

Meeting Customers Where They Want to Connect

How the Industrial Internet of Things empowers manufacturers to transform the B2B marketplace into the convenient, transparent e-commerce model modern buyers expect.



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AMAZON HAS HAD A CURIOUS EFFECT ON THE WORLD.

In the beginning, the wave of e-commerce it helped create primarily hit big box retailers, luring customers out of malls and onto browsers. Then, it was mostly a matter of convenience and novelty for these early adopters. While this certainly disrupted seemingly the retail market, it left the manufacturing industry (and its dealers) largely untouched.

But as Amazon and the e-commerce movement took hold, they began to change more than just shopping—they utterly transformed customer expectations.

Over time, the convenience, immediacy, and transparency of digital exchange became the norm of the buying process—customers began to expect easy self-service, personalization, and lightning-fast delivery for every transaction. In short, customers demanded to be met where, and how, they wanted to connect.

This last evolution of the “Amazon effect” has now made its way solidly into the manufacturing realm.

In today’s digital world, manufacturing dealers can’t get by with slow, 20th century quoting processes. Their customers demand more—in fact, they demand the same convenient self-service, customization, and transparency as any e-commerce-savvy shopper. And they expect that relationship to extend far beyond the purchase, into service management and warranty service that last as long as the product they are buying.

This opens a whole new world for the B2B market, one modeled half on the B2C expectations and half on the particular needs of the manufacturing industry.

On the face of it, this seems like an impossible transition for an industry so grounded on real-world production and in-person transactions.

But manufacturing has a weapon in its arsenal that makes this transition not only possible, but potentially transformative for the entire industry: the Industrial Internet of Things.

Leveraging the data, insights, and connections of the IIoT allows manufacturers to create an entirely new B2B marketplace that transforms the passive purchasing process of the past into today’s need for a real-time, transparent, e-commerce model. In the process, it enables plants and dealers to bridge the relationship far beyond the transaction, into an ongoing servitization, maintenance, and even predictive maintenance arrangement. The prospect holds the potential to disrupt the industrial buying process just as significantly as Amazon changed the retail world.

This e-book pulls together a broad range of articles arranged to help walk manufacturers through this transformation. From lessons on IIoT deployment to assessing its risks and rewards, from B2B purchasing models to servitization, this collection provides the full range of resources necessary to begin the journey from IIoT to the future of B2B commerce.

The end goal of this collection and the journey it maps is a simple one: To enable manufacturers to finally meet their customers exactly where they want to connect. ●



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THE DIGITAL FUTURE IS HERE, NOW

There are a multitude of ways available for machine shops of all sizes to boost productivity, enhance shopfloor flexibility, and preserve data security.

RAMONA SCHINDLER

The manufacturing technology industry is in flux as it seeks to find its way in the digital world, and the entire value chain necessitates the integration of suppliers who can respond to the needs of the industry. This situation has very little “history”, and so large end-customers and machine shops of all sizes are seeking assistance from suppliers, while the machine tool builders are likewise seeking to partner with developers and providers of hardware, software, communications, and controls, to bring to market the most-needed types of machines and technologies.

Within this general scenario, large manufacturers focus on the “big picture” as they link their production departments, often located in different cities or even countries throughout the supply chain, while small contract manufacturers with a dozen local customers wonder how this drive to the digital factory will impact their enterprise — and it will.

The good news is about the digitalization process now underway is that manufacturers already can use the IT, apps and communication devices in place in many of advanced machine tools, together with the rapidly emerging skill sets of new workers in the machine tool industry, to develop and implement the three basic levels of machine shop operations.

These levels are a) the communications hardware and protocols at the machine; b) the integration of inline machine production; and c) the data resident in the Cloud, which right now can be used in many ways to boost productivity through automated analytics of the shopfloor’s productivity; to enhance shopfloor flexibility through optimized methods of production; and to preserve data security by state-of-the-art software solutions.

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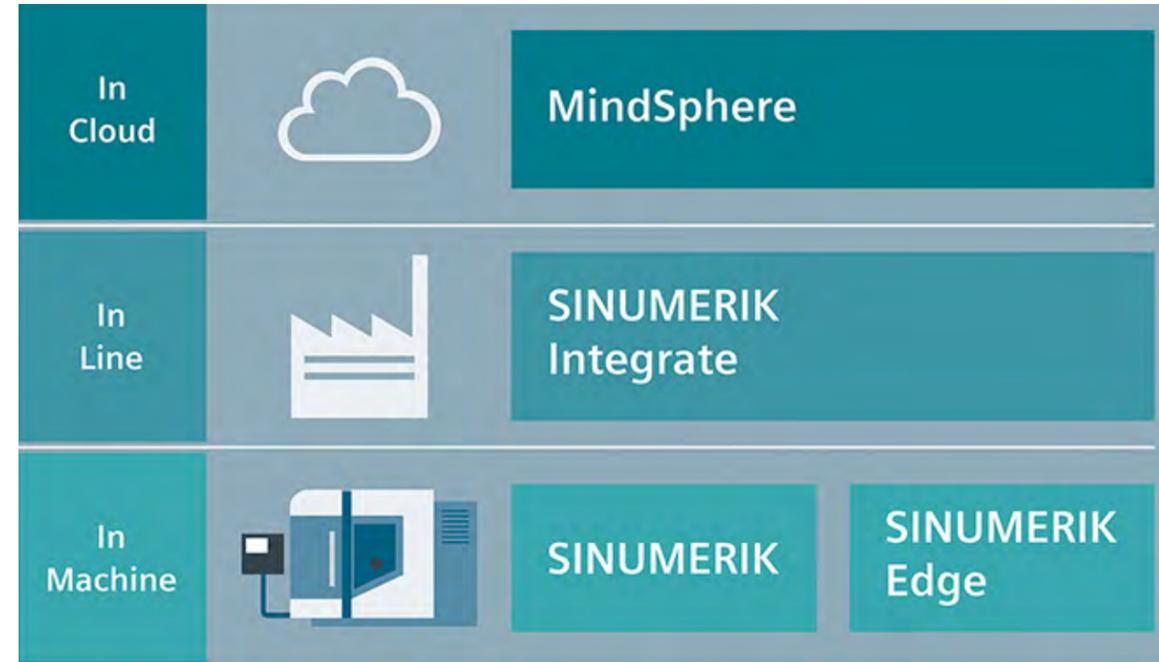
In essence, the capture and manipulation of such data drives the productivity of a small shop or large production department in similar ways. The concept of your manufacturing seen as an eco-system, with information and control capabilities at all levels, can drive that “factory of the future” — and it can do so now.

From the CNC on your machines, whether they are number three in a mold shop or three hundred at a transmission plant, you can extract the pre-analytics that can be used to feed existing apps or to develop the most beneficial apps to suit your production scheme and workflow. The beauty of these analytics-rich apps—whether you create your own, have a third-party integrator develop it, or use existing solutions—is that they provide the hierarchy of information to your operator, line supervisor, plant operations personnel, or global IT department in a similar manner. This scalability offers immediate benefit to manufacturers

of all sizes and it does so, right now. For example, machine tool users can quickly and easily configure a CNC machine’s connections and ascertain its program status and operating mode. This will lead to increased manufacturing productivity, reliability and availability of the machine.

Cloud-based systems always raise the question of access issues, as the data flow in real time at high-speed and can be made accessible to many levels of information managers and operations personnel. It is critical that a thorough assessment of the access to that data precede the development of any communications protocol.

There are three levels of data in a machine shop operation that can be used right now to boost productivity via automated analytics; to enhance shopfloor flexibility via optimized production methods; and to preserve data security via state-of-the-art software. (Source: Siemens Industry Inc.)



Operators’ ability to configure connections and ascertain program status and operating modes will increase machine shop productivity, manufacturing reliability, and machine availability. (Source: Siemens Industry Inc.)

Digitalization is not necessarily a costly undertaking. First steps can be implemented quickly on the shopfloor, for example, by deploying small, easily-programmable PCs like Raspberry Pi. Likewise, for the machine tool builder, the development of “digital twin” engineering — wherein a machine is fully designed, commissioned and test run in a virtual environment — is rapidly changing the playing field in this industry.

The number of connected machines is increasing exponentially and this is not simply engineering adornment: it is a necessary function for any manufacturer. Being able to determine quickly the overall equipment effectiveness (OEE) and conduct practical, beneficial predictive maintenance actions on your machines will contribute significantly to the production and profitability of your operation.

The management of today’s manufacturing shops and production departments are challenged to become aware of all these available technologies, and to chart a course for their implementation. This is not a “someday” scenario; it is a journey that is vital for shops of all sizes that want to remain competitive in today’s changing market.

My last bit of advice is to look at digitalization as an umbrella for secure shielding of smart data, not just big data. IIoT is the essential connectivity concept for all the elements of data on machine performance, materials flow, operations efficiency, and ultimately your overall productivity. It’s an exciting time in our business. ●

Ramona Schindler is the business development manager for the digitalization of machine tools at Siemens Industry, Inc.

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BE WISE: USING THE IIoT TO SERVITIZE (AND FUTURE-PROOF) YOUR BUSINESS

When your product rolls off the factory floor, it's time to begin a relationship with the customer that will last years.

VINAY NATHAN



Industry 4.0, the fourth industrial revolution driven by the Internet of Things (IoT), is gaining huge traction in the manufacturing industry. Like never before, machines have started exchanging information in real-time with each other, the software systems and their users. As a result, new revenue-generating business opportunities for traditional manufacturers through the servitization of products are taking hold.

Real-time categorized data forms the backbone for any Industry 4.0 Initiative, and industrial IoT (IIoT) enables business operations and finished products to work better, fail less often and produce much higher-quality output. It helps create a world of self-sustainable and adaptive systems that continuously learn from each other, and helps businesses interact more with their end-users.

In our [Smart Manufacturing Report](#) on Industry 4.0, we are seeing more makers of products deploying IIoT and looking to servitization to future-proof their businesses, improve customer engagement and become revenue-generating service providers.

Think about it: If you buy a car, you're not just buying a hunk of metal any longer, you're purchasing a commitment from the company to help maintain and service your vehicle. And, technology is helping to accelerate the transformation into providing services. For automakers, services can include upgrading a vehicle's software, offering on-demand breakdown service, delivering pre-maintenance reminders, sharing deals on tires, or identifying gas stations in the vicinity.

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This is made possible by the IoT on the consumer end and Industrial IoT (IIoT) on the manufacturer's side. These technologies open up new ways to look at your offerings and operations for future business success, including:

Considering Your Finished Product as Just the Beginning: When your product rolls off the factory floor, it's time to begin a relationship with the customer that will last years. Your product will require updates and maintenance. Most businesses would rather not deal with this, but the reality is that the Second Law of Thermodynamics dictates that whatever product you create will degenerate into a disordered state over time. Your services can help minimize and control that process.

Leveraging IIoT Data to Be a Valued Business Partner: Until now, there was a level of subjectivity in assessments about technology purchases. But IIoT offers the ability to delineate exactly how much time, energy and money a business is saving by using a more efficient piece of equipment. Coupled with a service offering, you can position yourself as a valuable business partner rather than just another vendor.

IIOT/IIOT IN ACTION: FROM ELEVATORS AND LIGHT BULBS TO TESLAS

The way manufacturers go from products to service offerings is by changing the definition of what they do. Elevator makers don't just make and service devices that carry people and objects from floor to floor; they are in the transport business. In this vision, elevators provide a service that should never be interrupted. Sensors and internet connectivity give manufacturers real-time data about usage and can accurately predict when maintenance is required to avoid service interruptions.

**IIOT IS THE
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Another example is Philips. The Dutch electronics giant a few years ago decided that it doesn't just make light bulbs, it is a lighting services company. Instead of hardware, Philips provides expertise and IoT technology that saves clients money on lighting. That means the right lux levels delivered in the most energy-efficient way possible and predictive maintenance ensures that there are minimal service interruptions.

Similarly, as Tesla owners know, one of the benefits of owning these vehicles is that there is a minimum of maintenance. Because it's electric, there's no need for oil changes, spark plug replacements or emissions checks. In addition, over-the-air updates mean that owners don't need to go to the shop for software updates. While owners of other cars might go to a local service station, Tesla makes a point of establishing a direct connection with its consumers with annual inspections every year or 12,500 miles.

It's easy to see how any manufacturer can use IoT and IIoT to become more than just a physical product provider and more of a true business partner for their customers. If you're in construction, then you're in the shelter business and can ensure that IoT maximizes efficient use of energy. If you create point-of-sale displays, IoT can transform you into a data-based marketing consultant.

The idea is not new. IBM, for instance, transformed itself from a maker of hardware to a service provider in the 1990s and 2000s. By 2010, services provided 80% of Big Blue's revenues, up from 50 percent in 2000, and analysts applauded the company for broadening its offerings beyond hardware, which could become commoditized. Similarly, Rolls-Royce's Power By The Hour Program, in which clients only pay when an airplane using one of its engines is flying, dates back more than 50 years.

BENCHMARKING AND MORE

For manufacturers, IoT on the back end enables a deeper level of customer service. For instance, recalls can be limited in scope because IoT makes it easy to trace a part back to the original factory. Aggregate data provides benchmarks for service and offers feedback about product performance and consumer engagement.

IIoT is the foundation of a digital transformation that will present new opportunities for manufacturers and redefine future business models. In addition to using IIoT to cut costs and run their factories more efficiently, smart manufacturers can unleash these technologies to add greater customer value, drive significant competitive advantage, build customer loyalty and grow recurring revenue. ●

Vinay Nathan is the co-founder and CEO of [Altizon Systems](#), an industrial IoT company. He is a strategic thought leader with 15+ years of global expertise in corporate sales and engineering.

ASSESSING MACHINE SHOPS' IoT RISKS AND REWARDS

The Industrial Internet of Things/Industry 4.0 changes the way business process information, deploy resources, and execute strategy. An ERP expert notes that shops should recognize these developments, and learn what the new technology is telling us

ROBERT BROOKS



The IIoT is a network that connects sub-networks, databases, information systems, production equipment, and objects: It draws information as necessary from these sources across these individual platforms into an interactive network that evaluates and communicates information to relevant sources and destinations.

Most machine shop operators don't think of their organizations as "big": they like to compete with the "big" manufacturers, and they may "dream big" about future plans and opportunities, but in their daily work their competitive advantage is in being small- and mid-sized enterprises, ready to work closely with customers, and able to adapt to changing market requirements.

But as for opportunities, machine shops have some adjustments to make. The big adjustment facing all businesses, including machine shops, is the Industrial Internet of Things (IIoT, also referred to as Industry 4.0), and the factors forcing these adjustments are equally formidable.

So, what is IIoT/Industry 4.0? It's more than a concept and yet not quite a fact of life — but it is moving quickly in that direction. In terms of big ideas, there may be none bigger than IIoT/Industry 4.0.

Fundamentally, it's a network, but one that connects sub-networks, databases, information systems, production equipment, and objects: It draws information as necessary from these sources across these individual platforms into an interactive network that evaluates and communicates information to relevant sources and destinations.

IIoT/Industry 4.0 seeks to advance and optimize the interaction between operations in a production supply chain. The integration of manufacturing, IT and cybersystems, including security is an expanding and evolving role in manufacturing — not least, at machine shops.

IIoT/Industry 4.0 is developing at such a pace that machine shops — however small-mid-sized the enterprise may be — must take steps to understand and adjust to its effect on their business. There are apparent opportunities to be gained, regarding optimized performance or energy savings, or new revenue possibilities. There are also potential risks, in terms of capital, human and equipment resources, and enterprise security. So, how should machine shops proceed to engage IIoT/Industry 4.0?

Many of the most critical functions of IIoT/Industry 4.0 in manufacturing draw on functions already established by ERP/MES technologies, so we consulted with Terri Hiskey, vice president for Product Marketing, Manufacturing Portfolio at Epicor Software — one of the most prolific developers of ERP/MES for manufacturing businesses, including machine shops.

THERE ARE APPARENT OPPORTUNITIES TO BE GAINED, REGARDING OPTIMIZED PERFORMANCE OR ENERGY SAVINGS, OR NEW BUSINESS POSSIBILITIES.

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What is the primary benefit for a machine shop that adopts Internet of Things/ Industry 4.0 functionality? Is it performance improvement? Or, competitive advantage?

"I think the answer to this is both. Machine shops that adopt IoT/Industry 4.0 technology can expect productivity improvements in instances where, currently, manual processes can be automated via sensors - such as tracking output or temperatures. This eliminates the need to have a person collect that information, and it also helps to prevent human errors that may be made in recording numbers and transferring them to a spreadsheet."

But, Terri Hiskey pushed past the basic question to make a crucial distinction about machine shops' practical benefits of the new technology:

"Machine shops that are first to adopt IoT/Industry 4.0 technology will be better positioned against their competitors with automated processes, and they will have

better visibility into their output and equipment, so they can understand earlier in the process if a machine needs servicing because it isn't producing as much output as usual," she noted.

"This will enable machine shops to be more proactive about dealing with faulty equipment, and will let them get ahead of servicing such equipment before having to shut down production lines," according to the Epicor expert.

How can machine shops or manufacturers get started collecting data via IoT in a standardized way?

"The ability to connect manufacturing equipment to a web-based network, and to derive substantial value from these connections is more practical and compelling than ever," Hiskey contended. "Most machine tools communicate in standard Internet technology such as HTTP, TCP/IP, XML, and Ethernet, that are inherently network friendly.

"Well-developed standards such as MTConnect and OPC-UA facilitate the connection of machine tools and other manufacturing equipment to a data collection network, and enable interoperability required for plant-wide communication.

"The smallest machine shop can get started with small applications, such as sensors that report on temperatures or output connecting back to a central database so that trends can be analyzed over time. This is an area that companies can test the waters with small, targeted use cases—no need to boil the ocean."

How can machine shops maintain security over data collected via IoT?

"Cyber threats to IoT-related processes are real and, according to security experts, are growing. Threats include theft of intellectual property (IP), alterations to data, and disruptions of processes. Shops will need to consider how to protect their data, systems and networks at every step," Terri Hiskey acknowledged.

"Connecting machines tools to a network can create a number of vulnerabilities, so companies will have to be sure to consider and build in security protocols to minimize these threats as they implement their Smart factory."

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Is it necessary to invest in capital equipment or hardware to collect information via IoT, or can cloud technologies be leveraged?

“While adopters of IoT technology will need a central repository in which to store the data that is collected, that repository doesn’t need to physically reside at the machine shop. In fact, many companies are opting for remote storage of their data via the cloud.

“This approach takes the responsibility of maintaining capital equipment like servers off the organization,” Hiskey noted, “and the capacity of the cloud to store and process data is virtually unlimited. Storing and processing data remotely is generally more economical, flexible, and secure than on-site alternatives.

“The cloud is also more scalable, and its capacity can be expanded to rapidly meet growing demand,” she noted.

What are the software and network programming requirements for a machine shop adopting IoT/Industry 4.0?

“Most machine tools communicate in HTTP, TCP/IP, XML and Ethernet, so nothing too out of the ordinary,” Hiskey assured. “A bigger thing to consider is what kind of data should be collected?

“One of the advantages of the data collected via IoT is that the data enables better decision-making,” she explained. “When devices are connected, the data they generate can flow into software applications that create the information individuals need to make choices that are timely and effective. Decisions then can be made on knowledge and facts, not guesswork.

“Better decisions mean fewer mistakes and less waste,” she continued. “Details to consider and determine when setting up IoT processes are: What data to collect; who should receive this data; how the information will be used; and how this supports decision making.”

What are the personnel and training requirements for a machine shop adopting IoT/Industry 4.0?

“As much as IoT enables the automation of processes, there is no doubt that human beings will still play a large, engaging role at manufacturers. In fact, the human role will grow in importance and influence,” Hiskey replied, indicating that the requirements of people within an IoT-empowered organization are extension of the current requirements: design insight, programming skill, material and energy engineering, and financial management and strategic analysis.

“IoT will enable the collection, analysis, and management of data for devices and



sensors throughout the manufacturing operation,” Hiskey noted, “but the most important sources and consumers of this data are people, including operators, programmers, maintenance engineers, production supervisors, and front-office business managers.”

What are the common or typical risks or mistakes faced by a machine shop adopting IoT/Industry 4.0?

“One of the biggest risks is IT security,” the Epicor expert reconfirmed. “Another risk, or potential mistake, is not defining specifically what data is the most helpful to a particular project, or determining a way to analyze the data that is being collected. These things should be considered from the start in order to have an effective IoT strategy.”

Do you recommend preliminary or incremental goals for a machine shop working to adopt Internet of Things/Industry 4.0 functionality?

“Yes. IoT projects can be implemented as small projects to start, with simple implementations of sensors collecting basic data around output, temperature or performance, where data can be collected, aggregated and analyzed easily.

“As the understanding of IoT grows, the projects can expand to become more complex,” she confirmed.

There is no denying the big potential for disruption to small- and mid-sized enterprises that IoT/Industry 4.0 represents. However, the growth opportunities are on a scale with that potential — and the evolution to a new way of doing business is underway. Machine shops should recognize these developments, and learn what the new technology is informing them about their customers, their markets, and their businesses. ●

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B2B PURCHASING IS SMARTER THAN B2C. HERE'S WHY.

The convenience of e-commerce carries risks to product quality, availability, and reliability. Skilled procurement has become an essential function in modern manufacturing.

MIKE ROTH

Business-to-consumer online marketplaces might seem like a good place for a manufacturing company to shop for supplies. After all, it's the same place you can get the best prices on smartphone earbuds, Christmas gifts, or even paper towels for your kitchen. Shouldn't you also be able to get the cheapest prices on the parts and supplies you need for manufacturing?

Maybe. Maybe not. If your favorite online seller screws up your earbud order, the biggest inconvenience is that you might have to wait a few more days for a replacement order, or visit a 'brick-and-mortar' store to purchase them. But if that big B2C e-commerce company screws up a parts order for a factory, shutting down the production line for a few days while they fix it can be incredibly costly.

That's just one of the risks that manufacturing companies take when they put their purchasing faith in large e-commerce marketplaces. They may have made consumer shopping easier, but B2B purchasing is much different.

Before you sort those search results by price, consider this: When you buy from a B2C online marketplace, often you're not even purchasing from the company whose website you selected.

Most large B2C marketplaces are really aggregations of independent sellers. While some of the products sold may come from the e-commerce firm's own warehouses,

many others ship directly from the company that makes the product. There's little or no oversight on product quality. Shipping time and tracking ability may be all over the place. And if something's wrong when the product arrives, you may not be able to reach the original supplier.

One well-known e-commerce company was forced to recall millions of pairs of eclipse glasses before the 2017 total solar eclipse, because it could not guarantee the glasses were manufactured to the standard required to protect wearers' eyes. The recall simply instructed people not to use them and refunded their money; there were no new glasses provided. If something similar happened with crucial manufacturing supplies or parts, your factory floor could be left in the dark.

But still, taking costs out of manufacturing and 'leaning' down the supply chain are strategic priorities these days. Doesn't it simply make more sense to purchase from the cheapest seller you can find? Maybe so, if the only cost is the upfront purchase cost.



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But, smart procurement professionals must consider the total cost of ownership associated with parts and supplies. For B2B purchasers, the best deals are still found with B2B suppliers.

Here are five factors purchasing specialists should consider:

Continuity. When a company establishes a sourcing relationship with a single supplier or a small group of suppliers, purchasing specialists can build relationships that create immense value. Shipping and delivery terms, packaging, and other details can be arranged for the purchaser's convenience and best value. Some suppliers can even engineer customized products and help manufacturers innovate. As the relationship grows, purchasers also gain leverage to negotiate price reductions.

Financing. Purchasing from an online B2C marketplace often requires up-front payments, usually with a credit card. But when purchasing from a B2B supplier, invoicing terms can be arranged that allow payments to be delayed 30 or 60 days after delivery. With millions of dollars flowing to outside suppliers, advantageous payment terms

Manufacturing purchasing specialists should evaluate each supplier source to ensure that it meets the organization's objectives for continuity, financing, efficiency, reliability, and risk management. (Source: MSC Industrial Supply)

Risk management. Finally, B2B suppliers reduce your risk. When you buy from an online flea market — where vendor identities, shipping locations and product quality can shift constantly — you can never be sure what you'll get or when you'll get it (no matter what you pay). And if something goes wrong, who do you call? B2B suppliers know their business success depends on your business success, so they focus on delivering maximum value and squeezing all the risk out of your supply chain.

Being a purchasing officer or procurement specialist is no longer just another job. According to Michigan State University supply chain expert Dr. Tobias Schoenherr, manufacturing companies spend up to 70% of their revenue on purchases from outside suppliers. That means buyers are responsible for an enormous amount of financial risk. Skilled procurement is an essential function in modern manufacturing.

The most successful procurement specialists are focused on more than just buying. They're selecting suppliers and building relationships to help their businesses become more efficient and productive, reduce operational risks, and increase profits. Partnerships with B2B suppliers are the key to that. ●

Mike Roth is the Senior Director for e-commerce at MSC Industrial Supply Co.

can reduce financing costs and help manufacturers better manage cash flow.

Efficiency. Purchasing from a B2B supplier often means fewer purchase orders, less unnecessary packaging, and lower overall shipping costs. This means less cost — and less hassle — for purchasing and operations staff. These gains in efficiency can be reinvested to grow the business, or the savings in overhead can drop to the bottom line.

Reliability. B2B suppliers understand they're not just shipping boxes to an address. They know their manufacturing clients depend on timely delivery of high-quality parts and supplies. As more manufacturers 'lean' out their supply chain, reliable delivery and the supplier's ability to meet specific standards becomes critical. Will that lowest-price vendor you've never heard of on that big B2C e-commerce site really provide that? Are you willing to risk your company's productivity and efficiency?

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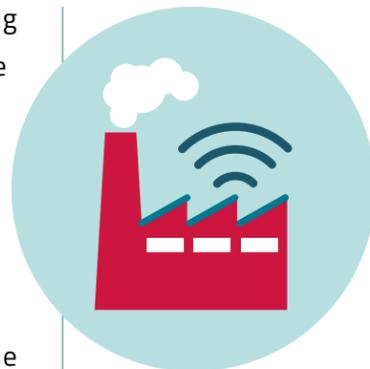
From self-inflicted obstacles to organizational inertia, these are common difficulties on the way to technological transformation – and the reliable work-arounds for your organization.

GUNEET BEDI

The Industrial Internet of Things (IIoT) is gaining momentum – both in terms of its adoption rate and its technological maturity. The manufacturing industry is helping lead this progress, and the companies and industries that have deployed data-harvesting sensors and analytics platforms are drawing the rewards of turning raw data into better business outcomes. [With enterprise artificial intelligence investments on the rise](#), the IIoT is really just getting started.

According to [this McKinsey Global Institute report](#), the IIoT may have an annual economic impact of more than \$11.1 trillion by 2025, with significant growth in the manufacturing, smart cities, retail, and automotive segments. As with personal computers, the Internet, and smartphones, the IIoT is becoming a technological catalyst for business.

And yet, many businesses fumble IIoT adoption. Any type of disruption to existing operating practices presents a business challenge, even if the results are guaranteed to have real and measurable benefits. IIoT involves changing business



THE IIOT MAY HAVE AN ANNUAL ECONOMIC IMPACT OF MORE THAN \$11.1 TRILLION BY 2025



processes, looking for new people skills, and developing incentives and KPIs. It also involves technologies at multiple stages of evolution, ranging from infancy to mature. However, many of the frequent missteps companies make are easily avoidable and dodging them can make or break an IIoT deployment.

While every deployment is unique, a few common mistakes affect several different industries and organizations. From self-inflicted obstacles to organizational inertia, here are three frequent IIoT deployment lessons learned – and three easy ways your organization can prepare for them.

1: Much more than a technology upgrade. Innovative technology is the cornerstone of IIoT but thinking of an IIoT deployment purely as a tech upgrade is a big mistake. Implementing a connected plant floor or a connected asset can radically transform a manufacturing business, driving better business outcomes through new insights and new revenue opportunities. Any technology solution is only worth its weight if it solves a business problem.

Otherwise, an IIoT deployment may be doomed before it starts. According to [this Cisco survey](#), collaboration between business decision-makers and IT departments was the No.1 driver of a successful IIoT project. Although an IIoT deployment may work

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on a technological level, it may leave key business problems unsolved. According to the same Cisco survey, many IT departments consider a deployment a technological success, while business decision-makers at the same organization consider it a failure.

The better approach: When planning a deployment, begin with a simple question: What business problem do we need to solve? All the right stakeholders should be involved in coming up with the answer. The IT department and the engineering team are critical, but business decision-makers, sales and marketing teams, and C-level leaders are equally important to provide clear direction and define primary business needs.

2: Be proactive, not reactive. In many markets, there are two prominent types of players. There are the 8,000-pound gorillas, market leaders who have established successful ways of doing things. As such, they are risk-averse. They usually implement change only when there's new competition or a forward-looking management team.

Then there are the disruptors. These smaller, nimbler companies are more compelled to adopt technology aggressively — especially if it helps them compete with those gorillas. For the most part, these disruptors are the early IIoT adopters. As market leaders wait and watch, these challenger companies are actively exploring new ways to optimize business processes, transform data into insights, and gain fluency with groundbreaking IIoT applications.

As such, these nimbler companies are shrinking the gap. Doing nothing is turning into a competitive disadvantage for market leaders.

The longer they wait, the further behind the curve they are when they deploy their own IIoT solutions. These disruptors may not even be your traditional competitors. Recently, the CEO of a large chemical-processing company told me, "If we find out a new competitor is innovating from outside our industry, it might already be too late for us to react."

The better approach: Take a proactive approach to IIoT deployment. The focus of any IIoT project should be to improve and inform your own business processes, not react to what the competition is doing. Yes, an IIoT deployment can be intimidating, and it shouldn't be rushed. That's precisely the reason that a "trigger event" approach is so dangerous: It forces an organization to plan

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and deploy in a hurry as a competitive reaction, rather than tailor the deployment to its own timeline and needs.

3. Don't try it alone. For a technologically savvy company, developing a data-harvesting infrastructure in-house may sound appealing, affordable, and fully customizable. In fact, it may actually work for simple pilots or single control scenarios. However, when it comes to a full-scale deployment, DIY solutions often run right into a brick wall — and they fall short of the IIoT's true promise.

Developing algorithms, artificial intelligence, and predictive-analytics applications requires a dedicated team of experts -- one that can continue to refine these things over time. It may not be rocket science, but it's close! There are no one-size-fits-all solutions in the IIoT universe and developing custom applications for these systems requires deep expertise.

Furthermore, when deploying an IIoT solution, many organizations overlook the system's ease of scalability, extensibility, the skills required for servicing a homebrew system, and applications beyond simple data capture. Turning data into actionable insight is the true promise of IIoT, and it's quite a complicated endeavor.

The better approach: Enlist the help of a partner, not just a solutions provider. There simply is no turnkey solution now, so beware of any vendor that sells you a product and says good luck. You need to seek out a trusted and knowledgeable integration partner, one that can guide you through the hidden challenges of an IIoT deployment, customize the solution to your primary needs, and continue to develop your solution through active engagement.

FORESIGHT IS ESSENTIAL

Each of these lessons involves foresight. The first step of any IIoT deployment should be to identify the ultimate business outcomes. Otherwise, a deployment may be a technical victory but fall short of addressing the business problems it's supposed to solve.

Second, any external "trigger event" that prompts your organization to consider an IIoT deployment likely means you've waited too long. Instead, consider the benefits and improved outcomes a deployment can bring to your own operations.

Lastly, building a solution yourself or buying an off-the-shelf solution will lead to bigger challenges in the future. An experienced integration partner can guide your organization to success with a customized, actively supported solution — one that addresses all your needs. ●

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TURN YOUR SUPPLY CHAIN INTO A COMPETITIVE WEAPON

Don't Buy into these four myths that limit the ability of leadership teams to turn their supply chain into a competitive weapon.

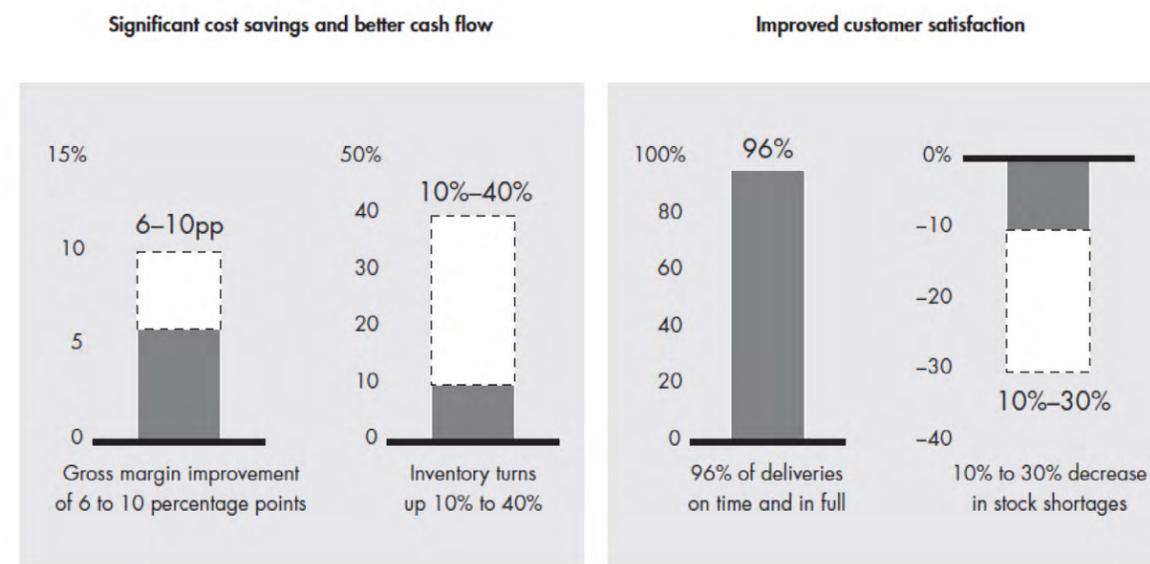
KEITH DONNELLY, MEGHAN SHEHORN, DEBJIT BANERJEE



A well-designed supply chain is a powerful weapon, especially in fast-moving markets. It can reduce cost, increase revenue and delight customers. But taking the bold steps to overhaul a company's mission-critical manufacturing and distribution footprint isn't easy. As a result, leadership teams often opt for incremental changes that fail to deliver big benefits.

That's a missed opportunity. Companies that take a more strategic approach improve plant output by up to 25% and inventory turns by up to 40% while reducing capital expenditure and increasing the agility, flexibility and speed of the supply chain, Bain research shows. Overall, creating an optimal manufacturing and distribution network increases gross margins by 6 to 10 percentage points (see **Figure 1**).

Figure 1
How network optimization improves performance



Source: Bain & Company

Leadership teams that achieve those gains have a broader and more strategic view of network optimization. They see it as an ongoing effort to determine the ideal number, size and location of manufacturing and distribution assets for a top-performing supply chain. They use network tools to figure out the right balance among cost, service, capital efficiency and flexibility—from purchasing raw materials to delivering finished goods—in order to best meet the company's needs and goals.

Successful companies understand the power of designing the network to support a specific strategy. For a discount retailer such as Aldi, for example, that may mean optimizing the network for costs. For a fashion retailer such as Zara, it might be optimizing

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Take the case of one large and fast-growing regional grocery chain that needed to quickly revamp its supply chain to support its growth. Based on the company's existing operations, the network optimization model recommended adding three new distribution centers at a capital investment of \$150 million. But before embarking on that path, the leadership team decided to step back and challenge some of the assumptions underlying the existing network design. What would happen if they segmented their product flow differently or if they improved inventory practices to free up more space in their existing distribution centers?

By starting with a clean slate and incorporating best practices, the leadership team was able to devise a new supply chain structure that delivered greater capacity but required only \$50 million in capital expenditure—a third of the cost of the original plan. The new structure extended the life of the company's supply chain by more than 10 years while lowering operational costs and maintaining service levels.

Myth No. 3: The main benefit of network optimization is reducing costs.

False. Network optimization can increase a company's competitive edge by improving the customer experience and satisfaction, increasing revenue and eliminating supply chain risks. Many leadership teams, under pressure to meet financial targets, seek short-term cost cuts from the supply chain. That approach produces incremental gains but overlooks the additional strategic benefits from network optimization.

Improved customer experience and increased revenue: A top-performing supply chain can help companies keep pace with evolving customer expectations, such as faster delivery times. It also enables them to better understand and address the needs of different customers and to segment their service offerings to customers more effectively. Better customer service, in turn, helps accelerate revenue growth by improving a company's ability to adapt to rapid changes in demand and by expanding output capacity.

A fast-growing Latin American personal care company, for example, redesigned its supply chain to improve delivery speed and flexibility and to adjust to new tax laws. It faced rising costs and logistics complexity after entering new retail channels and creating new brands, and its business-to-consumer service was poor in comparison with its competitors' service. In addition, new taxes on e-commerce were undercutting profitability.

After considering several scenarios, the leadership team shifted from a centralized distribution model to a hub-and-spoke distribution system, with central, regional and a select number of local fulfillment centers, strategically placing distribution nodes to reduce the company's tax burden. Using advanced supply chain analytics, the company

carried out simulations to evaluate the trade-off between different levels of service and revenue growth. That helped the team determine the right service level to achieve the desired growth. The new supply chain design enabled service on par with the competition, reduced distribution costs by 9% and improved gross margins by 23%. In addition, the new network allowed the business to grow as much as 20% a year without further investment.

Business resiliency and reduced supply chain risk: Network optimization modeling also helps reduce supply chain risk. Leadership teams can use scenario planning to evaluate shocks, such as a production line going down, and figure out whether the company would be able to sustain production and service levels until full capacity is restored. That information helps them decide whether and how to design such backup capacity.

Myth No. 4: Network optimization is about longer-term improvements and rarely yields quick wins.

False. Network optimization can produce quick wins by reallocating production volume and flow within an existing supply chain footprint, eliminating stock shortages, reducing inventory levels or avoiding capital spending—just to name a few. In fact, we typically see companies achieve 60% of run-rate savings in transportation and distribution costs within the first 12 months of a network optimization effort.

A North American food company, for instance, achieved rapid gains by remapping customers to more efficient plants and distribution centers to reduce transport distances and improve network speed. During the initial analysis, the company discovered it was shipping packaged soups from a Midwest manufacturing facility to a California distribution center before finally shipping them to customers in Utah and Colorado. The company remapped those customers to receive products from a Midwestern distribution center and saved more than 700 miles per shipment. Additionally, it identified a series of high-volume customers that could receive full truckloads directly from the plant, saving an extra transportation move and distribution handling costs. The company implemented these changes within two months of the initial network optimization analysis.

GETTING STARTED

Many companies talk about supply chains as a cost, but successful organizations view their supply chain as a competitive weapon. A fine-tuned manufacturing and logistics network enhances operational performance, improves customer experience and increases margins. It also helps leadership teams adapt to changing markets and customer

demands. Leadership teams interested in getting the most out of their supply chain can begin by asking themselves a few key questions:

- Is our network operating under stress?
- Are new entrants beating us on cost or service?
- Do we know how to adapt our network to meet evolving customer needs and product plans?
- Are we achieving year-over-year efficiency gains in our network?
- Are we taking advantage of new digital technologies, and how do they change our network needs?

These questions may point to network design problems or signal that it's time to rethink a company's manufacturing and distribution network (see **Figure 2**).

Figure 2

Symptoms of possible network design problems



Note: Net Promoter®, Net Promoter System®, Net Promoter Score® and NPS® are registered trademarks of Bain & Company, Inc., Fred Reichheld and Satmetrix Systems, Inc.; EBIT stands for earnings before interest and tax
Source: Bain & Company

If customers are demanding faster delivery and higher service levels, for example, network optimization can highlight how to meet those demands efficiently. With technologies and markets changing at a rapid clip, the odds are good that leadership teams can deploy network optimization to unlock significant value and improve their competitive edge. ●

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