



Digital transformation in manufacturing: The CIO's approach

Analysts and industry experts agree: Digital disruption in manufacturing is on the horizon. Technologies like the Internet of Things, dynamic enterprise management, global supply chain visibility, and machine learning are already changing the way manufacturers produce goods and interact with customers. Further changes will continue to intensify issues and reveal opportunities. New revenue streams will emerge, as well as new tactics for engaging with customers and creating memorable experiences. As these innovations and technologies unfold, manufacturers must decide how they will they respond. Will they boldly become early adopters of disruptive concepts? Or, will they choose the cautious route, waiting for best practices to be tested and refined?

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The future unfolds

Manufacturing stands at a tipping point. Digital disruption is on the horizon and rapidly approaching the point of full impact. From observing how waves of digitalization have transformed other industries, such as music and travel, we can anticipate the similar type of complete and dramatic re-invention to take hold in the manufacturing segment, too. There will be bold new innovations, companies that develop new revenue streams and ways of engaging with customers, as well as casualties—companies that simply could not keep with the rate of change and remain relevant.

CIO defines digital transformation as “the acceleration of business activities, processes, competencies, and models to fully leverage the changes and opportunities of digital technologies and their impact in a strategic and prioritized way.” But more than just acceleration, digital transformation is about a manufacturer’s ability to outpace disruption and stay competitive in a rapidly evolving financial, operational, and logistical environment.

Manufacturers have become accustomed to rapid change, becoming almost numb and skeptical about the promise of one more revolution. How many “total paradigm reinventions” can one industry absorb? Mobility, cloud deployment, 3D printing, omni-channel shopping, global commerce, Internet of Things, machine learning, virtual reality...have already plunged the industry into one long innovation cycle. Now, a full digital transformation is promising to rock manufacturing’s world even more. Some manufacturers, especially the ones already struggling to keep up, may be hesitant to accept the forecast. **IDC Manufacturing Insights** reports that today, only 15% of manufacturers are actively planning a digitalization strategy.

CIO: Why you need to shepherd the launch

Digitalization is one of those topics that has sparked the imagination of personnel in multiple areas of the plant, from product design to shop floor logistics and supply chain planning.

While this company-wide enthusiasm may seem positive on the surface, it can also be a hindrance. Too many conflicting priorities can cause chaos, ultimately sabotaging the success of the program. When multiple managers each bring their own agenda to the team planning efforts, lack of clear priorities can leave the group turning in circles.

The IT team, specifically the CIO, is a logical choice to take the lead and shepherd the digitalization strategy into execution stages. As the person assigned to spearhead the digitalization strategy, you need to have a broad knowledge of the operational, as well as the IT requirements, of your organization.

Digitalization may impact many areas within the organization, incorporating many solutions and applications, whether legacy tools, third-party custom applications, or new off-the-shelf SaaS solutions in the cloud. As the shepherd of the company-wide effort, you should hold the vision. You should know how the various solutions integrate, store and share data, and perform reporting requirements. One view of the enterprise, even when the enterprise involves many partners, is essential.

But you certainly cannot execute the entire vision alone. You’ll need buy-in from key stakeholders and C-level officers. Top management must set the culture of innovation, help set priorities, and provide clear parameters for investment decisions and risk tolerance. Then, your IT team can take charge and drive the project with objectivity and a logical approach to deployment, not letting individual pet silo projects interrupt the overall success.

The manufacturing industry experts and analysts proclaim digital manufacturing will be an unequivocal reality, though. According to consulting firm McKinsey, “Industry and academic leaders agree that **digital-manufacturing technologies** will transform every link in the **manufacturing value chain**, from research and development, supply chain, and factory operations to marketing, sales, and service. Digital connectivity among designers, managers, workers, consumers, and physical industrial assets will unlock enormous value and change the manufacturing landscape forever.”¹

Defining features of a digitalized approach

Digitalization is poised to transform manufacturing. According to **McKinsey**, “The explosion in data and new computing capabilities—along with advances in other areas such as artificial intelligence, automation and robotics, additive technology, and human-machine interaction—are unleashing innovations that will change the nature of manufacturing itself.”¹

With digitalization, manufacturers gain a fully integrated approach to using technology to connect people, processes, machines, and products with contextual, meaningful insights. Most importantly, these insights can be used to drive business prowess, whether that means speeding delivery of products or engaging with customers to create highly personalized products. Several technologies play a part. Cloud deployment, advanced ERP solutions, data science, predictive analytics, machine learning, smart sensors, and online portals all play a part. To make it all work, multiple specialized solutions are integrated along with a comprehensive ERP solution. That creates enterprise-wide visibility, which also includes the supply chain and partners. Advanced networks, usually in the cloud, connect everything, from financials and customer orders to internal assets, and remote personnel.

Smart sensors and Internet of Things technologies that collect and communicate data are often at the heart of innovative digitalization concepts. Highly flexible, tiny, and low-priced, sensors can be used to track a wide variety of issues, including geo location, environmental conditions, and identification. The sensors capture and communicate the data points and context. That raw data must be aggregated, analyzed, and turned into consumable insights. It can be used to identify trends and project future events. The data can also be used to uncover correlations between seemingly non-related incidents. And, the data can be searched, looking for conditions that are outside of the predetermined parameters, signaling alerts. Because the manufacturer is alerted to issues early, before they escalate into crises, it’s possible to avoid downtime or missed deliveries. This is often where manufacturers can achieve significant ROI.

Anomalies detected in the data analysis can trigger automated responses. The response can be as simple as sending a service request when a component begins to overheat, or as complex as automatically scheduling a technician, changing available capacity, re-routing customer orders, reassigning personnel to another task, and placing an order for a replacement component at the first signs of a component on the production line malfunctioning. This can all be automated, saving the manufacturer time and money.

In addition to proactive response to anomalies, incidents can be further investigated, looking for contributing underlying factors which can be prevented. Perhaps the component from one vendor has a higher failure rate than other vendors or failure may repeatedly occur on one shift that has limited supervision and new employees lacking training on proper machine operation. By understanding these correlations, interventions can be made.

New revenue streams and business models

In addition to using data to make well-informed decisions and algorithm-based predictions, digitalization strategies often use “out of the box” thinking to create new offerings for customers, new pricing structures, and new services. For example, an HVAC company may charge an industrial/commercial customer for conditioned air rather than selling a piece of HVAC equipment. Similarly, an equipment manufacturer may bill a contractor for “power by the hour” and may fine the operator when unsafe work practices occur, such as excessive speed or weight violations. One of the most common new revenue streams emerging from digitalization is monetizing the data collected from sensors. For example, a consumer’s car will generate thousands of data points about the performance of both the car and the driver. This data is valuable to many people, from component manufacturers to service providers, and even insurance companies.

Ownership of data and security around data are two critical issues emerging out of the new models, opening up debate, as well as yet more business opportunities. Companies offering to broker data exchanges and help establish IoT network security systems can be added to the list of new business models popping up. Opportunities will continue to evolve.

Risks of delaying adoption

Despite the huge potential, some manufacturers are waiting for further proof and proven best practices to be worked out before they jump in as early adopters. There is no denying that today the step-by-step directions for a best-in-class digitalization strategy are not completely mapped out. Lacking historical foundations and proven results, manufacturers may feel they are left with little more than fuzzy guidelines and vague advice. This uncertainty can be intimidating and overwhelming. It is understandable that the conservative and cautious enterprise may be tempted to wait for further evidence of profitability and for another enterprise to bear the burden of R&D, prototyping, testing security, and refining new integrations of solutions and applications of functionality.

While bold adoption of digitalization technology may not be within the comfort zone of some executives, choosing to wait on the sidelines can mean missed opportunities. Rapid and wholesale changes due to digitalization are poised to transform standard methods of doing business. Companies that are slow to conform may find themselves labelled as “out of step” and far behind the times. Once that perception is attached to a company, it is hard to shake it off.

Slow moving manufacturers may lose market share and find that their customers are trying new options. They may even find that their suppliers are reluctant to do business with them. As suppliers re-tool their business systems for peer-to-peer integration, IoT technologies, collaborative platforms, and open source databases, they're going to want to work with companies that have exhibited the same level of commitment to next-generation technology.

IDC Manufacturing Insights predicts that 65% of manufacturers will adopt digital manufacturing by 2020.

An IDC survey of manufacturers also reveals, though, that many manufacturers are reluctant to be early adopters.

- 5% are completely risk-adverse, and not going to make any changes
- 35% are keen on waiting to see changing technologies being proven in the industry first
- 37% want to be early adapters, but not first movers—there may be risks
- 23% want to be the first movers in developing technologies²

“The major barrier is the inability to create a consistent business case—which in turn creates a lack of C-level commitment. Change management and integrating new technologies with existing ones are also obstacles. All in all, data and information are only useful to decision makers when they can actually take action and trigger new business processes,” says IDC.²

It's hard to predict the risks of waiting to adopt new technologies. But, we know from observing other industries that resisting change can be highly dangerous. Consider the fate of Blockbuster, BlackBerry®, Borders Books, and Hostess, which all chose to continue operating “like always” when their industries were changing around them.

According to **Working Capital Review**, traditional adoption rates of new technologies follows an S-curve, with some users going early, a lot in the middle, and some following late. “These models assume that it takes a while for companies to find out about new technology and, once they do, for their employees to assimilate and use it. Robotics is a good example: It's obvious that it can increase productivity, but it takes some know-how to put robots to work.” For digitalization technology, the companies in the middle section of the S curve are not simply delaying benefits as they follow a learning curve; they are risking relevance and being overthrown by upstart new enterprises. The long S curve is no longer a luxury companies can trust.

Related research from the **University of Chicago** examines the effect of aging on organizational innovation and suggests that abrupt change can be overly stressful to the organization, especially an older organization well entrenched in its processes. These organizations may benefit from phased incremental adoption, although that approach leaves the organization vulnerable to more agile competitors. “The increasing gap between older organizations’ innovative capabilities and the technological frontier creates opportunities for new firms... better aligned with the current state of technology....”

When a company delays updating its technology, it simply opens the door inviting an upstart to take its place in the market. “The inability of established firms to adopt and incorporate major technological changes is one of the most important factors giving rise to bursts of high-technology entrepreneurship,” says the University of Chicago [research report](#).

Manufacturers face numerous market challenges and business pressures today. Attempting to address those issues, offer relevant products/services, and remain competitive is extremely difficult. Doing so without a modern IT infrastructure and the benefits of digitalization tactics places excessive stress on the organization. In this high-stakes game, cutting corners, stalling action, and taking a passive wait-and-see stance is a lot like racing a Model T, while the rest of your competitors are driving modern race cars. Who do you think will win?

Readiness vs. reluctance

It's quite likely the obstacle preventing manufacturers from engaging is not their lacking of willingness or interest—but simply their lack of readiness. [A Forrester/Accenture survey](#) recently asked: Do you agree that your company is ready to execute its digital strategy?

Respondents seemed to be least confident about their organizations' ability to execute digital strategy when compared with technology and operational processes. “The C-level executives who we surveyed were particularly hesitant that they have the right people in place, with less than half ‘agreeing’ or ‘somewhat agreeing’ that the organization is ready,” the report says. “Across all three of these dimensions, businesses are on the path to execution, with the majority at least ‘somewhat agreeing’ that their company is ready to execute their digital strategies. However, businesses have room to continue to transform, as a minority of respondents ‘completely agree’ that they have the technology (29%), operational processes (26%), and organization (24%) in place to execute their digital strategies effectively.”

This lack of confidence can cause a setback for any initiative, but it's something that can be remedied. Research, education, and a deep dive into the technical ramifications can help an organization make well-informed choices, based on timely facts, rather than hunch. Choosing a partner who can help with strategy, as well as execution, can also make a big difference. With an experienced partner in the mix, it's easier to feel confident and speedier to reach consensus. Information and resources are available. Executive officers need to make it a priority to investigate and enrich the company's understanding of the benefits of digitalization. Knowledge is the starting point.

Benefits of early adoption

While outpacing the competition is a powerful motivator for embracing digital transformation, so are the potential revenue opportunities. The [World Economic Forum](#) estimates that “the combined value—to society and industry—of digital transformation across industries is upwards of \$100 trillion over the next 10 years.”

The financial impact is certainly being felt at the enterprise level, with some companies cashing in on the opportunities at unprecedented levels. The World Economic Forum tells us that it was common for Fortune 500 companies to take an average of 20 years to reach a billion dollar valuation. “Today's digital start-ups are getting there in four,” the Forum reports. Revenue gains are not the only objectives and benefits, though. Digital organizations often place a high value on innovation and being the pioneer in a new market, product offering, or concept—like on-demand movie rentals, satellite radio, ride sharing. They hold the prestige of being the one to forge new ground. Names like Amazon®, Uber®, SiriusXM® Radio, Netflix®, and Travelocity® have become synonymous with change and drastically changing core tenets of the consuming class.

The first to market with a new product or concept is often the one to own the market, even as followers join in with knock-offs and attempts to divert customers willing to settle for lower-cost solutions.

In addition to dominating the market, early adopters can enjoy the benefits of influencing the market standards and establishing protocols that are conducive to their product/offering. They get to name the game and “stack the deck” toward their best interests. Early adopters can be among those who define expectations in an industry, forge new protocols, call for regulations, suggest measurement standards, tap spokespeople, create communication hubs, and set the bar for new standards.

A survey conducted by Forrester/Accenture also indicates there are many benefits and a variety of driving influences behind adoption—beyond mere revenue volume. The study found that how the sale is made is what matters. Firms ranking their top drivers for digital transformation most often said that they look to digital to help them sell profitably (58%), quickly (51%), and with superior customer satisfaction (48%).

Creating a strategy

The time to start forging a path is now. The ingredients are all there, and companies that start formulating a strategy now will have a far better chance of taking the lead in the race to transform their industries. Timing is everything, though.

“Industrial companies that don’t invest in data now,” says **Bill Ruh, CEO of GE Digital**, “will eventually be like consumer companies that missed the Internet: It’s going to be too late.”

Once you’re ready to jump in to digitalization, you need to design a strategy. This strategic plan will help you fully define the level of risk and speed of deployment that’s best for your manufacturing company. Strategy should include all of the classic elements of project planning, from prioritizing overall objectives to listing, tactics and specific action items. Don’t forget to get detailed and also map out team members you will tap to join the effort, examples of assignments, communication avenues, reporting methods, projected investment of resources (time and funds), and how you will measure your success.

If you opt for a measured deployment or want to assume a “wait and see” stance, be sure to clearly define the stages, the timeframe and specific trigger points which will be used to determine when you want to move forward.

In “**Business Decision Making in the Factory of the Future**,” IDC Manufacturing Insights offer these three tips for getting started planning your digital transformation strategy:

- 1. Start with quick wins**—Monitoring assets, for example, and leveraging these case studies as opportunities to develop the business case for larger investments within the organization.
- 2. Enable information-driven workflows**—IoT technology and supporting applications, such as integrated ERP, can be used to enable **information-driven workflows** that range from very wide (e.g., machine failure, spare-part replacement) to much narrower in scope (e.g., quality checks).
- 3. Bridge the gaps**—You need to bridge the existing gaps between information and operations, and create an intelligence layer that connects the shop floor with the boardroom, providing real-time **analytics to key decision makers**.

Next steps: Deploy, deploy, deploy

There are still many questions concerning digitalization deployment. Even the companies that already have deployed digitalization tactics seem to be unsure if their tactics were ideally executed. Could they have done something differently? What could have been improved? Should they have involved other consultants or vendors? The questions surrounding a deployment are often ones that cannot be answered. As with most new technologies, there is a degree of trial and error which is inherent.

There simply comes a point where you need to take a leap of faith and have confidence in the future. Take action. Understand that there may be some set-backs and failures. These are simply necessary parts of the innovation process.

A recent survey asked companies how confident they were about their digitalization projects. “Only 5% of said they felt they had mastered digital to a point of differentiation from their competitors.” That leaves 95% of organizations who realize their strategies were less than perfect and there was room for improvement. The lesson to be learned here: Perfection isn’t necessary.

Manufacturers can get started on strategies by doubling down on their existing assets, tools, and connectivity opportunities. Your organization likely has some basic “digital” concepts already in play, such as sensors and scanners, mobility solutions, intranets, automated alerts, and online portals for contractors and customers. These concepts can all be taken to the next level, expanded, and turned into differentiating elements.

For example, right now your sales people, who are often road warriors, may use mobile solutions to access account details and enter customer orders. But, now may be the time to expand the use of mobile devices, such as equipping field technicians with smartphones that can be used to capture results of service calls, parts installed, and call resolutions. Consider, too, the use of tablets on the shop floor so the supervisors can leave their workstation, walk the floor, see issues first-hand, and still access information through a handheld tablet?

Or, perhaps you can expand and enhance the online tools you offer to customers, whether they’re consumers, distributors, or OEM manufacturers. Currently you may offer a way for customers to enter orders online or email you their next purchase. Consider how you can expand that service so you can allow customers to visualize product personalizations, receive an accurate estimated shipping date, and forecast when their current inventory of your product will be depleted. With modern IT solutions, these enhanced services are easier to deliver, and are expected by customers.

Take action now

Rapid change has challenged manufacturers for the past decade. The pressure of keeping up with technology innovations and evolving market needs is nothing new. Manufacturers know they need to keep pace in order to remain relevant and competitive. Yet, many need a shove to launch their journey to digitalization. It's that intimidating.

The impact of digitalization will be widespread, dynamic, and lasting. While few proven tactics can be identified as the must-do best practices, there is one tactic that all industry experts seem to agree is important: Take action now. Plan your strategy. Get at least one foot on the playing field and explore your options. Or, you'll be left behind, alone, wondering where everyone went. Remember to shut the lights out if you're last one out the door.

[Learn more about digital transformation in manufacturing](#)



¹ McKinsey, "Digital manufacturing: The revolution will be virtualized," August, 2015.

² IDC Manufacturing Insights, Business Decision Making in the Factory of the Future, an IDC Info Brief, Sponsored by Infor | November 2015.

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