



# RETOOLING THE DATA CENTER FOR THE ERA OF SMART MANUFACTURING

As manufacturers work to support the scalability and real-time demands of smart manufacturing and digital business, many are grappling with how to retool and merge existing IT infrastructure with operational infrastructure.

The manufacturing industry is at a crossroads: mobile technologies, the Industrial Internet of Things (IIoT), and the influx of data coming from connected devices on the factory floor and in the field have set the stage for a new chapter in digitization and smart manufacturing. The Industry 4.0 era calls for fully integrated, collaborative manufacturing systems that optimize data-driven insights and automation. This shifts the emphasis from making great products to producing innovative products more efficiently and cost effectively, along with introducing new business models such as product-as-a-service.

Investment in smart technologies and new digital business processes is aimed at increasing manufacturers' agility, allowing real-time response to changing factory conditions, customer demands, and fluctuations in the supply network. [Grandview Research](#) expects the quest for data-driven insights and operational agility to spark a surge in the global smart manufacturing market; projections call for 130% growth to reach \$395 billion by 2025.



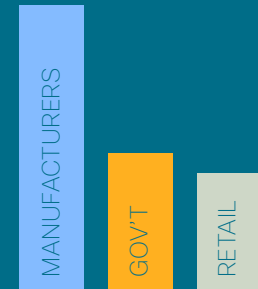
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Although manufacturers prioritize the ability to respond quickly to changing demands and customer requirements, many remain hamstrung by decades-old legacy and siloed, proprietary plant floor systems. These technologies, including older manufacturing execution systems (MES) and supervisory control and data acquisition (SCADA) systems along with traditional closed OT networks, impede visibility and make it difficult to integrate IIoT data with critical enterprise platforms such as enterprise resource planning (ERP). At the same time, the exponential growth of data driven by the increasingly connected enterprise and IT/OT convergence is putting a strain on traditional operational infrastructure. As stated in [a 2017 Cisco study](#), manufacturers stored 1,912 petabytes of data – more than any other industry including government (911 petabytes) and retail (776 petabytes).

### Designing a New Plan

Recognizing current constraints, manufacturers are planning for major data center transformation – replacing traditional non-virtualized environments defined by manual processes and limited scalability with software-defined, hyperconverged infrastructure that couples on-premise and cloud to deliver scalable, secure, and adaptive solutions.

A new survey conducted by IDG and Cisco found that manufacturers are giving equal weight to the digitization of both the plant floor and the IT data center infrastructure. At the same time, however, only 29% have moved to the next chapter: converging operations and plant floor systems with enterprise IT technology. However, while the integration of IIoT data with ERP systems is helping manufacturers improve operations, they are not yet leveraging data-driven insights to launch new revenue-generating services in areas like condition-based maintenance, predictive maintenance, and increased uptime based on service-level agreements (SLAs).



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### Digitizing Manufacturing Priorities

SOURCE: IDG/Cisco Survey 2018

■ Highest Priority    ■ 2nd Highest Priority    ■ Lowest Priority

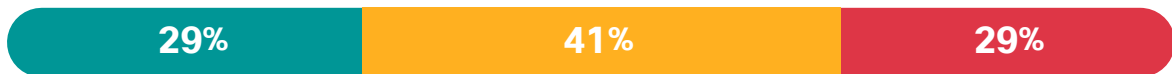
Manufacturing systems and plant floor



IT systems and infrastructure  
*(including data center)*



Integration of IT and OT








One critical stumbling block is the on-going misalignment and disconnect between the OT and IT agendas, particularly as it relates to IIoT initiatives. 451 Research's [Voice of the Enterprise survey](#) found that only 34% of OT respondents say they are currently cooperating closely with IT on IIoT projects, and some respondents went as far as to characterize the working relationship between two groups as an "active conflict."

At Eaton Corp., an industrial manufacturer, the cultural gap between IT and OT definitely presents a challenge. The groups, however, have found a way to work through their differences to deliver digital initiatives that better manage power consumption, ensure equipment efficiency, and automate a host of processes, including work instructions.

"OT generally lives in a world of reacting quickly, deploying fast, and getting immediate results, and it has traditionally been in a bit of isolation," says Bill Blausey, Eaton's CIO and senior vice president. "IT generally looks broader, at the whole system, in such areas as security, network overload, supportability, and sustainability. The benefit is to bring together the broader systems thinking of IT with the faster-to-value mentality of OT."



## Digitization Holds the Key to Competitive Advantage

As with most industries, digitizing manufacturing to support both operational excellence and new revenue growth is crucial to competitive advantage – but it's also table stakes for survival in a rapidly changing business climate. The IDG/Cisco survey found that nearly every aspect of the business stands to benefit from the digitization of manufacturing, including:

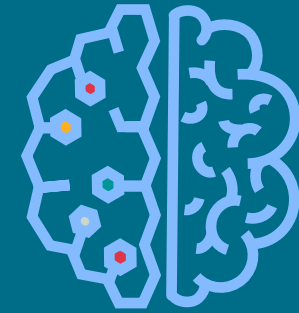
-  Operations **(90%)**
-  Business processes **(86%)**
-  Leveraging IIoT data to monitor plant performance **(84%)**
-  Enterprise agility **(82%)**
-  Gaining insights into production and supply chain processes **(82%)**

The digital transformation of manufacturing operations also has significant upsides for data center and IT infrastructure.

Respondents to the IDG/Cisco survey expect their digitization efforts to help them:

-  Achieve better visibility and management capabilities **(86%)**
-  Decrease downtime **(75%)**

A lesser number (63%) anticipate improvements in network load, indicating that the increased digital activity may call for network improvements.



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– BILL BLAUSEY,  
CIO AND SENIOR VICE PRESIDENT, EATON CORP.

## Predictive Maintenance Tops the List

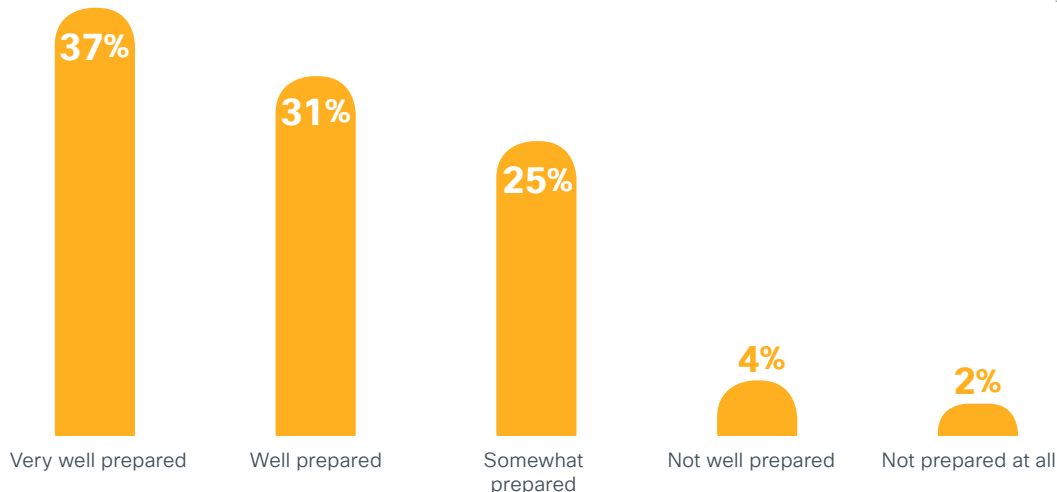
Predictive maintenance is one of the most widely anticipated use cases for the powerhouse combination of IIoT, machine learning, and advanced analytics. Real-time analysis of data collected from connected industrial assets on the plant floor or in the field can reveal in-use patterns that let manufacturers swap out parts or perform other maintenance tasks prior to asset failure. This not only prevents unplanned downtime, but also lets manufacturers maximize uptime, reduce the risk of lost revenue, and cut back on maintenance costs. According to [research from McKinsey & Company](#), AI-enhanced predictive maintenance of industrial equipment will generate a 10% reduction in annual maintenance costs, up to a 20% reduction in downtime, and a 25% reduction in inspection costs.

In addition, global manufacturers can leverage analytics and IIoT data to make real-time adjustments in plant floor processes to increase overall equipment effectiveness (OEE), maximize quality control, ensure worker safety and security, boost inventory turns, and gain efficiencies in their supply chain, among other use cases.

Key to achieving these benefits is the ability to handle the onslaught of IIoT data and integrate it into core enterprise systems such as ERP. That tight coupling of systems can promote strategic decision-making, resource optimization, and improved business processes. Two-thirds of respondents to the IDG/Cisco survey believe they are well prepared to handle the influx of IIoT data into ERP platforms.

## Readiness of Data Center and IT Organization to Integrate IIoT and ERP

SOURCE: IDG/Cisco Survey 2018



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According to the survey, the top reason to integrate IIoT with ERP systems and data is better cost management (75%) followed by real-time insights into production and supply chain processes (71%) and improved resource optimization (69%). In comparison, only 59% were prioritizing the integration for strategic business growth and 55% for business agility. This indicates there is still work required to handle data at scale.



### Infrastructure Upgrades to Support Digitization

Traditional non-virtualized environments rely on manual processes and have limited scalability, which can't support data-driven decision making and real-time operations. In comparison, software-defined hyperconverged systems are more adaptive and scalable. These systems integrate data and applications and eliminate the blind spots that can impede manufacturing activity.

In addition, automation and control systems must be synced up to the IT backbone using a converged, standards-based industrial Ethernet network and wireless capabilities, versus traditional proprietary networks. Managed Ethernet switches and support for emerging capabilities such as blockchain should be part of the modern network infrastructure roadmap.

Embracing a unified computing infrastructure that is policy-based and programmable is another important part of the strategy. Unified management capabilities that span hyperconverged and converged infrastructure, along with third-party storage, servers, and networks, can simplify and automate key processes. At the same time, they offer the ability to easily orchestrate, deploy, and configure resources based on changing requirements.

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Context-aware intelligent security must be integrated at every layer from every endpoint through the IT/OT networks and all the way through the data center, whether on-premise or in the cloud. Here again, programmable, policy-based security is essential for preventing threats such as ransomware; this also can help eliminate the risk of breaches as more factory assets are brought online to the open internet. In fact, cyberattacks on OT infrastructure are on the rise: [Cisco's 2018 Annual Cyber Security Report](#) found that 69% of respondents have already seen or expect to see cyberattacks on OT infrastructure. As a result, adding new security and cloud compute capabilities are the top priorities for respondents to the IDG/Cisco survey.



“We’re spending more time, more money, and more focus on the security aspects of the intersection [of IT and OT] than we did before,” says Steve Zerby, Vice President and CIO at Owens Corning. “We’ve got to build confidence with OT owners that we can string these things together in a way that doesn’t impact the production environment in a negative way while convincing IT owners that these older systems that often sit on the manufacturing floor aren’t going to transfer undue security risks to business networks as we begin to flow data in that direction.”

To handle the tidal wave of data generated by IIoT and the digital factory, manufacturers need to adopt software-defined storage architectures that can infinitely scale to accommodate data-intensive and real-time computing needs. Edge and fog capabilities are critical additions to the OT architecture; they support real-time processing and intelligent analytics of the most time-sensitive data close to where it is generated. This helps avoid continuously transmitting data to the cloud, which can include latency issues.





With edge and fog part of the IT/OT infrastructure, manufacturers can analyze and act on IIoT data in milliseconds to take corrective action or boost operational performance. Select data can be sent to the cloud and integrated with other enterprise systems like ERP to perform historical analysis. As of this time, however, software-defined storage and edge/fog computing capabilities are not a top priority to IDG/Cisco survey respondents. This is another indication that manufacturers are focused on optimizing their core infrastructure before moving ahead with more sophisticated data-driven insights and IIoT security best practices.

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While edge capabilities are crucial for handling only exception-based or condition-based data rather than massive data sets, moving away from traditional centralized models takes time, notes Owens Corning's Zerby. "It's a pretty dramatic shift to put more compute power into the manufacturing environment," he explains. "You have support, security, and lifecycle implications — none of which are difficult on their own, but to bring them all together is a challenge."

Yet as manufacturers get deeper into digitization and, specifically, go down the path of IIoT, they will need to introduce automation and AI-driven analytics into their roadmaps. According to an [MIT Sloan report](#), 83% of executives believe AI is a strategic priority for their businesses today.

The integration of AI, machine learning, and other smart factory technologies can help manufacturers on a number of fronts, including:

-  Automating and improving security postures
-  Optimizing multicloud environments
-  Identifying anomalies and inconsistencies in data flow
-  Making adjustments to manufacturing and supply chain operations based on intelligent insights


## The Bottom Line

Merging OT and IT infrastructures will go a long way in creating efficiencies and streamlining plant floor operations. Yet manufacturers need to commit to continued investment in digitization, including scalable, secure, and adaptive infrastructure, in order to support the advent of smart manufacturing. Only this can drive the innovation and data-driven decision-making that has become the hallmark for success in today's hyper competitive business climate.



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