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Converging 5G and IoT: a faster path to smart manufacturing

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Many manufacturers are seeking opportunities to accelerate their business through the adoption of digital technologies to enable the fourth industrial revolution (i4.0). Technologies such as autonomous robots and big data analytics are enabling companies to make the leap to smart, data-driven flexible manufacturing. Manufacturers need to develop and implement an effective transformation strategy to adopt these technologies and avoid losing ground to their competitors.

This article examines two vital components of such a strategy: the Internet of Things (IoT) and the fifth generation of wireless technologies (5G). Companies that are leading the integration of these technologies into their digital strategies will have the opportunity to reap huge rewards.

Technology and business trends have moved rapidly in their favor. In the past year IoT and 5G technologies have matured to the point where business decision makers can evaluate the benefits of using them together in their digital strategy. They are finding that these technologies are more powerful when they both form a coherent part of their i4.0 investment planning.

Offering big benefits

Both technologies can deliver substantial value to enterprises when implemented together. 5G networks offer tremendous benefits to manufacturers in terms of data speed, latency, efficiency, reliability, capacity and security. The technology is designed to be fast and dependable as fiber optic cable and offers the same capacity at a lower cost, with more flexibility. 5G will

improve the delivery of mobile broadband services, in comparison with previous wireless technologies, and is expected to support a wide array of new solutions. Digital capabilities based on AI, autonomous operations, virtual reality and drones are among the solutions that will employ 5G networks to deliver big gains in productivity and accelerate innovation.

5G offers an optimal telecommunications platform on which to realize IoT's benefits. IoT adoption is occurring at a rapid pace, and many analysts forecast a doubling of investment in these devices in 5 years or less[1]. Manufacturers are attracted by the many gains IoT offers: less machine downtime, higher product quality, predictive maintenance and more informed decision making. There are already systems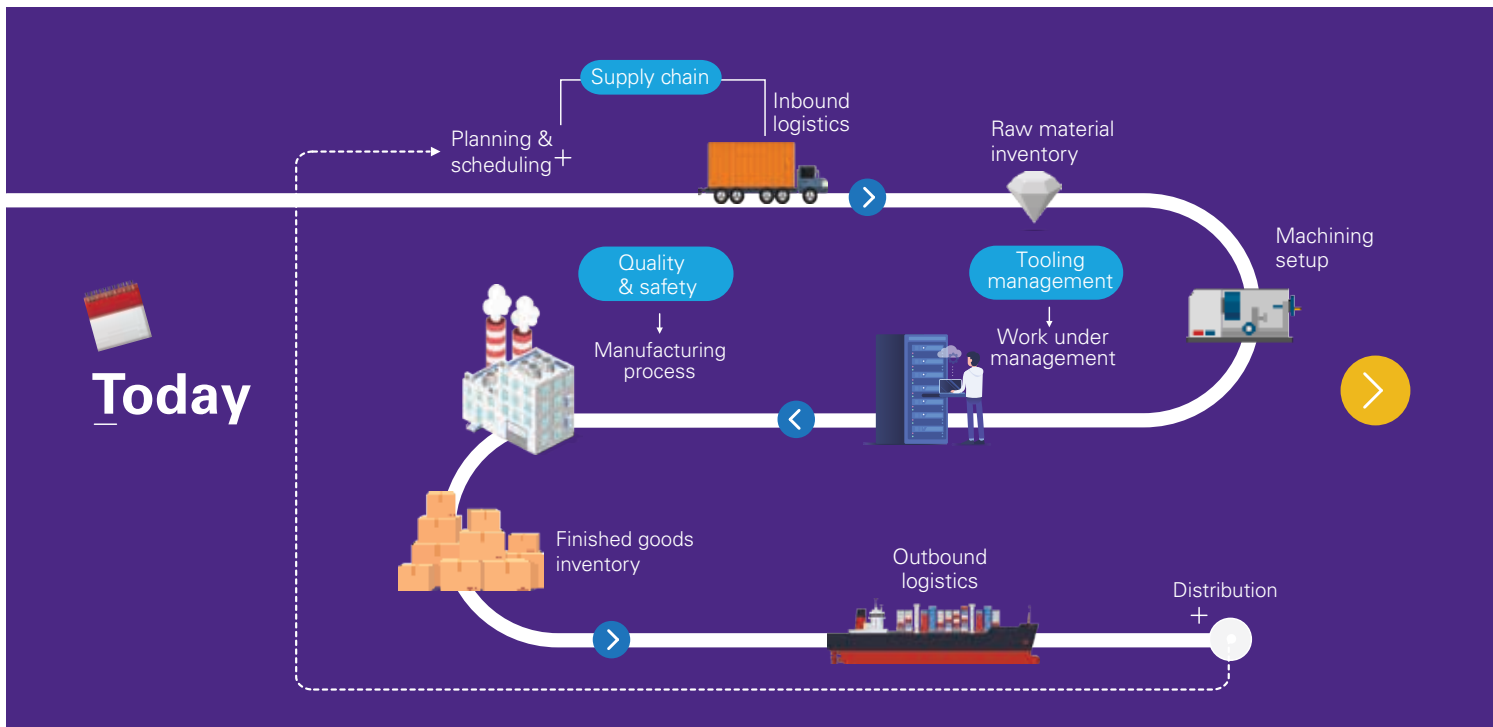 that help to integrate IoT devices into consolidated platforms, but 5G enables several use cases that were previously limited, due to lower throughput and performance. In manufacturing, wireless technologies have played a limited role due to vibration, sound, heat and so on. 5G is expected to eliminate these issues.

The hyper-connected enterprise

One important change is that IoT vendors are starting to cater to specific industry and functional needs. They are working closely with manufacturing enterprises to provide more secure solutions tailored to their clients' operations and digital transformation strategy. With the help of 5G networks, IoT platforms will be able to connect discrete point solutions and sensors to monitor entire processes, from R&D all the way to the very end of the product lifecycle.

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1. "IoT Report: How Internet of Things technology growth is reaching mainstream companies and consumers" Business Insider, 28 Jan 2019.

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Source: KPMG International, 2019.

Connectivity is a key component of i4.0, enabling manufacturers to break through traditional silos to create an integrated ecosystem designed to optimize manufacturing, distribution and the product-consumption lifecycle. IoT and 5G together play a crucial role by enabling the enterprise to connect all stages of the planning-to-sales process in a continuous loop, in which data is fed to analysts and decision makers from sensors installed throughout the operations of the manufacturers, its suppliers and, in some cases, its customers.

Data no longer flows in a straight line but back and forth throughout a multidimensional ecosystem, enabling producers to respond quickly to potential breakdowns, shifts in customer demand, or constantly changing vendors. Thanks to IoT devices, massive amounts of data are collected, enabling manufacturers armed with predictive analytics to undertake preventive maintenance and to plan to retool for product redesigns whenever the need arises. In addition to optimizing manufacturing processes, the newly flexible

global ecosystem means that fully customizable manufactured products are no longer a distant goal, but are now within grasp. The era of truly smart manufacturing is at hand.

A new generation of mobility

Some of the benefits of IoT could be realized within an existing telecommunications infrastructure, but previous wireless technology generations do not have the capability to integrate with autonomous robots or other advanced technologies. In contrast, when IoT is combined with 5G networks in a transformation strategy, the goals of i4.0 come within reach.

Furthermore, with 5G, manufacturers will no longer need to rely on both fixed and mobile networks for their communication needs; 5G is expected to deliver everything that fiber offers, plus the mobility that's increasingly important for flexible manufacturing. Enterprises will no longer tied down to a wired infrastructure and a less-than-reliable Wi-Fi network.

5G Enable Ecosystem
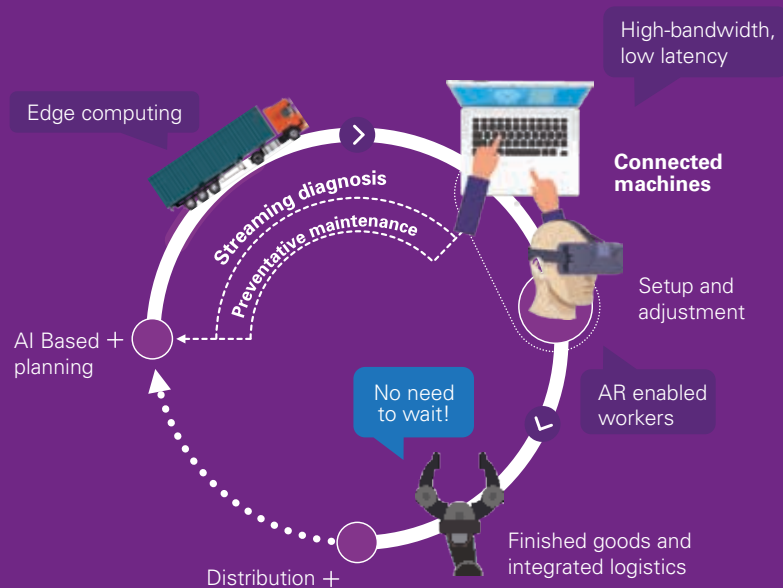
For example, workers equipped with augmented reality/virtual reality (AR/VR) headsets will be free to move about the factory floor, connected at all times to the 5G network. While interacting with IoT devices and data, they can simulate every process in three dimensions right up to the final product. Since even the smallest mistake in design or layout can be expensive, AR/VR's ability to spot potential errors through simulations is just one of the valuable attributes of this system.

In order to integrate the 5G network into their digital strategy, enterprises can create network slicing on demand, enabling a level of customization that was only available previously with highly customized, wired networks. Network slicing allows vendors and customers to be integrated into a network platform simply, easily and more securely. It provides discrete information that is relevant to each use case, enhancing connectivity and security in one step.

Private 5G network options

To implement an effective digital transformation strategy, large enterprises will want their own private networks in order to take advantage of the benefits of the convergence of 5G and IoT and use the entire spectrum to its full potential. When considering what model of private 5G network to adopt, manufacturers have two options: to develop a network that they can operate themselves or to work with an existing telecommunications provider to operate the network together. Until recently, carriers have been slow to respond to enterprise demands for private networks, but they are now shifting their focus to this market.

Governments are also opening up more 5G spectrum specifically for industry, given the competition for bandwidth among consumers, companies and the public sector.

The German regulator, Bundesnetzagentur, for example, announced in March 2019 that it would assign local 5G licenses to meet the needs of industry[2] and will assign spectrum on request. This will help enable local networks to be built to the specifications of individual manufacturers.

One question that has been frequently raised is the possible vulnerability of networks to cyber attack. The introduction of 5G telecommunications, network slicing and new, secure software algorithms is expected to give manufacturers a sizable lead over hackers and provide enterprises and their ecosystems with strong network security protocols. 5G technology, therefore, will offer a higher level of data security than that of existing telecommunications infrastructure. But, as always, there is no substitute for a carefully implemented cyber security governance program to ensure sustainable communications throughout the ecosystem. Digital transformation must be resilient to be really effective.

Seizing the IoT-5G opportunity

The fourth industrial revolution will unleash flows of data in quantities likened to the opening of a fire hydrant. It becomes more important than ever to manage these flows, ensure there is no leakage, and draw business insights from all the data. This is a huge task for any enterprise.

By integrating the 5G network with the IoT system in a powerful digital strategy, smart manufacturers will be able to plan ahead, operate with extreme flexibility and accelerate the path towards an agile ecosystem of suppliers and customers, with the enterprise at the core. This is the promise of i4.0. The vision has taken a big step closer to reality with the integration of 5G and IoT in transformation strategies. Now it is up to manufacturers to take full advantage of this new phase of the fourth industrial revolution.

2. https://www.mobileworldlive.com/featured-content/top-three/germany-to-assign-5g-spectrum-for-industrial-use/

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