

## U.S. Software

# AI Survey of Enterprise Execs – Shaping the AI Narrative Into 2024

### Summary

The AI phenomenon has been THE central issue impacting tech stocks in 2023, in many cases offering enough support to more than offset the headwind from the still-tough IT spending backdrop. In our view, what investors could benefit from most at this point is a more thorough understanding of customer/user spending intentions on AI initiatives into 2024, to supplement what we're hearing from the tech firms themselves. The UBS Technology Research team recently leveraged the UBS Evidence Lab data team to deliver exactly this. In this report, we summarize the feedback on AI technology choices and spending intentions via 30 core questions ([> Access Dataset](#)) touching on each key tech sector (chips, the choice of models, cloud infrastructure, software applications, data and security). We're hosting a recap call for investors at 11:30am ET on Mon Dec 18th.

### Overall AI Adoption/Spend

The good news from the survey is that everyone – literally 100% of respondents – are at least in the AI investigation and use case discovery stage. That speaks to the potential for solid 2024/2025 adoption. The bad news is that just 6% of respondent organizations are in production and a year after the AI phenomenon hit, just 39% have moved past the proof-of-concept (POC) stage and are actually deploying it. Needless to say, it's still early. A full 70% of respondents cited the next 6-12 months as the most likely go-live timeframe, implying a 2H24 adoption ramp. Given that adoption is ramping slowly, the average expected AI spend in 2024 was a relatively modest \$1.65 million, with this figure doubling in 2025. On Microsoft Copilot in particular, ~80% of respondents were trialing or planning to trial Copilot, and in terms of the portion of employees likely to be on M365 Copilot by the end of 2024, the most popular answer was 1-10% with almost half of respondents answering 10-30%, creating the potential for material Copilot/Duet adoption in 2H24/2025.

### Key Takes By AI Segment

We'd flag: 1. At the chip level, the survey supported a view of Nvidia's dominance and product breadth (with use extending well beyond H100s). CPUs featured more prominently than expected and the feedback on Nvidia's DGX Cloud was constructive, but adoption remains early-stage, and with 2/3rds of respondents saying that AI budgets would come at the expense of other budget items, the "crowding out" theme looks likely to persist. 2. At the infrastructure level, Microsoft Azure was the most popular AI workload platform, but AWS was not that far behind (incumbency matters). 3. At the model layer, OpenAI's models (notably GPT4.0 and 3.5) dominated, followed by Llama 2, Google's models and custom-built models. 4. In terms of AI applications other than Copilot, we'd note that a) DALL-E was the most popular image creation tool (followed by Adobe Firefly), Microsoft GitHub Copilot was the most popular AI coding tool (followed by GitLab) and Salesforce was cited as having as a compelling suite. 5. At the data layer, Snowflake and Databricks came out ahead. 6. Finally, at the security layer, Microsoft was the most popular choice to secure AI apps, followed by Zscaler and Palo Alto Networks.

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# Key Conclusions

We offer the detailed question and answers in the following section, along with our takes, in the following section. Here, we wanted to begin with what we felt were the key conclusions by subject area.

## Overall Enterprise AI Adoption

- **Adoption Timeframe:** The good news from these questions is that everyone – literally 100% of respondents – are at least in the AI investigation and use case discovery stage. That speaks to the potential for solid 2024/2025 adoption. The bad news is that just 6% of respondent organizations are in production and a year after the AI phenomenon hit, just 39% have moved past the proof-of-concept (POC) stage and are actually deploying it. Needless to say, it's still early, with evidence of larger-than-expected internal org change and/or technology that still needs to mature before widespread adoption. In terms of adoption timing, a full 70% of respondents cited the next 6-12 months as the most likely go-live timeframe, implying a 2H24 adoption period, with ~30% kicking things off in 1H24. In terms of AI adoption hurdles, we were not surprised to see "compliance and regulatory hurdles" rank high, but were a bit surprised to see "lack of qualified talent" at the top of the list. Anecdotes that we've picked up of late, including at the recent UBS Tech Conference, suggest that "unclear ROI" might be rising on this list, as we've heard some sources make the point that the models underpinning AI applications need to mature.
- **Disappointing Dollar Spend:** Given that adoption is ramping slowly, one would expect the dollar spend to also ramp slowly and that is indeed the case. Across all respondents and customer sizes, the average expected AI spend in 2024 was \$1.65 million, with this figure doubling to \$3.36 million in 2025, presumably as more organizations move beyond the POC phase. The expected growth rate in 2025 is encouraging, although expected spend of <\$2 million in 2024 is disappointing and a total AI spend of <\$5 million might be less than many Street analysts would have hoped for when the AI craze kicked-off earlier this year. That said, this might be a reflection of the fact that many organizations do not plan to be fully in production until 2025/2026.
- **Headcount Impact:** In 1H23, as we and investors were absorbing the AI phenomenon and gauging its impact, one concern was that AI could become powerful enough to serve as a catalyst to displace humans, especially those conducting repetitive tasks that could be better automated. We'd note that just 2% of respondents were expecting a "significant" reduction in headcount as a result of AI, with the number calling for an increase larger than the number calling for a decrease. While the "headcount reduction" concern among investors has already faded, this survey answer supports a view that employee or seat-based SaaS models might be less disrupted than some investors may think.

## Nvidia and Hardware Impact

- **Nvidia's dominance and product breadth:** As expected, the survey backed its dominance, though we were surprised to see that ~3x more respondents are using Nvidia SKUs other than H100 (e.g. L40S, A10, etc..) for inference workloads. For those using Nvidia for either training or inference, CUDA came in as an equally important factor to the raw hardware performance. Many investors focus on performance advantages – and those are clearly evident – but this is yet another validation of the power of Nvidia's ecosystem. AMD factored into responses, but not significantly. We do expect Nvidia to remain the dominant GPU supplier, but we would not draw too many conclusions on AMD given the timing of the survey and the fact that MI300X is just starting to ship.
- **AI and the "crowding out" of traditional compute:** We would characterize "mission critical" as the theme for IT and hardware spending this year as budgets did not expand much, but GenAI took top priority in the budget. The survey suggests that AI spending will most frequently be a mix of net new budget and displacement with ~30% of respondents highlighting AI as net new spend. Yet still, ~2/3 of respondents continue to see AI spending coming at the expense of spending in other areas. So, we don't have a prior survey to compare this number

to, but it is still a big enough number that the story around displacement for traditional infrastructure may not change much in 2024.

- **CPU more prominent than expected:** While Nvidia is still dominant, we were surprised to see a strong reliance on Google TPU (reads positively for Broadcom) as well as existing CPU infrastructure for inference – and even training – workloads. Because CPU is considered to be legacy and not likely to play a prominent role in AI, this reads moderately favorable for Intel and AMD on the CPU side.
- **Still early for DGX Cloud and Nvidia’s proprietary AI models:** Engagement with Nvidia’s models is still early, though we were encouraged to see penetration commensurate with models from well known AI startups like Cohere. If we are splitting hairs, the survey did show more of a propensity to use Nvidia models going forward, though the prominence of these intentions still lags far behind other AI model providers. In terms of its AI services, we are encouraged by what we saw on DGX Cloud as engagement is similar to others outside the Big 3 such as Oracle and IBM. Many investors perceive H100 access as the primary driver for customers to engage with DGX Cloud, but we were encouraged to see access to its software and model stack cited as equally important factors driving engagement.

## Choice of AI Model

- **OpenAI in the Lead:** In terms of the large language models (LLMs) that have grabbed the early lead, we’re not surprised to see that OpenAI’s GPT3.5 and GPT4.0 are dominant. OpenAI was obviously at the forefront of the AI phenomenon and with the backing of Microsoft, many large enterprises have defaulted to using OpenAI’s models. In terms of model preference going forward, the key change was a swing in favor of utilizing OpenAI’s GPT4.0 (and a commensurate reduction of interest in GPT3.5). As noted, the survey was completed BEFORE the mid-November OpenAI drama, and while we believe that most enterprises are building around OpenAI’s models, it is possible that the events in mid/late November could have motivated some to explore alternatives (in fact we’ve noticed that even Microsoft has since begun messaging a stronger “multi-model” narrative since the OpenAI events).
- **Llama 2, Google and Custom Models:** Consistent with our own checks, open source Llama 2 models have emerged as the most popular alternative to OpenAI, followed by Google’s various models. These appear to be the biggest threats to OpenAI’s and thereby Microsoft’s early dominance. We were surprised by the prevalence of custom-built models (we assumed that this would happen later) and early traction of the AWS Titan model. We think Llama 2’s popularity bodes well for Meta, which is using these models to power GenAI chatbots for WhatsApp, Instagram and Facebook, as well as to help advertising create consumer facing chatbots, and to help Meta quickly scale down compute cost per chat turn. While Google just show-cased its new Gemini model, we’re already aware of one very large AWS customer that has begun negotiations with Google to access its models and begin utilizing Google Cloud.

## Choice of AI Infrastructure

- **Azure in the Lead:** In terms of cloud infrastructure provider of choice for AI workloads, it will not be surprising to investors that Microsoft (despite being the #2 cloud infrastructure provider behind AWS) has grabbed the early lead for AI workloads. While expected, we should stop and reflect on the importance of that achievement (beating AWS at anything is incredibly tough). Going forward, the survey results suggest that Azure’s advantage is likely to increase over AWS. Oracle scored lower-than-expected, likely a reflection of the fact that most of its initial AI customers are AI start-ups, not mainstream large enterprises that we surveyed. Note that this could also be true for Amazon and Google, both of which have a higher proportion of startups, internet companies, and SMBs in their base vs Azure.
- **AWS Still Relevant for AI:** What is also evident is that organizations are hardly giving up on AWS, in fact it is actually not that far behind Azure as an AI workload hosting platform. This serves as good evidence that AWS may not be as far behind Microsoft as many think, that incumbency matters.
- **On-Prem Less Relevant:** It was also interesting that only 16% of respondents said that their AI workloads would be hosted “on-premise”, a number that fell to

just 2% when we asked about the outlook in 1-2 years. Clearly, AI workloads are predominantly cloud-hosted. These results suggest that the Big 3 cloud providers will dominate.

## Microsoft Copilot and AI Applications

- **M365 Copilot Adoption:** The good news is that ~80% of respondents were trialing or planning to trial either Microsoft's M365 Copilot or Google's Duet applications. There are various ways to get at planned adoption, and the key question we asked was what portion of employees at their organization would likely be on M365 Copilot and/or Google Duet by the end of 2024. The most popular answer was 1-10% and almost no one was planning for a full wall-to-wall roll-out by year-end. That said, almost half of respondents answered 10-30%, creating the potential for material Copilot/Duet adoption in 2024. These results point to a gradual/slow Copilot ramp, which is what Microsoft has been messaging and that we're already embedding in our Office 365 revs estimates.
- **Firefly Has Competition:** In the category of image creation tools, the consensus investor view is that Adobe's Firefly product is likely to be a major success in 2024/2025. It could be, but this survey question/answer makes it clear that there are a number of rival AI products, as OpenAI's DALL-E was the clear preferred tool and Adobe, Google and privately-held Midjourney were essentially tied for 2nd place. Interestingly, a full 25% of respondents had no plans to utilize any of these tools, compared to near-zero that answered the same with respect to M365 Copilot and Google Duet. Our survey also suggests that DALL-E, Firefly, Midjourney and other such tools will be used by a narrow subset (<20%) of creative employees. This, if true, could signal a more limited TAM for Adobe Firefly than most investors are assuming.
- **GitHub Copilot and Code Generation Tools:** We were not surprised to see that Microsoft's GitHub Copilot product has a material early lead in the auto-coding tool market. Interestingly, GitLab's Code Suggestions tool grabbed the #2 slot, ahead of the AWS Code Whisperer product. In terms of the productivity gains being realized to date, the survey results were not particularly encouraging. The bulk of respondents concluded that these tools result in productivity gains of <30%, with the most popular answer being <10%. While discouraging relative to the hype, we'd counter that it's early, these products haven't yet matured, and even a 5-10% productivity gain is material.
- **Salesforce and ServiceNow:** We asked where else AI applications had promising ROI and the key take was the number of respondents that cited Salesforce and ServiceNow as having compelling products (now, or down the road). We'd argue that ServiceNow shares largely reflect this AI upside opportunity but that Salesforce shares do not (a source of upside potential as the AI story plays out in 2024).

## Data Implications

- **Data Spend to Get a Lift:** The broad take here is that across all data software categories, more enterprises than not are planning to increase spend on data management as a result of AI projects, supporting a view that the data stocks (Snowflake, MongoDB, Confluent, Oracle, Informatica and others) could indeed get pulled-along by AI in 2024/2025. What is intriguing from this survey was that the data categories cited as likely to see the MOST pull-through were the cloud data warehouse sector (clearly benefiting Snowflake) and the ML/AIOps sector (benefiting Databricks, AWS Bedrock and privates such as Weights & Biases). The data software sector LEAST likely to see a pull-through, in fact most likely to see a net headwind, was the more mature relational database sector dominated by Oracle and Microsoft SQL Server. This isn't encouraging for Oracle, but we still wonder whether Oracle might benefit as its customer base migrates a larger portion of its Oracle databases to the cloud (OCI/Azure) over time as a result of AI initiatives.
- **Cloud Data Migrations:** As noted above, there was a clear preference to run AI workloads in the cloud, and not on-premise. There is a key bank shot from this that we and investors are already thinking through – namely, that if AI workloads will be run in the cloud, then the data required to train LLMs might also gravitate to the cloud. If AI spend can serve as a catalyst to migrate more corporate data to the cloud – regardless of which infrastructure provider hosts the workload – this could

be a boon to the cloud-hosted data/database software providers (Snowflake and MongoDB as well as incumbents such as Oracle and Informatica).

## AI Security Needs

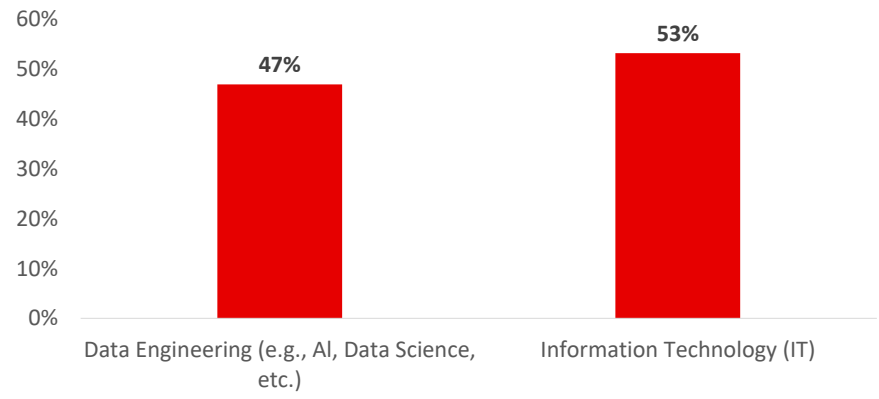
We offer our summary views below on the security implications of AI, and expand on these themes as well as profile the private companies included in the survey in our accompanying note (see link here: [GenAI - Who are the Security Enablers?](#))

- **How are organizations securing 3rd party GenAI apps?** In short, by blocking them. A full 41% of respondents cited permanently blocking GenAI apps and 35% cited temporary blocking certain applications. Outside of blocking, nearly a quarter of respondents indicated they are leveraging DLP and SaaS control solutions to secure GenAI apps, and just 16% said they were fully allowing all access to AI apps. Interestingly, just 14% said they had bought new cybersecurity solutions specifically to govern AI apps, suggesting that most organizations feel they can extend existing technology to secure these use cases.
- **Microsoft is a Key AI Security Partner:** We're not surprised, but a full 56% of respondents cited using Microsoft technology to help secure GenAI applications. This is strong evidence that Microsoft is using its early lead in AI to upsell its security suite and offer a full AI portfolio.
- **Zscaler and Palo Alto Networks:** It was clear from the survey results that it wasn't just Microsoft that was being used to secure AI applications, most were using multiple vendors. Among the "pure-play" security firms, Zscaler and Palo Alto Networks were by far the most frequently-cited, and they both screened well on forward adoption plans as well. Nearly a quarter of our respondents plan to use Zscaler to secure access to GenAI applications and 19% plan to use Palo Alto. Beyond these two providers, respondents flagged BigID (private), Netskope (private) and Varonis.

# Detail on the Survey and Respondents

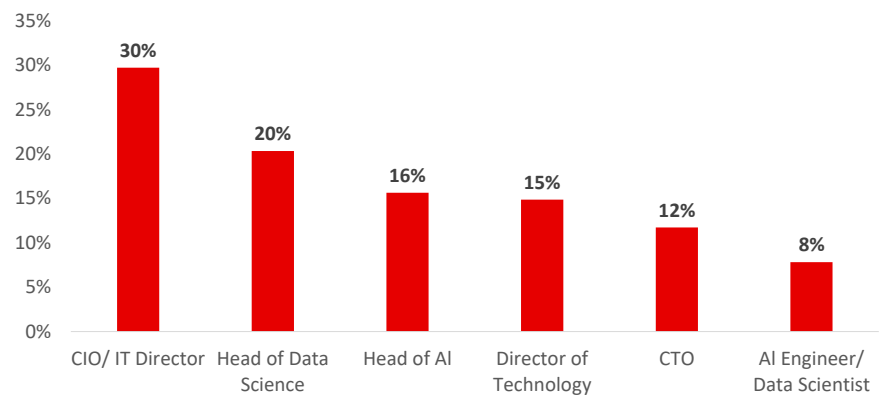
Let's start with some context about the survey results, as this is critical to know as readers interpret the survey results. We received feedback from 128 respondents, with more details about the respondents illustrated below. The survey was conducted from mid-October to mid-November 2023. This was BEFORE a) the OpenAI drama that unfolded in mid-November and b) the recent launch of Google's Gemini model, although we don't think that the answers would have changed dramatically. In our view the key conclusion is that the respondents represent a good cross-section of AI decision-makers and users across functional areas, industry verticals and company sizes.

**Figure 1: Which of the following best describes your primary job function?**



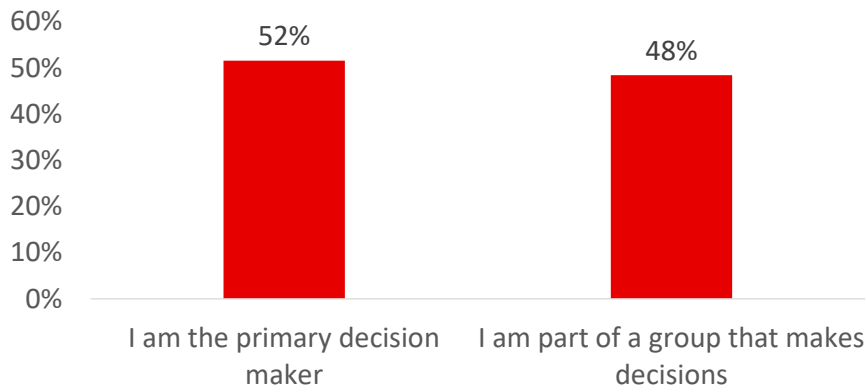
Source: UBS Evidence Lab ([> Access Dataset](#))

**Figure 2: Which of the following best describes your current title/role at your company?**



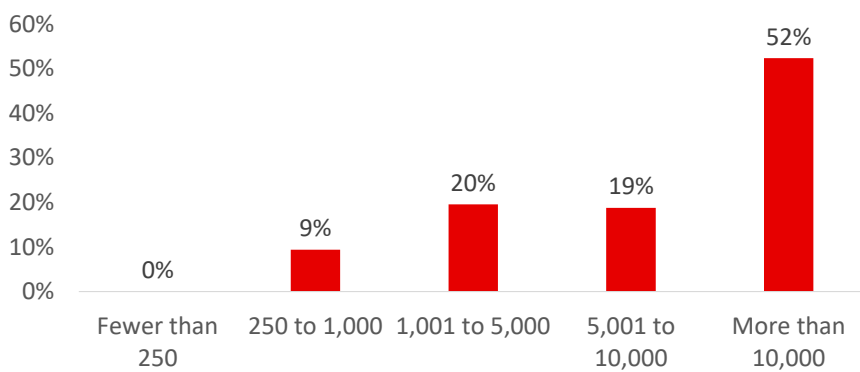
Source: UBS Evidence Lab ([> Access Dataset](#))

**Figure 3: How involved are you in decisions relating to evaluating and utilizing Generative Artificial Intelligence (AI) at your company?**



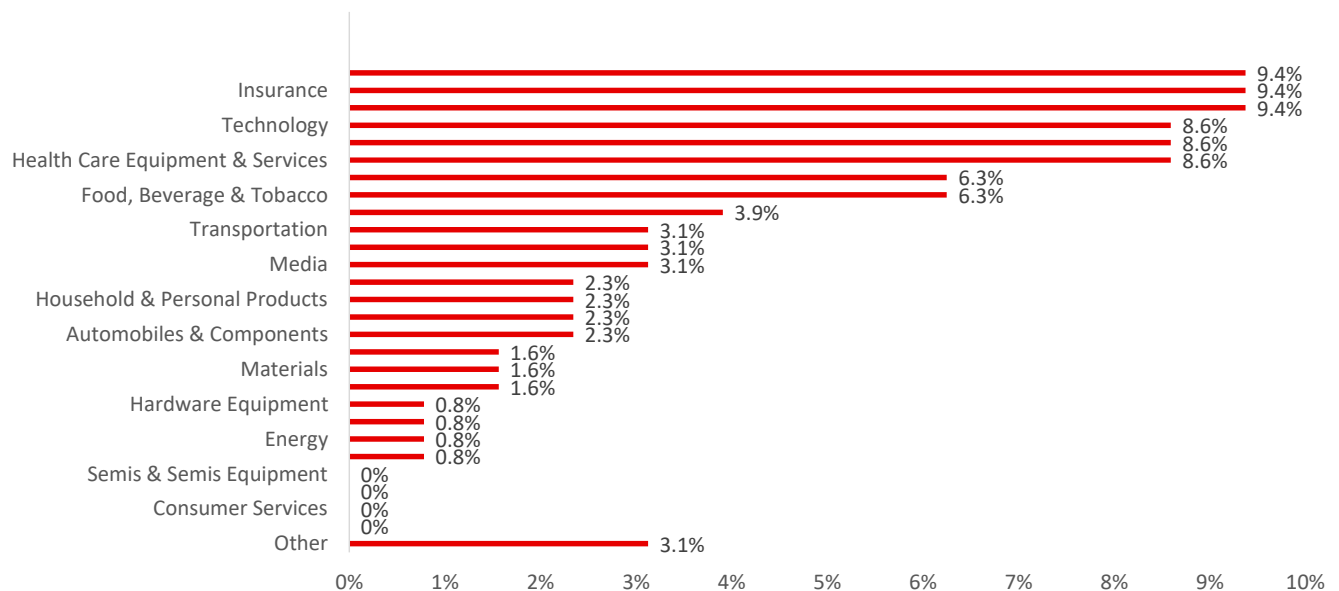
Source: UBS Evidence Lab ([Access Dataset](#))

**Figure 4: In total, how many full-time employees are there at your company?**



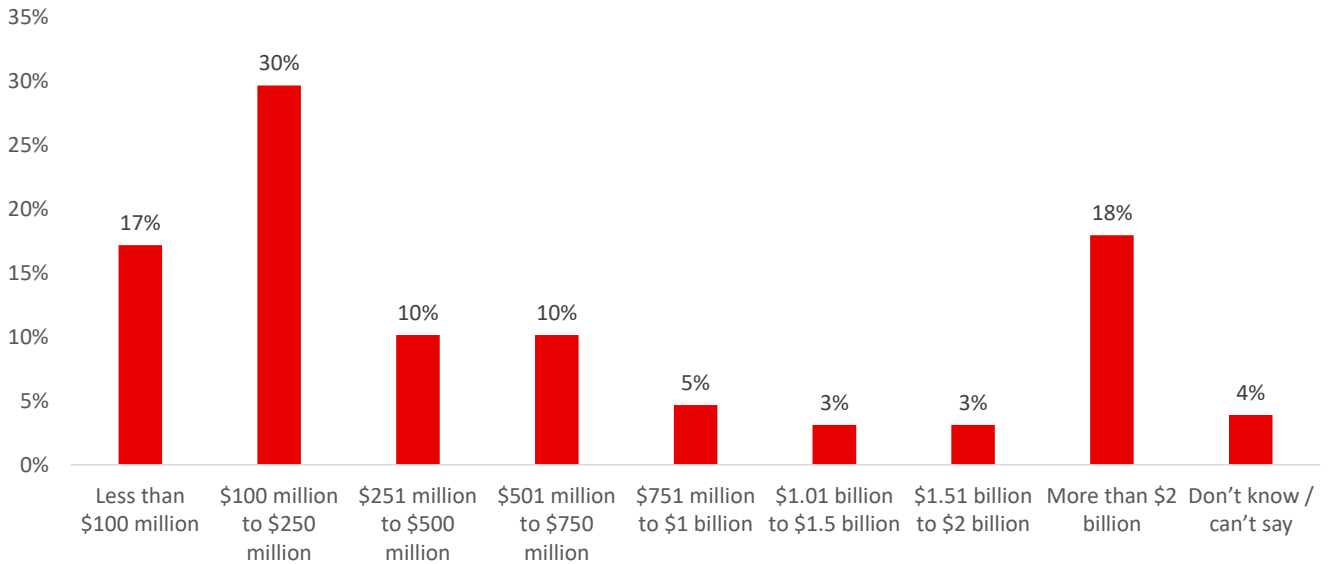
Source: UBS Evidence Lab ([Access Dataset](#))

**Figure 5: Which of the following most closely relates to your company's industry?**



Source: UBS Evidence Lab ([Access Dataset](#))

**Figure 6: What is the total IT budget of a typical company like yours in your industry in 2023?**

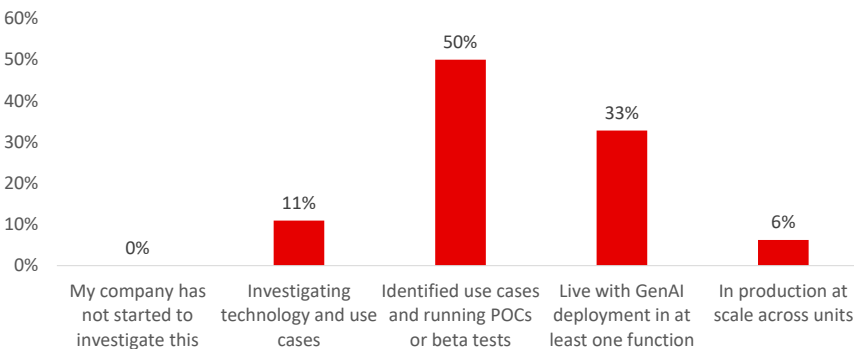


Source: UBS Evidence Lab ([Access Dataset](#))

## Overall AI Adoption

With that as backdrop, let's start by assessing where most organizations are in terms of AI adoption and what their spending intentions currently are.

**Figure 7: What is the state of Generative Artificial Intelligence (AI) deployment at your company today?**



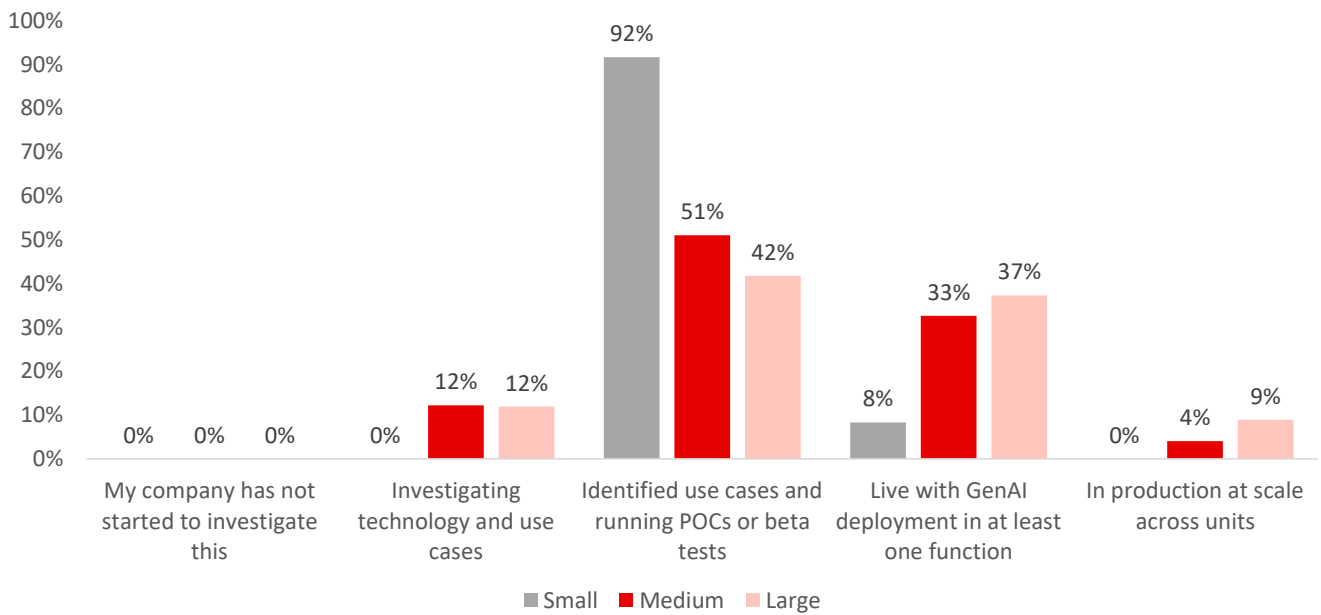
Source: UBS Evidence Lab ([Access Dataset](#))

**UBS:** The good news from this question is that everyone – literally 100% of respondents – are at least in the AI investigation and use case discovery stage. That speaks to the potential for solid 2024/2025 adoption. The bad news is that just 6% of respondent organizations are in production and a year after the AI phenomenon hit, just 39% have moved past the proof-of-concept (POC) stage and are actually deploying it. Needless to say, it's still early, with evidence of larger-than-expected internal org change and/or technology that still needs to mature before widespread adoption.

The results are also interesting when you break down the answers by company size. The portion of small companies that have moved past the POC stage and have begun to deploy AI was just 8%, with this number moving up to 37% for mid-sized companies and to 46% for large organizations. This signals to us that software firms selling primarily to G2000 organizations might have better initial traction with their AI products than SMB-focused software firms.

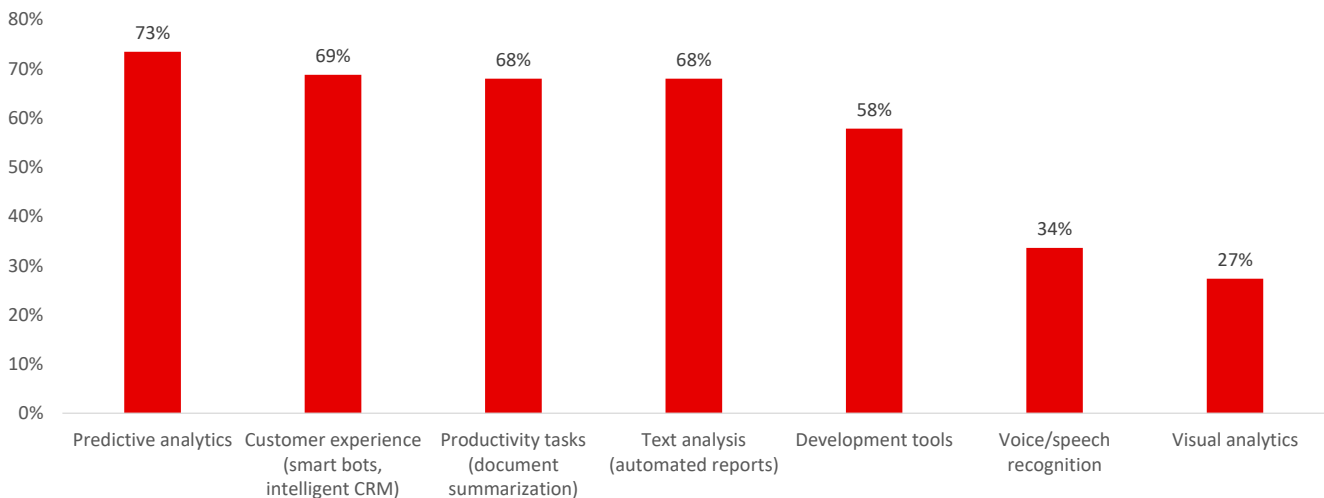


**Figure 8: What is the state of Generative Artificial Intelligence (AI) deployment at your company today? [stratified by company size]**



Source: UBS Evidence Lab ([> Access Dataset](#))

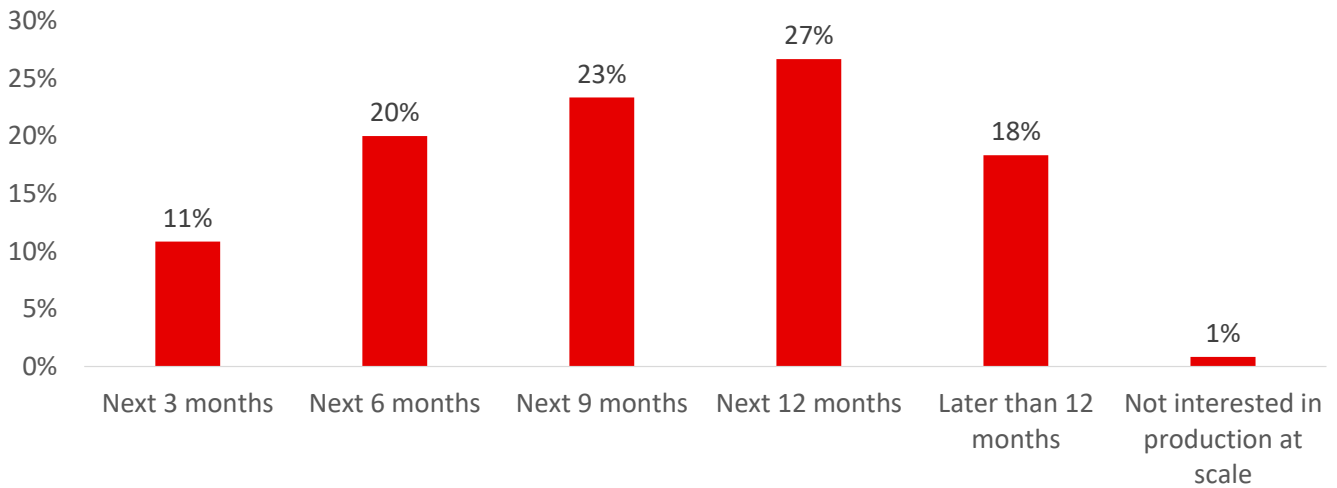
**Figure 9: Which of the following Generative Artificial Intelligence (AI) use cases would you expect to have the greatest ROI (Return on Investment) potential in your company? (select all that apply)**



Source: UBS Evidence Lab ([> Access Dataset](#))

**UBS:** This answer was somewhat surprising. We were expecting the 3rd and 4th most popular answers – document summarization and auto-generating reports and emails - to dominate the list of high-ROI use cases. We were not expecting “predictive analytics” to top this list. Now, to be clear, the question was which AI use case would have the highest ROI, not the use case that might dominate near-term, but nonetheless, it was an interesting signal that this generation of AI might end up as a strong fit for data analytics tasks and hence be utilized by the analytics-focused firms such as Snowflake and Databricks. The popularity of the “customer experience” answer also speaks to the large opportunity that front-office software firms such as Salesforce are facing.

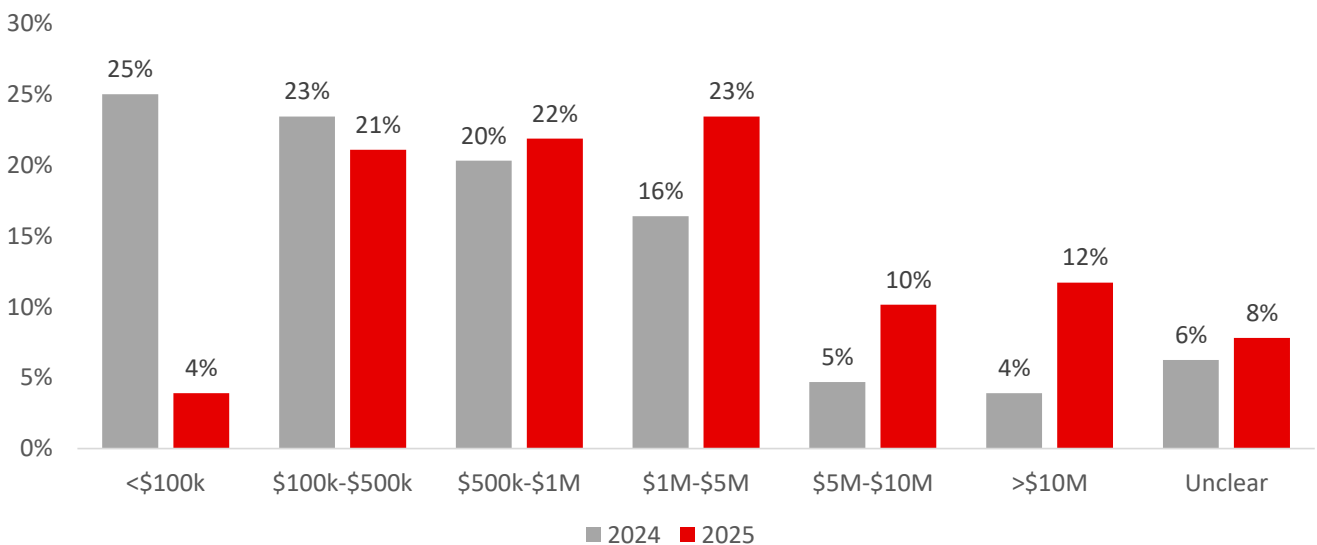
**Figure 10: If company not in production at scale yet, when do you expect your company to be in production at scale?**



Source: UBS Evidence Lab ([Access Dataset](#))

**UBS:** As noted above, just 6% of respondents were in production with AI applications, such that this question effectively addressed adoption timing. A full 70% of respondents cited the next 6-12 months as the most likely go-live timeframe, implying a 2H24 adoption period, with ~30% kicking things off in 1H24. This timeline feels roughly in-line with the data points we’ve picked up recently, with 2H24 likely to feel modestly disappointing to some investors.

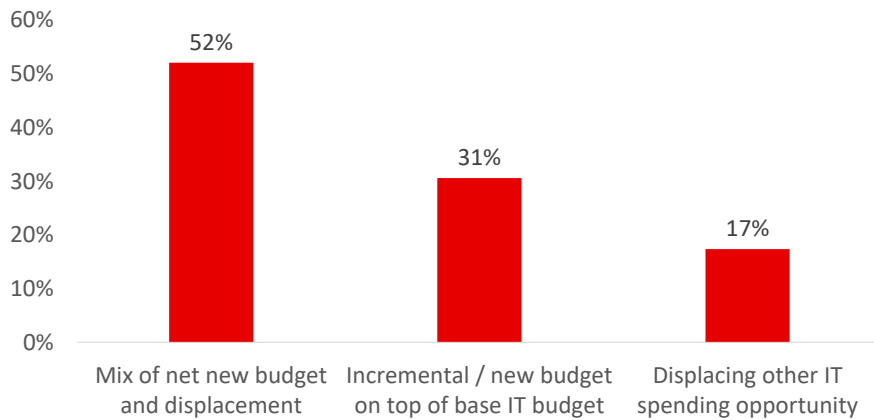
**Figure 11: What is your company's expected annual spend on Generative Artificial Intelligence (AI) in the following years?**



Source: UBS Evidence Lab ([Access Dataset](#))

**UBS:** Given that adoption is ramping slowly, one would expect the dollar spend to also ramp slowly and that is indeed the case. Across all respondents and customer sizes, the average expected AI spend in 2024 was \$1.65 million, with this figure doubling to \$3.36 million in 2025, presumably as more organizations move beyond the POC phase. The expected growth rate in 2025 is encouraging, although a total AI spend of <\$5 million might be less than many Street analysts would have hoped for when the AI craze kicked-off earlier this year. A more optimistic take would be that actual spend on AI exceeds initial expectations once enterprises are in production.

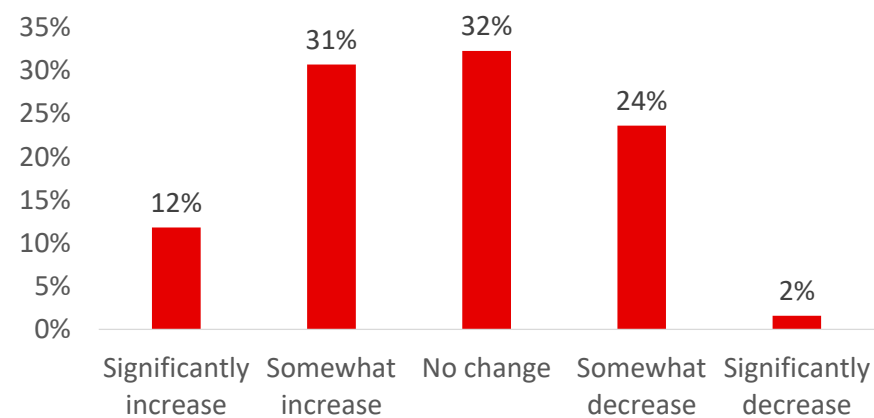
**Figure 12: Thinking about your company's increased spend on Generative Artificial Intelligence (AI) in the next 1-2 years, how does your company plan to cover these increased expenses on Generative Artificial Intelligence (AI) in the next 1-2 years?**



Source: UBS Evidence Lab ([> Access Dataset](#))

**UBS:** A common inbound question from investors, especially as many organizations are in the midst of (or just finished) their 2024 budget outlooks, is to what extent will AI-centric investments displace other IT budget items. Given the answer to the previous question – suggesting that average AI spend will be <\$2 million in 2024 – investors won’t need to worry too much about any displacement risk given that we’re talking about still-small numbers. But as noted above, only 31% of respondents said that AI spend would be entirely incremental, with the other 69% suggesting that it would displace/cut something else. For companies making bigger AI investments in 2024, this could result in added pressure to IT budgets, beyond the “macro” conditions. From the semis and hardware side, this also implies that the headwinds we have seen this year in traditional white box server procurement will not abate much in 2024 as the survey still suggests displacement at ~2/3 of enterprises.

**Figure 13: Thinking about when your company is in the production stage with Generative Artificial Intelligence (AI), how do you expect these AI investments to impact your company's hiring/headcount growth needs in the next 1-2 years?**



Source: UBS Evidence Lab ([> Access Dataset](#))

**UBS:** In 1H23, as we and investors were absorbing the AI phenomenon and gauging its impact, one concern was that AI could become powerful enough to serve as a catalyst to displace humans, especially those conducting repetitive tasks that could be better automated. We’d note that just 2% of respondents were expecting a “significant” reduction in headcount as a result of AI, with the number calling for an increase larger than the number calling for a decrease. While the “headcount reduction” concern among investors has already faded, this survey answer supports a view that employee or seat-based SaaS models might be less disrupted than some investors may think.

**Figure 14: What are the main challenges you see with Generative Artificial Intelligence (AI) adoption at your company today? (select all that apply)**

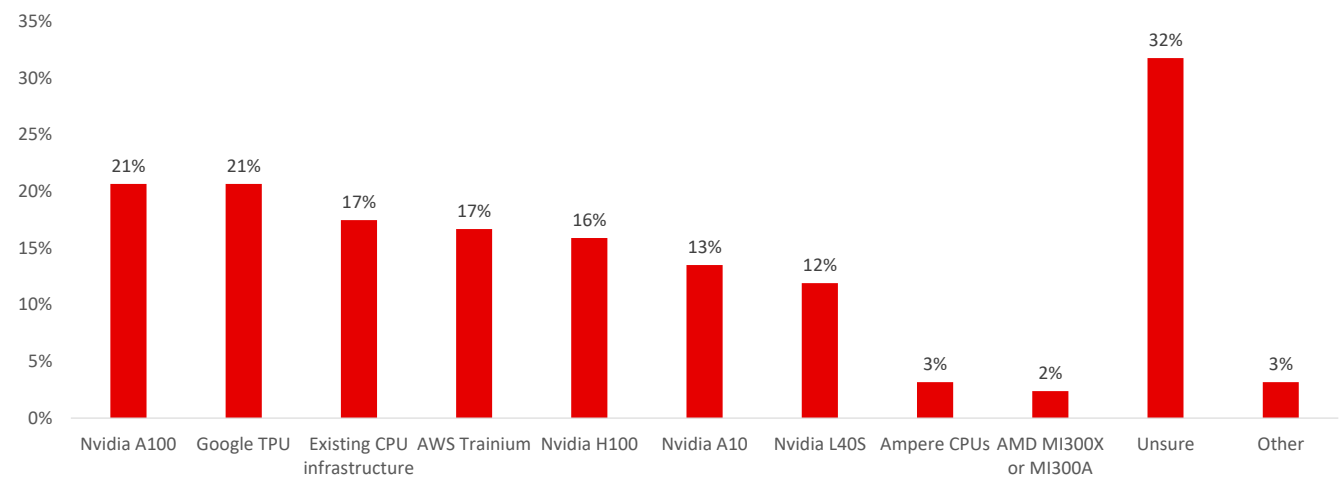
Challenges	Total
Lack of qualified in-house expertise	52%
Compliance and regulatory concerns	52%
Complexity/Integration	46%
Lack of data privacy (leaking content to foundation models)	42%
Unclear ROI	35%
Lack of data/data quality issues	35%
Lack of budget	18%
Lack of compelling use cases	16%
Lack of management buy-in	15%
None	3%
Other	3%
Don't know	0%

Source: UBS Evidence Lab ([Access Dataset](#))

**UBS:** In terms of AI adoption hurdles, we were not surprised to see “compliance and regulatory hurdles” rank high, but were a bit surprised to see “lack of qualified talent” at the top of the list. That is obviously a source of friction that could take some time to address, slowing adoption. Anecdotes that we’ve picked up of late, including at the recent UBS Tech Conference, suggest that “unclear ROI” might be rising on this list, as we’ve heard some sources make the point that the models underpinning AI applications need to mature and result in a higher value-prop (perhaps this will occur via greater investment in fine-tuning).

## Nvidia and the Broader Hardware Sector

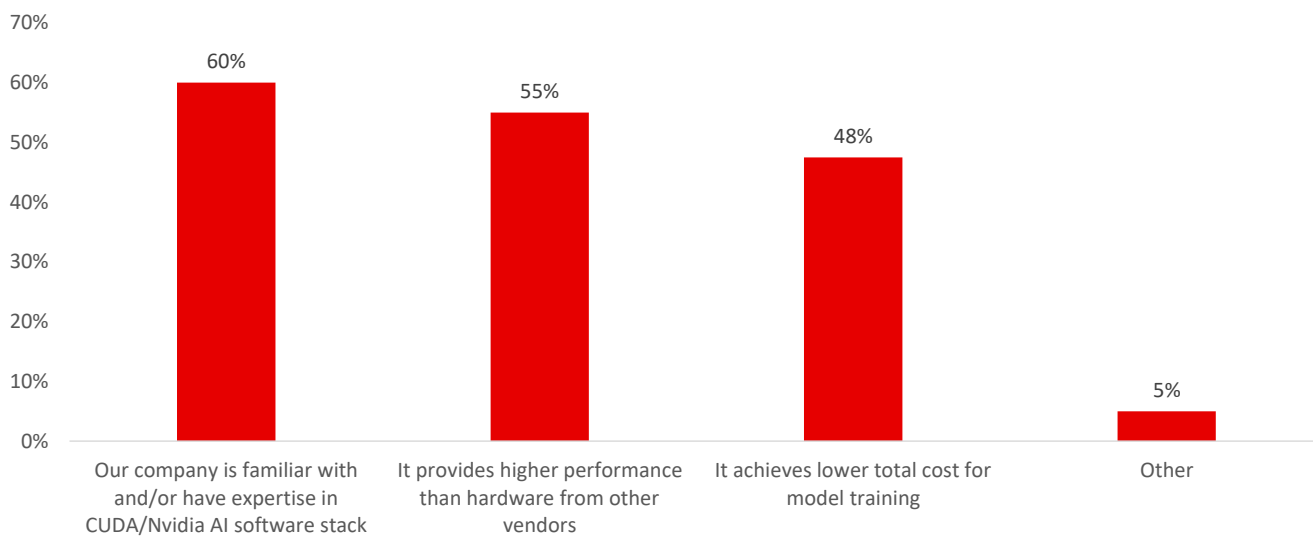
**Figure 15: For the TRAINING of LLMs (large language models), which type of chips is your company planning to utilize?**



Source: UBS Evidence Lab ([Access Dataset](#))

**UBS:** In terms of hardware preferences for LLM training, Nvidia still commands a majority share but at a combined ~62%, the number was not as high as we would have thought. Of those planning to use Nvidia, we were surprised to see how prominent SKUs like L40S and A10 are for training applications – investors are often so focused on H100s that this highlights the breadth of Nvidia’s GPU portfolio. We were somewhat surprised that about half of the respondents expect to use some combination of TPU, CPU and ASICs like Trainium for training. We were surprised to see Google’s TPUs ranking this high, especially since our checks suggested that TPUs may not be industry-standard and given that Microsoft Azure and AWS have such a strong early lead for AI workload hosting. The responses around using CPU infrastructure for training were also interesting and somewhat unexpected. We also see some early interest in AMD for training workloads, though we continue to see inference as a much bigger opportunity for AMD. It was slightly surprising to see that even ARM-based CPUs like Ampere may be more commonly used than AMD. We would however expect AMD to be much more prominent in our next survey.

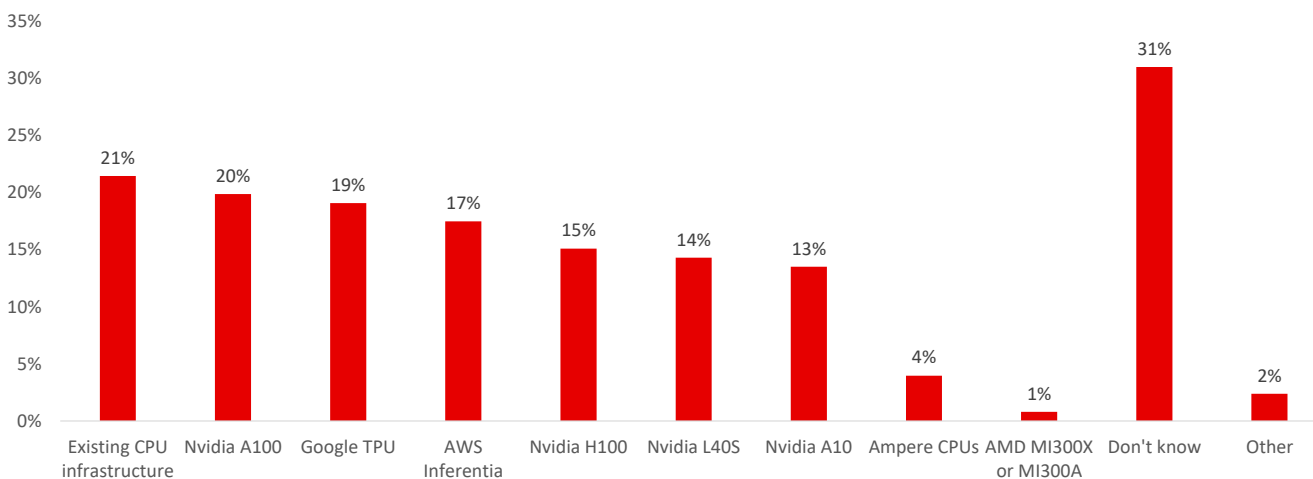
**Figure 16: You said your company currently is planning to utilize Nvidia GPUs for the TRAINING of LLMs (large language models). Which, if any, of the following are reasons for this?**



Source: UBS Evidence Lab ([Access Dataset](#))

**UBS:** Most investors understand the superior performance brought by Nvidia for training workloads, but the responses suggest that CUDA is an equally important factor. While most investors also understand the power of the CUDA ecosystem, we were a bit surprised to see it highlighted alongside performance as factors in using Nvidia for training.

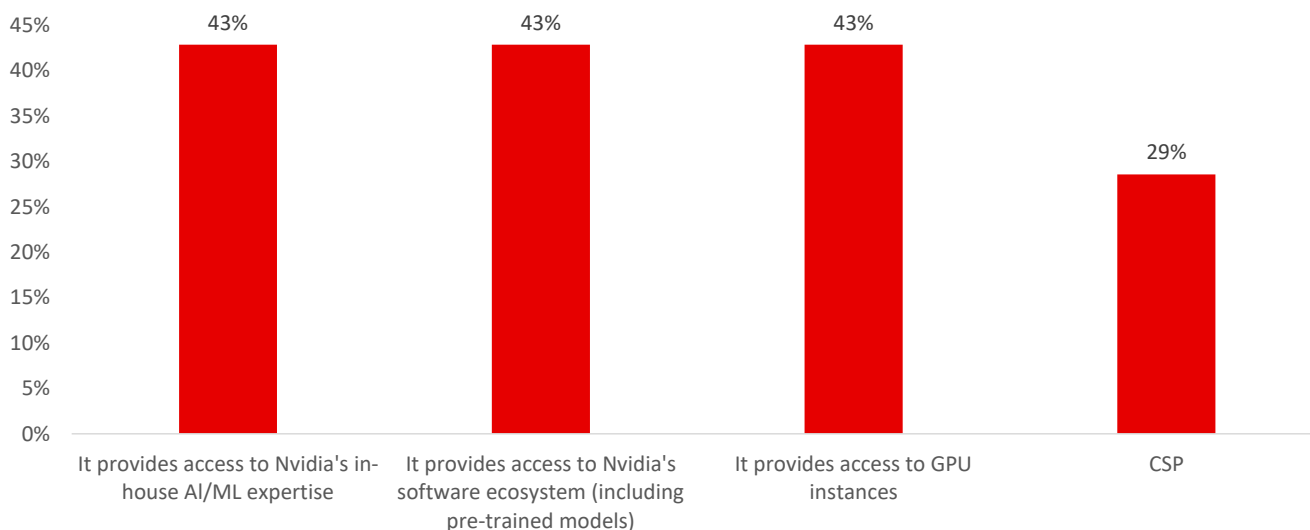
**Figure 17: For the INFERENCE of LLMs (large language models), which type of chips is your company planning to utilize?**



Source: UBS Evidence Lab ([Access Dataset](#))

**UBS:** We were a little surprised to see the mix here be very similar to the responses for training – this is positive for Nvidia as, on the surface, it suggests its training position will carry over to an inference TAM that is likely to be much bigger. It was also interesting to see that across Nvidia’s data center GPU portfolio, ~3x as many respondents are opting to use GPUs other than the H100 (e.g. A100, L40S, A10), which we believe is largely being driven by still-limited availability of H100 cloud instances. We expect this proportion to shift more in the favor of the H100 in future surveys as supply constraints ease. Google TPUs featured more prominently relative to, say, A100s or H100s than we would have expected. This reads positively for Broadcom. AMD did not feature prominently here either – somewhat surprising, but also likely because MI300X is only just beginning to ship. Ergo, we would expect much greater prominence for AMD in our next survey.

**Figure 18: You said your company currently uses or is most likely to use Nvidia DGX Cloud for your Generative Artificial Intelligence (AI) applications/ to run the required chip in the next 1-2 years. Which, if any, of the following are reasons for this?**



Source: UBS Evidence Lab ([Access Dataset](#))

**UBS:** DGX Cloud is one of the many prongs in Nvidia’s multi-pronged approach to growing its software and services business (now at a ~\$1B run-rate exiting 2023). Responses are consistent with those we heard from customers earlier this year, which we highlighted [here](#) when we determined that DGX Cloud could represent an eventual revenue opportunity in the region of \$10B/year. As Nvidia rolls out additional DGX Cloud capacity across CSPs, it will be better positioned than any of its customers (by default) to feed H100 GPUs into these capacity corridors - thereby gaining an edge in servicing demand for H100 GPU instances as demand remains well in excess of supply. Even in a more balanced supply environment, DGX Cloud will broaden its ecosystem "lock-in" across a host of new verticals and enterprises.

# Choice of AI Model

Let's now turn to the survey answers about the choice of AI models. As noted, this survey was completed before Google show-cased its latest Gemini LLM.

**Figure 19: Which if any of the following LLMs (large language models) are your company currently using? (select all that apply)**

LLMs	Total
OpenAI ChatGPT 4.0	70%
OpenAI ChatGPT 3.5	60%
Llama	36%
Google (PaLM-2, Duet or Gemini)	33%
Custom-built model	21%
AWS Titan	19%
Anthropic	14%
Cohere	10%
Stability AI	9%
Nvidia NeMo	8%
Nvidia other model (BioNeMo, etc.)	7%
A121 Labs	3%
No LLM required	1%
Other	5%
Unsure	3%

Source: UBS Evidence Lab ([> Access Dataset](#), survey run and completed before Google demonstrated and launched its newest Gemini model)

**UBS:** In terms of the large language models (LLMs) that have grabbed the early lead, we're not surprised to see that OpenAI's GPT3.5 and GPT4.0 are dominant. OpenAI was obviously at the forefront of the AI phenomenon and with the backing of Microsoft, many large enterprises have defaulted to using OpenAI's models. Consistent with our own checks, open source Llama 2 models have emerged as the most popular alternative to OpenAI, followed by Google's various models. These appear to be the biggest threats to OpenAI's and thereby Microsoft's early dominance. Answers that surprised us were a) the prevalence of custom-built models (we assumed that this would happen later), b) early traction of the AWS Titan model (this strengthens the view that the endorsement and backing of the hyper-scalers themselves is a major adoption catalyst) and c) the relatively small traction to date of independent model providers Anthropic and Cohere (likely a reflection of the fact that these firms are still early-stage in building out an enterprise sales presence). The survey shows solid, if unspectacular, engagement with Nvidia's proprietary models.

**Figure 20: Which if any of the following LLMs (large language models) would your company be planning to use in the next 1-2 years? (select all that apply)**

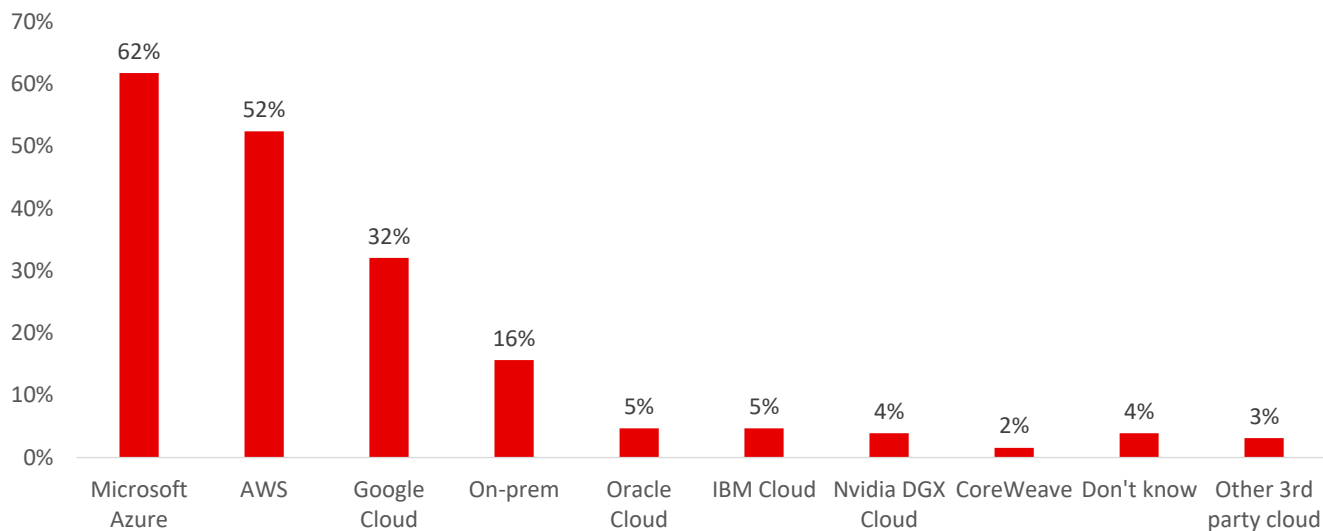
LLMs	Total
OpenAI ChatGPT 4.0	77%
OpenAI ChatGPT 3.5	34%
Custom-built model	31%
Llama	30%
Google (PaLM-2, Duet or Gemini)	28%
AWS Titan	21%
Anthropic	13%
Nvidia other model (BioNeMo, etc.)	9%
Nvidia NeMo	8%
Stability AI	6%
Cohere	5%
A121 Labs	4%
Other	7%
Don't know / can't say	4%
Not applicable	2%

Source: UBS Evidence Lab ([> Access Dataset](#), survey run and completed before Google demonstrated and launched its newest Gemini model)

**UBS:** In terms of model preference going forward, the key changes were a) a swing in favor of utilizing OpenAI's GPT4.0 (and a commensurate reduction of interest in GPT3.5), b) an even greater interest in building custom models, c) an uptick in interest in using the AWS Titan model (we suspect as enterprises default to a view that AWS will continue to invest in maturing Titan, good news for AWS), d) some increase in intentions around Nvidia's models, and e) a fade in interest of almost every other model. These survey answers suggest that the LLM "winners" are most likely to be OpenAI, Llama 2, custom-built models and LLMs offered directly by AWS and Google Cloud. The success of Nvidia's proprietary LLMs will depend to some degree on the breadth of engagement for its DGX Cloud service.

## Choice of Infrastructure Provider

**Figure 21: Which, if any, of the following infrastructure options does your company currently use for your Generative Artificial Intelligence (AI) applications/ to run the required chip?**

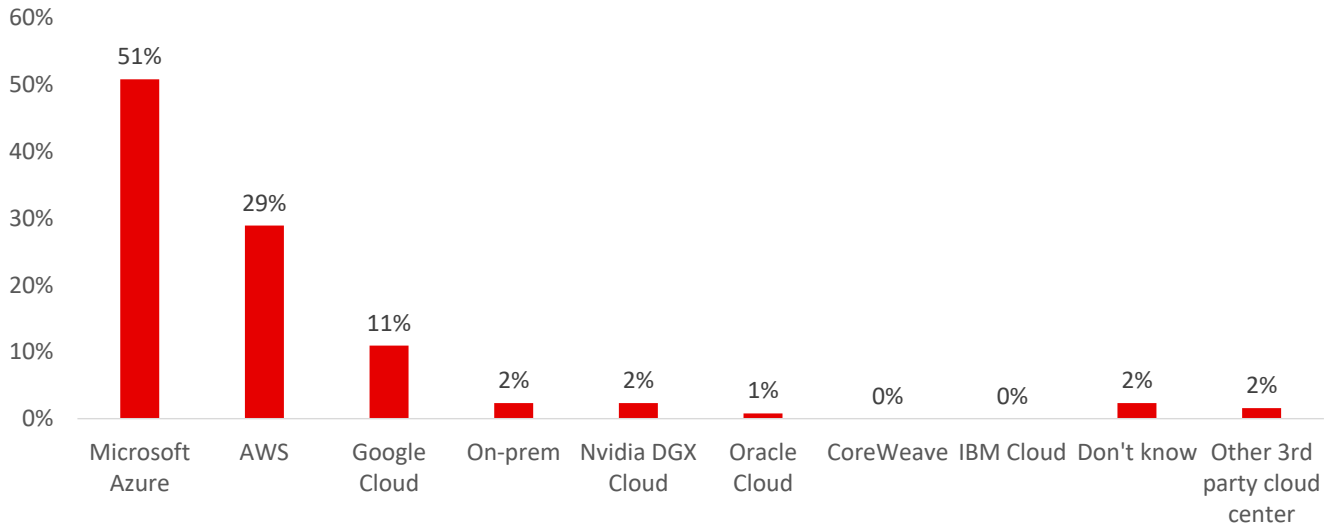


Source: UBS Evidence Lab ([> Access Dataset](#))

**UBS:** In terms of cloud infrastructure provider of choice for AI workloads, it will not be surprising to investors that Microsoft (despite being the #2 cloud infrastructure provider behind AWS) has grabbed the early lead for AI workloads. While expected, we should stop and reflect on the importance of that achievement (beating AWS at anything is incredibly tough). But what is also evident is that organizations are hardly giving up on AWS, in fact it is actually not that far behind Azure as an AI workload hosting platform. This serves as good evidence that AWS may not be as far behind Microsoft as many think, that incumbency matters (we have been flagging this since [our July note](#)). It is also interesting that "on-premise" accounts for only 16% of answers – clearly, AI workloads are predominantly cloud-hosted (in our view weakening the view that on-premise tech firms will see any material "AI lift"). In our view Oracle scored lower-than-expected, likely a reflection of the fact that most of its initial AI customers are AI startups, not mainstream large enterprises that we surveyed (this reality could be impacting the survey results for AWS and Google Cloud as well, as both have a higher proportion of startups, internet companies and SMBs in their base vs Azure) and it is worth noting that engagement with Nvidia's cloud offering (DGX Cloud) is on par with Oracle.



**Figure 22: Which ONE of the following infrastructure options is your company MOST likely to use for your Generative Artificial Intelligence (AI) applications/ to run the required chip in the next 1-2 years?**

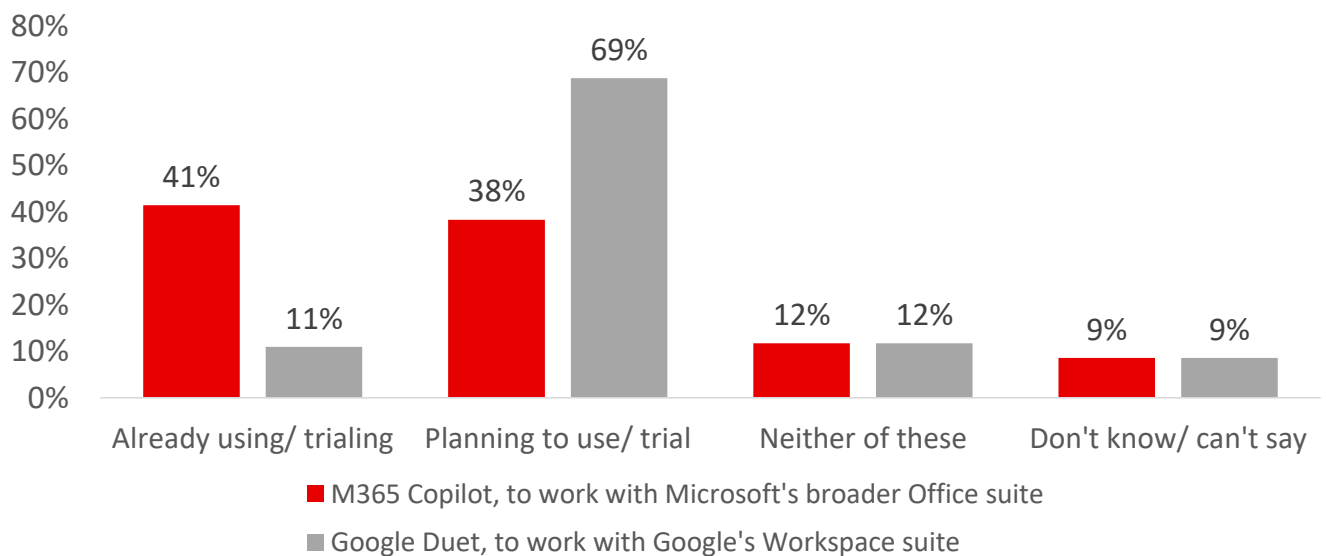


Source: UBS Evidence Lab ([> Access Dataset](#))

**UBS:** In terms of cloud infrastructure provider of choice for AI workloads going forward, the survey results are quite interesting. Key takes are a) if anything, the results suggest that Azure’s advantage is likely to increase over AWS, for which the results suggest some fading of utilization for AI workloads, b) the portion of respondents planning to run AI workloads anywhere else – on-prem or on any other cloud – falls off significantly. These results suggest that the Big 3 cloud providers will dominate. Beyond the Big 3, note that Nvidia’s DGX Cloud screened more prominently than Oracle, which, given the nascency of Nvidia’s cloud offering, is an encouraging data point relative to the large CSPs.

## Microsoft Copilot, Google Duet and Applications

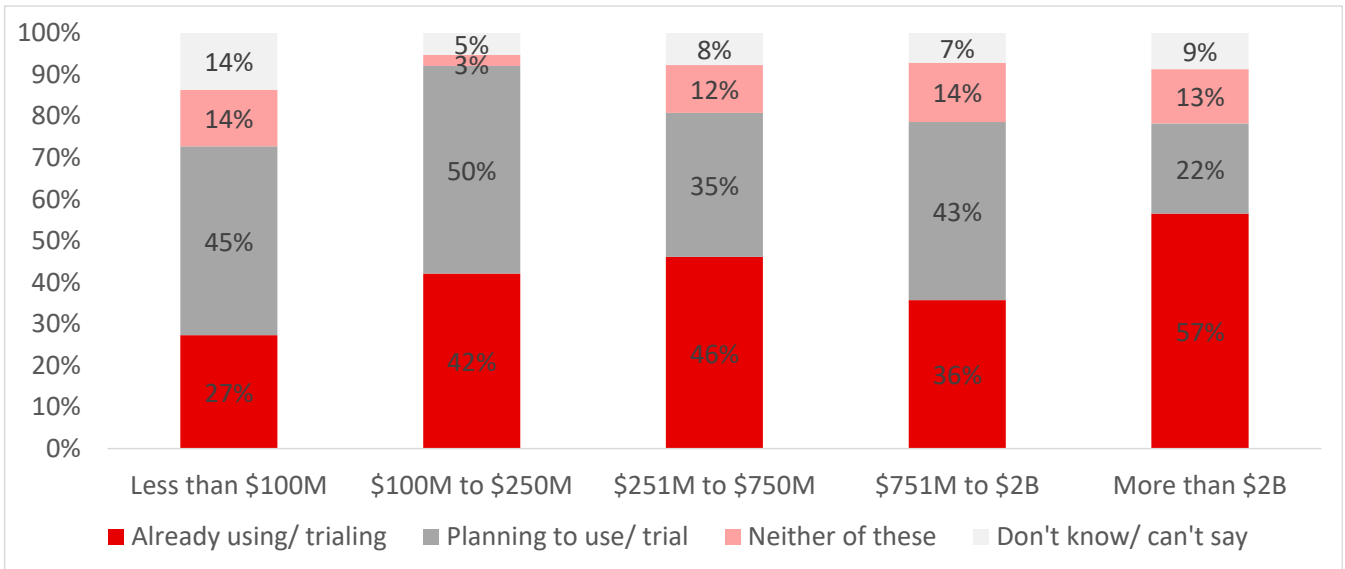
**Figure 23: Is your company already using/trialing or planning to use/trial Microsoft’s M365 Copilot and/or Google’s Duet "productivity AI" products?**



Source: UBS Evidence Lab ([> Access Dataset](#))

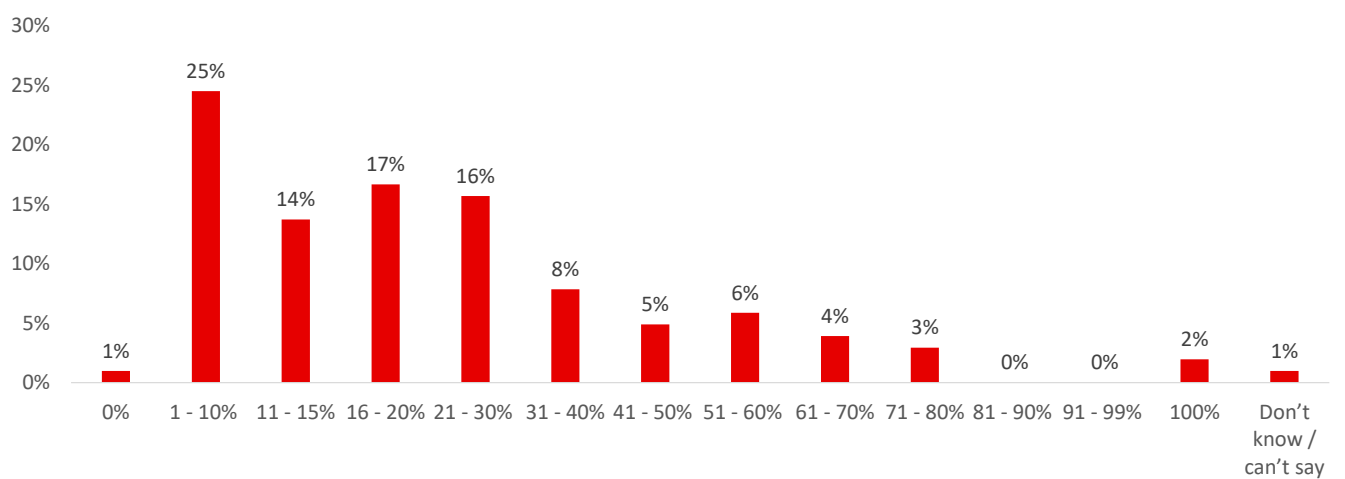
**UBS:** The good news is that ~80% of respondents were trialing or planning to trial either Microsoft's M365 Copilot or Google's Duet applications. Not surprisingly, the number of respondents already trialing Copilot was significantly higher than that of Google Duet, by a factor of almost 4x. If we examine these results by company size, it is clear that the larger the organization, the more likely it is that they are trialing these products. In the case of Microsoft's M365 Copilot, this is partly due to the fact that Microsoft has the product in limited GA, a narrow group of customers that likely skews to larger enterprises. We were surprised to see that 80% of respondents were using or planning to trial Google Duet, which – if this materializes - could result in a larger Duet AI-related revenue uptick versus our estimates. We were assuming 10% adoption in GOOG's user base ([note here](#)).

**Figure 24: Is your company already using/trialing or planning to use/trial Microsoft's M365 Copilot and/or Google's Duet "productivity AI" products? [stratified by IT budgets]**



Source: UBS Evidence Lab ([Access Dataset](#))

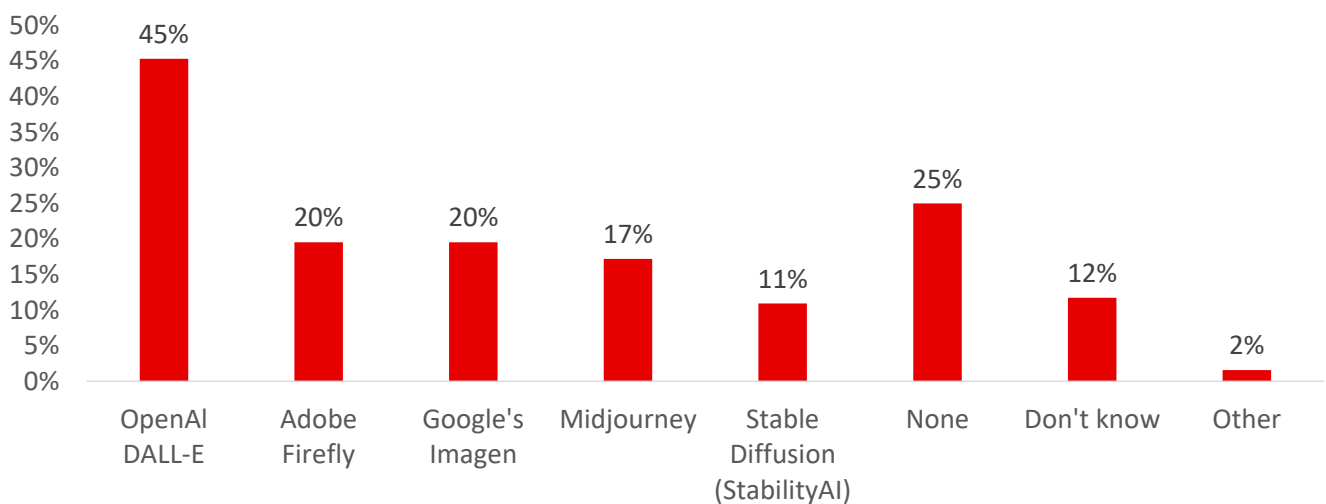
**Figure 25: Approximately what percentage of your current employees would you expect to be live on M365 Copilot and/or Duet by the end of next year?**



Source: UBS Evidence Lab ([Access Dataset](#))

**UBS:** There are various ways to get at planned adoption, and the key question we asked was what portion of employees at their organization would likely be on M365 Copilot and/or Google Duet by the end of 2024. The most popular answer was 1-10% and almost no one was planning for a full wall-to-wall roll-out by year-end. That's not exactly encouraging. That said, almost half of respondents answered 10-30%, creating the potential for material Copilot/Duet adoption in 2024. In our Microsoft model, we're conservatively assuming that Microsoft Copilot achieves a paid seat count of 7 million by the end of Microsoft's FY25, a penetration rate of just 4% against the addressable Office seat base of ~170 million. This assumption underpins our estimate for ~\$1 billion in Copilot revs in FY25. The survey results were directionally consistent with our assumptions, if not slightly more optimistic than we're assuming. From the semis perspective, we continue to note that much of the Nvidia narrative from here will probably hinge on adoption and monetization data points for services such as Microsoft Copilot.

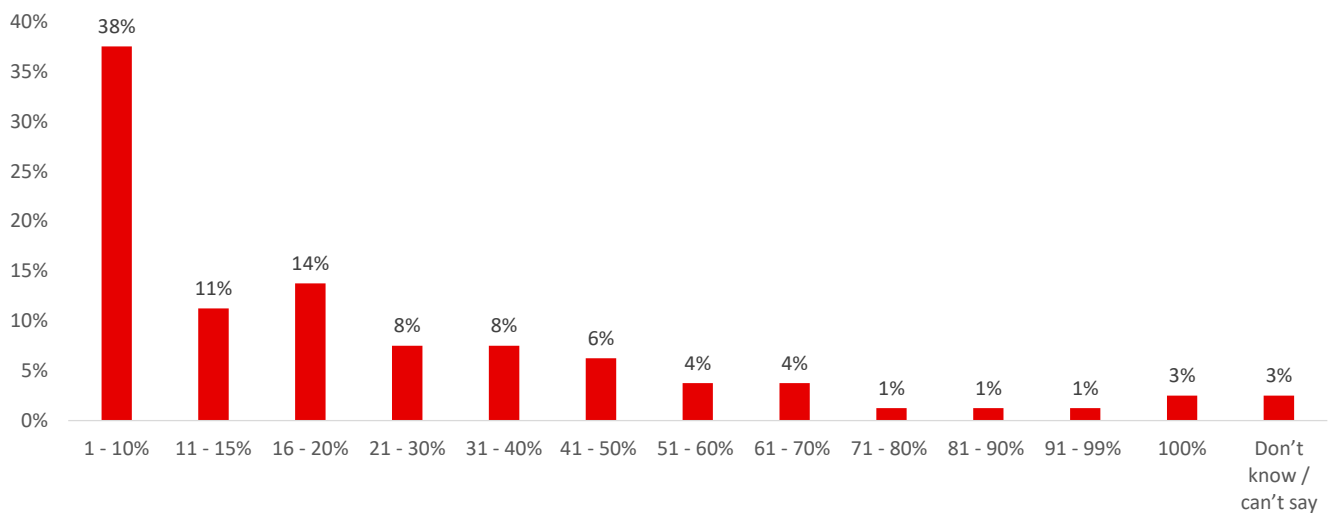
**Figure 26: Several firms have launched text-to-image creation AI tools, used by creative professionals. Which, if any, of the following is your company most likely to utilize?**



Source: UBS Evidence Lab ([Access Dataset](#))

**UBS:** In the category of image creation tools, the consensus investor view is that Adobe's Firefly product is likely to be a major success in 2024/2025. It could be, but this survey question/answer makes it clear that there are a number of rival AI products, as OpenAI's DALL-E was the clear preferred tool and Adobe, Google and privately-held Midjourney were essentially tied for 2nd place. Interestingly, a full 25% of respondents had no plans to utilize any of these tools, compared to near-zero that answered the same with respect to M365 Copilot and Google Duet.

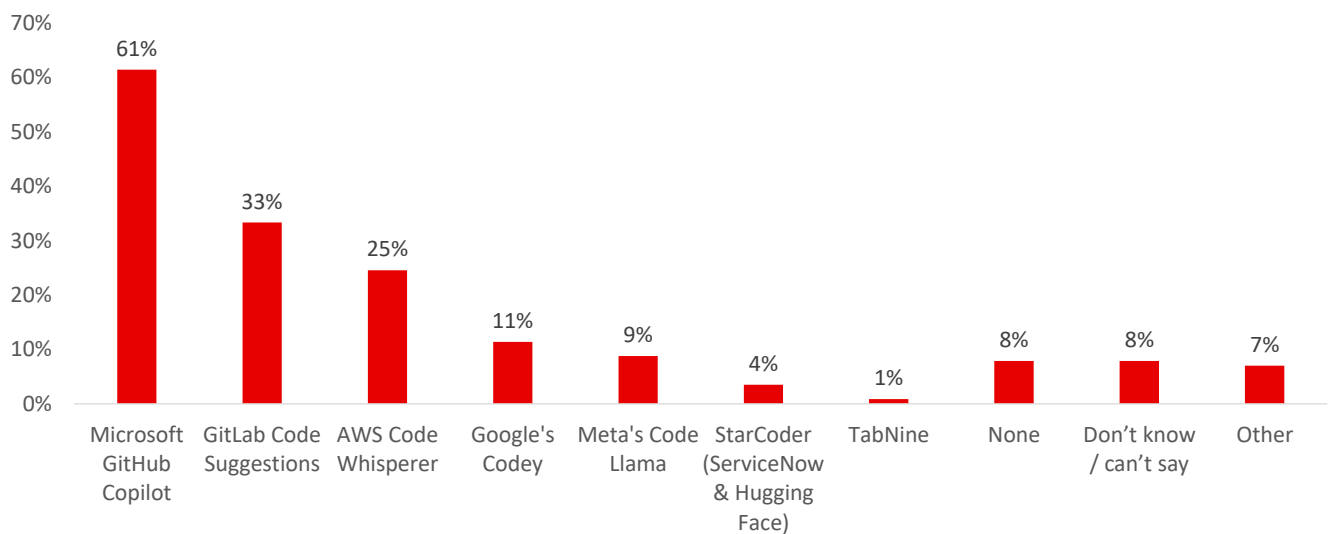
**Figure 27: You said that your company is most likely to utilize text-to-image creation AI tools. Approximately what percentage of your creative employees (i.e., designers) would you expect to be live on text-to-image creation AI tools by the end of next year?**



Source: UBS Evidence Lab ([> Access Dataset](#))

**UBS:** This was a surprising result, as we would have expected most organizations to be planning to roll-out these AI image creation tools to most of its designers or creative employees. Instead, the answers above suggest that DALL-E, Firefly, Midjourney and other such tools will be used by a narrow subset (<20%) of creative employees. This, if true, could signal a more limited TAM for Adobe Firefly than most investors are assuming.

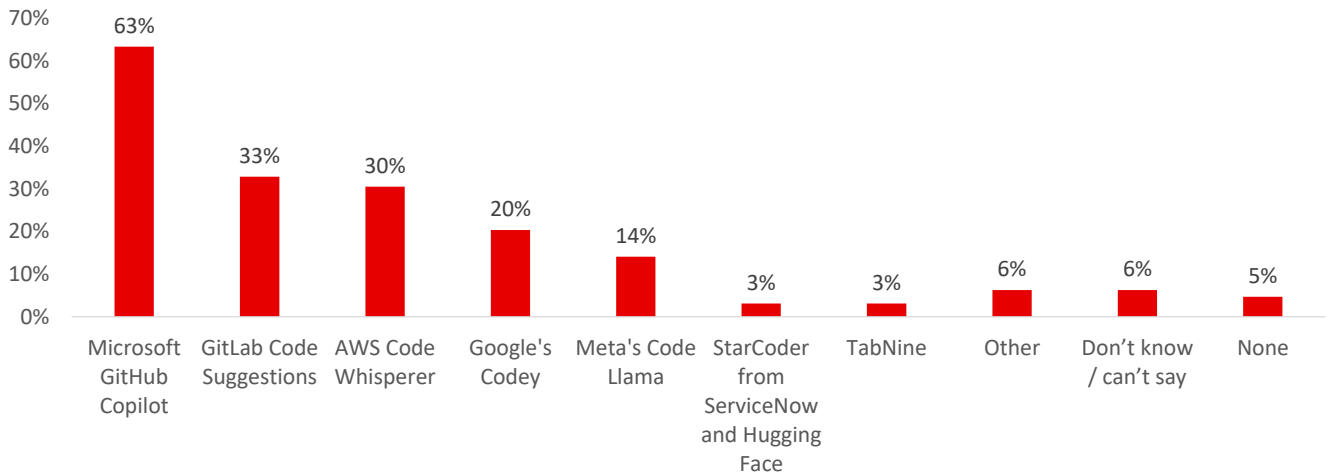
**Figure 28: Several technology firms have announced AI-based auto-programming tools for use by developers. Which, if any, of the following is your company currently using?**



Source: UBS Evidence Lab ([> Access Dataset](#))

**UBS:** Given its early market introduction, we were not surprised to see that Microsoft's GitHub Copilot product has a material early lead in the auto-coding tool market. Interestingly, GitLab's Code Suggestions tool grabbed the #2 slot, ahead of the AWS Code Whisperer product. This in our view lends support to the view that a) GitLab could prove to be more competitive in this market than many investors believe and b) that given its scale and incumbency, many organizations will defer to the AWS product, even if it's less mature than what is being offered by Microsoft and GitLab.

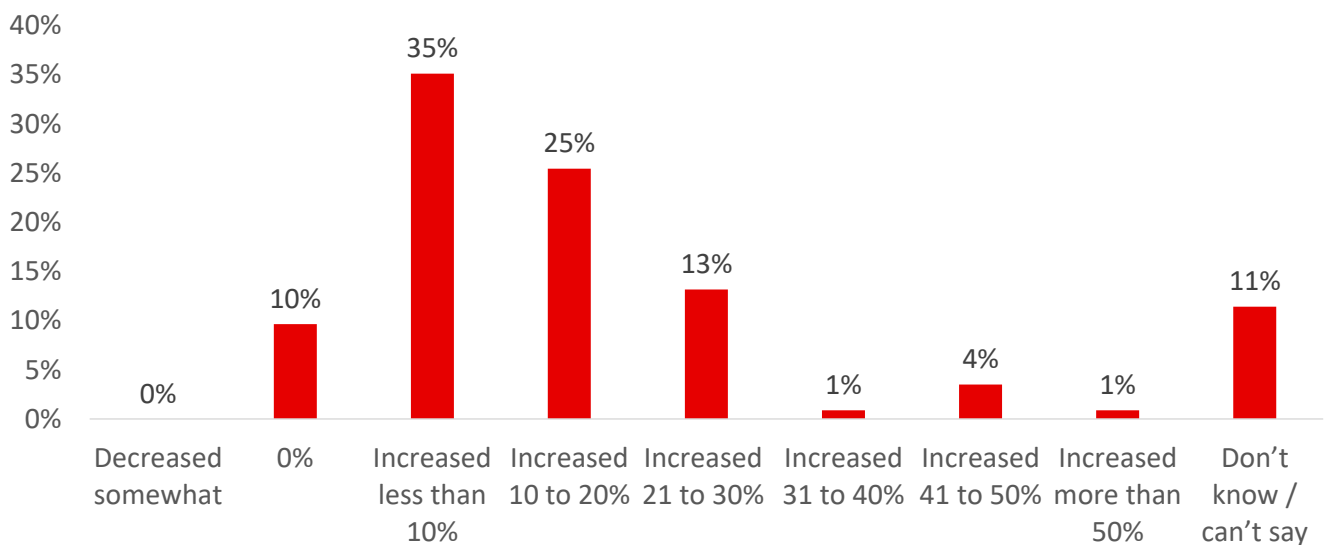
**Figure 29: Several technology firms have announced AI-based auto-programming tools for use by developers. Which, if any, of the following is your company planning to use in the next 1-2 years?**



Source: UBS Evidence Lab ([Access Dataset](#))

**UBS:** Looking out 1-2 years, the answers didn't materially change, as Microsoft's GitHub Copilot still stands out and GitLab and AWS were essentially tied for 2nd. In this forward look, respondents leaned more constructive on the products from Google and Meta, perhaps as they're expected to mature over time.

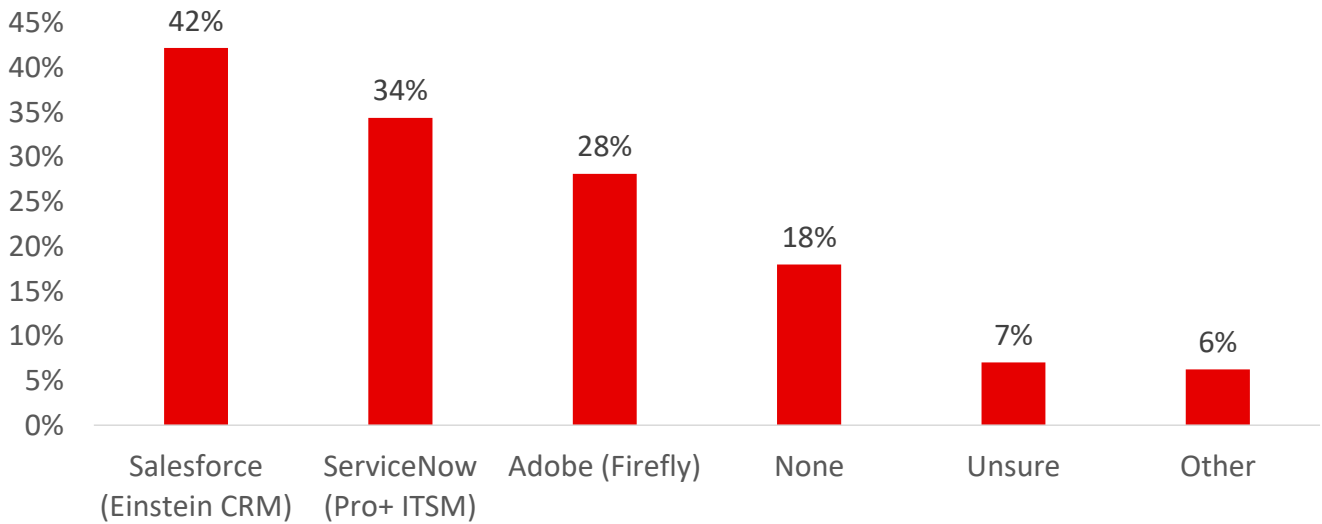
**Figure 30: You said your company is currently using AI-based auto-programming tools. How have these tools impacted the developer productivity in your company?**



Source: UBS Evidence Lab ([Access Dataset](#))

**UBS:** The answer to this question wasn't particularly encouraging. Microsoft, for instance, has marketed GitHub Copilot as resulting in productivity gains of 50%+ for programmers. Yet in this survey, literally 1% of respondents claimed to be seeing productivity gains of this magnitude. The bulk of respondents concluded that these tools result in productivity gains of <30%, with the most popular answer being <10%. While discouraging relative to the hype, we'd counter that a) it's early, these products haven't yet matured, and b) even a 5% productivity gain is material. On this latter point, we'll offer a recent anecdote from the President of one of the largest publicly-traded SaaS firms. This firm calculated a ~5% productivity gain across its developer base and elected to acquire GitHub Copilot anyway. The logic was that a 5% gain across an employee base with average compensation of \$200,000 was \$10,000, materially more than the cost of GitHub Copilot.

**Figure 31: Among other 3rd-party software application providers, which, if any, of the following has a compelling AI-centric product that your company would consider using?**

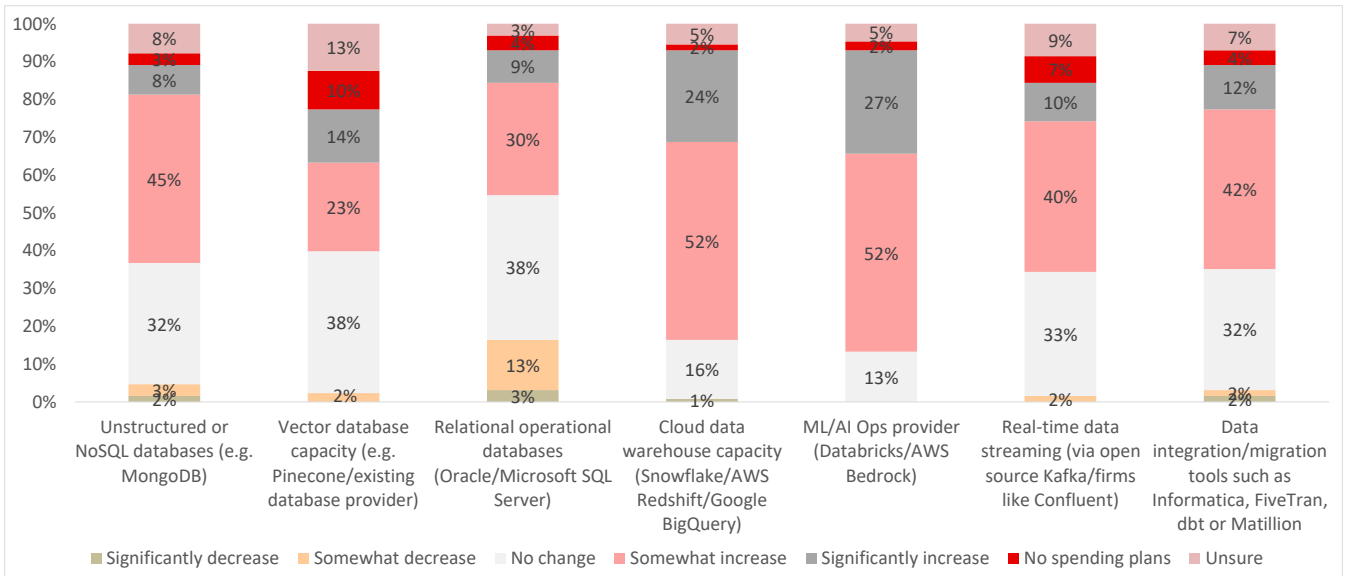


Source: UBS Evidence Lab ([Access Dataset](#))

**UBS:** The key take from this question was the number of respondents that when reflecting on other software firms offering AI-centric products, cited Salesforce and ServiceNow as having compelling products (now, or down the road). We'd argue that ServiceNow shares largely reflect this AI upside opportunity but that Salesforce shares do not (a source of upside potential as the AI story plays out in 2024).

## Data and Security Needs

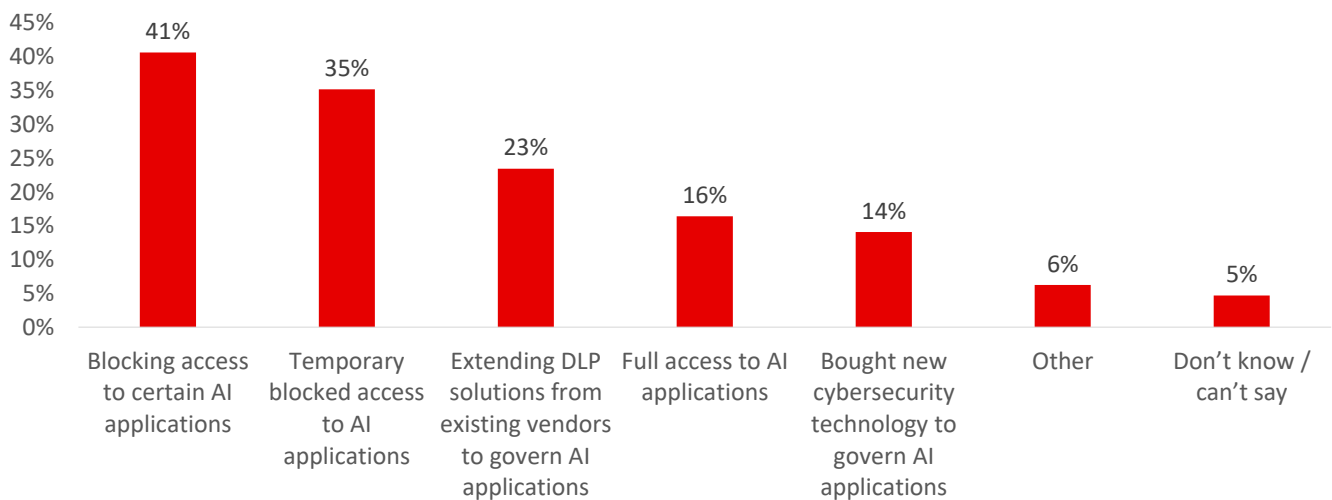
**Figure 32: How do you expect your company's spending on each of the following to change in the next 12 months?**



Source: UBS Evidence Lab ([Access Dataset](#))

**UBS:** This was an important question to ask. Many investors – and we – are keen to better understand how organizations are re-thinking their data stacks, the portion of their data to be hosted in the cloud and the mix of databases on-prem versus the cloud as a result of AI planned initiatives. The broad take, as noted above, is that across all data software categories, more enterprises than not are planning to increase spend on these categories as a result of AI projects, supporting a view that the data stacks (Snowflake, MongoDB, Confluent, Oracle, Informatica and others) could indeed get pulled-along by AI in 2024/2025. What is intriguing from this survey was that the data categories cited as likely to see the MOST pull-through were the cloud data warehouse sector (clearly benefiting Snowflake) and the ML/AIOps sector (benefiting Databricks, AWS Bedrock and privates such as Weights & Biases). The data software sector LEAST likely to see a pull-through, in fact most likely to see a net headwind, was the more mature relational database sector dominated by Oracle and Microsoft SQL Server. This isn't encouraging for Oracle, but we still wonder whether Oracle might benefit as its customer base migrates a larger portion of its Oracle databases to the cloud (OCI/Azure) over time as a result of AI initiatives.

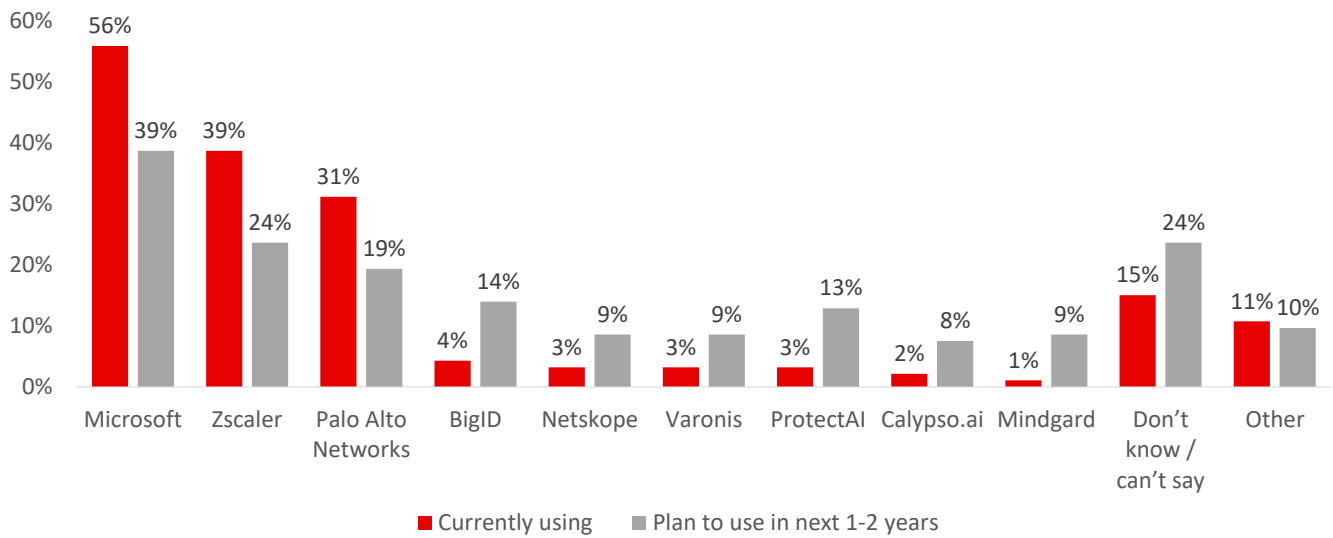
**Figure 33: How has your company implemented cybersecurity technology to help control employee use of Generative Artificial Intelligence (AI) applications (e.g., ChatGPT)?**



Source: UBS Evidence Lab ([> Access Dataset](#))

**UBS:** Our survey supports the anecdotal evidence that most common initial response to the rapid rise in employee interest in GenAI applications is to outright ban them from corporate networks. The most common response amongst our respondents was to block access to certain AI apps, either on a temporary (35%) or permanent basis (41%). Blocking certain applications, as well as controlling granular access to certain applications, can be achieved through existing SaaS access control and data loss prevention (DLP) solutions. The Security Edge vendors that offer Cloud Access Security Broker (CASB) and Secure Web Gateway (SWG) technology have all spoken to their ability to be used in these scenarios (more below). In our survey, 23% of respondents cited securing GenAI apps by extending existing DLP solutions to AI apps. Lastly, just 14% of respondents claimed that they had bought new cybersecurity tools to reign in GenAI applications, suggesting that GenAI isn't a massive uplift to new business today. That said, we'd suspect many companies are still thinking through how to deploy and secure these new applications, and forward purchase decisions may still be under consideration.

**Figure 34: You said your company has implemented cybersecurity technology to help control employee use of Generative Artificial Intelligence (AI) applications (e.g., ChatGPT). Which of the following cybersecurity vendors is your company currently using or planning to use in the next 1-2 years to support security of Generative Artificial Intelligence (AI) applications?**



Source: UBS Evidence Lab ([Access Dataset](#))

**UBS:** We're not surprised, but a full 56% of respondents cited using Microsoft technology to help secure GenAI applications. This is strong evidence that Microsoft is using its early lead in AI to upsell its security suite and offer a full AI portfolio. It was clear from the survey results that it wasn't just Microsoft that was being used to secure AI applications, most were using multiple vendors. Among the "pure-play" security firms, Zscaler and Palo Alto Networks were by far the most frequently-cited, and they both screened well on forward adoption plans as well. Nearly a quarter of our respondents plan to use Zscaler to secure access to GenAI applications and 19% plan to use Palo Alto. Beyond these two providers, respondents flagged BigID (private), Netskope (private) and Varonis. Our survey revealed growing interest in some of the companies offering targeted AI/ML security and model rigor solutions, such as ProtectAI, MindGard and Calypso.AI, significant given all three are early stage (Seed to Series A). We expand on these themes as well as profile the private companies included in the survey in our accompanying note (see link here: [GenAI - Who are the Security Enablers?](#))



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**\*UBS Evidence Lab** is a sell-side team of experts that work across 55+ specialized labs creating insight-ready datasets. The experts turn data into evidence by applying a combination of tools and techniques to harvest, cleanse, and connect billions of data items each month. Since 2014, UBS Research analysts have utilized the expertise of UBS Evidence Lab for insight-ready datasets on companies, sectors, and themes, resulting in the production of thousands of differentiated UBS Research reports. UBS Evidence Lab does not provide investment recommendations or advice but provides insight-ready datasets for further analysis by UBS Research and by clients. All published UBS Evidence Lab content is available via UBS Neo. The amount and type of content available may vary. Please contact your UBS sales representative if you wish to discuss access.

*This is the first wave of the US AI Business Survey. UBS Evidence Lab conducted an online survey of 128 IT executives/data engineers in the US. Fieldwork took place from the 25th of October to the 3rd of November 2023. To qualify for the survey, respondents had to work for a company with 250 or more employees and have decision making responsibility related to evaluating and utilizing Generative Artificial Intelligence (AI) at their company. Survey invites were sent to respondents via online access panels. This report leverages the following UBS Evidence Lab asset: US AI Business Survey.*

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### **Valuation Method and Risk Statement**

Investing in the technology sector entails above-average risk given low sales visibility, rapid pace of innovation and technological change, intense competition, frequent M&A, and low barriers to entry in many markets.

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12-Month Rating	Definition	Coverage <sup>1</sup>	IB Services <sup>2</sup>
Buy	FSR is > 6% above the MRA.	54%	40%
Neutral	FSR is between -6% and 6% of the MRA.	38%	42%
Sell	FSR is > 6% below the MRA.	9%	40%
Short-Term Rating	Definition	Coverage <sup>3</sup>	IB Services <sup>4</sup>
Buy	Stock price expected to rise within three months from the time the rating was assigned because of a specific catalyst or event.	<1%	<1%
Sell	Stock price expected to fall within three months from the time the rating was assigned because of a specific catalyst or event.	<1%	<1%

Source: UBS. Rating allocations are as of 30 September 2023.

1:Percentage of companies under coverage globally within the 12-month rating category.

2:Percentage of companies within the 12-month rating category for which investment banking (IB) services were provided within the past 12 months.

3:Percentage of companies under coverage globally within the Short-Term rating category.

4:Percentage of companies within the Short-Term rating category for which investment banking (IB) services were provided within the past 12 months.

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**UBS Securities LLC:** Karl Keirstead, Lloyd Walmsley, Roger Boyd, Timothy Arcuri.

### Company Disclosures

Company Name	Reuters	12-month rating	Price	Price date
<b>Adobe Systems Inc</b> <sup>16</sup>	ADBE.O	Neutral	US\$584.68	15 Dec 2023
<b>Advanced Micro Devices Inc</b> <sup>4,5,16,7,20</sup>	AMD.O	Buy (CBE)	US\$139.15	15 Dec 2023
<b>Alphabet Inc.</b> <sup>4,5,16,7</sup>	GOOG.O	Neutral	US\$133.84	15 Dec 2023
<b>Alphabet Inc. - Class A</b> <sup>4,5,16,7</sup>	GOOGL.O	Neutral	US\$132.60	15 Dec 2023
<b>Amazon.com</b> <sup>5,16</sup>	AMZN.O	Buy	US\$149.97	15 Dec 2023
<b>Broadcom Inc.</b> <sup>4,5,16,7</sup>	AVGO.O	Buy	US\$1,129.74	15 Dec 2023
<b>Confluent Inc</b> <sup>5,16</sup>	CFLT.O	Neutral	US\$24.97	15 Dec 2023
<b>GitLab Inc</b> <sup>16</sup>	GTLB.O	Buy	US\$62.34	15 Dec 2023
<b>Informatica Inc</b> <sup>5,16</sup>	INFA.N	Neutral	US\$28.98	15 Dec 2023
<b>Meta Platforms</b> <sup>16</sup>	META.O	Buy	US\$334.92	15 Dec 2023
<b>Microsoft Corp.</b> <sup>13,4,5,16,7,8,6a,6b,6c</sup>	MSFT.O	Buy	US\$370.73	15 Dec 2023
<b>MongoDB Inc</b> <sup>16</sup>	MDB.O	Buy	US\$420.17	15 Dec 2023
<b>NVIDIA Corp</b> <sup>13,5,16,18b</sup>	NVDA.O	Buy	US\$488.90	15 Dec 2023
<b>Oracle Corporation</b> <sup>16</sup>	ORCL.N	Buy	US\$103.32	15 Dec 2023
<b>Palo Alto Networks</b> <sup>4,5,16</sup>	PANW.O	Neutral	US\$307.30	15 Dec 2023
<b>Salesforce Inc</b> <sup>5,16,18a</sup>	CRM.N	Neutral	US\$261.60	15 Dec 2023
<b>ServiceNow Inc</b> <sup>16,8</sup>	NOW.N	Buy	US\$698.24	15 Dec 2023
<b>Snowflake Inc</b> <sup>16,7,20</sup>	SNOW.N	Neutral (CBE)	US\$199.01	15 Dec 2023
<b>Varonis Systems Inc</b> <sup>16</sup>	VRNS.O	Suspended	US\$44.26	15 Dec 2023
<b>Zscaler Inc</b> <sup>16</sup>	ZS.O	Buy	US\$221.66	15 Dec 2023

Source: UBS Global Research; LSEG Eikon. All prices as of local market close. Ratings in this table are the most current published ratings prior to this report. They may be more recent than the stock pricing date.

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