

The State of AI and Machine Learning

AI Industry Gains Traction
with Increased Executive Visibility and Budgets

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Introduction

We introduced the State of AI report over six years ago when AI and machine learning adoption was still in its infancy. Since then, the industry has grown significantly, with budgets, executive visibility, and ownership all increasing year-over-year (YoY).

Despite rapid growth, there is more room for organizations to adopt, scale, and evolve their AI programs. In 2020, global organizations and well-funded startups are leading the way by integrating AI as a core component of their business. Other organizations are still testing the waters or working to scale their initial programs, as they see early results. This is the second year where we have explored the gap between line of business decision-makers (which we refer to throughout the report as **business leaders**) and technical practitioners (which we refer to as **technologists**). As AI adoption matures, it is opportune for leaders on both sides of the organization to be mindful of these differences to manage change better. New to the report this year, we have also measured the state of AI for **enterprise** (1,000+ full-time employees) and **commercial** (fewer than 1,000 full-time employees) organizations.

As organizations begin to scale their deployments, we see the C-suite embracing and taking ownership of AI. This shift puts more focus on areas like ethics and bias, scalability, and the criticality of AI to the business as key parts of building a successful AI journey.

The State of AI 2020 report is the output of a cross-industry, large-organization study of senior business leaders and technologists. The survey intended to examine and identify the main characteristics of the expanding AI and machine learning landscape by gathering responses from AI decision-makers. Additional details about the study can be found in the [methodology on page 24](#).

The results paint an exciting picture for organizations working on AI initiatives across all levels of adoption. There has never been more focus, budget, people, algorithms, hardware, and other resources available for AI initiatives at any point in history. This is not to say that the road ahead is easy. This report sheds light on common challenges and opportunities that organizations need to be prepared to address. We aim to illustrate the current state of AI and machine learning, detailing how organizations are implementing AI within their business. For readers who might be amid their own AI initiatives, understanding the dial turns for AI success will be invaluable.

Lastly, given the current world context, we looked at how the adoption of AI is impacted in the wake of COVID-19, as organizations are forced to rethink the way they operate in a world that needs to adjust to a new normal.



Many organizations have adopted the use of the internet at the core of their processes, and AI is on a similar journey from fringes to core value offering. Increasing investment in AI projects and greater involvement by the C-suite, along with accelerating enterprise adoption in the wake of COVID-19, are clear indicators that AI is core to business success. However, most companies are still in the early stages and facing challenges, especially around training data. ”

Mark Brayan
CEO, Appen



Key Takeaways



1

While nearly 3 out of 4 organizations said AI is critical to their business, nearly half feel their organization is behind in their AI journey.

2

Budgets greater than \$5M doubled YoY.

3

An increasing number of enterprises are getting behind responsible AI as a component to business success, but only 25% of companies said unbiased AI is mission-critical.

4

3 out of 4 organizations report updating their AI models at least quarterly, signifying a focus on the model's life after deployment.

5

The gap between business leaders and technologists continues, despite their alignment being instrumental in building a strong AI infrastructure.

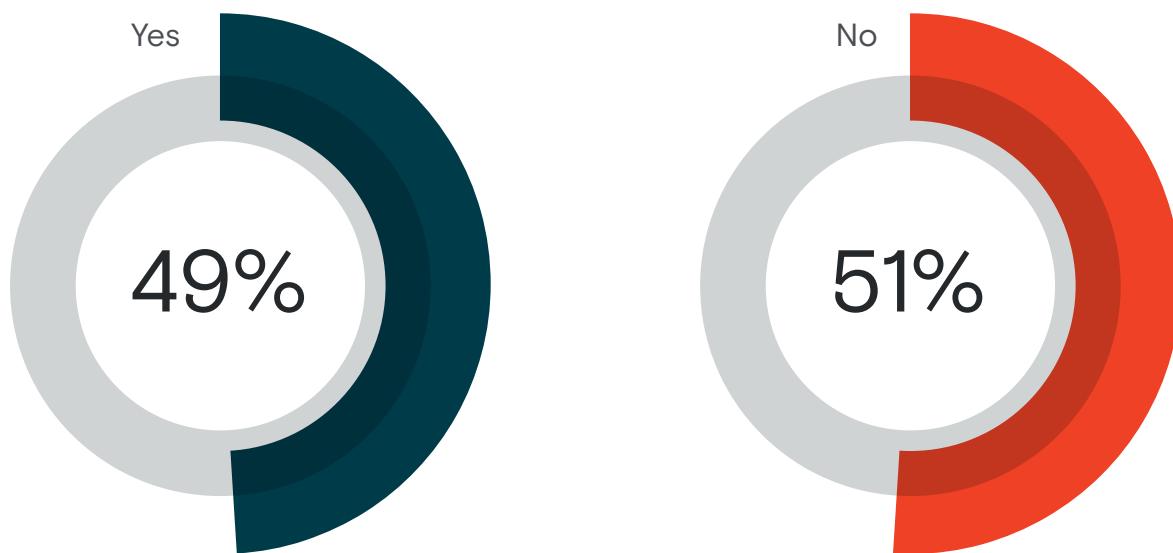
6

Despite turbulent times, more than two-thirds of respondents do not expect any negative impact from COVID-19 on their AI strategies.

While nearly 3 out of 4 organizations said AI is critical to their business, nearly half feel their organization is behind in their AI journey.

The survey responses show that nearly three-quarters of businesses now consider AI critical to their success, and AI continues to grow in importance across companies of various sizes and industries. Yet, nearly half of those who responded feel their company is behind in their AI journey, suggesting a critical gap exists between the strategic need and the ability to execute.

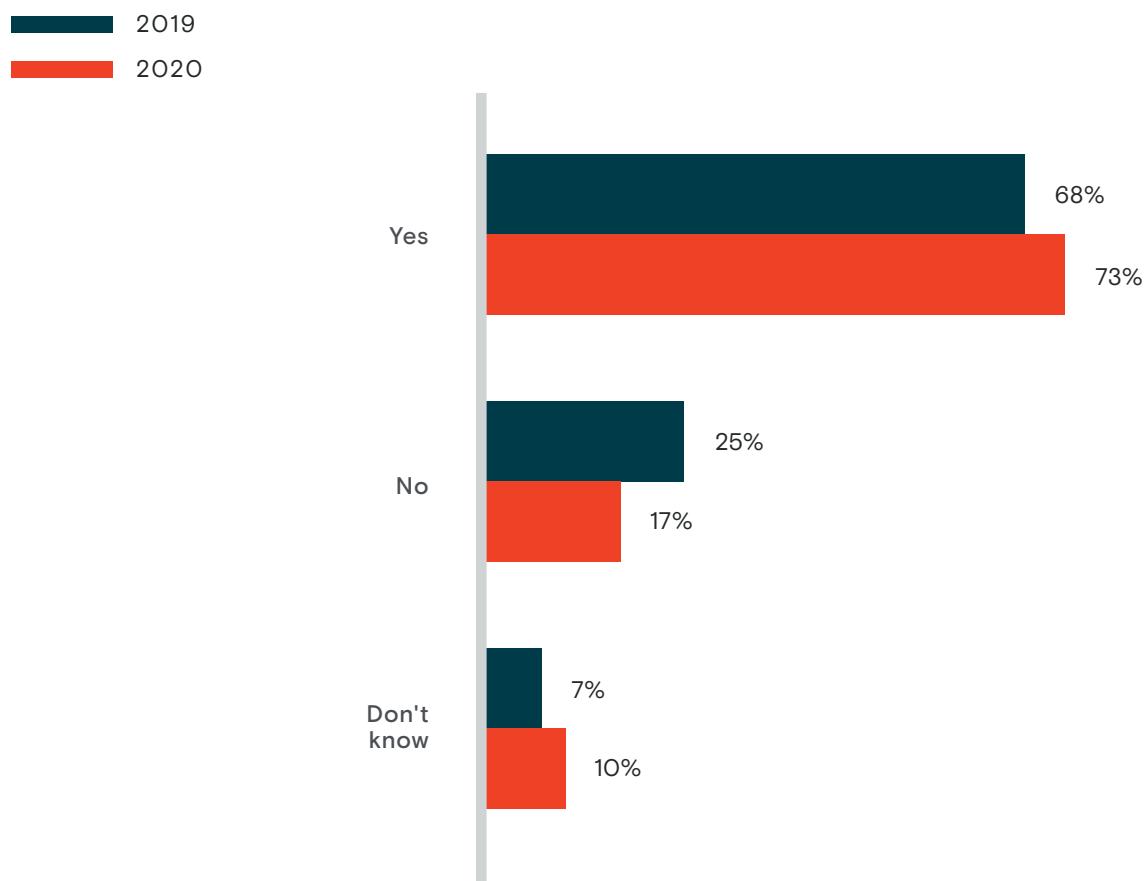
Figure 1: Do you feel that your company is behind when it comes to adopting AI?



Participants surveyed: 374
Single select

Nearly three-quarters of businesses now consider AI critical to their success as AI continues to grow in importance across companies of various sizes and industries. Yet, nearly half of those who responded feel their company is behind in their AI journey, suggesting a critical gap exists between the strategic need and the ability to execute.

Figure 2: Is AI critical to the success of your business?

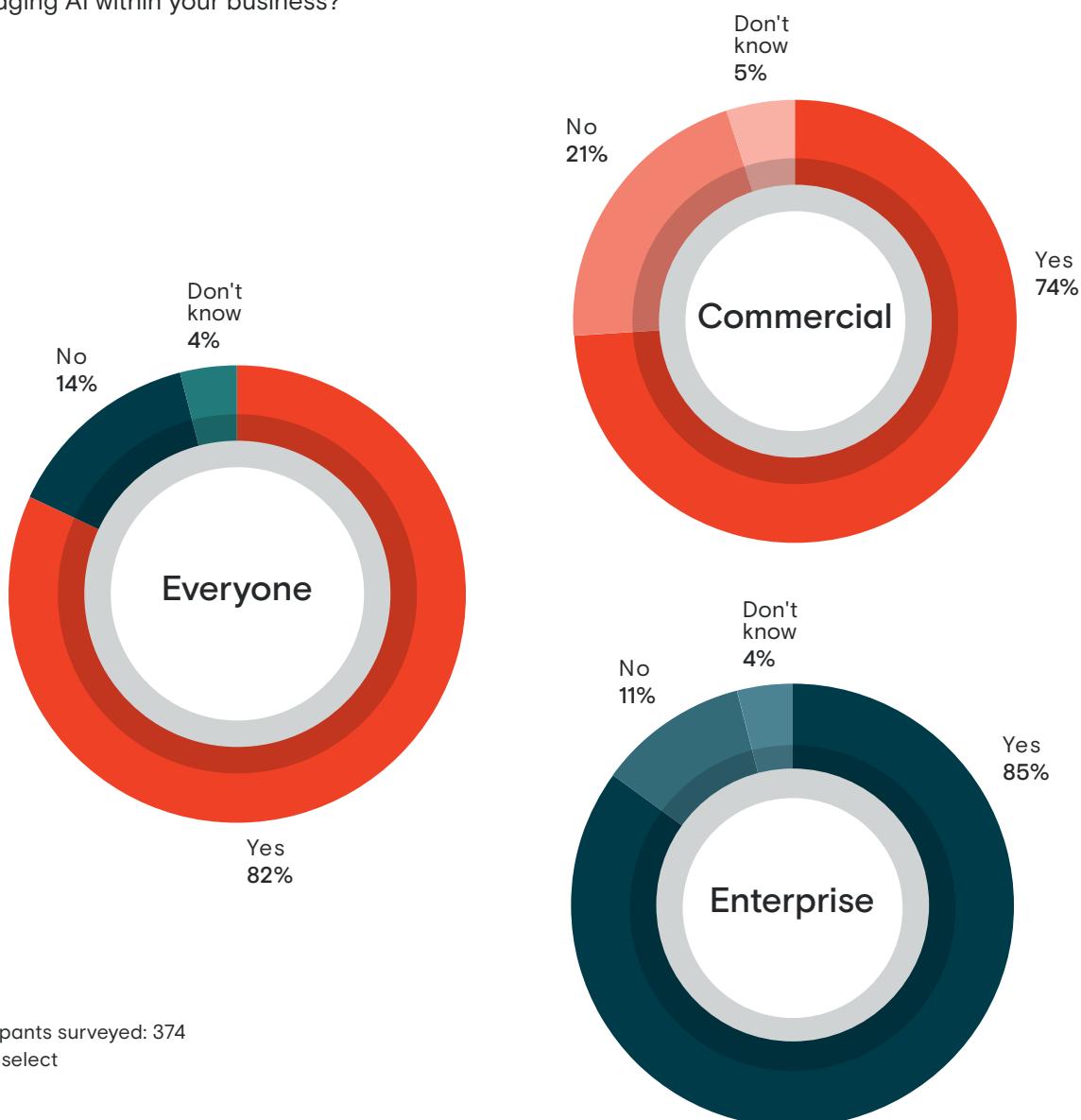


Participants surveyed: 374 in 2020 & 251 in 2019
Single select

We found that while 82% of respondents are leveraging AI within their business, 14% of companies reported not leveraging AI in any capacity. Between the number of businesses not using AI at all, and the quarter of businesses who do not feel that AI is critical to their business, we can expect it to be a few more years before a majority of companies report AI as core to their business success.

Unsurprisingly, commercial organizations are maturing at a slower rate than enterprises. What's interesting is that commercial organizations are 10% less likely to utilize AI in their business.

Figure 3: Are you currently leveraging AI within your business?

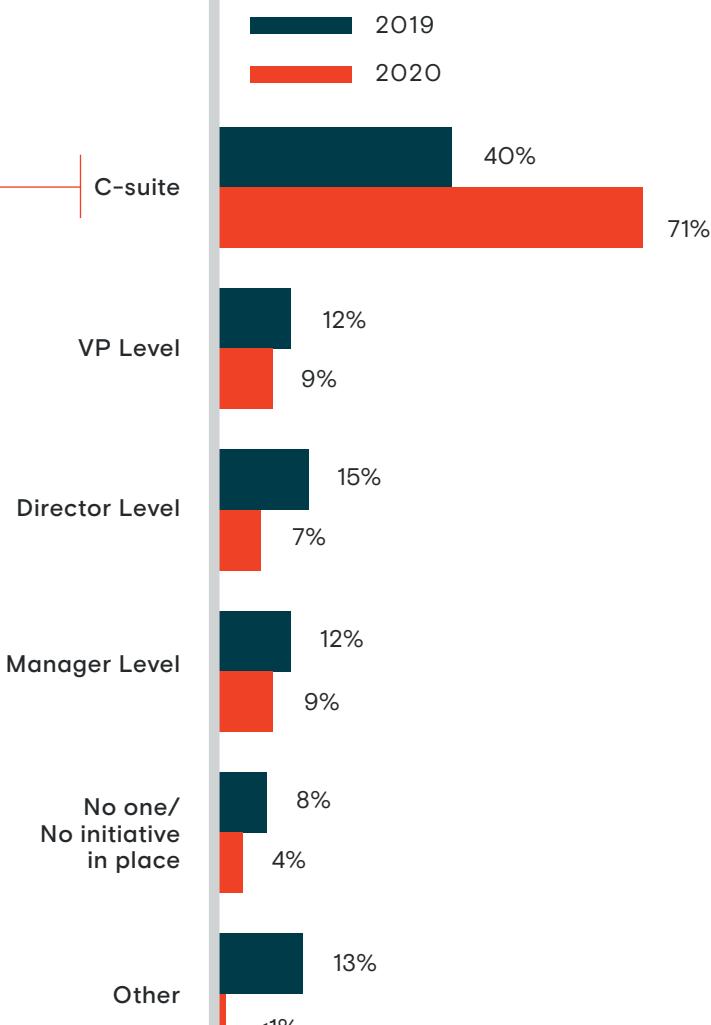


Budgets greater than \$5M doubled YoY.

In 2019, only 39% of executives owned AI initiatives. In 2020, executive ownership of AI skyrocketed to 71%. With this increase in executive ownership, the number of organizations reporting budgets greater than \$5M also doubled.

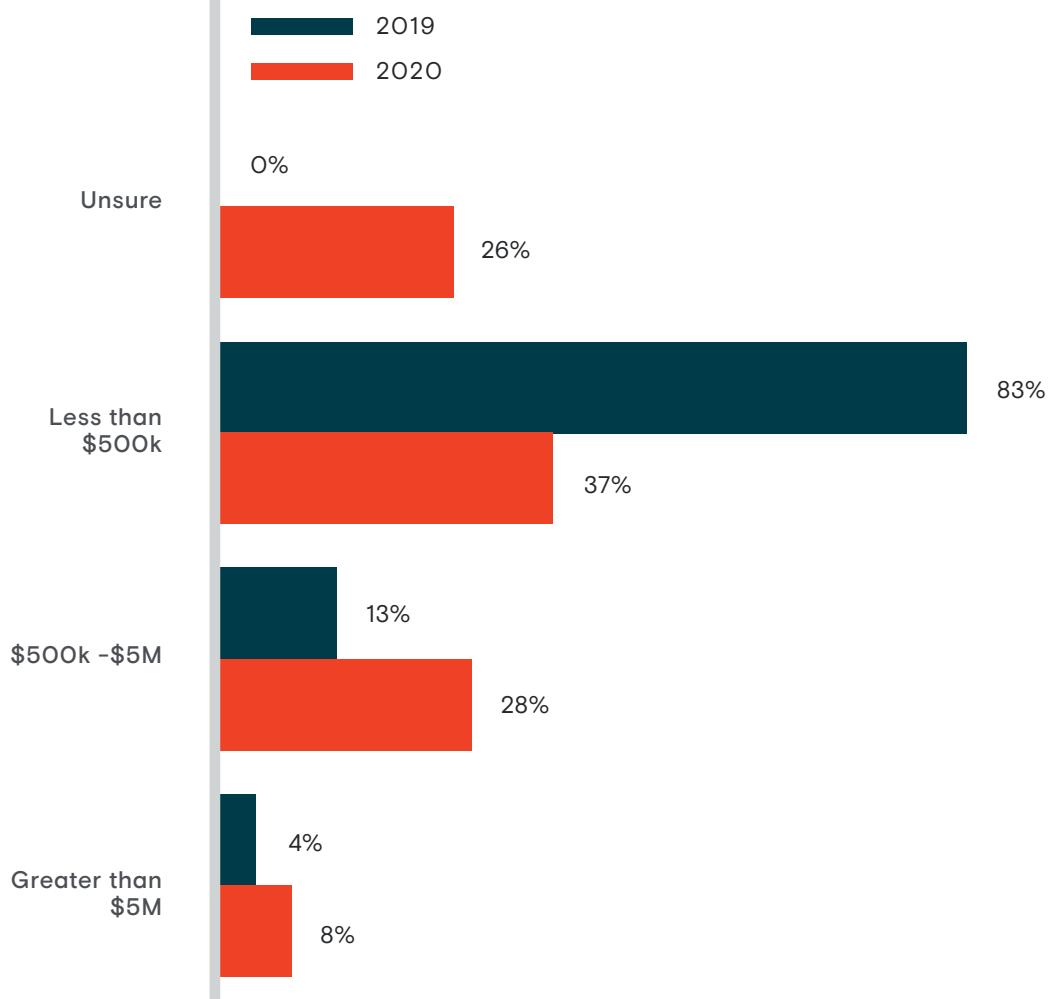
Of the 71%
of C-suite
ownership,
CTOs make
up 42%,
previously at
20% in 2019.
This may be
a contributing
factor to
increased
budgets.

Figure 4: Who is ultimately responsible for all AI initiatives within your organization?



Participants surveyed: 374 in 2020 & 251 in 2019
Single select

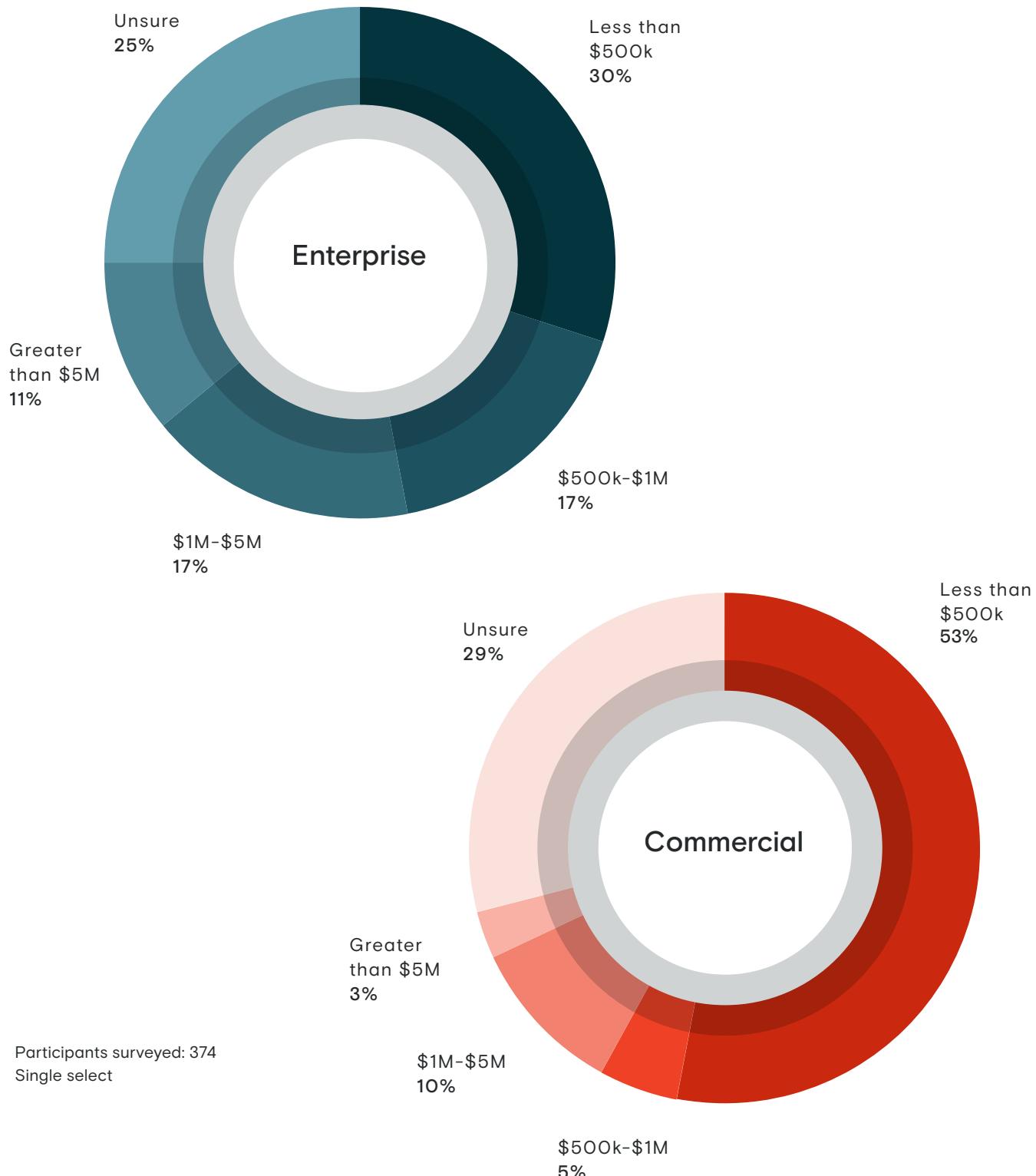
Figure 5: Do you have allocated budget for any AI initiatives and if so, how much?



Participants surveyed: 374 in 2020 & 251 in 2019
Single select

The scale of increasing budgets for AI projects and deployments YoY indicates that AI is a significant and growing operation across companies of various sizes and industries. 27% of enterprise budgets are now reported to be over \$1M, with 10% of those actually beyond \$5M. As more businesses find AI to be critical to their organization, experience success, and gain traction, we anticipate this number to grow.

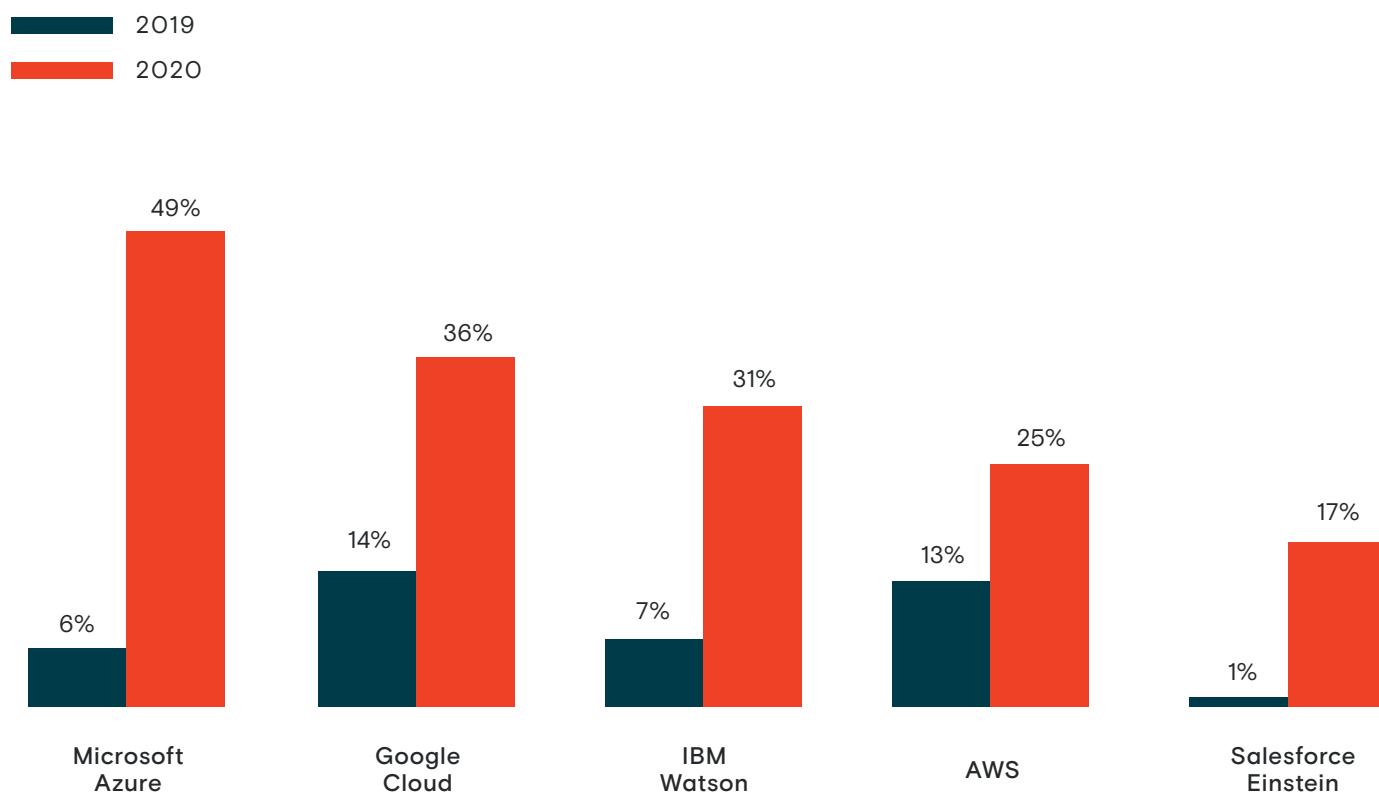
Figure 6: Do you have allocated budget for any AI initiatives and if so, how much?



Global cloud providers gained significant traction as data science and ML tools from 2019, which may also be due to increased budget and executive oversight. In 2020, 4 times as many respondents reported using global cloud machine learning providers, identifying all major cloud providers: Microsoft Azure (49%), Google Cloud (36%), IBM Watson (31%), AWS (25%), and Salesforce Einstein (17%).

Each of these front runners saw double-digit adoption increases vs 2019, proving that as more companies are moving to scale, they're looking for solutions that can scale with them.

Figure 7: What data science and machine learning tools/frameworks do you use?

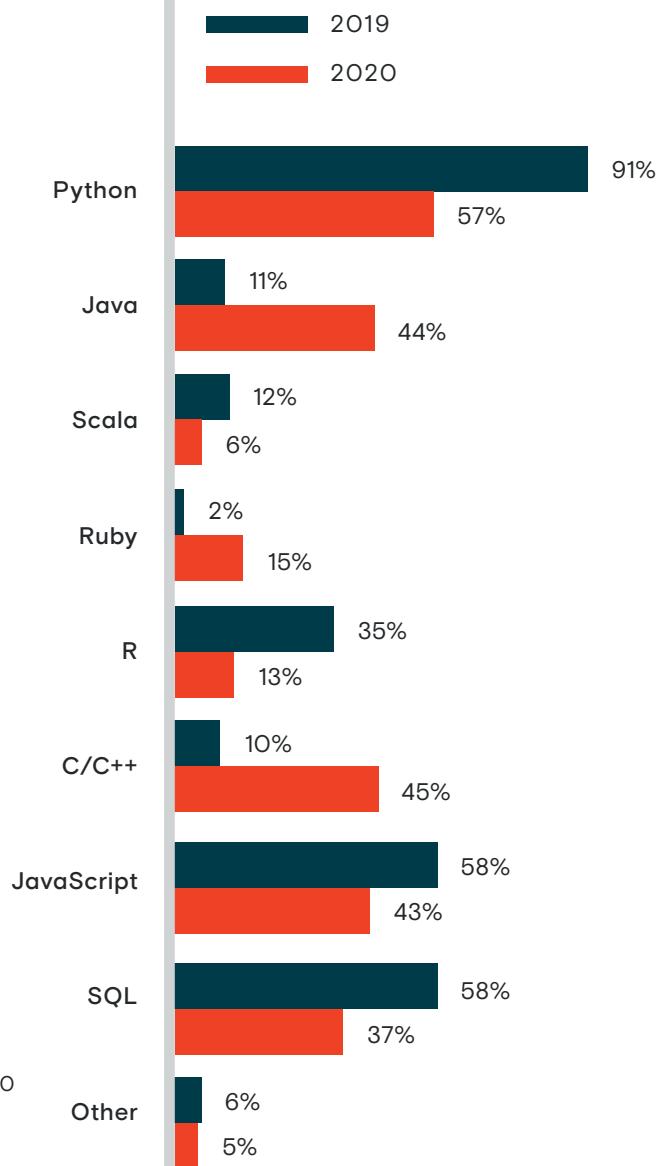


Participants surveyed: 374 in 2020 & 251 in 2019
Multi-select

Variability in languages used to build models has also shifted from 2019. While Python remains the most used language in both 2019 and 2020, SQL and R were the second and third most commonly used language in 2019. However, in 2020, Java, C/C++, and JavaScript gained significant traction. Python, R, and SQL are often indicative of the pilot stage, while Java, C/C++, and JavaScript are more production stage languages.

Seeing both categories in 2020 indicates organizations are both running experiments and moving to production.

Figure 8: What programming language do you use the most at work for your AI initiatives and projects?

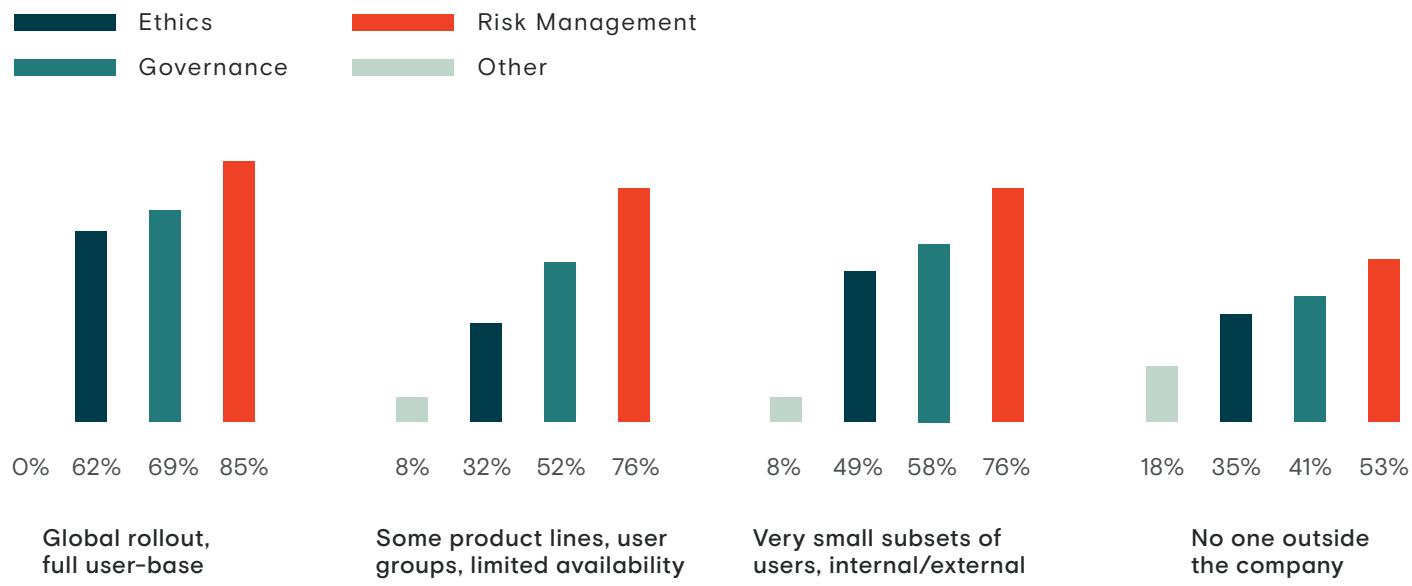


Participants surveyed: 374 in 2020
& 251 in 2019
Multi-select

⋮⋮⋮ An increasing number of enterprises are getting behind responsible AI as a component to business success, but only 25% of companies said unbiased AI is mission-critical.

Organizations are beginning to take a more holistic approach to AI initiatives with an emphasis on risk management, governance, and ethics gaining traction. This may be due to the increased C-suite visibility opening up discussions around responsible AI. As more companies deploy AI at a global scale, the need for AI to work for everyone makes data diversity and bias more prominent. 100% of respondents who rolled out their initiatives globally or to their full user base identified ethics, governance, or risk management as a lens used when thinking about AI.

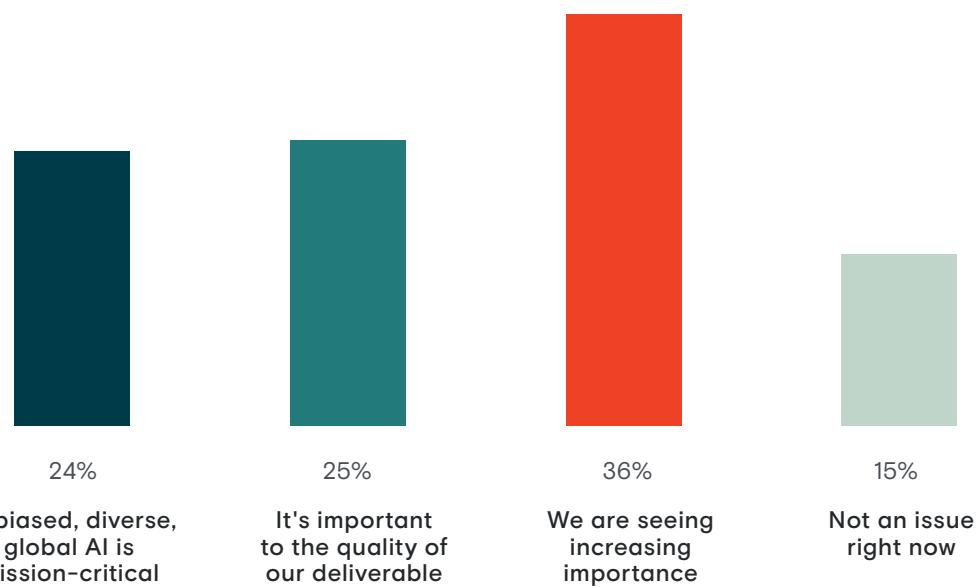
⋮⋮⋮⋮⋮ Figure 9: What lenses are you using when thinking about AI?



Participants surveyed: 217
Multi-select

While many enterprises are getting behind responsible AI as a critical component to business success, **only 25% of companies said unbiased AI is mission-critical.** 50% either didn't consider this an issue or are just starting to think about it. Without a more proactive approach to responsible AI, many companies may see their initiatives flop. There are inherent risks by not considering ethics in your AI thought process, which may include AI not working for a diverse user base, not focusing on wellness and fair pay for the AI supply chain, or creating privacy issues if, for example, your AI is trained using data users didn't consent to be used for that purpose.

Figure 10: How do you think about data diversity, bias reduction and global scale for your AI?



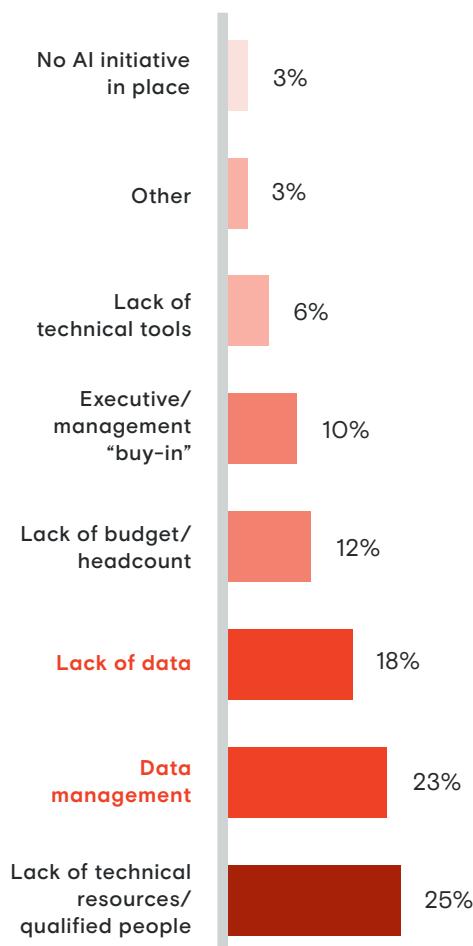
Participants surveyed: 374
Single select

3 out of 4 organizations report updating their AI models at least quarterly, signifying a focus on the model's life after deployment.

Companies are now reporting that they are updating their models more frequently. We found that, of those who update at least quarterly, **40%** report that lack of data or data management were of the biggest roadblocks to AI success.

Participants surveyed: 173 – update models quarterly or more often
Single select

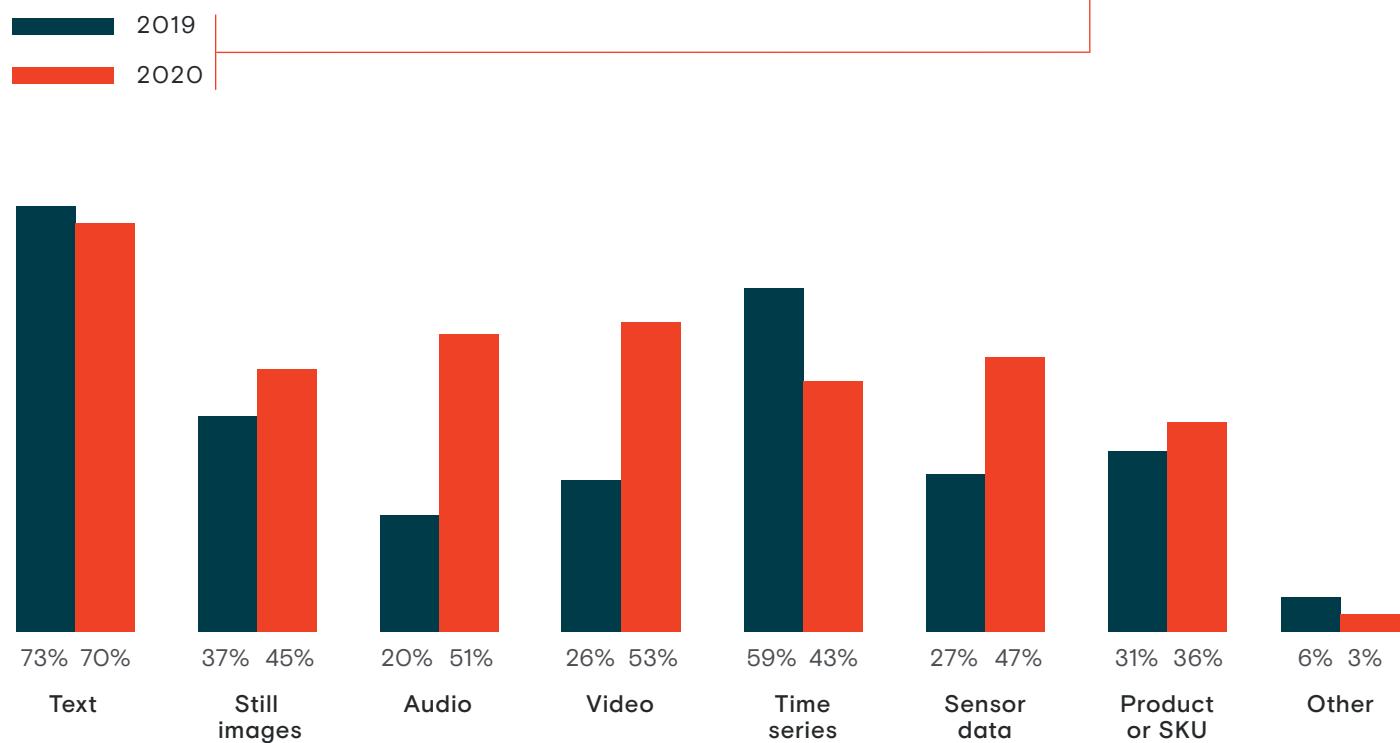
Figure 11: What do you consider the biggest bottleneck to any of your AI initiatives or project?



Lack of data and data management are not the only data challenge, though. Training data is foundational of AI and ML model deployments, so, unsurprisingly, 93% of companies report that high-quality training data is important to successful AI.

Organizations also reported using **25% more data types** (text, image, video, audio, etc.) **in 2020, compared to 2019.** Not only are models getting more frequent updates, but teams are using increasingly more data types, and that will translate in an increasing need for investment in reliable training data.

Figure 12: What kinds of data do you work with?



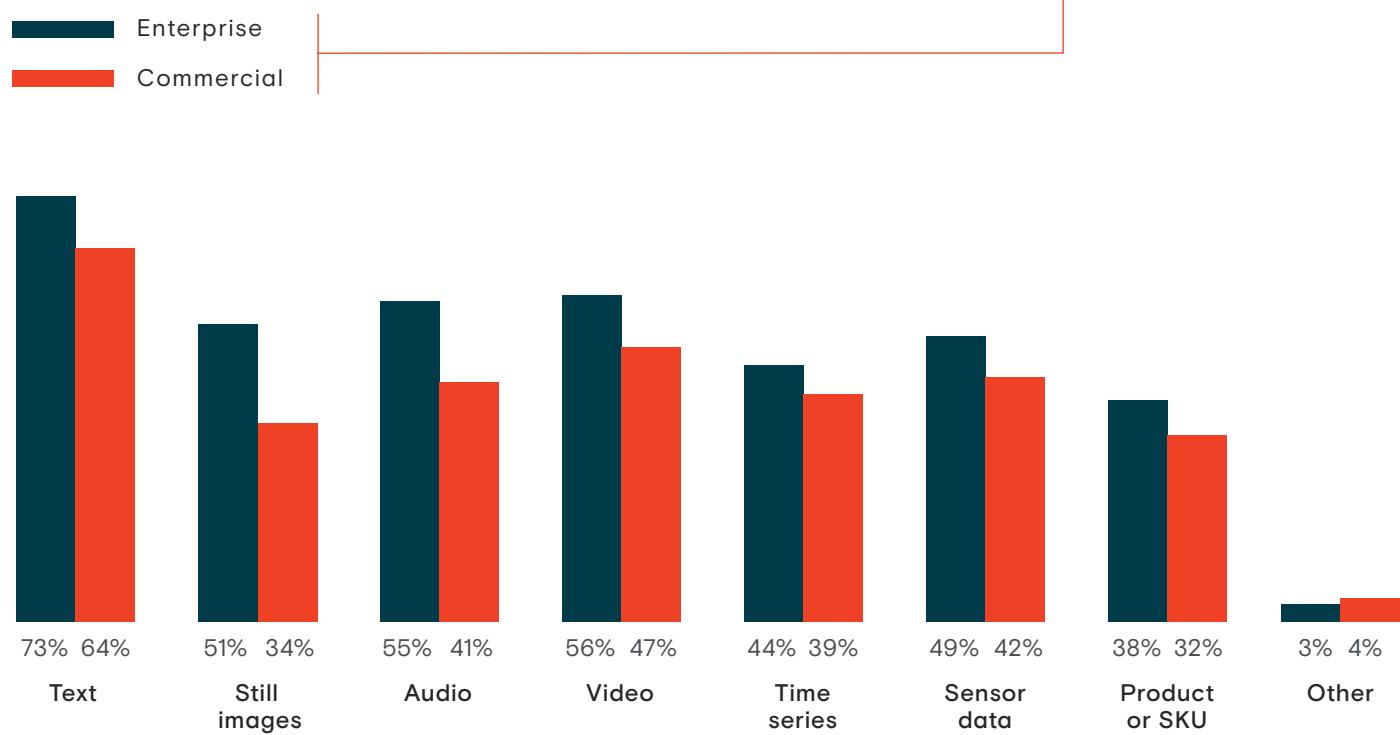
Participants surveyed: 374 in 2020 & 251 in 2019
Multi-select

The increase in the average number of data types used by commercial organizations was lower than enterprises in 2020 when compared to the 2019 average of 2.8 data types.

Commercial organizations were up just 9%, whereas enterprises averaged a 33% increase from 2019.

Commercial organizations report using fewer data types, and they are also a lot less likely to utilize more complex (and resource-intensive) data types like video and sensor data.

Figure 13: What kinds of data do you work with?



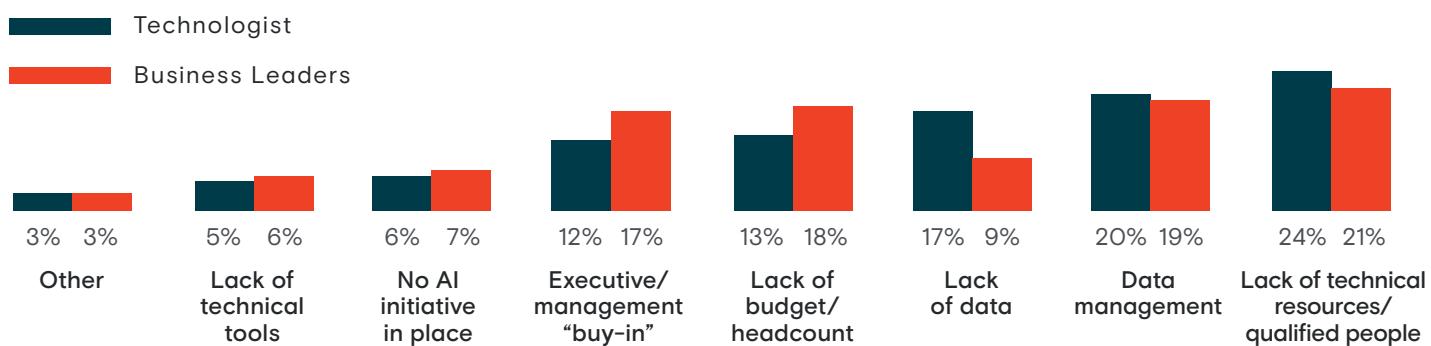
Participants surveyed: 374
Multi-select

::::: The gap between business leaders and technologists continues, despite their alignment being instrumental in building a strong AI infrastructure.

In the [2019 State of AI report](#), it was evident that there were differences between technologists and business leaders in how they viewed their organization's AI progress. This gap still exists in 2020, signaling that organizations need to double down on their efforts to bridge the difference between the two. Alignment between business leaders and technologists is an instrumental component in building a strong AI infrastructure and is a massive opportunity for organizations to improve their chance of successfully deploying AI at scale.

Business leaders and technologists are often not on the same page when it comes to core problems, budget allocation, and where they are at with their AI initiatives. The most significant difference reported between the two was on what the key challenges are, with twice as many technologists as business leaders reporting lack of data as problematic. This could be attributed to business leaders misunderstanding that the data on hand is often not the data needed when it comes to deploying AI at scale.

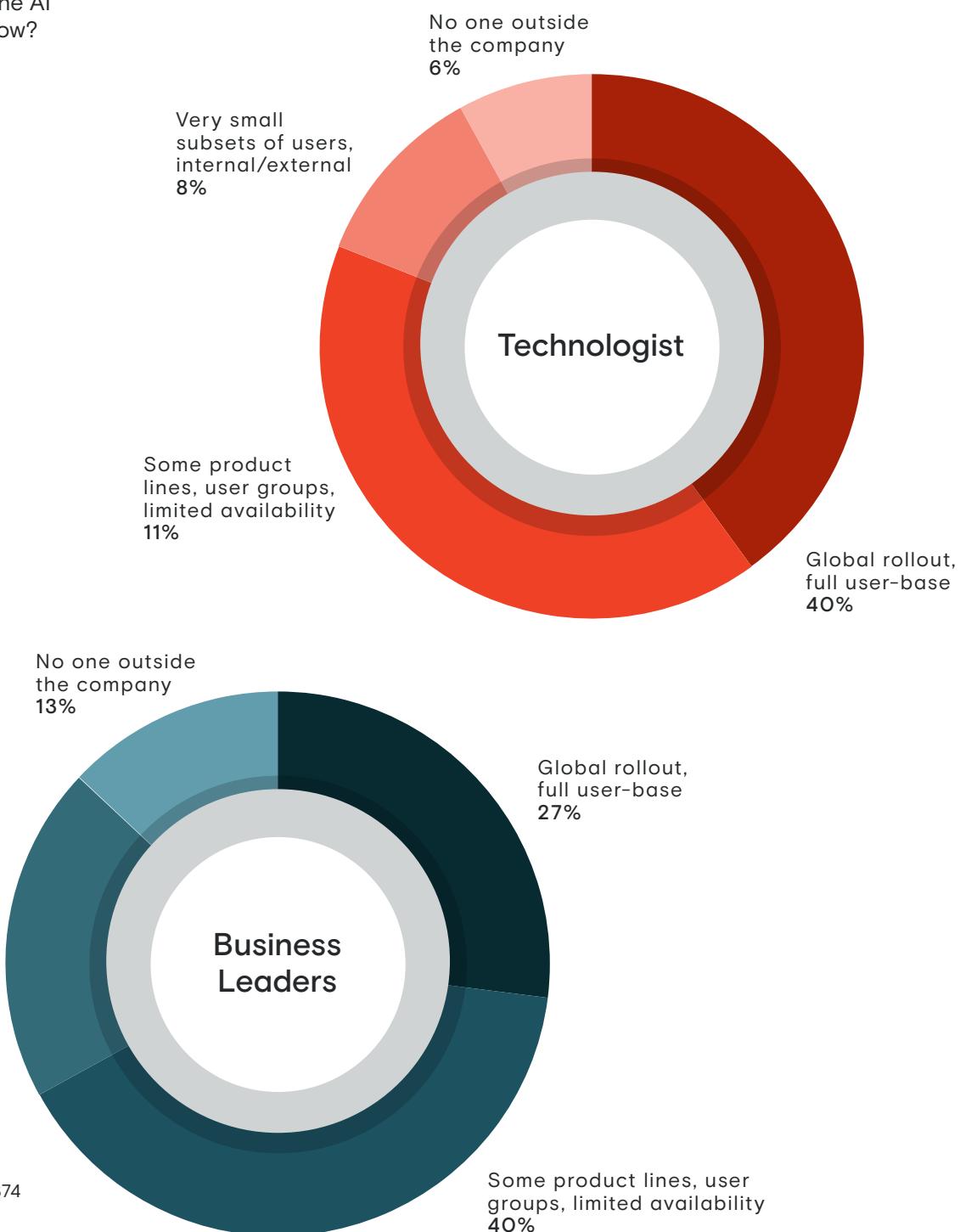
..... **Figure 14:** What do you consider the biggest bottleneck to any of your AI initiatives or project?



Participants surveyed: 374
Multi-select

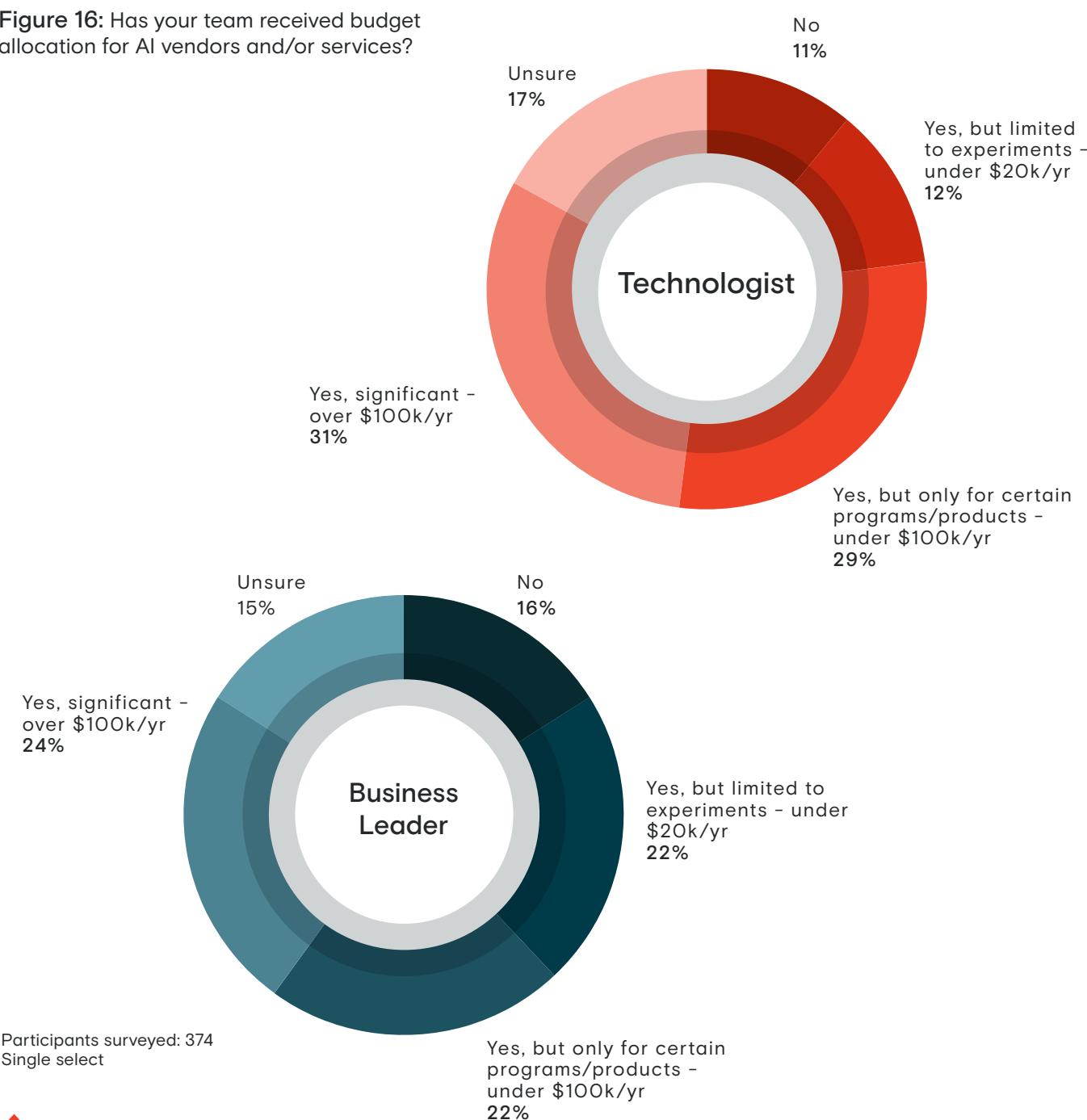
Technologists also report that their AI initiatives are further along, and are **50% more likely** to say their AI initiatives are rolled out globally or to their full user base, compared to business leaders.

Figure 15: Who is the AI rolled out to right now?



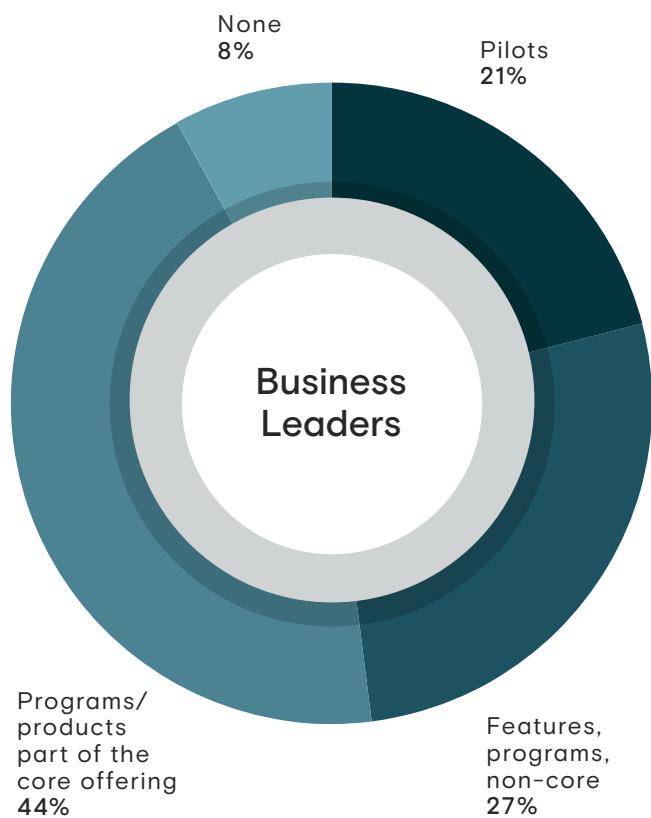
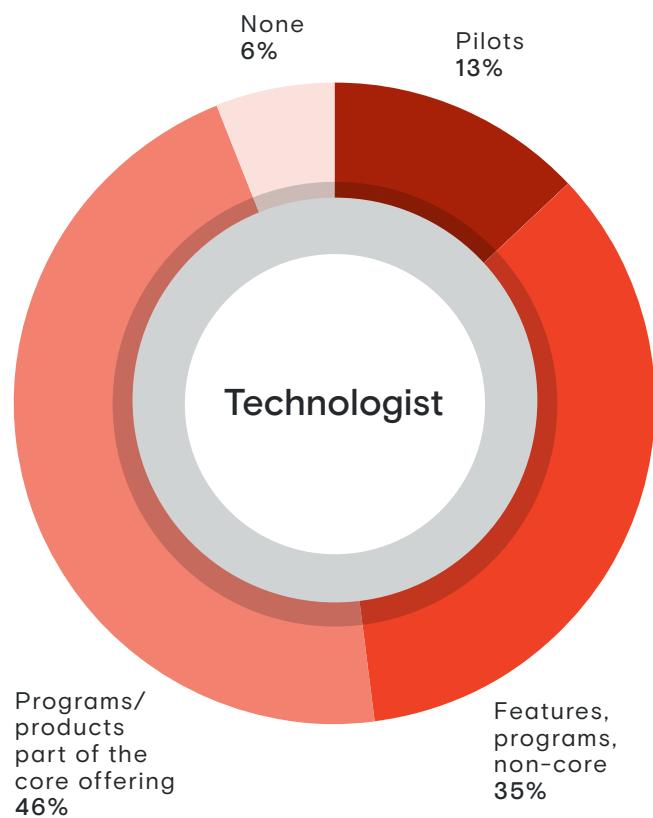
The good news is that technologists and business leaders appear to be aligned on overall budgets. This alignment breaks down, though, when looking at where budgets are going. Technologists also reported higher spends allocated to AI vendors, compared to business leaders.

Figure 16: Has your team received budget allocation for AI vendors and/or services?



Misalignment isn't limited to just technologists and business leaders. When asked if their company was behind on adopting AI, respondents appeared to be nearly **50/50**, regardless of if they were technologists or business leaders.

Figure 17: How would you describe your most advanced AI initiatives?

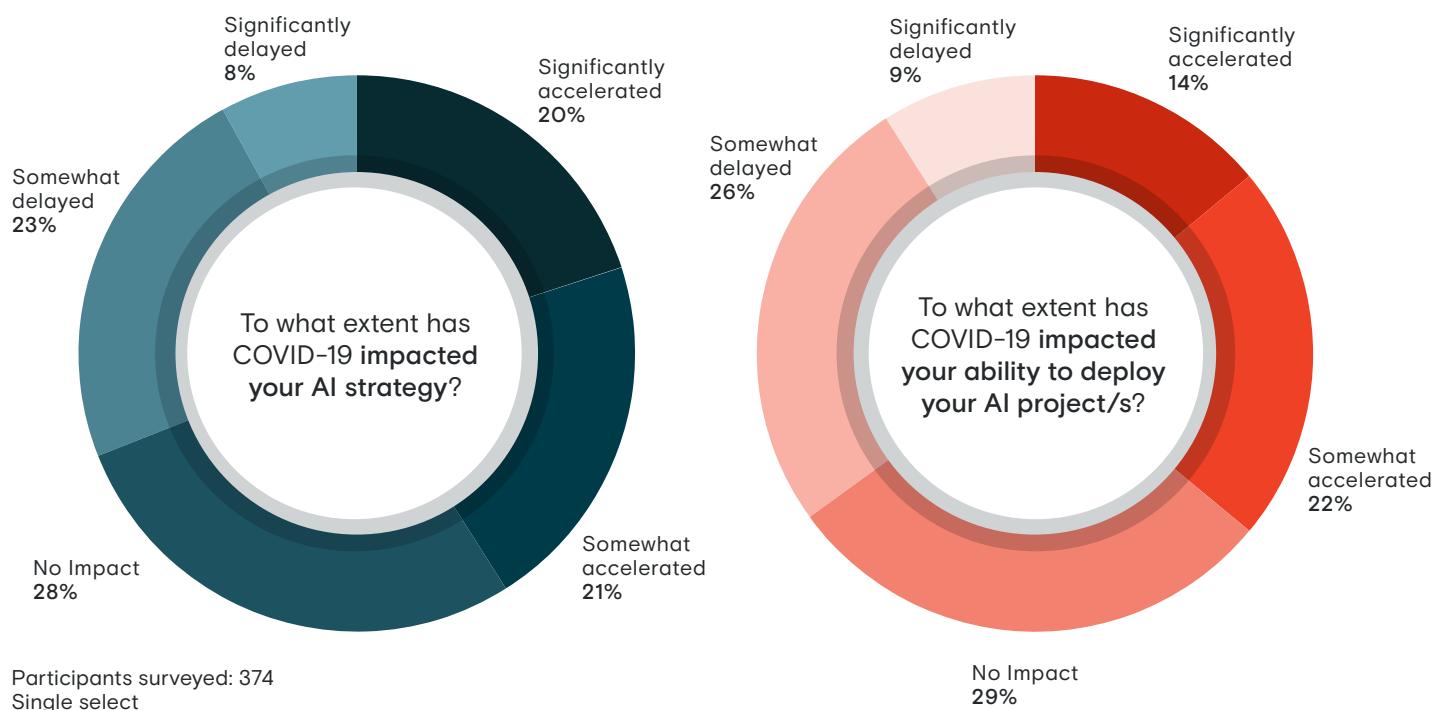


Participants surveyed: 374
Single select

Despite turbulent times, more than two-thirds of respondents do not expect any negative impact from COVID-19 on their AI strategies.

2020 has been a turbulent year for many businesses as we experience transitions and a new normal due to COVID-19 impacts. While uncertainty can often be a time when projects get put on hold, AI is poised to not only withstand the current state but, in many cases, even accelerate. 70% of businesses report that COVID-19 will either cause no impact, or accelerate their strategies, betting on AI projects to have a positive impact on their organizations' resiliency, efficiency, and innovation. Of those feeling confident in accelerating their AI strategies, 20% report significant acceleration. On the flip side, 30% of organizations expect some level of delay in their AI strategy. For 9% of companies, COVID-19 is contributing significant delays to their AI strategy.

Figure 18: COVID-19 impact



Conclusion

Similar to how many organizations have adopted the use of the internet at the core of their processes, AI is progressing from the fringes to a core value offering. It's only a matter of time before it becomes critical to most organizations' success, and those who invested in it early and recognized the value of AI will be rewarded. Today, we found that three out of four businesses are running continuous AI initiatives and updating their AI at least quarterly, meaning they are already ahead of the game. Between C-suite visibility gains, growing operations and budgets, as well as added focus on responsible AI, it appears companies are starting to find ways to make AI work in the real world, identifying productive use cases that enable them to scale, and leveraging more and more of the data that's being produced every day. For everyone else still working to figure out the first steps, it is just a matter of time.

This year, COVID-19 and other market changes that would be perceived as a setback may be driving forces to businesses turning to AI to differentiate. While a lot of organizations reported acceleration of their AI adoption, there are still challenges to rapidly adopting AI, and the biggest one is data. This stems from the requirement for high-quality training data being a key component in successful AI deployments. With organizations using more data types as well as requiring more data for model refresh, organizations must be prepared to tackle and manage their data pipeline effectively and efficiently.

Regardless of your place in the AI journey, we hope this report has helped you gain a better understanding of the current landscape and appetite for AI initiatives among business leaders and technologists. Please feel free to [reach out](#) should you have any questions about what you've read here or about embarking upon your own AI journey.



COVID-19 has changed everything about the way companies are operating today, but not everyone has adapted in the same way. These findings show that despite turbulent times, more than two-thirds of respondents do not expect any negative impact from COVID-19 on their AI strategies. Those that are prioritizing AI see the power of digital transformations as a way to improve their resiliency and long-term performance. Many businesses are still early on their AI journey and they are finding that their data needs span beyond in-house resources when looking for high-quality, annotated training data that drives AI success. Industry leaders are turning more and more to third-party providers like Appen to help them deploy their AI projects.”

Wilson Pang
CTO, Appen

Methodology

The purpose of The State of AI and Machine Learning 2020 survey was to examine and identify the main characteristics of the expanding AI and machine learning landscape, by gathering responses from both line of business and technology decision-makers.

We surveyed 374 respondents in April and May 2020. They were a mix of random sampling through a [Research.net](#) panel provider and our prospect, customer, and partner databases. The random sample consisted of 200 directors, VPs and above of product management, engineering, IT, data, data science at companies with 500+ employees. The results reflect the real population within a margin of error of ~5%.

Our qualification questions ensured that at least 30% of responses came from organizations under 1,000 employees, whereas 70% represent 1,000+ organizations, 18% being greater than 25,000 full-time employee companies.

Industry

Advertising & Marketing	
Agriculture	
Airlines & Aerospace (including Defense)	
Automotive & Transportation	
Business Support & Logistics	
Construction, Machinery, and Homes	
Education	
Entertainment & Leisure	
Finance & Financial Services	
Food & Beverages	
Government	
Healthcare & Pharmaceuticals	
Insurance	
Manufacturing	
Nonprofit	
Retail & Consumer Durables	
Real Estate	
Telecommunications, Technology, Internet & Electronics	
Utilities, Energy, and Extraction	

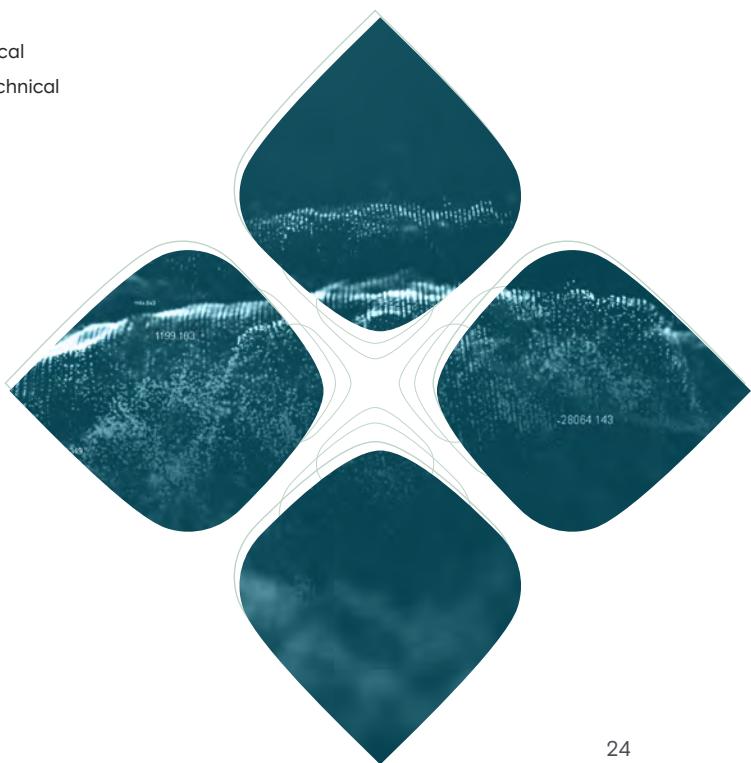
Role

Data Scientist
Data Engineer
Data Analyst
DevOps Engineer
Machine Learning Engineer
Software/App Developer
Software/SaaS Engineer
Program Manager/Director
Product Manager/Director
Business Analyst/Intelligence
VP / C-Level Executive - Technical
VP / C-Level Executive - Non-Technical
Business Process/Dept Owner

Company Size

Under 500
501 - 1,000
1,001 - 5,000
5,001 - 10,000
10,001 - 25,000
25,001 +

Anonymous data can be made available upon request for journalists or academia.





About Us

Appen collects and labels images, text, speech, audio, video, and other data used to build and continuously improve the world's most innovative artificial intelligence systems. Our expertise includes having a global crowd of over 1 million skilled contractors who speak over 180 languages, and the industry's most advanced AI-assisted data annotation platform. Our high-quality training data gives leaders in technology, automotive, financial services, retail, healthcare, and governments the confidence to deploy world-class AI products. Founded in 1996, Appen has customers and offices globally.

- Experience working in **130+ countries**
- Expertise in **180+ languages**
- Over **800 employees** located in offices around the globe.
- Access to a curated crowd of over **1 million** flexible contractors worldwide
- More than **13 billion** judgments made and 500,000 hours of audio processed
- **20+ years working** with leading global technology companies