Research Insights Paper

How Organizations Unlock Their Data Capital with Artificial Intelligence

What Sets Organizations that Are Unlocking their Data Capital with AI Apart from their Peers

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November 2019

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Executive Summary

The process of extracting actionable intelligence from data is one of the most important activities organizations undertake today. But organizations are overwhelmed by the amount of data they have to store and analyze, and traditional query-based analytics processes have drawbacks in terms of speed, bias, and precision. The thoughtful application of artificial intelligence (AI) offers hope. Increasingly, organizations are turning to artificial intelligence to optimize data analysis and decision making. ESG research shows that nearly three-fifths (59%) of organizations are increasing their spending on AI in 2019.[1] These first movers are gaining a significant edge: 71% of organizations using AI in production today attribute more than 5% of their revenue directly to AI initiatives.

How do organizations make the most of their data with AI? This Research Insights Report shows that the success organizations have enjoyed unlocking their data's value with AI varies, and that organizations enjoying the greatest success operate fundamentally different IT environments than their counterparts. Figure 1 illustrates the relationship between the ability of an organization to use AI to unlock its data capital and the organization's propensity to utilize modern infrastructure.

Figure 1. Relationship Between Successful Data Capital Conversion and Modernized Infrastructure
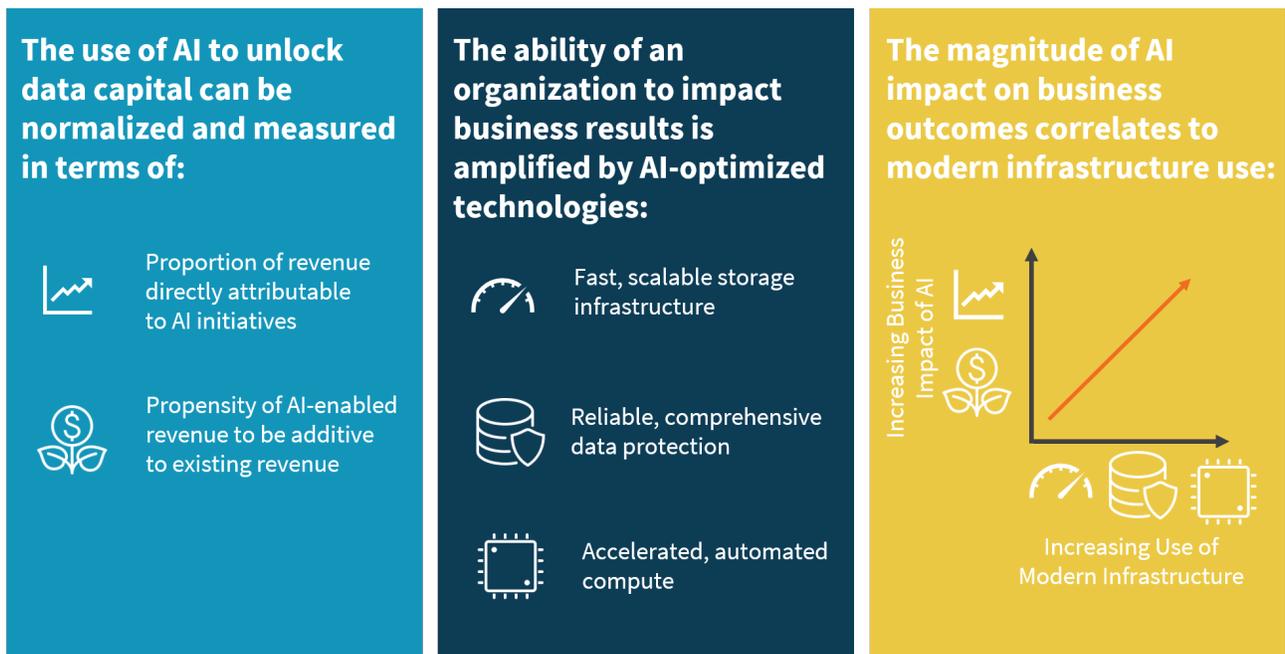
Source: Enterprise Strategy Group

This relationship between AI success and modern infrastructure was measured and proven by ESG's primary research capturing the perspectives of 750 strategic IT decision makers.

The research examined key infrastructure technologies including the storage technologies supporting AI, like all-flash storage, scale-out NAS, and sophisticated tiering technologies for agile data placement. It also looked at data protection capabilities that ensure the AI data pipeline is protected from beginning to end irrespective of location and how organizations automate and accelerate their server environments. Finally, the research showed linkage between AI success and the propensity of organizations to partner with third-party service providers to implement and optimize AI projects.

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[1]Source: ESG Master Survey Results, *2019 Technology Spending Intentions Survey*, March 2019.

The remainder of this report details the segmentation criteria ESG used to categorize organizations into three stages: *Stage 3* organizations (*Data capital high achievers*), *Stage 2*, or *Stage 1* organizations. It also discusses the specific differences in IT environment and skill augmentation observed among *Data capital high achievers (Stage 3)*. For example, *Data capital high achievers* were:

- Nearly 3x more likely than *Stage 1* organizations to extensively use all-flash storage to support AI workloads.

- Nearly 3x more likely than *Stage 1* organizations to report extensively using scale-out NAS to support AI workloads.

- Much more likely than *Stage 1* organizations to protect their data pipeline (84% vs. 26%) and 3x more likely to report protection is comprehensive.

- 2x more likely to report they rely much more on third-party professional services for AI than other initiatives.

Modern Business Demands the Application of Artificial Intelligence to Data

The most valuable asset for modern businesses is their data. With it, organizations are redefining entire industries and unlocking previously unrecognized revenue streams. To recognize and capitalize on opportunities requires organizations to ingest, analyze, and act on data dynamically. Similarly, organizations are looking to leverage as much data as possible, regardless of size, type, or the rate at which it changes. Many organizations approach data management by using a host of business analysts querying siloed databases with legacy analysis and decision tools. But this legacy approach won't work in the modern data era. It's simply not possible to unlock the value of data using outdated technology and processes. It's time to modernize.

Enter artificial intelligence (AI). AI refers to systems or machines that can simulate human intelligence to make decisions or perform tasks. These systems can be iteratively improved based on the data they collect and the insights they derive from past actions. For example, an ecommerce company with an AI engine that ingests web traffic and user interaction data at scale can tailor offerings to improve the customer experience for site visitors in real time. Another example would be an AI-enabled chatbot that is trained to answer customer questions more efficiently and effectively using past customer service interactions and outcomes data.

AI offers several advantages over traditional query-based analytics and decisioning workflows, including:

- **Speed.** AI systems can act on data faster than humans can make query-based decisions.

- **Scale.** AI systems can ingest and retain more and a greater variety of data than humans to inform decisions.

- **Impartiality.** With proper training, AI systems can minimize bias in their decision-making processes.

- **Precision.** AI systems can create more precise inferences and calculations from data than humans.

- **Uptime.** AI systems, unlike humans, can operate 24x7.

Clearly, AI is one tool organizations can apply to their data to maximize its value. But what about the connection between AI use cases and the use of modern infrastructure? This data-validated report presents the results that businesses are achieving today from deploying AI on modern IT infrastructure. The survey backing this report included respondents from across the globe with 40% residing in North America, 20% in Western Europe, 30% in the Asia-Pacific region, and 10% in Latin America. All respondents were employed in a role that involved IT decision making and at an organization either using AI today, or planning to deploy AI within the next 24 months. Moreover, all respondents were required to be familiar with both the IT infrastructure underpinning AI workloads, as well as the business initiatives and processes being augmented by AI.
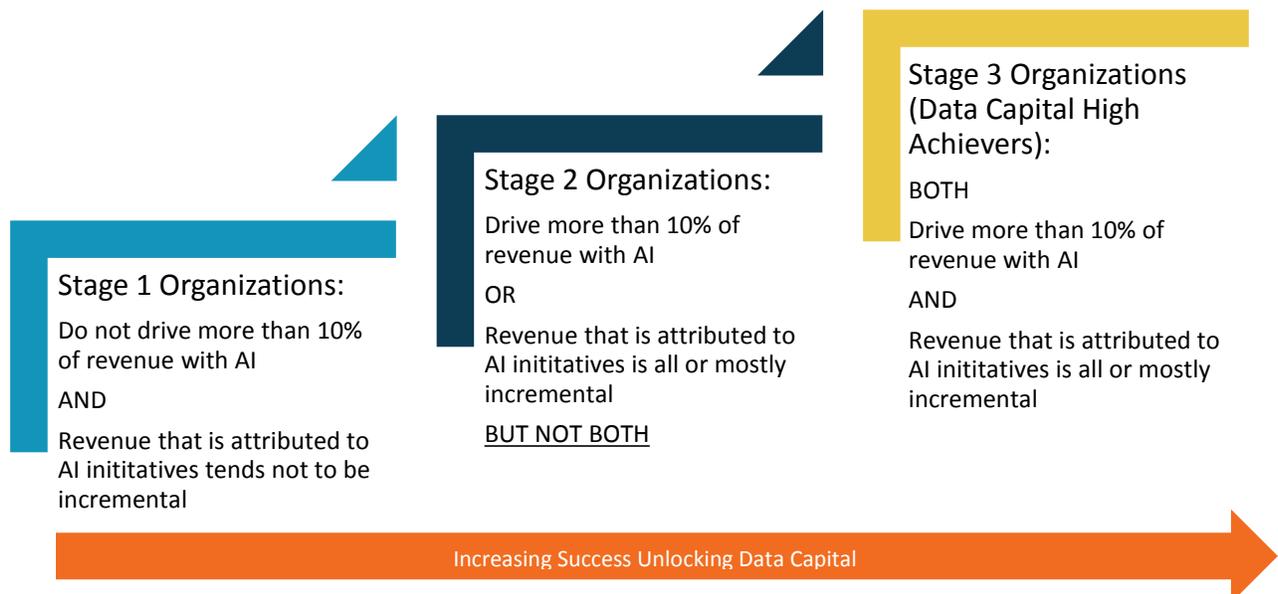
Benchmarking Successful Data Capital Conversion

One of the key goals of ESG's research was to understand what separates organizations that successfully unlock the value of their data with AI from those that do not. To observe differences among cohorts of organizations, ESG segmented respondents by considering **two key criteria**:

1. **The ability of the organization to positively impact top-line revenue with AI initiatives.** To be considered a *data capital high achiever* or *Stage 3 organization*, an organization must be using AI to positively impact business results. The variety of ways AI can help drive revenue is nearly infinite: human capital freed up through process automation can be used to drive other revenue-generating projects forward; customer data can be mined to identify upsell and cross-sell opportunities; sensor and machine data can be used to prevent production line downtime or to increase yields. While the opportunities are endless, the results an organization has achieved can be normalized and compared in terms of top-line revenue. Thirty-nine percent of respondents reported that AI initiatives are responsible for more than one-tenth of total revenue.

2. **The propensity of AI-enabled revenue to be incremental to existing revenue streams.** To be considered a *data capital high achiever* or *Stage 3 organization,* the revenue enabled by AI must be additive (i.e., it would not have been earned without the investments the organization made in AI). The act of unlocking the value data means that prior to being unlocked, the value was not recognized. *Data capital high achievers* use AI to uncover new and innovative ways to impact business results. When ESG asked respondents what percentage of their organization's revenue tied to AI is additive, 59% reported all or most of the revenue is incremental.

ESG used these two criteria to create three segments of organizations within the survey data set (see Figure 2). *Stage 1* organizations are those that do not meet either of these criteria: They do not drive more than 10% of their revenue with AI and of the revenue they do drive, much of it would be earned without their investments in AI. *Stage 2* organizations are those that meet one of the criteria, but not both. And *Stage 3* organizations—*data capital high achievers*—meet both criteria and are at the leading edge of unlocking data capital with AI. About one-quarter of AI users today (27%) meet both requirements, 44% meet one requirement, and 29% meet neither.

Figure 2. Benchmarking Successful Data Capital Conversion

Stage 1 Organizations:
Do not drive more than 10% of revenue with AI
AND
Revenue that is attributed to AI inititaives tends not to be incremental

Stage 2 Organizations:
Drive more than 10% of revenue with AI
OR
Revenue that is attributed to AI inititaives is all or mostly incremental
BUT NOT BOTH

Stage 3 Organizations (Data Capital High Achievers):
BOTH
Drive more than 10% of revenue with AI
AND
Revenue that is attributed to AI inititaives is all or mostly incremental

Increasing Success Unlocking Data Capital

Source: Enterprise Strategy Group

What Separates AI-enabled Data Capital Achievers: Modern Infrastructure

By creating agile, high performance, reliable IT environments, data capital high achievers create fertile ground for AI initiatives to take root and flourish, ultimately driving value for the organization.

ESG's research touched on many aspects of organizations' IT environments. When comparing organizations of different data capital success stages, it quickly became obvious that *data capital high achievers* (*Stage 3* organizations) have made many more strides toward modernizing their infrastructure. Compared to *Stage 1* organizations, they were nearly 3x more likely to be using flash and scale-out NAS storage extensively to support AI, and they were also 3x more likely to be using data protection technologies comprehensively in the AI data pipeline. ESG believes that by creating scalable, high performance, reliable IT environments, *Stage 3* organizations create fertile ground for AI initiatives to take root and flourish, ultimately driving more revenue for the organization. ESG believes IT modernization is a large part of the reason 100% of *data capital high achievers* can derive more than 10% of their revenue from AI initiatives. Organizations looking to create material, incremental value from their data with AI should follow the example of *Stage 3* organizations.

Next, we'll explore the three key infrastructure elements needed for successful AI deployments at *Stage 3* organizations – storage, data protection, and compute.
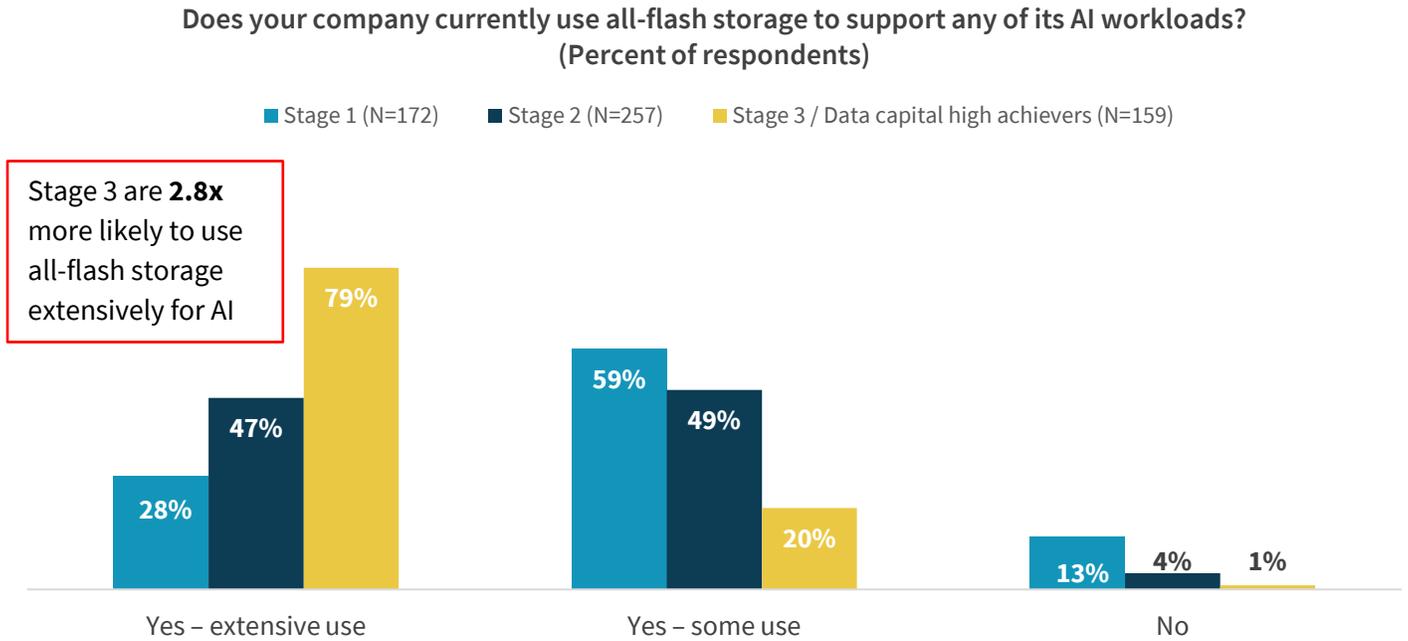
AI-optimized Storage

While AI model training requires massive parallel processing, organizations can't make the most of their compute resources if the data delivery mechanism doesn't keep pace. Slow storage means underutilized compute resources, slower AI development and refinement, lower AI effectiveness, and ultimately less AI-derived value for the organization. This drives the need for compute and storage to be in lock-step to satisfy performance requirements of AI workloads.

Companies driving the most value from AI today are making the biggest investments in high-performance all-flash storage platforms.

If data is the modern organization's most valuable asset, then it would make sense that the performance of systems responsible for retaining and delivering that data would be an area of focus for organizations maximizing AI outcomes. Indeed, this hypothesis is borne out in ESG's research. When ESG asked respondents if their company uses high-performance, all-flash storage to support AI workloads, 79% of *data capital high achievers* reported extensive use. That proportion was nearly 3x higher than was observed among *Stage 1* organizations. Those companies driving the most value from AI today are making the biggest investments in high-performance all-flash storage platforms (see Figure 3).

Figure 3. Organizational Use of All-flash to Accelerate AI Value

**Does your company currently use all-flash storage to support any of its AI workloads?
(Percent of respondents)**

■ Stage 1 (N=172)   ■ Stage 2 (N=257)   ■ Stage 3 / Data capital high achievers (N=159)

Stage 3 are **2.8x** more likely to use all-flash storage extensively for AI

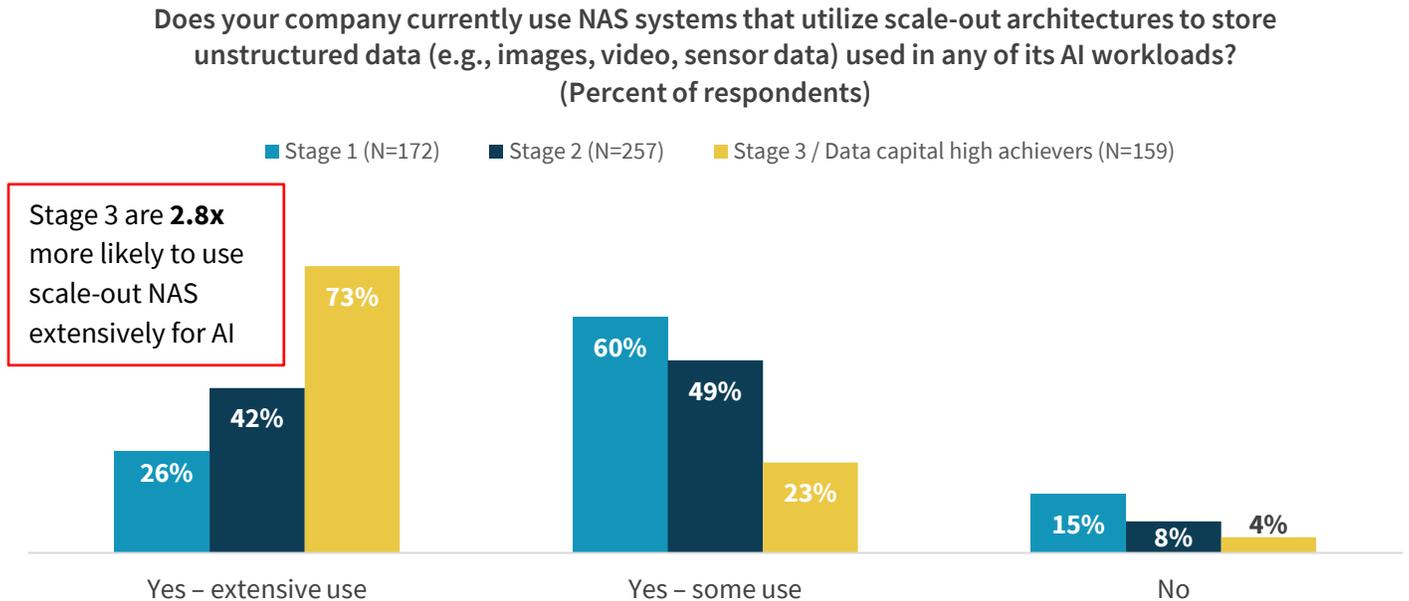|	Yes – extensive use	Yes – some use	No
Stage 1	28%	59%	13%
Stage 2	47%	49%	4%
Stage 3	79%	20%	1%

Speed is not the lone characteristic of AI-optimized storage. Scale is an increasingly important consideration. Two trends drive this requirement.

- AI methodologies are increasingly using deep learning (DL) algorithms. One distinctive feature of these algorithms is that the quality of the AI models they enable increases as the amount of data fed to the model increases. To put it simply: All else being equal, an AI model trained with 1 petabyte (PB) of data will be more effective than a model trained by 100 terabytes (TB) of data, which will be more effective than a model trained by 1 TB of data.

- Data format also increasingly drives a need for scale in AI-optimized storage. AI models frequently utilize large sets of unstructured data, such as images and video, which cannot be compressed or deduplicated. These data types tend to use more space than structured data.

Deep Learning Model Efficacy

Volume of Data Used to Train Deep Learning Model
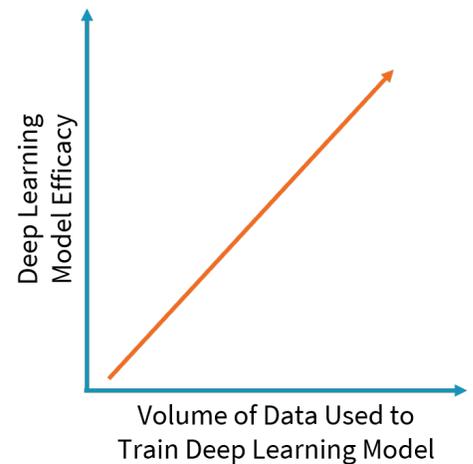
These two trends taken together make it easy to see how storage scalability has become such an important requirement in AI environments.

How do *data capital high achievers* architect their storage environments to account for these scalability requirements? ESG asked respondents if their organization uses scale-out NAS systems within their AI environments to accommodate the scale needed by unstructured data types. The results were noteworthy: *Stage 3* organizations, those driving the most value with AI today, were nearly 3x more likely than *Stage 1* organizations to report extensively using scale-out NAS to support AI workloads (see Figure 4).

Figure 4. Organizational Use of Scale-out NAS to Support AI Scale

Does your company currently use NAS systems that utilize scale-out architectures to store unstructured data (e.g., images, video, sensor data) used in any of its AI workloads? (Percent of respondents)

■ Stage 1 (N=172)   ■ Stage 2 (N=257)   ■ Stage 3 / Data capital high achievers (N=159)

Stage 3 are **2.8x** more likely to use scale-out NAS extensively for AI

	Yes – extensive use	Yes – some use	No
Stage 1	26%	60%	15%
Stage 2	42%	49%	8%
Stage 3	73%	23%	4%

Source: Enterprise Strategy Group

Clearly *data capital high achievers* have identified a hybrid storage environment as the "right tool for the job" when it comes to supporting their AI initiatives. On one hand, high-performance AI operations like model training are powered by high-performance purpose-built all-flash storage. On the other hand, to economically retain the wide-ranging and massive data sets powering AI applications, organizations use scale-out NAS systems, which likely include a "cheap and deep" tier for data types like video and images.

A hybrid storage environment drives the need for a sophisticated tiering solution capable of moving active data to high-performance flash while storing cold data on less-expensive capacity. When ESG asked respondents how effective their organization is at tiering AI data, *data capital high achievers* were at the head of the class. Nearly half (49%) of *Stage 3* respondents said their organization was highly effective at AI data tiering, 5.5x the frequency of their counterparts at *Stage 1* organizations (9%).

AI-optimized storage, as evidenced by organizations unlocking the most value from their data capital, has three key requirements:

1. **Speed** needed to ensure that storage does not become an AI bottleneck.

2. **Scalability** needed to satisfy data-hungry AI algorithms.

3. **Intelligence** to move data to storage that can deliver the right mix of speed and scalability seamlessly.

> Nearly half (49%) of *data capital high achievers* said their organization was highly effective at AI data tiering, 5.5x the frequency of their counterparts at *Stage 1* organizations (9%).

Comprehensive Data Protection

AI workloads rely on a complex data pipeline or series of steps to go from raw data to trained and tuned AI model. First, data to be used by an AI model must be identified, captured, and integrated. Next, it must be transformed into a format that is compatible with AI algorithms, which includes accounting for missing or incomplete records, reformatting data as needed, and adding variables to the data set to improve model performance or accuracy. Data must then be selected for

training with an eye toward ensuring the data is representative, high quality, error free and unbiased. Finally, AI models can be developed, trained, tuned, and eventually deployed to production.
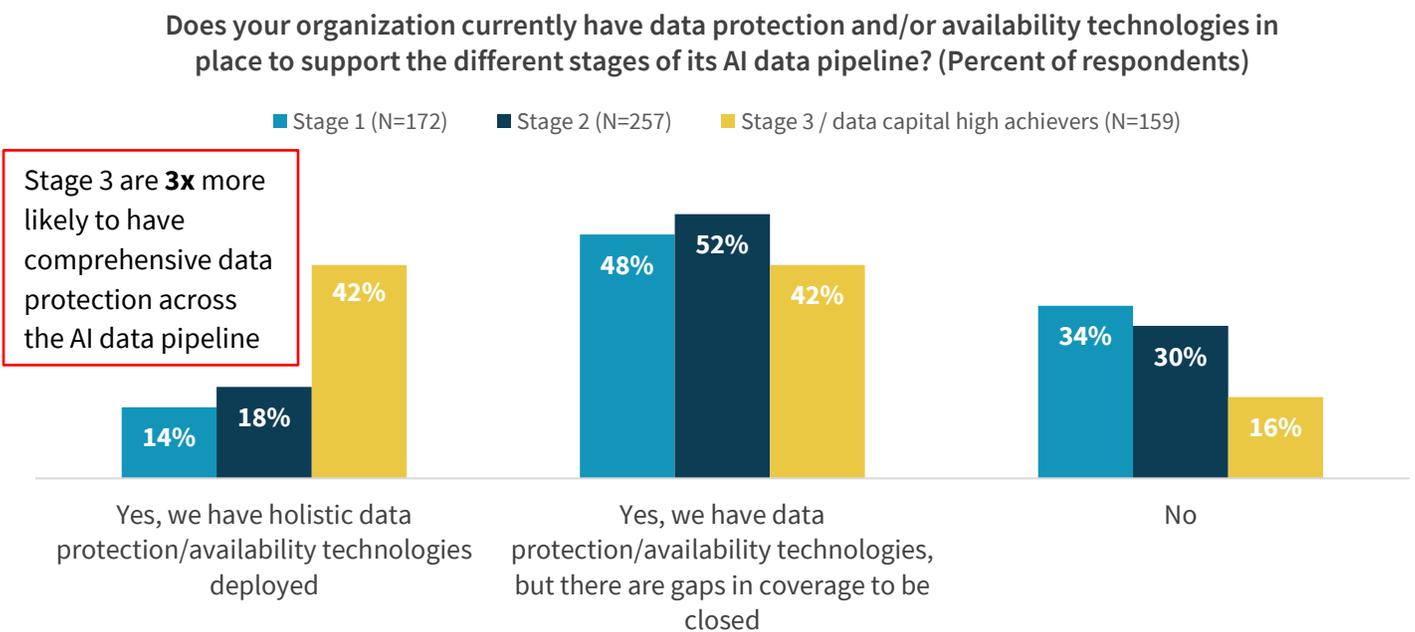
> *Data capital high achievers* were 3x more likely than *Stage 1* organizations to have comprehensive data protection spanning the AI data pipeline.

Each of these steps is serial, depending on the prior step's effective execution. If data in any step of the process is deleted or corrupted, the accuracy of the model could be impacted, meaning the data would have to be replaced or repaired and models would have to be retrained, negatively impacting time to value. Moreover, these steps will likely be executed in different locations, whether a core data center, an edge location, or the cloud. These two dynamics underscore the importance of comprehensive data protection throughout the data pipeline and irrespective of location.

When ESG asked respondents if their organization uses data protection technologies within the AI data pipeline, 84% of *data capital high achievers* reported they did, either across the whole pipeline or with some gaps. This represents a 35% increase over *Stage 1* organizations. When looking at the most aspirational state of AI data protection, *Stage 3* organizations were 3x more likely than *Stage 1* organizations to have comprehensive data protection spanning the entire AI data pipeline (14%) (see Figure 5).

Figure 5. Organizational Use of Comprehensive Data Protection throughout the AI Pipeline

Does your organization currently have data protection and/or availability technologies in place to support the different stages of its AI data pipeline? (Percent of respondents)

Legend: ■ Stage 1 (N=172) ■ Stage 2 (N=257) ■ Stage 3 / data capital high achievers (N=159)

Stage 3 are **3x** more likely to have comprehensive data protection across the AI data pipeline

- Yes, we have holistic data protection/availability technologies deployed: 14%, 18%, 42%
- Yes, we have data protection/availability technologies, but there are gaps in coverage to be closed: 48%, 52%, 42%
- No: 34%, 30%, 16%

Source: Enterprise Strategy Group
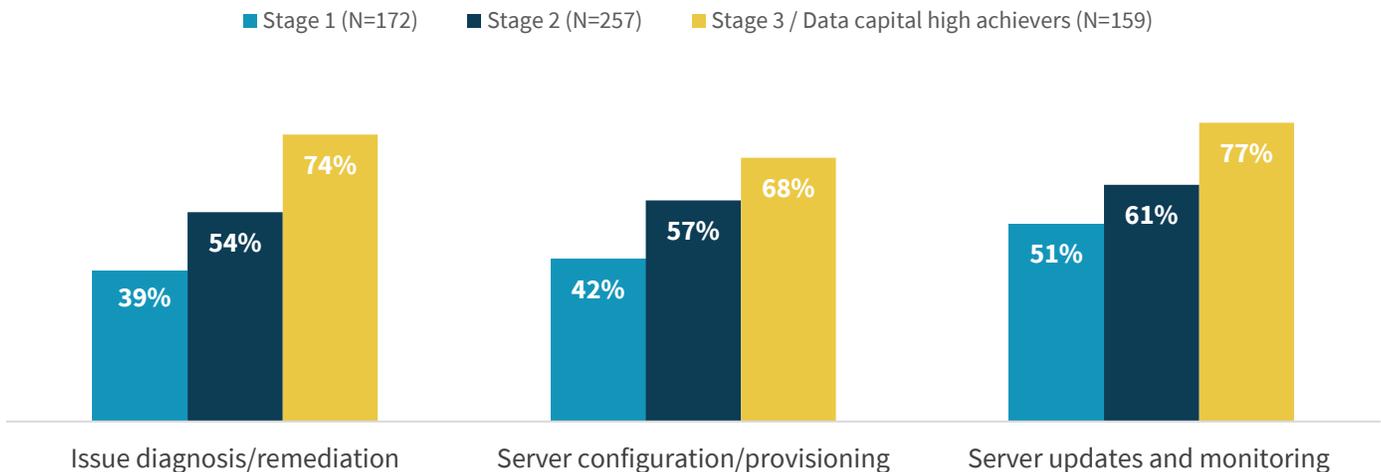
AI-enabled Compute

ESG believes that agility, scalability, and efficiency within an organization's compute environment are all prerequisites to self-service IT resource provisioning. ESG also believes that self-service IT is essential to optimizing AI workflows. By giving data engineers, architects, and scientists the ability to provision the resources needed to develop, train, and deploy AI models to production, IT enables AI innovation rather than becoming an AI bottleneck. *Data capital high achievers* make the investments needed in their server environment to allow data specialists to maximize the value of the organization's data.

> *Data capital high achievers* make the investments needed in their server environment to allow data specialists to maximize the value of the organization's data.

ESG asked respondents to describe the server management workflows in their environment from entirely manual to entirely automated. Regardless of the activity, *Stage 3* organizations operate a much more automated server environment: 68% described server configuration and provisioning tasks as mostly or completely automated; 74% described issue diagnosis and remediation as mostly or completely automated; and 77% described server updates and monitoring to be mostly or completely automated (see Figure 6).

Figure 6. Server Management Automation

To what extent would you say each of the following server infrastructure management tasks are automated within your IT operations team? (Percent of respondents reporting "Entirely automated" or "More automated than manual")

■ Stage 1 (N=172)   ■ Stage 2 (N=257)   ■ Stage 3 / Data capital high achievers (N=159)

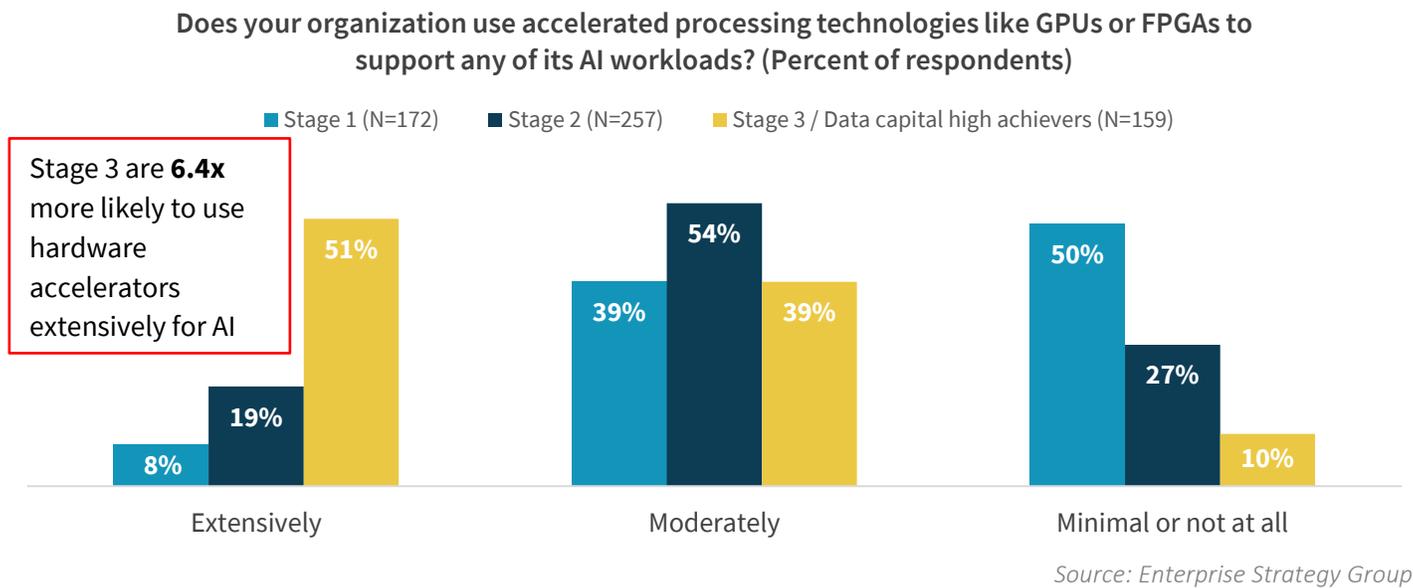|	Issue diagnosis/remediation	Server configuration/provisioning	Server updates and monitoring
Stage 1	39%	42%	51%
Stage 2	54%	57%	61%
Stage 3	74%	68%	77%

Source: Enterprise Strategy Group

In addition to extreme automation, *data capital high achievers* operate much more highly virtualized server environments. ESG asked respondents what proportion of production servers in their environments were VMs. Compared with *Stage 1* organizations, *Stage 3* organizations were 2x more likely to report that more than 60% of production servers were VMs (36% versus 17%). Conversely, *Stage 1* organizations were nearly 2x as likely to report 40% or less of their production servers were VMs (47% versus 25%).

While *Stage 3* organizations are much more likely than their counterparts to be making strides in automation and virtualization across the entirety of their server environments, AI workloads are specialized and many use cases require hardware acceleration.

ESG asked respondents if their organization uses hardware accelerators like GPUs or FPGAs to support AI workloads. The majority of *Stage 3* organizations (51%) reported they extensively use hardware accelerators for AI, 6x the frequency of *Stage 1* organizations (see Figure 7).

Figure 7. Use of Hardware Accelerators for AI Workloads

Does your organization use accelerated processing technologies like GPUs or FPGAs to support any of its AI workloads? (Percent of respondents)

- Stage 1 (N=172)
- Stage 2 (N=257)
- Stage 3 / Data capital high achievers (N=159)

Stage 3 are **6.4x** more likely to use hardware accelerators extensively for AI

	Extensively	Moderately	Minimal or not at all
Stage 1	8%	39%	50%
Stage 2	19%	54%	27%
Stage 3	51%	39%	10%

Source: Enterprise Strategy Group

## What Separates AI-enabled Data Capital Achievers: Data Science Skill Augmentation

ESG's research shows how modern infrastructure is the engine of an effective AI workload, helping organizations maximize the financial return on their AI effort and expenditures. However, it takes more than just infrastructure to make AI a material and additive value driver for the organization. ESG's research also shows dramatic differences in the ways in which high achievers as a group augment their AI talent compared with organizations struggling to turn AI into a meaningful data capital conversion tool.

The Data Science Skills Shortage

Employment in the data science field would need to nearly double overnight to close the existing talent shortfall.

AI is one application of data science, an emerging field in high demand. The U.S. Bureau of Labor Statistics tracks and projects employment for four job titles under the umbrella of "mathematical science occupations." From 2016 to 2026, the BLS forecasts that employment in the field will increase by 27.9%, outstripping its growth projections for all occupations by nearly 4x (7.4%, see Figure 8). While demand is high, the labor market for data scientists is tight. A recent LinkedIn Workforce Report quantified the shortage of individuals with data science skills as nearly 152,000. Given that the BLS estimated that the entire employment in mathematical science occupations stood at 181,000 in 2016, employment in the data science field would need to nearly double overnight to close the existing talent shortfall.

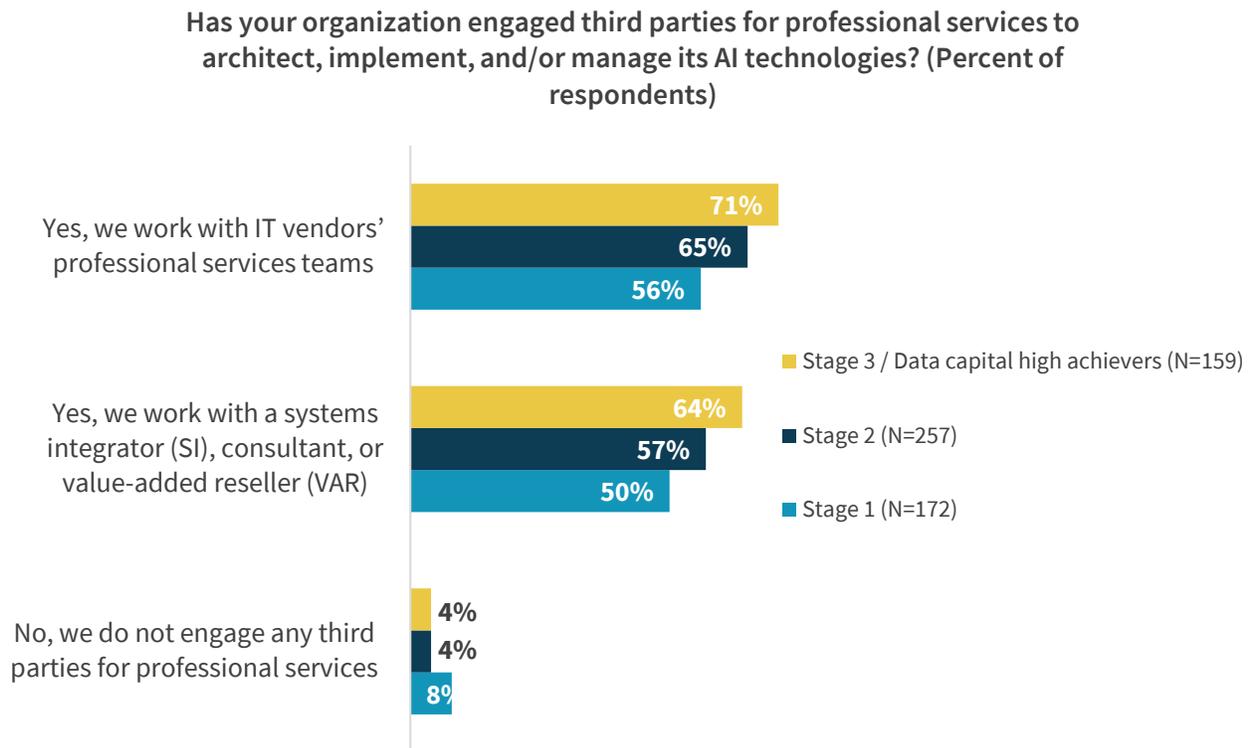**Figure 8. Forecasted Data Science Employment Growth**

Forecasted percentage employment change 2016-2026

Mathematical science occupations	**27.9%**
Total, all occupations	**7.4%**
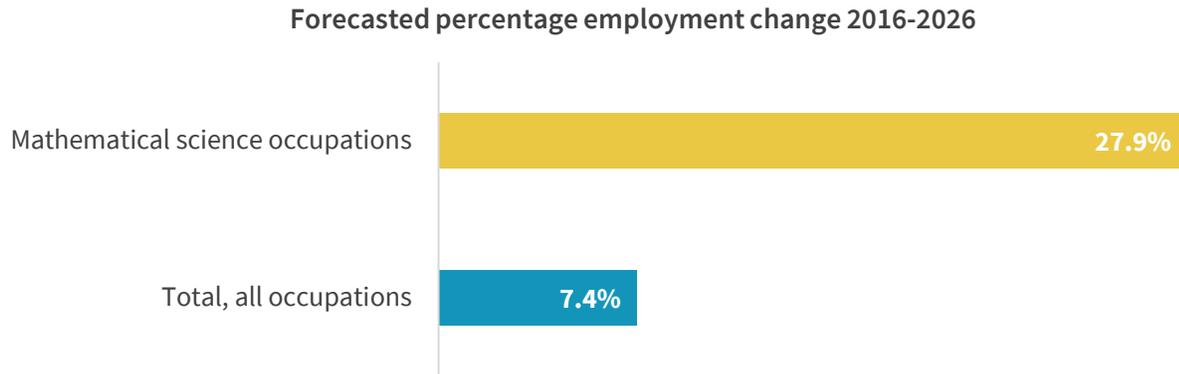
Source: U.S. Bureau of Labor Statistics, Employment Projections program

Maximizing AI Value with Third-party Services

ESG's research touched on the topic of skills augmentation via professional services consumption. Once again, the research validates that there are fundamentally different behaviors between organizations maximizing their data capital and their lower success counterparts. ESG asked respondents if their organization engages third-party service providers to help architect, implement, and manage AI technology. Across all respondents, the answer was a resounding *yes*—with more than nine out of ten reporting their organization partners with IT vendors' professional services teams, an outside consultant (system integrator, VAR, etc.), or both. However, *data capital high achievers* were much more likely to look outside their walls for help (see Figure 9).

Figure 9. Use of Third-party Professional Services for AI

Has your organization engaged third parties for professional services to architect, implement, and/or manage its AI technologies? (Percent of respondents)

Yes, we work with IT vendors' professional services teams: 71%, 65%, 56%

Yes, we work with a systems integrator (SI), consultant, or value-added reseller (VAR): 64%, 57%, 50%

No, we do not engage any third parties for professional services: 4%, 4%, 8%

Stage 3 / Data capital high achievers (N=159)
Stage 2 (N=257)
Stage 1 (N=172)

Source: Enterprise Strategy Group

ESG's research showed that data capital high achievers were more apt to use third parties to optimize their AI efforts and more likely to report these engagements were bigger and more strategic. ESG asked respondents to compare their third-party engagements for AI with other professional services agreements to support other major IT projects. Stage 3 organizations were more than 2x as likely to report they rely much more on third-party professional services for AI than other initiatives where third parties are consulted (see Figure 10).

Data capital high achievers were 2x more likely to report they rely much more on third-party professional services for AI than other initiatives where third parties are consulted.

Figure 10. Comparative Depth of Engagement with Third Parties for AI

Compared to other major IT initiatives your organization has undertaken, has or will your organization rely more or less on third-party professional services for AI? (Percent of respondents)

■ Stage 1 (N=156)   ■ Stage 2 (N=247)   ■ Stage 3 / Data capital high achievers (N=152)

Stage 3 are **2.1x** more likely to rely much more on third-party professional services for AI

We have/will rely much more on third-party professional services	We have/will rely somewhat more on third-party professional services	Comparable to or less than other major IT initiatives
17% / 17% / 35%	47% / 52% / 37%	35% / 31% / 28%

Source: Enterprise Strategy Group

ESG believes all organizations with AI aspirations face a tight labor market without the necessary skills to accomplish all that they want. However, *Stage 3* organizations appear to have been quicker to act on this reality. Organizations looking to maximize their AI impact should not hesitate to engage with third-party experts.

The Bigger Truth

For many organizations, data analytics initiatives are still evolving. However, ESG research shows that many organizations today *directly attribute* a measurable portion of their revenue to the next generation of analytics initiatives—AI. Additionally, the majority (59%) of organizations monetizing AI believe this revenue is incremental to existing revenue streams. Often times, these revenue improvements are compounded by cost reductions attributable to AI, dramatically enhancing an organization's profitability. More than two-fifths (42%) of organizations surveyed reported having reduced cost of business operations through AI-enabled automation.

However, the success organizations are having varies. *Data capital high achievers* (*Stage 3*) make up just 27% of all AI users today. However, all of these organizations report that AI initiatives account for more than 10% of their organization's revenue *and* all or most of that revenue is incremental—truly remarkable results.

By contrast, the majority (51%) of *Stage 1* organizations attribute 6% to 10% of their revenue to AI initiatives and 72% say only about half of this revenue is additive. While both cohorts of organizations are making tangible business gains thanks to AI, high achievers are affecting greater business transformation with AI.

This research reveals some of the actions high achieving organizations are taking today that separate them from AI also-rans:

1. Supporting AI workloads with storage environments that deliver the performance of all-flash when it's needed, the scalability of scale-out NAS to enable data-rich model building that leverages file types like video and images, and the intelligence to move data between tiers based on requirements.

2. Protecting data throughout the entirety of the data pipeline—from data preparation to model retraining—and regardless of location—from core, to edge, to cloud.

3. Leveraging hardware acceleration technologies extensively to enable the massively parallel processing requirements of building and training AI models for many use cases.

4. Engaging third parties to help implement and optimize AI projects.

Early gains achieved thanks to AI are noteworthy. Moreover, they are amplified at organizations underpinning their AI initiatives with advanced infrastructure. For organizations lagging on AI today, the behaviors of high-success AI leaders offer a clear roadmap, Laggards should invest in AI-enabled infrastructure while seeking out the AI expertise of professional services organizations within the vendor community, or risk being left further behind.

How Dell EMC and Intel Technologies Can Help

This ESG Research Insights Paper was commissioned by Dell EMC and Intel Corporation. To learn more about Dell EMC and how its family of brands powered by Intel technologies can help you make the most of your AI vision, start here:

- Dell EMC's storage portfolio based on Intel Xeon processors encompasses Isilon scale-out NAS, and PowerMax, with all the speed needed to power the most demanding AI workloads.

  o The Dell EMC Isilon F800 All-Flash Scale-out NAS delivers the analytics performance and extreme concurrency at petabyte scale for AI. Powered by the Isilon OneFS operating system, the Isilon F800 has the ability to support massive concurrency, scale from 10s TBs to 10s PBs of data and linearly scale bandwidth from 15 GB/s up to 945 GB/s per cluster. This makes the Isilon F800 a perfect data complement to the high performance, high bandwidth requirements to the most compute and data-intensive AI workloads. Additionally, Isilon's enterprise features for data management, data security, data compliance, and data protection help your AI solutions conform to regulatory and enterprise security policy requirements.

  o Dell EMC PowerMax is a block storage system built for steps in the AI workflow and specific machine-learning and deep learning algorithms that require very low-latency for real-time response rates during data ingest, data prep and production inference. The PowerMax is built on end-to-end NVMe, delivering latencies under 300ms at between 1.7 and 10M IOPs and with up to 13TB per brick.

- Dell EMC's data protection solutions, with its broad application support including Hadoop and custom application protection with BoostFS, ensure your organization's AI applications and infrastructure, and its most critical resource, data, is protected and remains available from edge to core to cloud.

- Dell Technologies Consulting helps organizations of all sizes, industries, and maturity levels adopt and accelerate their analytics and AI capabilities from strategy through to execution and data modeling. Services for AI include ProConsult Advisory Services, comprised of facilitated development of a plan to modernize your analytical platforms and architectures for scalability and performance, using our AS-IS / TO-BE methodology. We provide an unbiased, end-to-end assessment that delivers actionable outcomes aligned to your corporate vision and strategy.

- AI-enabled PowerEdge Servers with Intel Xeon Scalable processors and Intel FPGAs offer best-in-class automation, hardware acceleration compatibility, and modular agility. The PowerEdge R740xd has 2 Intel 2nd Gen Xeon Scalable processors with up to 28 cores of processing power each with Intel Deep Learning Boost—everything you need to get started and scale your AI business initiatives over time.

Appendix I – Research Methodology and Respondent Demographics

To gather data for this report, ESG conducted a comprehensive online survey of IT decision makers from private- and public-sector organizations in 9 countries: U.S. (32%), Canada (7%), U.K. (9%), France (11%), Australia (8%), New Zealand (3%), Singapore (9%), China (11%), and Brazil (11%). The survey was fielded between May 7, 2019 and May 30, 2019. To qualify for this survey, respondents were required to have influence in the purchase process for data center infrastructure, private cloud investments, data protection, or AI/ML technologies. Furthermore, all were required to be knowledgeable about their organization's current/planned AI initiatives.

After filtering out unqualified respondents, removing duplicate responses, and screening the remaining completed responses (on several criteria) for data integrity, a final sample of 750 respondents remained.

All respondents were provided an incentive to complete the survey in the form of cash awards and/or cash equivalents. Note: Totals in figures and tables throughout this report may not add up to 100% due to rounding.

The figures below detail the demographics of the respondent base: individual respondents' current job responsibilities, as well as respondent organizations' total number of employees, primary industry, and annual revenue.
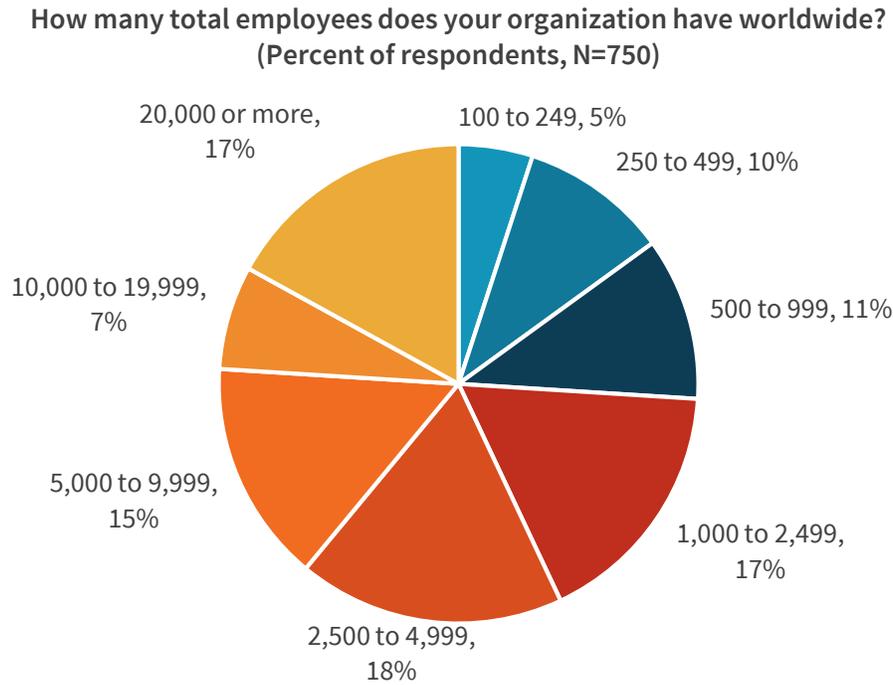
Figure 11. Survey Respondents, by Job Responsibility

Which of the following best describes your current job title/level?
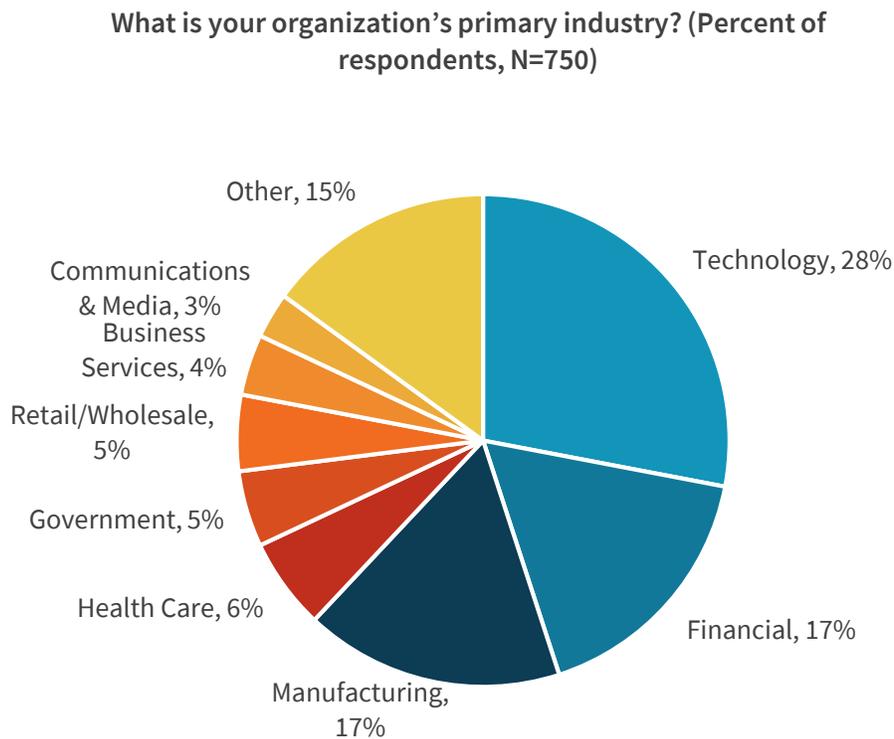(Percent of respondents, N=750)
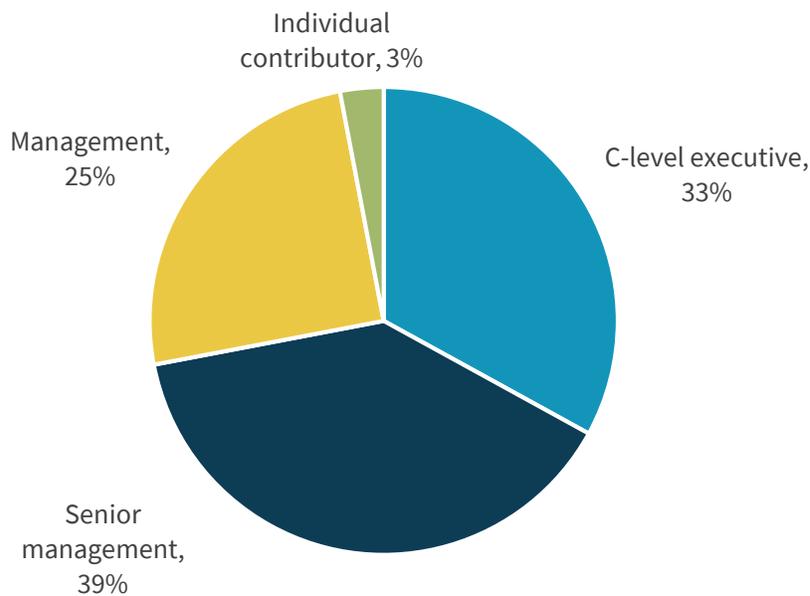
Source: Enterprise Strategy Group

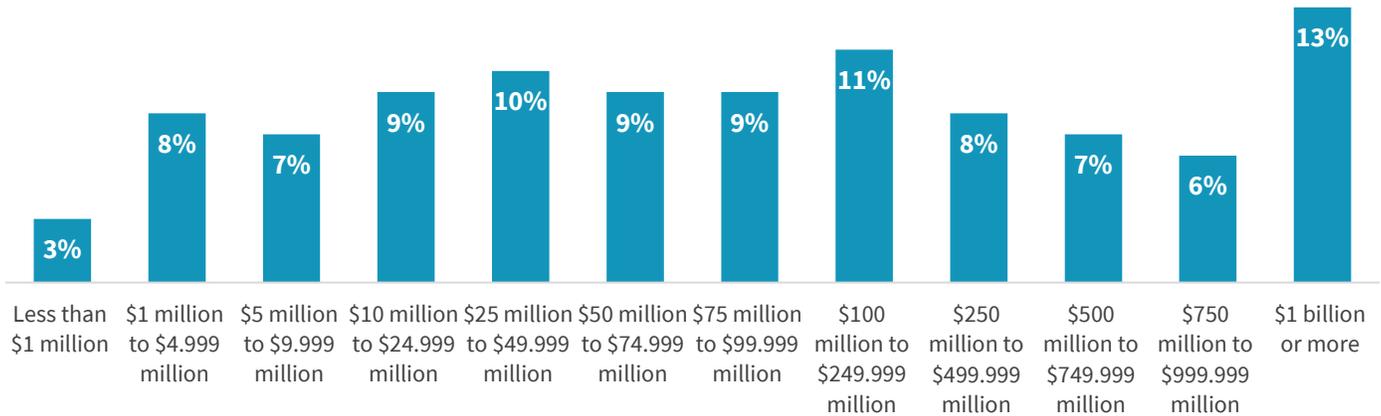**Figure 12. Survey Respondents, by Company Size (Number of Employees)**

How many total employees does your organization have worldwide?
(Percent of respondents, N=750)

- 20,000 or more, 17%
- 100 to 249, 5%
- 250 to 499, 10%
- 500 to 999, 11%
- 10,000 to 19,999, 7%
- 1,000 to 2,499, 17%
- 5,000 to 9,999, 15%
- 2,500 to 4,999, 18%

Source: Enterprise Strategy Group

Figure 13. Survey Respondents, by Industry

What is your organization's primary industry? (Percent of respondents, N=750)

- Other, 15%
- Technology, 28%
- Communications & Media, 3%
- Business Services, 4%
- Retail/Wholesale, 5%
- Government, 5%
- Financial, 17%
- Health Care, 6%
- Manufacturing, 17%

Source: Enterprise Strategy Group

Figure 14. Survey Respondents, by IT Budget

To the best of your knowledge at this time, what is your organization's total projected 2019 budget for all IT products, staffing, and services ($US)? (Percent of respondents, N=750)

Less than $1 million	$1 million to $4.999 million	$5 million to $9.999 million	$10 million to $24.999 million	$25 million to $49.999 million	$50 million to $74.999 million	$75 million to $99.999 million	$100 million to $249.999 million	$250 million to $499.999 million	$500 million to $749.999 million	$750 million to $999.999 million	$1 billion or more
3%	8%	7%	9%	10%	9%	9%	11%	8%	7%	6%	13%

Source: Enterprise Strategy Group

Appendix II – Criteria for Evaluating Organizations' Success Unlocking Data Capital
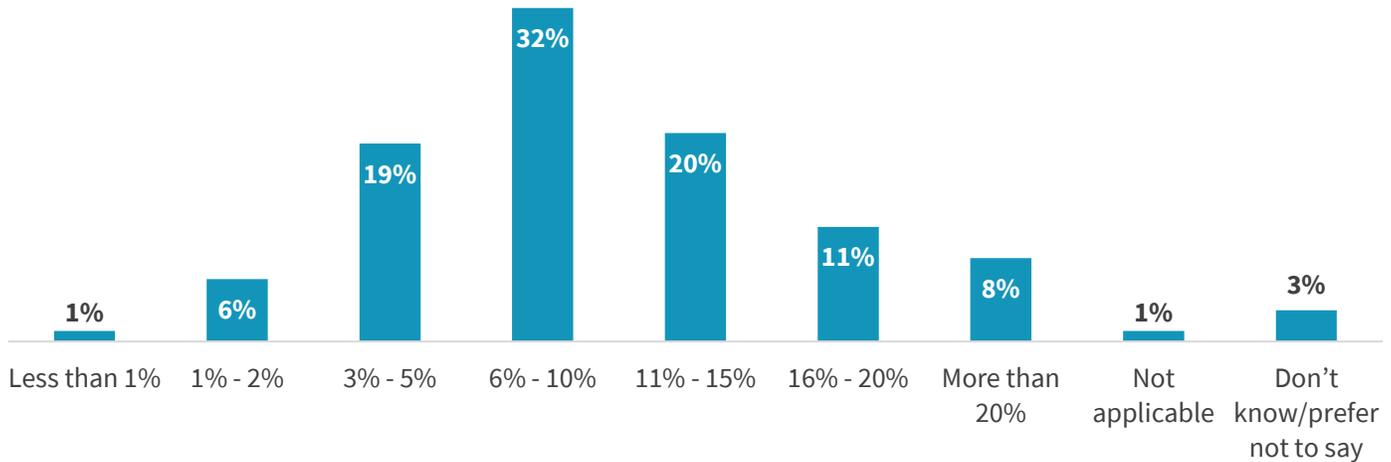
To segment organizations by their success in unlocking data capital with AI, ESG asked each respondent two questions about the revenue impact of AI initiatives to date:

1. How much revenue can be directly attributed to AI initiatives?

2. What proportion of revenue contributed by AI initiatives is incremental to other revenue streams?

Organizations reporting that AI directly drives more than 10% of their revenue *and* that most or all of that revenue is incremental were rated as *Stage 3* organizations or *data capital high achievers*. Those that only satisfied one of these criteria were rated as *Stage 2*, and organizations that satisfied neither of these criteria were rated as *Stage 1*. The figures that follow detail the questions used to segment organizations.

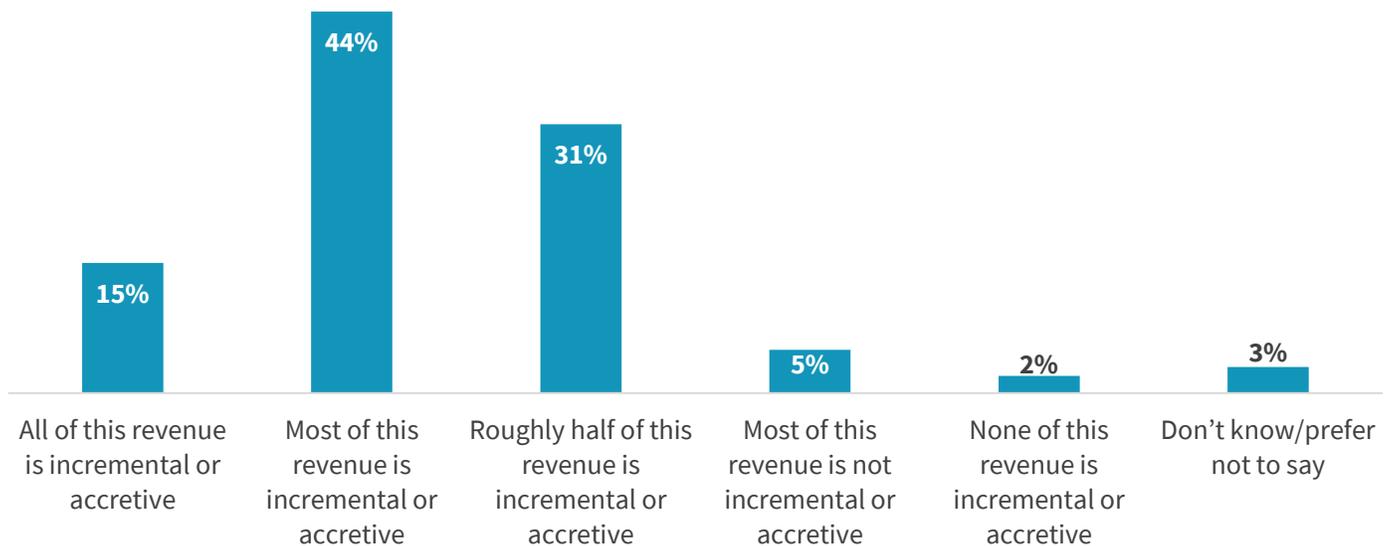**Figure 15. Revenue Attributable to AI Initiatives**

Thinking about your company's current fiscal year (FY), roughly what percentage of your organization's revenue do you believe can be directly tied back to its AI initiatives? (Percent of respondents, N=588)

Less than 1%	1% - 2%	3% - 5%	6% - 10%	11% - 15%	16% - 20%	More than 20%	Not applicable	Don't know/prefer not to say
1%	6%	19%	32%	20%	11%	8%	1%	3%

Figure 16. Proportion of AI Revenue that Is Incremental to Other Revenue Streams

Roughly what percentage of your organization's revenue tied to AI do you believe is incremental or accretive (i.e., would not have been earned by the organization in some other way without its AI investments)? (Percent of respondents, N=588)

All of this revenue is incremental or accretive	Most of this revenue is incremental or accretive	Roughly half of this revenue is incremental or accretive	Most of this revenue is not incremental or accretive	None of this revenue is incremental or accretive	Don't know/prefer not to say
15%	44%	31%	5%	2%	3%

Enterprise Strategy Group is an IT analyst, research, validation, and strategy firm that provides actionable insight and intelligence to the global IT community.

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