CIOs Need To Take The Lead On AI For Transformational Outcomes Across The Company

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Executive Summary

Artificial intelligence (AI) — a broad set of technology building blocks that help systems sense, think, learn, and act — is fundamentally reshaping business, and enterprises are embracing it at an unprecedented rate. AI is helping deliver revenue growth with better customer experiences, increasing innovation, and improving operational effectiveness. However, most firms are just getting started, and many are pursuing a broad array of uncoordinated AI initiatives. Challenges and risks abound, and IT teams are playing catch-up and are sometimes bypassed altogether.

CIOs must take the helm, engage the lines of business on their AI initiatives, and ultimately drive the AI agenda to ensure successful outcomes and mitigate risks. CIOs are optimally positioned to build the organization's overall AI capabilities as the data, applications, server, accelerator, fabric, and storage infrastructures that they manage are critical for driving business value with AI. However, their IT teams will need to transform. CIOs need to invest in new software applications, infrastructure, and platforms necessary for AI, and modernize existing systems to better support the ever-increasing number of AI initiatives.

Dell EMC commissioned Forrester Consulting to examine AI and its impact on the IT team and IT transformation efforts. Forrester conducted a global online survey with 353 respondents with decision-making responsibility for AI technologies to explore this topic. Survey respondents were from large enterprises; specifically, 33% of respondents were in companies with over 5,000 employees and 8% had over 20,000 employees.

KEY FINDINGS

› **AI is more than hype: The gains from AI initiatives are real.** Half of companies surveyed expect an ROI on AI investments between 2x and 5x. AI is already driving business results, such as improved customer service, revenue growth, reduced risk, and better operational efficiency, in approximately a third of firms.

› **Line-of-business teams are taking the lead on AI deployment, sometimes without IT support.** As the lines of business work quickly to implement AI initiatives, they are bypassing the IT organization approximately 15% to 20% of the time. Between half and three-quarters of firms see this increasing risk to data security, total spend, and the IT department's reputation. Most importantly, it risks poor business outcomes.

› **Eighty-one percent of firms report the need for IT modernization to achieve AI transformation.** AI initiatives increase the need for machine learning software, high performance compute, high-speed storage, and fabrics, as well as accelerators such as graphic processing units (GPUs), field programmable gate arrays (FPGAs) and other purpose-built processors. These upgrades are well worth the price tag: 38% percent of firms expect $10 million or more in business value as a result of infrastructure modernization investments.

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Enterprises Are Starting To Transform Themselves With AI

Enterprises are frantically working to test and launch AI initiatives, and these initiatives are already delivering results. However, the wave of AI implementation is just getting started. We found that:

› **Enterprises are using AI to understand customers today, and improve customer experience in the future.** Companies currently use AI to gain better customer insights, innovate product design and development, and test products. In the next 12 months, 54% of companies plan for AI to help create and deliver a better customer experience. More than half of firms plan for AI to improve business and IT operational efficiencies (see Figure 1). This transition from using AI to first gain understanding, then use that understanding for delivering improved products and operations, will place new demands on hardware/software systems. Businesses must have the right tools to accommodate evolving AI demands.

› **Initial deployments of AI in production are focused on targeted use cases.** While companies are exploring a host of different AI building block technologies, only the most advanced companies have a multitude of building blocks in production. Data and its preparation are a key requirement for machine learning models, so it's not surprising that the most widely deployed AI building blocks are data preparation and

Figure 1 Top Five AI Use Cases For Next 12 Months

"Which of the following use cases/application scenarios is your firm currently using or planning to use AI technologies for?"

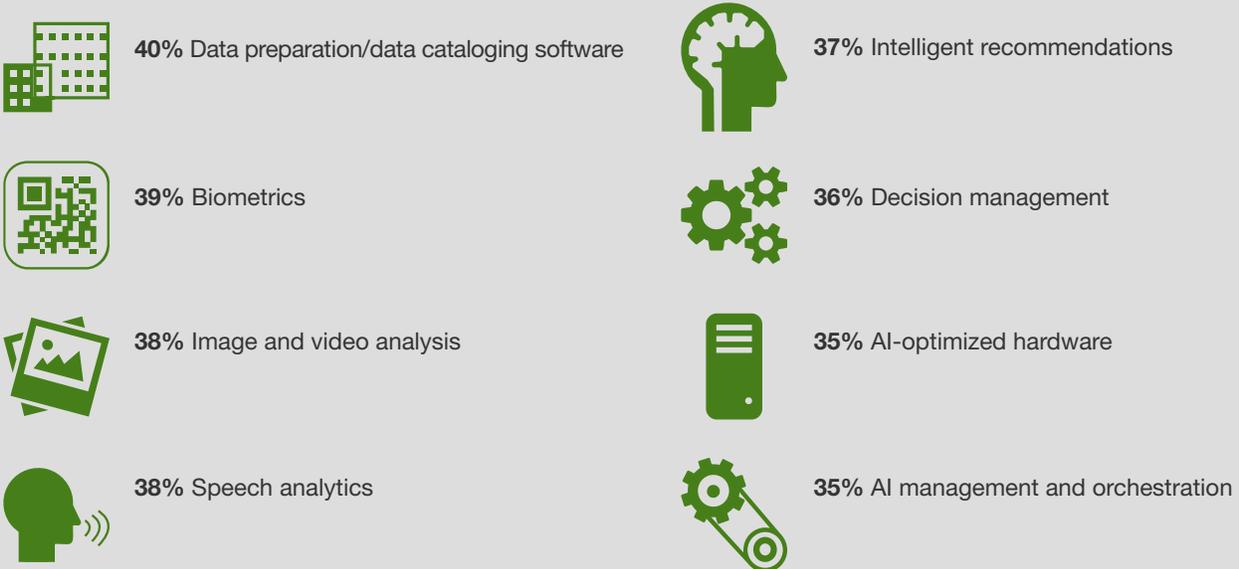|		
	1	Create and deliver a better customer experience
	2	Improve efficiencies in IT operations
	3	Improve delivery of insights services by an internal team to other parts of the organization
	4	Drive adoption of insights systems by employees
	5	Improve efficiencies in business operations

Base: 342 global IT management and line-of-business leaders driving AI projects
Source: A commissioned study conducted by Forrester Consulting on behalf of Dell EMC, January 2018

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cataloging software (40% of firms). For improving customer experience, companies are deploying speech analytics (38%) — frequently used in call center operations — and recommendation systems (37%). Respondents are also showing an appetite for newer AI technologies such as biometrics (39%), image/video analysis (38%), and virtual agents and chatbots (34%) for improving customer service. Particularly noteworthy is the rapid adoption of AI-optimized hardware systems; 35% of enterprises had these in production even though these systems have only recently become available (see Figure 2).

› **The AI journey is just beginning for some and continues for others.** Some companies (21%) are still in the early stages of their AI journeys, using only a small number of easily deployed AI building blocks (e.g., data preparation, recommendations systems, image analytics, and virtual agents). A majority of enterprises (52%) are exploring, or leveraging, more complex building blocks for deploying AI, such as AI-optimized hardware, as well as AI management and orchestration, to improve model build time and performance. The most advanced firms (27%) go further still, pursuing platforms and solutions for developing and deploying their own custom AI solutions using machine learning and deep learning platforms, semantic technology, and text analytics. These more advanced companies are most likely to be building solutions across lines of business, requiring IT support. Based on deployment of these building blocks, we can already see a broad distribution of companies moving along the AI journey. Companies who are further along in their AI journey are investing more and expect to get more in return (see Figure 3).

Figure 2 AI Building Blocks In Widespread Use Or Production

"Which of the following building blocks is your firm using or considering for your AI initiatives?"

40% Data preparation/data cataloging software

37% Intelligent recommendations

39% Biometrics

36% Decision management

38% Image and video analysis

35% AI-optimized hardware

38% Speech analytics

35% AI management and orchestration

Base: 353 global IT management and line-of-business leaders driving AI projects
Source: A commissioned study conducted by Forrester Consulting on behalf of Dell EMC, January 2018

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Figure 3 More Mature Organizations Invest More — And Get More In Return

Average AI spending (In USD millions)

Expected ROI in AI investment (x times)

51% expect ROI of 2x - 5x AI investment

$23M $32M $36M

← 21% →   ← 52% →   ← 27% →

Starting AI Journey
(N = 74)

Picking Up Speed
(N = 182)

Breaking Away
(N = 97)

AI Building Blocks In Use

Starting AI Journey	Picking Up Speed	Breaking Away
• Data preparation/ data cataloging • Virtual agents • Image and video analytics • Intelligent recommenda- tions	• AI management and orchestration • AI optimized hardware • Biometrics	• Machine learning platforms • Deep learning platforms • NLP/text analytics • Semantic technology

Lines Of Business Are Leading AI Initiatives But Need Leadership From The IT Organization

Companies understand the potential of AI, and the lines of business are scrambling to take advantage of the opportunity. In the rush to take advantage of AI, the lines of business must remember to include their IT counterparts. And the IT organizat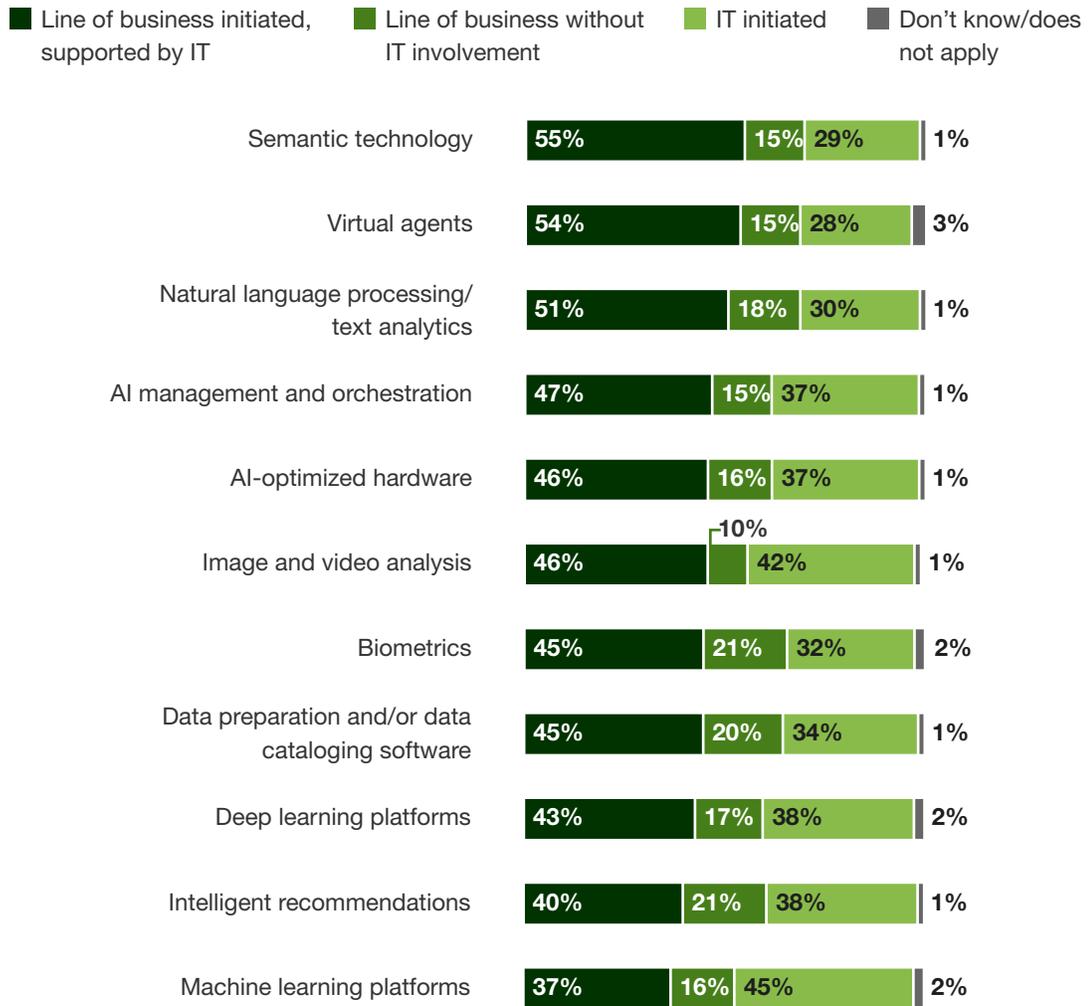ion must take the lead. When the IT team leads AI initiatives, the company deploys twice as many AI building blocks, compared with companies where the lines of business lead. The IT team is better positioned to tackle the challenges of AI initiatives while there are large risks when the lines of business take the journey alone. Our survey found that:

› **The lines of business are leading the AI charge.** Line-of-business leaders initiated most AI deployment efforts, particularly when improving sales and the customer experience. The lines of business were likely to initiate projects related to virtual agents, chatbots, natural language processing (NLP) and text analytics, speech analytics, and natural language generation — technologies that typically require significant business domain knowledge (see Figure 4). The lines of business were, for the most part, working with the IT organization for support, but in approximately 15% to 20% of firms, the line of business was bypassing the IT team altogether. The line of business was likely to be pursuing conversation service solutions, without IT involvement, likely reflecting the rapid development of chatbot solutions providers.

› **Involving the IT team leads to use of more AI building blocks.** When the IT organization leads or collaborates with the lines of business, the company is pursuing not only more AI building blocks overall, but is using more advanced AI technologies. For example, companies that involve IT are three times more likely to adopt machine learning platforms, compared with companies where the lines of business are working without the IT team. Similarly, companies that involve IT are twice as likely to adopt deep learning platforms. Firms that adopt these two AI technologies are further along in their AI journey as they are developing AI models tailored to their particular needs. In contrast, when lines of business are pursuing many AI building blocks without the IT department's support, these firms are investigating and developing an average of half as many AI building blocks.

Figure 4 Line Of Business Initiates AI

"Which of the following best describes who is driving the effort to deploy the following AI technologies?"

■ Line of business initiated, supported by IT ■ Line of business without IT involvement ■ IT initiated ■ Don't know/does not apply

Technology	LOB initiated, supported by IT	LOB without IT involvement	IT initiated	Don't know/does not apply
Semantic technology	55%	15%	29%	1%
Virtual agents	54%	15%	28%	3%
Natural language processing/text analytics	51%	18%	30%	1%
AI management and orchestration	47%	15%	37%	1%
AI-optimized hardware	46%	16%	37%	1%
Image and video analysis	46%	10%	42%	1%
Biometrics	45%	21%	32%	2%
Data preparation and/or data cataloging software	45%	20%	34%	1%
Deep learning platforms	43%	17%	38%	2%
Intelligent recommendations	40%	21%	38%	1%
Machine learning platforms	37%	16%	45%	2%

Base: 353 global IT management and line-of-business leaders driving AI projects
Source: A commissioned study conducted by Forrester Consulting on behalf of Dell EMC, January 2018

› **Extensive organizational challenges exist, but IT leaders can help.** Nearly two-thirds of companies are facing a host of challenges around executing their AI strategies (see Figure 5). The biggest challenges are centered on security, as firms report this as both an organizational and technical challenge. Additional organizational challenges include changing data and analytics practices, complying with regulations, ensuring privacy, and data governance — none of which the lines of business are well equipped to tackle on their own. Further, lines of business typically have a harder time building data pipelines that are authorized to tap data sources outside of the business unit, and struggle to deploy and maintain production-grade AI systems. In contrast, these issues are critical to the IT team as it is better positioned to develop coordinated solutions to overcome these challenges across multiple lines of business.

Figure 5 Organizational Challenges

"On a scale of 1 to 5 where 1 is 'not at all challenging' and 5 is 'very challenging,' how challenging are each of the following organizational items as you plan to execute your organization's AI strategies?"
(Showing percentage of respondents who selected 4 or 5)

66% Introduction of new security threats

65% Change management to replace existing data and analytics practices

65% Fast changing regulations on AI use as new technology emerges in the market

64% Inability to maintain oversight/governance of machine decisions/actions

63% We don't have a well-curated collection of data to train an AI system

63% Opportunity costs of AI investment

62% Privacy concerns with the use of AI to mine customers insights

60% Workforce concerns about job security

60% Lack of skills to implement and operate such systems
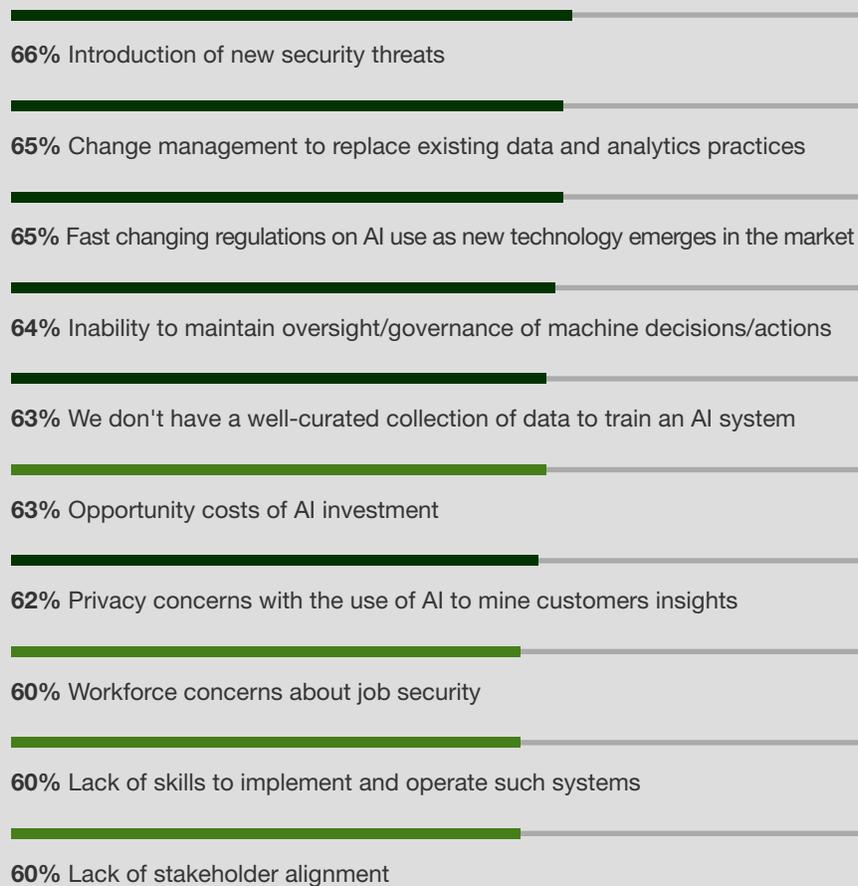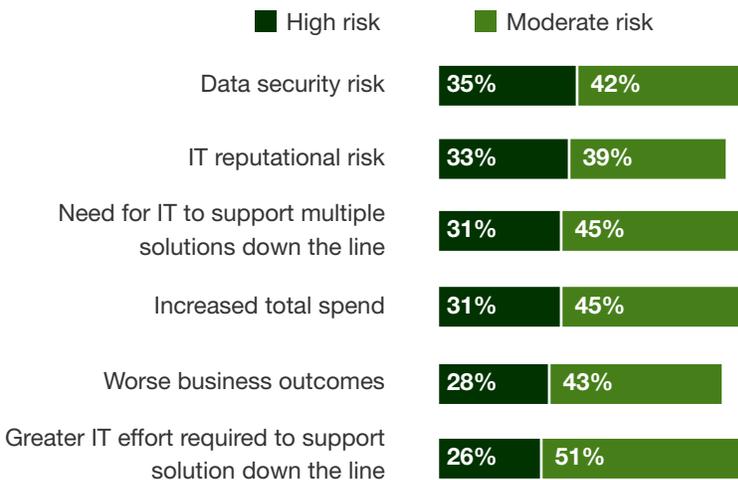
60% Lack of stakeholder alignment

Base: 353 global IT management and line-of-business leaders driving AI projects
Source: A commissioned study conducted by Forrester Consulting on behalf of Dell EMC, January 2018

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› **IT and business outcomes are at risk when the business decides to go it alone.** Most firms reported significant risks — to data security, to total spend, and, most importantly, of worse business outcomes — when line-of-business teams deployed AI technologies without involving the IT department (see Figure 6). Moreover, many of the anticipated risks affect IT directly, inevitably requiring the IT team's involvement later and, adding insult to injury, at the expense of the IT team's reputation. Over three-quarters of respondents expect that excluding IT from AI initiatives will ultimately require IT to support additional solutions at greater effort down the line. IT manages the central repository of the company's data warehouses, and the IT team has insight into cross-organizational AI initiatives and models. The IT department is also best suited to keep AI secure and maintain this over the long run.

Figure 6 IT Involvement Will Mitigate Risk

"How risky are each of the following items as your organization's line-of-business teams pursue AI technologies without IT involvement?"

Legend: ■ High risk   ■ Moderate risk

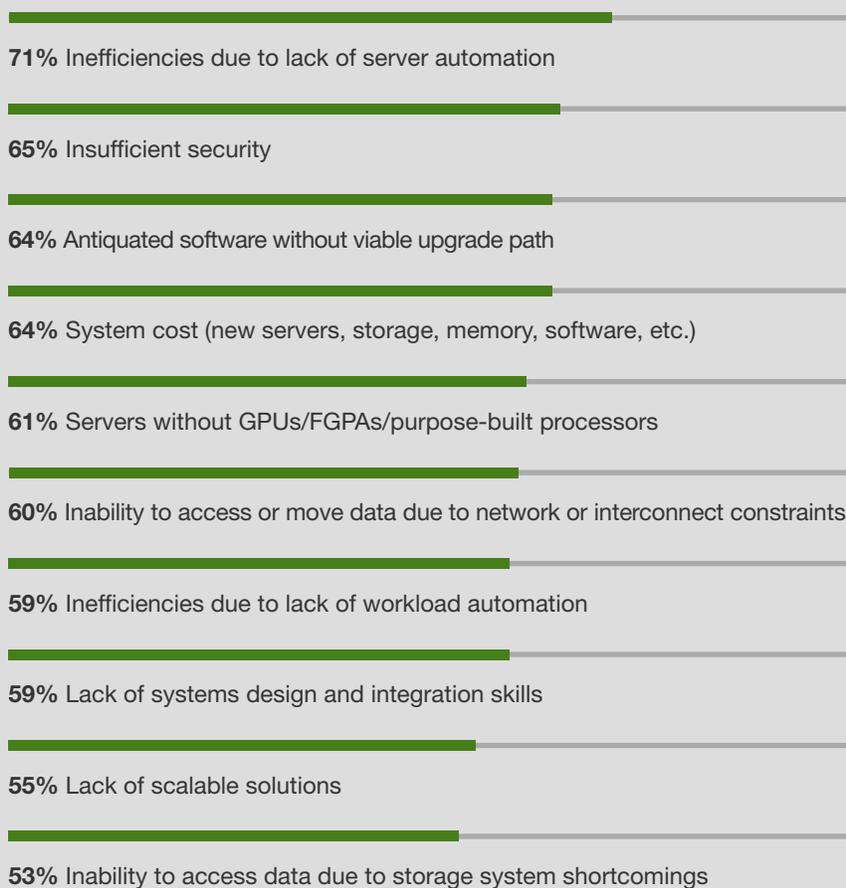|	High risk	Moderate risk
Data security risk	35%	42%
IT reputational risk	33%	39%
Need for IT to support multiple solutions down the line	31%	45%
Increased total spend	31%	45%
Worse business outcomes	28%	43%
Greater IT effort required to support solution down the line	26%	51%

Base: 257 global IT management and line-of-business leaders whose IT is not involved in deploying AI technologies
Source: A commissioned study conducted by Forrester Consulting on behalf of Dell EMC, January 2018

AI Requires Modern Infrastructure

To successfully innovate and integrate AI initiatives and technologies, companies must transform their infrastructure. Modernization requires some investment; however, an infrastructure investment will pay off not only in return on investment dollars, but also in additional business value, such as improved customer experience and IT operational efficiency. Our survey found that:

› **The data center needs to modernize to support AI.** Most firms found that technology infrastructure posed a challenge to executing their AI strategies and firms are investing in new infrastructure for AI. The largest challenge to AI in the data center was antiquated infrastructure that made it difficult for the IT organization to support the business in an agile manner. Enterprises especially called out the inefficiencies due to a lack of server and workload automation, as well as insufficient security and antiquated software that could not be upgraded (see Figure 7).

Figure 7 Most Challenging Infrastructure Issues For AI Strategies

71% Inefficiencies due to lack of server automation

65% Insufficient security

64% Antiquated software without viable upgrade path

64% System cost (new servers, storage, memory, software, etc.)

61% Servers without GPUs/FGPAs/purpose-built processors

60% Inability to access or move data due to network or interconnect constraints

59% Inefficiencies due to lack of workload automation

59% Lack of systems design and integration skills

55% Lack of scalable solutions

53% Inability to access data due to storage system shortcomings

Base: 353 global IT management and line-of-business leaders driving AI projects
Source: A commissioned study conducted by Forrester Consulting on behalf of Dell EMC, January 2018

71% lack server automation, and 61% lack servers with GPUs/FGPAs/ purpose-built processors.

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› **AI requires specialized infrastructure.** Machine learning, especially deep learning, requires a new level of computational horsepower, as well as high-bandwidth, low-latency networking and storage. 81% of firms pointed to the need for new servers for high-performance computing. Similarly, 80% noted the need for accelerators — GPUs, FGPAs and other processors that are optimized for deep neural networks — that cut down model training times from days, and weeks, to minutes and hours. Many enterprises are finding that open source deep learning frameworks are difficult to scale. As a result, enterprises are turning to commercial machine learning platforms that offer optimized versions of these algorithms and tools that streamline cluster management. The demand for upgraded infrastructure will only continue to intensify as enterprises deploy more AI building blocks.

› **AI costs are significant, but so are the returns.** Enterprises are challenged by the cost of acquiring new systems. Despite hesitations around the upfront cost, companies expect an ample return and additional business value: 51% of responding organizations are expecting a 2x to 5x return on their AI investments.

› **AI is driving the need for modern data management.** Enterprises called out data management modernization initiatives needed for AI (see Figure 8). Data is the foundation for AI strategies, as these initiatives require large amounts of data from various sources.

› **Infrastructure investment drives improved customer experience.** Investments in infrastructure that supports data management and integration, as well as improves IT capabilities, will improve sales, operations, and security. Investments in infrastructure will also lead to faster customer response times and better customer experience, the top implementation priority for AI technologies in the next year (see Figure 9).

82%

AI data integration pushes infrastructure needs.

81%

AI drives modernization of servers and high-performance computing.

Figure 8 AI Initiatives Drive Need For IT Infrastructure Modernization

"To what extent do AI initiatives increase your organization's need for IT infrastructure modernization in each of the following areas?"

82% Data integration

81% Database

81% Servers/high-performance computing

81% Data warehouse

80% Security

Base: 353 global IT management and line of business leaders driving AI projects
Source: A commissioned study conducted by Forrester Consulting on behalf of Dell EMC, January 2018

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› **Modernizing infrastructure investment improves IT operations.**
More than half of firms report adopting AI technologies to increase
IT operational efficiency, and modern infrastructure makes that
possible. Infrastructure investments lower the dependency on legacy
infrastructure and improve reliability and redundancy while reducing
exposure to security issues (see Figure 9).

Figure 9 Benefits Of IT Infrastructure Modernization

"Which of the following benefits have you achieved or do you anticipate as a result of your IT infrastructure
modernization investments?"

Modern infrastructure leads to better business outcomes . . .

30% Faster customer response times leading to better customer experiences

29% Real-time processing

24% Delivered new customer-facing software faster

22% Increased time to innovate

22% Faster time-to-market

. . . and more resilient, effective IT operations.

27% Increased control over compute workloads

25% Lowered our dependency on legacy infrastructure

24% Improved reliability and redundancy

23% Reduced exposure to security issues

23% Improved adherence to compliance/regulations

23% Reduced app complexity

21% Lowered our dependency on retiring workforce

21% Reduced infrastructure complexity

19% Reduced downtime

**38% of firms expect
an ROI or business
value of $10 million
or more as a result
of infrastructure
modernization
investments.**

Base: 353 global IT management and line of business leaders driving AI projects
Source: A commissioned study conducted by Forrester Consulting on behalf of Dell EMC, January 2018

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Key Recommendations

Companies are already using AI to drive business growth by delivering better customer experiences, increasing innovation, and improving operational effectiveness — and they are just getting started. However, challenges exist. Most firms are pursuing uncoordinated AI initiatives with IT teams caught in the middle. IT teams are either playing catch-up to develop capabilities the lines of business need or, worse, being bypassed altogether. Forrester's in-depth survey of IT and business leaders about AI yielded several important recommendations:

CIOs need to lead the company on AI initiatives. CIOs must proactively lead the AI conversation and get ahead of the broad array of AI initiatives happening across the company. Their organizations must eventually develop, deploy, and maintain AI solutions for the enterprise that reconcile the business need for agility with the IT team's need for security and data governance. To get there, most teams will need to invest heavily in outreach and communication. They first need to become active listeners in the AI conversation before they can guide it. They will need to earn their seat at the table by understanding AI and become intimately familiar with the company's strategy and goals. In the worst-case scenario, the IT organization must put the company's priorities above its own and support the line of business' decision regardless of the risk. It is far worse to be excluded entirely.

IT needs to modernize its infrastructure to deliver AI at scale. AI requires highly scalable IT infrastructure that is optimized for machine learning calculations, as well as a host of new platforms ranging from deep learning to speech and text analytics. Separately, the IT organization needs to invest in automation and self-service for all workloads to be able to handle the proliferation of new users and use cases that it is supporting.
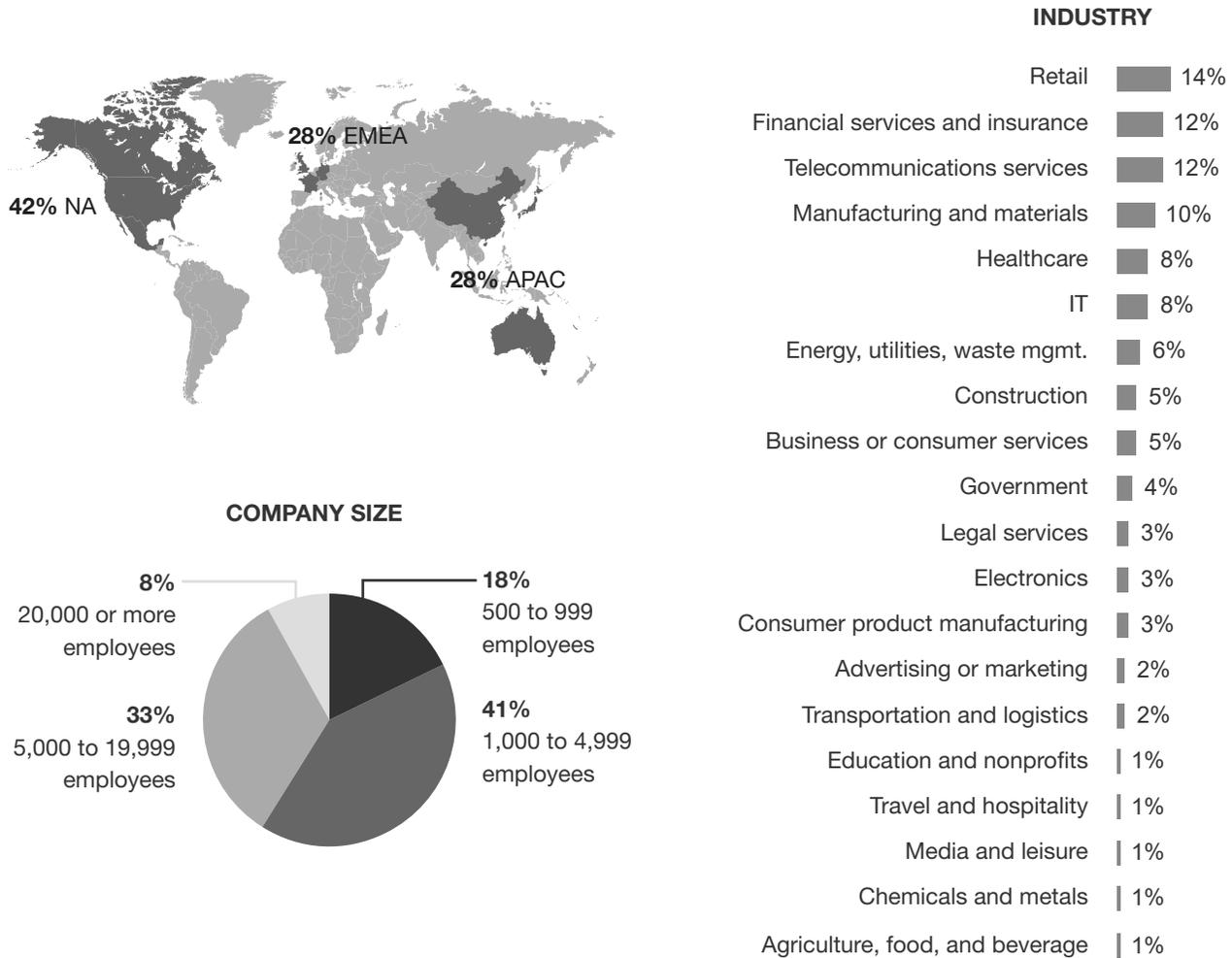
Build AI capabilities with an AI center of excellence. CIOs are optimally positioned to build centralized expertise on AI for the entire company. IT teams own and manage the company's data, infrastructure, and applications that are essential to driving business outcomes with AI. Further, they can coordinate across the different lines of business on their AI initiatives. CIOs must step out of their comfort zones, embrace both the wide scope of AI and its rapidly evolving nature, and acquire entirely new AI expertise and capabilities. It won't come cheap, but CIOs are the only ones who can do it, at scale, for the entire enterprise.

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Appendix A: Methodology

In this study, Forrester conducted an online survey of 353 enterprises in North America, EMEA, and Asia Pacific to examine AI implementation plans and understand the impact these plans have on IT infrastructure modernization. Survey participants included decision makers in IT and business management. The study began in December 2017 and was completed in January 2018.

Appendix B: Demographics/Data

INDUSTRY

Industry	%
Retail	14%
Financial services and insurance	12%
Telecommunications services	12%
Manufacturing and materials	10%
Healthcare	8%
IT	8%
Energy, utilities, waste mgmt.	6%
Construction	5%
Business or consumer services	5%
Government	4%
Legal services	3%
Electronics	3%
Consumer product manufacturing	3%
Advertising or marketing	2%
Transportation and logistics	2%
Education and nonprofits	1%
Travel and hospitality	1%
Media and leisure	1%
Chemicals and metals	1%
Agriculture, food, and beverage	1%

28% EMEA
42% NA
28% APAC

COMPANY SIZE

- **8%** 20,000 or more employees
- **18%** 500 to 999 employees
- **41%** 1,000 to 4,999 employees
- **33%** 5,000 to 19,999 employees

Base: 353 global IT management and line-of-business leaders driving AI projects
Note: Percentage may not total 100 because of rounding.
Source: A commissioned study conducted by Forrester Consulting on behalf of Dell EMC, January 2018

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Appendix C: Supplemental Material

RELATED FORRESTER RESEARCH

"TechRadar™: Artificial Intelligence Technologies And Solutions, Q1 2017," Forrester Research, Inc., January 18, 2017

"Deep Learning: An AI Revolution Started For Courageous Enterprises," Forrester Research, Inc., May 12, 2017

"The Forrester Wave™: Predictive Analytics And Machine Learning Solutions," Forrester Research, Inc., March 7, 2017

"Predictions 2018: The Honeymoon For AI Is Over," Forrester Research, Inc., November 9, 2017

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