

Conversations for tomorrow

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**Intelligent Industry:
The Next Era of
Transformation**

#GetTheFutureYouWant



REALIZING THE POWER AND PROMISE OF INDUSTRIAL 5G

Monika Gupta

Vice President, Group 5G & Edge Lead for Industries & Partnerships

Monika Gupta is a global 5G & Edge expert leading industry use cases and partnerships. She also leads the industry focused 5G lab in Mumbai. She works with Capgemini clients on how they can adopt 5G, Edge and complementary technologies for their data-driven digital transformation. She has over 25 years of experience in the telecommunications and IT industry and has led large green-field and transformation programs.

Pierre Fortier

Vice President, Global 5G & Edge lead, Capgemini Invent

Pierre Fortier has 17 years of experience in consulting and transformation in the telecoms & connectivity space. He leads Capgemini Invent offers, thought leadership and business development activities in the 5G & Edge space. Pierre directs projects both for our telecom clients as well as for industrial organizations across sectors – from automotive to transportation, industry 4.0, and public safety, helping them shape their 5G & Edge strategy & roadmap and deliver on this vision through implementation & transformation programs.

The fourth industrial revolution is under way. Industrial organizations are harnessing the power of data and digital to enhance operations performance, increase flexibility and agility, and unlock innovation. This digital acceleration brings connectivity challenges to center stage. To become more “intelligent,” organizations need advanced solutions to collect, share, and process exponential volumes of data in real time, with the right scale, velocity, and security. In this context, 5G and edge computing are two key technologies addressing these connectivity challenges, providing companies with opportunities to disrupt, innovate, and accelerate the development of factories of the future.

Early adopters have said that 5G is proving its value and delivering significant gains, with the potential for much more

The Capgemini Research Institute’s recently published report, “[Accelerating the 5G Industrial Revolution – state of 5G and Edge in industrial operations](#),” examines the power and promise of this technology. It finds that these are still early days for 5G industrial adoption, with only a third (30%) of organizations conducting 5G pilots or progressing to 5G deployments and

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40% expecting to roll out 5G at one site at least within two years.

However, the experience of the early adopters indicates that the technology is matching or even exceeding expectations and proving its value: we found that three fifths have achieved higher operational efficiency.

As the global 5G deployment and industrial adoption gains momentum, now is the time for organizations to assess how 5G, specifically in convergence with other technologies, can enable new waves of transformation.

Unlocking opportunities across the value chain



Monika Gupta
Vice President,
Group 5G & Edge Lead for
Industries & Partnerships

51%

**of organizations plan to leverage 5G to
offer new products.**

5G lends itself to a wide spectrum of applications across the manufacturing value chain, from enabling autonomous mobile operations to conducting video-based quality inspection and enabling remote collaboration using AR/VR-based applications. Industrial organizations are also optimistic about 5G driving revenues by enabling new products, services, and business models. More than half (51%), for example, plan to leverage 5G to offer new products.

5G use cases in manufacturing can be segregated into four categories:

- **Remote monitoring and control**

When it comes to critical manufacturing operations, the higher bandwidth and lower latency of 5G allows real-time and high-resolution video monitoring and seamless communication with remote devices.

For example, 5G can mobilize video-analytics for quality inspection. A high-resolution, low-latency video feed of a production line enabled by 5G and edge computing can help organizations detect faults in real time, have a more granular control on quality, and achieve higher accuracy. For instance, a 5G private network deployed at a Taiwan-based IT hardware manufacturer has led to a reduction in the re-inspection labor force of 50%.

- **Autonomous robots and machinery**

5G greatly enhances the range and field of operations for robots and autonomous machinery – far exceeding the capabilities of current connectivity technologies such as WiFi.

This becomes even more critical as autonomous mobile robots or drones become a more mainstream part of manufacturing operations. It can also help to adjust production lines faster. Audi and Ericsson are testing use cases that leverage 5G's features of mobility and low latency to run autonomous robots and machinery on the shop floor.¹

¹ Audi, "5G technology: unleashing the robots," February 18, 2020.

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- **Connected worker**
5G also offers a variety of ways to augment operators in an industrial environment, such as with AR/VR. AR/VR in its current form is either limited by range (connected via wires, leading to restriction in movement and range) or capacity (remote AR/VR devices are unable to offer a truly immersive experience due to limits of bandwidth). 5G can help alleviate both these constraints. A low-latency, high-bandwidth, stable remote connection opens up a number of remote collaboration opportunities in two-way communication using AR/VR – in the areas of design, production, maintenance, and customer service. Schneider Electric is testing the use of 5G to perform maintenance activities using AR/VR.²
- **Connectivity**
Organizations can achieve a higher quality of service in connectivity with 5G. For instance, 5G enables supply chain partners to run their own devices and applications over a network slice of 5G with enhanced QoS, reliability, and governance – ensuring higher security standards. 5G also allows for simultaneous and scalable over-the-air upgrades.

60%

**of industrial 5G early adopters are already realizing
improved operational efficiencies.**

² Schneider Electric, "Orange and Schneider Electric Run Industrial 5G trials in French Factory," September 28, 2020.

Within these four categories, below are the top-five uses cases for manufacturers that offer the most business impact for these sectors:

Manufacturing

Consumer products manufacturing	Automotive	Industrial manufacturing	Semiconductor and hi-tech
<ul style="list-style-type: none"> Asset tracking Massive sensor networks for predictive maintenance Use of AR/VR Human machine interface Over-the-air upgrades 	<ul style="list-style-type: none"> Video-based site inspection Massive sensor networks for predictive maintenance AMRs/AGVs/AIVs/drones Over-the-air upgrades Supplier/partner connectivity 	<ul style="list-style-type: none"> Video-based quality inspection Asset tracking AMRs/AGVs/AIVs/drones Mission critical voice, data, and video Supplier/partner connectivity 	<ul style="list-style-type: none"> Massive sensor networks for predictive maintenance Asset tracking Collaborative robots Over-the-air upgrades Supplier/partner connectivity
Aerospace and defense	Chemicals	Life sciences	
<ul style="list-style-type: none"> Video based site inspection Video based surveillance of plants/sites Collaboratives robots Mission critical voice, data, and video Supply/partner connectivity 	<ul style="list-style-type: none"> Video-based site inspection Collaboratives robots Smart tools and machinery Over-the-air upgrades Supply/partner connectivity 	<ul style="list-style-type: none"> Video-based surveillance of plants/sites AMRs/AGVs/AIVs/drones Collaboratives robots Mission critical voice, data, and video Supplier/partner connectivity 	

Use case categories

- Remote monitoring and control
- Autonomous robots/machinery
- Connected worker
- Connectivity

Source: Capgemini Research Institute, 5G and edge in industrial operations survey, February–March 2021, N=302 industrial organizations that have run pilots/trials or full-scale implementations of 5G.

However, key challenges are yet to be conquered

There are a range of challenges holding back more widespread adoption of 5G in the industrial sector. The lack of 5G industrial devices is a major impediment – at least in the short run. In addition, there are challenges associated with the economics of rolling-out 5G networks for brownfield sites and identification of highest impact use cases (business benefits, scale, technical feasibility, and 5G added value), as well as the integration of 5G with existing enterprise networks, IT and OT systems, among others.

To accelerate 5G adoption, industrial organizations should begin experimenting/testing the new technologies and the capabilities they bring, and applying them to address business challenges and driving innovation while progressively fine-tuning their approach as new features become available and they prepare at scaling up the adoption. For this, collective innovation and experimentation is key.

A holistic approach to the 5G implementation journey is critical

Given multiple stakeholders and a large and closely intertwined ecosystem, organizations need to follow a structured and cohesive approach:

- Develop a clear understanding of 5G and edge computing's capabilities and how they can drive innovation. This is essential to ensure that the adoption of 5G addresses actual business challenges instead of becoming a goal in itself. Organizations will need to evaluate how they can enable or enhance relevant use cases using 5G capabilities.

- Select the network deployment scenarios that best fits your requirements for selected use cases. Given the network deployment options offered by 5G, organizations must assess their requirements of control, security, and costs to choose a network model – private, public, or hybrid – to closely align with these goals.
- To effectively counter the challenges in identifying 5G use cases and estimating the ROI, engage with the ecosystem to tap into shared expertise and jointly test and develop.
- Build a business case for 5G adoption supported by a multi-year implementation roadmap. Some of the factors that organizations should consider include the top- and bottom-line impact of 5G, installation and operations costs, savings determined both in the long and short term, and net impact of greenfield versus brownfield deployments.
- Take a gradual and measured approach to operationalizing use cases. Create a roadmap that incorporates new features into the testing and adoption cycle as they become available.
- Ensure that security is built-in by design from the earliest stages of 5G implementation. To prepare for potential risks arising from 5G adoption, organizations should focus on security from the earliest stages of planning and ideation. Our research found that only 50% of organizations do this currently.



Pierre Fortier
Vice President, Global 5G &
Edge lead, Capgemini Invent

"To keep pace, organizations need to take a collaborative experimental approach: working with the entire ecosystem of vendors, partners, customers, and governments to realize the exciting potential of 5G."

The 5G journey has begun and, already, some organizations are establishing an early edge over their competitors. To keep pace, organizations need to take a collaborative experimental approach: working with the entire ecosystem of vendors, partners, customers, and governments to realize the exciting potential of 5G.

