efficiency.

With a Nokia and Dassault Systèmes' solution, a private wireless network connects all manufacturing assets indoors and outdoors so data can be fed into MES and MOM systems that are deployed on premises or in the cloud. Manufacturers can maximize the benefits these valuable systems bring to their operations, while eliminating the high cost, time and effort required to install wired networks. For example, they can:

- Reduce network infrastructure costs
- Increase visibility of manufacturing operations by connecting more assets
- Gain real-time access to rich data, work instructions, procedures and documentation for use in highly regulated environments
- Accelerate detection of non-conformances
- Improve adherence to schedules
- Increase manufacturing quality and productivity
- Improve flexibility and mobility

Connected workers

The various types of wireless connectivity that exist today in factories make it challenging to give workers who are spread across indoor-outdoor manufacturing facilities seamless access to the data-rich 3D representations, instructions and procedures they need to perform operational, maintenance and repair tasks.

With a Nokia and Dassault Systèmes solution, manufacturers can provide workers with information about assets and their environment on field-proven, industry-standard 3GPP wireless devices. Workers can access instructions and real-time telemetry data to assist with maintenance or repair tasks and get remote video assistance from experts if needed. They can also take advantage of augmented work instructions, record their activities and document information with photos and tags to prove tasks were executed in compliance with requirements.

With connected workers located anywhere in the facility, manufacturers can:

- Increase productivity while reducing waste
- Use real-time data about events and status to continuously improve quality and processes
- Improve adherence to safety standards
- Increase worker engagement and retention

Virtual twins for proactive, dynamic production

Unfortunately, many manufacturers are still working in a reactive way with very little ability to capture and analyze operational data so it can be used to identify key areas for improvement. This limited insight into daily operations reduces agility, and impacts factory performance, output, and deliveries.

Nokia and Dassault Systèmes give manufacturers the private wireless connectivity and software needed to contextualize and analyze operations data from IIoT, MES, MOM and other systems in the virtual world so they can use that insight to make targeted improvements in real-world operations. Manufacturers can access data from equipment that could not be connected using wired solutions and combine it with 3D data to analyze and optimize operations in near-real-time. They can also perform root cause analysis to reveal issues and prevent reoccurrence, capture and augment video, images and real-time telemetry data with 3D data to create a rich virtual twin experience.

By connecting the virtual world to the real world, manufacturers can:

- Increase productivity while reducing the waste associated with trial-and-error improvements
- Improve operational excellence by increasing visibility, control, orchestration and automation of manufacturing activities
- Increase responsiveness and agility through model-based manufacturing
- Improve performance by using historical data to visualize, schedule and prepare for upcoming production activities
- Improve safety standards

Manufacturers can also use virtual twin capabilities to create a 3D virtual representation of the 5G private wireless network to ensure assets connected to the network are always communicating to MOM and MES systems. For example, it's possible to simulate and predict network connectivity requirements, such as latency and throughput, in different areas of the production floor based on manufacturing processes and schedules. The resulting insights allow the network to dynamically adjust to provide the right connectivity characteristics in the right areas of the production floor at the right time.

With increased visibility of networking requirements, manufacturers can:

- Reduce costs by providing network coverage on an as-needed basis with minimal redundancy
- Guarantee continuous network coverage for all assets to maintain production output at all times
- Analyze network usage and apply the insight to future network planning scenarios

The power and potential when two industry leaders join forces

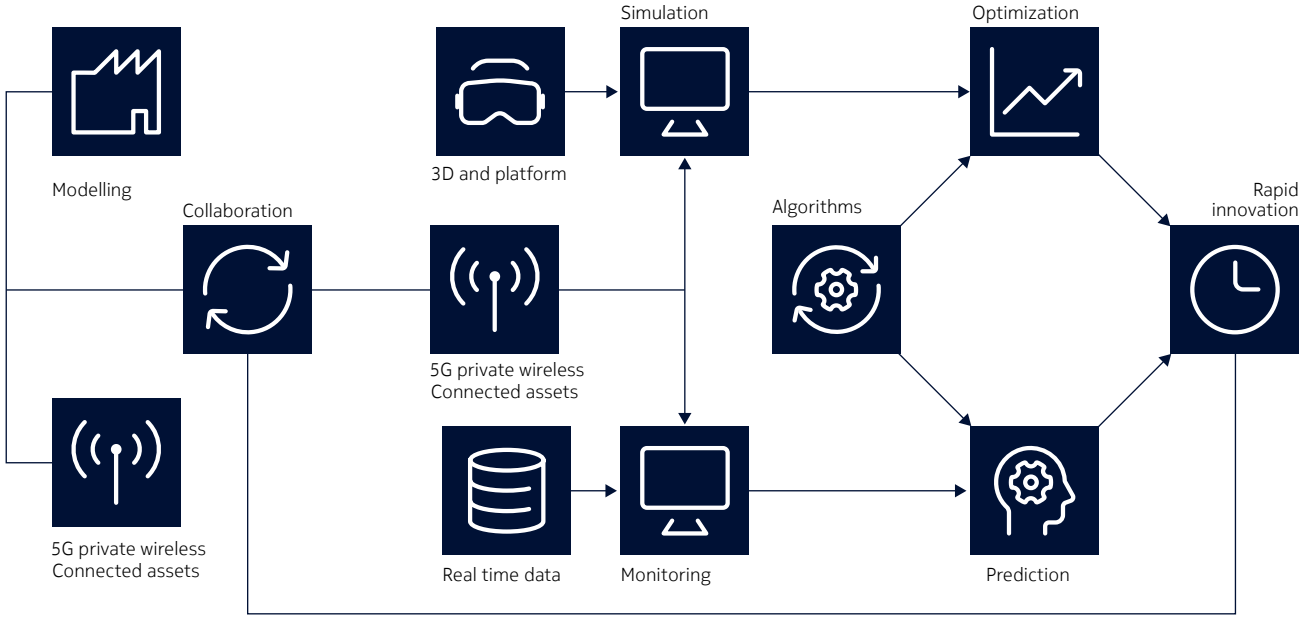
The combination of solutions provided by Nokia and Dassault Systèmes gives manufacturers a unique opportunity to adopt a comprehensive and unified approach to key digitalization initiatives. Jointly, we provide manufacturers with the capabilities needed to accelerate their evolution to a 5G smart factory that leverages connected operations, workers and assets to:

- Increase productivity with real-time planning and simulation
- Increase efficiency with optimized use of resources and assets
- Improve quality with more consistent and standardized production, faster issue detection and better containment of potential defects
- Increase worker safety with higher situational awareness and immediate notifications
- Reduce costs with proactive maintenance, less downtime, and the ability to provide workers with remote support
- Increase sustainability by enabling products to be designed and manufactured using the most responsible and resource-sensitive methodologies

Manufacturers have a clear path to a 5G smart factory

Nokia and Dassault Systèmes use proven tools and methodologies to determine the best way for manufacturers to deploy solutions that deliver measurable improvements today, and that can be easily scaled and adapted to further optimize processes and future challenges.

Figure 1. Nokia and Dassault Systèmes accelerate 5G smart factory innovation



With Nokia and Dassault Systèmes, manufacturers can leverage the capabilities and experience of two recognized industry leaders for their own business success:

- As of year-end 2022, Nokia had provided private wireless networks to more than 550 customers globally, and according to numerous analysts, is the #1 provider of industrial-grade private wireless networks globally.
- Dassault Systèmes is a global leader in manufacturing, scheduling and optimization, and has worked with world-leading design and manufacturing companies since its inception.

Learn more

To learn more about how the Nokia can accelerate your journey to Industry 4.0 and digitalization, check out www.nokia.com/networks/industry-4-0/.

For more information about Dassault Systèmes' Digital Manufacturing solutions and Virtual Twins, visit www.3ds.com/manufacturing/connected-industry

About Dassault Systèmes

Our 3DEXPERIENCE® platform powers our brand applications, serving 11 industries, and provides a rich portfolio of industry solution experiences. Dassault Systèmes, the 3DEXPERIENCE Company, is a catalyst for human progress. We provide business and people with collaborative virtual environments to imagine sustainable innovations. By creating 'virtual experience twins' of the real world with our 3DEXPERIENCE platform and applications, our customers push the boundaries of innovation, learning and production.

Dassault Systèmes' 20,000 employees are bringing value to more than 270,000 customers of all sizes, in all industries, in more than 140 countries.
For more information, visit www.3ds.com.

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About Nokia

At Nokia, we create technology that helps the world act together.

As a B2B technology innovation leader, we are pioneering the future where networks meet cloud to realize the full potential of digital in every industry.

Through networks that sense, think and act, we work with our customers and partners to create the digital services and applications of the future.

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