ThoughtLab

Building a smart, connected enterprise

November 2025

Harnessing the power of intelligent connectivity

The rapid rise of IoT and AI technologies is transforming how businesses operate—catapulting them to unprecedented heights of efficiency, profitability, and growth. By harnessing these latest technologies, leading organizations across industries are morphing into smart, connected enterprises with the power to fully optimize assets and data across their IT and physical environments. Organizations that have made this dramatic transition are already unlocking huge strategic, financial, and operational benefits.

Yet most organizations remain in the early stages of this journey. While many are piloting or using common IoT devices such as network cameras and environmental sensors, these are often managed in silos with limited system and data integration. In most cases, organizations are only beginning to tap into the wide array of IoT devices and use cases that could elevate connectivity to the next level.

Benchmarking the progress of 600 companies

To better understand where organizations are in their connectivity journeys, in the summer of 2025 ThoughtLab and Axis Communications conducted a study of 600 respondents across North America, Europe, and the Asia-Pacific region. The study examined IoT strategies in various industries, including aviation, cargo and logistics, healthcare, manufacturing, public transportation, and retail.

This paper explores where businesses stand today in their efforts to become smart, connected enterprises. It highlights best practices from organizations that have made the strategic transition and the wide-ranging benefits they have achieved as a result.

Survey sample

Number of respondents: 600

Industry profile: even distribution across six sectors, including aviation, cargo and logistics, healthcare, manufacturing, public transportation, and retail.

Regional profile: 47% of respondents from EMEA; 30% from APAC; and 23% from North America.

Revenue size: average $12.3bn, with 35% under $1bn, 35% between $1bn and $10bn, and 30% over $10bn.

Executive function: mix of COOs, CIOs, CTOs, chief digital officers, chief data officers, IoT directors, and others

ThoughtLab

The connectivity imperative

Organizations are rapidly expanding their use of IoT devices to drive performance. But to unlock the myriad benefits of IoT connectivity, executives need to overcome obstacles on the way.

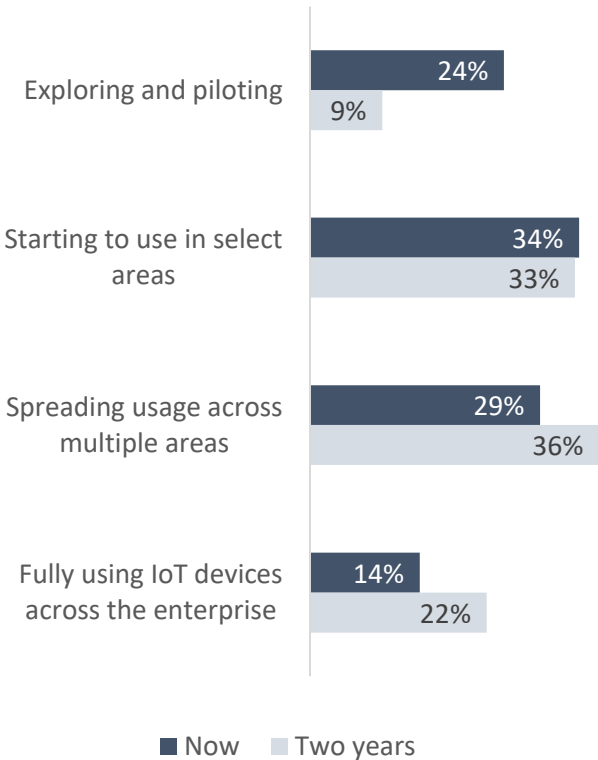**Thought**Lab

The rise of connected organizations

According to [IoT Analytics](#), a research firm, the number of connected devices will rise from 18.8bn in 2024 to over 40bn by 2030. Our research shows that players across industries are following this IoT growth trajectory. They are boosting their use of IoT devices as technology advances, costs fall, and data-driven automation grows.

Although 58% of organizations are still just piloting or starting to use IoT devices, 43% are now spreading use or fully using IoT devices. The percentage is even higher for those in manufacturing (63%), aviation (54%), public transportation (48%) and cargo and logistics (46%).

IoT devices will become pervasive
Over the next two years, only 9% of organizations will still be piloting, and about a third will be using IoT devices in selected areas. Almost 6 out of 10 will be spreading use or fully using IoT devices.
Except for healthcare, more than half of those in each sector will be widely or fully using IoT devices. Manufacturers and aviation firms will stay on top.

The use of IoT devices is growing fast

	Now	Two years
Exploring and piloting	24%	9%
Starting to use in select areas	34%	33%
Spreading usage across multiple areas	29%	36%
Fully using IoT devices across the enterprise	14%	22%

■ Now ■ Two years

*Totals may exceed 100% due to rounding.

% with spreading or full usage of IoT devices across the enterprise

Industry	Now	Two years
Manufacturing	63%	76%
Aviation	54%	71%
Public transportation	48%	62%
Cargo and logistics	46%	56%
Retail	38%	57%
Healthcare	5%	26%

Q6: To what extent does your company now use IoT devices? To what extent does your company plan to use them over the next two years?

The allure of IoT connectivity

Organizations are speeding their adoption of IoT devices for one simple reason: to unlock substantial strategic, financial, and operational benefits. Our research shows that organizations are already reaping these benefits—results that multiply as their IoT usage accelerates.

Strategic and financial gains
One top benefit from IoT adoption is higher customer satisfaction, as organizations upgrade their ability to deliver more personalized and responsive service. Another is improvements in strategic planning and decision-making thanks to greater access to data and real-time analysis. Profitability also rises as revenue rises and costs decline.

Operational improvements
The use of IoT devices also helps drive major cost savings. These come from optimizing energy use, enhancing asset utilization, boosting operating performance, and reducing downtime. At the same time, organizations use their IoT capabilities to uplift worker safety and productivity.

Strategic and financial benefits

Benefit	%
Higher customer satisfaction	62%
Improved strategic planning	59%
Better decision-making	52%
Greater profitability	45%
Improved scalability	43%
Improved predictive and scenario analysis	40%
Greater innovation	31%
Greater top line growth	23%

Operational benefits

Benefit	%
Lower operational costs	58%
Reduced energy and resource consumption	58%
Improved asset utilization	56%
Enhanced operational performance	56%
Better supply chain and inventory management	48%
Improved worker safety	47%
Reduced downtime	43%
Improved productivity	42%

Q13: What are the main benefits that your company is seeing from the use of IoT solutions?

ThoughtLab

Speed bumps on the road to connectivity

Becoming a smart connected enterprise can be challenging. The use of network cameras and audio generates sensitive personal data, which raises data security and privacy alarm bells for most organizations, particularly in the face of growing regulations and higher standards around IoT data use.
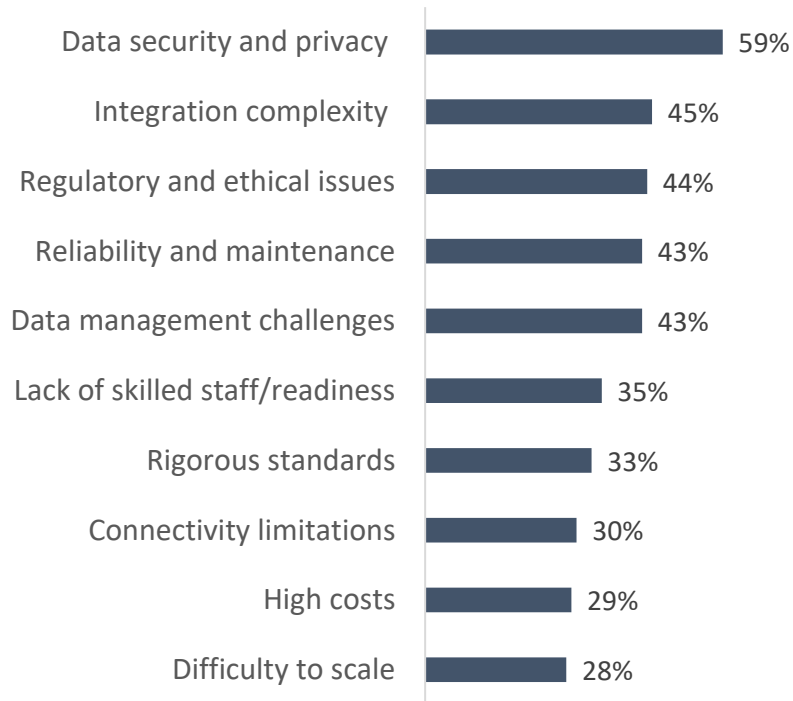
"Strong data privacy practices are key to building trust and enabling the wider adoption of IoT and AI," according to Stephen Borg, CEO of meldCX. "It's about innovating responsibly—moving beyond earlier technologies that relied on facial recognition, which in most environments isn't privacy-compliant, towards solutions that put privacy at the core."

Fragmented IT and data systems

At the same time, fragmented legacy systems can hinder integration and scalability—and even lead to maintenance difficulties as IoT devices multiply. These problems can be compounded by data silos and other data management hurdles that can undermine efforts to unlock value from data.

Carl Staël von Holstein, Business Development Director– Future Business at Axis Communications, sees a lack of systems interoperability as a major impediment. "For example, when commuting to work, Google Maps provides me with information about congestion along my route. But if the Google Maps data could be fused with the government's traffic monitoring system, then I could get very exact predictions on how long my journey will take and proactive insights into how to shorten my time on the road."

Biggest challenges in deploying IoT devices

Challenge	Percentage
Data security and privacy	59%
Integration complexity	45%
Regulatory and ethical issues	44%
Reliability and maintenance	43%
Data management challenges	43%
Lack of skilled staff/readiness	35%
Rigorous standards	33%
Connectivity limitations	30%
High costs	29%
Difficulty to scale	28%

Q16: What are the biggest challenges that your organization has faced in deploying IoT devices?

Building a smart connected business

Our research identified IoT leaders that have successfully seized the opportunities of IoT connectivity. Their approach provides a roadmap for others striving to become smart connected businesses.

ThoughtLab

Leaders show the way

Our research identified a select cadre of leaders that are well ahead of other organizations in smart connectivity. These enterprises excel at harnessing AI and real-time data from across physical and digital assets to drive business performance and decision-making.

Our study shows that leaders do five things differently than others:

1. **Deploy an array of IoT devices** on a centralized IoT platform that integrates IT and OT data streams.

2. **Build multiple use cases**—including advanced solutions such as scenario analysis and predictive maintenance—to supercharge results.

3. **Excel at overcoming IoT hurdles**, such as those around data security and privacy, compliance, skills gaps, and high costs.

4. **Make IoT innovation a continuous process**, constantly embracing new IoT devices and use cases.

5. **Turn connectivity into a force multiplier**, delivering much higher ROI and many more strategic, operational, and financial benefits.
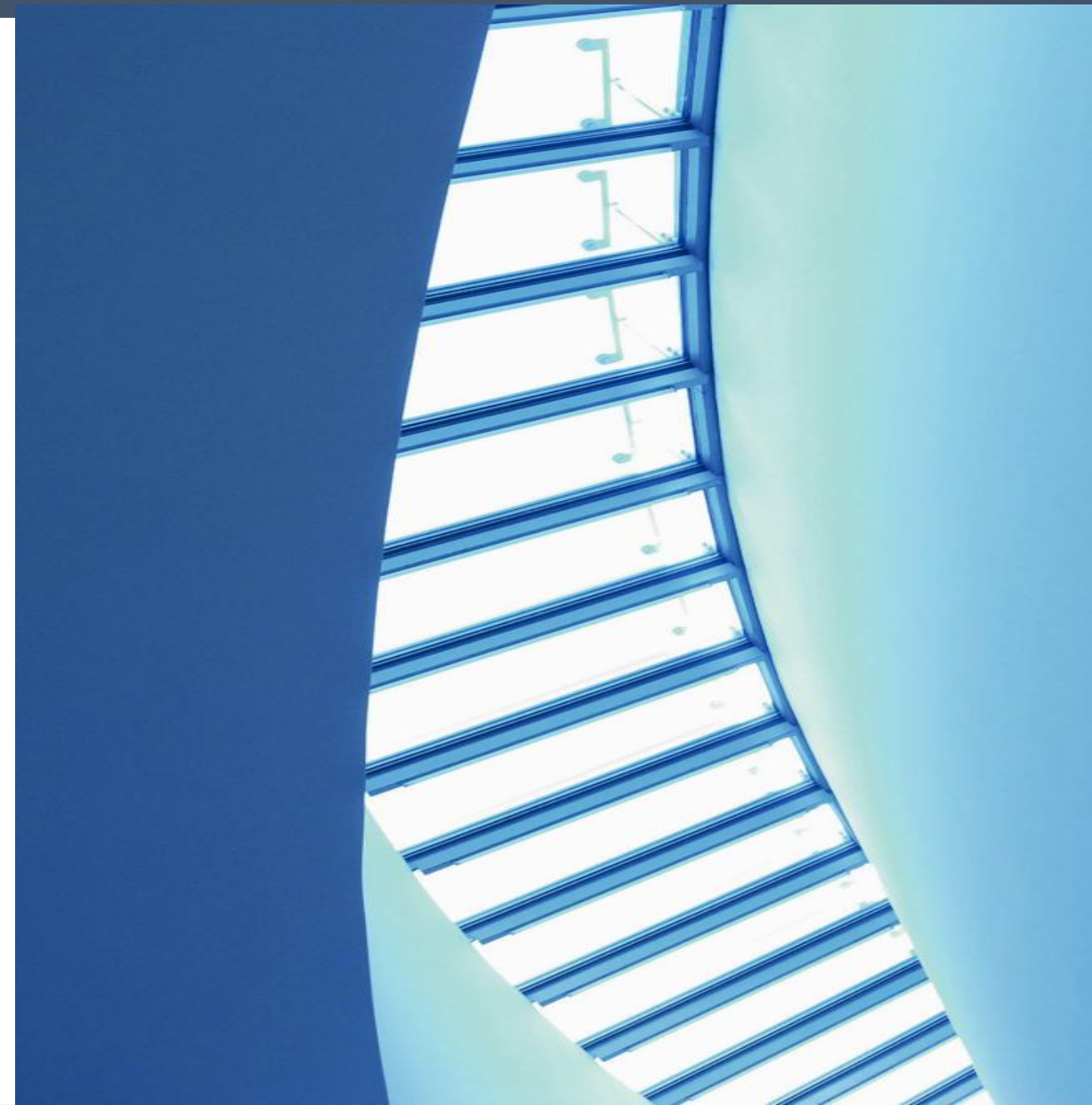
Q13: What are the main benefits that your company is seeing from the use of IoT solutions?

Identifying the leaders

Our research shows that organizations typically progress through five distinct stages of IoT maturity. As part of our survey, we asked executives to rank their firms' use of IoT devices against these five levels of maturity:

Level 1: IoT devices are managed individually or within isolated networks.

Level 2: IoT devices are monitored through dashboards showing basic visualizations and status updates, with limited system integration.

Level 3: A centralized IoT platform manages devices and consolidates data and is integrated with existing core IT systems.

Level 4: A centralized IoT platform integrates both IT systems and operational technology data streams, enabling insights across digital and physical operations.

Level 5: An advanced, centralized IoT platform leverages AI to deliver predictive insights and automation across IT and OT systems, maximizing the value of IoT infrastructure.

Currently, almost half of organizations are still in the first two levels of maturity, while only one-quarter have reached the advanced levels (4 or 5). But over the next two years, this balance is expected to shift: just 25% of firms anticipate being in early stages, while about half expect to advance to the most mature levels.
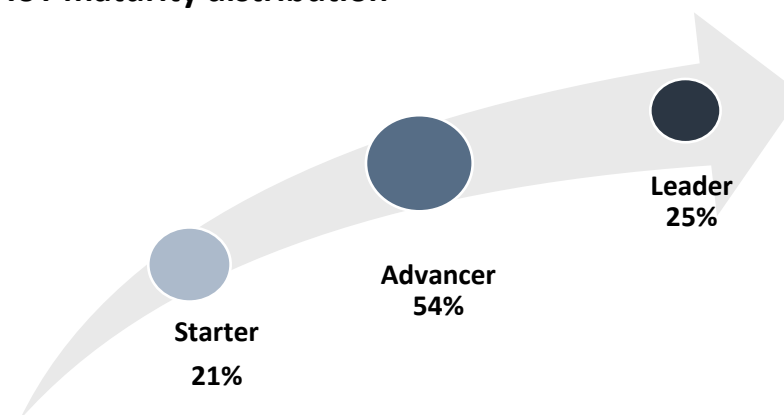
Organizations that self-identified as being at Level 1 were classified as starters; those at Levels 2 and 3 as advancers; and those at Levels 4 and 5 as leaders. In this paper, we define leaders in the use of IoT devices as smart connected enterprises.

The path to becoming a smart connected organization

	Level 1	Level 2	Level 3	Level 4	Level 5
Now	21%	27%	27%	18%	7%
Two years	12%	14%	26%	31%	18%
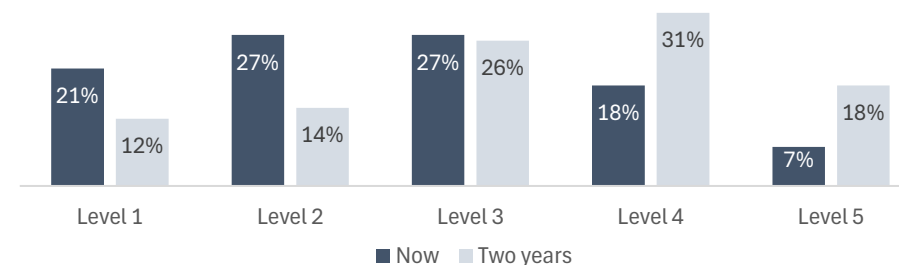
■ Now ■ Two years

*Totals may exceed 100% due to rounding.

IoT maturity distribution

Starter 21%

Advancer 54%

Leader 25%

Q9: Which best describes your company's level of maturity in managing IoT devices now? What level of maturity does your company plan to achieve in two years?

Who are the leaders?

Our analysis found that manufacturers are the most advanced in IoT maturity, with nearly half identifying as leaders. In contrast, healthcare is the least advanced, held back by privacy and security concerns, regulatory requirements, and smaller budgets. Only 3% of healthcare firms are classified as leaders.
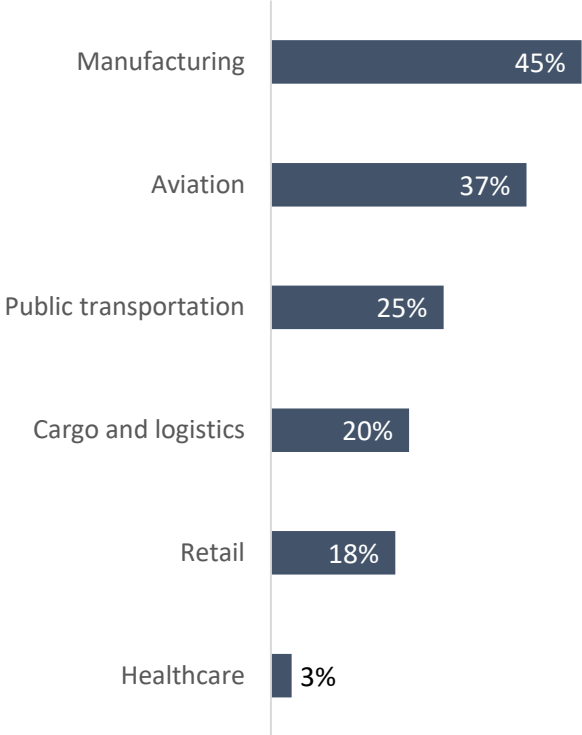
Large players have a distinct edge
Leaders tend to be larger entities with access to greater resources. Overall, 57% of companies with annual revenues above $10 billion (or budgets in the case of public agencies) are leaders, compared to only 2% of those with annual revenues below $1 billion.
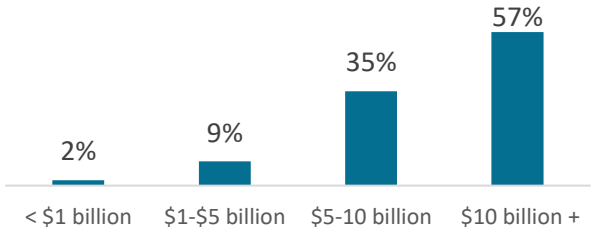
North American organizations are racing ahead
North America has twice as many leaders than EMEA or APAC. While a quarter of entities in APAC and EMEA are just beginning their IoT journey, fewer than 10% in North America are at this early stage. The reason that North American players are ahead is that they were early IoT adopters: on average they started using IoT devices 4.3 years ago vs 3.7 in EMEA and 3.5 in APAC.
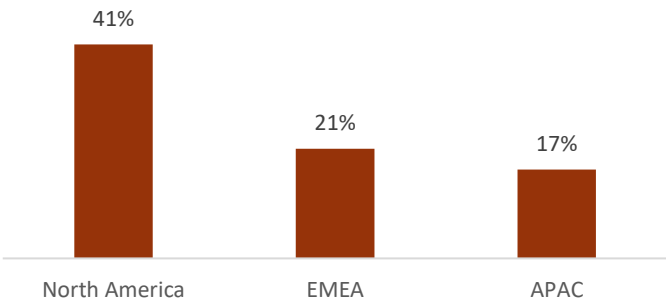
Percentage of leaders by industry

Industry	
Manufacturing	45%
Aviation	37%
Public transportation	25%
Cargo and logistics	20%
Retail	18%
Healthcare	3%

Percentage of leaders by size

< $1 billion	$1-$5 billion	$5-10 billion	$10 billion +
2%	9%	35%	57%

Percentage of leaders by region

North America	EMEA	APAC
41%	21%	17%

Becoming a leader takes time

Transforming into an IoT leader is a long-term commitment. It takes more than deploying IoT devices; it requires a deep transformation across technology, operations, culture, and strategy. "This is a journey of gradual integration, interoperability, and AI innovation," says Carl Stael von Holstein at Axis Communications.

Our research bears this out. Leaders have been deploying IoT devices nearly four times as long as starters—an average of 6 years vs 1.4 years, respectively.

Funding the future
Building a smart connected organization requires investment in technology, talent, operations, and data systems. That is why large organizations, with greater revenues (see previous slide), have an advantage.
Cyrus Shaoul, CEO of Leela AI explains: "Transitioning into an integrated IoT ecosystem requires not only significant hardware and software investments but also upskilling workforce members and hiring digital experts. Successfully scaling these initiatives takes time and depends heavily on top-level commitment and clear strategic planning."
Leaders invest nearly 9% of their IT/OT budgets into IoT devices vs 6.9% for starters. Leaders plan to ramp up their investments to 10.3% in two years.

Time the company has been using IoT devices

Leaders	Advancers	Starters
6 yrs	3.7 yrs	1.4 yrs

Share of IT/OT budget spent on IoT devices

	Leaders	Advancers	Starters
Now	9%	7.9%	6.9%
Two years	10.3%	9.2%	8%

The five best practices of leaders

Leaders differ from others in five main ways:

1. Deploy and integrate an array of IoT devices.
2. Build multiple use cases to supercharge results.
3. Excel at overcoming IoT hurdles.
4. Make IoT innovation a continuous process.
5. Turn connectivity into a force multiplier.

ThoughtLab

1. Leaders deploy and integrate an array of IoT devices

Leaders deploy more than three times as many types of IoT devices as starters, demonstrating far greater breadth in adoption. Starters typically begin with foundational IoT technologies such as network cameras, access control, environmental sensors, and audio. In contrast, most leaders also invest in network motion detectors and radar, as well as robots and digital signage.

Crucially, leader recognize that the true value of IoT lies not in individual data streams, but in combining them to create a holistic view of their operations. They install a wider range of IoT devices and integrate them to drive higher levels of insight, automation, and business value.

All together now
Leaders also invest in central, interoperable platforms to manage devices and consolidate data. This architecture simplifies integration across a wide variety of new and existing IoT devices. Interoperability is crucial because it enables data to flow seamlessly into core business systems, such as SAP or Power BI dashboards, where it can directly inform strategic decision-making.

A key lesson from leaders is to start small, often with a single, high-impact use case that proves value, and then expand. This evolutionary path naturally broadens device adoption as the organization learns and identifies new problems to solve. "Companies tend to start with very basic applications and then move up," explains Carl Staël von Holstein. "They start to unlock the true value of IoT when they realize it can be implemented across their entire systems."

Types of IoT devices deployed by maturity

	Leader	Advancer	Starter
Network cameras	99%	92%	69%
Network access control	95%	80%	39%
Network motion detectors	89%	54%	9%
Network environmental sensors	87%	70%	21%
Robots	76%	48%	6%
Network audio	62%	39%	24%
Network radar	53%	16%	6%
Digital signage (screens/TV)	52%	36%	9%
Network thermal imaging	45%	14%	0%

Every leader in our study uses a centralized IoT platform that integrates IT systems and operational technology data streams.

Q8: What types of IoT devices does your company currently deploy? Which types of IoT devices do you expect it to deploy over the next two years?

ThoughtLab   Building a smart, connected enterprise   13

2. Leaders build multiple use cases to supercharge results

Leaders not only deploy a much wider range of IoT devices; they also use them to achieve a richer set of goals. Starters focus primarily on gathering real-time data from physical operations to fill visibility gaps and support decision-making. Often, they still rely on manual interpretation of the data collected.

By contrast, five times more leaders than starters take broader approach to IoT applications. Forecasting and scenario analysis are a case in point: 82% of leaders, compared with only 4% of starters, use IoT for this purpose. For example, a leading manufacturing company can run simulations to predict how introducing a new product model will impact the factory floor, anticipating the need for different robot routes or adjustments in staffing.

Leaders also harness large historical datasets to build digital twins of entire factories. These allow engineers to run "what if" scenarios—such as modeling the impact of replacing a machine with one that runs faster—before committing to investment. Cyrus Shaoul, CEO of Leela AI, highlights that this capability is critical for manufacturers with a wide product mix, as they require comprehensive datasets to accurately model all possible variations.

" The most sophisticated companies are now using video, IoT sensors, and AI to detect and prevent issues in real time, ultimately creating safer, more efficient enterprises."

Stefan Borg
CEO of SiB Solutions

IoT use cases by maturity

	Leaders	Advancers	Starters
Quality control	95%	66%	11%
Enhanced customer experience	92%	75%	29%
Energy management	92%	52%	6%
Data gathering	89%	81%	68%
Decision-making	87%	67%	30%
Asset tracking and management	86%	55%	3%
Forecasting and scenario analysis	82%	25%	4%
Strategic planning	80%	39%	13%
Predictive maintenance	77%	47%	15%
Real-time response	75%	43%	14%
Supply chain management and visibility	74%	35%	5%
Remote management and diagnostics	69%	30%	8%
Safety and compliance	64%	31%	13%

Q7: In which ways does your company use IoT devices today? In which ways will your company start to use IoT devices over the next two years?

BMW

Elevating quality control

BMW is not only a leading company in the automotive industry but is also a role model for smart connected innovation. At the forefront of its approach is its iFACTORY program, which combines IoT and AI solutions. BMW is now rolling out its iFACTORY program across all plants around the world.

BMW's iFACTORY is built on the BMW's proprietary AIQX (Artificial Intelligent Quality Next) IT platform, which leverages IoT sensors and AI to streamline quality control processes. By using cameras to capture intricate details of each car produced—and applying computer vision and deep learning technology—the AIQX platform enables highly automated quality control to take place in fractions of a second. The AIQX platform leverages a vast network of IoT sensors and cameras to automatically detect design flaws and various errors by reviewing millions of collected data points, primarily images and videos.

The real-time video images are swiftly transmitted to the cloud-based AIQX platform for immediate analysis using advanced AI algorithms. Production line staff can access the data and analysis immediately on their smart devices, allowing them to swiftly identify and address any defects before the vehicle progresses further in production. The result: substantial time and cost savings.

*This example is drawn from a full case study on Axis Communications website.

Toronto Pearson International Airport
Improving passenger experiences

Toronto Pearson International is the second-busiest airport in North America for international traffic, receiving 276 inbound international flights a day. To respond to passenger feedback about regular congestion and extended wait times at the Canada Border Services Agency (CBSA), the Greater Toronto Airports Authority (GTAA) turned to IoT and AI technology.

GTTA wanted to proactively estimate wait times by correlating line counts with flight numbers, the time of day, and international flights schedules. With that knowledge, airport personnel could better manage the inbound queues and navigate passengers more quickly through customs.

To forecast wait times, the airport leveraged a network of IoT cameras and a proprietary AI platform to translate camera images into actionable information. The AI model estimates wait times by using IoT cameras to capture the number of people entering and exiting the queue. To improve accuracy of the predictions, the platform also draws on machine learning to take changing conditions into account.

"Using the AI platform, we split the camera coverage into matrices so we could identify individual flows, including international visa travelers, international Canadian travelers, travelers with global entry passes, and travelers with families," explains Zeljko Cakic, director of airport IT planning and development for the Greater Toronto Airports Authority.

*This example is drawn from a full case study on Axis Communications' website.

ThoughtLab

3. Leaders excel at overcoming IoT hurdles

Becoming a smart, connected organization can be a complex journey, requiring executives to overcome a range of obstacles. At the outset, these challenges can appear daunting, with beginners facing an average of over five challenges. About two-thirds of starters encounter barriers related to data security, privacy, and regulatory compliance. More than half also face significant hurdles around lack of skills, high costs, and data management.
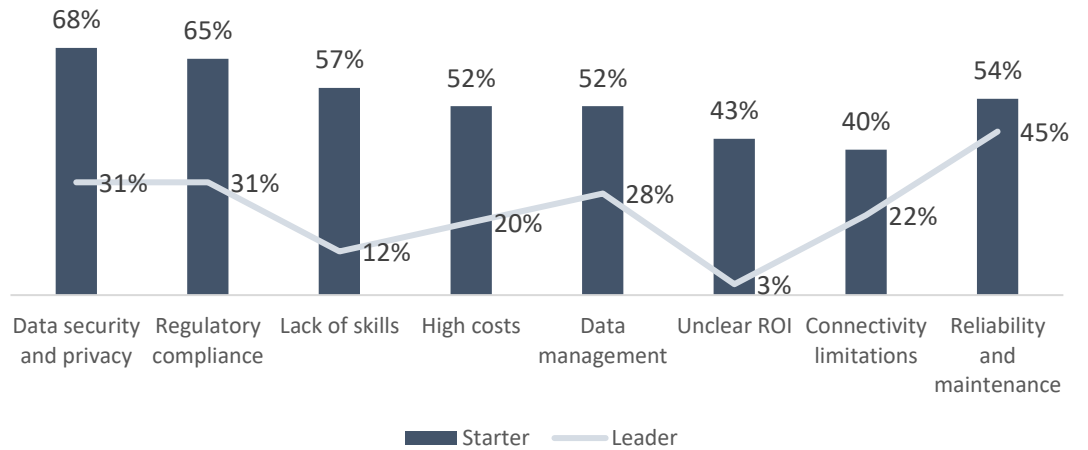
Leaders head off risks...
As organizations mature into leaders, they overcome many of these barriers, with the average number of challenges decreasing to slightly over three. They proactively address data security and privacy issues by taking these considerations into their strategy from the very beginning. With a "privacy-first" mindset and continuous investment in cybersecurity, fewer than a third of leaders still face challenges in this area.

...and build a foundation for IoT to succeed
Leaders put in the organizational structure needed for IoT to advance by developing training programs, hiring IoT specialists, and teaming up with technology partners. At the same time, they harness the latest technologies, such as AI, edge computing, and mesh networks, to overcome data and connectivity issues, and they shift to SaaS solutions and cost and infrastructure sharing models to reduce outlays.

Leaders overcome many hurdles that starters face

	Data security and privacy	Regulatory compliance	Lack of skills	High costs	Data management	Unclear ROI	Connectivity limitations	Reliability and maintenance
Starter	68%	65%	57%	52%	52%	43%	40%	54%
Leader	31%	31%	12%	20%	28%	3%	22%	45%

Starter ——— Leader

> "Mature companies have the internal skills, but they also have the right data-driven cooperative culture. They look at connectivity from a holistic standpoint rather than as something that will deliver isolated solutions."

Gabriele Mangiafico
Business Development Manager, Industrial and Manufacturing, EMEA
Axis Communications

Q16: What are the biggest challenges that your organization has faced in deploying IoT devices?

How leaders surmount hurdles

Data security and privacy

"Data security concerns were resolved with industrial-grade encryption and network segmentation."
CTO, Japanese machinery manufacturer

"We have overcome data security and privacy concerns by making sure that the devices particularly run firmware through secured boot processes."
CTO, French aviation organization

Data management

"Our team has utilized data compression and aggregation to reduce storage needs. That made it easy for us to manage large data sets."
COO, US manufacturer

"We implemented AI and ML models to easily manage the data."
COO, Canadian transportation agency

Regulatory compliance

"We managed regulatory and ethical concerns through early engagement with legal and compliance teams during solution design."
Senior executive, US airline company

"Our IoT systems include built-in compliance checks that flag potential issues. This proactive approach keeps us ahead of changing regulations."
CTO, German consumer goods firm

Lack of skills

"Building strategic relationships with tech service providers has eliminated the need to build internal expertise**."**
Chief supply chain officer, Canadian cargo and logistics company

"We have started offering flexible and easily accessible training options through webinars and online learning platforms."
Chief Medical Officer, Canadian Hospital

High costs

"Reduced costs by using shared cloud infrastructure instead of developing internal capacity."
Chief data officer, Japanese retailer

"Explored open-source software and platforms to minimize high licensing costs."
IoT director, US logistics company

Connectivity limitations

"We solved connectivity challenges by using edge analytics to reduce data overload."
IoT director, US retailer

"Connectivity issues in large warehouses were solved with mesh networks and strategically placed access points for complete coverage."
Senior executive, French logistics firm

Reliability and maintenance

"We addressed reliability concerns through predictive maintenance and vendor service agreements."
CIO, Japanese manufacturer

"Optimizing our network architecture has improved network reliability."
CIO, French airline company

Unclear ROI

"At first we were not sure about ROI, so we tested fuel tracking on a small scale and grew it after quick results."
Senior executive, US cargo company

"We fostered a culture of continuous improvement in which each experiment yields useful insights for future investments."
**Chief digital officer, Australian airline**

Q17: How has your organizations overcome these challenges?

4. Leaders make IoT innovation a continuous process

Currently, only 29% of leaders are at the highest level (Stage 5) of IoT maturity. These elite organizations employ centralized IT platforms that draw on AI to maximize the value of their IoT infrastructure. Over the next two years, two-thirds of leaders expect to reach Stage 5.

Leaders will also expand their use of IoT devices during this period. The percentage of leaders fully deploying IoT will rise from 54% to nearly three-quarters. At the same time, the average number of IoT device types will grow from 6.6 to 8.3, with adoption of network thermal imaging rising by 93% and digital signage by 65%. Leaders will also broaden the applications of IoT, with predictive maintenance, strategic planning, and remote management becoming nearly universal.

Growth in % of Level 5 leaders*

66%

29%

■ Now
■ Two years
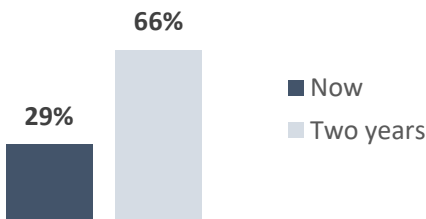
*Defined as organizations with advanced centralized IoT platforms that leverage Ai to deliver predictive insights and automation across IT and OT systems, maximizing the value of IoT systems.

54% of leaders now fully use IoT devices across their enterprises.

This number will grow to

72% in two years.

IoT device types with largest increases for leaders

	Today	2 years	% increase
Network thermal imaging	45%	87%	93%
Digital signage (screens/TV)	52%	86%	65%
Network audio	62%	96%	55%
Network radar	53%	79%	49%
Robots	76%	94%	24%

IoT use cases with the largest increase for leaders

	Today	2 years	% increase
Safety and compliance	64%	89%	39%
Remote management and diagnostics	69%	94%	36%
Predictive maintenance	77%	97%	26%
Supply chain management and visibility	74%	93%	26%
Real-time response	75%	93%	24%
Strategic planning	80%	95%	19%

Q6. To what extent does your company now use IoT devices? To what extent does your company plan to use them over the next two years? Q7. In which ways does your company use IoT devices today? In which ways will your company use IoT devices over the next two years? Q8: What types of IoT devices does your company currently deploy? Which types of IoT devices does your company plan to deploy over the next two years? Q9. Which best describes your company's level of maturity in managing IoT devices now? What level of maturity does you company plan to achieve in two years
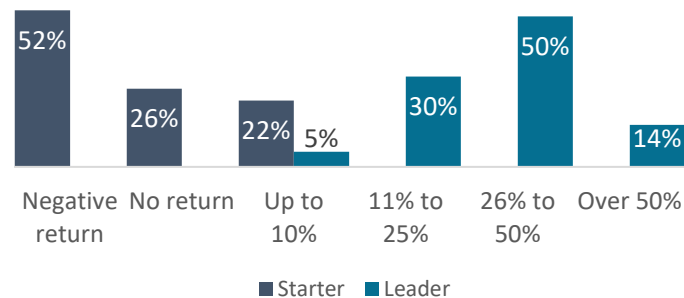
5. Leaders turn connectivity into a force multiplier

As organizations implement a smart connected strategy, they recognize over three times as many benefits. Our research shows that starters see an average of 3.7 benefits vs nearly 13 for leaders.

For some benefits, the differences between starters and leaders are striking. For example, leaders are over 50 times as likely to see greater revenue growth, 30 times as likely to see greater innovation, and 18 times as likely to see improved predictive and scenario analysis.

Leaders are also able to translate the greater benefits into a huge ROI advantage. Leaders have seen an average ROI of nearly 34% vs an ROI of 1% for starters. In fact, most starters are seeing negative ROI (52%), while almost two thirds of leaders (64%) are generating high or very high ROI.

Leadership forcer multiplier

	Starter	Leader	Multiplier
Greater top line growth	1%	52%	52.0
Greater innovation	2%	59%	29.5
Improved predictive analysis	4%	72%	18.0
Improved worker safety	8%	78%	9.8
Greater profitability	13%	70%	5.4
Improved asset utilization	19%	91%	4.8
Improved scalability	17%	71%	4.2
Reduced downtime	17%	64%	3.8
Greater regulatory compliance	14%	49%	3.5
Better supply chain management	23%	74%	3.2
Lower operational costs	28%	89%	3.2

Leaders fire up results

Bar chart — Negative return: 52% (Starter); No return: 26% (Starter); Up to 10%: 22% (Starter), 5% (Leader); 11% to 25%: 30% (Leader); 26% to 50%: 50% (Leader); Over 50%: 14% (Leader).

■ Starter ■ Leader

Average number of benefits

Leader **12.9**

Starter **3.7**

Q16: What are the main benefits that your company is seeing from the use of IoT solutions? Q15. What is the current ROI on your investments in IoT devices?

How leaders plan to unlock additional value

Predictive analytics

"With the help of IoT devices, we will be able to do better scenario planning and improve resilience in volatile situations."
Senior executive, French material producer

"IoT will help us shift from treating illnesses as they occur to managing health proactively and preventing issues early."
Senior executive, UK hospital

Supply chain management

"By embedding IoT devices into cargo containers, we will track temperature in real time, making it easier to follow safety standards and reduce spoilage."
Chief data officer, German cargo firm

"We will use IoT to monitor the progress of raw materials and components as they pass through the supply chain."
IoT director, Australian manufacturer

Reduced downtime

"We will be able to plan repairs sooner because connected sensors will help us to identify parts of the roads that are wearing out before they turn risky."
Senior executive, Indian transportation agency

"Over the next two years, we'll implement predictive maintenance through IoT on our locomotives and rail cars to reduce downtime and extend asset life."
Chief supply chain officer, Canadian logistics company

Increased innovation

"Having IoT tools in place will make it easier for us to adopt new technologies like AI, robotics, or smart ticketing systems."
Chief digital officer, US transportation agency

"IoT will enable digital transformation across our systems from flight operations and maintenance to customer facing applications and real-time data analytics."
IoT director, US airline

Worker safety

"Smart sensors will help us to monitor store conditions and improve safety."
IoT director, Canadian retailer

"IoT wearables and sensors will keep workers safe by monitoring conditions and spotting risks early while also ensuring safety rules are followed."
CIO, Japanese manufacturer

Asset utilization

"We're using IoT tags to track the location and status of all equipment in our facilities, improving asset utilization and reducing loss."
Senior executive, French cargo company

"In some departments, we are thinking of adopting IoT-powered asset tracking systems for portable medical equipment, reducing search times and improving utilization for the future."
COO, Japanese healthcare provider

Lower costs

"Connected sensors will help us to use the energy and materials we really need reducing waste and costs in our production."
IoT director, US retailer

"Smart sensors throughout our facilities will help us identify where we're wasting energy and materials, cutting costs while helping the environment."
Senior executive, French cargo company

Customer experience

"We will tailor customer experiences using connected devices and focus on creative solutions that are cost-efficient."
COO, US consumer goods manufacturer

"Over the next two years, we plan to integrate IoT with AI and data infrastructure to create a seamless customer experience across online and physical stores."
Chief digital officer, Japanese retailer

Q17: How has your organizations overcome these challenges?

IoT scorecards by industry

ThoughtLab

Of the companies in our study, manufacturers are the most advanced in intelligent connectivity, with 45% identified as leaders. The average manufacturer has been using IoT devices for nearly five years, longer than organizations in other industries in our study. As a result, manufacturing companies generate a higher ROI—24%—than others.

Manufacturers have long relied on automation and data to optimize activities across their value chains. Hence, the shift to smart, connected IoT systems has been a natural progression as manufacturers embrace Industry 4.0.

The average manufacturer uses 5 to 6 different IoT devices, more than organizations in other industries. They also put these devices to greater use: 93% use them for early fire prevention, and nearly as many for quality control, temperature monitoring, and anomaly and leak detection.
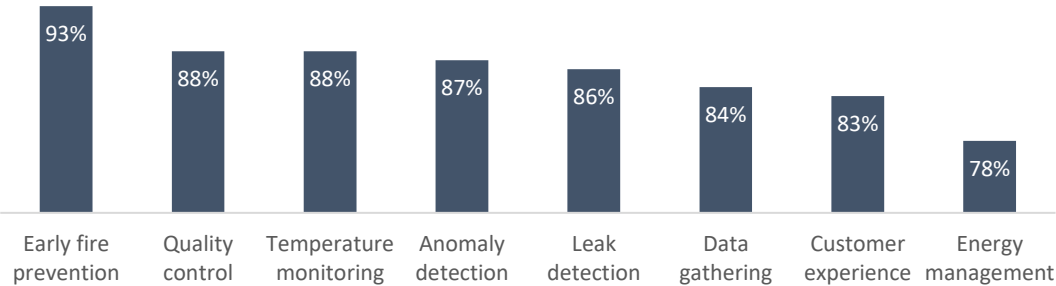
Breakout by IoT maturity

- 9%
- 45%
- 46%

■ Starter   ■ Advancer   ■ Leader
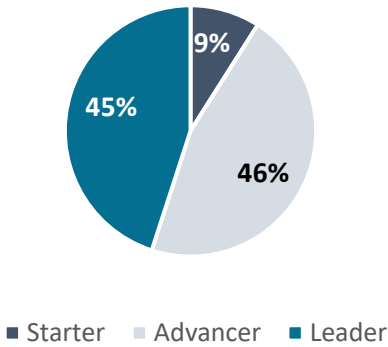
IoT devices used today

Access control	93%
Cameras	92%
Environmental sensors	81%
Motion detectors	71%
Robots	66%
Network audio	51%
Thermal imaging	47%

23.6% average ROI

4.7 years average period of use

10.2% of IT/OT budget spent on IoT devices

Top IoT uses for manufacturing

Early fire prevention	Quality control	Temperature monitoring	Anomaly detection	Leak detection	Data gathering	Customer experience	Energy management
93%	88%	88%	87%	86%	84%	83%	78%

Top three benefits

1. Better supply chain management
2. Improved asset utilization
3. Higher customer satisfaction

Leela AI
Creating real-time factories

Cyrus Shaoul

CEO, Leela AI

"Today's best practice in manufacturing is achieving real-time, highly accurate visibility into operations so that companies can react swiftly to environmental changes," according to Cyrus Shaoul, CEO and co-founder of Leela AI.

Thanks to advances in AI and IoT technologies, manufacturers are moving towards more autonomy in operation, explains Shaoul. "For example, if a machine slows down unexpectedly, an IoT-connected system can detect this anomaly and initiate corrective actions or alerts without delay, minimizing downtime and bottlenecks."

While traditional sensors have provided foundational data, many manufacturing activities have been very difficult to digitize, especially tasks involving complex, manual steps. "The best practice is using new kinds of sensors like video cameras, IP cameras, to fill in those holes, thereby capturing the nuances of manual work that otherwise remain invisible to digital systems," argues Shaoul.

Leveraging visual AI

In Shaoul's view, AI—particularly computer vision—is critical for monitoring production activities in real time. "Visual AI allows us to accurately interpret high-speed video streams and determine exactly what is happening on the factory floor," he says. "AI enables us to look at every pixel in a video stream. That's an enormous amount of data when you consider there are millions of data points per frame, and we are analyzing 30 frames a second. Our AI algorithms examine what's happening in the video feeds and determine whether someone is starting on a task, completing it, or if an activity is not adding any value. Without AI you would need to hire hundreds of people to do that."

Building a strong data foundation

Such advanced analysis is only possible if you have a modern data management system in place, according to Shaoul. "You need a foundational data platform, where data is collected correctly, stored in a uniform way, and managed with full metadata and taxonomy. And you need an enterprise data team focused on making sure that everything is running properly. Without a data foundation and the people to manage it, even the most advanced IoT and AI systems cannot operate reliably or deliver maximum value." His advice: "Reevaluate your information architecture, remove silos, and ensure that data quality is high enough to drive full scalability and ecosystem integration."

Our research shows that aviation companies are the second most advanced organizations in intelligent connectivity, with 37% identified as leaders. The average aviation company has been using IoT devices for nearly four and half years, longer than the average firm. Aviation companies are already generating an ROI of 19%, significantly above the average for all industries.

The growing use of IoT devices is reshaping the aviation sector into a more intelligent, responsive, and safer industry. Aviation companies draw on IoT connectivity to optimize fuel consumption, improve asset utilization, foster better passenger experiences, and achieve other industry goals.

The average aviation firm uses about five different IoT devices, trailing only manufacturing firms in the number of devices. They also put these devices to greater use: more than nine out of ten use them for early fire prevention and data gathering, and eight out of ten use IoT devices to manage queues and improve people flow.
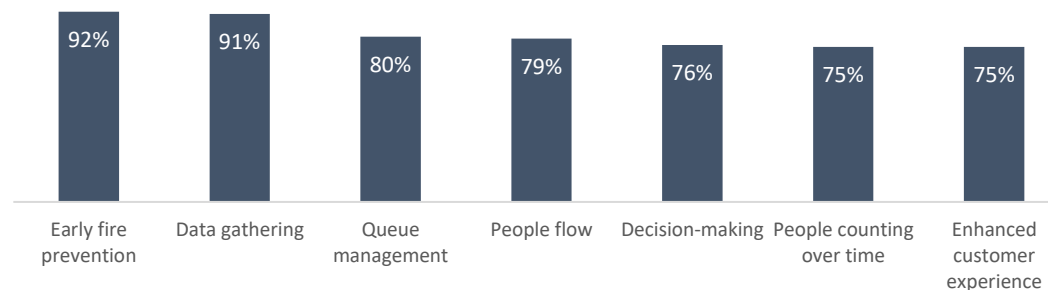
Breakout by IoT maturity

- 16%
- 37%
- 47%

■ Starter ■ Advancer ■ Leader
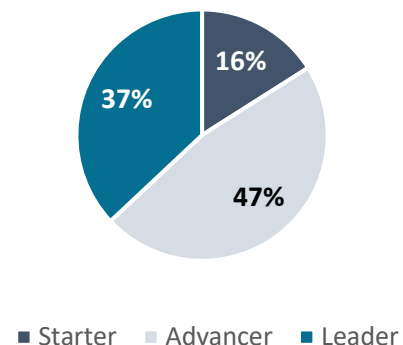
IoT devices used today

Network cameras	93%
Access control	81%
Environmental sensors	73%
Network audio	64%
Robots	55%

19.3% average ROI

4.4 years average period of use

10.1% of IT/OT budget spent on IoT devices

Top IoT uses for aviation

Early fire prevention	Data gathering	Queue management	People flow	Decision-making	People counting over time	Enhanced customer experience
92%	91%	80%	79%	76%	75%	75%

Top three benefits

1. Reduced energy consumption
2. Improved asset utilization
3. Higher customer satisfaction

ThoughtLab

Public transportation has made significant strides in IoT innovation. One-quarter of public transportation agencies are considered leaders in the use of IoT, trailing manufacturing and aviation firms. Their smaller IoT budgets many be holding them back: Public transportation agencies spend 6.7% on IoT vs. over 10% for manufacturing and aviation. Despite the lower spending, they are earning a 16% ROI.

Public transportation agencies use IoT to improve strategic planning and asset utilization and provide their riders with a higher level of customer service. IoT technologies help them transform transit systems into smarter, more responsive networks that better serve urban mobility needs.

The average agency uses 4-5 different IoT devices. Nearly nine out of 10 use them for early fire prevention, over eight out of ten for audio messaging, data gathering, and object detection, and over seven out of ten for quality change, passenger analysis, and enhancing customer experience.

Breakout by IoT maturity

- 18% Starter
- 57% Advancer
- 25% Leader

■ Starter ■ Advancer ■ Leader
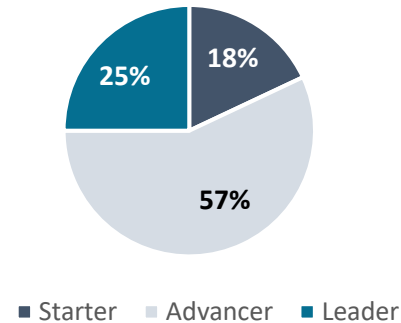
IoT devices used today

Network cameras	88%
Access control	74%
Environmental sensors	73%
Robots	55%
Motion detectors	54%

Top IoT uses for public transportation

Early fire prevention	Audio messages	Data gathering	Object detection	Quality control	People flow	People counting over time	Occupancy in specific areas	Enhanced customer experience
89%	86%	81%	81%	76%	72%	72%	72%	69%

15.9% average ROI

3.8 years average period of use

6.7% of IT/OT budget spent on IoT devices
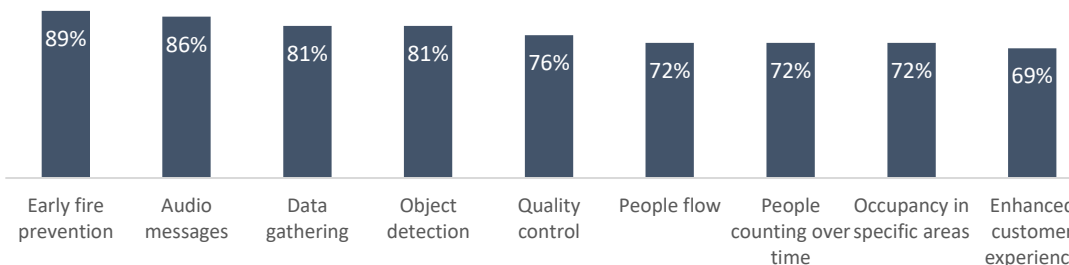
Top three benefits

1. Improved strategic planning
2. Improved asset utilization
3. Higher customer satisfaction

For an industry centered on tracking and managing shipments, IoT can be a game changer. It enables companies to optimize routes, speed up delivery, prevent theft or damage, and comply with safety standards. But despite the many benefits, only 25% of firms in this industry are IoT leaders.

Part of the reason is that cargo and logistics firms are relatively new to the game. The typical firm has used IoT devices for 3.7 years. On average, they invest 9.3% of their IT budgets in IoT and generate a 15% ROI.

The average company uses four different IoT devices, although leaders use 5-6. The main use cases include early fire prevention, visual goods tracking, and identification of blocked exits, all used by about nine out of ten cargo and logistics firms.

The top benefit from IoT use is improved asset utilization, thanks largely to real-time tracking of vehicles and containers and predictive maintenance of equipment. Other key benefits include better supply-chain management and lower operational costs.
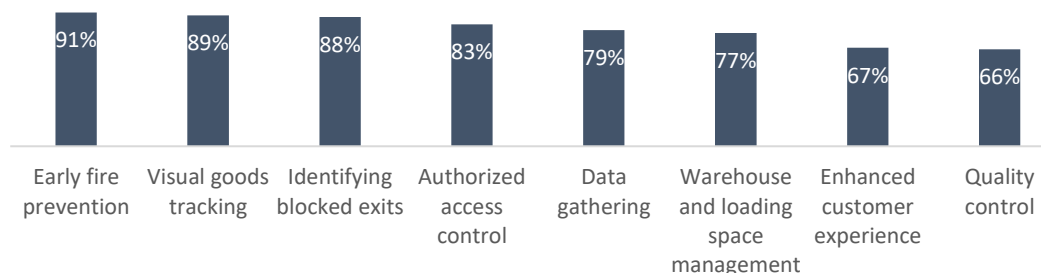
Breakout by IoT maturity

20% 20%

60%

■ Starter ■ Advancer ■ Leader
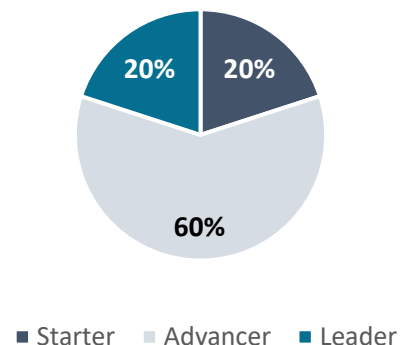
IoT devices used today

Network cameras	88%
Access control	64%
Environmental sensors	63%
Motion detectors	53%
Robots	50%

13.6% average ROI

3.6 years average period of use

9.3% of IT/OT budget spent on IoT devices

Top IoT uses for cargo and logistics

Early fire prevention	Visual goods tracking	Identifying blocked exits	Authorized access control	Data gathering	Warehouse and loading space management	Enhanced customer experience	Quality control
91%	89%	88%	83%	79%	77%	67%	66%

Top three benefits

1. Improved asset utilization
2. Better supply chain management
3. Lower operational cost

ThoughtLab

27

Building a smart, connected enterprise

Driving performance through intelligent logistics

Stefan Borg

CEO, SiB
Solutions

The integration of IoT devices and AI in logistics is revolutionizing the cargo and logistics industry from the ground up. According to Stefan Borg, CEO of SiB Solutions: "In five years, intelligent video and AI solutions will be the industry norm, not the exception."

Borg believes that the combination of AI with real-time data from IoT sensors opens logistics processes to dynamic, proactive management. "Video and computer vision are key to directing robots and assessing conditions in warehouses," explains Borg. This advanced level of on-ground automation significantly improves accuracy and safety, enabling warehouses to operate with minimal human intervention while ensuring more precise goods handling.

Real-time decision making

Thanks to AI, the industry is moving towards real-time decision-making, according to Borg. "With computer vision, we can assess what is actually happening right now in the packing and loading process and combine that with data from warehouse management systems, thereby enabling operational corrections on-the-fly." For example, if someone intends to place a parcel in a designated location, but accidentally places it elsewhere, the AI system can detect that discrepancy and notify the operator instantly. In the future, decision-making in logistics will be automated AI systems providing the insights and information that a 'human in the loop' needs to make the best possible decision in any given context.

Continuous improvement

"By getting visual insights and evidence," says Borg, "you can learn a lot about each process. You can then use that knowledge to finetune processes, provide feedback to operators and workers, and drive continuous improvements." In Borg's view, fact-based, video-supported insights can also reduce the "supply chain blame game" between operators, suppliers, and customers. "By showing people the facts, you can save hours upon hours of time disputing what happened."

These continuous improvements can lead to a litany of benefits, including higher accuracy, safety, and agility. For Borg, the best part is that companies can achieve these benefits with little upfront investment. "Many IoT services are subscription-based. Companies just need to onboard the system, start using it, and enjoying the benefits. Within three to six months, they can expect payback."

Compared to other sectors in this study, retail is behind in the use of intelligent connectivity, with only 18% of firms identified as leaders. The average retailer has used IoT devices for 3.6 years. It typically spends 6.8% of its IT budget on IoT, yielding an average ROI of 11%.

Retailers have been slow to adopt IoT due to their fragmented store environments and onerous legacy infrastructure. In addition, the upfront costs of deploying sensors, smart shelves, and connected devices across multiple locations can be cost prohibitive, particularly for mid-sized chains.

Retailers generally use four different IoT devices. They primarily use them for visual goods tracking, including analyzing the impact of product placement on customer behaviors and improving loss prevention. Another key application is inventory management, where sensors are used for such activities as monitoring stock levels and automatic restocking.

The biggest benefit from IoT innovation is higher customer satisfaction, not surprising for an industry that makes the customer the center of gravity.

Breakout by IoT maturity

20%
18%
62%

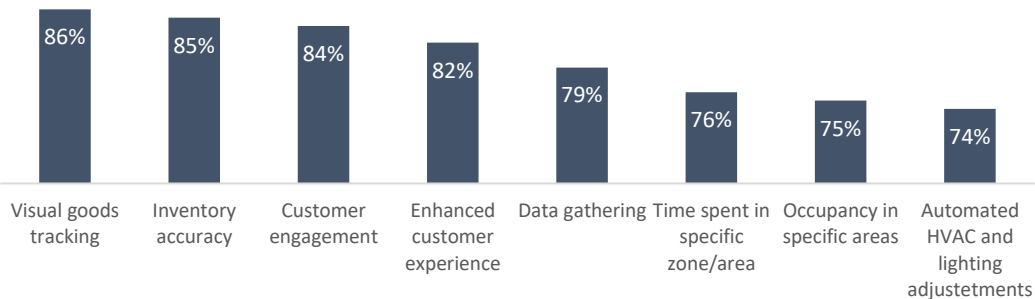■ Starter   ■ Advancer   ■ Leader
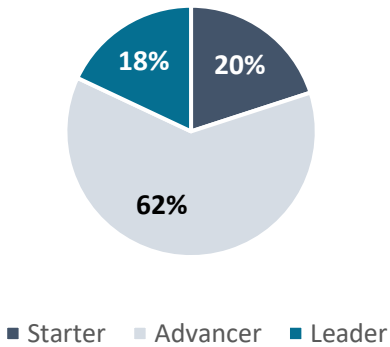
IoT devices used today

Network cameras	89%
Access control	77%
Digital signage	60%
Environmental sensors	57%
Motion detectors	50%

10.7% average ROI

3.6 years average period of use

6.8% of IT/OT budget spent on IoT devices

Top IoT uses for retail

Visual goods tracking	86%
Inventory accuracy	85%
Customer engagement	84%
Enhanced customer experience	82%
Data gathering	79%
Time spent in specific zone/area	76%
Occupancy in specific areas	75%
Automated HVAC and lighting adjustetments	74%

Top three benefits

1. Higher customer satisfaction
2. Improved strategic planning
3. Better decision-making

ThoughtLab

Building a smart, connected enterprise

Stephen Borg

CEO, meldCX

Retailers today face a mix of urgent challenges: safeguarding customer privacy, reducing high infrastructure costs, boosting sales conversion, and monetizing store space. Extreme edge computing—running AI directly inside IoT devices such as cameras and kiosks—offers a breakthrough response. By processing data at the very source, retailers eliminate the need to transmit or store sensitive images, minimizing compliance and security risks while cutting network and cloud costs.

Stephen Borg, CEO of meldCX, explains: "True best practice is to process data at its origin. Our on-camera approach ensures that only anonymized, de-identified data points ever leave the device—delivering unparalleled privacy, trust, and scalability for retailers."

Immediate benefits

Traditional warehouse management systems rely on centralized data processing, often leading to delays and limited insight into ongoing processes. In contrast, extreme edge computing involves deploying powerful sensors, cameras, and AI-driven devices directly within the warehouse environment. These devices analyze data locally, enabling immediate insights and autonomous decision-making that were previously impossible.

According to Borg, on-camera analytics reveal aggregated, anonymized insights into shopper dwell times, shelf interactions, and in-store movement patterns—empowering retailers to optimize space and boost product conversion. Retailers can see, for example, which demographics are most drawn to a product or whether customers frequently pick it up but ultimately choose a competitor. "Every square foot of the store becomes an asset to be optimized and monetized," says Borg. The approach also elevates customer service. Real-time on-camera signals enable staff to engage shoppers at the right moment—reducing missed opportunities and abandoned purchases. "Understanding your environment in real time changes the game," Borg adds.

What's next

The next step is democratization: retailers will be able to use what Borg calls "digital building blocks." These are preconfigured AI modules that can be combined anonymously to track behaviors such as hand movement, product engagement, or dwell time without the need for costly model training. This will allow non-technical teams to create new use cases quickly, lowering barriers to entry.

Healthcare providers are the least advanced organizations in our study, with only 3% classified of leaders. Healthcare providers have been slow to adopt IoT devices, with the average company using them for 2.6 years. Because of the lagging uptake of IoT, healthcare is seeing a lower ROI than other industries, just 3.6%.

Healthcare providers have been held back by privacy concerns around patient data, as well as by strict regulatory standards. Limited budgets have also been a barrier, with only 4.7% of industry IT and OT budgets spent on IoT devices. The average healthcare provider uses only three different IoT devices, the fewest of all the sectors surveyed.

IoT holds great promise for the industry. The top use cases include emergency-coded alerts, occupancy estimates, and remote patient monitoring. Healthcare respondents cite enhanced operational performance, including improving patient triaging, monitoring, and care, as the main benefit of IoT innovation, followed by improved planning and decision making.
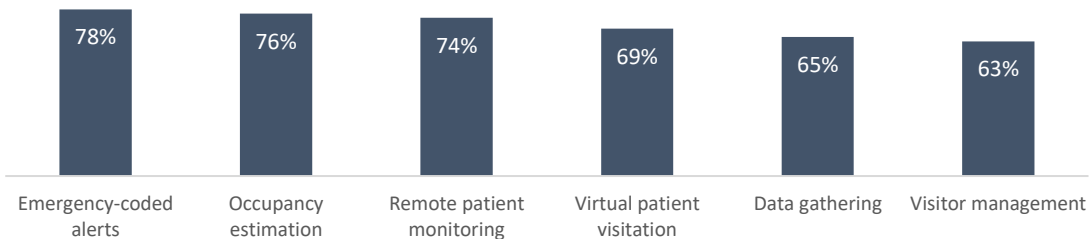
Breakout by IoT maturity

44%

53%

■ Starter   ■ Advancer   ■ Leader
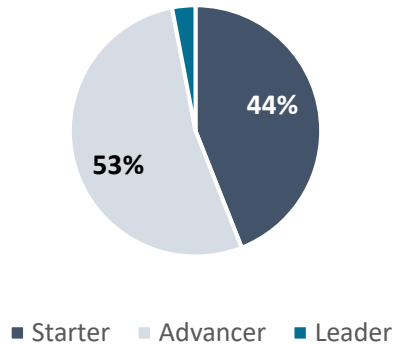
IoT devices used today

Network cameras	83%
Access control	62%
Motion detectors	37%
Environmental sensors	36%
Digital signage	29%

3.6% average ROI

2.6 years average period of use

4.7% of IT/OT budget spent on IoT devices

Top IoT uses for healthcare

Emergency-coded alerts	Occupancy estimation	Remote patient monitoring	Virtual patient visitation	Data gathering	Visitor management
78%	76%	74%	69%	65%	63%

Top three benefits

1. Enhanced operational performance
2. Improved strategic planning
3. Better decision-making

Calls to action

Six steps to becoming a smart connected leader

Carl Staël von Holstein

Business Development Director–Future Business, Axis Communications

1. Start with a strategic vision

Smart connected leaders start with a long-term vision and strategic commitment from the management team. Without a well-defined goal and strategic roadmap, IoT progress will meander and stagnate. A vision will guide investments and foster organizational alignment around a smart, connected strategy.

2. Implement in stages

Focus on a single use case. Explore how to add value through AI. Then grow from the initial success. Follow an iterative process and refine your strategy through continuous feedback and a culture of experimentation. This approach will allow your organization to learn, adapt, and demonstrate ROI early, building momentum for broader IoT transformation.

3. Prioritize interoperability

Interoperability and open architecture are fundamental to success. By using APIs and open frameworks your organization can build integrated platforms that allow diverse systems and devices to work seamlessly together. It won't work if data sits in different platforms. You need to create an ecosystem that promotes data sharing, minimizes silos, and maximizes value from linked systems.

4. Integrate physical and digital systems

Divisions between physical and digital environments are blurring in today's business world, so it is critical to blend operational and information technology. Without combining the two, you're only halfway there. Maximum value comes from integration. It will enable you to take AI insights and automation to the next level.

5. Think long term

While quick wins can demonstrate immediate value, sustainable IoT leadership requires an unwavering focus on your organization's long-term vision and goals. Leaders dedicated to a strategic, future-oriented approach will develop capabilities like predictive maintenance and autonomous decision-making that give them a competitive advantage.

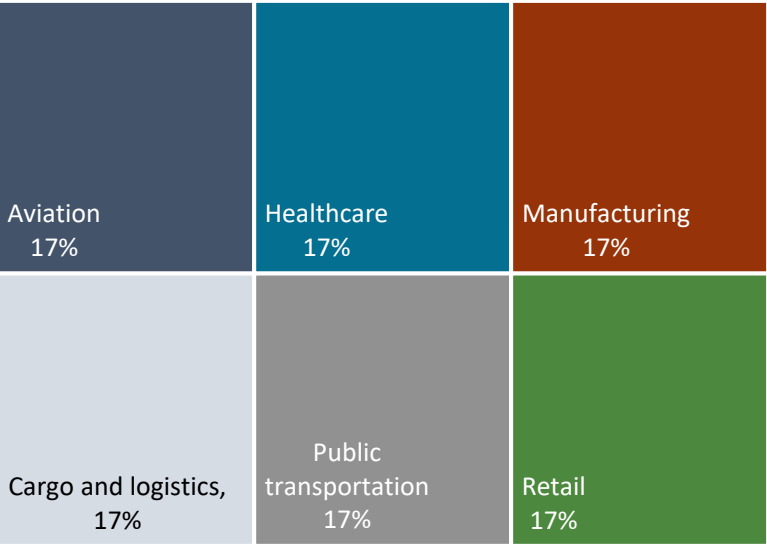## 6. Foster a culture of collaboration

Successful leaders invest in their people and foster collaboration. They know that internal cooperation and the use of cross-functional teams -- as well as ecosystem partners -- are crucial for navigating the complexities of becoming a smart, connected enterprise and for bolstering ROI.
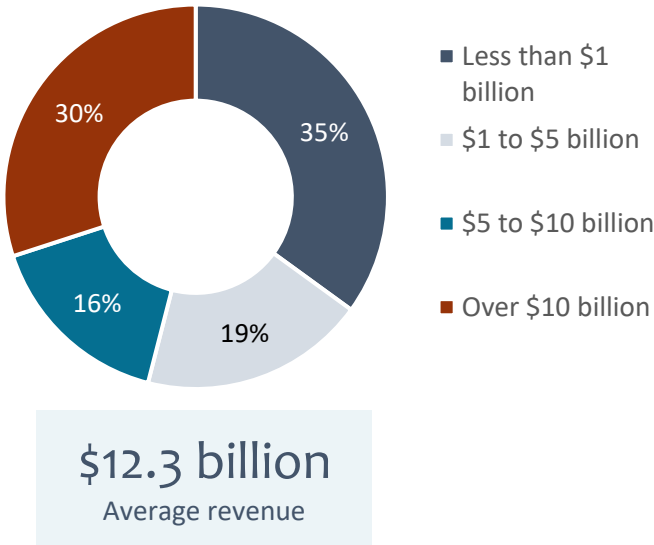
Appendix: Survey sample

Survey demographics

To better understand where organizations are in their connectivity journeys, ThoughtLab and Axis Communications conducted a study of 600 respondents across North America, Europe, and the Asia-Pacific region in Q3 of 2025.

Respondents by sector

| Aviation 17% | Healthcare 17% | Manufacturing 17% |
| Cargo and logistics, 17% | Public transportation 17% | Retail 17% |

Respondents by revenue

- Less than $1 billion
- $1 to $5 billion
- $5 to $10 billion
- Over $10 billion

35%
30%
19%
16%

$12.3 billion
Average revenue

Respondents by region and country

Australia	10%
India	10%
Japan	10%
Asia Pacific	**30%**
France	10%
Germany	10%
Poland	8%
UAE	8%
UK	10%
Europe	**46%**
Canada	10%
United States	13%
North America	**23%**

ThoughtLab

ThoughtLab is an innovative thought leadership and economic research firm providing fresh ideas and evidence-based analysis to help business and government leaders cope with transformative change. We specialize in analyzing the impact of technological, economic, and demographic shifts on industries, cities, and companies.

To learn more about ThoughtLab, visit: **www.thoughtlabgroup.com**

For further information about this study, please contact:

Lou Celi, Chief Executive Officer
louceli@thoughtlabgroup.com

Daniel Miles, Chief Economist
danielmiles@thoughtlabgroup.com

Building a smart, connected enterprise