

Introduction

We're facing a challenging environment and adjusting to a new future. Organizations must find new ways to thrive – while protecting human health.

IoT initiatives offer enormous opportunities for companies to adapt and remain resilient in a rapidly evolving operating environment.

A new study by Forrester points to the potential of strategic enterprise IoT to transform operations and boost performance. And in the pages following, we provide snapshots of 10 companies across industry that are succeeding with IoT initiatives at scale.

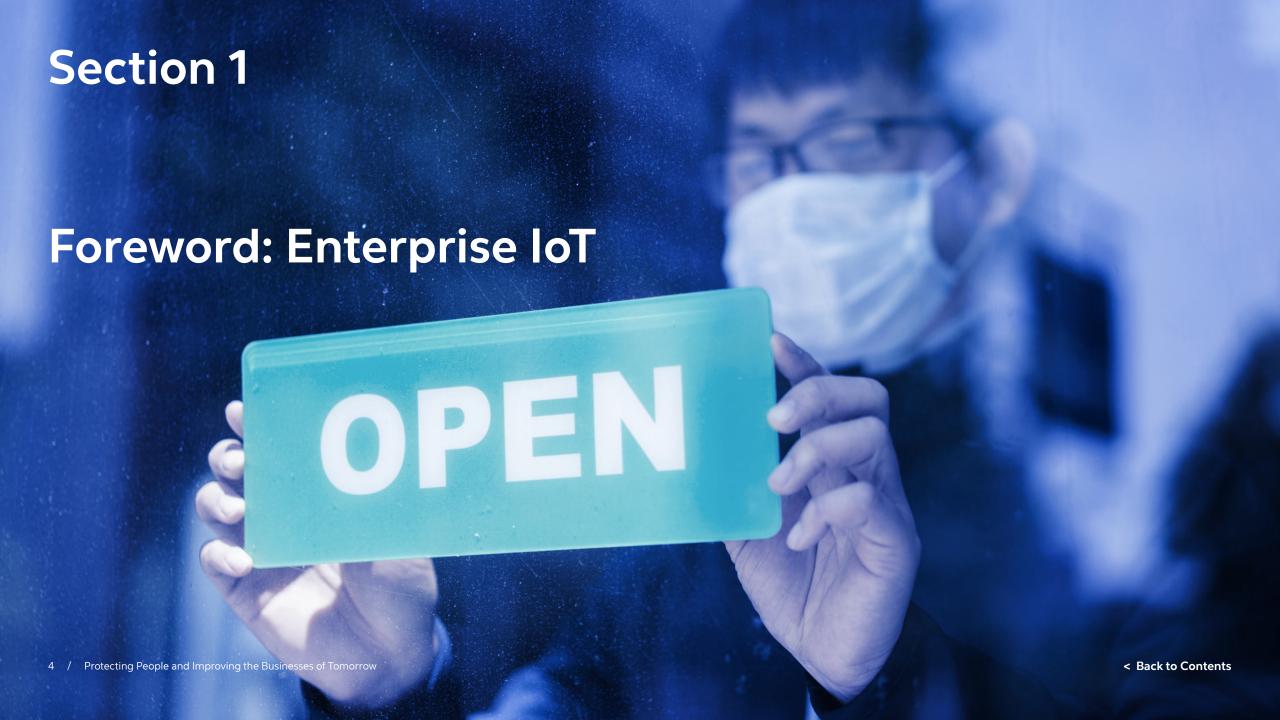


While offering clear and measurable business benefits in the short term, IoT initiatives must be integrated into long-term strategy. IoT should be on the C-suite agenda when planning for the digital evolution of business models.

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Protecting people and improving the businesses of tomorrow



We face what is surely the challenge of the century. Managing through the current pandemic remains the preeminent challenge for us all. Protecting employees, customers, vendors and contractors is a foremost concern.

Businesses are also gauging the significant, if not epochal, changes in how to conduct operations while adjusting to an uncertain future. Every day, our clients are prioritizing initiatives that streamline operations and processes, enable employees to perform optimally and lower costs. Never before have these initiatives meant so much to sustainable business growth.

For decades, we have helped organizations build smart solutions and smarter businesses. Now, as every operational process is being reexamined and every initiative scrutinized for potential ROI, as exposures are being re-assessed and human risks addressed, our skills and experience are even more critical.

The Internet of Things (IoT) helps organizations run better and think smarter. Enterprise and third-party data on an unprecedented scale alongside powerful analytics are helping businesses make smarter decisions more quickly. Artificial intelligence (AI) provides critical, actionable information to improve processes, identify exposures and assess risk, and inform decision-making.

We help forward-thinking businesses to adopt IoT strategically at enterprise scale, building digital solutions that cut across geographic and functional boundaries and democratize information. We help them run better, realize measurable near-term ROI, drive new revenue streams, and embed new processes and business models.

At many organizations, IoT initiatives exist in silos: They are introduced and tested but, even if successful, they often are not implemented at scale. We often say such initiatives are "trapped in the innovation basement." This must change. IoT cannot be a localized effort. It must be an enterprise strategy.

We recently commissioned Forrester Consulting to study what factors are most important to enable companies to build IoT initiatives. We sought to identify what factors impede this capability and identify critical success factors for overcoming challenges that might hinder implementing IoT.

This summary of our key findings includes 10 real-world examples of how we have delivered IoT at enterprise scale to help organizations leverage data and analytics to modernize their business models and drive new revenue. These stories span many industries, including industrial manufacturing, real estate portfolio management, automotive, rail infrastructure, utilities and consumer products.

Amid today's challenges, businesses must take a proactive stance to secure a better future. Operating digitally helps businesses function more efficiently and safely, and IoT thus offers opportunity and provides optimism to forward-thinking businesses.



Randal Kenworthy

Cognizant VP

IoT and Engineering Services





Asked about IoT at scale, leaders say it's critical, but implementation is hard

How key executives and functional leaders think about IoT at enterprise scale, its importance and what enables success.

In March 2020, we commissioned Forrester Consulting to survey more than 550 C-level executives, IT executives, directors and functional managers at companies in the U.S., UK, Germany and France with revenues from \$1 billion to more than \$50 billion.

The study shows that enterprises of all sizes recognize that IoT offers enormous benefits, and most are committed to leveraging IoT across the enterprise.

However, 55% of respondents said their organizations have struggled to deliver business value from IoT projects. Many respondents who have conducted multiple in-house IoT pilots noted they lacked a coherent strategy to deploy their initiatives enterprisewide. They reported that the new IoT capabilities often did not receive the necessary investment or leadership support to extend the initiative across the business.

To better understand the challenges these organizations face, we explored the depth of their commitment to adopting IoT at scale and learned what measures helped them succeed. Among the key findings:

- **Exploration and implementation of IoT is pervasive.** Most respondents (52%) support implementations of multiple IoT uses cases or processes, and more than two in five (42%) are planning broader, enterprise-wide adoption. Only a few (6%) view their IoT initiatives as single or isolated use cases.
- I Investment has increased and will only grow. Investment in IoT is on the rise, with 73% having increased spending in the last two years while nearly a quarter (24%) report having increased IoT spending by more than 10%. About three-fourths (73%) expect spending to increase in the coming two years. Only 2% expect spending to decrease.
- I Analytics and process improvement are the top drivers. More than half the respondents say better use of data and analytics in decision-making is a key driver of IoT initiatives. Almost half (47%) see opportunities for greater efficiency in operational technologies using insights from data.
- **Key drivers signal strong appetite for IoT.** More than two in five respondents identify one of five other critical reasons to explore IoT: capturing data to optimize actions in real-time (45%), lowering operational costs (43%), improving customer experience (41%), improving employee productivity (40%) and gaining insight into how customers use products (40%).

- I Insights remain a top priority for operations. Nearly half of respondents (46%) say they need greater visibility into processes and operations from automated data collection to make decisions, or want to better understand customer needs (45%), enhance collaboration (43%) and improve product performance (44%), including in the field. Other desired outcomes include energy efficiency (41%), improved compliance (39%), optimized use of machinery or assets (37%) and less equipment downtime (33%).
- **Despite investment, most still struggle to realize value.** While few respondents (9%) report not having proceeded beyond proofs-of-concept (POCs), significantly more than half (55%) report that they tried to execute beyond the POC stage, though they have had limited success or have not yet realized business value. More positively, 45% report IoT having delivered business value.

We believe these findings are pertinent to operations generally. They signpost how to move forward in the new normal. Organizations that derive the most value from IoT initiatives have established reliable, mature programs and are committed to them.

Five levers emerged as affecting an organization's ability to succeed in implementing IoT at enterprise scale: organizational strategy, infrastructure, integration of IoT into existing processes and systems, use of data and enablement practices. Respondents who have addressed these challenges reported greater success in scaling up initiatives and experienced more positive outcomes.

Collectively, these findings support our perspective on enterprise IoT: While offering clear and measurable business benefits in the short term, IoT initiatives must be integrated into long-term strategy. IoT should be on the C-suite agenda when planning for the digital evolution of business models.

Learn more at www.cognizant.com/loT.

Section 3

Achieving IoT at enterprise scale: Case studies worth studying

Commercial automaker uses telematics data to improve the ownership experience for their customers' 400,000 vehicles

The challenge

An international commercial vehicle manufacturer already had a prototype in-field vehicle diagnostics system, but its solution was cumbersome. It relied on third-party service providers for data, but data quality was insufficient for detailed diagnostics and the prototype did not interoperate with other systems used by buyers. This limited customer adoption.

Our approach

We helped the company reconceive how it gathered, analyzed and shared critical diagnostic information on equipment performance to vehicle buyers, including those with large fleets, and developed a telematics-based, real-time, connected vehicle IoT-enabled platform.

The solution

Economic conditions and our client's customer expectations were changing. Revenues were stagnant in its core product lines, while compliance demands

were increasing and costs rising. The company sought to be a product supplier and a solutions provider to help customers improve fleet uptime with advanced vehicle diagnostics, real-time usage tracking and driver monitoring to meet compliance requirements.

The key was data collection and analytics at scale for more than one million in-service vehicles in customer fleets. We collaborated with IT leadership to spearhead development of new telematics devices that could be installed at its factory or after-market. We designed an end-to-end, open architecture, connected vehicle IoT platform using the Azure IoT stack to collect high-fidelity data from all fleet vehicles at sub-second frequency, regardless of manufacturer or installed telematics device. This data, enriched with contextual information, is normalized and made available through APIs to different applications. Our solution ingests data from 400,000 vehicles daily, with the scalability to increase in data volume, in an effort to continuously improve the ownership experience for their customers.

- I Forecast more than \$40 million in monthly savings for customers by lowering the costs of repairs.
- I Forecast \$65 million in warranty cost savings in two years, with savings increasing over time.
- I Reduced unplanned vehicle downtime by 30%.
- Accelerated service turnaround time



Reversing water losses by implementing loT diagnostics, realizing potential new revenue

The challenge

A UK-based water company wanted to upgrade its technology platform to gain a consolidated, comprehensive view of all operational data for analysis, modeling and reporting, including equipment status and water leakage. It sought to transition from reactive, alarmbased asset management to a proactive model based on analytics, maximizing efficiency from existing assets rather than building anew.

Our approach

We provided consulting and implementation services to company leadership and its IT team, conducting workshops to assess platform challenges, documenting gaps in systems, developing a strategy to align operational technologies, and assessing available tools and technologies to align with those needs.

The solution

We designed a scalable data management platform to be the single secure gateway between operational technology, in-field assets, IoT devices and enterprise IT systems, to monitor equipment remotely and predict usage and maintenance needs.

We adopted Microsoft Azure IoT Hub as the cloud platform for the enterprise IT architecture and the Azure suite including Stream and Data Factory for data ingestion from IoT devices and the company's industrial systems; for data lake and data management, analytics and a machine learning (ML) platform; and for managing APIs.

Our solution supports data inputs on a massive scale, including asynchronous and bidirectional communication to send commands. It maps device data and enables real-time alerts on weather conditions and pumping station and asset performance. It uses advanced algorithms and ML to gain insights about usage patterns. The solution integrates with the company's enterprise systems and provides end-to-end security.

- A scalable operational technology platform with a defined data structure and provisioning.
- I Enterprise-wide data collection from loT devices and in-field assets.
- Robust analytics to predict anomalies, asset failures and service interruptions.
- A unified view from dashboards that report on asset performance.
- I Lower, more predictable development and maintenance costs.
- I Improved asset and network security.



Running right while protecting maintenance workers optimizes operations for thousands of railway infrastructure assets

The challenge

Running a national rail system is challenging enough. It's harder when rigid maintenance schedules create stoppages for unnecessary work or when service interruptions occur because of maintenance not timely performed. Both lead to higher costs. And performing maintenance puts workers at risk.

Our client is one of the world's largest national rail infrastructure management companies. It asked us to rationalize how maintenance was scheduled, optimizing schedules to maximize efficiency while better protecting personnel.

Our approach

With massive infrastructure challenges and workforce management issues that required both practical and political finesse, we partnered with the national rail management organization and two preeminent infrastructure consulting companies to form a working consortium.

The solution

Despite gathering a growing volume of data across all assets, from IoT sensors to video imaging, the company was struggling with data quality and with analyzing its voluminous data. We knew Al and analytics could transform their network.

Our consortium is delivering three services over a five-year period: modernizing the organization's data platform and enabling analytics, gathering sensor data to improve equipment monitoring to anticipate maintenance needs and share it in the cloud, and scheduling needed maintenance. We used Microsoft Azure to develop the solution, relying on an Agile DevOps approach. Our multidisciplinary team includes resources from our digital business teams and transportation industry specialists.

The results

As a result of this project, the company will:

- I Reduce equipment failures that affect passenger services by more than 10%.
- I Improve safety for engineers through more reliable maintenance planning.
- Predict service and repair needs more accurately across its thousands of miles of rail.



Industrial pump manufacturer supplements product offerings by providing business intelligence to 100,000 pumps

The challenge

One of the world's leading industrial pump manufacturers had a problem: its products were so good the company was losing sales because the products worked so well for so long. Our client realized it needed to no longer just be in the pump manufacturing business but in the information business. Its answer? Leverage data from IoT-enabled devices to provide customers data they could use—i.e., monetizing a SaaS platform.

Our approach

Working closely with leadership, we designed an IoT platform based on Microsoft Azure to allow the organization to gather structured and unstructured data from the 16 million new pumps it sold annually, implementing algorithms that perform analytics at the edge while sharing meaningful data securely via the cloud, and growing to global scale.

The solution

We piloted an Azure cloud-based remote update capability for the company's installed base of pumps, building a common enterprise information platform that is easier to maintain and scale. With Microsoft Cloud Gateway and eSIMs, we created ways to ingest data from devices in different environments without compromising security. The scalable solution integrates with the company's CRM software.

We then helped expand its services to adjacent sectors—providing customers value-added information on equipment performance, water volume and pressure, energy use, and even the composition of fluids moving through pumps. Solutions include allowing water utilities to identify leaks, isolate lines and shut them down for repair; helping companies with fire protection systems to identify where sprinklers have been triggered, to track fires and protect personnel; and using information to service and repair pumps in the field—services formerly contracted to others.

The results

The company now can:

- I Monitor assets in the field and gather data at the edge.
- I Derive actionable intelligence from remote equipment using analytics.
- Lessen time needed to deliver insights from months or days to hours.
- I Share performance information to improve product design.
- I Upgrade how water use is tracked, to promote sustainability.



Optimizing office space use boosts productivity globally, saves billions while improving worker morale

The challenge

Today's knowledge workers can work from anywhere. This has enormous implications for how corporations manage office space. In the wake of the pandemic, space management considerations are increasingly important.

A leading financial institution with a global workforce and offices in all the world's major cities wanted to better manage employee work preferences, lower facilities costs, reduce overhead, and simplify and optimize space management.

Our approach

We collaborated with the bank's leadership team, its real estate and facilities team, and its IT professionals to determine how digital reengineering could enable a cloud-based space optimization and employee "hoteling" management solution that could scale to its global footprint.

The solution

Our Cognizant OneFacility solution is a cloud-based

IoT platform that provides comprehensive building and facilities management and monitoring. We leveraged OneFacility to create an enterprise-wide IoT solution that uses occupancy sensors and users' IT devices to coordinate and track hoteling personnel across the organization. It provides data on space utilization to improve demand forecasting and the user experience, tracks employee work habits and commuting preferences, and lowers the burden on administrative personnel who handle scheduling at its facilities around the world.

Our solution automates the work of facilities management and scheduling, reducing person-hours. It integrates facility operations management with existing building management systems and provides real-time alerts and space assignment updates to employees requesting space. It increases network security, while allowing the company to monitor employee space usage and work habits, optimize energy use based on occupancy and plan for future real estate needs.

- Boosted support role and space utilization rates in corporate hubs from 65% to 80%.
- Reduced total building footprint by more than 20%, to 400 facilities down from over 530.
- Achieved \$1.2 billion in savings in Year One.
- Forecasts savings of more than \$3 billion in three years.



Global Big Three automaker boosts customer experience, connects drivers to five million vehicles and its brands

The challenge

A global automotive manufacturer wanted a platform to deliver connected car applications and services to car owners and to create opportunities for new markets. But the company lacked the in-house expertise necessary to design and deploy an end-to-end solution and ensure program success across North America, India, China and Europe.

Our approach

We designed a program to generate new revenue by delivering services to existing customers and to drive brand loyalty with features that enhance security and provide convenience, giving drivers useful and natural ways to interact with their vehicles using smartphones and voice-activated assistants.

The solution

Our team included professionals in IoT, machine connectivity, telematics and analytics, along with industry experts. We built a proof-of-concept (POC) and a roadmap

for an end-to-end connected car platform with two mobile applications: one for electric vehicle owners and one for luxury brand owners.

Enhancements include remote control and monitoring features such as route planning, range and electricity consumption, battery charge, and notifications of needed maintenance or charging completion. Drivers can adjust the internal climate before arriving at the vehicle and can verify a car's location. Safety features include remote door lock/unlock and parental monitoring when in use. Security measures include token-based authentication and authorization and a PIN.

Implementing the solution required program management, IoT infrastructure analysis and strategy, requirements and architecture design, analytics, integration development, performance testing and infrastructure services to support 50-plus locations across North America, Europe, China and India. We scaled the connected car program to five million cars globally in the first year.

- I Unified more than 25 vehicle data sources on one platform.
- I Mobile application enabled service alerts and vehicle monitoring.
- Rapidly grew POC to global scale across 50 countries.
- I Ensured fast go-to-market timelines for releases.



Global soft-drink titan implements IoT at scale to monitor stock, equipment performance and tampering, and customer preferences

The challenge

Industry-wide, soda sales are declining. Brands need to increase profitability and create exceptional customer experiences. A multinational food and beverage company wanted to increase the profitability of its soda fountains, coolers and vending machines. Its strategy was to lower the incidence of sales lost due to stock-outs, lower restocking costs, reduce equipment maintenance costs, and prevent theft of coolers and vending machines.

Our approach

We recognized that IoT-based data collection and monitoring could help identify when the company's retail drink dispensers and vending machines needed restocking, while predicting service needs and alerting management when machines were being tampered with.

The solution

We worked with the company's team in an internal innovation "collaboratory" to plan a next-generation

network, applying our expertise in IoT program management and supply-chain logistics along with our consumer products industry knowledge. We helped select technologies, then led a multi-vendor effort to build a comprehensive equipment network that included software that performs data analytics, issues alerts and provides a dashboard for monitoring in real time.

Now, throughout the day, sensors on equipment transmit data about stock levels, operational health and customer behavior. Touchscreen soda fountains record and transmit information about each dispenser and issue alerts when ice is low, when selections are canceled and when machines must be restocked. The system records customers' flavor preferences to track demand.

We managed the equipment vendors, developed the technology to convert machine data to alerts and tested the new smart machines in the collaboratory. To lower the cost of storing and analyzing data, our engineers migrated the company's servers to the Microsoft Azure cloud.

The results

This project helps ensure customers get what they want. It also:

- Reduced supply chain costs by 15% in Europe.
- Reduced equipment theft by 5% below the industry average.
- Increased sales by 5% in Europe.
- Reduced service and maintenance costs by 10% to 15%.



Global retailer uses IoT and analytics to monitor in-store refrigerators to preserve foodstuffs, trim waste, improve safety and cut costs

The challenge

Food waste in the global supply chain is massive and costs billions. Poor temperature control in refrigerator or freezer equipment leads to spoilage, adding risks for consumers while increasing energy costs and burning technicians' valuable time in servicing equipment.

A worldwide grocery retailer wanted to monitor its installed base of in-store refrigerator and freezer units to control temperatures to minimize waste while improving equipment efficiency—optimizing energy use, preserving foods more safely and reducing expensive service visits.

Our approach

The company generates thousands of work orders each year to address alerts for repairs; 60% require technicians on site. We designed a scalable retail IoT solution that connects analytics to assets, reducing on-site service needs and waste. Our POC included 200 stores in the Americas.

The solution

Our enterprise IoT solution connects building assets via the cloud and uses analytics to boost efficiency and reduce waste. It performs preventive analytics to determine patterns and anticipate equipment needs on a common platform, taking into account prevailing conditions such as temperature and workload, but also factoring in perishable products and prevailing costs of energy at different times of the day.

Our solution uses rules-based algorithmic analysis to classify the types of device data, and to make triaging equipment maintenance and service needs more efficient. The platform aggregates and analyzes information from building management systems and third-party OEM equipment "at the edge" to triage alerts, uses algorithmic decision-making to make in-store adjustments automatically and reduces the number of critical alerts requiring service. The upside is not only lower cost performance but also an improved customer experience.

The results

Our IoT solution substantially reduces work orders requiring on-site service. It also:

- Reduces food waste losses by approximately 40%.
- Automates 87% of on-site work orders.
- I Reduces service response from 36 hours to fewer than four hours.



Global real estate portfolio owner enhances resident experience and boosts brand while improving efficiency and lowering costs

The challenge

A private equity investor with a portfolio of commercial and residential properties wanted to modernize how it manages multiple high-occupancy multifamily residences in a major city by upgrading systems and moving to the cloud.

Built over decades, the properties have various building management systems (BMS) and legacy equipment for HVAC, fire protection, water tanks and plumbing, commonarea lighting, security and even laundry. On-site management and scheduled service or needed equipment repairs were massively expensive.

Our approach

Aging equipment is inefficient and costly, and managing multiple buildings creates redundancies that can be eliminated. We audited and documented systems and equipment and reviewed their existing BMS and IT capabilities. We road-mapped and implemented an IoT-

based solution scalable across geography and reviewed technologies available to best manage more than 120 buildings as an integrated entity.

The solution

We provided an IoT strategy for state-of-the-art digital infrastructure and building systems management. Our end-to-end IoT ecosystem encompasses BMS, sensors, cloud, deployment partners and civil engineering expertise. We supervised the instrumentation of more than 10,000 individual residences and common areas along with systems and equipment in all its buildings.

The result is a scalable, end-to-end IT infrastructure: a digital twin of each building's physical systems for monitoring and management replicable across other holdings in the portfolio irrespective of geography. Dashboards reduce the complexity of managing multiple properties and reporting on various systems and equipment. The solution dramatically cuts spending on maintenance and labor.

The results

Our IoT solution delivers annual cost savings that can be invested in new amenities and in creating an attractive, modern community, boosting the owner/operator's brand, improving resident safety and lowering costs. It allows our client to shift from reactive to proactive real-time monitoring and maintenance. Other achievements include:

- I Forecast operational cost-savings of more than 8%.
- Direct savings from a \$4.2 million green-city tax incentive.
- I Reduced need for mechanical fixes.
- I Lowered service labor costs by 8%.



U.S. industrial manufacturer implements advanced IoT solution using Industry 4.0 platform to optimize production

The challenge

A Fortune 1000 industrial manufacturer with multiple commercial and consumer brands wanted to streamline and consolidate data capture from production equipment and assembly lines to improve insight into manufacturing processes and optimize them, but it had various datagathering protocols across its many facilities.

Our approach

Our client recognized it had an opportunity to create value by moving from simple efficiency improvements to an Industry 4.0 IoT platform that promoted connectivity and digital visualization. Objectives included improved accuracy in order fulfillment, lower production error rates, reduced energy costs, and improved safety and compliance.

The solution

We designed an integrated cloud platform for gathering and analyzing information from disparate factories to more efficiently allocate resources. We inventoried production equipment to gauge readiness for instrumenting with stateof-the-art IoT sensors, to collect information for analytics on efficiency and up-time, yield and productivity measures for workers, assets and entire facilities.

We deployed an "operational nerve center" using IoT at four plants in 12 weeks, showing how cloud-connected, sensor-instrumented production devices allowed monitoring and flexible decision-making through analytics, then rolled out the solutions globally without disrupting the business, creating a network of plants that can respond quickly to changing needs using digital twins.

Overall equipment effectiveness (OEE) measures are now embedded in manufacturing processes, providing managers detail on asset availability and run-time, configuration and customization, scheduling, through-put and quality output, down-time and maintenance needs. Real-time notifications and web-based user interfaces enable remote experts to collaborate with shop-floor personnel—empowering the company's next generation of smart workers. Better asset use promotes efficiency and lowers energy use.

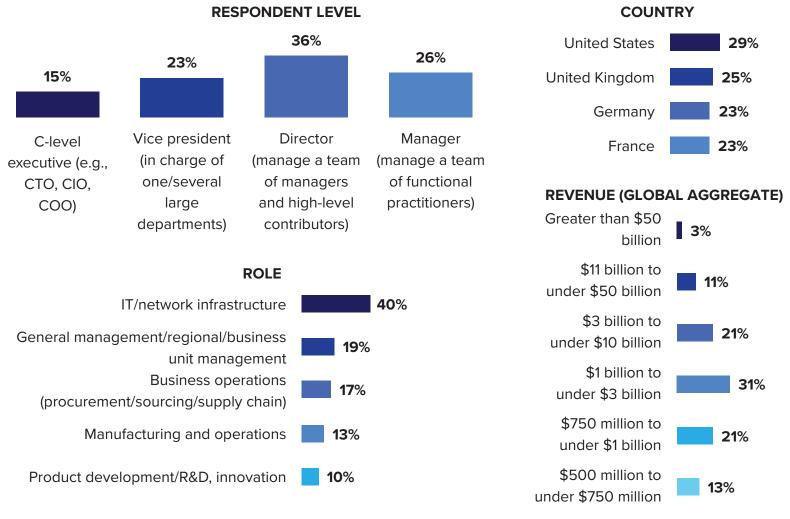
- I Developed an Industry 4.0 reference architecture with tools and templates for OEE, software and best practices.
- I Industrial IoT platform scaled to connect 100+ facilities and thousands of machines and production lines.
- Dashboards monitor asset performance, yielding insights for decision-making.
- I Forecasting \$100+ million in cost savings and profitability gains over a five-year period.



Methodology

Forrester interviewed six IoT decisionmakers at companies with more than \$500 million in annual revenue that have several use cases for IoT. It also conducted an online survey of 524 manager level and higher IoT strategy makers and IoT data and analytics decision-makers in the U.S. and EMEA to evaluate why many IoT projects don't gain the investment or support to scale beyond pilots across the business and geographies. Survey participants included decision-makers in IT/network infrastructure, general management/regional/business unit management, business operations, manufacturing and operations, product development/R&D, and innovation. Questions provided to the participants asked about their company's IoT implementation efforts and initiatives. The study began in February 2020 and was completed in March 2020.

Demographics/Data



Base: 524 IoT strategy and IoT data and analytics decision makers at the manager level and above in the US and EMEA Note: Percentages may not total 100 because of rounding.

Source: A commissioned study conducted by Forrester Consulting on behalf of Cognizant, March 2020

Learn More

For more information and to find out more about Cognizant IoT solutions, visit www.cognizant.com/loT.

About Cognizant Digital Business

We help clients build digital businesses and innovate products that create new value - by using sensing, insights, software and experience to deliver on what customers demand in the digital age. Through IoT, we connect the digital and physical worlds to make smart, efficient and safe products, operations and enterprises. Leveraging data, analytics and Al, we drive intelligent decisions and anticipate where markets and customers are going next. Then we use those insights, combining design and software, to deliver the experiences that consumers expect of their brands. Learn more about how we're engineering the modern enterprise at cognizant.com/digitalbusiness.

About Cognizant

Cognizant (Nasdaq-100: CTSH) is one of the world's leading professional services companies, transforming clients' business, operating and technology models for the digital era. Our unique industry-based, consultative approach helps clients envision, build and run more innovative and efficient businesses. Headquartered in the U.S., Cognizant is ranked 194 on the Fortune 500 and is consistently listed among the most admired companies in the world. Learn how Cognizant helps clients lead with digital at www.cognizant.com or follow us @Cognizant.

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