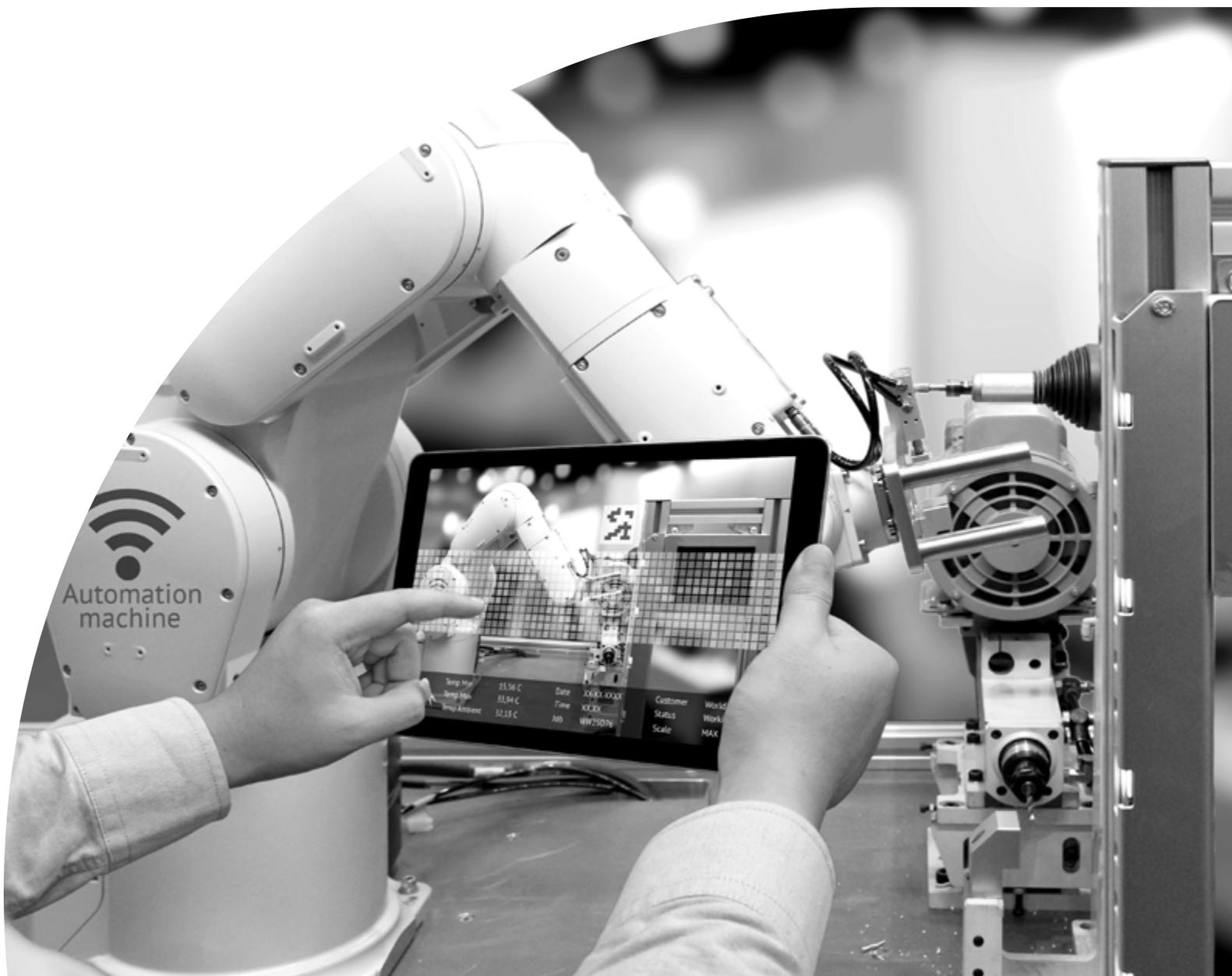


Lead the fourth industrial revolution with IIoT

How connected manufacturing harnesses industrial IoT to turn data into business value



Where to start?

Before you launch a major initiative, ask yourself these questions about the industrial internet of things (IIoT):

- What are your biggest business challenges and opportunities — for example, asset tracking, downtime, maintenance, process controls?
- What data do you collect today, and how could a deeper understanding of this data help improve your business?
- Do you have the infrastructure to integrate IIoT devices — including network, WiFi, computing and software?
- Do you have the needed analytics and application development skills?
- Do you have a defined approach to integrate the diverse collection of “things” in your environment?
- Have you developed an operational data visualization strategy?
- How will you manage and secure an IIoT infrastructure?
- Do you have a trusted partner with broad IIoT knowledge and experience?

Sensors and their data are now ubiquitous in the industrial setting, providing real-time information on processes, efficiency and safety. Yet too few organizations are able to fully capture, manage and analyze those torrents of data — let alone translate that information into real insights or bottom-line business value. To prosper in the emerging digital economy, industrial firms must embrace and master the internet of things (IoT).

But what exactly is IoT? Ask a dozen manufacturing or industrial specialists to describe it, and you will likely get at least a dozen definitions. From a technological standpoint, IoT is an informational network of intelligent devices and machines. Gartner defines it as, “The network of physical objects that contain embedded technology to communicate and sense or interact with their internal states or the external environment.”¹

From a business viewpoint, IoT is about using the data culled from those countless connected devices to generate insights that lead to measurable business outcomes, such as cost savings and efficiencies.

The industrial IoT (IIoT) uses IoT technologies to enhance manufacturing and industrial processes. As with many emerging technologies, IIoT may still engender a fair degree of confusion about precisely what it is and what it may promise.

In this paper, we examine the forces driving IoT, its impact on manufacturing and other industrial firms, and how organizations can make the transition to a more connected, data-oriented environment.

A new industrial IoT vision

Collecting data is not new — industrial organizations have deployed devices and gathered data for decades. The third generation of the industrial revolution introduced computers, data gathering and automation into manufacturing processes. We are now moving full throttle into the fourth industrial revolution. Industry 4.0, as it is called, connects more devices and machines, creating intelligent networks of “things” that can communicate and cooperate with each other. Data sources can be combined with other sources of information in real time, enabling quicker decisions and predicting failures before they happen.

Unfortunately, much of this data is collected but not retained. And much of what is retained is not used. Acting on this data — and automating those actions through control mechanisms — is key to turning information into manufacturing improvements (Figure 1).

How to leverage IIoT

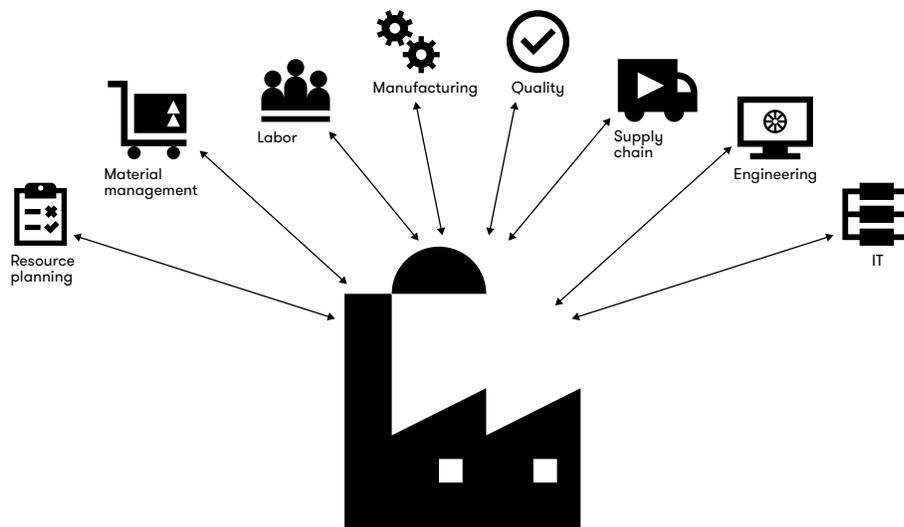
Industrial automation is perhaps the most common and recognized use of IIoT. In a production- and manufacturing-oriented environment, web-capable IIoT technologies are used for process automation and robotics, predictive maintenance, condition monitoring, product testing and safety efforts, as well as for handling and analyzing materials.

¹ <https://www.gartner.com/it-glossary/?s=IoT>

However, manufacturing plants do more than just consume data. They are also sources of data for enterprise business processes that are driven by domain experts with specific operating models and applications that support the enterprise as a whole. From the business’s perspective, this data is crucial to applications such as enterprise resource planning and material management. But from the plant’s perspective, these enterprise-wide solutions can create complexity because they are not aimed at optimizing production processes in the plant’s operations.

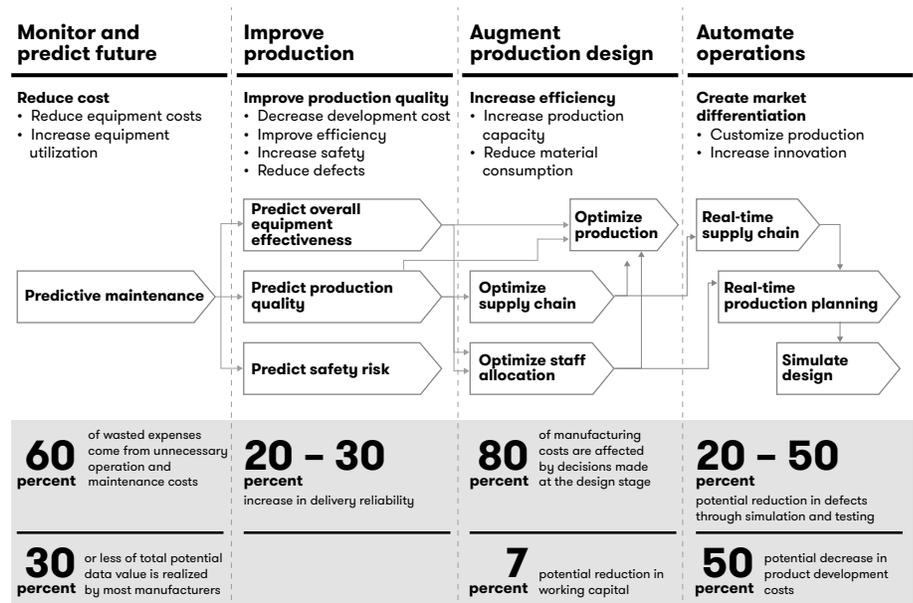
Changing the perspective and considering plants as “enterprises” in their own right uncovers opportunities for using IIoT to create new solutions that integrate discrete processes and improve cost, availability, scheduling, quality and compliance. One key to making this approach successful is to ensure that project teams include manufacturing people with IT skills who can help drive the new “manufacturing” enterprise services. Another key is creating an agile analytics framework that aligns the manufacturing enterprise and integrates discrete processes to help manufacturing keep pace with change.

Figure 1. Business and manufacturing processes can be improved with IIoT.



Typically, deep compute and analytics activities for applications that are not extremely time-critical would remain in a traditional data center environment. But today’s more advanced artificial intelligence (AI), analytic and data management technologies can leverage IIoT data culled from the factory floor, enabling companies to perform high-level business intelligence functions, including simulation modeling, inventory management, accelerated diagnostics and remote plant equipment diagnostics. That means companies can, for example, more precisely monitor and predict operational failures — a significant diagnostic, considering that 60 percent of wasted expenses come from unnecessary operation and maintenance costs. These IIoT data-driven technologies can also augment and improve production design, which in turn can reduce overall manufacturing costs. **Figure 2** illustrates the DXC AI model for an industrial setting, with information on these and other improvement opportunities.

Figure 2. DXC industrialized AI model



IloT platform essentials

- Platform acceptance
- Machine learning
- Security
- Workflow, event processing and rules
- Core manufacturing execution system (MES) application capabilities
- Device connectivity topologies
- Application marketplace
- Analytics and dashboards
- Enterprise capabilities

Accelerate insights with the edge advantage

With more IoT devices and sensors embedded within the industrial environment, manufacturers can use edge computing to shift some of the heavy lifting of analysis typically handled in the data center right to their plant locations, or even closer to the action. This type of edge computing is not new, but when it involves network-connected temperature sensors, alarms or motor drives and other devices combined with big data analysis at the source, manufacturers can turn vast datasets generated by those devices into insightful and actionable information more quickly. Machine learning and AI technologies can automatically draw from the datasets to improve the production environment, and enterprise analytics and planning systems can use them to drive better business decisions.

A diaper manufacturer, for example, improved energy efficiency by analyzing the production material and energy consumption data of cells in the production line. Making this information visible at the enterprise level helped the manufacturer significantly reduce its energy footprint for the site. Additionally, leveling out consumption helped the manufacturer negotiate reduced rates for the future, based on the lower consumption patterns.

Steps to IloT

How can organizations best map and undertake the journey toward fully harnessing the power of IloT? DXC Technology recommends a logical progression based on knowledge, transformation and long-term management.

Knowledge. The first step, for most organizations, is to gain the specific knowledge needed to support a successful IloT environment. This process might begin with facilitated exercises designed to identify issues related to data, connectivity and analytics in the industrial setting. It might also help to investigate and document specific processes, infrastructure challenges or application workloads in greater detail. During this exploratory phase, special attention should be given to aligning any eventual IloT approach across functions and organizations.

The objective of this discovery phase should be to formulate an IIoT roadmap — a detailed set of policies, skills requirements, and processes needed to monitor and manage an internet-enabled industrial environment.

Transformation. A digital transformation giving companies the ability to harness and integrate information is creating a new class of business solutions, but legacy applications and structures running the plants today still form the basis for IIoT-enabled solutions. Companies should keep this in mind as they plan the appropriate application development and infrastructure for the digital transformation.

Other important aspects to consider:

- Establishing the right building blocks — open standards, industry support and so on — is key to long-term success.
- Application development and iteration efforts should focus on data acquisition, reporting and dashboard systems, edge analytics, and mobile user solutions.
- Infrastructure planning should address new kinds of connectivity (including wireless, LAN and WAN systems), cloud computing and data centers. Hardware will quite often need to be resized, relocated or reconfigured.

Management. Manufacturers will likely need added support to manage these new, highly connected industrial operations. Next-generation digital manufacturing applications require next-generation methods for monitoring both information technologies and operational technologies — including sensors, networks and connectivity, and edge-oriented computing. The internet-driven industrial world calls for new methods of managing and modeling data, so new types of web- and cloud-enabled monitoring and management tools may be needed in an IIoT setting. Also, operating models for network support and security management will need to be updated and strengthened to ensure end-to-end integration.

The IIoT presents unique technical support demands, so organizations should consider the need for customer service desks, alert management and more complete field support. Managing and reporting SLAs may also differ somewhat when there is greater reliance on sensors, data and analytics in a production environment.

Get started

The IIoT can help manufacturers realize efficiencies in all aspects of their business, from the shop floor to the supply chain. Advanced analytics, machine learning and AI, coupled with edge computing that puts the power of IoT right into the industrial environment, can help them leverage the vast amounts of data generated every day in ways they might not have imagined even a few years ago. The possibilities are many. The main challenge lies in sorting through those possibilities and determining how to get started on the journey — deciding where the greatest benefits lie and designing a way to get there. The journey can start with a small step or a big leap, but manufacturers that begin the journey now, with IIoT to enhance their processes, will be the leaders of the fourth industrial revolution.

About the Author



Bob Gosselin is an industry chief technologist supporting the aerospace and defense industry at DXC Technology. Bob works collaboratively with DXC customers and partners to combine IT capabilities with industry trends to define business-driven solutions.

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