



A guide to Industry 4.0 technologies for reluctant adopters

Overcome barriers, set priorities, and take cautious steps forward

Industry 4.0, smart factories, digitalization, and the Internet of Things (IoT) are all hot topics in the manufacturing sector, generating considerable buzz—and even some consternation. These disruptive technologies are exciting, offering opportunities ranging from innovative R&D to digital supply networks. But with this excitement also comes complexity, which can easily seem overwhelming. And for cash-light enterprises that struggled through the Great Recession, the pressure to adopt multiple new technologies can appear to be beyond their means and feel too risky.

Not every enterprise has the resources—or the desire—to toss out legacy systems and reengineer the entire organization's data network.

An incremental approach—one that follows a logical, prioritized strategy—is something that every organization, no matter its size or available resources, can plan and follow. In this paper, you'll find tips to help you create a practical plan of action, including options with minimal disruption and low risk. With this guidance, even those who have been reluctant to embrace next-generation technology can put a plan in place and get started on the journey.

The magnitude of change

Is it possible to separate the hype from reality and obtain a true picture of the magnitude of change that has already hit manufacturing and what is yet to come? No. Hype and reality are tightly intertwined. Hyperbole and optimism have combined and evolved into to a new generation of stories that elicit amazement and envy. We're bombarded with articles describing manufacturing plants performing near-miraculous feats: Robots think, machines communicate, cameras fly, inventory is never out of stock, and orders are always on time; a customer can imagine a product, and in the blink of an eye, the product is produced and delivered.

And yet, this isn't even smoke-and-mirrors or fanciful dreams. For some, these are already realities. Considering science and technologies that already exist, as well as the results of early adopters, experts who live and breathe innovation are projecting that this level of change will certainly get much bigger.

In fact, the analysts at [Capgemini](#) predict that smart factories could add from \$500 billion to \$1.5 trillion in value to the global economy in the next five years.

Prognosticating beyond that, however, proves challenging. The subject matter is moving at an alarming rate of change, making it difficult to definitively quantify results. Even timely surveys, like the ones referenced in this paper, might already be outdated by the time their statistics are published—as more factories deploy IoT projects and boost profits.

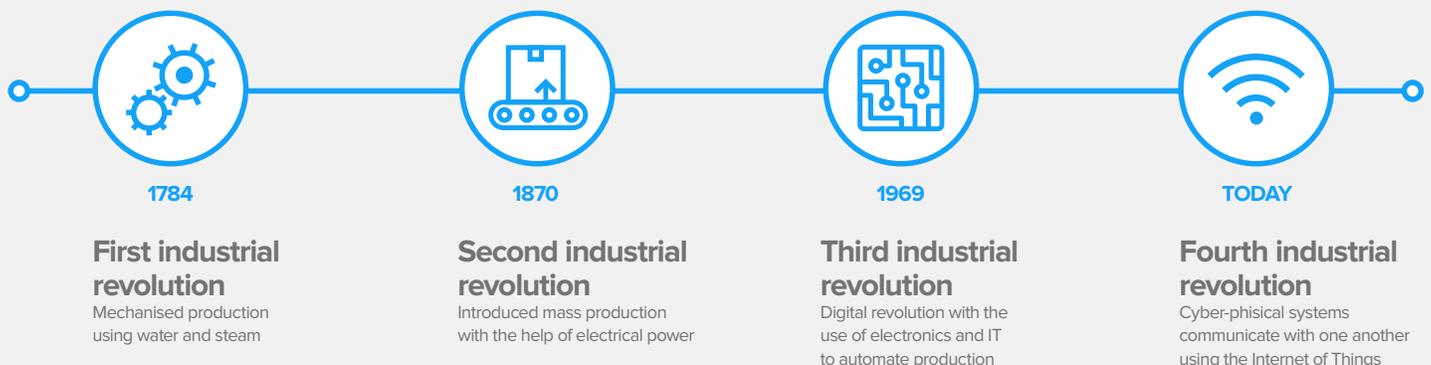
While manufacturers must learn to live with a degree of ambiguity as to what exactly the future has in store, the simple truth is that technology as a driving force in manufacturing is not going away any time soon.

Defining Industry 4.0

While definitions for Industry 4.0 are numerous, it's essentially: "The marriage of physical and digital technologies such as analytics, artificial intelligence, cognitive technologies, and the Internet of Things (IoT). This marriage of the physical with the digital allows for the creation of a digital enterprise that is not only interconnected, but also capable of more holistic, informed decision making," according to [Deloitte](#). Data collected from the physical world (like machinery) is used to generate insights, which are then reapplied to the physical world. Deloitte says, "These feedback loops generate abundant opportunities for new products and services, better ways to serve customers, new types of jobs and wholly new business models."

We don't even have consensus as to what we call this "new technology" that's changing the way we design, make, and deliver products to customers. The German government coined the phrase, "Industry 4.0" as a nod to the "fourth industrial revolution." Industry 4.0 originally encompassed machine-to-machine (M2M) technology and connected devices. The equipment industry used to call this telematics.

Then the sensor market exploded and the IoT was the next big thing. Soon, the "Industrial Internet of Things" (IIoT) came about as result of the need to distinguish industrial applications from more consumer-oriented applications.



The UK prefers the term “4IR,” for fourth industrial revolution. There are also smart factories and smart products, as well as smart Millennials who insist on highly intuitive software that behaves like their smartphones. No matter what you want to call this wave of disruptive technology, it’s real and about to drastically change your factory—if it hasn’t already.

Turning denial into acceptance

There are still skeptics. There are those who resist change. There are naysayers who expertly play devil’s advocate at every exploratory meeting. They worry about the loss of jobs, machines taking over the world, and why we can’t keep viruses out of our inboxes. Skeptics play a valuable role. They keep the optimists from getting carried away and forgetting to analyze risks before pouring all available resources into the newest widget.

Skeptics are usually right about at least one thing: the need for proper security. We live and work in a world where criminals and terrorists—including the “cyber” variety—pose very real threats. There’s no denying that security breaches have happened and will continue happen. We’ve heard the horror stories and are aware of the high stakes. Just the question, “What about security?” can cause many CIOs to shiver. It’s a scary question because there are no easy answers. Fortunately, the right people are diligently working on ways to protect us from known and unknown threats. We’re still learning and making inroads into building secure infrastructures.

Meanwhile, manufacturers can take prudent precautions. They can use edge applications and hybrid solutions, which help minimize risks to central databases. These types of solutions also provide the benefits of cloud computing, such as elastic storage capacity, while protecting critical customer data. These tactics may hold the answers for risk-averse companies.

Avoiding cloud-based technologies can actually impede a company’s progress. Staying relevant—and viable—means staying in touch with suppliers, partners, and customers, and conducting business with them in the ways they want to do business. Manufacturing relies on appealing to a wide market, pleasing customers, and offering goods the market will buy.

You must meet the customers in their comfort zone. And customers today want e-commerce, fast delivery, value, personalized products, and an exceptional experience—just like they expect from the likes of Amazon®, Uber™, Airbnb™, and Netflix™. That means cloud.

Where are we going anyway?

If your company has moved into the acceptance stage and is ready to embrace digital technologies or Industry 4.0 concepts, you’re still not out of danger of decision-paralysis. You still have numerous planning meetings to survive. Experts and analysts will concede that these can be difficult. You may find yourself asking, “What are we trying to achieve?” a dozen or more times as you try to steer your team toward establishing a clear goal with measurable milestones.

According to [Capgemini](#), even organizations that already have Industry 4.0 projects underway admit to a lack of confidence. Only 14% of companies claim they’re satisfied with their level of smart factory success, and only 6% label themselves as “digital masters” that are fully confident of their processes.

Setting your goals is essential for building a plan that is practical, doable, and cost effective. It also helps you resist the temptation to try to do it all or solve every pain point. Industry 4.0 is not about pressing a button and instantly solving every headache the company has faced for the past decade.

For many companies, picking one basic goal offers the chance to test the waters, obtain buy-in from the internal stakeholders, and develop confidence. Some examples of popular phase-one goals include preventing unexpected downtime, optimizing inventory levels, and ensuring account profitability.

Once you select a goal, the corresponding tactics and solutions become a matter of logical problem solving and applying technology to fulfill specific needs. The table on the following page shows the progression of planning—from goal to tactics and the type of software solutions that apply.

Goal	Tactics	Solutions
Prevent unexpected downtime and keep shop floor assets running.	Improve preventive maintenance. Monitor assets for signs that maintenance is required.	Add sensors to key plant machinery and capture performance data through IoT systems. Early warning signs of machine failure trigger automated responses.
Better manage inventory levels with fewer stock-outs and less excess inventory.	Improve forecasting of demand and inventory requirements.	Deploy predictive analytics.
Meet customer demand for highly personalized products.	Enhance MTO and ETO processes, streamlining complexity, minimizing delays.	Provide configure, price, quote tools; collaboration capabilities; and shop floor activities management.
Improve customer engagement and build brand loyalty.	Directly involve the customer, add service offerings, increase value, and build relationships that continue past point of sale.	Add e-commerce capabilities and advanced field service systems.
Speed time to market of new product introductions.	Facilitate innovation and speed prototyping.	Deploy product lifecycle management solutions.
Boost workforce productivity.	Automate basic tasks, eliminate redundancies, increase visibility, and speed decision-making.	Upgrade your ERP solution and utilize AI to make well-informed decisions.

The hunt for resources

Manufacturers that have persevered through the Great Recession may have some battle scars and suffered collateral damage. Equipment may be old. Systems may be patched. Processes may be hobbled together. Problem solving might have been limited to short-term solutions. And capital funds are tight.

When facing multiple investment demands, it's easy to become overwhelmed and opt for a "do nothing" response, rather than make difficult decisions. Ignoring the problem will only exacerbate the issues. Instead, consider cloud deployment for your new IT solutions.

Because cloud deployment uses a subscription model, there isn't a large, one-time capital investment. You also don't need to invest in hardware and systems, such as servers, security, and back-ups. These are all handled for you by your cloud service provider, so your IT team is freed up to focus on other issues, rather than setting up hardware and continually worrying about upgrades and back-ups.

Another way to overcome funding issues is to plan a phased approach, with savings generated from the phase-one projects to fund the phase-two projects. Those savings can fund phase three, and so on.

In most organizations, there are opportunities for easy wins—commonly referred to as “low-hanging fruit.” These fast and easy wins, often involving deployment of a point solution, can produce major savings. Here are some examples:

- Business-intelligence tools for tracking real-time results
- CRM solutions to manage customer relationships
- Shop-floor scheduling, planning, and time-tracking
- Field-service management, and tracking warranties and service agreements
- Inventory management to improve accuracy

Building the foundation

Building the business case is an important next step in adopting Industry 4.0 technologies.

According to [Deloitte](#), executives often struggle to formulate a strong business case for advanced technologies. When asked what the hindrances were, executives named a lack of internal alignment (43%), a lack of collaboration with external partners (38%), and a dominating focus on the short term (37%).

Expanding the focus to include more departments and stakeholders may help build your case. As Deloitte says, “Organizations that expand their use of Industry 4.0 technologies to include suppliers, customers, workers, partners and others in their ecosystems can find more transformative benefits.”

Even if you are forced to scale back to a modest plan, make sure to prioritize. There are some prerequisites that are must-have basics for modernizing your operations. You can think of these as your foundation for growth. These are some of the abilities that were once considered nice-to-haves, which and are now typically seen as essential capabilities:

- End-to-end visibility: Eliminate disparate systems and silos.
- Mobility: You must be able to access data from anywhere, anytime.
- Attractive, easy-to-use interfaces: If you want to recruit and retain a modern workforce, you need software that has the look and feel of consumer devices.

- Self-service reporting, workbenches, and dashboards: Users shouldn’t have to go to the IT team to run reports on how their business unit is doing.
- Mod-free: They days of heavily modified software are over; you need industry-specific features built in so you can avoid modifications, which hinder upgrades.

With these foundational elements, you can achieve all the corresponding goals with a single, modern ERP solution. Whether you’re deploying your first ERP solution, replacing an outdated system, or upgrading an existing solution to the latest version, you can make major inroads on your journey to Industry 4.0 by using the right ERP solution.

Being bold and taking risks

Some manufacturers are using sensor-generated data to build new revenue streams and even new business models. Some manufacturers are using a servitization business model, where they offer the product as a service or outcome-based offering. For example, a manufacturer of medical devices might provide a hospital with a set volume of patient scans, rather than selling the equipment only. Then, using IoT technology, the medical device manufacturer (or distributor) can monitor the equipment, ensuring it is in optimal working order and can achieve the promised goal efficiently.

A [PwC webcast](#) shared data saying that manufacturers generate about 77% of revenue from traditional products and services—with 14% from digitally enhanced products and services and 9% from purely digital offerings. Within 5 years that will evolve to 69% from traditional products and services—with 17% from digitally enhanced services, and 14% from purely digital offerings.

This type of reimagining of processes, offerings, and business models, requires a new way of thinking about how business is done. Technology alone can’t provide it; nor can it create a formula for breakthrough solutions or products that haven’t been developed yet.

The companies that unleash this type of creative thinking are the ones that are reinventing our perception of the world. If you want to be on the forefront of innovation, you need to be bold, willing to take risks, and have the faith to invest in unproven concepts you believe in.

Today's environment has made that easier. Barriers to entry have been removed from most industries, markets, and opportunities. With the proliferation of smartphones, even people in remote locations have access to the internet, technology, and resources. Logistics and delivery systems have made nearly the entire globe reachable—often overnight. Crowdfunding and angel investors can turn start-ups into global enterprises. The expansion of the “gig economy” means that experts-for-hire can help companies make giant steps forward.

Not every brilliant idea will be successful or find its audience, time, or place. Several factors contribute to making an idea transform an industry, such as thorough product research, truly understanding the market's needs, and a having a business model that can scale and grow.

Final thoughts

It's an exciting time to be in manufacturing. The multitude of opportunities and technology options can also make it overwhelming. The rate of change is so rapid that many manufacturers have trouble wading through the hype, discerning fact from enthusiastic optimism, and making confident decisions about investments.

Capgemini describes this quandary well:

“There is no common understanding of how the manufacturing business will change and how organizations need to transform. There is a risk that the hype around Industry 4.0 will bypass corporate reality. Nevertheless, the consequences for late-movers are most likely devastating: as in earlier industrial revolutions, organizations ignoring the need for change will be forced out of the market rapidly.”

In today's fast-moving business environment, reluctance to embrace next-generation technology and doing nothing is no longer an option. Now is the time to put a plan in place and get started on the digital transformation journey.

By taking a pragmatic view, manufacturers can transgress common barriers, set realistic goals, and find funding to make innovative ideas come to fruition. It won't be easy. But modernizing your factory is essential if you want to remain relevant.

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641 Avenue of the Americas, New York, NY 10011

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Godlan, Inc.
15399 Canal Road
Clinton Township, MI 48038
586-464-4400
info@godlan.com
www.Godlan.com