

Unlocking the business value of **Industrial IoT**



Executive Summary

At many organizations, Industrial IoT initiatives are failing to achieve their goals and reach meaningful scale. We found that more than six out of ten organizations have failed to take Industrial Internet-of-Things (IIoT) initiatives past proof-of-concept stage or beyond implementation at one or two sites. Business and technical challenges stand between the organization and successful wide-scale adoption:

- **No clear business case:** Around half of organizations struggle to establish a clear business case for IIoT investments.
- **Security concerns:** Many organizations (62%) are grappling with cyber risks that could have significant reputational and financial consequences.
- **Constrained analytical capabilities:** 60% of organizations say they do not have the analytics capabilities to take advantage of the data generated from IIoT sources.
- **Uncertainty about IIoT standards and protocols:** More than half of organizations say uncertain standards are a significant challenge.

How should organizations think about managing these challenges? Based on what we have learned from our research—as well as our experience working with clients—we believe that organizations should focus on three critical areas:

- Create a clear and compelling vision for how IIoT can address critical problems for the business.
- Put together a leadership team that has the business and technical acumen to devise a coherent IIoT strategy and navigate the organization through the changes required.
- Drive scale by focusing on a subset of high-potential use cases and moving them quickly to enterprise-wide adoption.

Using this framework as a guiding principle, organizations will also need strong technology competence in the following areas:

- **Robust analytics and development platforms** to take advantage of growing volumes of structured and unstructured IIoT data.
- **Advanced analytics and AI capabilities** that are both delivered centrally as well as “at the edge.”
- A “**security-by-design**” approach that addresses cybersecurity threats and which follows best practices for data management and security controls.

Introduction

Organizations around the world are placing big bets on the Industrial Internet of Things (IIoT), including platforms, hardware, and applications. In 2016, global spending on IoT reached \$700 billion and is expected to reach 1.3 trillion by 2020, largely driven by IIoT spends.¹ However, turning investment into a positive return is another question. A number of research studies have established that organizations are struggling to establish a clear business case for IIoT with organizations unconvinced about the financial benefits.² The critical question for executives leading IIoT initiatives therefore becomes: how do we define the ROI and how can we justify capital investment in the IIoT?

To answer this question—and understand how organizations can maximize IIoT investments—we surveyed senior executives from over 300 organizations across the globe who are already implementing IIoT initiatives. We also

analyzed more than 300 cross-sector, real-life uses cases for manufacturing and operations spanning industrial manufacturing, retail, consumer products, energy & utilities, automotive and telecommunications, to identify which ones have the greatest impact. More detail on our research methodology is at the end of this paper.

Our goal is to understand:

1. Where organizations are moving to large-scale IIoT adoption and the reasons why others get stuck at the pilot stage
2. How organizations can identify and prioritize the most valuable use cases and give more focus to their implementation efforts
3. The essential steps to get started with an IIoT strategy.



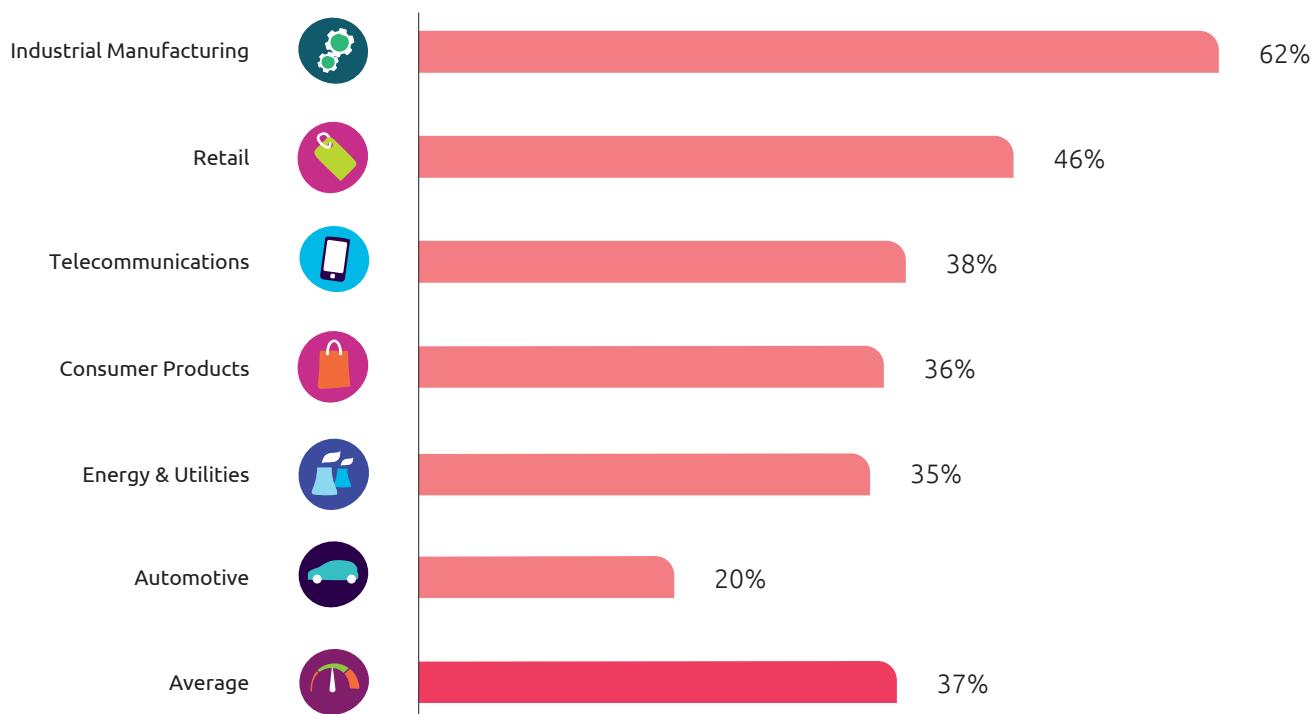
Where organizations are succeeding, and where others are failing to achieve scale

Harley Davidson, the leading global motorcycle manufacturer, invested in a fully IIoT-enabled plant, connecting key processes and devices in their production process on a single network. The impact was significant: operating costs dropped by \$200 million, downtime reduced, and production efficiency went up. The company was also able to reduce its build-to-order cycle by a factor of 36, and grow overall profitability by 3% to

4%. Overall, the company became more operationally efficient and was able to respond to customers' needs faster.³

While the IIoT can bring these sorts of transformational benefits, many businesses are still grappling with how IIoT applications can reach the scale required to maximize ROI.

Figure 1. Organizations that are deploying IIoT at full scale*, by industry



*Full scale implementation means organizations with deployments across all regions, geographies and sites that the company operates in. Organizations with one or more use cases at full scale implementation form part of 37%.

Source: Capgemini Research Institute, Industrial IoT survey, N=316 organizations, 37% represents 116 organizations who have implemented IIoT, October 2017

The challenge of scaling up is compromising benefits

Realizing the full value of IIoT depends on quickly taking applications into wide-scale adoption. However, our research shows that, as a rule, this is only happening in a minority of instances. We found that, on average, just 37% of organizations implement IIoT at scale (see Figure 1). Many organizations are yet to get beyond deployment at one or two sites, let alone large-scale adoption across business units, functions, or geographies. For a senior executive in a leading pump manufacturing company in Denmark, this compromises the value that can be delivered: “[The challenge for IIoT adoption is not technical. Roughly speaking, anything can be achieved technically. It is more about finding the value.](#)”⁴

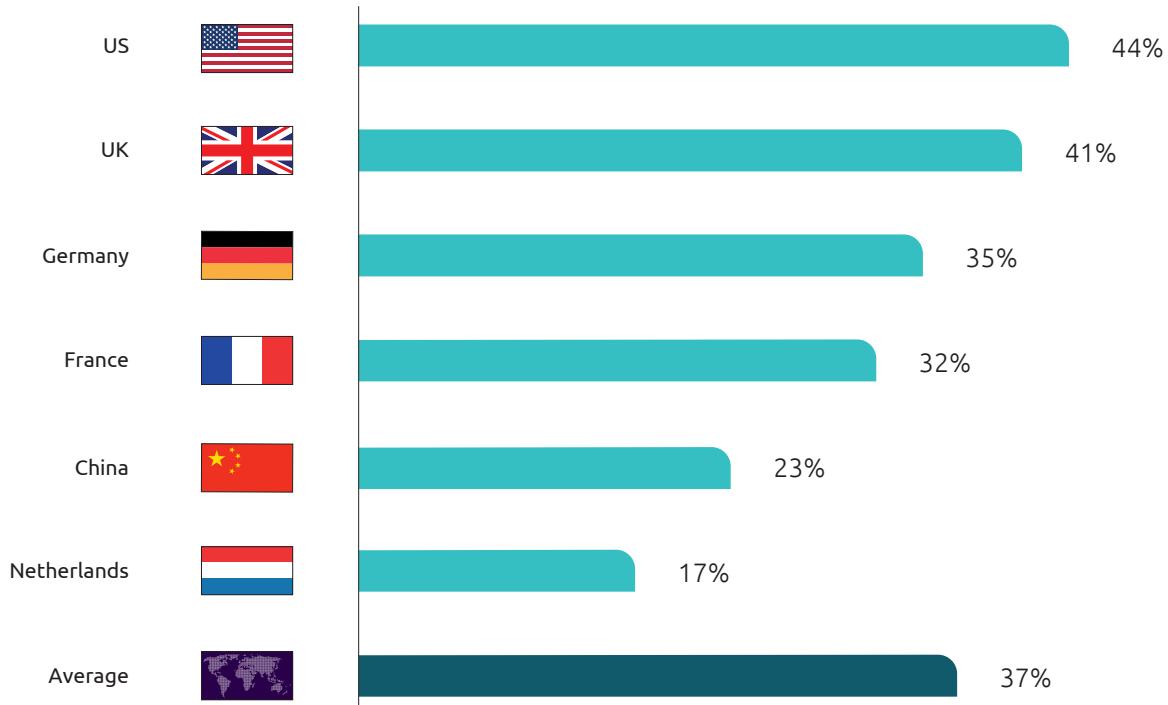
The US tops the league in terms of organizations deploying IIoT at scale (see Figure 2). There are several possible reasons for this:

- The country attracts significant venture capital investment, with one estimate showing that over two-thirds of the

startups funded over the past five years are based in the US.⁵ This funding supports innovation by start-ups in the core IIoT stack—sensors, platforms, and predictive analytics.

- US companies are well placed to manage any cybersecurity concerns, with the US home to many startups focused on security solutions for the IIoT.⁶ In comparison, China has made relatively slow progress in scaling up IIoT initiatives. This is despite being a leading adopter of IIoT technologies⁷ and enjoying strong government support. This can be partly explained by two issues. First, the lack of mature IIoT applications makes the selection of IIoT software for specific use cases extremely challenging for firms looking to scale. Second, lingering doubts over whether the IIoT is a central part of business strategy leave many Chinese firms not demonstrating leadership support and commitment.⁸

Figure 2. Organizations that are deploying IIoT at full scale, by country



Source: Capgemini Research Institute, Industrial IoT survey, N=316 organizations, 37% represents 116 organizations who have implemented IIoT, October 2017

Why are organizations struggling to move beyond pilots?

There are number of factors that might be holding organizations back from moving beyond the proof-of-concept stage:

- **Security threats and privacy concerns:** In 2016, hackers penetrated a water utility's control system and altered the levels of chemicals being used to treat tap water, threatening the health and safety of citizens. The same hack also exposed the personal information of the utility's 2.5 million customers.⁹ Incidents like this highlight concerns around privacy and security and the financial and reputational consequences. In our survey, 62% of the organizations that are struggling to scale up IIoT applications cited cybersecurity and data privacy threats as a top concern (see Figure 3). Unless these risks are mitigated, organizations will find it difficult to scale up.
- **Lack of a solid business case:** We found that about half of organizations are experiencing challenges with establishing

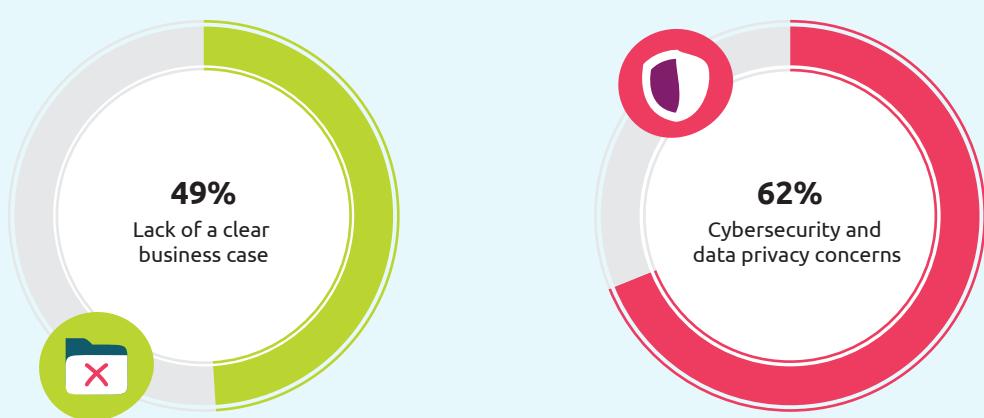
a clear business case (see Figure 3), making it difficult to secure funding and leadership support.

There are also data and technology challenges that can impede progress:

- **Lack of structured data and analytics capabilities:** The ability to process the huge data volumes that are generated from sensors on a real-time basis is critical for success. However, it does not come naturally to a number of firms. When we look at the firms that are finding their IIoT implementation challenging, 60% say that their current analytics capabilities are not ready to take advantage of the data generated (see Figure 4). As the IIoT lead of a tier 1 Japanese parts manufacturer, says: “[This idea that we can finally harness the data coming in from all of these different sources—whether they are machines, humans, or parts—is well understood. But, I think the real challenge is the next step; how do I execute?](#)¹⁰”

Figure 3. Struggling firms face business case and cyber security/privacy challenges

Share of organizations facing challenges in IIoT implementation



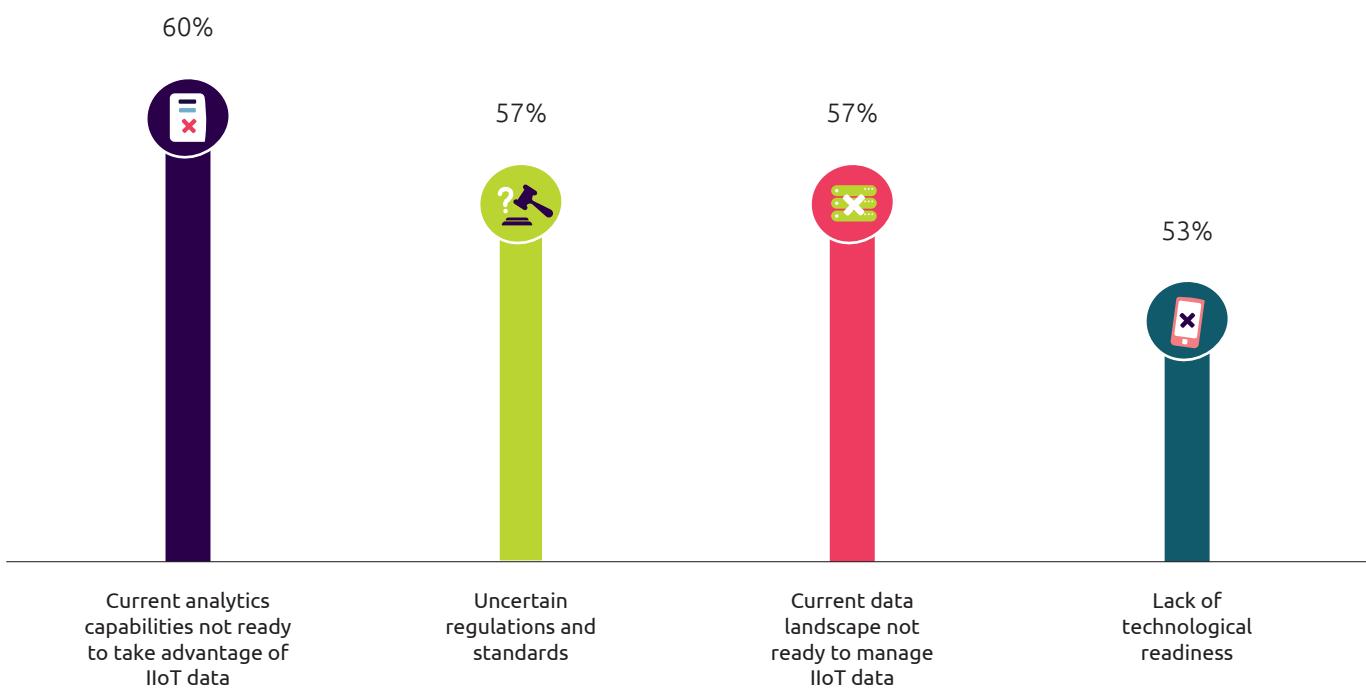
Source: Capgemini Research Institute, Industrial IoT survey, N=316 organizations that are implementing IIoT, October 2017

- Absence of uniform standards and protocols poses a serious challenge:** There are no central IIoT standards today related to machine-to-machine communication, routing, and networks. It is only in the past year that a handful of alliances for IIoT standards have started collaborating to define unified protocols for data sharing, networks, and interoperability.¹¹ More than half of the organizations we surveyed cite uncertain standards as a significant challenge (see Figure 4). It will take several years for different technology standards to be consolidated and provide the backbone of IIoT deployments across the globe.
- Connectivity issues:** Connectivity is a challenge across planning, deployment, and scaling-up for two reasons. First, connectivity issues are magnified as organizations move from the proof-of-concept (POC) stage to full scale. For example, when deploying IIoT solutions at the

POC stage, network connectivity is seamless and has low latency because the number of devices are limited and the network is homogenous. However, when deploying IIoT at scale, where the number of devices increases significantly, multiple issues can disrupt connectivity: different cell towers, varying connectivity speeds, proxy servers, and firewalls. Second, because we do not yet have a widely-accepted set of standard connectivity protocols, there is uncertainty around the relevance of key connectivity technologies such as Bluetooth, ZigBee, NFC, Wi-Fi, and in the future, LoRa. As the CEO of an IIoT solution platform provider said: *"The concern here is around future proofing and support to interoperate across the myriad of legacy, new, and unknown machine protocols. Being able to ingest, combine, and correlate data from any device that comes along is critical."*¹²

Figure 4. Inability to leverage IIoT data is a major hindrance

Share of organizations facing challenges in IIoT implementation



Source: Capgemini Research Institute, Industrial IoT survey, N=316 organizations that are implementing IIoT, October 2017

Identifying and prioritizing use cases

To help organizations choose optimal use cases, we segmented them by business value and the payback period. The *high potential use cases* we identified are therefore the ones that combine higher benefits with a shorter payback time (see Figure 5). By focusing on these use cases, organizations will be in a better position to drive greater value from their IIoT investments and secure a competitive advantage.

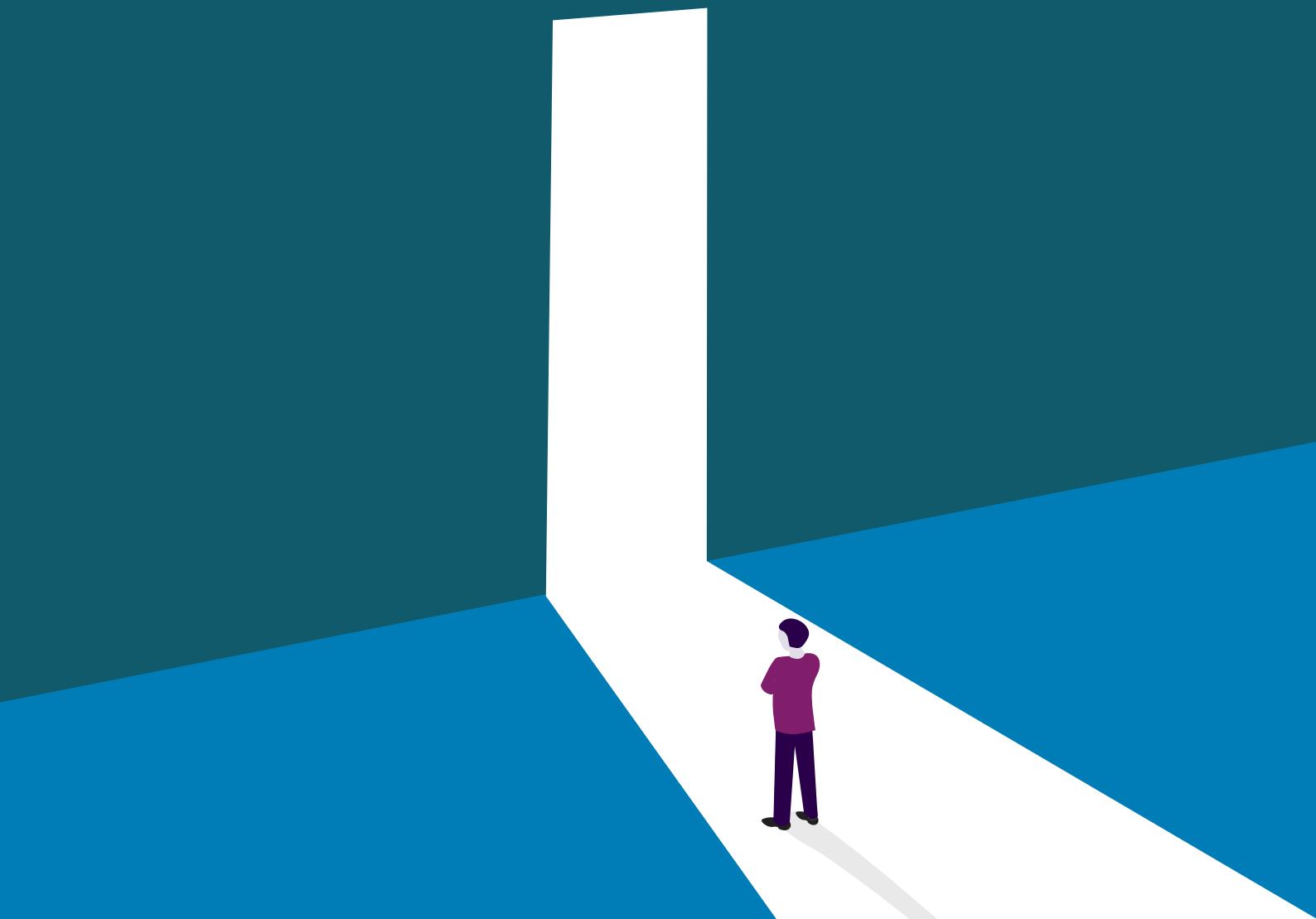
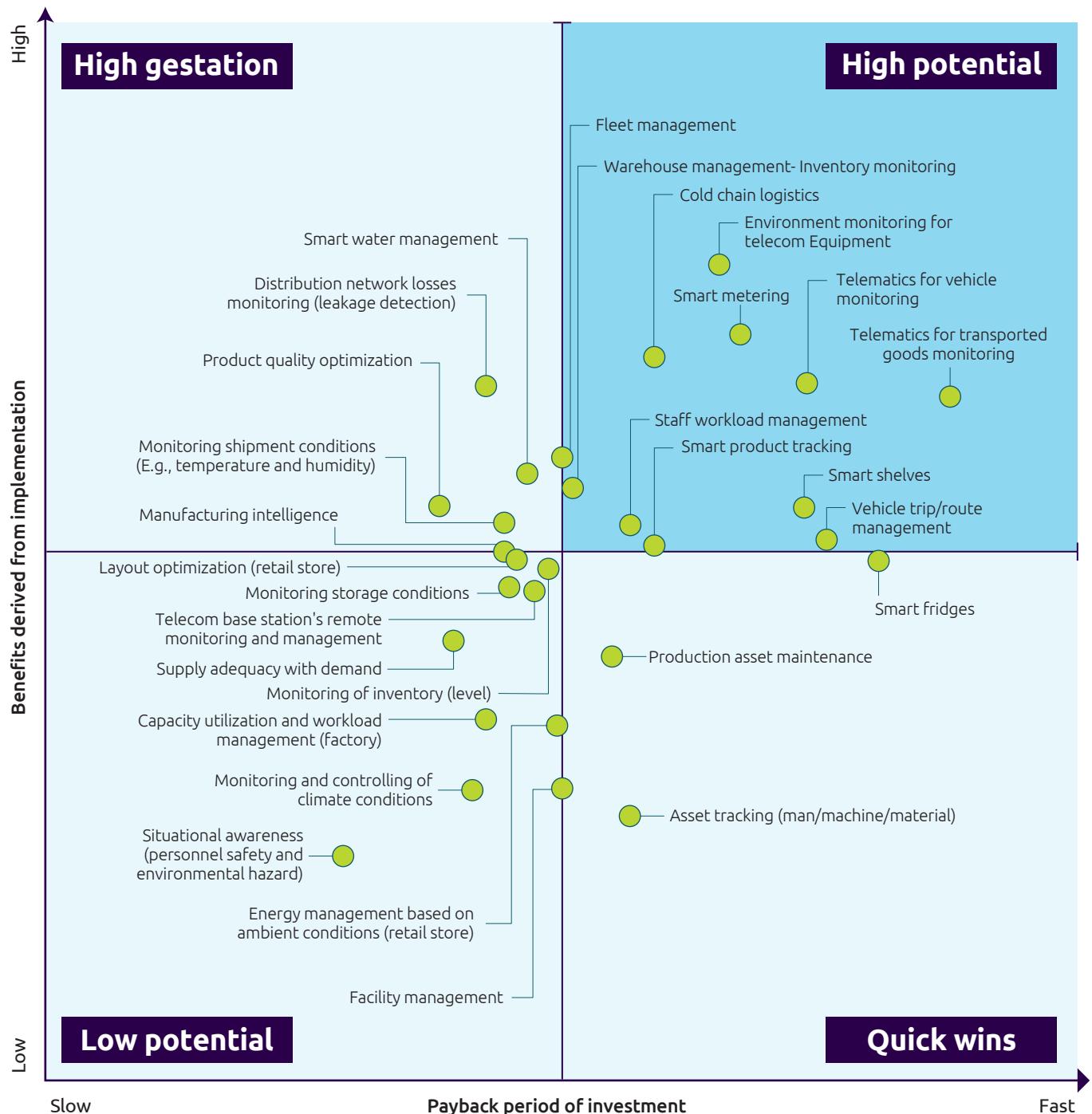


Figure 5. Distribution of use cases by benefits and payback period of investments



High = Greater than average benefit on a normalized range

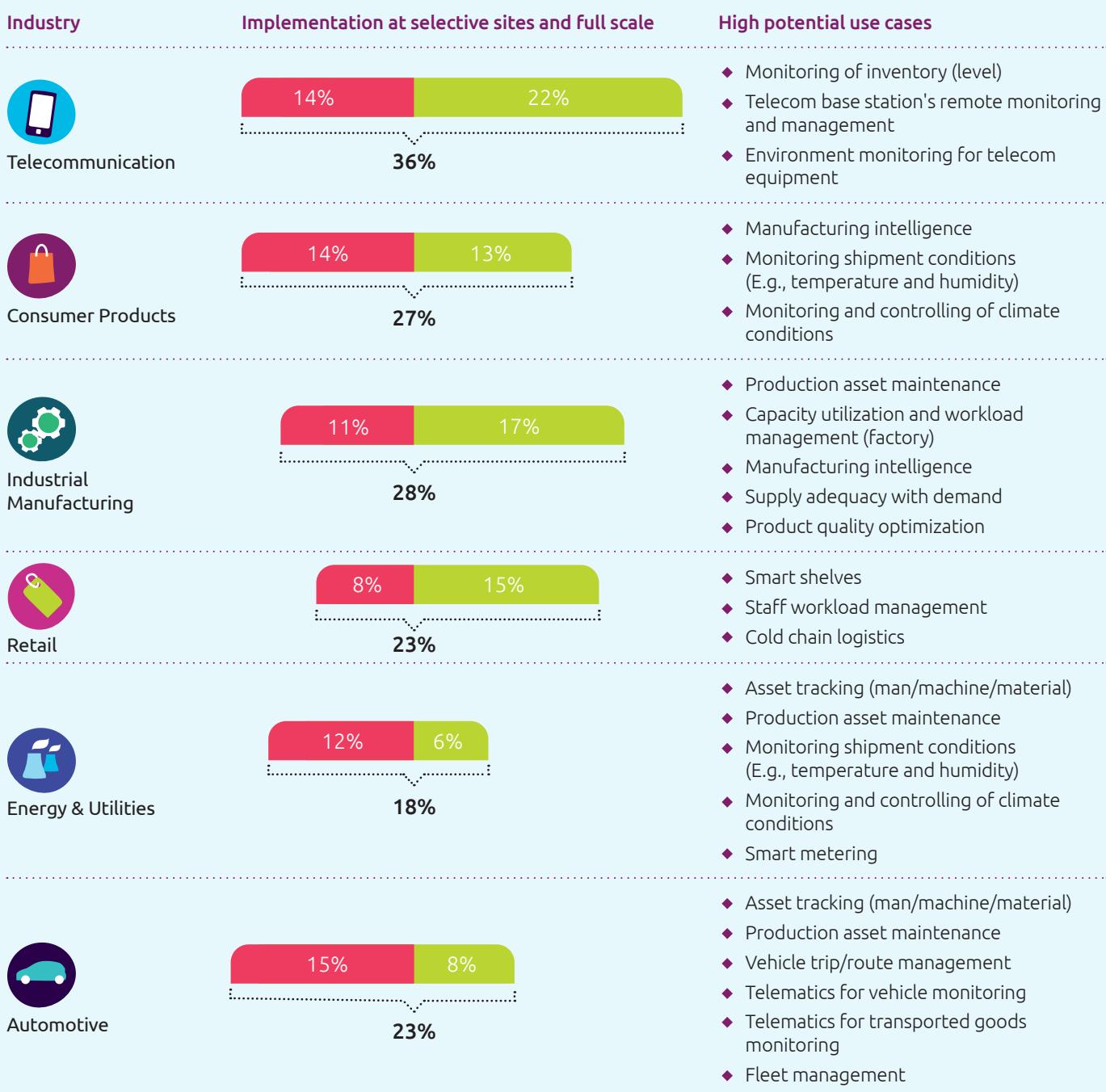
Fast = Greater than average payback period on a normalized range

Source: Capgemini Research Institute, Industrial IoT survey, N=316 organizations that are implementing IIoT, October 2017

However, we found that many organizations across sectors are not focusing on these high potentials (see Figure 6). If we look at the sector distribution, we find that telecoms lead the way in implementing high potentials, with around four out of

ten organizations (see Figure 6). Many organizations, however, are missing out on the performance opportunity offered (see "High Potential Use Cases: Sector Examples").

Figure 6. Average implementation percentage of 'high potential' use cases by industries



● Average multi-site implementation percentage

● Average full scale implementation percentage

Source: Capgemini Research Institute, Industrial IoT survey, N=316 companies that are implementing IIoT, October 2017

High Potential Use Cases: Sector Examples

Retail: Smart shelves

An average retailer loses around 4% of total sales due to stock-out. To tackle this problem, a US-based grocery chain, Giant Eagle, deployed smart shelves in its stores. The smart shelves used sensors and dashboards to measure inventory life and send shoppers product information on their mobile phones. As a result, Giant Eagle reduced its out-of-stock replenishment time by two-thirds and cut its out-of-stock SKUs by 50% on any given day.¹³

Industrial Manufacturing: Asset tracking and production asset maintenance—curative, preventive, condition-based, predictive

Rolls-Royce, one of the largest jet engine manufacturers, uses the IIoT to increase the fuel efficiency of jet engines, optimize flight paths, and improve maintenance. The company utilizes information from sensors fitted inside the engine to track engine health, air traffic control, route restrictions, and fuel use to diagnose potential faults or operational anomalies in aircraft engines. The company tracks and analyzes engine performance mid-flight, allowing it to carry out proactive maintenance. This helps Rolls-Royce to reduce not only the frequency of unexpected or severe faults but also improve engine efficiency and lower fuel consumption. By an estimate, a 1% reduction in fuel usage translates to US\$250,000/plane/year.¹⁴

Consumer Goods: Manufacturing intelligence

Hershey's, a leading chocolate manufacturing company, added IIoT sensors to its candy-making manufacturing facilities to improve production efficiency. The implementation required retrofitting of sensors on each candy holding tank to assess the temperature. Using approximately 60 million data points from the sensors, the company was able to adjust the size of

its products to stay within legal sizing guidelines. Overall, every 1% adjustment downward in size to bring the products closer to the precise weight results in \$500,000 in savings in a 14,000-gallon batch.¹⁵

Energy & Utilities: Production asset maintenance

Royal Dutch Shell, a leading oil and gas company, realized a \$1 million return on a \$87,000 investment in a remote IIoT-based asset monitoring and maintenance solution. The company installed sensors in 80 oil fields in West Africa, which produce upwards of 600,000 barrels of oil per day. The oil wells are in difficult terrain, and the sensors made remote monitoring of output and performance possible. Royal Dutch Shell reported immediate cost savings from reduced site visits for equipment maintenance and reduced downtime.¹⁶

Automotive: Telematics for vehicle monitoring

Andrew Page, a leading auto parts distributor based in the UK, used telematics on its fleet of 900 vehicles. The aim was to reduce accidents through continuous monitoring of driver behavior. The introduction of telematics has led to a 97% reduction in speeding, 47% reduction in crashes, and a circa 7% improvement in fuel economy and reduced maintenance costs. In addition, driver behavior scores have improved greatly across the fleet, resulting in fleet fuel efficiency through efficient scheduling.¹⁷

7%

improvement in fuel economy realised by Andrew Page, a leading auto parts distributor based in the UK by introduction of telematics.

Target use cases that directly impact on financial goals

Payback time and benefit delivered helps prioritize use cases. However, organizations also need to tie use cases to financial goals. Some organizations are more focused on cost reduction

while finding new revenue streams might motivate others. That said, finding the optimal use case for your industry is not easy. To help, and to drive targeted outcomes, we have taken the high potential use cases and aligned them against potential revenue and cost benefit gains for different industries (see Figure 7).

Figure 7. Sector-wise High Potential use cases by revenue and cost

Revenue	Cost
<ul style="list-style-type: none">◆ Telematics for transported goods monitoring◆ Telematics for vehicle monitoring◆ Vehicle trip/route management	<ul style="list-style-type: none">◆ Telematics for vehicle monitoring◆ Fleet management◆ Production asset maintenance
<ul style="list-style-type: none">◆ Monitoring shipment conditions (E.g., temperature and humidity)◆ Monitoring and controlling of climate conditions◆ Manufacturing intelligence	<ul style="list-style-type: none">◆ Manufacturing intelligence◆ Monitoring shipment conditions (E.g., temperature and humidity)◆ Monitoring and controlling of climate conditions
<ul style="list-style-type: none">◆ Cold chain logistics◆ Smart shelves◆ Staff workload management	<ul style="list-style-type: none">◆ Smart shelves◆ Cold chain logistics◆ Staff workload management
<ul style="list-style-type: none">◆ Production asset maintenance◆ Smart metering◆ Asset tracking (man/machine/material)	<ul style="list-style-type: none">◆ Smart metering◆ Monitoring and controlling of climate conditions◆ Production asset maintenance
<ul style="list-style-type: none">◆ Capacity utilization and workload management (factory)◆ Production asset maintenance◆ Product quality optimization	<ul style="list-style-type: none">◆ Manufacturing intelligence◆ Supply adequacy with demand◆ Product quality optimization
<ul style="list-style-type: none">◆ Environment monitoring for telecom equipment◆ Telecom base station's remote monitoring and management◆ Monitoring of inventory (level)	<ul style="list-style-type: none">◆ Environment monitoring for telecom equipment◆ Telecom base station's remote monitoring and management◆ Monitoring of inventory (level)

Source: Capgemini Research Institute, Industrial IoT survey, N=316 organizations that are implementing IIoT, October 2017

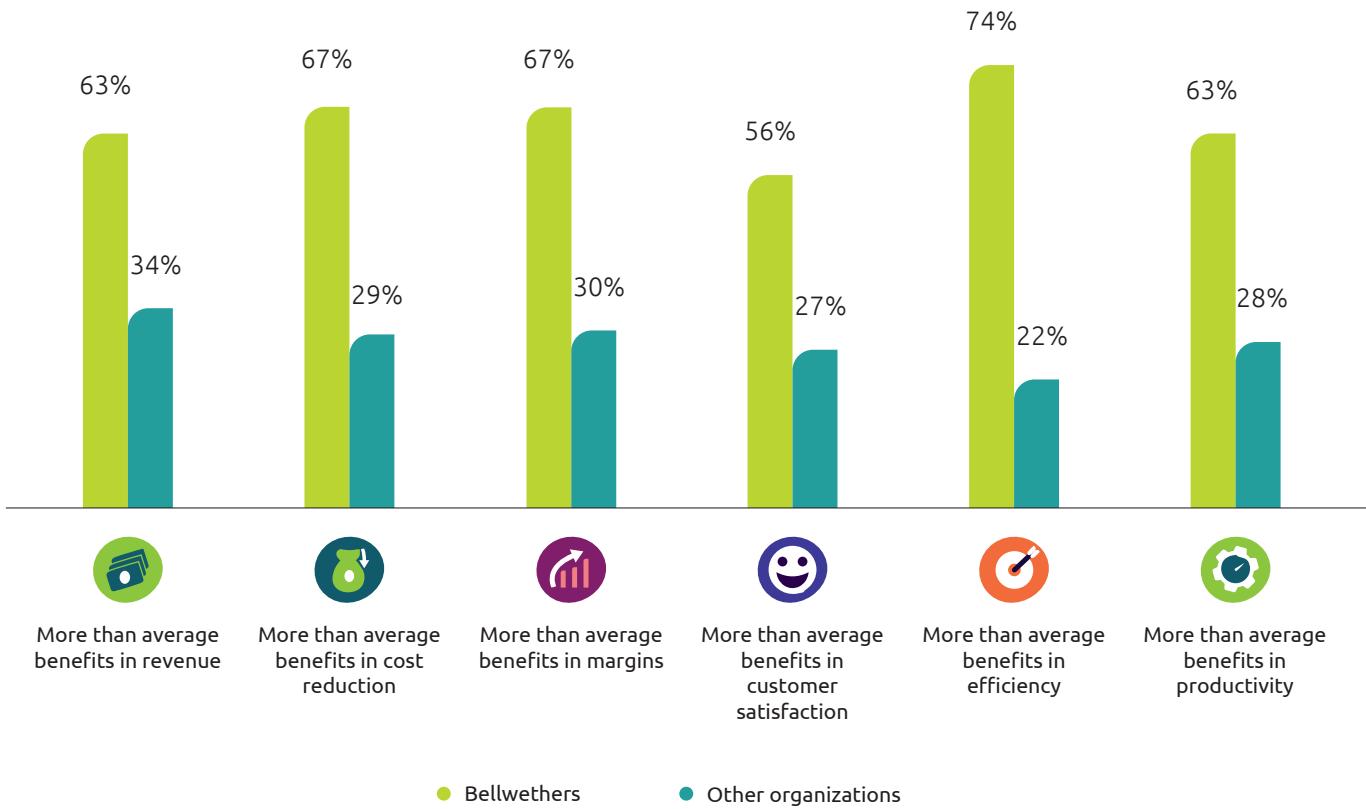
Getting started with an IIoT strategy

As part of our analysis, we identified a group of organizations that are characterized by their ability to scale up 50% or more of the IIoT use cases that they launch at pilot. We call this cohort the "Bellwethers" and they comprise 8% of our sample.

We found that bellwethers deliver above-average benefits compared to the rest of the sample, in areas from revenue performance to productivity (see Figure 8).

Figure 8. Bellwethers enjoy greater benefits from their IIoT investments

Percentage of bellwethers and other organizations who gain more than average benefits from IIoT implementation



Source: Capgemini Research Institute, Industrial IoT survey, N=27 for bellwether companies and 289 for other organizations, October 2017

Understanding the characteristics of these bellwethers helps understand the elements of a successful IIoT strategy.

Strategic imperative

Unsurprisingly, the companies that are under competitive market pressure, or that consider IIoT to be a strategic imperative to remain competitive, are leading in terms of scaling their IIoT initiatives.

Bellwethers consider this as critical, with more than 80% saying that *not* having an IIoT vision and strategy will put them out of business (see Figure 9).

As part of strategy development, organizations should first define their vision for IIoT, both short term and long term. This means answering questions such as:

- What business problems are critical for us to solve (from the desire to cut costs to the need to drive revenue through new services and business models)?

- How much value can we potentially gain by investing in the IIoT to solve those problems?

With a defined vision and strategy, firms will be in a better position to arrive at a business case. As Alexis Duret, Managing Director of Alizent, an IIoT specialised company belonging to Industrial Gases Group Air Liquide, says: “[In many cases, IoT initiatives are driven by industrial directors who are focused on pure cost savings. But IoT business cases should not always be built with such a narrow focus. Organizations should have a “value stream” running where people will think of the business value that the IoT creates. That stream should look at new business models, new customer services, logistic improvements, and new avenues to optimize assets.](#)” A clearly defined vision also demonstrates strong leadership, focuses minds, and creates a sense of urgency, all of which are helpful for achieving widespread adoption.

Figure 9. Bellwethers view IIoT as a critical part of their business strategy

Percentage of companies who believe not implementing IIoT can drive them out of business



Source: Capgemini Research Institute, Industrial IoT survey, N=27 for bellwether companies and 289 for other organizations, October 2017

“*Organizations should have a “value stream” running where people will think of the business value that the IoT creates. That stream should look at new business models, new customer services, logistic improvements, and new avenues to optimize assets.”*

Alexis Duret

Managing Director, Alizent

Business and technical leadership

Strong and committed leadership is critical. As Figure 10 shows, bellwethers are much less likely to be struggling with unsupportive leaders. In contrast, over half of the rest of the sample face this challenge.

Figure 10. Bellwethers are less challenged by lack of leadership support

Percentage of companies who believe that lack of leadership support is a major challenge for IIoT implementation

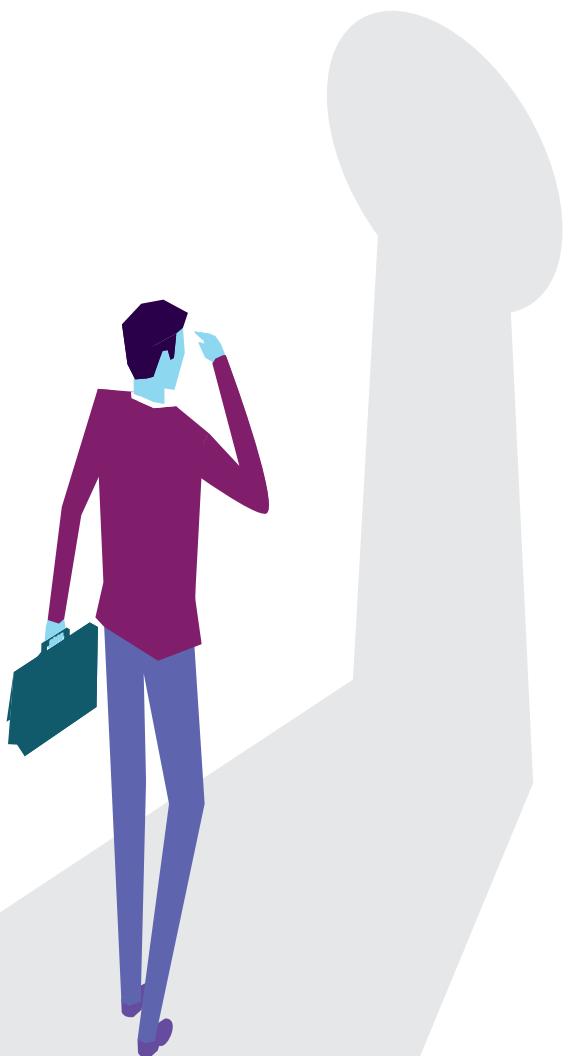


Source: Capgemini Research Institute, Industrial IoT survey, N=27 for bellwether companies and 289 for other organizations, October 2017

In addition to committed and supportive leadership, the type of leadership matters. IIoT should not be tech-dominated. The leader should have a blend of business and technical acumen to be able to chart a cohesive IIoT strategy. The leader can be a senior-level executive from IT, operations or, better still, a CXO. As Alexis Duret says: "The selection of a leader spearheading an IIoT initiative will depend on the criticality of the business problem that organizations are trying to solve through IIoT. If the problem is very core to the business, then

a CXO should lead. In other cases, an executive heading a particular function can be nominated as a leader."²⁰

Increasingly, leadership is about managing the cultural change required by an IIoT strategy. As a senior technical executive in a leading refined oil products company says: "Using the IoT to create central visibility into data—which could also enable centralization of decisions—would represent an entire cultural shift away from the autonomy that ships operate under today."²² Leadership plays a vital role in navigating an organization through this change. Tom Siebel, CEO of C3 IoT, a leading analytics platform company, says: "Everything needs to change: the compensation plan, the training, the labor contract, the organizational chart. These are daunting human capital problems. And there's no question in my mind that if the leadership is not coming from the CEO directly, the company is not going to succeed."²²



Focus

The initial phases of an IIoT program should be about experimentation, examining different initiatives across the organization. But to scale, you need to focus on few high potential use cases. As with any major transformation, early wins will be critical. They help convince the organization to adopt what are very new practices, which often challenge deeply rooted cultures and entrenched behaviors. Having focus increases success rates and helps deliver a better return on investment. Bellwethers are significantly more likely to focus on high potential use cases than other organizations (see Figure 11).

Figure 11. Majority of bellwethers implement "High Potential" use cases

Percentage of organizations who implement "High Potential" use cases



Source: Capgemini Research Institute, Industrial IoT survey, N=27 for bellwether companies and 289 for other organizations, October 2017

Scaling an IIoT strategy

Leadership and focus are key to making a good start. However, achieving scale also means giving close attention to the fundamentals of IIoT, which includes:

- Investing in data management and analytics
- Reviewing current tech capabilities and plugging the gaps
- Addressing security concerns.

Reviewing current tech capabilities and plugging gaps

Firms need to ensure the IIoT vision is matched by technological readiness. Close to 60% of bellwethers do not see the data landscape or analytical capabilities as a major deterrent to IIoT deployment (see Figure 12). They have already put in place the analytics and development platforms required to take advantage of growing volumes of structured and unstructured data.

When deciding on a commercial IIoT platform, organizations should consider the following criteria:

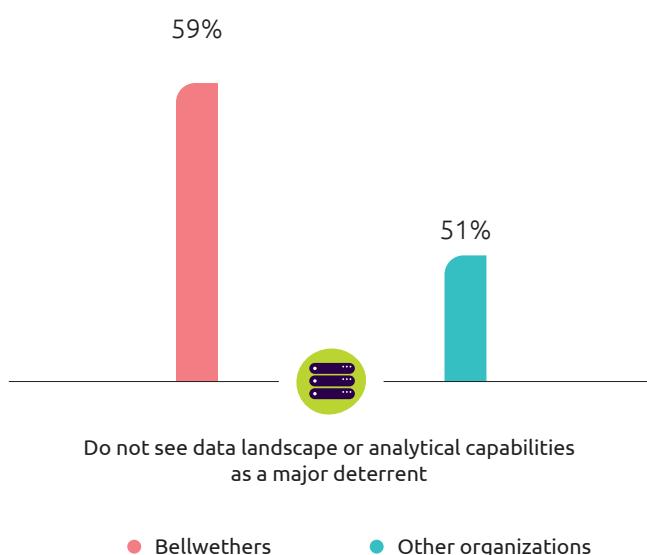
- What differentiates one platform from the other?
- What are the IIoT platform's capabilities and applications?
- Which platforms are sufficiently mature to handle the complexity of the use cases targeted?
- Is the platform equipped to handle security?
- What level of customization is available?

Organizations can also choose to build a platform in house. But that may prove very challenging because of different business priorities, the need to get to market quickly, and the complexity of IIoT initiatives. Regardless of the decision to build or buy, certain features are crucial:

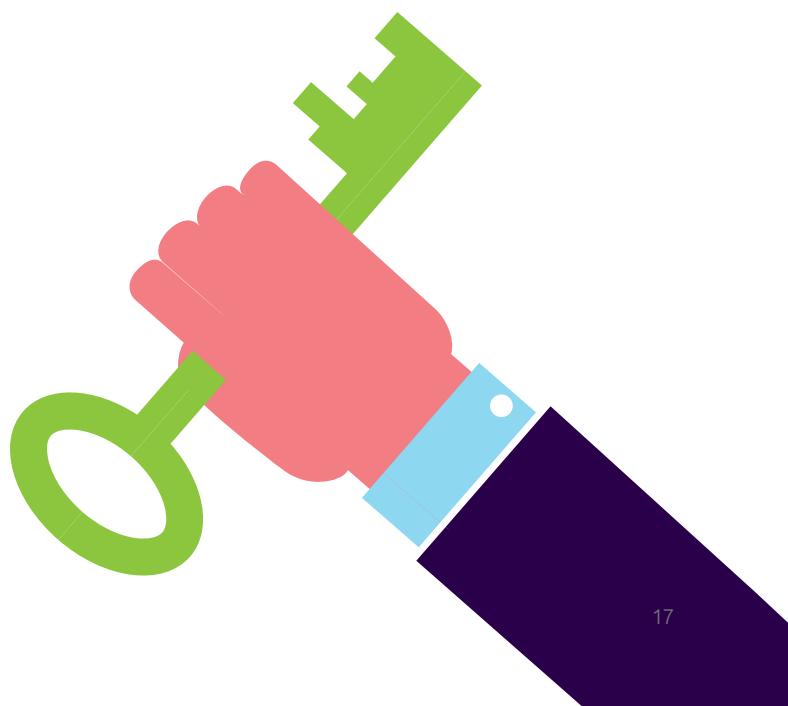
- Fully-fledged device management capabilities
- Seamless integration with current business applications, data structures, and third-party applications
- Data security
- The ability to handle and analyze the huge volumes of data generated from sensors.

Figure 12. Bellwethers have superior data management and analytical capabilities

Percentage of organizations who agreed with the statement



Source: Capgemini Research Institute, Industrial IoT survey, N=27 for bellwether companies and 289 for other organizations, October 2017



Investing in data management, analytics and artificial intelligence (AI)

As well as putting in place the right technologies and plugging any gaps, organizations also need analytics and AI capabilities that are mature enough to deliver the ambitions of their IIoT initiatives, ranging from descriptive to prescriptive analytics:

- Descriptive analytics and AI to gain a granular view of the specific process that is being measured and monitored
- Predictive analytics and AI to learn from past patterns and events, anticipating the potential failures or issues that might impact their top or bottom line and mitigating and managing those risks
- Prescriptive analytics and AI to build a feedback loop into the process monitoring in order to optimize, assist, or partly automate that process

At Capgemini, we believe in creating “applied insights.” This means bringing together IIoT and advanced analytics and AI capabilities so that insights are delivered to processes in two ways: first, centrally, so that you can undertake top-down analysis and drive overall optimization; and second, “at the edge,” insights are fully embedded in the place of action, be it shelf, warehouse, car, production line, or drill site.

Addressing IIoT security concerns

A number of steps are critical to address security concerns:

- First, IIoT devices need to be built for security from the ground-up and run on an OS that treats security as a primary concern. Currently, organizations are not doing enough to prevent security shortfalls at the conceptualization and design stage. Bruce Schneier, a renowned security analyst, says: *“Security is an afterthought in product design and not something that's taken seriously enough. Companies are rewarded for features, price, and time-to-market. It's easy to slough off security because it's not immediately obvious that you've done so.”²³*

- Second, organizations need to follow best practices for data management and security controls to guard against potential risks, particularly those emerging from the partner ecosystem (IIoT solution vendors and start-ups). The security of an IIoT platform is vital because most data transmission and operations run through it. As we show in our research “The Currency of Trust: Why Banks and Insurers Must Make Customer Data Safer,” deploying strong controls for third-party data access helps strengthen security. Organizations should also consider deploying automated intelligence and security procedures, such as automatically updating patches when they become available. Automation reduces vulnerability by reducing incident response time.²⁴
- Third, security solutions need to be tuned in to the specific needs of industrial IoT set-up. As Guido Jouret, CDO of ABB, a technology leader in electrification products, robotics and motion, industrial automation and power grids, says: *“Even though security is paramount in the world of IIoT, there is one attribute that trumps even that: availability. By this I mean that many industrial machines can never be taken down to install patches or to fix a possible breach. Cybersecurity systems for the industrial IoT need to factor in the non-stop mission criticality of processes and continuous availability.”²⁵*

Conclusion

- The benefits of Industrial IoT are compelling, with proven and multiple use cases showing the significant value that organization across sectors can generate. However, finding the sweet spot for the IIoT will require more than just deep-seated know-how of the technology. Firms will need to have a coherent IIoT strategy and vision that address significant business issues, the right blend of committed leaders, and a strong focus on high-value use cases. Organizations that excel in these areas are delivering significant benefits and establishing a competitive edge that other firms—those that struggle to get beyond experimentation—will find increasingly difficult to match.



Research Methodology

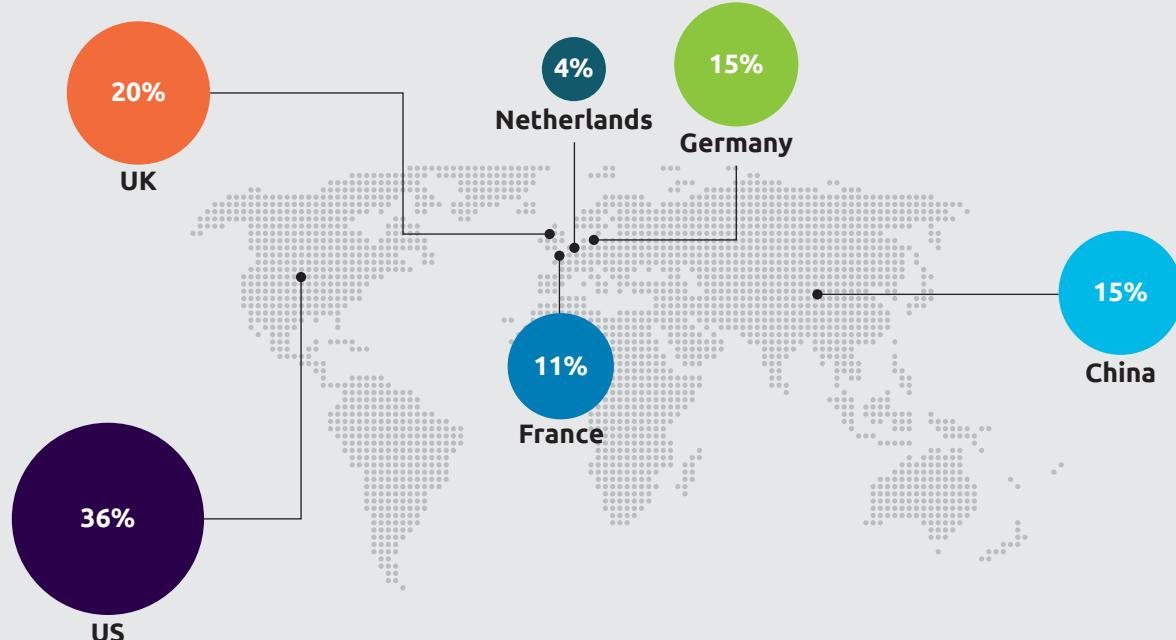
Our research drew on quantitative and qualitative techniques. Between September and October 2017, we surveyed 316 respondents from companies implementing Industrial IoT across a range of sectors and countries:

- Automotive, Industrial Manufacturing, Retail, Telecommunications, Consumer Goods, and Energy & Utilities

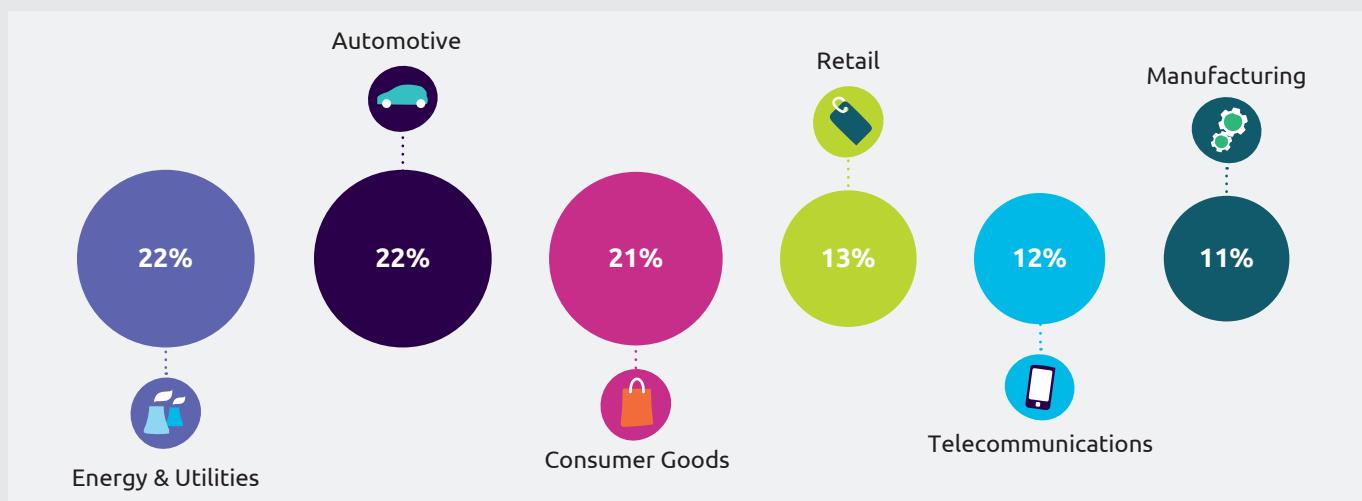
- The United States, the United Kingdom, France, Germany, China, and the Netherlands.

We also interviewed IoT solution providers and industry experts, examining the implementation challenges of IIoT and best practices.

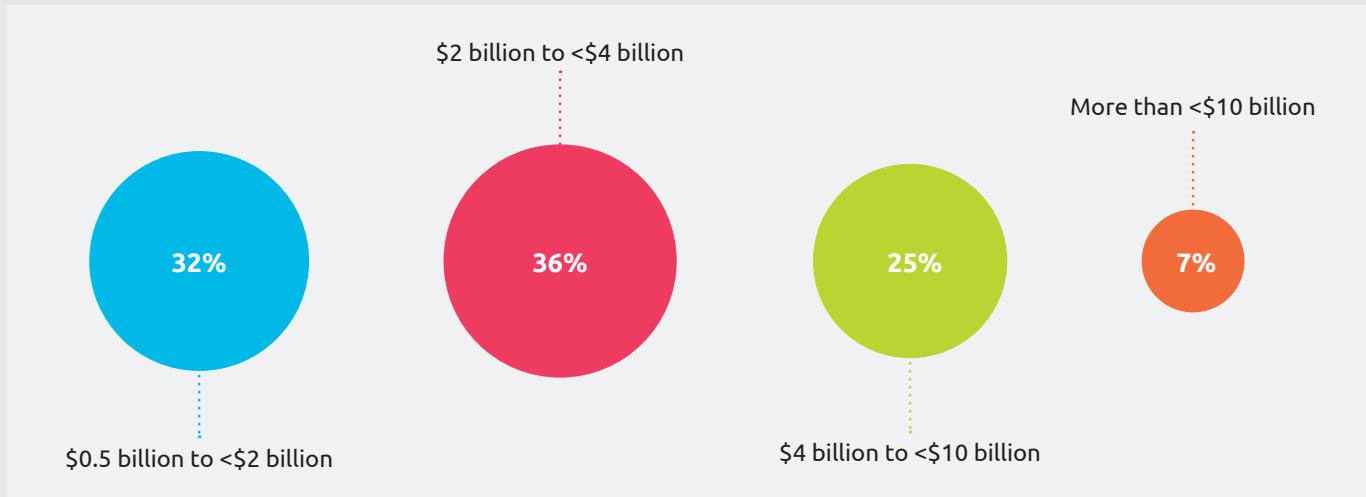
Respondents by country



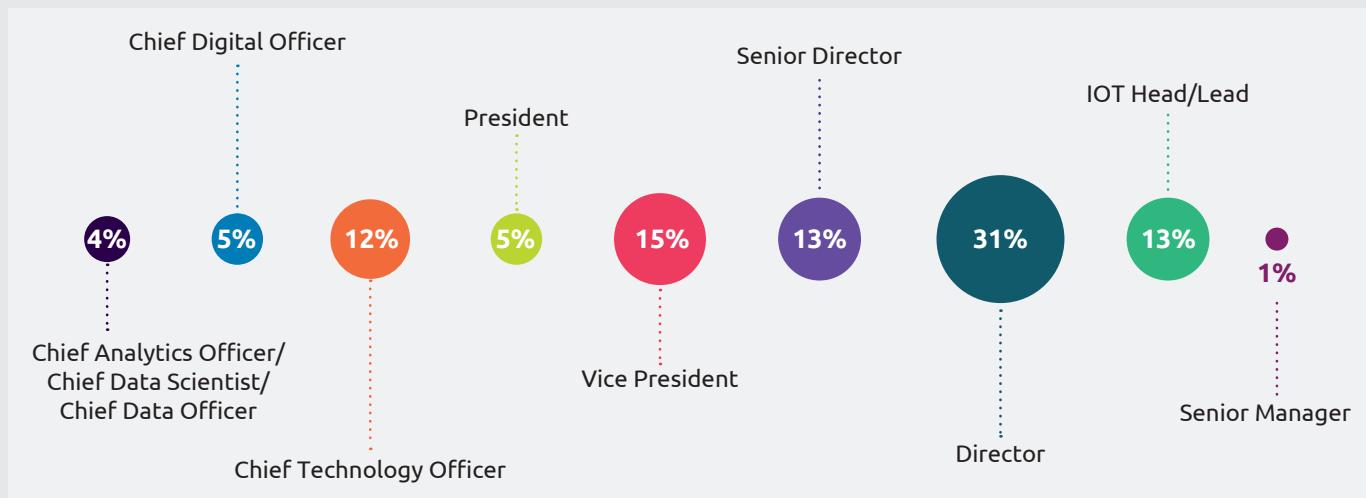
Respondents by sector



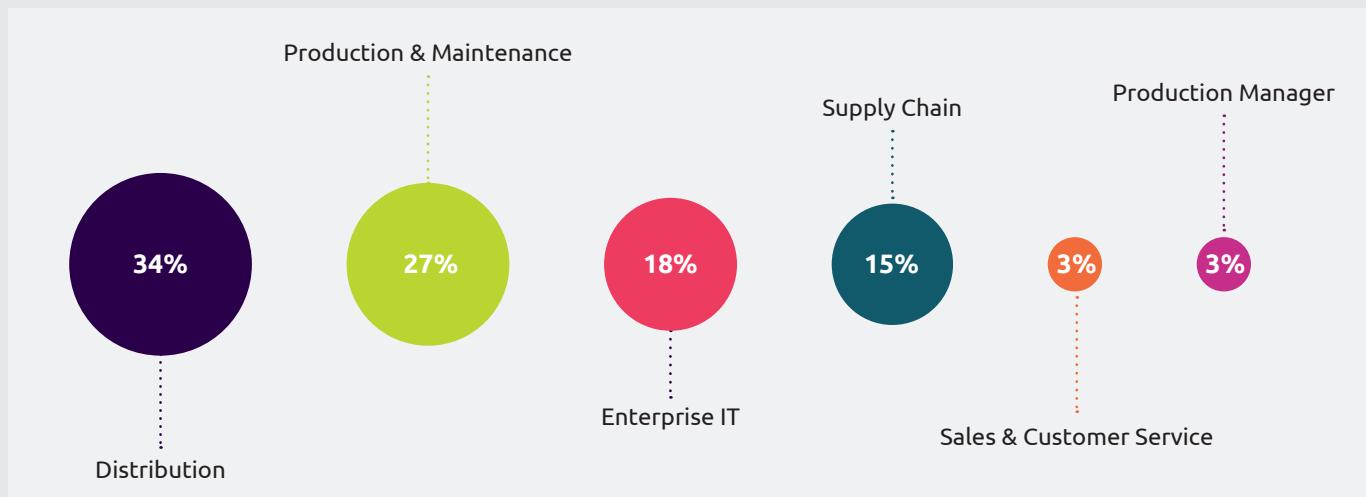
Respondents by organization's annual revenue



Respondents by job category



Respondents by function



References

1. IDC, "Internet of Things Spending Forecast to Grow 17.9% in 2016 Led by Manufacturing, Transportation, and Utilities Investments, According to New IDC Spending Guide," January 2017
2. Vodafone, "Vodafone IoT Barometer 2017/18," September 2017
3. HBR, "Success with the Internet of Things Requires More Than Chasing the Cool Factor," August 2017
4. Ericsson, "Every. Thing. Connected," November 2015
5. Venture Scanner, "Where in the World Are IoT Startups?— Q3 2017," October 2017
6. Lux Research, "Venture Funding of Cybersecurity to Rise to \$400 Million as Threats from IoT Grow," May 2016
7. GSMA.com, "China is Global Leader in Deployment of The Internet Of Things," July 2015
8. Forrester, "Boost Digital Business With the Internet of Things," September 2016
9. The Register, "Water treatment plant hacked, chemical mix changed for tap supplies", March 2016
10. Forbes, "Unlocking the Value Of The Industrial Internet Of Things (IIoT) And Big Data In Manufacturing," April 2017
11. InfoWorld, "Why IoT standards aren't coming any time soon," January 2017
12. PR Newswire, "#1 Challenge for IoT projects is 'Connectivity and Protocols,'" May 2016
13. Stores, How Giant Eagle's technology experiments reduce losses from out-of-stocks, September 2017
Microsoft transforms the retail experience at NRF's Big Show, January 2017
14. Rolls-Royce: Embracing IoT on a wing and a prayer, November 2016
Rolls Royce to use IoT technologies to make its airplane engines 'intelligent,' August 2016
IoT reshapes transportation, whether driving down the street or flying at 30,000 feet, April 2016
15. How Hershey used IoT to save \$500K for every 1% of improved efficiency, February 2017
The Candy Cloud, April 2017
16. RCR Wireless, IIoT use cases in the oil and gas industry, July 2016
Harvard Business School, The IoT and Big Data Will Transform Royal Dutch Shell, November 2016
17. IoT-Now Andrew Page reduces collisions and improves driver safety, November 2015
Financial Times, Telematics is revolutionising fleet management, April 2016
18. Capgemini interview, November 2017
19. Capgemini, "The Internet of Things: Why Companies Are Leaving Trillions on the Table," June 2017
20. Capgemini interview, November 2017
21. Ericsson, "Every. Thing. Connected." November 2015
22. Forbes, "Managing Through Culture: Tom Siebel On the Impact Of Technology For Leaders," August 2017
23. ExpressVPN, "An interview with Bruce Schneier on the Internet of Things, global surveillance, and cybersecurity," October, 2017
24. Capgemini, "The Currency of Trust: Why Banks and Insurers Must Make Customer Data Safer and More Secure," February 2017
25. Capgemini interview, November 2017

Accelerate your digital manufacturing transformation by partnering with Capgemini

Our value proposition

Many companies have been experimenting with Industrial IoT. Most of these initiatives often yield promising results, but are confronted with the challenge of scaling from “proof of value” to a full-scale deployment towards what is known as “Industry 4.0”. Industry 4.0 is indeed much more than deploying IoT technologies in the factory to improve equipment control.

At Capgemini, we have been working with manufacturing companies across the successive waves of technology innovation and we understand that, to really deliver benefits, culture must evolve in lock step. The last 15 years were shaped by the Lean culture, the next 15 will be shaped by a “Digital Lean” culture. Industrial IoT, and the pervasive use of data analytics, will bring the data culture to the shop floor, thus extending the reach and accelerating the impact of Lean Manufacturing.

How we do It—our approach

We have created three levels of services to take our customers along the Industrial IoT/Industry 4.0 journey.

A comprehensive Industry 4.0 assessment that delivers in 6-8 weeks a comprehensive view of the “readiness” of a company to embrace the “digital manufacturing” revolution. Focusing on key areas where data and analytics allow to optimize operations, the assessment covers technology, practices, competences and culture and delivers step-by-step roadmap.

An “Operational Intelligence” (OI) framework, allowing companies to experiment and then scale as an analytics-driven performance optimization. The framework includes a flexible OI platform and pre-defined analytics adapted to the most common requirements by industry – asset reliability, line performance and quality improvement. It allows to quickly set up pilots and then scale the platform on client’s preferred technology stack.

A Manufacturing Operations Management (MOM) architecture. The main obstacle to scaling Industrial IoT is the complexity and often obsolescence of Manufacturing Execution Systems (MES). MOM is the convergence of MES and IIoT technologies into an open and scalable manufacturing optimization platform. With a range of expertise, from ERP to industrial automation, we help companies design MOM roadmaps limiting risks and delivering results along the way.

Why us?

We bring together key strengths in consulting and technology, combined with a global network of Applied Innovation Exchanges and a strong partner ecosystem to deliver end-to-end digital transformation projects. Our expertise in large scale transformation and long tradition of technology innovation with clients and partners can help you gain sustainable competitive advantage from your digital investments.

Discover more about our recent research on digital transformation



[Loyalty Deciphered:
How Emotions Drive
Genuine Engagement](#)



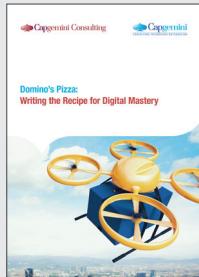
[The Disconnected Customer: What
digital customer experience
leaders teach us about
reconnecting with customers](#)



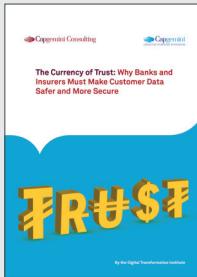
[The Digital Talent Gap:
Are Companies Doing Enough?](#)



[Making the Digital
Connection: Why Physical
Retail Stores Need a Reboot](#)



[Domino's Pizza:
Writing the Recipe for
Digital Mastery](#)



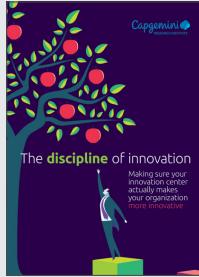
[The Currency of Trust: Why
Banks and Insurers Must
Make Customer Data Safer
and More Secure](#)



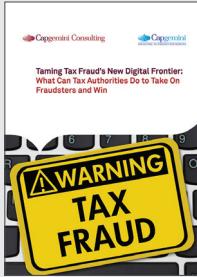
[Digital Transformation
Review 10: The Digital
Culture Journey: All on
Board!](#)



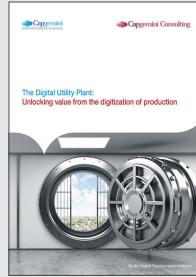
[The Digital Culture
Challenge: Closing the
Employee-Leadership Gap](#)



[The Discipline of Innovation:
Making Sure Your Innovation
Center Actually Makes Your
Organization More
Innovative](#)



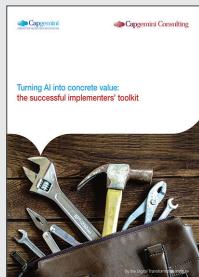
[Taming Tax Fraud's New
Digital Frontier: What Can
Tax Authorities Do to Take
On Fraudsters and Win](#)



[The Digital Utility Plant:
Unlocking value from the
digitization of production](#)



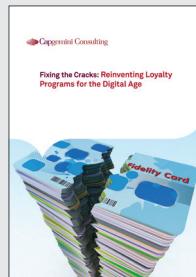
[Smart Factories: How can
manufacturers realize the
potential of digital industrial
revolution](#)



[Turning AI into concrete
value: the successful
implementers' toolkit](#)



[Driving the Data Engine:
How Unilever is Using
Analytics to Accelerate
Customer Understanding](#)



[Fixing the Cracks:
Reinventing Loyalty
Programs for the Digital Age](#)



[Unlocking Customer
Satisfaction: Why Digital Holds
the Key for Telcos](#)

About the Authors



Dr. Markus Rossmann

Principal, Digital Manufacturing,
markus.rossmann@capgemini.com

Markus is global head of Portfolio Management for Capgemini's Digital Manufacturing Services. He is responsible to drive digital initiatives in product and asset management, and operations management across all Capgemini business units and industrial sectors.



Anne-laure Thieullent

Vice President, Insights & Data, Capgemini France
annelaure.thieullent@capgemini.com

Anne-Laure is Vice President and Global Head of Manufacturing, Automotive and LifeSciences for Capgemini's Insights & Data practice. With more than 17 years of experience in the field of Information Technology, data and analytics, she advises Capgemini customers on how they should put Big Data and artificial intelligence technologies to work for their organization. Her passion is to bring technology, business transformation and governance together and take customers to where they want to be as data-driven and innovative companies.



Marc Chemin

Global insights/Data Consulting Leader,
CC Global Hub
marc.chemin@capgemini.com

Marc Chemin is leading the Insights & Data Consulting practice, providing data-related services to business customers. He is directly involved in client work with leading industrial companies around IoT topics.



Kunal Kar

Manager, Capgemini Research Institute
kunal.kar@capgemini.com

Kunal is a manager at the Capgemini Research Institute. He tracks the impact of digital technologies on the financial sector and helps clients on their digital transformation journey.



Andreas Hein

Vice president-Digital, Capgemini Germany
andreas.hein@capgemini.com

Andreas Hein has more than 25 years of experience in Business and Consulting Leadership, mainly focused on manufacturing and automotive. He has successfully taken a number of businesses through end-to-end digital transformation projects. He is directly involved with clients on Industry 4.0, digital manufacturing topics, cognitive IoT and Artificial intelligence.



Pascal Brosset

EVP-CTO, Digital Manufacturing
pascal.brosset@capgemini.com

Pascal BROSSET is the global CTO and North America leader for Capgemini's Digital Manufacturing services. He has 30 years of experience including a seven year stint as a Group CTO with Schneider Electric and ten years with SAP AG as a Chief Strategy Officer. Pascal successfully took a number of businesses through major shifts, combining technology and business model innovation. At Capgemini, Pascal is responsible for orchestrating and developing the company's strategy and portfolio of solutions for the Industry 4.0/IoT/Digital Manufacturing market, and organizing the go-to-market for the related solutions.



Jerome Buvat

Global Head of Research and Head, Capgemini Research Institute
jerome.buvat@capgemini.com

Jerome is a head of the Capgemini Research Institute. He works closely with industry leaders and academics to help organizations understand the nature and impact of digital disruptions.



Yashwardhan Khemka

Senior Consultant, Capgemini Research Institute
[@yashwardhan_k](mailto:yashwardhan.khemka@capgemini.com)

Yash is a senior consultant at the Capgemini Research Institute. He likes to follow disruption fueled by technology across sectors.

The authors would like to especially thank Vaibhav Agarwal from Capgemini Consulting and Subrahmanyam KVJ from Capgemini Research Institute for their contribution to the research.

The authors would also like to thank JeanPierre Petit, Philippe Ravix, Alain Marion, Phillippe Vie, Alexandra Bonanni, Pierre Fortier, and Paul Egret from Capgemini France; Sven Dahlmeier, Alexander Heßeler, and Hendrik Wördehoff from Capgemini Germany; Atul Kurani, Gita Babaria, Satish Nayak, Vivekanand Sangle, Vinutha Naik, and Shalabh Dhankar from Capgemini India; Frederic Vander Sande and Pieter Schoevaerts from Capgemini Belgium; Joeri Van Geystelen from Capgemini Canada; Ron Tolido, Kees Jacobs, and Frank Wammes from Capgemini Netherlands; Johan Williamson from Capgemini Sweden; Nick Gill from Capgemini UK; Alexander Korogodsky, Sandeep Sachdeva, Debbie Krupitzer, and Robert Smith from Capgemini US.

Capgemini Research Institute

The Capgemini Research Institute is Capgemini's in-house think-tank on all things digital. The Institute publishes research on the impact of digital technologies on large traditional businesses. The team draws on the worldwide network of Capgemini experts and works closely with academic and technology partners. The Institute has dedicated research centers in the United Kingdom, United States and India.

research@capgemini.com

For more information, please contact:

Pascal Brosset
pascal.brosset@capgemini.com

Dr. Markus Rossmann
marcus.rossman@capgemini.com

France

Jacques Bacry
jacques.bacry@capgemini.com

Eric Grumblatt
eric.grumblatt@capgemini.com

Patrice Le Franc
patrice.le-franc@capgemini.com

Laurent Perea
laurent.perea@capgemini.com

Philippe Ravix
philippe.ravix@capgemini.com

Sweden/Finland

Michael Eriksson
michael.eriksson@capgemini.com

Daniel Granlycke
daniel.granlycke@capgemini.com

India

Sanjeev Gupta
sanjeev.a.gupta@capgemini.com

Dattatraya Kulkarni
dattatraya.kulkarni@capgemini.com

Kiran N
kiran.a.n@capgemini.com

Germany

Jochen Bechtold
jochen.bechtold@capgemini.com

Lukas Birn
lukas.birn@capgemini.com

Reinhard Winkler
reinhard.winkler@capgemini.com

Netherlands

Femke De Jager
femke.de.jager@capgemini.com

Eric Kruidhof
eric.kruidhof@capgemini.com

Norway

Gunnar Deinboll
gunnar.deinboll@capgemini.com

North America

Philippe D'Amato
philippe.d-amato@capgemini.com

Debbie Krupitzer
debbie.krupitzer@capgemini.com

Jerry Lacasia
jerry.lacasia@capgemini.com

Mark Landry
mark.landry@capgemini.com

Darshan Naik
darshan.naik@capgemini.com

Adrian Penka
adrian.penka@capgemini.com

UK

John Lewins
john.lewins@capgemini.com

Mumtaz Salam
mumtaz.salam@capgemini.com





About Capgemini

A global leader in consulting and technology services, Capgemini is at the forefront of innovation to address the entire breadth of clients' opportunities in the evolving world of cloud, digital and platforms. Building on its strong 50-year heritage and deep industry-specific expertise, Capgemini enables organizations to realize their business ambitions through an array of services from strategy to operations. Capgemini is driven by the conviction that the business value of technology comes from and through people. It is a multicultural company of 200,000 team members in over 40 countries. The Group reported 2016 global revenues of EUR 12.5 billion.

Learn more about us at

www.capgemini.com

People matter, results count.