

Forbesinsights

2,000 Days:

The CIO's World In 2025

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Over the next few years, chief information officers (CIOs) will **preside over a maelstrom of change** that will fundamentally alter the way their companies do business in the future.

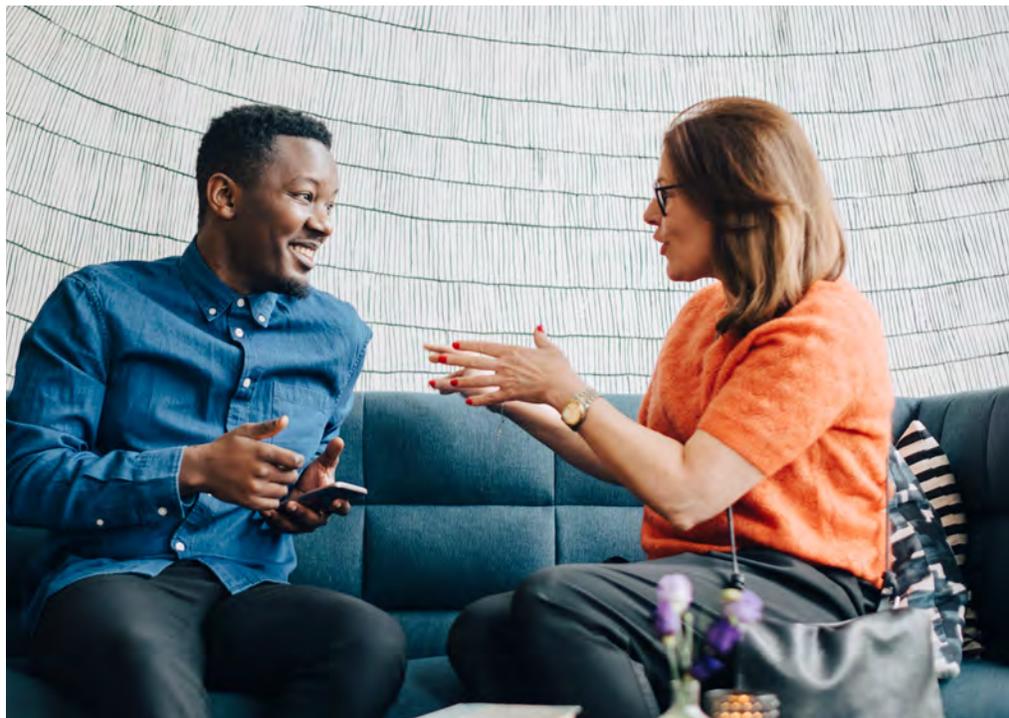
Those who navigate with skill and foresight will have the opportunity to guide their companies to new levels of success, while those who ignore important trends and insist on doing business as usual will see their companies fall into decline.

By 2025, successful CIOs will play a much more strategic role than they do today. As they roll out fast-moving technologies like artificial intelligence (AI) and machine learning (ML), they will transform business models and gain a host of new responsibilities. They will create products, services and entirely new business lines designed to generate revenue. They will lead the enterprise through a period of tremendous cultural change as teams are forced to acquire new skills in order to realize the benefits of emerging technologies.

They will also be expected to achieve new social responsibility goals, not only striving to prevent harm at a time of increasingly grave cyber threats, but engaging in efforts to improve the environment, foster social justice and reduce the digital divide in education.

These are some of the key findings from a Forbes Insights survey of more than 650 CIOs, which was conducted in partnership with VMware. The survey covered a broad range of industries, including financial services, healthcare, government, manufacturing, retail and telecommunications. The CIOs were from organizations with annual revenues of \$1 billion or more, with 16% from firms with \$10 billion or more in revenue.

This report explores how the world for CIOs is rapidly changing and what their role will look like in 2025.



CIOs Will Be At The Center Of The Business

Today's CIOs already hold positions of significant responsibility, and they expect their roles to expand substantially, the survey found. In five years' time, 66% expect to be key decision-makers for corporate strategy, with those in the government, manufacturing and financial services sectors leading the way.

In five years, 66% of CIOs expect to be key decision-makers for corporate strategy.

Nearly 60% of CIOs expect to hold a seat on their company's board of directors in five years, showing that the investors and stakeholders who appoint them value technology expertise in the executives who will guide their companies into the future.

CIOs in the consumer-facing healthcare and retail industries, which are rapidly developing apps for their customers, have the highest expectations of achieving a board seat. Consumer use of retail apps [doubled](#) last year, and the global market for health apps is expected to grow from \$8 billion in 2018 to [\\$111 billion](#) by 2025.

"A company's board needs the expertise of the CIO to unleash this potential to serve consumers and drive business growth," says Shivani Saini, CIO of Asia-Pacific Consumer Healthcare for GlaxoSmithKline.

CIOs' influence in all industries will continue to rise as they become not only technology implementors, but also architects of new business models, introducing products and services and directing changes that will transform enterprise efficiency.

"Technology has historically been seen as an enabling function, not a company-driving function. To be effective in their role, CIOs must become drivers of change throughout the organization, leading the thinking about how technology impacts the company and how it can be used as a critical weapon in the fight for survival," says David Gledhill, CIO and group head of technology and operations at DBS Bank, a global bank based in Singapore.

As part of an eight-member executive team driving the bank's strategy, Gledhill has spent the past few years describing technology's fundamental role in every aspect of the business. "A lot of my time

has been focused on helping to shape the thinking on the strategic leadership team—how do we inform, educate and inspire the thinking of the board and the executive team around the technological shift?"

As a result of these discussions, strategic thinking has changed, he says. "The entire leadership team is starting to think like CIOs, looking at how technology is used and how it is disrupting the business."

59%
of CIOs expect to hold a seat on their company's board of directors by 2025.

CIOs Will Be At The Center Of The Business

By 2025, Gledhill expects the link between technology and business strategy will be stronger throughout the enterprise world.

“To achieve success in 2025, you won’t just have a CIO banging a drum for technology, but a collection of CIOs-slash-business leaders who understand the importance of technology and know how to drive technological disruption into the business,” he says.

As that disruption occurs, technology will transform the way enterprises operate, and CIOs will guide more decisions about where to make changes to achieve the best results. In five years, over 60% expect to be the enterprise’s primary leader of corporate innovation.

“I have the opportunity to shape the innovation agenda and play the role of venture capitalist,” says Shankar Arumugavelu, senior vice president and global CIO at Verizon Wireless. “I can show what is possible with technology and give guidance about where we need to place some bets.”

61%

of CIOs expect to be the primary leader of corporate innovation in 2025.

CIOs Will Be At The Center Of The Business

Asked where in the company they expect their influence to increase, 60% of CIOs said they will have much greater influence over product design and development (Figure 1), a reflection of the growing strategic importance of apps.

As CIOs harness the power of AI and ML to develop more capable apps and decrease the time-to-market for new products and services, they will also need to upgrade the skills of existing staff and compete to hire scarce top-notch talent. Half expect to play a greater role in human resources in the next few years.

CIOs will also forge closer relationships with chief operating officers and chief marketing officers, enabling them to use customer data in ways they never thought possible. "Data is the fuel for innovation. We can use it for optimizing operations and differentiating the customer experience," Arumugavelu says.

Another area where CIOs will play a greater role is in regulatory compliance. As laws safeguarding personal information increase, CIOs will be called upon to find ways of increasing data security and providing better disclosures and more data-sharing options for customers.

As CIOs gain expertise solving business problems and developing profitable new services across the enterprise, they're ideal candidates for the top position—CEO. In the survey, nearly half (49%) said they expect to become CEO by 2025.

FIGURE 1

Top Areas Where CIOs' Influence Will Grow

Expect Influence To Grow Substantially



49% of today's CIOs
expect to become CEOs
by 2025.



AI And Machine Learning Will Drive Transformation

Over the next five years, CIOs will roll out game-changing technologies that will turn their organizations into beehives of productivity and create a new generation of data-driven products.

The most important of the new technologies will be AI, which a quarter of CIOs cited as their top priority. Nearly as many chose ML and IoT, which often work in tandem with AI.

“We are working on AI across the entire spectrum of the company, from robotic process automation (RPA) for back-office processes to customer-facing chatbots that provide a human-like conversational experience,” Arumugavelu says.



25% of CIOs say AI is their top priority.

AI And Machine Learning Will Drive Transformation

AI is a blockbuster technology expected to produce an extra [\\$13 trillion](#) in global economic value by 2030. [Nearly half](#) of organizations use at least one AI-powered function in their business activities. Gartner lists IoT as a top strategic technology trend, and predicts that by 2021 there will be [25 billion](#) internet-connected “things.”

Though AI applications are still in their infancy now, CIOs see them as the keys to the future. The more AI is used in products and internal business applications, the greater importance it will assume for companies' bottom lines. Over 60% of CIOs said that by 2025, AI and ML will be very important or critical to their business (Figure 2).

Emerging technologies open the door to creativity, allowing enterprises to develop promising new products and innovative solutions to boost efficiency. In addition to developing more capable chatbots, Verizon is experimenting with computer vision, analyzing satellite images to identify new locations for its networks. That saves the company from countless hours of ground-based hunting and

uncovers areas it might not have known to search. Verizon also plans to use predictive analytics to make its networks self-optimizing, eventually solving problems on their own, without the need for an on-site technician.

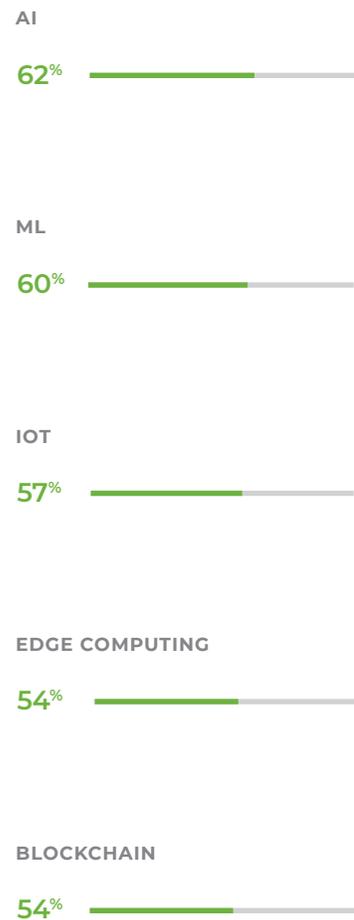
“As we build confidence with algorithms, I foresee self-optimizing networks becoming ubiquitous,” Arumugavelu says.

AI's potential is enormous—and so are its challenges. One of the most difficult is avoiding algorithmic bias that leads to unintended discrimination. Organizations like [AI Now](#) are looking into ways to avoid bias and ensure that AI is used responsibly. [Microsoft](#) has called for world governments to enact regulations governing the powerful technology. But for now, companies are largely on their own.

FIGURE 2

Top 5 Critical Future Technologies

Very Important Or Critical In 5 Years





>60%

of CIOs believe AI and ML will be very important or critical to their business in five years.

AI And Machine Learning Will Drive Transformation

“You need to have a plan of attack for AI and machine learning. If you just let it evolve, it can be very dangerous,” says Gledhill, whose company implemented 280 different AI solutions last year, from credit analytics to recruiting, employee engagement and customer service chatbots. Developing strong data governance policies, cleansing the data and avoiding model bias are crucial when adopting AI, Gledhill says.

Another challenge will be managing technology’s impact on employees.

“Anything that is a repeatable transaction is an opportunity for us to apply machine learning and automation,” says Sarah Haywood, chief technology officer and vice president of technology at Denmark-based brewer Carlsberg Group. “Suddenly people are doing less work, and the work they are doing is harder. They’re faced with complex issues that need human interaction to resolve. It will shift the type of people we are employing.”

“You have to engineer the company for completely new disciplines and skill sets,” Gledhill says. “Doing that at scale and maintaining control are the secrets to success.”



Driving Revenue Generation

One of the CIO's most important responsibilities in 2025 will be creating new sources of income. Many revenue-generating applications will use customer data, either by packaging and selling it or using it to develop internal or external apps. CIOs will work closely with marketing and sales executives, and some will join them in client meetings (Figure 3).

Over half of CIOs are already responsible for at least some revenue-generating initiatives, and by 2020, that figure will rise to 89%. By 2025, developing money-making initiatives will be a standard part of the CIO's role.

Other studies bolster these findings. In a 2018 [Gartner survey](#), 55% of CIOs listed increasing revenue as one of their job objectives. In [another study](#), over 80% of CIOs said they experience intense pressure to defend their technology investments and prove ROI. By 2020, one report said, [80% of IT leaders](#) will find their compensation aligned with the extent to which they achieve business KPIs and growth.

Many CIOs see technology becoming a key driver of business expansion.

"Technology is not just about improving efficiency; it's about gaining insights to improve sales and consumer engagement. We should absolutely be focusing on top-line growth," Haywood says.

Indeed, at many companies, technology and business results are so tightly interwoven that they are becoming indistinguishable. "Business equals technology," Gledhill says. "My job is not just providing information technology, but delivering on business outcomes and customer satisfaction."

FIGURE 3

How Will CIOs Make Money In The Next Five Years?

Revenue Initiative To Implement

PACKAGING AND SELLING CUSTOMER DATA TO A THIRD PARTY

20%

DIRECTLY MANAGING CUSTOMER DATA

18%

PROVIDING IT SERVICES TO THIRD PARTIES

17%

JOINING SALES AND BUSINESS DEVELOPMENT STAFF FOR CLIENT MEETINGS

16%

SELLING INTERNALLY DEVELOPED APPS TO THIRD PARTIES

15%

MANAGING CUSTOMER RELATIONSHIPS THROUGH THE USE OF CUSTOMER DATA

13%

New Weapons Needed In The Cybersecurity Battle

CIOs have worried about cyber-threats for years, and AI and IoT applications are increasing the attack surface exponentially. The odds that a company will experience a data breach in the next two years are now greater than one in four, and the average cost of a breach has risen to nearly \$4 million, according to the Ponemon Institute's 2018 [Cost of a Data Breach](#) study.

Another hot-button issue is data misuse, which has become a consumer focus in light of the Facebook/Cambridge Analytica debacle and other recent data privacy scandals. Regulations like the EU's General Data Protection Regulation (GDPR) and California's Consumer Privacy Act attempt to address both data use and security breaches with a bevy of new rules and fines.

In response, companies are increasing protections for customer and employee data and strengthening their cyber defenses with new tools and better training in online safety. Many have upped the budgets of their security operations centers.

But it's not enough, according to the survey's CIOs, who believe that the proliferation of data and the sophistication of cybercriminals

are outpacing organizations' ability to keep up. When asked whether cybercrime would lead to a shutdown of the internet, 35% say it was likely or very likely to happen.

Eighty-four percent say they believe the internet needs to be significantly overhauled and restructured to control cyber risk.

As forward-thinking companies develop new solutions—including securing and centrally managing the growing number of application programming interfaces (APIs) that businesses employ—the conversation about security is bound to evolve.

Arumugavelu, though he doesn't foresee a general internet shutdown, agrees that risks are becoming more complex and new solutions would be welcome.

"The internet was founded on openness and universal access, which has served us well. But it was created in a period before everyone had a smartphone in their hands and access to high-speed bandwidth. If we designed a new internet, would we do it differently? I don't have a prescriptive answer, but perhaps there may be an opportunity here."

84%
of enterprise CIOs
believe the internet
needs an overhaul
to control cyber risk.

A Deeper Role In Social Responsibility

Today's CIOs care deeply about the impact technology has on society. In the survey, an overwhelming majority disagreed with the once-prevalent notion that their only responsibility is to work toward making the company more profitable. Nearly 70% said they have a responsibility to prevent technology from causing social harm.

But CIOs also believe they can do much more to help society. Nearly 70% say they have a responsibility to use technology for the greater social good.

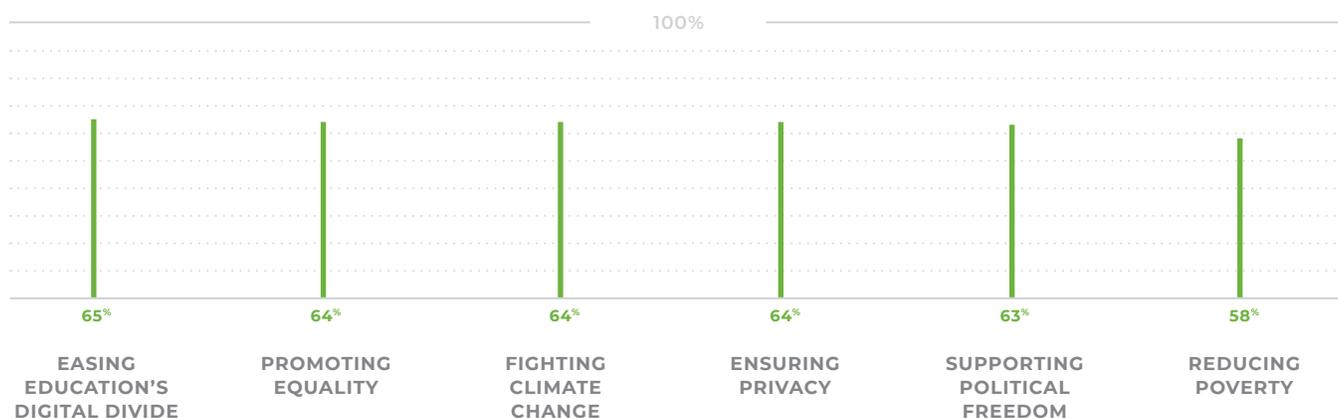
CIOs believe they can help their companies fight climate change and ease the digital divide in education, as well as promote equality and fight poverty (Figure 4).

FIGURE 4

Making The World A Better Place

How CIOs Plan To Foster Social Good

■ CIOs HAVE AN IMPORTANT ROLE



Nearly

70%

of CIOs **feel a responsibility** to use technology for the greater social good.



Driving Social Responsibility

Behind these aspirations lies a trend toward holding businesses more responsible for social outcomes. Part of the reason is the greater transparency today's technology provides: Corporate actions are frequently scrutinized and discussed on social media, where companies have little control.

In addition, Millennials, who will comprise [35%](#) of the global workforce by 2020, have high expectations for corporate social responsibility, and many believe businesses aren't meeting them. In a 2019 [survey of Millennials](#), just 55% said business has positive social effects; in 2018, for comparison's sake, 61% said it did. Millennials are also making consumption decisions based on companies' social responsibility reputations, creating a direct effect on their bottom lines.

Companies have noted this trend and are taking on a larger role in promoting the social good. In a recent [Forbes Insights and Deloitte survey](#), 95% of respondents said their company planned to take a more aggressive position on social-impact issues, and over half are devoting a percentage of revenues to programs meant to have social

consequences. [In a second Forbes Insights and Deloitte survey](#), nearly 75% of business leaders said their organization had changed its products or developed new ones to generate positive societal impact.

Executives, including CIOs, are increasingly judged—and are judging themselves—on their social responsibility performance, the Forbes Insights and VMware survey shows. When CIOs were asked what was the single greatest cultural or professional change they needed to make to be successful, one of the top responses was “make technology play a role for the public

good.” In the second Forbes and Deloitte survey, more than a third of executives said “societal impact” was the most important factor used to judge their performance.

By 2025, achieving progress in social responsibility goals will likely be a standard measure of CIO performance.

To be successful in 2025, CIOs must use technology to further the social good.

How CIOs Will Achieve Social Responsibility Goals

Technology leaders have many opportunities to contribute to the social good. Here are some areas where they are likely to accelerate their efforts over the next five years:

Creating An App Democracy

By encouraging the development of apps that democratize services, CIOs can contribute to equality while also fulfilling their companies' revenue goals.

"With technology, we can do things at scale which we have only been able to do manually for a select percentage of our customer base," Gledhill says. "Wealth management advice was once for the supremely wealthy, but now we're able to touch a much wider portion of the population."

Technology can help reduce poverty, too. The Bill and Melinda Gates Foundation has helped companies create [apps](#) that allow unbanked people in Kenya and Bangladesh to transfer money by sending a text message on their phones. The [World Bank](#) is investigating the use of blockchain to reduce fees on payment transfers and establish unalterable property records in paper-based economies.

In Colombia, a private [startup](#) created a bicycle delivery app to transport goods along heavily congested and polluted roads.

The service now operates in seven South and Central American countries and has provided jobs to over 100,000 unemployed people, many of them Venezuelans who fled to escape political persecution. SoftBank recently decided to invest \$1 billion in the company, saying it will improve the lives of millions in the region.

In Zambia, a London insurance executive created [MicroEnsure](#), a company that partners with local telecoms to provide insurance to the poor. Customers can acquire various types of insurance simply by buying extra minutes of cellphone time. The company now has more than 56 million customers in emerging economies.

Companies like these are examples of the "[prosperity paradox](#)"—which describes the ability of entrepreneurs to create products that somehow become successful in countries that appear to lack the infrastructure needed to support them.

Rather than waiting for governments or NGOs to improve education, transportation, manufacturing capacity or lending,

these startups home in on unmet consumer demand, developing ad hoc solutions that are profitable from the start. Once they begin to succeed, they attract investors and partners eager to help with infrastructure and financing. CIOs play a critical role here, supplying the young companies with the technology expertise they need to develop solutions and scale.

Easing The Digital Divide

Sixty-five percent of CIOs in the survey said they can help ease the digital divide in young people's education.

"A big focus of ours is bridging the digital divide. We have given over 1 million kids a technology education, and our goal is 2 million more by 2021," Arumugavelu says.

Teaching young people technology skills not only improves their prospects—it can also help companies fill IT jobs in tight employment markets, says Anton Rutten, head of IT systems for Rabobank, an international bank based in the Netherlands.

Partnering with a nonprofit, Rabobank's IT staffers visit school

How CIOs Will Achieve Social Responsibility Goals

classrooms during paid working hours to educate children in technology. The bank also supports STEM education for girls.

“In the Netherlands, only 10% of people in IT education are girls. If we want to solve the talent problem, we need to get more women in tech. We’re sowing the seeds to fill jobs in 10 years’ time,” Rutten says.

The bank also gives its technology staff opportunities to work on projects that further the social good. Software engineers build platforms for the food and agricultural department, which works with large companies to reduce food waste, optimize nutritional value, reduce sugar and fat content, and lower the carbon dioxide footprint of agriculture operations.

Projects with a social impact also help the bank attract talent.

“We find it’s important to candidates to spend time working for the greater good of society. It’s one of the reasons they want to work for us,” Rutten says.

Protecting The Environment

Over 60% of the CIOs in the survey believe they have a role in fighting climate change. One place they can start is with their own operations.

The IT sector is an enormous consumer of energy, accounting for 7% of world electricity consumption, according to [Greenpeace International](#). That proportion could rise to 13% by [2030](#). Moving more workloads to the cloud could have a significant positive impact on the environment. [A study published in 2018](#) by Microsoft and the professional services consultancy WSP found that carbon emissions associated with the Microsoft cloud are 98 percent lower than those produced by on-premise data centers.

Technology leaders can make a further difference by switching to renewable energy. Led by technology giants, including Google, Facebook, Amazon and Apple, U.S. companies achieved a [new record](#) in renewable energy procurement last year, and more than a hundred have set themselves the goal of using 100% renewable energy in the future. VMWare, for its part,

announced in November 2018 that its business operations had become carbon neutral, two years sooner than the company had expected. In June 2019 it [announced](#) that it was now running 100% of its operations using renewable energy, a year ahead of schedule.

Companies in the manufacturing sector, where IoT sensors are used extensively, have additional opportunities to increase energy efficiency.

“In our breweries, sensors measure performance of the machinery, the use of water and heating. That allows us to optimize the performance of the line and therefore reduce the environmental impact,” says Haywood of Carlsberg Group. The company’s goal is to reduce its water waste and carbon footprint to zero. “The data we gather from the machinery in our breweries will drive insights to help us work toward that goal,” she says.





The New CIO

The Forbes Insights survey shows that over the next five years, CIOs will be key leaders in evolving their organizations. They will shoulder more strategic responsibilities across a broader span of the business and find ways to generate profits with new products and services. They will need to search for the right solutions and the right talent as they implement rapidly evolving technologies, including AI, ML and IoT. They will need to enlist the support of both corporate stakeholders and employees.

On top of all that, the CIOs of 2025 will be seeking radical new solutions to cybersecurity problems that have plagued their organizations for years.

Though they face many challenges, CIOs are not pessimistic. They expect to use their role not only to transform their companies, but also to engage in issues they are passionate about, including improving the environment, fighting for social justice and improving technology education for all.

CIOs know they can't fulfill all these new responsibilities by themselves. But by forming strategic partnerships with other corporate leaders and forward-thinking technology companies, they can build stronger businesses and a better world.

Methodology

Forbes Insights and VMware surveyed 652 CIOs around the globe about the future of their role in April 2019. Some 31% of respondents were from North America; 39% from Europe; and 30% from the Asia-Pacific region, including Japan. These CIOs represented a wide range of industries, including financial services, government, healthcare, manufacturing, retail and telecommunications. All CIOs were from organizations with annual revenues of \$1 billion or more, with 16% from firms with \$10 billion or more in revenue.

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