Intelligent
Connections

Reinventing enterprises
with Intelligent IoT
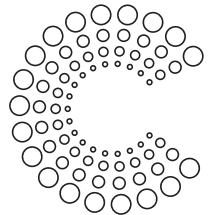
This report draws on input from 3,158 conversations with C-suite executives from July through September 2017. It is part of the 19th edition in our ongoing series of CxO studies from the IBM Institute for Business Value (IBV). We have had over 12,000 conversations with CxOs in 2017. Here, we explore their perspectives on how the Internet of Things (IoT) can enable the Digital Reinvention™ of enterprises. See ibm.com/globalcsuitestudy.

How IBM can help

Clients need strategies and operating plans to harness the game-changing potential of real-time actionable insights, to apply predictive analytics to processes and assets, and to enable their digital transformations. Intelligent IoT is creating the potential to enable new markets and grow new revenue streams. We see this rapidly evolving competence pushing at the boundaries of what is possible today. IBM Digital Operations for IoT and supply chain management offers integrated services, software and infrastructure solutions. Connect with us to navigate this dynamic, rapidly changing landscape and apply artificial intelligence (AI)/learning machines computing power to IoT. Visit ibm.com/services/us/business-consulting/digital-operations-internetofthings.

Amplifying performance

As virtually everything becomes connected and data proliferates, enterprises should address three great opportunities:

- Enabling deeper customer relationships

- Finding new sources of value through data

- Accelerating the digital transformation of their operations.

Those leading the way are amplifying their performance—capturing numerous diverse forms of data from a variety of interconnected devices—and leveraging that data using AI-based applications to reach new levels of operational and financial proficiency. They are developing personalized customer services and experiences that transform their brands and open entirely new opportunities for monetization and competitive conquest. How? They are applying intelligence to the data deluge from connected things.

Shifting forces

Competitors are offering more compelling value propositions through the use of innovative technologies and more effective approaches to delivery. It's no surprise that industry incumbents are feeling enormous pressure on their current business models.

Industry convergence—the merging of industries as suppliers, distributors, customers and competitors cooperate in ecosystems created to deliver new products and services—continues to be a primary catalyst for many of the strategic decisions being made in boardrooms around the world.

In response, many C-suite executives plan to modify elements of their existing business models in order to deliver new value propositions within their market, and/or shift their company's position in the industry value chain. They are recognizing a strong need to reinvent their enterprises by digitizing communications and interactions as part of a shift from product and service innovation to creating superior customer experiences (see sidebar on page 3, "Speeding auto manufacturing: Lowering downtime and raising efficiency").

A Japanese automobile manufacturer utilizes IoT to model the behavior of their welding process. The manufacturer wanted to identify causal factors of failures and faults, identify top predictors of equipment failure, and improve production line availability and reliability.

The new system delivers 90 percent prediction of faults with no false positives; 50 percent of the faults are predicted over 2 hours in advance. The company saved 1.5 hours per fault thanks to advanced prediction.

Speeding auto manufacturing: Lowering downtime and raising efficiency[1]

IoT is a significant component of the reinvention strategy and execution plans for a majority of C-suite executives. Sixty-six percent of the executives surveyed in 2017 are currently executing plans to incorporate IoT into their operating models. For many in this group, their reinvention agenda also includes applying AI to optimize processes and create further insight from virtually all of their interconnected things (see sidebar on page 4, "Degrees of connectedness in IoT").

"Revolutionary services and applications will be the biggest outcome of combining IoT and AI. Many standalone businesses will undergo reinvention and will become part of integrated networks."

Chief Information Officer, IT and Professional Services, Switzerland

IoT refers to the growing range of connected devices that send and receive data across the Internet without human interaction.

A *device* is any object with embedded electronics that can transfer data over a network. Examples are wearables and environmental sensors that monitor factory equipment; in-home or office building conditions; or components of mobile assets, such as trucks, trains and aircraft.

Things are *connected* when the devices are attached to the Internet or private network, can exchange data and are uniquely addressable.

Things are *interconnected* when they can interact with each other and with decision agents via the Internet or private network.

Things are *intelligently interconnected* when the data is parsed into analytic or AI-based algorithms for autonomous decision making and to drive more efficient machine-to-human interaction. The combination of these foundational (such as IoT) and emerging (such as AI, bots, robots) technologies are "cognitive" engines capable of:

- Continually building knowledge and learning
- Understanding natural language
- Reasoning and interacting more naturally with human beings than traditional programmable systems.

The end result of these converging technologies is a set of capabilities that can vastly extend efficiency, speed and value across the enterprise.
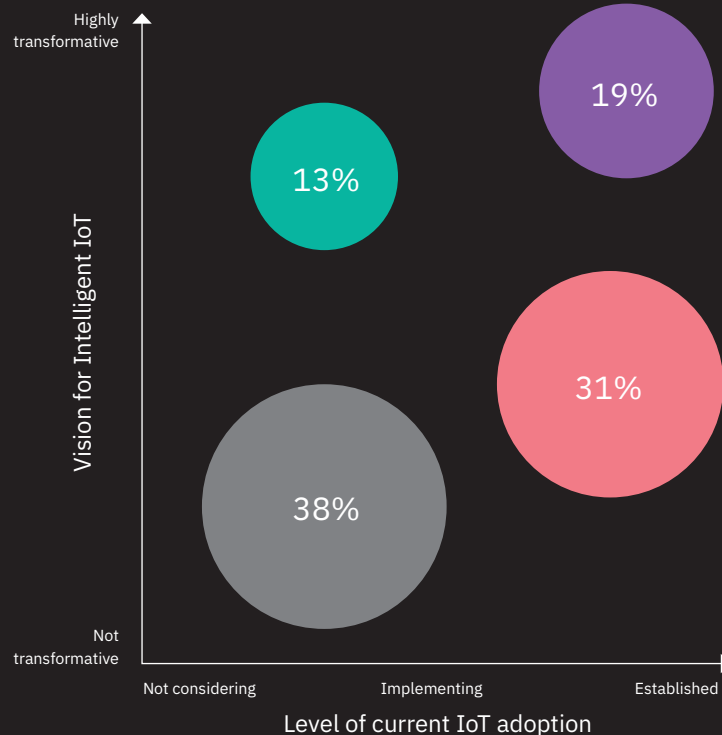
Degrees of connectedness in IoT

Figure 1

Reinventors
Tacticians
Aspirationals
Observers

IoT + AI archetypes

We segmented our respondents by their current use of IoT and vision for Intelligent IoT

Note: Totals do not equal 100% due to rounding.

Meet the Reinventors

We segmented study participants based on their current adoption of IoT to automate their business processes, coupled with their vision for reinventing their enterprises by applying AI to their IoT networks (see Figure 1).

Our analysis reveals significant differences in capabilities, strategies and enterprise agility, with four archetypes emerging. We call them Reinventors, Tacticians, Aspirationals and Observers.

The Reinventors (19 percent of surveyed CxOs) have the highest levels of IoT adoption and take a visionary approach to an Intelligent IoT strategy. They leverage a broad range of internal and external data, using it to innovate their products and services, and design new customer experiences. Their vision for AI is to bring real-time insights and "on-the-spot" actions across the enterprise and ecosystem, ultimately driving growth and prosperity.

Reinventors stand out as leaders in financial performance and innovation; their clarity of vision, execution agility and collaboration may have already paid off (see Figure 2).

In this study, we compare the two archetypes most active with IoT today: Reinventors and Tacticians. Their salient points of differentiation are clarity of vision, aligned strategies and execution agility. These collectively drive improved performance and innovation in the era of Intelligent IoT — and other organizations can learn from these examples.

We explore these perspectives and approaches across three chapters:

Interconnecting the ecosystem
Building a platform for growth
Reinventors leap ahead

Figure 2

Reinventors
Tacticians

The Reinventors stand out for leading in financial performance and innovation among industry peers

Financial performance and market perception (past 2–3 years)

58%   77%

55%   77%

54%   80%

High revenue growth

High profitability

Leading innovator
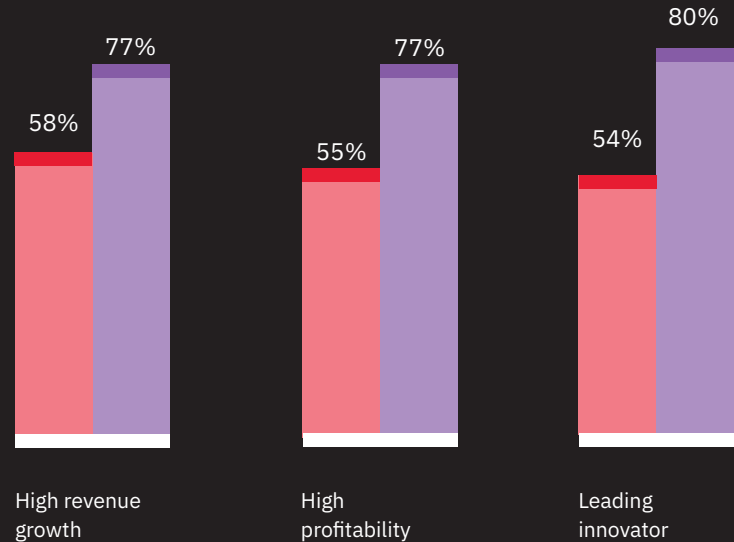
Interconnecting the ecosystem

Reinventors are investing in IoT to drive innovation from insights gained in analyzing and using integrated and interconnected data. They are moving from *capturing* IoT sensor data to *leveraging* it for competitive advantage (see sidebar on page 8, "PhotonStar Technology: Helps customers anticipate weather and remotely adjust building systems").

They have a vision for driving operational excellence by using insights from virtually every connected thing. Reinventors want to develop intelligence by orchestrating connections across their business ecosystem. They know that faster, more extensive access to data can drive insights that uncover new business opportunities and create a competitive advantage. And they are amplifying the value of IoT to enable better and faster actions. With AI applied to IoT and ecosystem data, they are reinventing the customer experience, as well as their business and operating models.[2]

"AI and IoT could help us fully integrate data suppliers and data consumers into a data-driven business model."

Chief Financial Officer, Life Sciences and Pharmaceuticals, Germany

Buildings consume 42 percent of all electricity worldwide

Heating, ventilation, air conditioning and lighting represent the largest energy costs for businesses. PhotonStar Technology in the UK is creating control systems to manage buildings and facilities. Their cognitive IoT platform solution collects key metrics such as energy use and building occupancy, securely encrypts the information and consolidates it for analysis on the cloud. There, customers use dashboards to track efficiency, create predictive maintenance plans and remotely monitor real-time status.

For instance, a customer can remotely test emergency lights or check to see whether a restaurant's refrigerator temperature is in the proper range. Integrated building management delivers reduction in operating costs, and new insights into how buildings are utilized by their occupants that can help define future space and other use requirements.

PhotonStar Technology:
Helps customers anticipate weather and remotely adjust building systems[3]

Reinventors collaborate to innovate

Reinventors excel at using customer data and competitor information to continuously innovate their products and services. They scrutinize available data to understand customer needs and anticipate their wants, and they also analyze their competitors' responses to customer demands. They are using these insights to evaluate, reengineer and fine-tune their customer experiences. Even more impressively, they are using data to identify previously undefined and unmet customer needs (see Figure 3).

Reinventors then go a step further. They bring customers into the discussion to collaborate on new product design specifications and on service improvements.
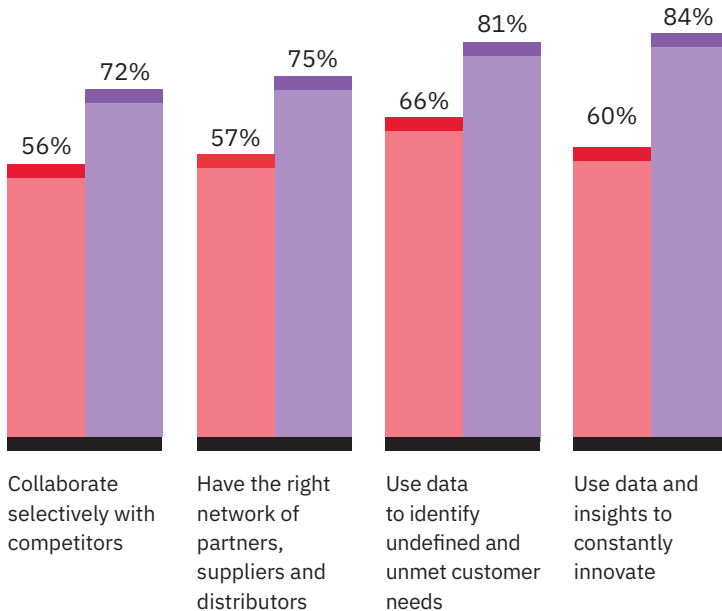
Reinventors' competitive strategy is to modernize or diversify their capabilities, products and services, and to be innovative forward-thinkers. To accomplish this, they embrace their network of business partners. Seventy-five percent of Reinventors report having the right network of partners, suppliers and distributors to execute their business strategy, compared to only 57 percent of Tacticians.

Figure 3

Reinventors
Tacticians

Reinventors excel at using customer data while collaborating with competitors to innovate products and services

Effectiveness at creating compelling customer experiences

	Collaborate selectively with competitors	Have the right network of partners, suppliers and distributors	Use data to identify undefined and unmet customer needs	Use data and insights to constantly innovate
Tacticians	56%	57%	66%	60%
Reinventors	72%	75%	81%	84%

And they don't stop there. Reinventors leverage their competition as well. Although it's challenging to strike the right balance between trust and protecting intellectual property, nearly three quarters of the Reinventors also collaborate — selectively — with their competitors. Many realize that co-opetition has historically led to technological innovation within and across industries. This is often achieved through joint go-to-market and cooperative investments.

Reinventors understand the importance of an inclusive organizational culture with empowered employees. They promote and support collaboration and knowledge sharing. Eight in ten Reinventors report that they empower their teams to decide on the best course of action, compared to only half of Tacticians.

Reinventors also have a fluid work structure that is built upon cross-functional teams collaborating and working together in a non-threatening, non-competitive environment. The focus is on outcomes. Their organizational culture equally rewards fast failure (trial may lead to error but also new learning through iterative attempts) and successful innovation.[4] Seventy-four percent exhibit strong experimentation and iterative practices, reporting that they engage in rapid prototyping, envisioning, creation, trial and scale, whereas only 52 percent of Tacticians have adopted agile execution approaches.

In short, Reinventors collaborate to innovate.

Building a platform for growth

Both Reinventors and Tacticians have made equal strides toward implementing the foundational capabilities needed to create a network of IoT devices, and to capture and explore the mountain of data generated by those devices.

But Reinventors have evolved much further in one critical area—creating highly scalable IoT infrastructure. As connectivity increases the capabilities of IoT products and services, network complexity and data grow exponentially. That requires a robust platform that is engineered to scale (see Figure 4).

These IoT platforms can support billions of devices and trillions of messages and can process and route those messages to endpoints and to other devices. Key components for scale include:

• Cloud infrastructure

• Device connectivity management software

• IoT Platform as a Service (PaaS)

• IoT data storage/data lakes

• Microservices

This cloud-based computing environment supports the rapid development and management of applications and analytics required to leverage the value of large volumes of real-time data (see sidebar on page 12, "Growth: In every sense of the word").

Figure 4

**Reinventors
Tacticians**

Reinventors are extending their connectivity capabilities by building highly scalable IoT platforms

IoT technologies selected or implemented

77%
70%
45%
48%
61%
35%

Network services

Data analytics

Connectivity for products and devices
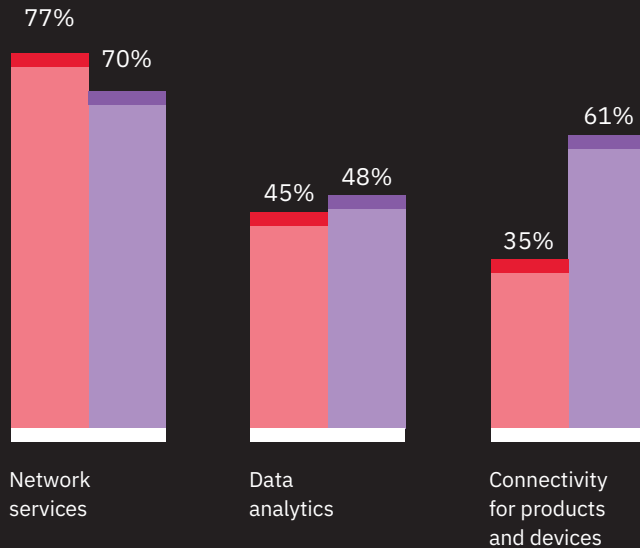
"The IoT allows us to collect vast amounts of data in real-time streams. Without intelligence, though, IoT is just sending in data from devices. AI can quickly find nuances and trends in that data to improve our decision-making and reveal new opportunities."

Frederik Soendergaard-Jensen, Managing Director, Collabor8, Mauritius

Successfully executing an IoT strategy is not without peripheral challenges and risks. Reinventors cite securing their IoT platform and devices as a top challenge (see Figure 5). A world of connected things makes them, the data they produce and use, and the systems and applications that support them vulnerable. As enterprises expand the deployment of their IoT footprint, they need to engineer and design for security concerns, creating policy requirements that are well defined, considered and addressed. (See sidebar on page 13, "Product innovation: Your car can become a contactless credit card with Visa.")

A world of connected things makes them, the data they produce and use, and the systems and applications that support them vulnerable.

Farming relies on many factors working in concert to deliver a crop. It's challenging work involving a lot of intuition—at least until recently. What happens when farmers can combine satellite imagery of crop canopy size, water status, and water use? Better yields. Farmers using IoT sensors and multiple sources of environmental data can treat crops with precision. Precision agriculture provides the ability to reduce water usage by up to 25 percent, which saves the environment while providing better economic outcomes for farmers.
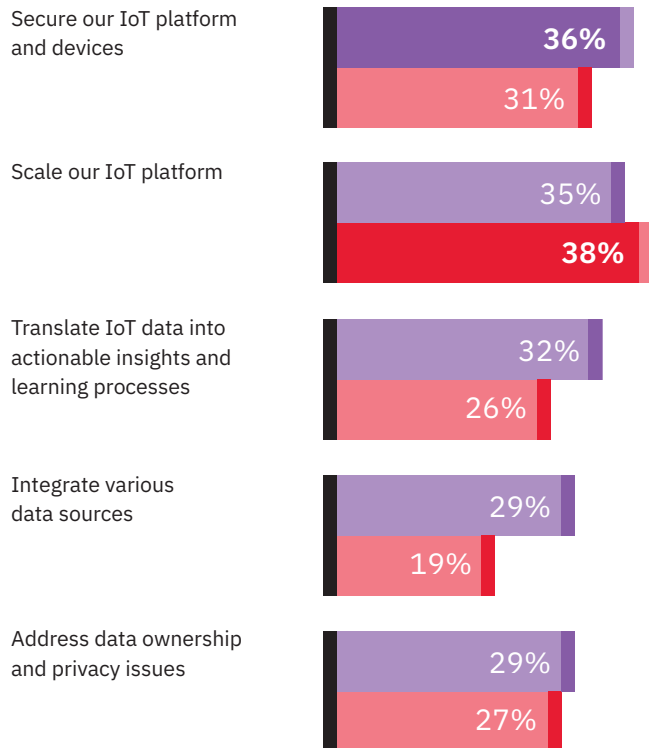
Growth: In every sense of the word[5]

Reinventors
Tacticians

Securing the IoT platform and devices is a top challenge

Challenges the enterprise faces in executing an IoT strategy

Secure our IoT platform and devices

36%

31%

Scale our IoT platform

35%

38%

Translate IoT data into actionable insights and learning processes

32%

26%

Integrate various data sources

29%

19%

Address data ownership and privacy issues

29%

27%

Visa is enabling secure payment experiences through IoT. Businesses can now introduce secure payment services using a Visa Token Service—a new security technology that replaces sensitive payment account information found on payment cards with a unique digital identifier.

Commerce transactions can now occur via any connected object, bringing new levels of simplicity and convenience.

Product innovation: Your car can become a contactless credit card with Visa[6]

Connectivity advances to interconnectivity

Reinventors indicate they have invested, on average, more extensively across foundational technologies such as cloud, mobile and IoT. 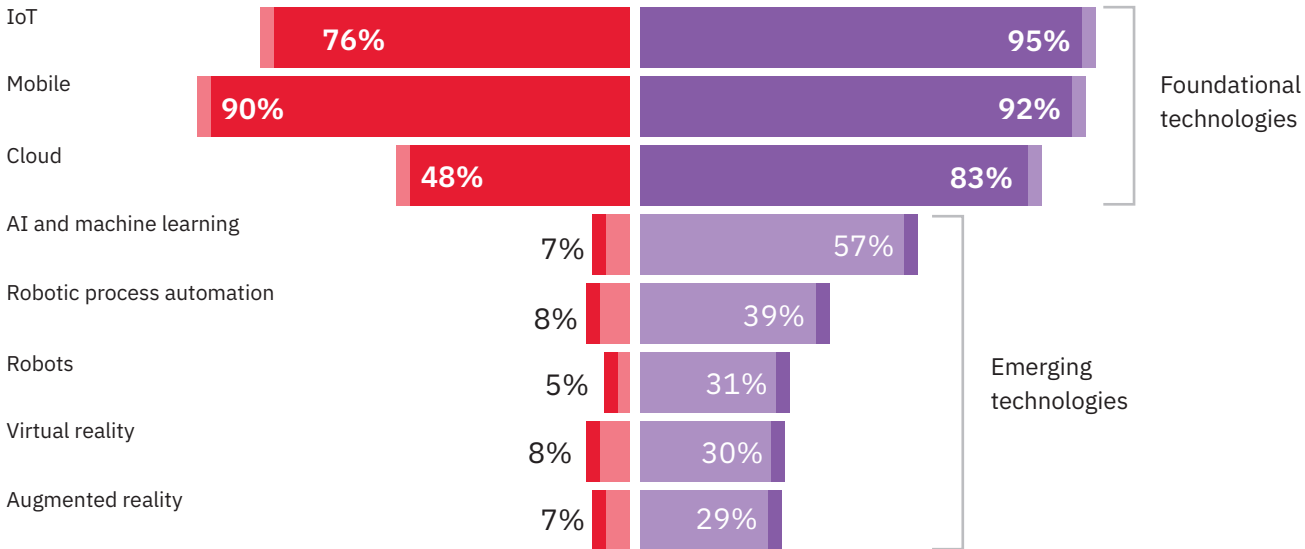They're also indicating a significantly greater commitment than Tacticians to future investment in emerging technologies that leverage AI and data. These could include robotic process automation, physical robots and virtual and augmented reality (see Figure 6).

Figure 6

Reinventors
Tacticians

Reinventors are more committed to investing in emerging technologies to enable a host of future capabilities

Very likely to invest in the following technologies to enable strategic goals

Technology	Tacticians	Reinventors	
IoT	76%	95%	Foundational technologies
Mobile	90%	92%	
Cloud	48%	83%	
AI and machine learning	7%	57%	Emerging technologies
Robotic process automation	8%	39%	
Robots	5%	31%	
Virtual reality	8%	30%	
Augmented reality	7%	29%	

Moving through plans, building, turnover and maintenance, building engineers are using IoT and augmented reality to see through walls to provide personnel with more technical guidance:

- What is behind the wall?
- Where exactly is it?
- How do I fix/operate it?

It enables non-experienced personnel to perform maintenance-guided operations, reducing specialists' time and costs, and extending remote expertise across field technicians. It captures tacit knowledge of the workforce while simplifying and shortening the completion time and complexity of technical operations.

Seeing through walls: IoT and augmented reality reveal new value for builders[7]

Reinventors report they are deploying these technologies to enable a multitude of future capabilities across operations, customer interactions and transactions, and to create the digital platforms that underpin their business ecosystem.

Supporting the business ecosystem by linking complex networks of suppliers, distributors, customers—and even competitors—is one of *the* essential success factors to digitally reinvent the business model.

"Our biggest opportunity is to understand our business models not only as 'business-to-business,' but also as 'business-to-business-to-customer' and even 'business-to-business-to-society.'"

Tetsuji Ohashi, President and Chief Executive Officer, Komatsu Ltd., Japan

Enabling the ecosystem to function at scale requires engineering prowess coupled with the wherewithal to execute (see sidebar on page 15, "Seeing through walls: IoT and augmented reality reveal new value for builders"). Strong alignment between IT strategy and business strategy is one factor that enables successful execution—and Reinventors overwhelmingly excel in this regard (see Figure 7). Not only that, but more than two thirds of the CIOs in Reinventor organizations say they are effective at building the digital foundation needed to support their business ecosystem, compared to less than half of Tacticians.

Strong alignment between IT strategy and business strategy is one factor that enables successful execution—and Reinventors overwhelmingly excel in this regard.

Figure 7

Reinventors
Tacticians

Reinventors excel at aligning their IT strategy to their business strategy

IT and business strategy are very closely aligned

65% more

48%   79%
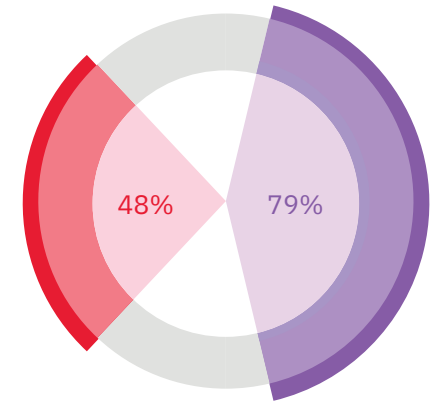
Reshaping the workforce

The convergence of new technologies and intelligent machines is reshaping the future of work. Leveraging emerging technologies to optimize business performance and extract valuable insights from proliferating data is creating new opportunities.

For example, traditional methods of analyzing structured data aren't designed to efficiently process the vast amounts of real-time data that stream from IoT devices. AI-based analysis and response becomes critical for extracting optimal value from that data.

This has significant consequences for the future of the workforce. Human workers can evolve to higher-value tasks associated with understanding and exploiting AI-driven insights, and reinforcing those findings. They can leverage the AI solution's machine learning capabilities to "teach" or train it—and apply the insights to innovate their business or operating model.

These changes contribute to two value propositions:

• The potential for an abundance of new human workforce roles, many of which provide a higher return on investment in terms of labor dollars

• The ability to optimize the monetization of data.

In 2012, Nucleus Research found the scientific concept of half-life can be applied to data to measure both its initial and diminishing value.[8] In fact, a great deal of environmental data from IoT devices has a short life, with value diminishing rapidly over time. Humans can't process this data fast enough, but AI in combination with IoT has the potential to manage change at this scale and complexity.

This additional complexity is due to several factors:

• IoT data is growing twice as fast as social- and computer-generated data

• Much of IoT data processing happens at the edge—where data is created and human interaction occurs

• The scale and diversity of IoT data creates ambiguity and uncertainty that programmable systems struggle to handle.

To help overcome these limitations, Reinventors are looking to find and sustain new opportunities for differentiation by integrating IoT with AI and machine learning technologies—and by driving the technology and human skillsets needed to take advantage of those opportunities.

The change management implications for technology adoption, leadership and workforce requirements are broad and complex, though not impossible to control. Much of what drives greater success for Reinventors is cultural, from their leadership transparency to more iterative, learning-based implementation styles. Reinventors rise to the challenge and manage the ensuing change. They have been highly successful at managing change in the past and continue to be highly effective at managing the ongoing reinvention needed to execute their digital strategy (see Figure 8).

The change management implications for technology adoption, leadership and workforce requirements are broad and complex, though not impossible to control.

Figure 8

Reinventors
Tacticians

Part of what drives greater success for Reinventors is cultural: They rise to the challenge of managing change

52% 85%
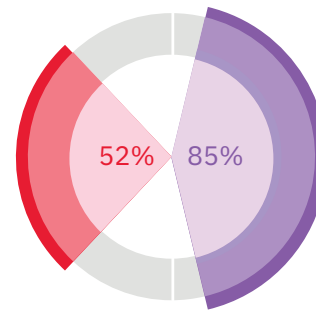
63% more

Highly successful at managing change **in the past**

44% 87%
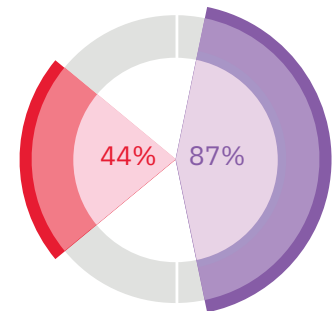
98% more

Highly effective at organizational change **today**

Reinventors leap ahead

Reinventors have a vision to integrate AI with IoT across the business. Two thirds *strongly agree* that the full potential of IoT can only be realized with the introduction of AI technologies, as compared to only one out of ten Tacticians (see Figure 9).
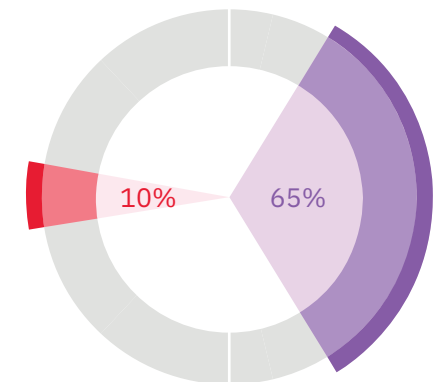
Figure 9

Reinventors
Tacticians

Reinventors have a vision to integrate AI with IoT across the business

With the addition of AI and machine learning, the full potential of IoT can be realized

550% more

10%

65%

AI and machine learning can help overcome the limitations of traditional programmable computing systems—helping organizations to better manage the scale, diversity and complexity of IoT:

- With AI and machine learning, systems don't need to be explicitly programmed. They learn from interactions with users and experiences with the environment. This enables them to keep pace with IoT complexity and havoc.

- Machine learning is moving from computer labs and web applications to the physical world, where current levels of digital training data and computing power make it functional and actionable. The ability to embed learning capabilities within the device itself, plus marry device-centric insights with aggregated intelligence in the cloud, is expected to dramatically improve outcomes.

- AI and machine learning can bring intelligence into things, systems and processes so they can understand your goals and then integrate and analyze the relevant data to help you achieve them.

Creating intelligent, intuitive technology with AI and machine learning

Figure 10
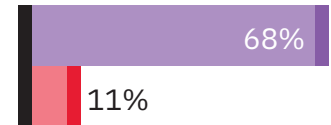
Reinventors
Tacticians

Intelligent IoT can enable business model reinvention leading to new services and revenue streams

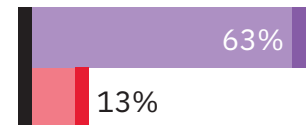Understanding of the benefits from combining IoT and AI

Improve quality and operational efficiency, with less human and financial risk
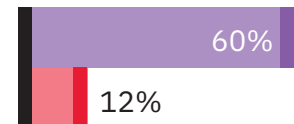70%
14%
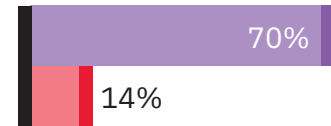
Enable new services, business models and revenue streams
68%
11%

Enable new patterns, opportunities and actionable insights
63%
13%

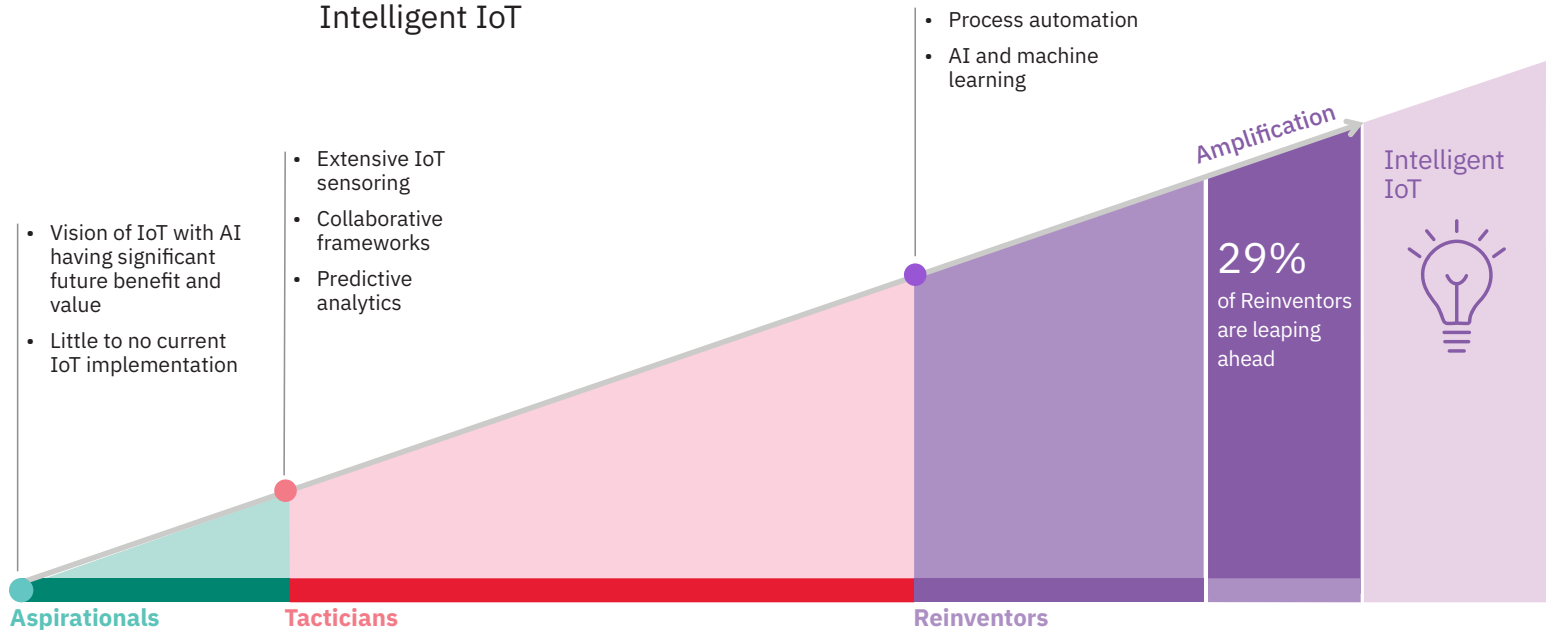Enable new classes of IoT products and services that sense, reason and learn
60%
12%

Reinventors understand that with the addition of AI, the full potential of IoT can be leveraged for business model reinvention (see sidebar on page 20, "Creating intelligent, intuitive technology with AI and machine learning"). With intelligence, they can introduce new products, discover new opportunities, reduce risk and increase revenue (see Figure 10).

Among the Reinventor participants in our analysis, we discovered that roughly 30 percent (5 percent of all participants) are actively embracing *Intelligent IoT*—the combination of IoT and AI (see Figure 11).

Figure 11

An elite group of Reinventors is furthest along in the journey toward Intelligent IoT

- Process automation
- AI and machine learning

- Extensive IoT sensoring
- Collaborative frameworks
- Predictive analytics

- Vision of IoT with AI having significant future benefit and value
- Little to no current IoT implementation

Amplification

Intelligent IoT

29%
of Reinventors are leaping ahead

Aspirationals   **Tacticians**   **Reinventors**

HVAC (heating, ventilation and air conditioning) companies typically offer warranty and maintenance service through certified dealers, but face an inefficient, complex and slow detection cycle from product defects and fraudulent claims.

Using advanced statistical analysis and predictive modeling to revolutionize the warranty claims process, one company is joining claims data, dealer service reports and real-time sensor data on installed components to trigger failure and performance event notifications.

With predictive models to spot trends and anomalies, claim processing cycle times have improved 20 percent, while reducing required support personnel by 5 percent.

We examined—through a closer lens—Reinventors' preparedness and plans for increased intelligence and automation, and their expected outcomes.

These trailblazing Reinventors have the strategy and resources in place to execute their vision. Elements of their strategy are developed, tested and refined before being implemented. And they obtain extensive input from the operational side of the business to help ensure they get it right (see sidebar, "What's really cool? An HVAC provider finds warranty savings in IoT").

One of the challenges with introducing machine learning into the work environment is the optimal design and change management of human-machine interaction.[10]

These trailblazing Reinventors have the strategy and resources in place to execute their vision.

What's really cool? An HVAC provider finds warranty savings in IoT[9]

Humans should not only be trained to work alongside intelligent machines that can sense, evaluate and respond to their environments. They also need to understand how their own role may shift to higher-value activities. While higher-value work for humans may be the outcome of these investments, getting there requires considerable attention to training the machines and retraining humans in new ways to work.

This elite group of Reinventors is poised to tackle this challenge, with over 90 percent reporting investments in continuously

improving their employees' skills to remain competitive. Ultimately, they have a clearer vision for how AI and IoT can help to amplify their business performance (see Figure 12).

Reinventors are far more focused on developing intelligent connections across multiple dimensions of their business ecosystem. They do this to drive strategic outcomes such as improving their decision-making capability or enabling the development of new services, revenue streams and business models (see sidebar on page 24, "IoT + AI for process and operations: Who doesn't want 100 percent one-year payback?").

Figure 12

Reinventors have a clear vision of how AI and IoT—combined —can amplify their business

Future combination of AI and machine learning with IoT technologies

Intelligence
(AI potential, insights, new products)

47%   100%

All other Reinventors | Trailblazing Reinventors

+

Automation
(quality, efficiency, risk reduction, device-to-human)

47%   100%

All other Reinventors | Trailblazing Reinventors

=

Outcomes
(new business models and services, revenue streams)

52%   100%

All other Reinventors | Trailblazing Reinventors
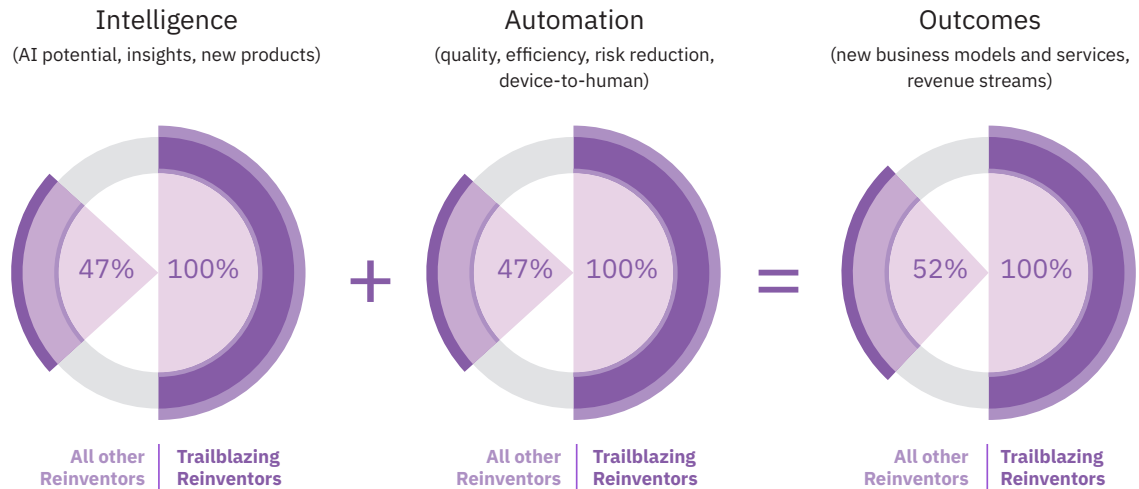
A major aircraft manufacturer is using IoT to maintain calibration of precision assembly tools and improve manufacturing quality.

Using data gathered from shop floor tools along with equipment failure data, the solution uses predictive quality analytics to generate models that identify tools likely to need servicing. Faulty tools are proactively removed from the shop floor to be maintained and recalibrated, leading to significant improvements in manufacturing quality.

This approach enabled a 100 percent payback within one year—avoiding millions of dollars of rework and months of production delays by preventing out-of-alignment tools from remaining in the aircraft production workflow.

"By combining new analytical models, IoT data sources and cognitive machine learning, we can achieve new customer insights, and increase customer loyalty and stickiness."

Chief Information Officer, Telecommunications, United States

IoT + AI for process and operations: Who doesn't want 100 percent one-year payback?[11]

The journey toward Intelligent IoT and automation

To reinvent your enterprise capabilities by leveraging Intelligent IoT, a well-constructed program based on specific use cases is a great starting point.

Develop a clear vision

- *Design* for a connected, software-driven world. Develop and articulate a clear vision of your AI/IoT strategy. Back it up with reinvention roadmaps and execution plans. Communicate this vision to your stakeholders.

- *Create* an organizational culture of inclusion. Promote and support collaboration and knowledge-sharing with employees.

- *Equip* engineers, developers and operations to deal with unprecedented complexity and technology developments. Enable agile, globally distributed teams to deliver the right skills.

Build the platform

- *Leverage* a broad range of internal and external data across your ecosystem and use that data to design new customer experiences. Evaluate and even include select competitors to innovate your products and services.

- *Build* for scale. Optimize connected assets, equipment and processes across your supply chain to transform yield and quality, and reduce cost.

- *Ensure* that operational excellence, transparency and trust are the cornerstones of your enterprise culture.

Reinvent with intelligence

- *Infuse* operations and customer experience with IoT intelligence and automation. AI can enable new classes of IoT products and services that sense, reason and learn.

- *Automate* and optimize processes to improve quality and operational efficiency with less human and financial risk.

- *Develop* new revenue sources by transforming products, services and experience with individualized interactions delivered through new services, great design and new features that customers cherish.

Interconnect devices, data, employees, partners and customers. Infuse new intelligence into your enterprise. Receive an abundance of insights derived from intelligent connections.

It's a journey. Performance = inclusion + infusion + intelligence.

Our research methodology

The IBM IBV, in cooperation with Oxford Economics, interviewed 3,158 C-suite executives from 91 countries and 20 industries worldwide. Information was collected through a combination of 2,676 live phone interviews and 482 face-to-face meetings conducted from July through September 2017. Respondents in our study were a balanced mix of six C-suite roles: Chief Executive Officers, Chief Finance Officers, Chief Human Resource Officers, Chief Information Officers, Chief Marketing Officers and Chief Operating Officers.

We analyzed responses to questions about their current levels of automation and their ability to leverage structured and unstructured data, coupled with their current and future plans to invest in AI for IoT-based applications. This analysis yielded four unique archetypes (Reinventors, Tacticians, Aspirationals and Observers). A broader set of macro, general business, role-specific and industry-specific questions were analyzed against those archetypes. In addition, we analyzed participants' contextual responses using the IBM Watson Natural Language Classifier to obtain overarching themes and priorities.
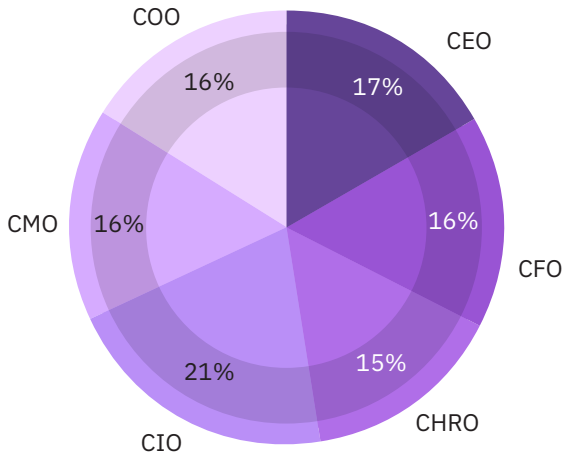
Note: Totals do not equal 100% due to rounding.
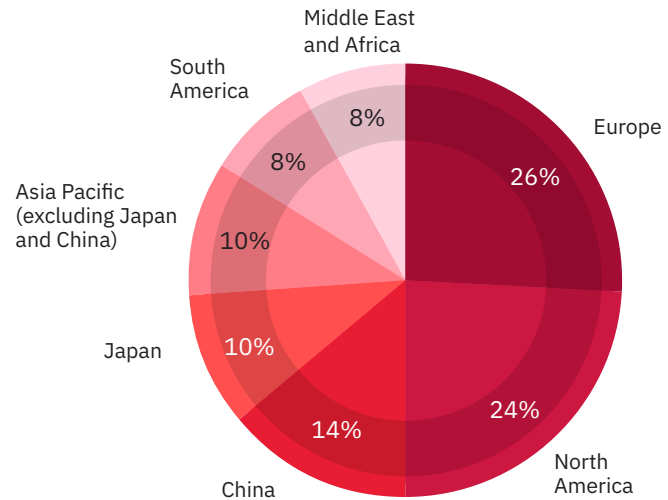
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For more information

To learn more about this IBM Institute for Business Value study, please contact us at iibv@us.ibm.com. Follow @IBMIBV on Twitter, and for a full catalog of our research or to subscribe to our monthly newsletter, visit: ibm.com/iibv.

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IBM Institute for Business Value

The IBM Institute for Business Value, part of IBM Global Business Services, develops fact-based strategic insights for senior business executives around critical public and private sector issues.

Notes and sources

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