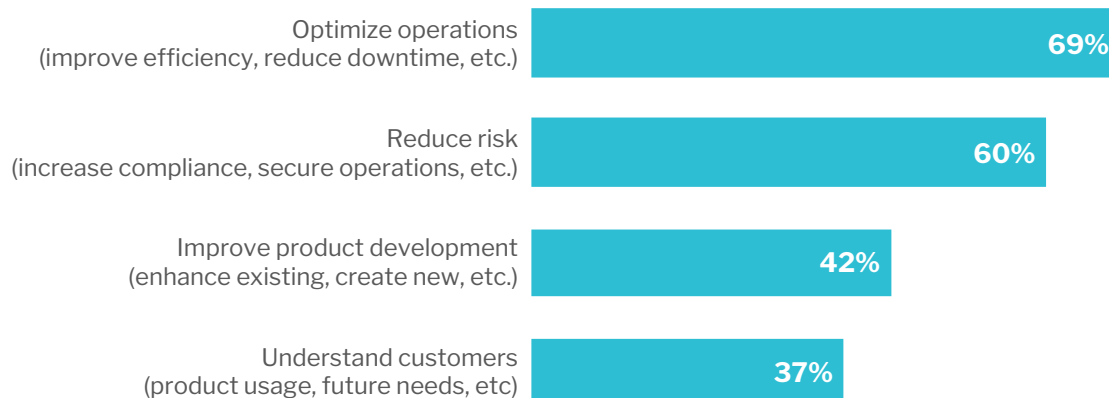# Transforming manufacturing with IoT

The 451 Take

Manufacturers today are on a journey to Industry 4.0, promising digital transformation via increasing levels of data-driven automation. At the center of this voyage sits the Industrial Internet of Things (IIoT), enabled by the collection and analysis of massive amounts of industrial machine and sensor data to deliver better, faster and more actionable insights. IIoT brings together two worlds: the operational technologies (OT) and systems that run the factory floor, and the information technologies (IT) and platforms that provide the infrastructure for collecting, processing and analyzing all that machine data.

Manufacturers come in many sizes and flavors – from discrete manufacturers that plan, build and assemble products from complex bills of materials in industries such as automotive, electronics and aerospace, to continuous-process manufacturers that produce goods via formula or recipe in sectors such as food and beverage, pharmaceuticals and chemicals. And no two manufacturers – be they large global builders of finished products or localized piece-part suppliers into complex supply chains – are at the same point on the path to Industry 4.0.

Yet this digital transformation journey is defined by common, mission-critical business outcome goals – driven by the executive suite and delivered via the collaboration of OT and IT technology groups to capture, manage and analyze IIoT data. According to 451 Research's survey of enterprise IoT decision-makers, manufacturers want to leverage insights from that data to increase efficiencies, reduce operational risk and cut costs; better understand how customers use existing products to enhance and improve them; and ultimately use that process optimization and increased product and customer intelligence to build new and better products to gain competitive advantage.

Business Outcomes Drive Industrial IoT Deployments
Source: 451 Research's Voice of the Enterprise: IoT Budget Survey, Q1 2019

Category	Percentage
Optimize operations (improve efficiency, reduce downtime, etc.)	69%
Reduce risk (increase compliance, secure operations, etc.)	60%
Improve product development (enhance existing, create new, etc.)	42%
Understand customers (product usage, future needs, etc)	37%

In the end, the true value of Industry 4.0 and Industrial IoT comes from realizing these improved business outcomes. The challenge is how to get there.

Business Impact

To capture those business-critical outcomes and realize a significant return on their investment as they progress along their Industrial IoT journey, manufacturers should keep in mind best practices gleaned from our surveys of and discussions with IIoT early adopters.

DEPLOY THE RIGHT INDUSTRIAL USE CASES AT THE RIGHT TIME. Industry 4.0 and Industrial IoT is a use case game. Manufacturers must identify the areas where IIoT can add value to their organization and implement the projects to deliver on that promise. According to 451 Research's enterprise IoT survey, the lowest-hanging fruit for manufacturers – the use cases most easily deployed and quickest to deliver value – are centered on analyzing industrial data to improve operational efficiency. Those use cases are already beginning to reach wide deployment: in the next two years, 75% of manufacturers said they will deploy IoT-enabled manufacturing monitoring and optimization use cases; another 74% said they will leverage IoT for inventory monitoring and management. That's an excellent starting point. Manufacturers further along in their Industry 4.0 journey can leverage their IIoT data and insights to deliver the next wave of use cases, such as predictive or condition-based maintenance (62% of respondents), IoT-enabled smart robotics (49%), and connected worker applications (42%). Gaining early wins can help drive IIoT deployments out of the proof-of-concept (PoC) stage and into broad-scale production, delivering their full value.

EXECUTE IIOT WORKLOADS IN THE RIGHT LOCATIONS FOR THE RIGHT REASONS. Deploying Industry 4.0 applications requires a keen understanding of where those apps should be deployed – edge to cloud – and why. Historically, OT has run largely siloed on the factory floor, either completely air-gapped or minimally (and cautiously) connected to enterprise IT and the outside world. Industrial IIoT design patterns and requirements bring new levels of connectivity and infrastructure into the equation. Many early IIoT adopters sent their data out for storage and processing at private or public cloud locations. That made sense for rapid deployments of limited trials. At production-scale and during operations, additional factors come into play. Latency and performance requirements often require more local processing. Data security and sovereignty concerns come into play, as do cost challenges as PoC-level data streams turn into production-level torrents – driving up cloud transport, storage and computing costs. Making the right venue decisions requires close collaboration between OT and IT, with the operations team defining performance and business metrics and IT delivering the infrastructure to deliver on those requirements.

FUTURE-PROOF YOUR IIOT INFRASTRUCTURE FOR LONG-TERM SUCCESS. In the end, manufacturers traversing their Industry 4.0 journey will do best to think about IIoT infrastructure as a strategic and competitive asset enabling a range of evolving and growing use cases rather than as a series of SaaS-only point solutions deployed for convenience today but running into scalability and performance issues tomorrow. Owning and operating one's own flexible and scalable IIoT infrastructure – on the factory floor edge or at a connected near-edge location (and, as appropriate, in an enterprise datacenter or public cloud environment – can enhance IIoT security, simplicity and scalability while delivering the power to handle even the most sophisticated edge compute and analytics.

Looking Ahead

Although manufacturers are at different stages of their Industry 4.0 journey, they share some common business drivers, goals and infrastructure requirements, and this is a journey that will only continue. Industrial thirst for data about machines, processes and outcomes is unquenchable. Each new insight brings with it the possibility of increased optimization, decreased risk, improved product development and increased sales – factors that will separate the next generation of manufacturing upstarts from also-rans.

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