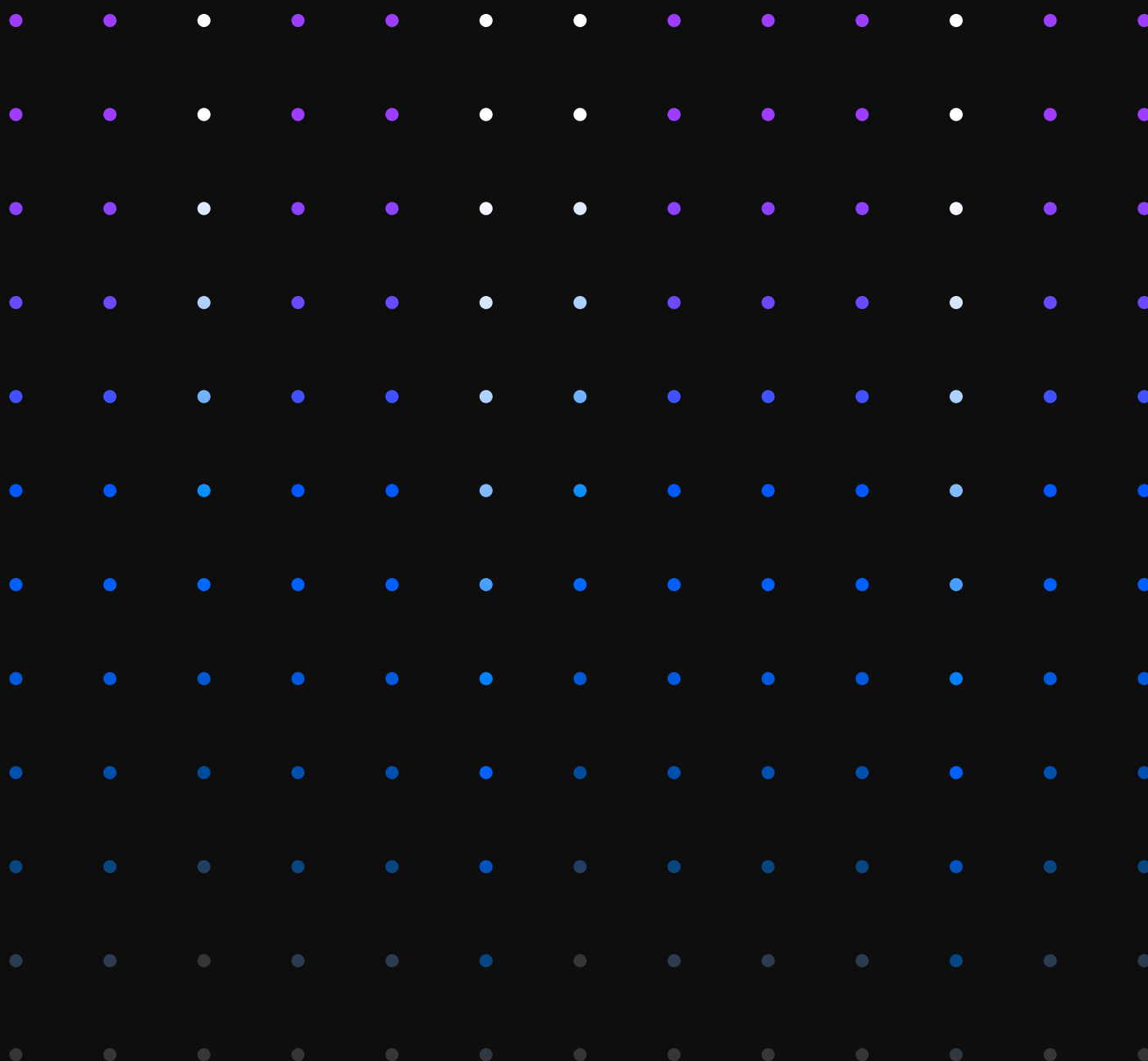




# AI in the enterprise

Unleashing opportunity through data

*Results from research conducted in 2021  
by IBM Market Development & Insights*



## **ABOUT THE RESEARCH**

The IBM Market Development & Insights team conducted a series of surveys on the fields of artificial intelligence (AI), machine learning (ML) and deep learning (DL). The surveys captured the perceptions, expectations and real-world experiences of more than 600 decision makers in large enterprises and midsize businesses across the United States, Canada, the United Kingdom, Australia and India. Respondent roles span IT, line of business, data science and application development and represent those whose organizations are currently using AI as well as those exploring or planning to adopt AI technologies in the near future. The results offer insight into the experiences and challenges for implementing AI in the organization today and point to where AI offers rich opportunities to come.

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## AI is changing everything

Data is transforming virtually every aspect of how we understand and shape our world. As enterprises ingest vast volumes of data and seek to integrate and analyze it for insights, they are turning to artificial intelligence to uncover trends and patterns that signal opportunity for better decisions and next actions. AI is accelerating tasks and augmenting human expertise with incredible speed and accuracy.

Advances in AI and related fields—which include machine learning and deep learning—hold the keys to unleashing the full potential of data. AI supercharges data exploration, enabling better decision making and helping organizations find answers to questions they didn't even know they should be asking.

With AI technologies, machines learn through model training, finding patterns within data that help drive efficiencies within various business processes. AI is automating workflows and business processes, helping organizations manage operational costs while improving performance and enabling better products to be brought to the marketplace faster. AI is powering many of today's most compelling customer experiences, driving awareness and loyalty.

Survey respondents report that AI, machine learning and deep learning technologies are changing what is possible to learn from data. They're excited about the possibilities and looking ahead for new ways to implement AI to propel their business forward.



## Transformation for competitive advantage

### Survey results overview

Much is expected from AI. For years the hype has raged, with vendors often overpromising and underdelivering on what AI could really accomplish. Today those perceptions are starting to change, driven by increased adoption and a new understanding of what is achievable within the field of AI.

Respondents to this survey are strong advocates, with large majorities agreeing that AI will deliver powerful transformational benefits for their organization. Key areas highlighted include:

- *Transforming operations*
- *Enhancing engagement with customers*
- *Reimagining the sales process*

Even so, challenges remain top of mind for many respondents, including:

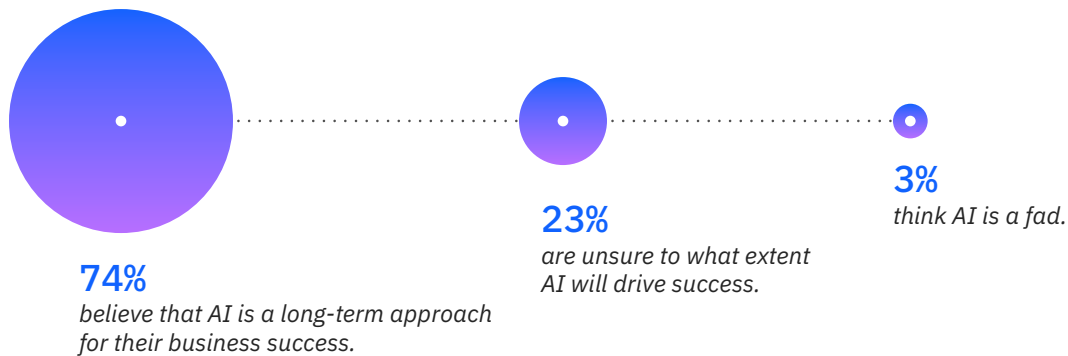
- *Data privacy*
- *Managing AI implementations across the organization*
- *Lack of internal expertise*

Despite the growing media attention around the ethics of AI, less than half of those surveyed named ethical considerations as a primary reason for delaying AI implementation or expansion. While the market may not be as focused on the ethics of AI, IBM firmly holds it as a priority in the development of its AI products as well as its relationships with clients. To read more about IBM's position, [click here](#).

# AI is a long-term play

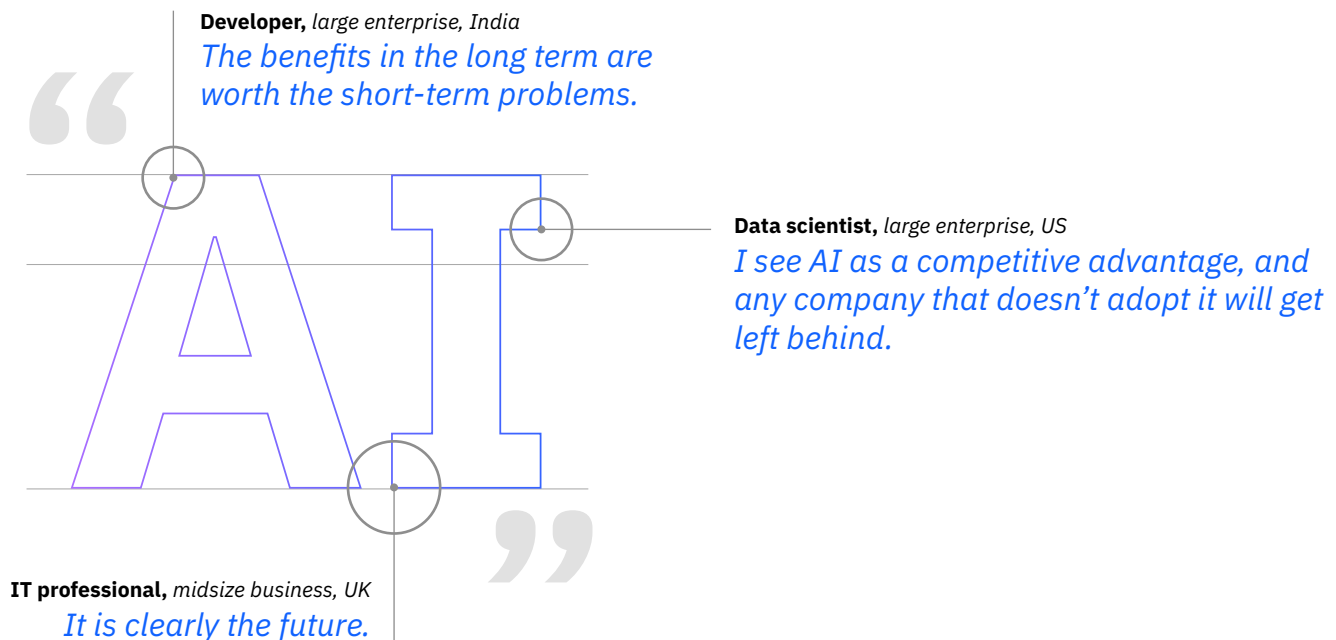
## What people think

We asked decision makers whether they thought AI was here to stay or just a passing fad.



See Figure 1 for complete data.

## What people said



## However, some concerns were noted

*"The technology is not yet mature and does not seem to have improved much in recent years."*

**IT professional, midsize business, UK**

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## KEY TAKEAWAY

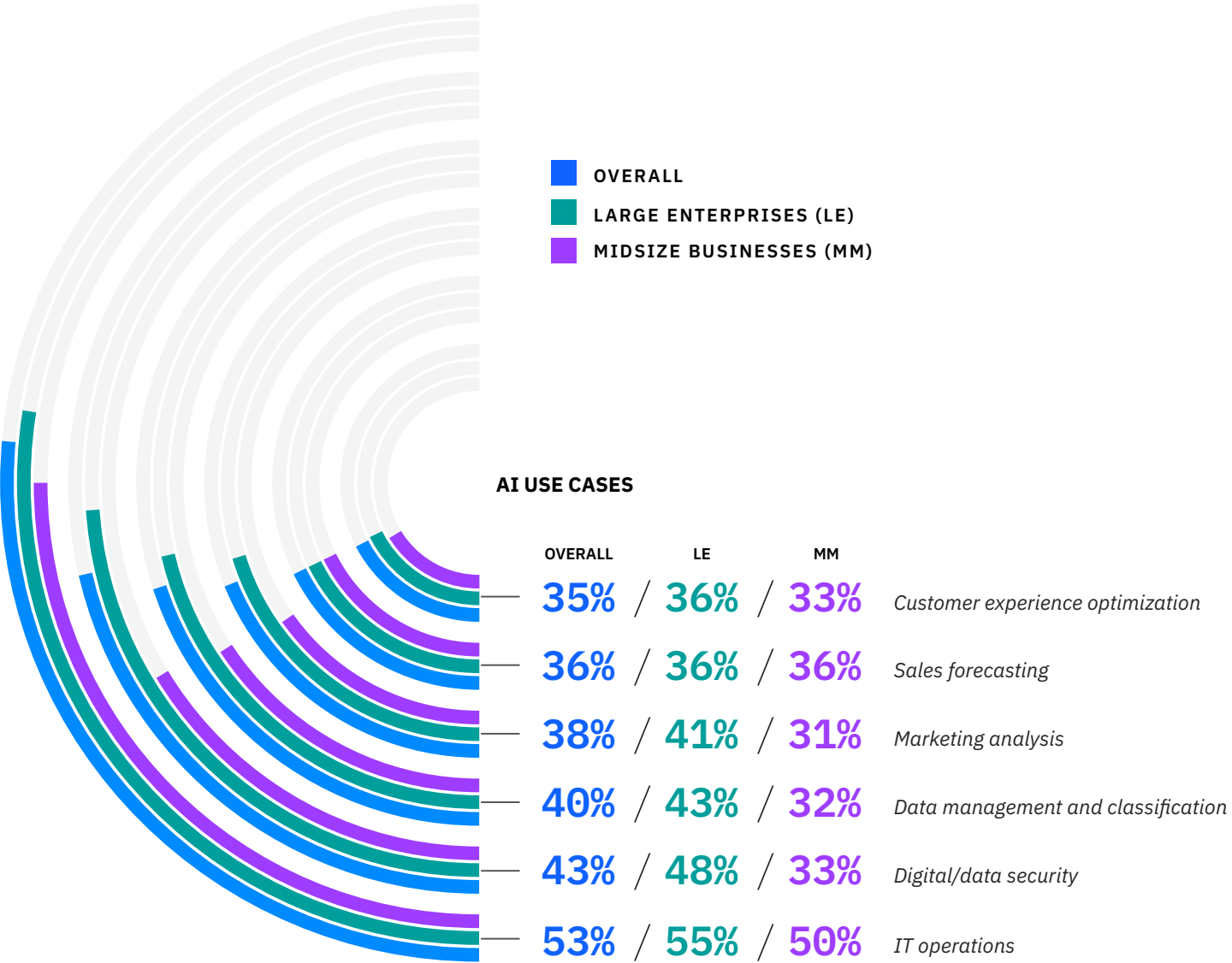
As with most technological advancements, companies that effectively leverage AI will gain a clear competitive advantage in the marketplace, while those that don't adapt will be left behind. However, some frustrations remain around the perceived pace of technological advancement as well as how to manage large-scale or cross-enterprise AI initiatives, in large part because of a lack of experienced talent.



# Putting AI to work

## Enterprises are expanding deployment of AI-infused solutions

Deployment of AI technologies spans a broad range of use cases, with some notable similarities and differences seen in how large enterprises and midsize businesses are using the technologies. Both large enterprises and midsize businesses name IT operations as a major focus for AI. Large enterprises are placing more emphasis on security, while midsize businesses expect AI for sales forecasting to be a top priority.

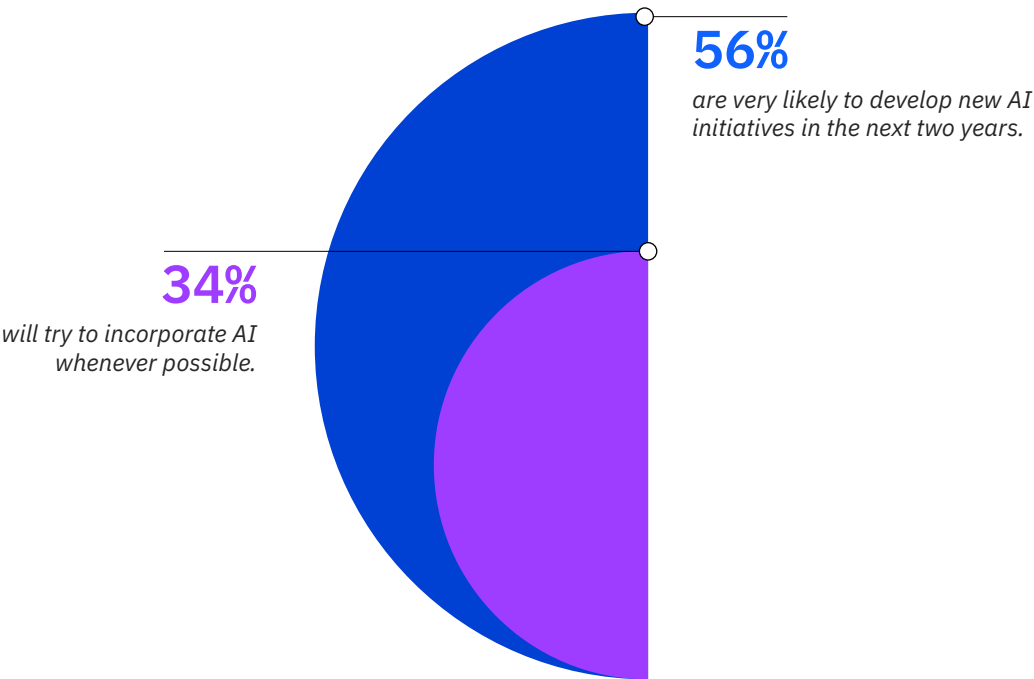


See Figure 2 for more detail.



Near-term plans

Although large enterprises are leading the way in deploying AI technologies compared to midsize organizations, both groups see the value of AI and are moving ahead with plans to expand their AI investments.



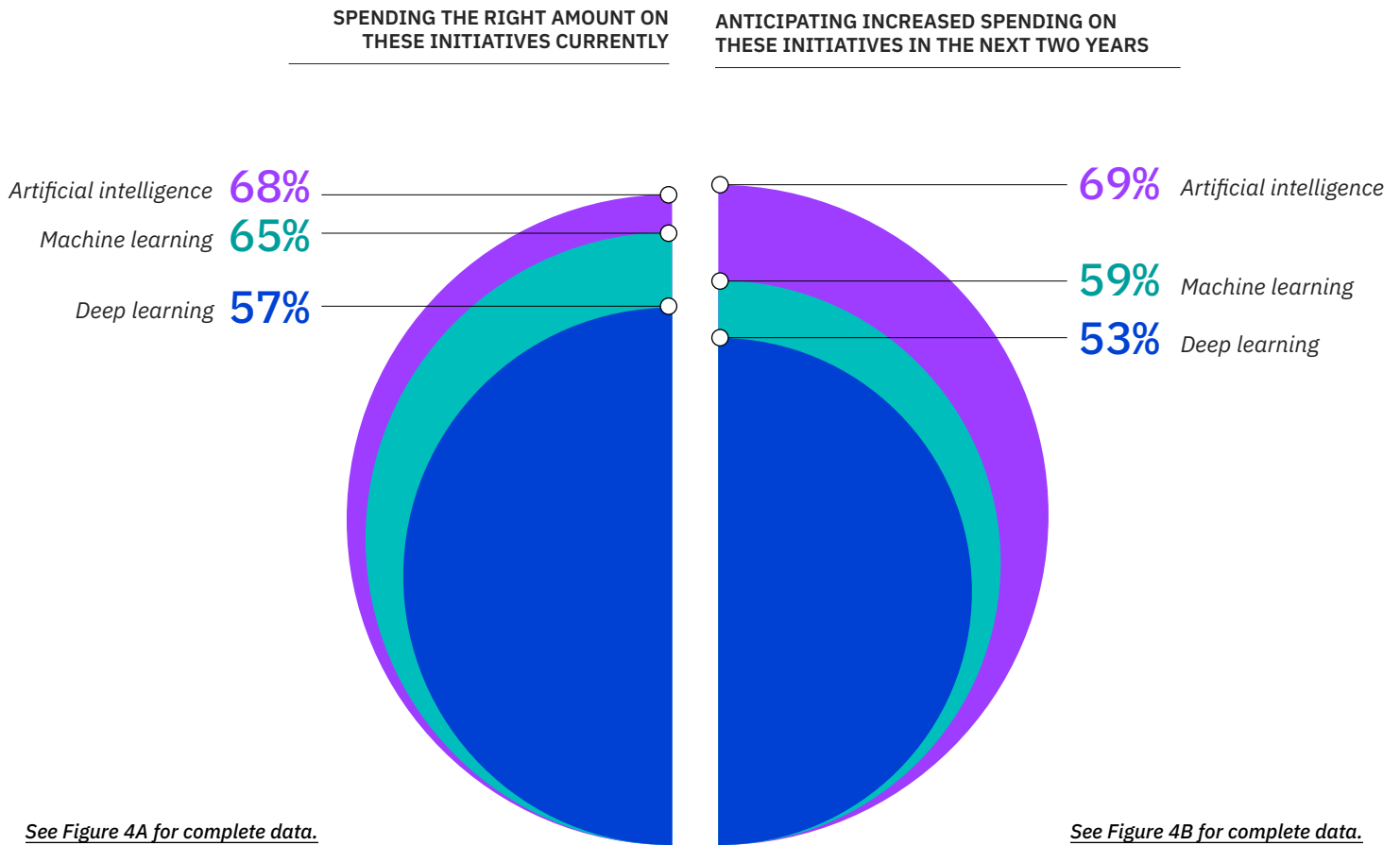
See Figure 3 for complete data.

However, when asked about their organization’s adoption of AI technologies versus others in their industry:



## Investing in the future

Most of those we surveyed feel their organization is investing the right amount into AI, ML and DL technologies but foresee expanded investment.



## KEY TAKEAWAYS

- Large enterprises are implementing AI technologies at a greater pace and in more areas than smaller organizations.
- The majority of respondents expect their businesses to make increased investment in AI, machine learning and deep learning technologies.

## MACHINE LEARNING AND DEEP LEARNING: What are they, and how are they being used?

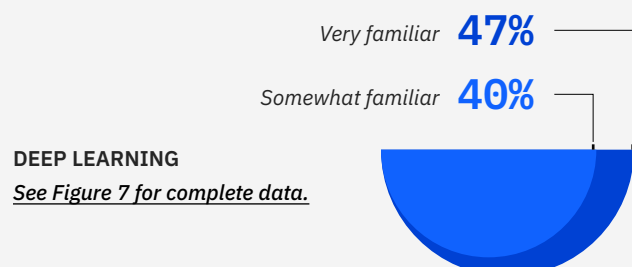
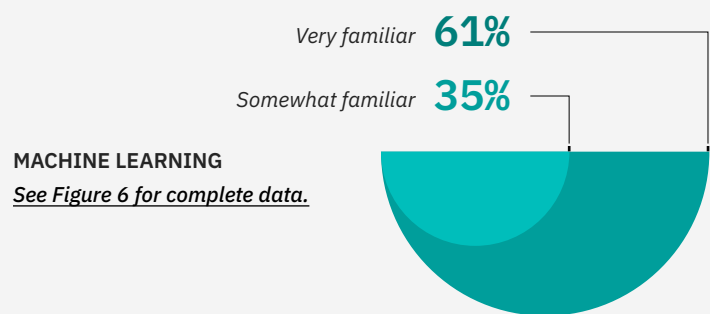
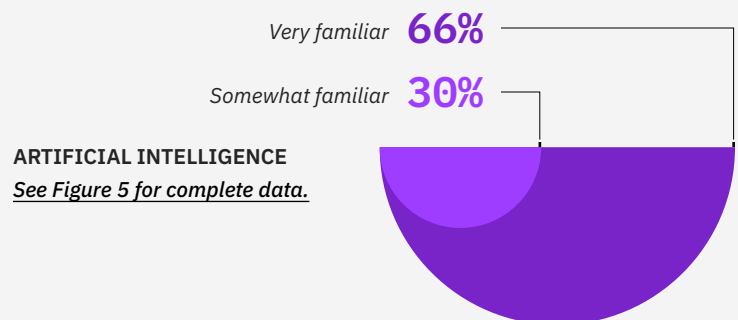
As AI technologies continue to become part of our lives, there remains some confusion around the terms AI, machine learning and deep learning.

Both machine learning and deep learning are considered subsets of AI. Although deep learning has received more media attention recently, neither type of algorithm is necessarily better than the other. In fact, data scientists frequently experiment with both types to determine an algorithm that fits a specific use case the most effectively.

That said, deep learning is considered more scalable than machine learning, using large data sets to eliminate some of the human intervention required within machine learning. In machine learning, an expert needs to determine the hierarchy of features within the algorithm, while deep learning automates this aspect of the process. This is likely the reason that deep learning is ideal for use cases such as data management and classification as indicated in the survey.

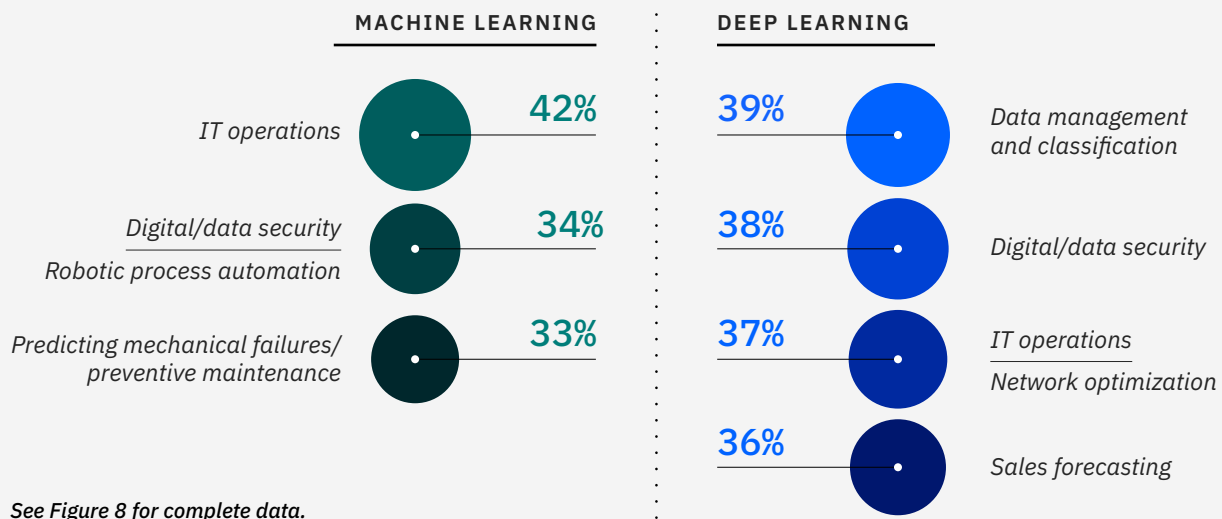
For more complete information on the differences between these terms, visit the [AI vs. Machine Learning vs. Deep Learning vs. Neural Networks: What's the Difference?](#) blog post. To learn more about AI in general, visit the [IBM Cloud Learn Hub](#) and filter for artificial intelligence.

Survey respondents, who included decision makers, influencers in roles such as IT and line of business, data scientists, and application developers, were more familiar with the concept of artificial intelligence than with machine learning and deep learning.



## Common use cases

We asked respondents about the most common use cases they associated with machine learning and deep learning technologies. Top answers included:



Asked about how their company is implementing AI, ML and DL into the business, responses included:

### PREDICTIVE ANALYTICS AND FORECASTING

*"We are using it more and more to make sales predictions based on seasonal changes."*

—Line-of-business executive, midsize business, US

### EFFICIENCY AND PRODUCTIVITY

*"Making a networking decision for efficiency and quality control"*

—IT executive, large enterprise, US

### AUTOMATION

*"To automate all manual processes wherever possible"*

—Developer, large enterprise, UK

### MANAGEMENT AND TRAINING

*"We plan on using AI for employee training in the next few years."*

—Data scientist, large enterprise, US

### CUSTOMER SERVICE

*"We have implemented chatbot services [for] analyzing customer comments and for providing personalized services to online shoppers."*

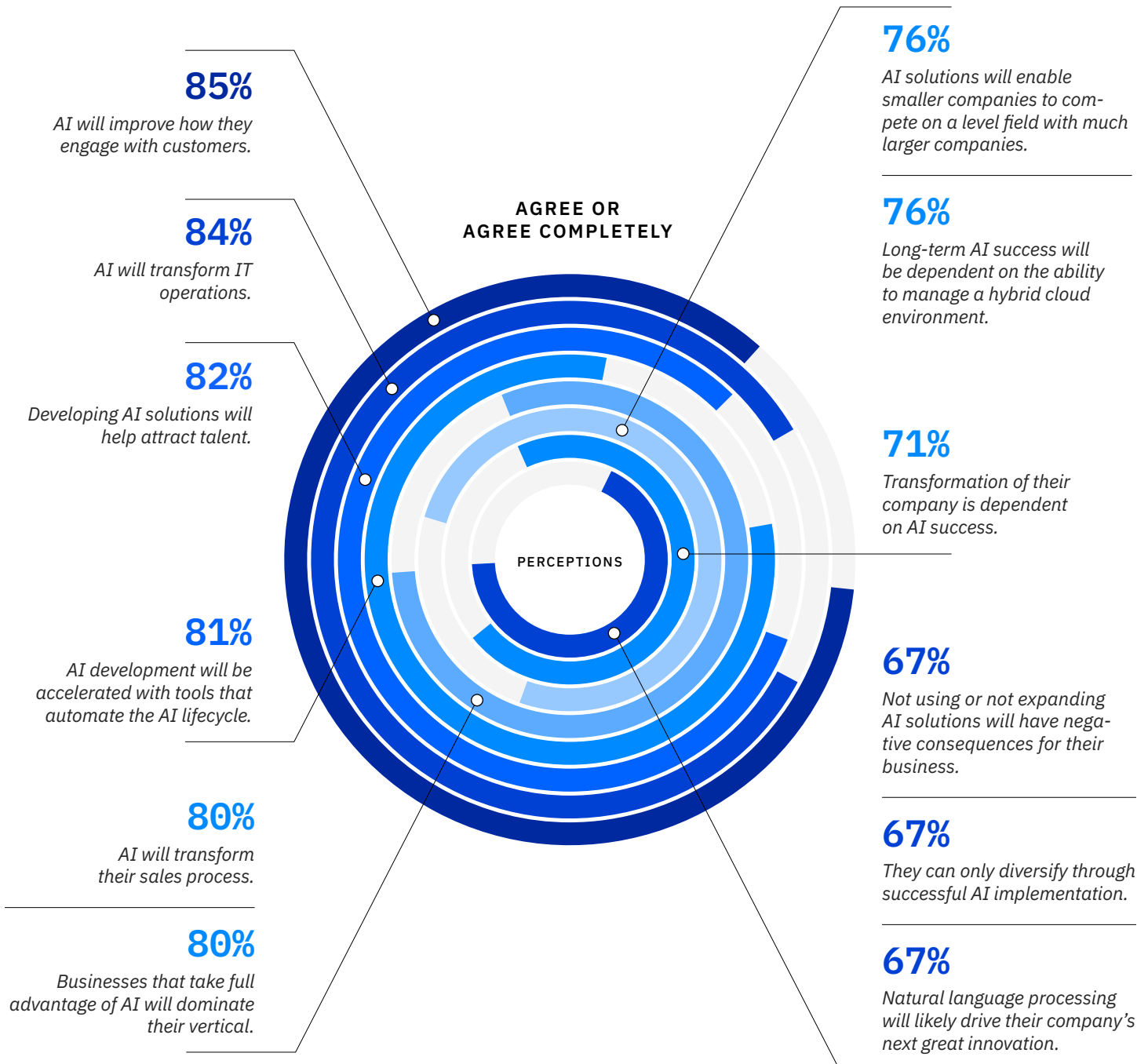
—Developer, large enterprise, US

[Learn more](#) about how IBM is helping organizations around the world put AI to work.

## Expectations and concerns

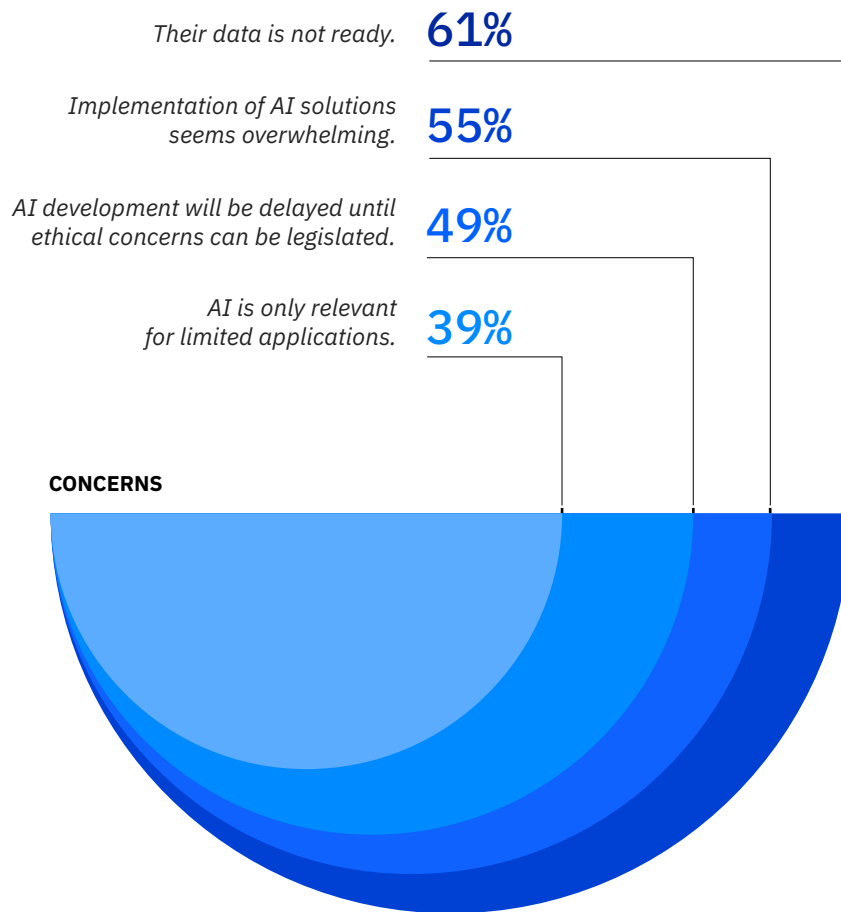
### Users expect AI to change their business

Respondents have high expectations for the ability of AI and related technologies to enable significant change in how their organization works. We asked how much respondents agreed with the following statements:



See Figure 9 for more detail.

At the same time, real concerns were recognized:



See Figure 9 for more detail.

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## KEY TAKEAWAYS

- Primary concerns center around preparing company and customer data for AI and uncertainty over how to effectively implement and manage AI.
- Large majorities of respondents view AI technologies as having a critical transformational effect on their operations, sales processes and customer experience.

# Is your data ready for AI?

Data is the lifeblood of any AI solution, revealing insights that drive exploration and fuel intelligent, automated action. Unlocking those insights requires that you first prepare your data for AI—something survey respondents identified as among their biggest challenges for adopting AI within their organizations.

Deploying AI successfully requires a methodical, phased approach built on a foundation of trusted data. IBM believes that there is no AI without IA—that is, effective artificial intelligence solutions require an information architecture designed for AI. This remains true for a stand-alone AI pilot project or for a comprehensive, cross-enterprise initiative.

Start with an honest assessment of the value drivers you're pursuing, your business imperatives, and the current state of your data architecture and where and how it needs to evolve for AI.

Preparing your data requires several key steps:

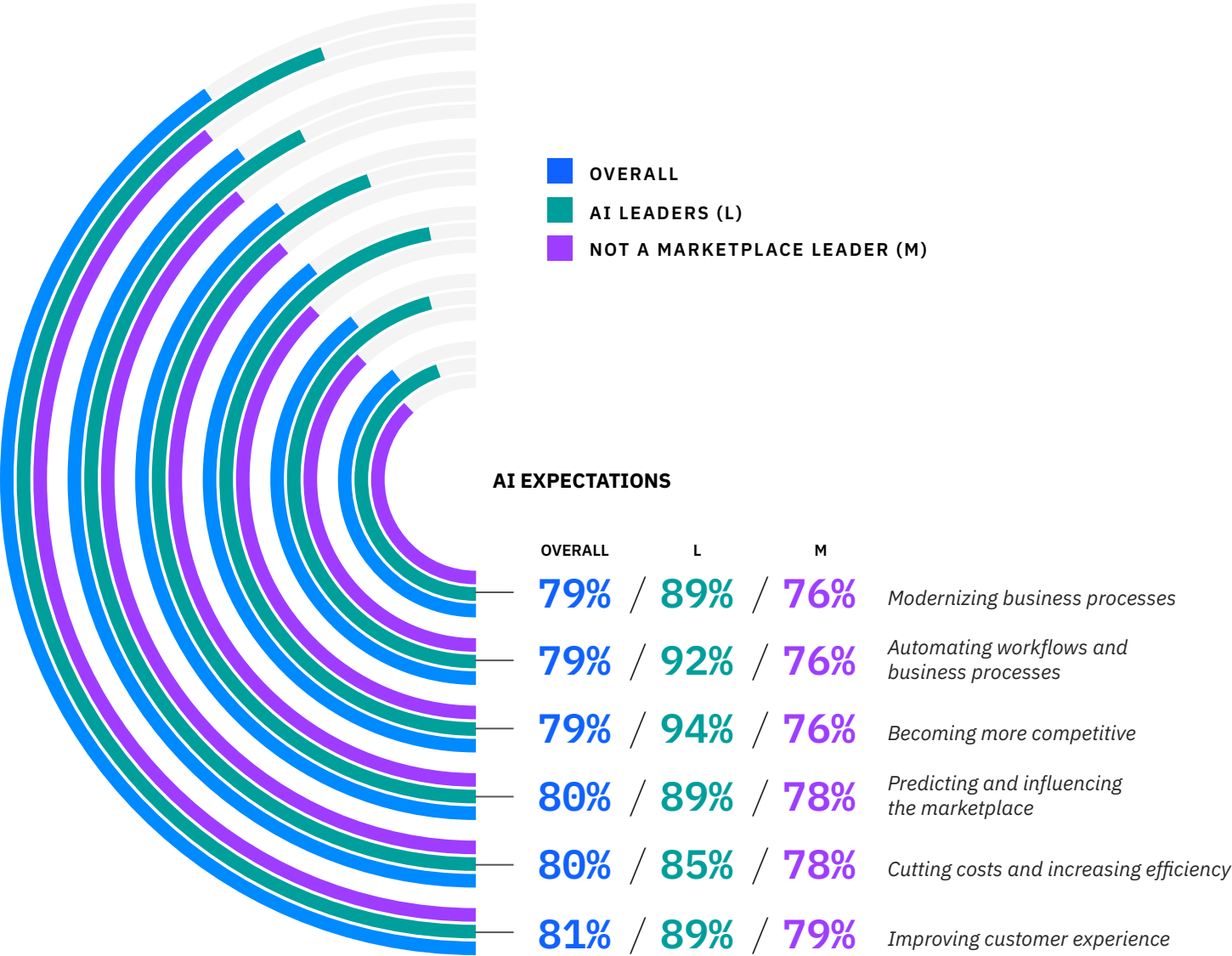
- *Breaking data out of organizational silos for integration across the enterprise*
- *Ensuring that the data is clean, correct and accessible*
- *Establishing a common structure that enables diverse data types and sources to be made consistent and usable by AI systems*
- *Managing unintentional bias and potential ethical concerns*

Preparing your data for AI requires significant expertise. With the right mix of talent, a sound strategy for deploying AI, and a proven methodology for ensuring clean and trusted data, your organization can capitalize on the rich promise of AI.

# Hype versus reality

## Benefits anticipated, benefits received

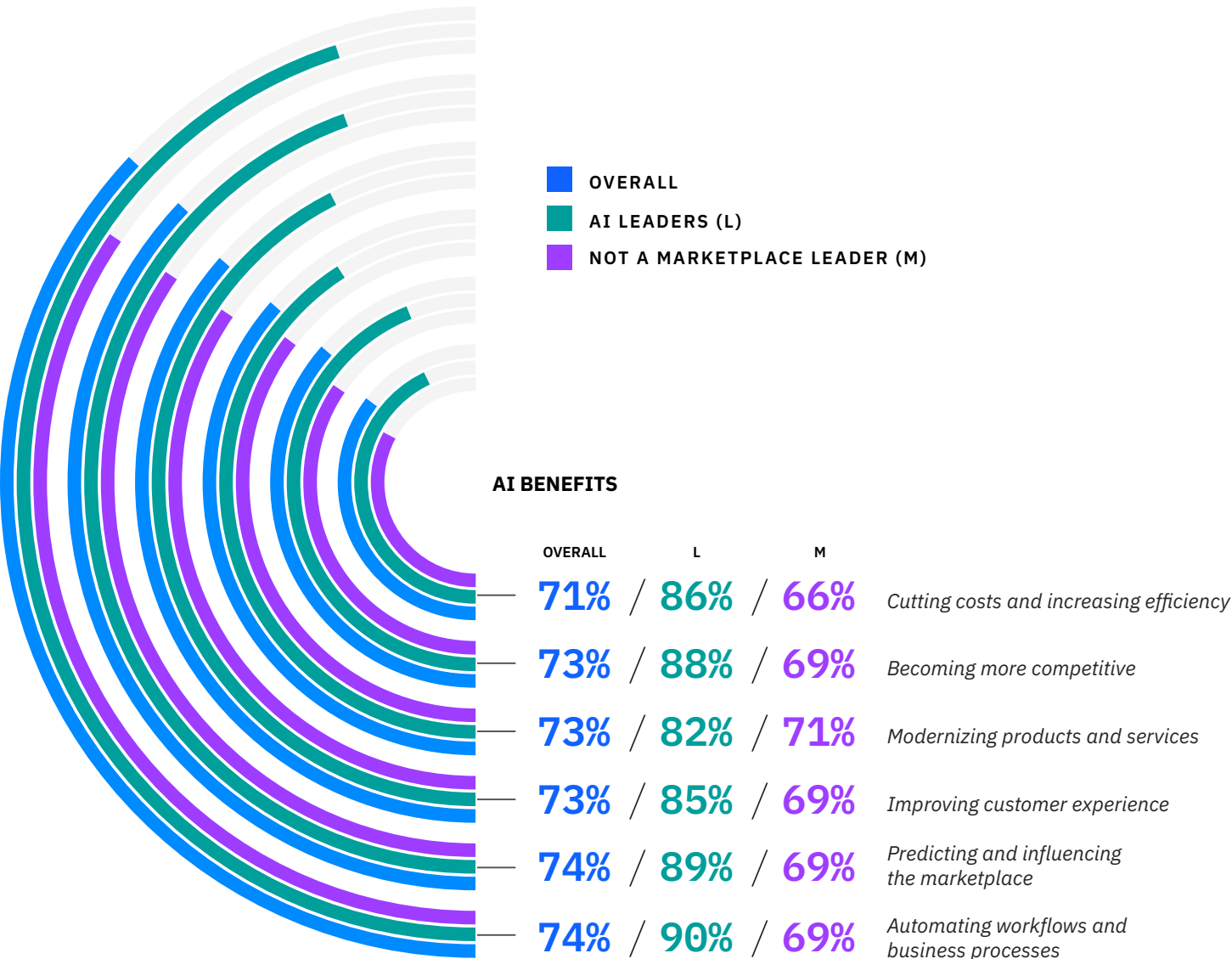
Asked what specific benefits they felt would be expected from their AI investments, those surveyed reported a range of anticipated results. Interestingly, those who consider their organization to be a leader in implementing AI solutions reported significantly higher expectations for their AI initiatives than those not rating their organizations as leaders. This could be because when leader organizations infuse AI throughout the business and users experience the benefits, more opportunities for using AI can be identified, with a corresponding increase in expectations from those initiatives.



See Figure 10 for more detail.



We then asked respondents with AI initiatives currently deployed about the real-world benefits their organizations have received from their investments. Again, AI leaders reported receiving much greater benefits than those not identifying as leaders in most cases.



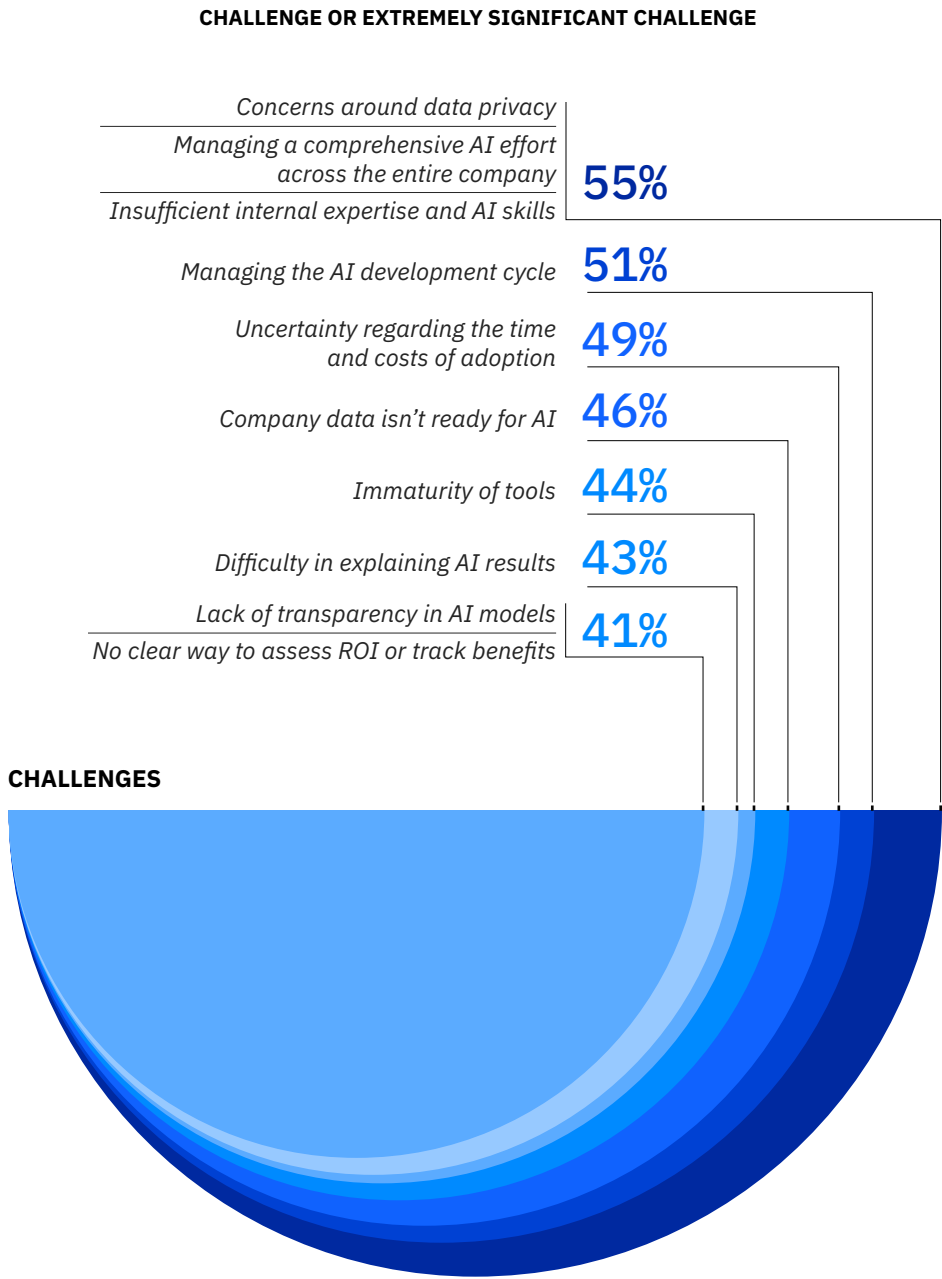
See Figure 11 for more detail.

KEY TAKEAWAY

Expectations are high for AI, and those self-identifying as leaders in deploying AI technologies are realizing the greatest returns. This potentially could be because leaders are deploying AI more often or in more ways than those not self-identifying as leaders.

# Challenges experienced

Although benefits of AI are clearly being realized by large enterprises and midsize businesses, respondents noted a number of concerns and challenges. Top concerns include:



See Figure 12 for complete data.

---

## KEY TAKEAWAYS

- Privacy concerns and the ability to manage large AI projects surface as the main challenges within artificial intelligence. The latter is driven in large part by the lack of AI talent within teams.
- Safeguards can help overcome many concerns around privacy, such as designing AI systems that prioritize consumers' privacy and rights as well as disclose the data being collected and how it will be accessed, used and stored.
- Other concerns, such as lack of transparency in AI models, have also been noted. Some AI models can be referred to as “black-box” models because it can be unclear why or how a model is arriving at a given result. The ability to understand and interpret these results is important for us to create impartial decision-making systems as it allows us to identify and adjust for bias effectively.



## AI and the road ahead

AI, machine learning and deep learning are here to stay, and organizations recognize the imperative to get in the game and start or expand deployment of these transformational technologies. The benefits are many: streamlined operations, enhanced ability to identify marketplace trends, improved products and services, and a better customer experience.

While concerns remain, respondents are strongly positive about the future of AI and its effect on their business. Are you ready to unleash the value of your data with AI? IBM experts can help.



Learn how AI can drive  
[\*transformation for your organization.\*](#)



Find out how easy it is to roll out new AI models.  
[\*Trial AutoAI on the IBM® Watson® Studio platform.\*](#)



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IBM Corporation  
Route 100  
Somers, NY 10589

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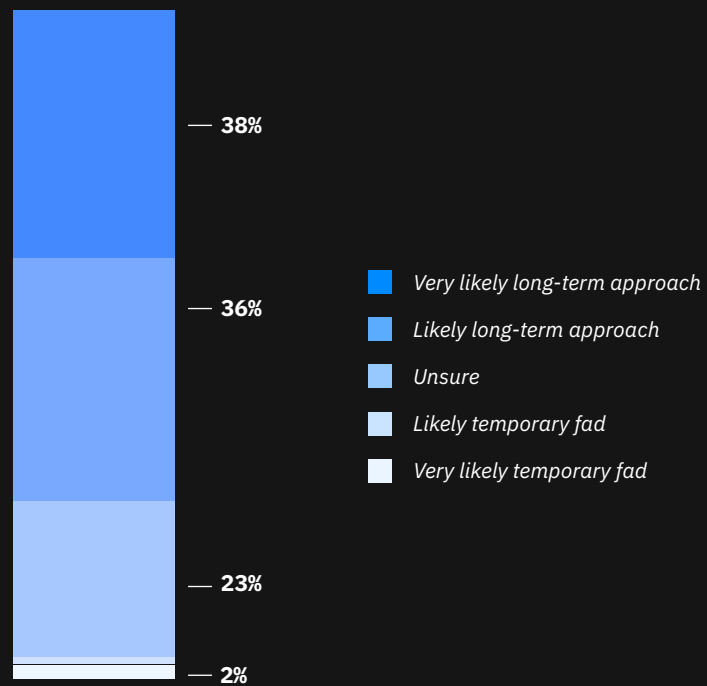
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## APPENDIX

Future of artificial intelligence  
(n=601)



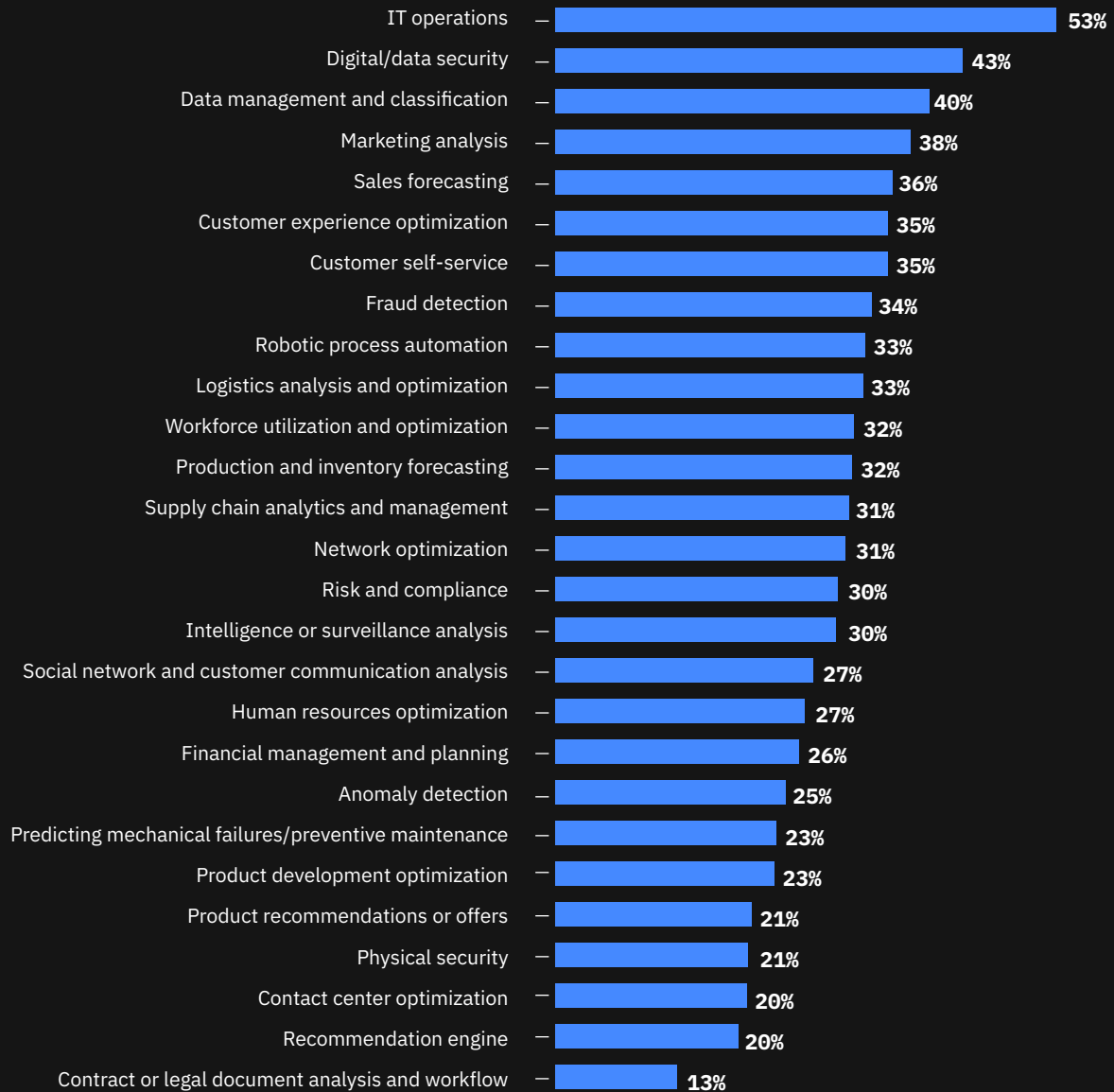
**Q17.** *To what extent do you think artificial intelligence (AI) will be a long-term approach to your business success or just a temporary fad? Please select one.*

**Q18.** *[Do not ask for “Unsure”] Please explain the reasons for your answer.*

Figure 1

## Artificial intelligence use cases being deployed

(n=579)

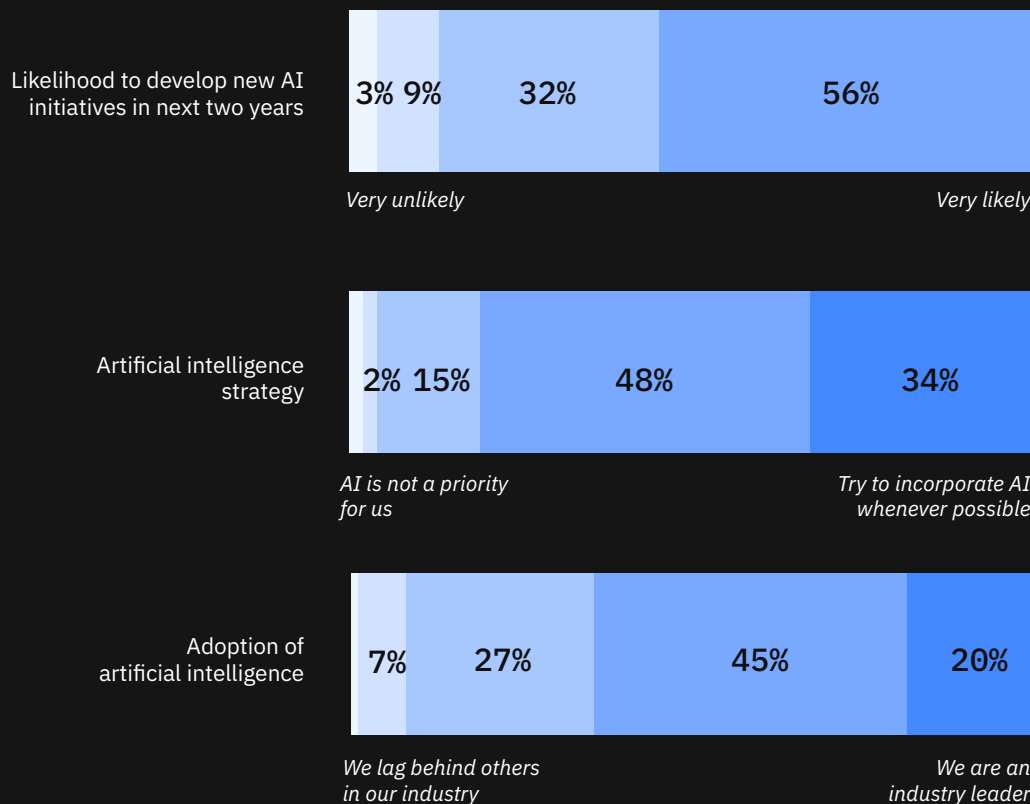


**Q12.** [Ask if “Experimenting with” or “Embracing” any technologies in Q5] For which of the following use cases is artificial intelligence (including machine learning or deep learning) being deployed in your business? Select all that apply.

Figure 2



### Artificial intelligence strategy, adoption and development (n=601)



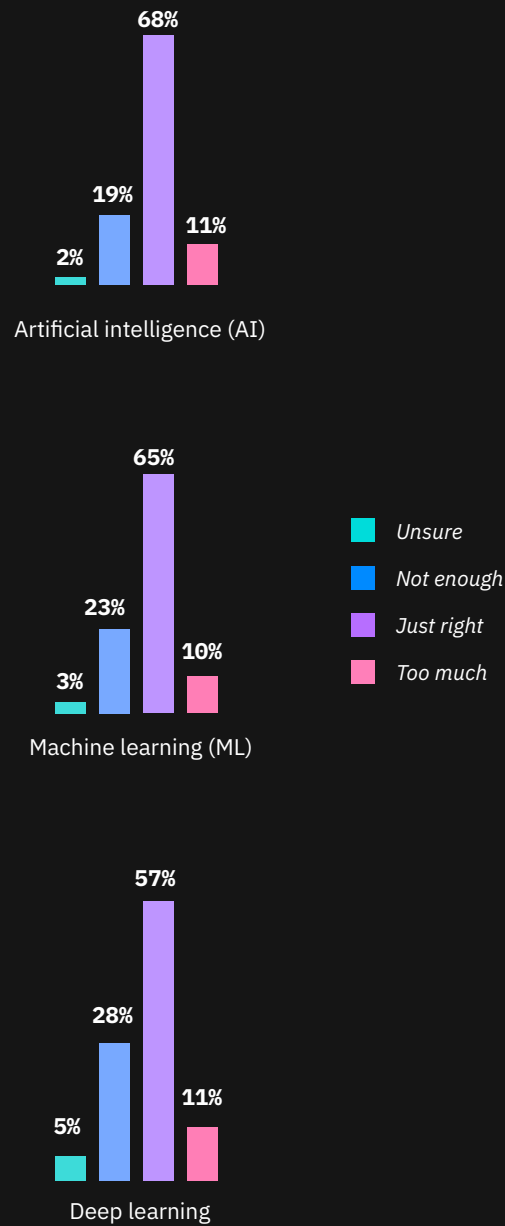
**Q10.** How likely is your company to develop new initiatives using artificial intelligence in the next two years? Please provide a rating.

**Q8.** How would you define your company's strategy with regard to the use of artificial intelligence (AI)? Select one.

**Q9.** Compared to others in your industry, how would you classify your organization's adoption of artificial intelligence (AI)?

Figure 3

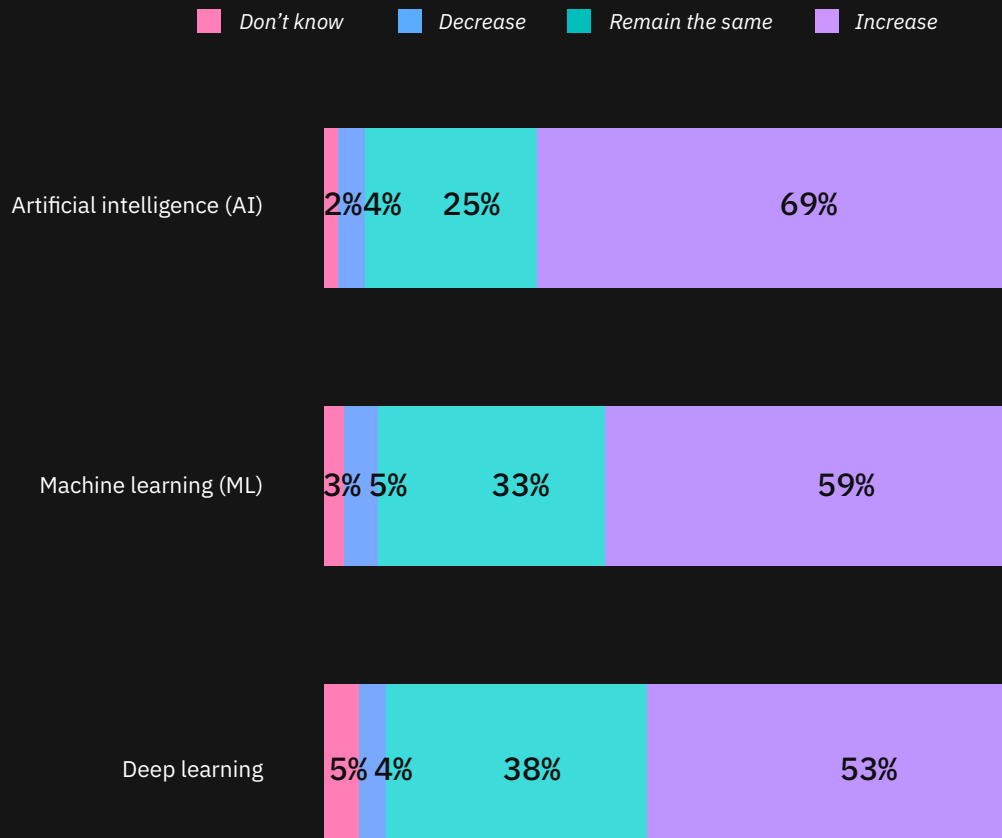
### Money/time/effort toward technologies (n=601)



Q6. Do you believe the amount of money, time and effort your business is placing on artificial intelligence, deep learning and machine learning currently is...? Select one per column.

Figure 4A

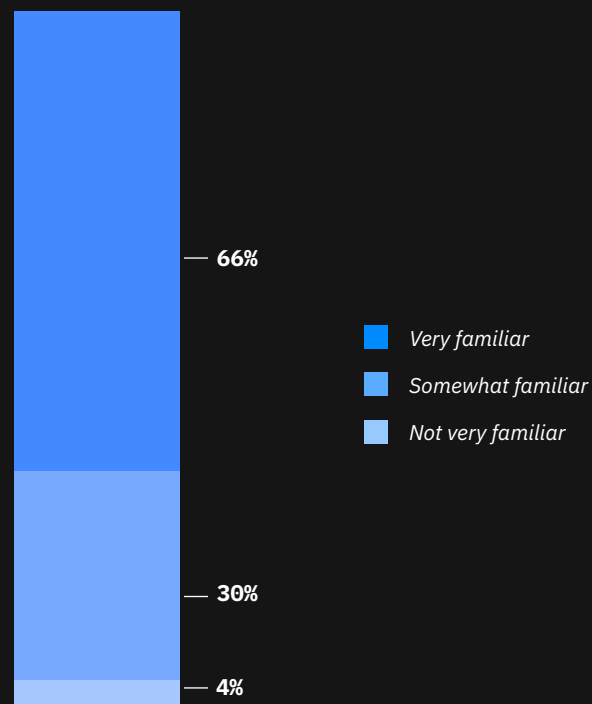
Expectation for change in money/time/effort in next two years  
(n=601)



**Q7.** And will this amount of money/time/effort on artificial intelligence, deep learning and machine learning likely increase, decrease or remain the same in the next two years?

Figure 4B

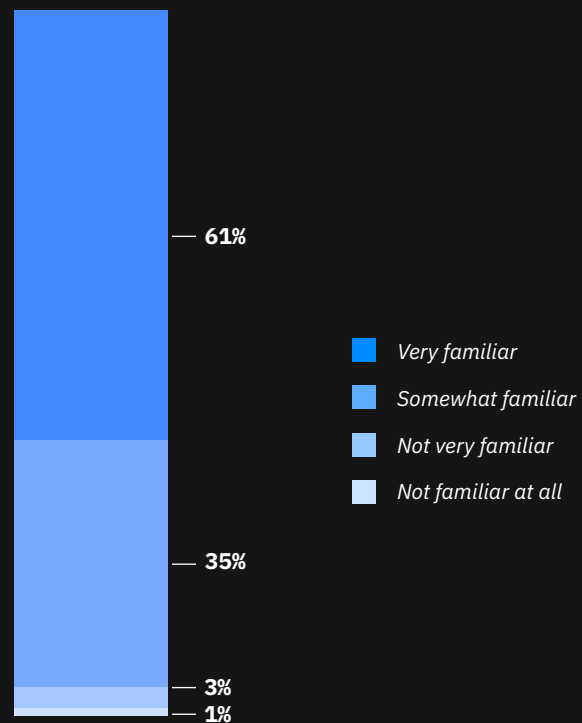
Familiarity with artificial intelligence  
(n=601)



S3. Please rate your level of familiarity with some of the newer technologies and approaches shown below.

Figure 5

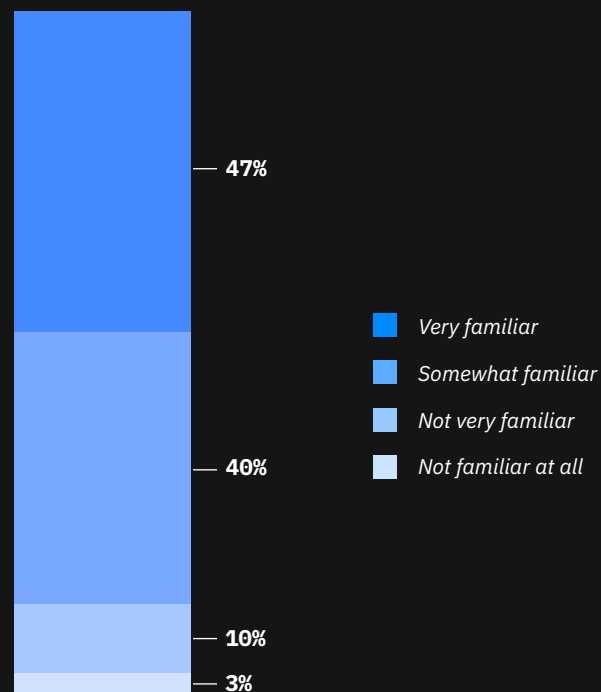
Familiarity with machine learning  
(n=601)



S3. Please rate your level of familiarity with some of the newer technologies and approaches shown below.

Figure 6

Familiarity with deep learning  
(n=601)



S3. Please rate your level of familiarity with some of the newer technologies and approaches shown below.

Figure 7

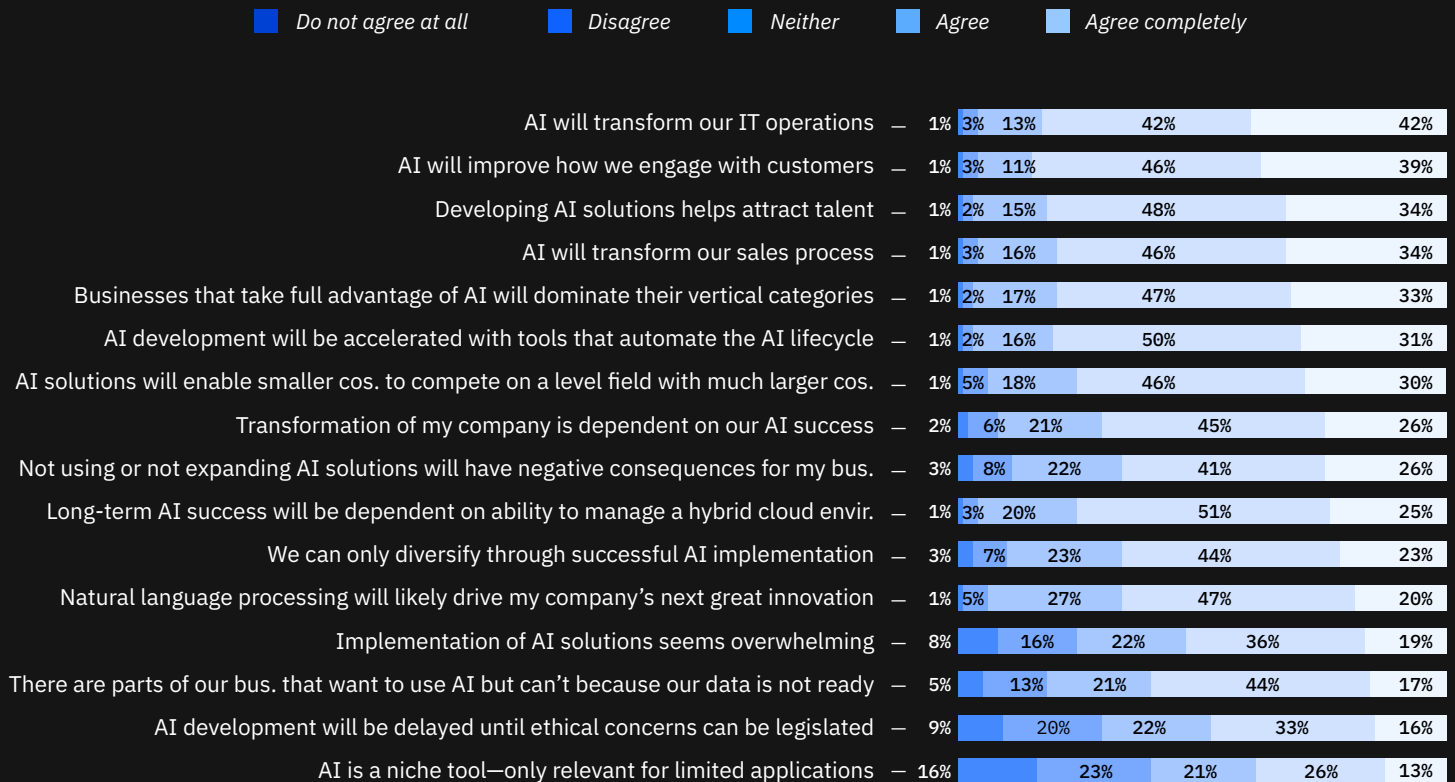
### Use cases most associated with (n=601)

	<30%	30–39%	40–49%	50%+
	Artificial intelligence	Deep learning	Machine learning	
IT operations	51%	37%	42%	
Digital/data security	48%	38%	34%	
Robotic process automation	47%	28%	34%	
Intelligence or surveillance analysis	47%	33%	24%	
Fraud detection	45%	34%	29%	
Data management and classification	42%	39%	31%	
Network optimization	41%	37%	30%	
Sales forecasting	40%	36%	30%	
Workforce utilization and optimization	40%	34%	27%	
Customer self-service	40%	27%	26%	
Anomaly detection	39%	32%	29%	
Supply chain analytics and management	39%	30%	31%	
Product development optimization	38%	31%	30%	
Logistics analysis and optimization	38%	34%	30%	
Risk and compliance	38%	34%	26%	
Customer experience optimization	38%	30%	29%	
Predicting mechanical failures/preventive maintenance	37%	35%	33%	
Marketing analysis	36%	34%	31%	
Production and inventory forecasting	36%	31%	26%	
Social network and customer communication analysis	34%	32%	25%	
Human resources optimization	34%	31%	26%	
Recommendation engine	33%	30%	28%	
Financial management and planning	33%	32%	22%	
Product recommendations or offers	31%	29%	24%	
Physical security	31%	24%	27%	
Contact center optimization	26%	29%	26%	
Contract or legal document analysis and workflow	25%	33%	23%	

Q4. Which of the following use cases do you most associate with the capabilities of artificial intelligence, deep learning and machine learning? Select all that apply.

Figure 8

## Artificial intelligence perceptions (n=601)



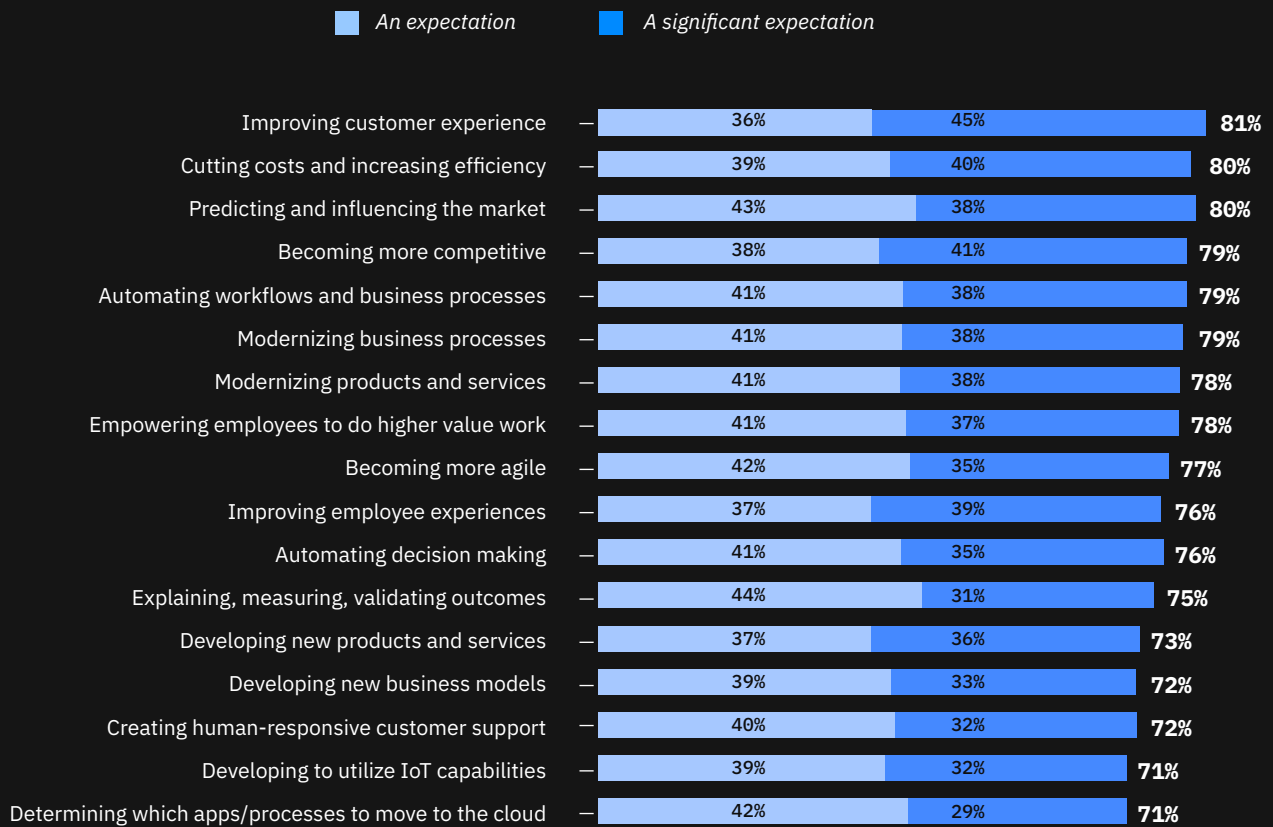
**Q19.** How much do you agree or disagree with the following statements related to artificial intelligence (AI)?  
Please rate each item.

Figure 9



## Expectations of artificial intelligence investments

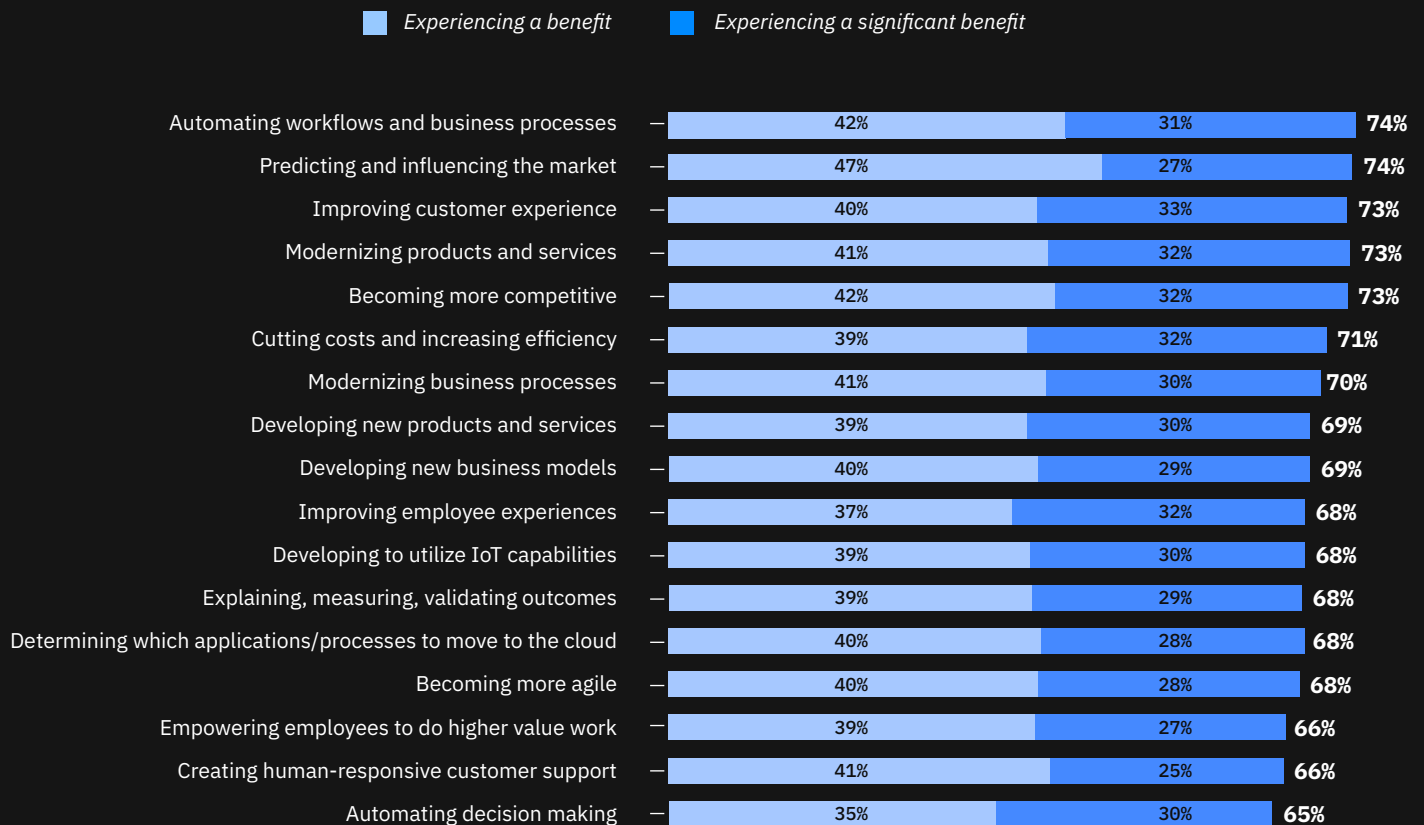
(n=601)



**Q13.** To what degree is each of the following an expectation of your artificial intelligence investments?  
Please rate each item.

Figure 10

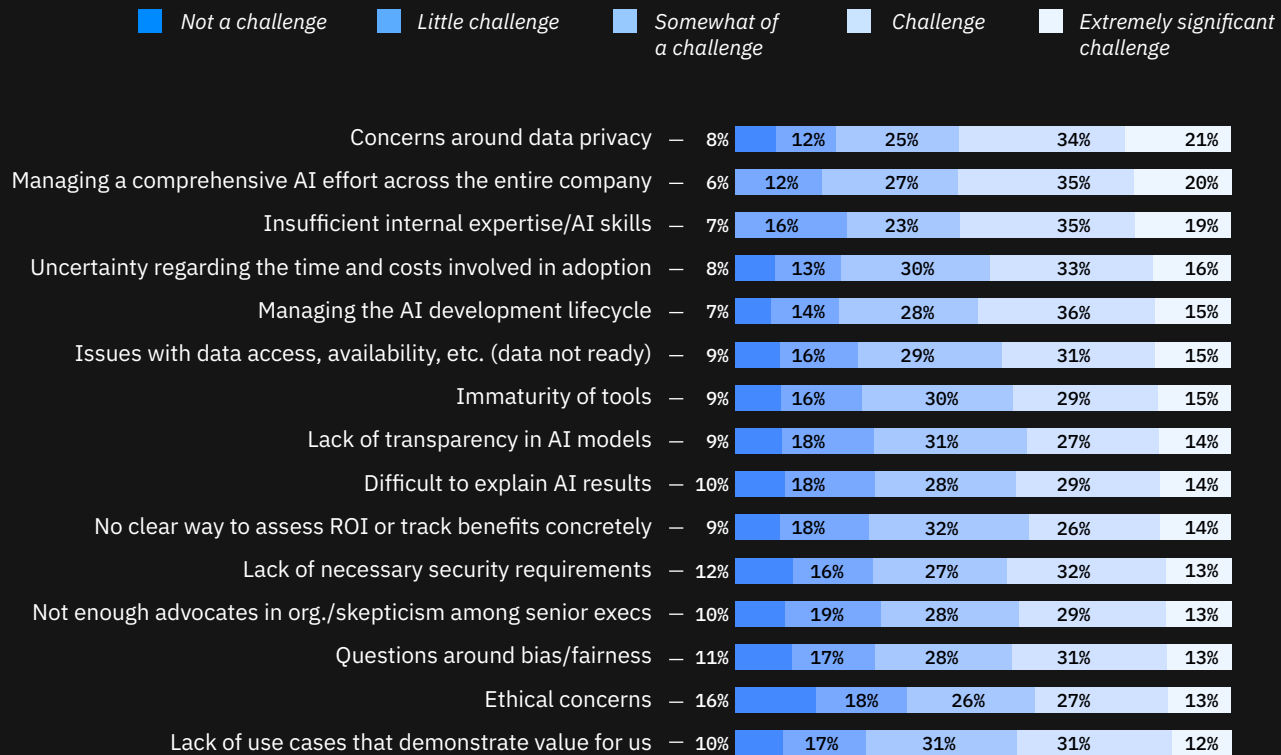
**Benefits experienced from artificial intelligence adoption**  
*(Of those at least experimenting with AI-related technology, n=546–560)*



**Q14.** *[Ask if “Experimenting with” or “Embracing” any technologies in Q5] Please rate the degree to which your company is experiencing the following benefits from adopting artificial intelligence (AI). Please rate each item.*

Figure 11

## Challenges in artificial intelligence adoption (n=601)



**Q15.** Please rate the degree to which each of the following has been a significant challenge in successfully adopting or expanding the use of artificial intelligence (AI) in your company. Please rate each item.

Figure 12