

Competition has never been higher in manufacturing, and outside factors can cause major disruptions overnight. Many manufacturers have turned to smart manufacturing as the driver and platform for operational resiliency.

## Top Trends Driving Smart Manufacturing Adoption and Success

November 2021

**Questions posed by:** Lumen Technologies

**Answers by:** Reid Paquin, Research Director, IDC Manufacturing Insights

### Q. What's holding back most manufacturers when it comes to smart manufacturing?

**A.** Existing legacy/manual systems are one of the biggest challenges for manufacturers; in fact, IDC's *Industry IT and Communications Survey* (June 2021) found that 40% of manufacturers are increasing budgets to update/replace outdated technology. This is leading to a push among manufacturers to automate as much as possible and incorporate robotics. Manufacturing has been focused on its fourth revolution over the past decade. The incorporation of technologies such as cyberphysical systems, the Internet of Things (IoT), and cloud/edge computing allows for new possibilities on the shop floor. While these initiatives represent massive opportunity across the globe, manufacturers must ensure their existing processes, operations, and IT systems are optimized to truly take advantage of what these new technologies can offer.

Unfortunately, many organizations have overlooked the foundational elements of manufacturing and still possess manual or paper-based processes across the enterprise. These processes often result in errors, delays, and inefficiencies and are present across manufacturing organizations — maintenance, quality, engineering, or service departments. Manufacturers turned to these manual systems for reasons such as perceived capital savings, flexibility in process changes, and knowledge of existing solutions. However, as a manufacturer grows and innovates, these systems cannot scale with the business. Digitizing these processes results in many immediate business benefits, but more importantly, these processes serve as the building blocks for digital transformation (DX). This is leading to a push across the industry to automate as much as possible and incorporate robotics to set up smart manufacturing programs for success.

## Q. What use cases are manufacturers prioritizing first to deliver value?

**A.** IDC's DX spending research shows that smart manufacturing represents over \$1 trillion of the \$4.5 trillion DX opportunity in manufacturing. However, this DX opportunity cannot be realized overnight; it's important for companies to prioritize use cases that can deliver immediate value and serve as building blocks for long-term success. In general, smart manufacturing is built around the following three main programs:

- » **Strategic asset management.** Use cases include asset instrumentation, digital work instructions, predictive maintenance, and augmented maintenance.
- » **Quality management.** Use cases include remote expert guidance, cognitive root cause analysis, and manufacturing/specification intelligence.
- » **Resilient lean.** Use cases include real-time scheduling, digital shift handover, resource/yield management, materials optimization, and energy management.

While the priority of each program can vary depending on manufacturing segment, most start with asset management/maintenance. Operational resiliency is all about being able to respond to change while maintaining excellence. The ability to respond to highly variable market demand requires control over assets; therefore, most manufacturers start by focusing on asset management. Many manufacturers still rely primarily on corrective or preventive maintenance strategies. Digitizing assets allows operational personnel to monitor performance in real time and make data-driven decisions. These digitization efforts also enable a company to progress further and start diagnosing issues before they arise, which is what all manufacturers need to strive for. This is how a manufacturer can truly shift from being reactive to proactive when it comes to asset management.

## Q. What is the role of edge computing for smart manufacturing?

**A.** A key component to enabling manufacturing resiliency is utilizing data to make rapid and effective decisions. Manufacturers will need to rely upon a mix of on-premises and cloud computing.

A huge volume of data is generated every day on the plant floor, and we know that processing this data is essential to generate insights and value. Scalability is also an important consideration when building out a smart manufacturing road map. Many manufacturers are turning to cloud computing to accomplish this task. The primary benefits of cloud services are lower total cost of ownership (TCO) and increased agility/flexibility for the business. While cloud computing has allowed manufacturers to reduce data management costs and scale, sending all this data to the cloud can be expensive.

In addition, the real-time nature of most manufacturing processes results in many workloads staying on premises. Edge computing provides the ability to collect, process, and/or store data at or near the location where the data is generated. Manufacturers will need to embrace some mix of cloud and edge computing to scale, stay agile, and react in real time. Workloads that can't be moved or don't make sense to move to the cloud will utilize edge computing. Many companies are still trying to determine their edge-to-cloud approach, but they don't have to tackle this issue alone. Network partners aligned with cloud service providers can help address these business requirements.

## Q. How does IT align with operations and help support OT systems?

**A.** As resiliency and taking a more market-focused approach rise as priorities for manufacturers, the importance of connecting operations outside the "four walls" rises as well. Manufacturers need to become more responsive to fluctuations in demand or market disruptions and adjust production to react accordingly. For a manufacturer to become more adaptive, resilient operations are essential. This leads to manufacturers converging their IT and OT systems, which creates its own benefits and challenges. Integrating IT and OT systems is a complex endeavor; security concerns and legacy systems are the top barriers encountered and the top drivers behind investment and focus.

While IT/OT convergence is a rising priority for all manufacturers, many companies approach it inefficiently. IDC's *IT/OT Convergence Survey* found that only 26% of manufacturers have an integrated governance model in place; however, in three years, 67% of manufacturers expect to move to this integrated approach (June 2020). It's not IT versus OT or vice versa — the goal for manufacturers is to respect and understand the value of both IT and OT and to ensure that the two groups work together to enable smart manufacturing and operational resiliency. Collaboration between IT and OT teams will be essential — the focus needs to be on alignment, communication, and cooperation.

In an integrated governance model, investment decisions about control/execution systems are made through a center of excellence; ongoing business-as-usual collaboration exists between IT and OT; and a single unit is responsible for making decisions about investments/priorities related to operations.

## Q. As more manufacturing data becomes available and integrated across the business, what does this mean from a security standpoint?

**A.** As more manufacturers embrace smart manufacturing and the changes required, networks are becoming more exposed and vulnerable to security threats and attacks. Long gone are the days when an organization needed to protect only what was within the perimeter. Today, organizations are highly distributed, with applications and data being migrated to the cloud. In addition, IT and OT systems continue to converge, which brings its own security concerns that need to be addressed.

While this increased connectivity provides manufacturers with new avenues to drive business value, it also clearly comes with added security risk. Manufacturers need to plan so that their assets, control systems, and networks are safe from vulnerabilities and constantly evolving security threats while focusing on reliability, network uptime, and real-time access to critical data. In IDC's recent *Global IoT Decision Maker Survey*, 24% of manufacturers indicated that their security processes are integrated into the whole IoT workflow, ensuring that malicious content cannot accompany valid IoT data. Another 15% have taken an even more holistic view — their security procedures cover end-to-end processes, delivered by and supported through extensive automation. Implementing this holistic approach is no easy task, and as a result, many manufacturers look outside their organizations for help implementing and managing the right security framework.

## About the Analyst



### **Reid Paquin, Research Director, IDC Manufacturing Insights**

Reid Paquin is Research Director for IDC Manufacturing Insights responsible for the IT Priorities and Strategies (ITP&S) practice. Mr. Paquin's core research coverage includes IT investments made across the manufacturing industry and manufacturers' progress with DX. Based on his background covering the manufacturing space, Mr. Paquin's research also includes an emphasis on the technology enablers that help manufacturing executives make better-informed operational decisions.

## MESSAGE FROM THE SPONSOR

### About Lumen Technologies

Lumen is a technology company that enables organizations to benefit from emerging applications that power the 4th Industrial Revolution. We provide the fastest, most secure platform for next-gen applications and data that integrates network infrastructure, cloud connectivity, edge computing, connected security, voice, collaboration, and enterprise-class services into an advanced application architecture across industries. As data is dramatically shaping the future of all humankind, Lumen is working to relentlessly unleash the potential of data, leading to more capable and efficient edge computing and pervasive technologies across devices, systems, and workloads.

For more information, please visit: [Lumen.com/Manufacturing](https://Lumen.com/Manufacturing).

### IDC Custom Solutions

#### IDC Research, Inc.

140 Kendrick Street  
Building B  
Needham, MA 02494, USA  
T 508.872.8200  
F 508.935.4015  
Twitter @IDC  
idc-insights-community.com  
www.idc.com

This publication was produced by IDC Custom Solutions. The opinion, analysis, and research results presented herein are drawn from more detailed research and analysis independently conducted and published by IDC, unless specific vendor sponsorship is noted. IDC Custom Solutions makes IDC content available in a wide range of formats for distribution by various companies. A license to distribute IDC content does not imply endorsement of or opinion about the licensee.

External Publication of IDC Information and Data — Any IDC information that is to be used in advertising, press releases, or promotional materials requires prior written approval from the appropriate IDC Vice President or Country Manager. A draft of the proposed document should accompany any such request. IDC reserves the right to deny approval of external usage for any reason.

Copyright 2021 IDC. Reproduction without written permission is completely forbidden.