ESG Research Insights Paper

Analyzing Outcomes Delivered by Modern Multicloud Storage Environments Optimized for Next-generation Workloads

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Executive Summary

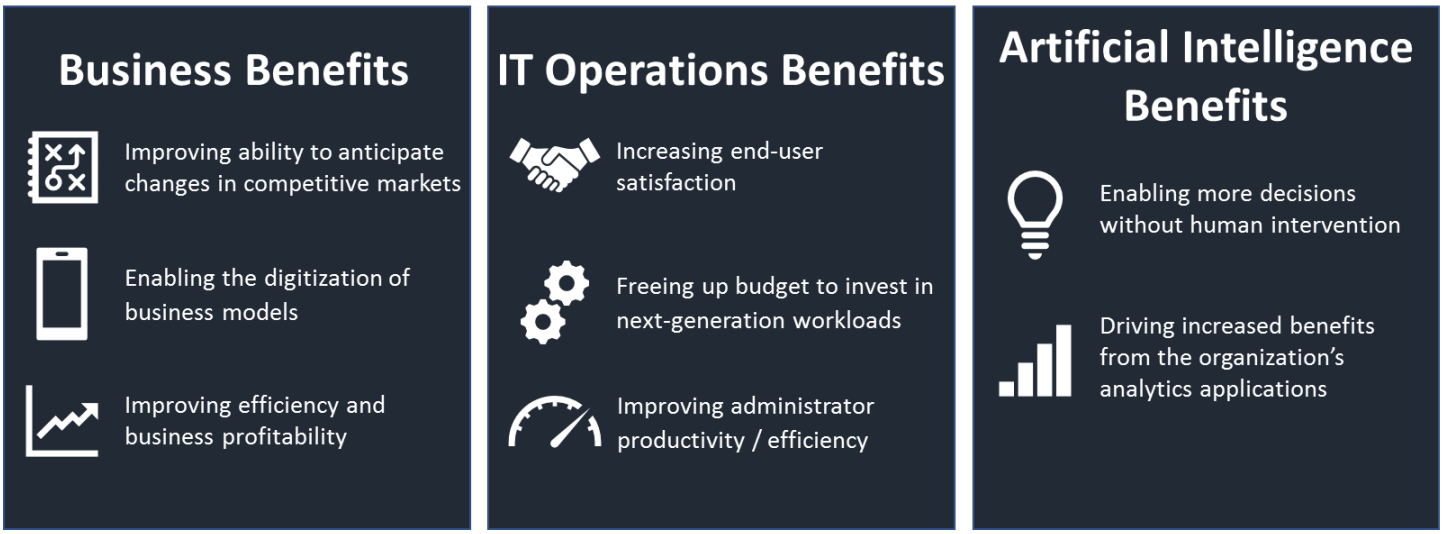
Many of the problems organizations face today are related to data. Most organizations have too much data, which is growing too quickly, and which is siloed and difficult to consolidate. These challenges create an "insight gap," where organizations are not able to adequately analyze their data and thus capitalize on its value. Traditional methods of data analysis are not sufficient for many petabyte-scale organizations. However, the promise of self-optimizing analytics powered by artificial intelligence and machine learning offers a path forward, but many organizations don't know where to get started.

While unlocking intelligence is one common data problem, another is enabling innovation. An organization's data is the perfect testbed for application developers and database administrators. By working with actual data in a development environment, they can better debug errors, predict production performance, and identify optimizations earlier in the development lifecycle. However, many organizations can only provide developers with dummy data sets which vary significantly from a company's production data. This creates issues and uncertainty in the development lifecycle and slows down innovation.

The topic of data residency brings up still more issues. Organizations today have numerous options available to them when it comes to storing their data. There are a host of on- and off-premises solutions and services, all with different and shifting cost-benefit profiles. However, many organizations are unable to migrate data in an agile manner to ensure it is located for optimal performance at the lowest possible costs, and, that if requirements change, the organization is not prohibitively locked in to the platform choice.

Many organizations face a combination of many or all of these data problems. Whatever the range and extent of such problems, they will invariably combine to diminish the value of an organization's data. There is an imperative to implement data solutions to these data problems. To help, IBM has developed a vision for organizations: to implement **hybrid multicloud-enabled** storage infrastructure that modernizes traditional workloads and is optimized to run **next-generation workloads**, enabling them to operate as dynamic 'data-driven' enterprises**.** The collection of characteristics that determine whether an organization has achieved this vision are collectively referred to as Storage Maturity in this report. Research conducted by ESG strongly validates the premise that organizations that have taken the steps prescribed by this view of Storage Maturity are better positioned to harness the power of their data and to enjoy a competitive advantage over their peers.

Benefits organizations can achieve by advancing their Storage Maturity are multifaceted, including:



Defining a Vision for Storage Maturity

Storage Maturity can have different meanings to different organizations, but to apply a consistent, data-driven model, ESG had to formulate concrete characteristics against which organizations could be assessed. Ultimately, ESG developed a three-pillar model for assessing Storage Maturity that we believe objectively considers organizational characteristics that are both unbiased and broadly applicable to organizations today:

- Data-ready infrastructure—This pillar relates to the ability of the organization's infrastructure to store, manage, and perform at a level required by a modern, data-centric organization. Within this pillar, ESG assessed an organization's propensity to utilize high-performing flash storage to power on-premises workloads and deploy software-defined solutions that pool storage resources and abstract management capabilities into a single view. Organizations with both characteristics have data infrastructures that combine ease of management at scale with high performance, a suitable foundation for Storage Maturity.

- Strategic reuse of secondary data—This pillar relates to the ability of the organization's storage to support analytics and application development initiatives. Within this pillar, ESG assessed whether the organization can supply near-production copies of company data for analysts and application developers to work with. Organizations supporting these constituencies enable innovation by using storage infrastructure for more than just data retention, an appropriate aspiration of a mature storage environment.

- Workload and data portability—This pillar relates to the ability of the organization to migrate data and workloads to a variety of platforms based on the requirements and the organization's goals. Within this pillar, ESG assessed whether the organization has containerized legacy applications and/or developed cloud-native applications from the ground up. Going one step further, ESG measured the frequency with which organizations are migrating workloads to different on- and off-premises environments to capitalize on temporary advantages or satisfy a changing requirement. Organizations with a high degree of data and workload portability are likely to be operating a highly flexible, cost-optimized, multicloud environment.

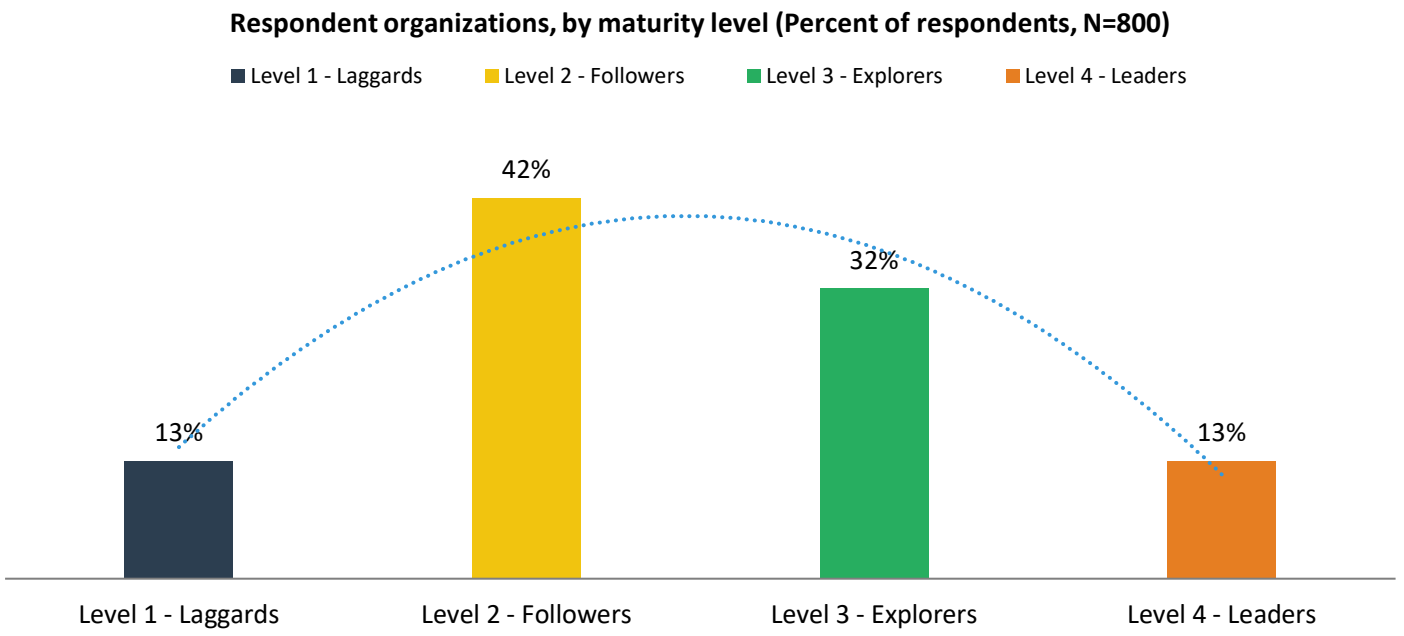
The Current State of Storage Maturity

ESG's three-pillar model segmented survey respondents into four different levels of Storage Maturity based on their responses to survey questions related to their infrastructure's data readiness, enablement of data-intensive workloads, and data portability.

Respondents earned between 0 and 100 maturity points based on their responses to these questions. ESG rated respondents scoring in the bottom quartile (0-25 points) as Level 1 or *Laggards*, respondents scoring in the second quartile (25.5-50 points) as Level 2 or *Followers*, respondents scoring in the third quartile (50.5-75 points) as Level 3 or *Explorers*, and respondents scoring in the top quartile (75.5-100 points) as Level 4 or *Leaders*. See *Appendix II: Criteria for Evaluating Respondent Organizations' Storage Maturity* to review the full list of dimensions of Storage Maturity on which ESG evaluated respondents.

ESG's analysis found that very few IT organizations have achieved enough progress across enough criteria to be classified as Leaders, as defined by this maturity model. Just 13% of respondents surveyed provided answers about their organizations that resulted in a score in the top quartile. The vast majority of respondents' organizations fell into either the Follower (42%) or Explorer (32%) categorizations, showing progress in some Storage Maturity characteristics, but with additional advancement needed. Mirroring Leaders, ESG rated just 13% of respondent organizations Laggards in terms of Storage Maturity, falling short on many—if not all— of the criteria included in ESG's model (see Figure 1).

Figure 1. Storage Maturity Distribution



Source: Enterprise Strategy Group

The Importance of Storage Maturity

Why does Storage Maturity matter? Simply put, ESG found that organizations earning a *Leader* designation reported the best results across many key performance indicators (KPIs) and characteristics, including: business success, IT operations effectiveness, achievement of multicloud agility, and advancement of artificial intelligence initiatives.

Moreover, the upward trend observed across maturity levels was extremely consistent across the broad spectrum of KPIs included in the research. While the differences noted in KPIs are the greatest when comparing *Laggard* and *Leader* organizations, ESG observed that KPIs incrementally improved across each level in the spectrum.

Improved Business Outcomes

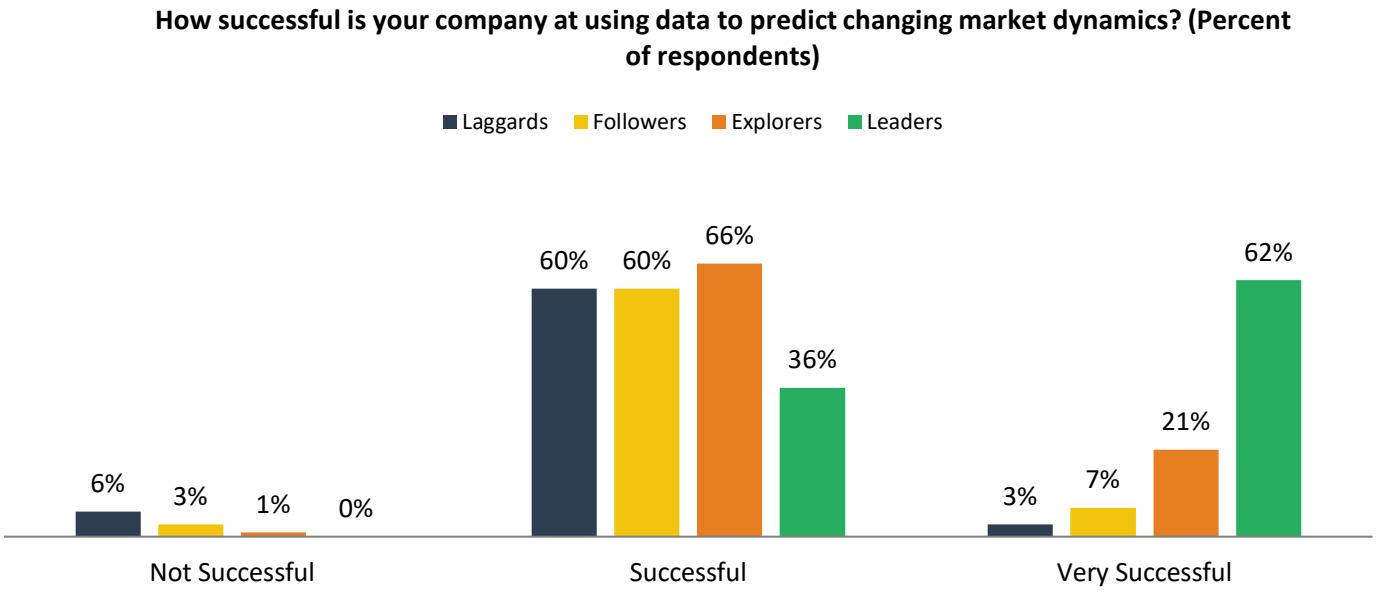
Ultimately, IT exists to support the business. If there are activities that IT can undertake to improve business outcomes, then those activities are worthwhile. In ESG's research, organizations in alignment with the principles laid out in the Storage Maturity model— those designated as *Leaders*—consistently reported the highest degree of business performance across all metrics included in the research. In short, there is a strong correlation between organizations that have achieved storage *Leader* status and the most successful organizations in the market.

Increased Maturity Leads to More Actionable Business Strategy

Organizations are awash in data: sales activity, customer support records, employee engagement metrics, market research, among others. Each of these data sources contains practical information about the state of a company: sales activity can show which sales region or product is performing best, customer support data can provide a glimpse into customer satisfaction, and employee engagement metrics can show which teams and managers are operating most effectively. However, one of the most strategic use cases for a business's data is to accurately predict changing market dynamics like which new markets will develop, what new product launches will be successful, or which new features will be broadly adopted by users. When ESG asked respondents how successful they felt their companies were at using data to

predict changing market dynamics, respondents at *Leaders* were 20 times more likely to report their company was "very successful" than those at *Laggards* (62% versus 3%, see Figure 2).

Figure 2. Storage Maturity Makes Analytics Actionable



Source: Enterprise Strategy Group

Increased Maturity Means More Digital Enablement

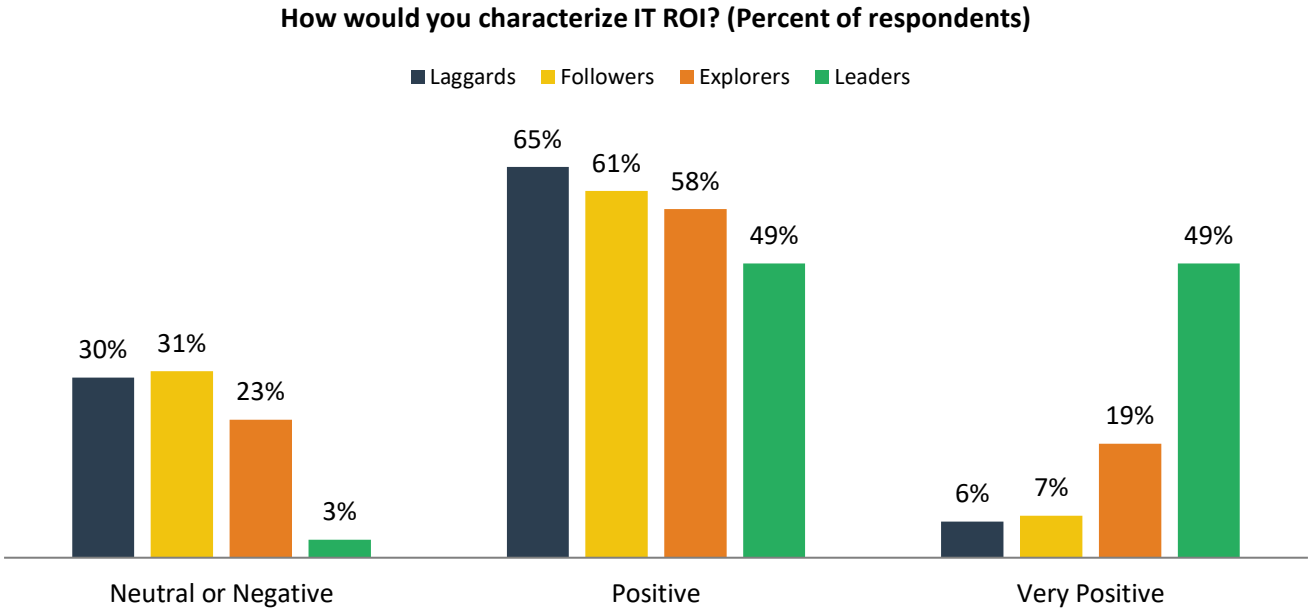
For many organizations, there is no bigger business imperative than increasing digitization. Digital initiatives can vary widely. For one organization, a digital initiative may mean transitioning from a predominantly brick and mortar customer experience to a greater reliance on ecommerce. For another, it may mean enhancing digital marketing and lead nurture capabilities. Still others may be focused on entirely new digital services and subscriptions supporting net-new business models. Regardless of how ambitious these initiatives are, it often falls to IT to support and enable them.

ESG's research shows a distinct correlation between Storage Maturity and organizational digitization. Respondents from *Leaders we*re over four times as likely as *Laggards* to report that more than 10% of their organization's revenue was driven from newly developed digital channels that did not exist two years prior (81% versus 17%). Moreover, *Leaders* anticipate digital revenue to grow at over three times the rate as *Laggards* year-over-year over the next three to five years (41% versus 13%).

Increased Maturity Means IT-fueled Profitability

IT organizations and executives are often frustrated by the perception that IT is a cost center for their organizations. IT is a critical component of business operations, with revenue-generating employees relying on IT systems and services to be productive. For many organizations, IT often functions as the innovation engine of the organization, supporting new services and finding new ways to deliver offerings to employees and other end-users. In ESG's research, Storage Maturity was positively correlated with the IT organization's ability to make a more dramatic impact on the business. In fact, IT organizations at *Leaders* were eight times more likely than *Laggards* to operate with a very positive return on investment (49% versus 6%, see Figure 3).

Figure 3. Storage Maturity Improves IT ROI



Source: Enterprise Strategy Group

Given the fact that business benefits delivered by IT at *Leaders* are much more likely to significantly outweigh costs, it is not surprising to observe that *Leaders* were three times more likely to expect their organization to beat their annual profitability goals in 2018 than *Laggards* (62% versus 19%). ESG believes the positive business impact by IT organizations at *Leaders* is a major contributing factor to their overall bottom-line success.

Enhanced IT Effectiveness

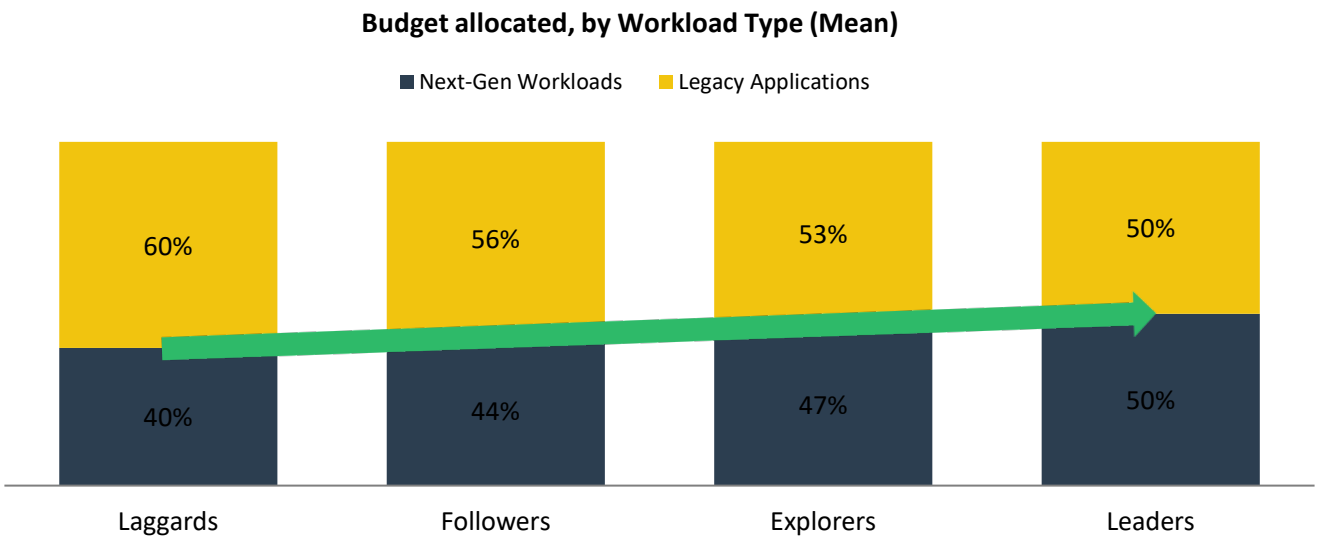
While the correlations that exist between Storage Maturity and positive business outcomes are consistent and numerous, ESG also observed many ways in which Storage Maturity and IT capabilities trend in the same direction. In many ways, these correlations are even more noteworthy as it is more likely that they are the result of a causal relationship—that the maturity of the organization's infrastructure, workload capabilities, and workload portability directly cause positive IT performance.

Increased Maturity Helps Organizations Lead on Innovation

Complex, legacy IT environments are difficult and costly to maintain. More importantly, the amount of time, effort, and budget they require can preclude IT from other more strategic projects like cloud migrations, data center consolidations, and application modernization efforts. However, scalable, software-defined, highly virtualized infrastructure—all managed through a single pane of glass—can free up both staff and budget resources to advance these other initiatives. By freeing up staff and dollars from infrastructure management, organizations can sharpen their focus on innovation.

Leaders represent this mature type of environment well, with a high rate of adoption of simple, scalable flash storage and a large portion of their storage infrastructures that have been virtualized—allowing a complex heterogeneous storage footprint to be managed as a single pool of resources from a single console. Thus, it is not surprising to note that *Leaders* are able to allocate an incremental 10% of their annual IT budget on next-generation workloads compared to *Laggards,* which spend 60% of their budget maintaining legacy applications (see Figure 4).

Figure 4. Spending Patterns, by Storage Maturity



Source: Enterprise Strategy Group

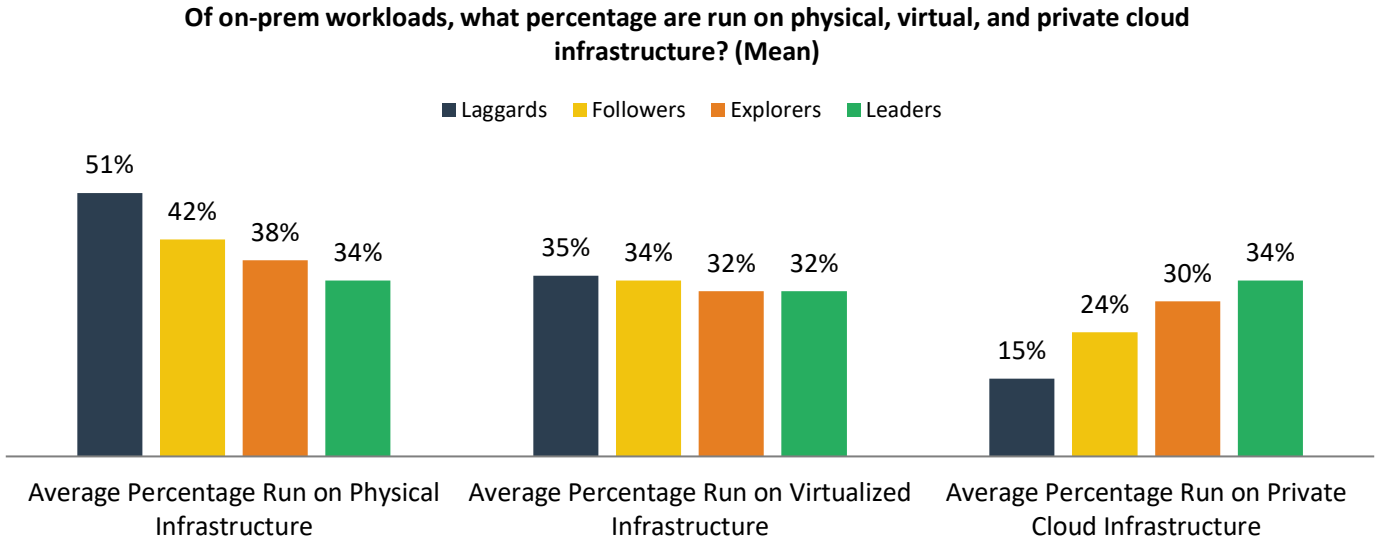
Moreover, *Leaders* as a group agree they are getting value from their ability to allocate more of their budget to innovation. ESG asked all respondents to describe how much progress they've made leveraging IT resources to speed product innovation and time to market. Respondents at *Leader* organizations were more than four and a half times as likely as those at *Laggard* organizations to describe progress as "excellent" (42% versus 9%).

Innovation Is the Precursor to Private-cloud-driven Efficiency

As noted, *Leaders* can allocate significantly more of their budgets to supporting next-generation workloads. Part of that means they can spend more on application development and modernization. But it also means they can spend more on the infrastructure that sits underneath those modernized applications. Given this increased level of investment on next-generation infrastructure, it would be logical to assume *Leaders* have made greater advancements in private cloud adoption. That is, it would be logical to assume that more of their on-premises infrastructure is highly virtualized, scalable, and elastic and that end-users are able to provision resources in a self-service manner with usage-based tracking. ESG was able to test this assumption in the research. ESG asked each respondent what percentage of on-premises workloads they run on physical servers, on virtual servers managed in a traditional manner, or on true private cloud infrastructure that mirrors public cloud service offerings. Respondents at *Leaders* reported running more than twice as many of their on-premises workloads on scalable, elastic, and dynamic private cloud infrastructure than respondents at *Laggard* organizations (see Figure 5).

ESG believes the fundamentally different, more agile infrastructure environments present at *Leader* organizations in turn play a significant role in those organizations' ability to launch workloads to their production environments ahead of schedule. ESG asked respondents what percentage of all production workload launches in the past two years had been completed ahead of, on, or behind schedule. *Leaders*, thanks in no small part to their private cloud investments, reported that 34% of workload launches had been completed ahead of schedule, on average. By contrast, *Laggards* reported that just 13% of launches had been completed ahead of schedule, on average.

Figure 5. Storage Maturity Correlated to Organizations Operating Larger Private Clouds



Source: Enterprise Strategy Group

IT's Innovation and Efficiency Drives Line of Business Satisfaction

Ultimately, IT's charter is to support business, to give employees the tools and technology to do their jobs effectively. In many ways, the satisfaction of line of business employees is the true test of how effective IT is. This is a test *Leaders* pass with flying colors. When ESG asked respondents how satisfied line of business end-users at their organizations are with the applications and IT services they are provided with to perform day-to-day business tasks, 60% of respondents at *Leaders* said, "extremely satisfied." That represents a fifteen-times multiple over the frequency observed among *Laggard* organizations (just 4%).

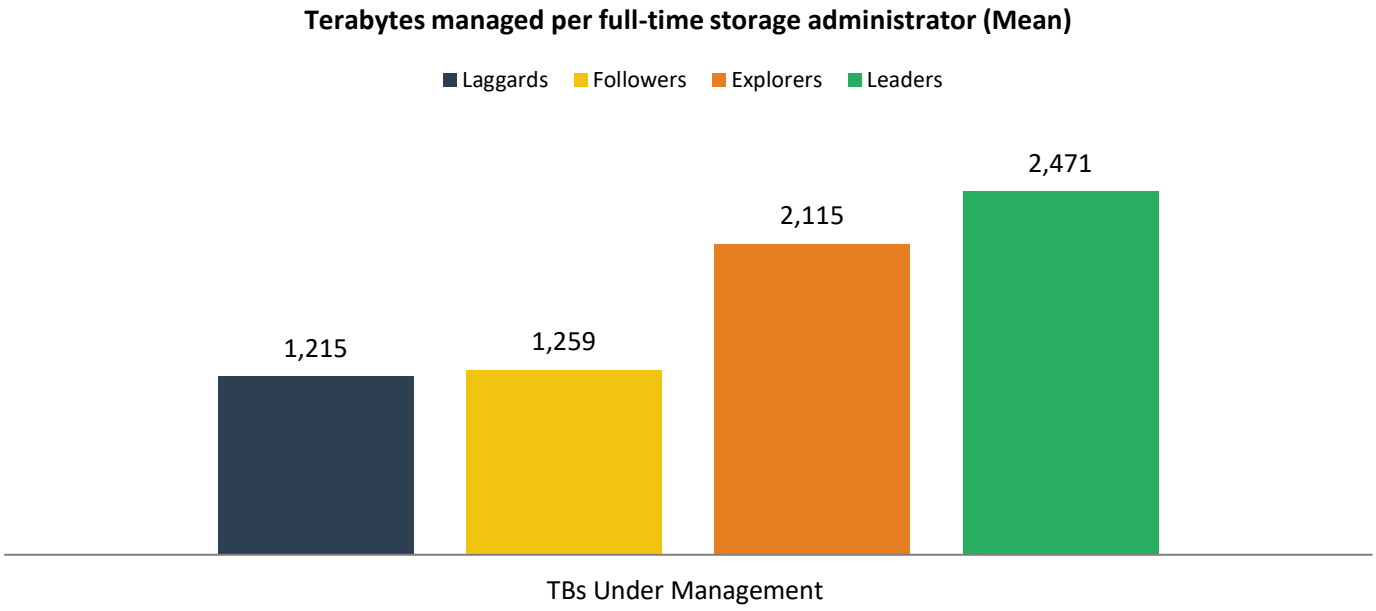
Zeroing in on Storage KPIs

ESG's research into Storage Maturity would be severely lacking if it did not include an assessment of how Storage Maturity is correlated to storage-specific KPIs and attitudes. ESG assessed a broad set of these metrics in its research and observed universally positive correlations between KPI performance and Storage Maturity.

Tactically, Maturity Leads to Productivity and Execution

ESG's survey included a question on the organization's total storage capacity. It also asked respondents to report how many full-time equivalents were employed by their organization to administer storage. By looking at the average ratio of these two data points in each level of Storage Maturity, ESG was able to derive a metric for administrator productivity across *Laggards, Followers, Explorers,* and *Leaders*: average number of TBs per storage administrator. Not surprisingly, *Leaders* reported the highest level of productivity, reporting more than twice as many TBs under management per administrator than their *Laggard* counterparts (see Figure 6).

Figure 6. Storage Maturity Drives Administrator Productivity



Source: Enterprise Strategy Group

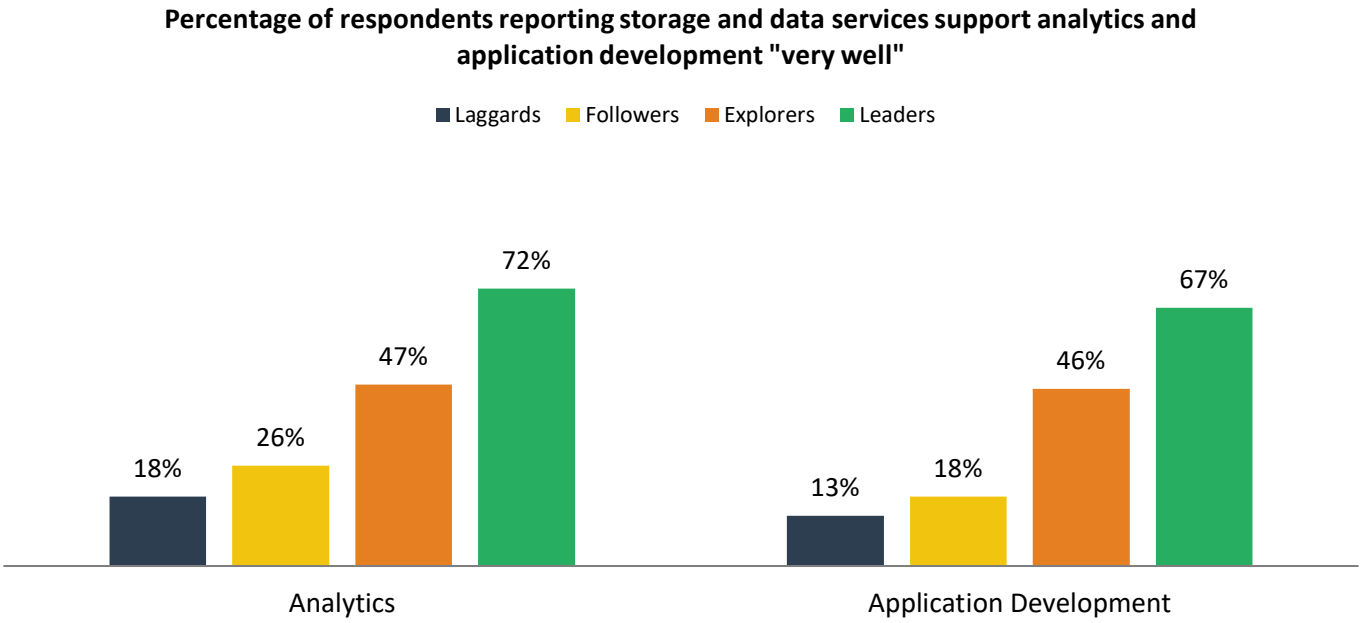
Administrator productivity and efficiency is likely a contributing factor to higher organizational confidence in the storage functional group. ESG asked all respondents how confident they were in their organizations' ability to execute major storage-related projects like new application deployments, new/extended array deployments, technology refreshes, data migrations, etc. Respondents at *Leaders* were three and a half times more likely than their counterparts at *Laggards* to report they were fully confident in the IT organization's ability (76% versus 22%).

Storage Maturity Helps Optimize Strategic Initiatives – Analytics, Application Development

For many organizations, storage is no longer just about data retention and protection. Storage is seen as a resource with the potential, if not mandate, to support other strategic initiatives. Respondents at *Leaders* are much more likely than other levels of Storage Maturity to feel their storage resources do a good job supporting these endeavors. Nearly three-quarters of respondents at *Leaders* (72%) reported that storage and data services support analytics projects "very well," far outstripping the rate reported by *Laggards* (18%). Similarly, 67% of respondents at *Leaders* reported that storage and data services support application development initiatives like DevOps "very well," compared to 13% of *Laggards.* For IT

organizations and storage stakeholders looking to maximize their relevance to business strategy and strategic imperatives, optimizing Storage Maturity will help highlight the value of storage resources.

Figure 7. Storage Maturity Enables Analytics, Application Development



Source: Enterprise Strategy Group

Storage Maturity Advances AI-aided Analytics

Leaders are seven times more likely than *non-leaders* to report their organization uses automated systems and/or artificial intelligence software to make many analytics-based decisions that affect business processes without human involvement (42% versus 6%). Consequently they are also much more likely to report analytics has helped improve offering quality (63% versus 39%), improved efficiency (63% versus 47%), improved customer satisfaction (58% versus 38%), and reduced organizational risk (48% versus 30%).

The Bigger Truth

Based on ESG's research, Storage Maturity *Leaders* are the exception, not the rule—87% of the market has significant work to do to attain a *Leader* designation. However, this research shows that incremental benefits can be achieved by making steps to move up the maturity curve: *Followers* outperform *Laggards* and *Explorers* outstrip *Followers*.

If you are interested in improving your organization's standing against the benchmarks laid out by ESG, it is important to understand the criteria we used to assess Storage Maturity, as well as the actions you can take to improve your rating.

1. ***Leaders* actively refactor legacy applications and develop cloud-native applications from the ground up.** Ninety-five percent of *Leaders* in this research have containerized one or more legacy applications compared to just 2% of *Laggards.* Similarly, 97% of *Leaders* have developed one or more cloud-native applications from the ground up versus 5% of *Laggards.* By adapting and developing applications that can take advantage of multicloud deployment models, organizations reduce the friction of shifting those workloads from one cloud environment to another. In fact, **the majority of *Leaders* report they very frequently migrate workloads from cloud to cloud** to take advantage of a temporary advantage (e.g., lower cost) or to satisfy a temporary requirement (e.g., a traffic spike). Not a single respondent from *Laggard* organizations reported this level of workload agility.
2. **Storage *Leaders* have placed strategic bets on next-generation infrastructure like all-flash arrays and storage virtualization.** Ninety-eight percent of all *Leaders* support on-premises applications with flash storage compared to 26% of *Laggards*. Furthermore, 99% of all *Leaders* (versus 23% of *Laggards*) have deployed storage virtualization technology that allows storage management to be abstracted from the infrastructure and the underlying storage to be managed as a single pool of resources.
3. **Storage *Leaders* have mature DevOps and analytics initiatives** underway, and these initiatives are **supported by progressive uses of secondary storage**. Eighty-four percent of *Leaders* have analytics initiatives underway that use data to develop and refine business processes over time compared to just 4% of *Laggards*. Nearly half (49%) of *Leaders* describe their DevOps adoption as extensive versus 0% of *Laggards.* Moreover, more than four out of five *Leaders* report they can use near-production copies of their data to run analytics on and to use in application development/testing compared to less than one-third of *Laggards*.

Leaders run data-intensive workloads on data-ready infrastructure, and they have a high degree of flexibility enabled by the application portability unlocked by containerization. As a result, they can run IT more effectively, positively impact business outcomes, and even capitalize on early gains delivered by AI-driven analytics. Organizations should take notice of the behaviors and technology solutions allowing *Leaders* to capture these benefits and take the steps necessary to follow their lead.

Appendix I: Research Methodology

To gather data for this report, ESG conducted a comprehensive online survey of IT managers and practitioners from private- and public-sector organizations in North America (United States and Canada) and Western Europe (United Kingdom, France, and Germany) between May 31, 2018 and June 20, 2018. To qualify for this survey, respondents were required to be familiar with their organizations' current and future IT budget and spending plans and responsible for their organizations' data storage and data management purchases. All respondents were provided an incentive to complete the survey in the form of cash awards and/or cash equivalents.

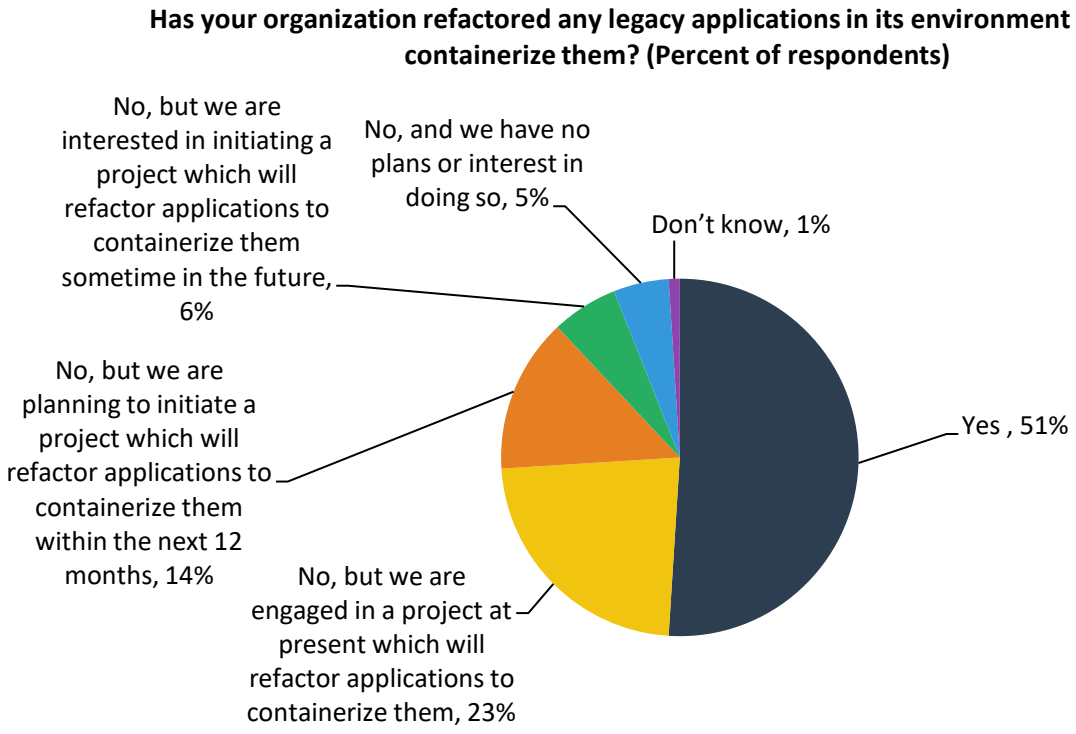
After filtering out unqualified respondents, removing duplicate responses, and screening the remaining completed responses (on several criteria) for data integrity, a final sample of 800 respondents remained.

Note: Totals in figures and tables throughout this report may not add up to 100% due to rounding.

Appendix II: Criteria for Evaluating Respondent Organizations' Storage Maturity

ESG's maturity model determined organizations' Storage Maturity based on respondents' answers to a subset of questions included within the over 60 questions in the survey. The figures that follow detail these key inputs to the model.

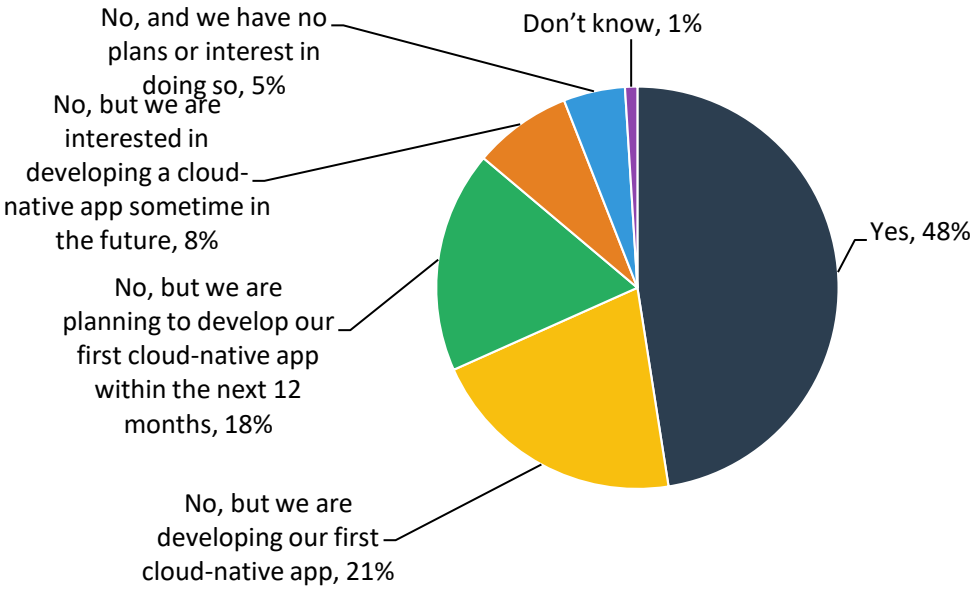
Figure 8. Organizational Propensity to Containerize Legacy Applications



Source: Enterprise Strategy Group

Figure 9. Organizational Propensity to Have Developed Cloud-native Applications

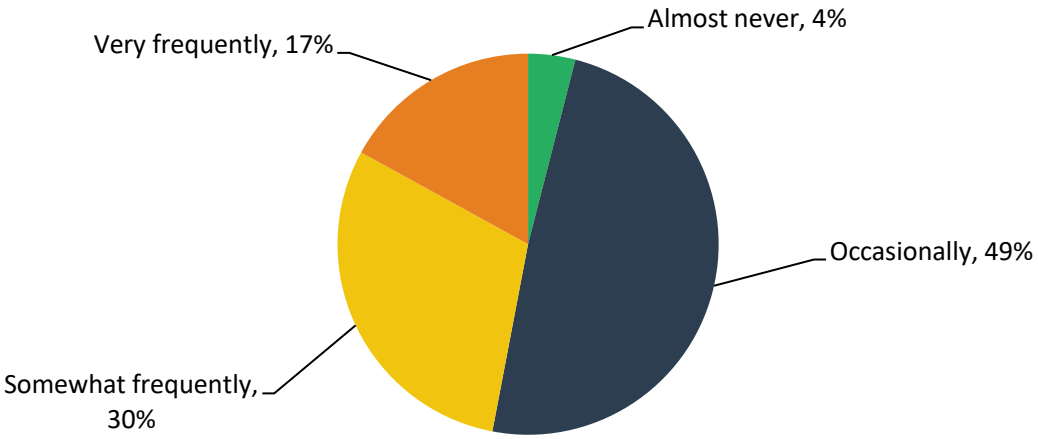
Has your organization developed any applications it would consider "cloud native"? (Percent of respondents, N=800)



Source: Enterprise Strategy Group

Figure 10. Frequency of Workload Migration

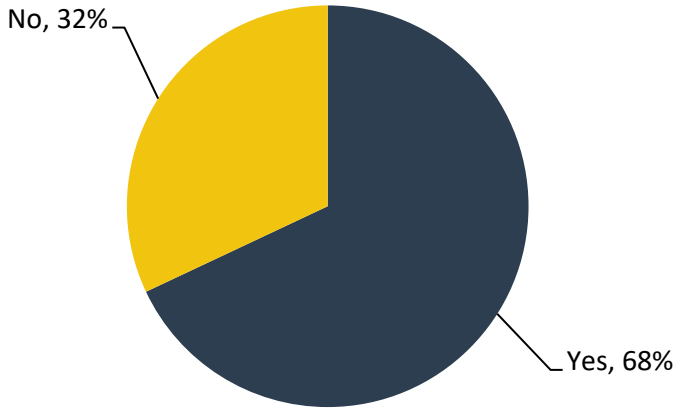
How often does your organization change where a workload is run to take advantage of a temporary advantage (e.g., cost reduction) or satisfy a temporary requirement (e.g., traffic spike, need for reduced latency)? (Percent of respondents)



Source: Enterprise Strategy Group

Figure 11. Flash Storage Utilization

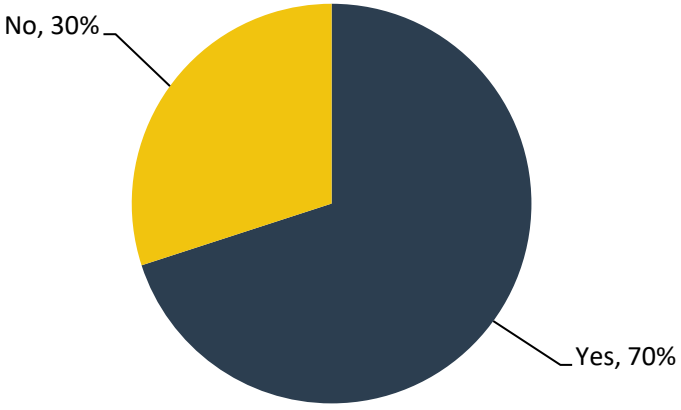
Does your company currently use flash storage to support any of its on-premises applications? (Percent of respondents)



Source: Enterprise Strategy Group

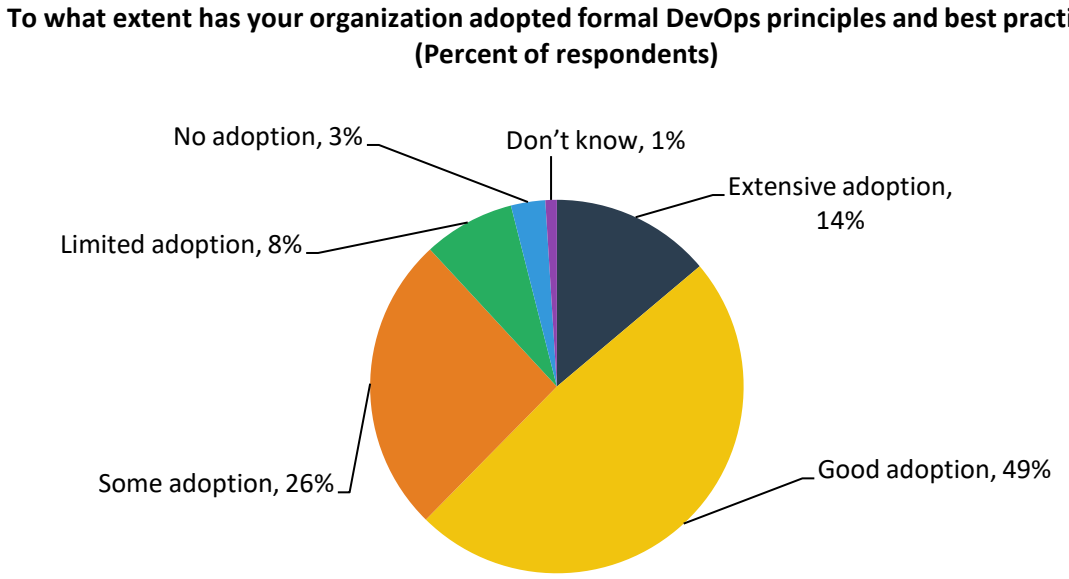
Figure 12. Storage Virtualization Utilization

Has your company deployed storage virtualization/software-defined storage technology that allows storage management to be abstracted from the infrastructure and storage to be pooled and managed in a consolidated fashion? (Percent of respondents)



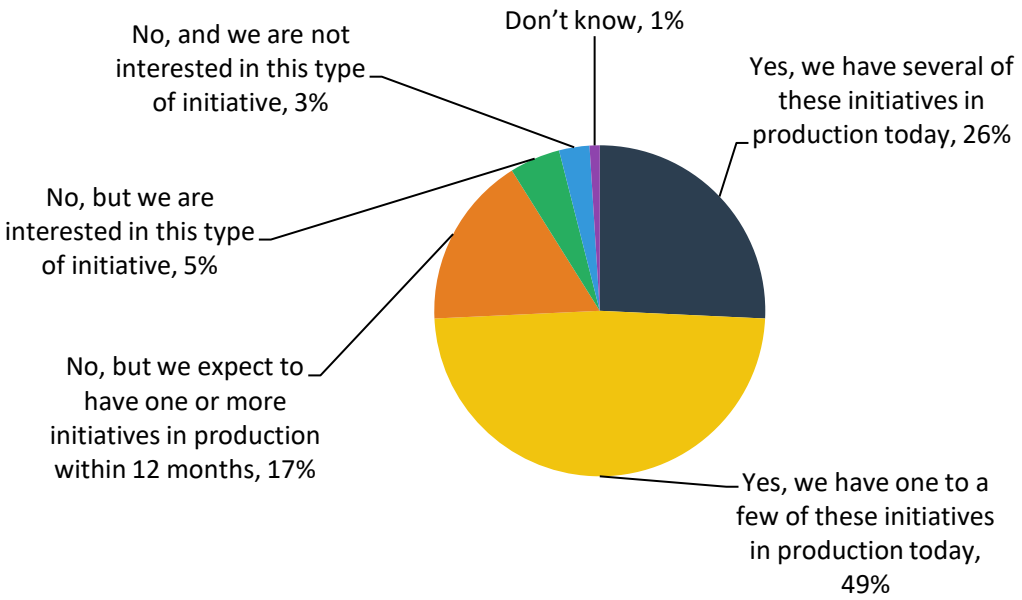
Source: Enterprise Strategy Group

Figure 13. DevOps Adoption



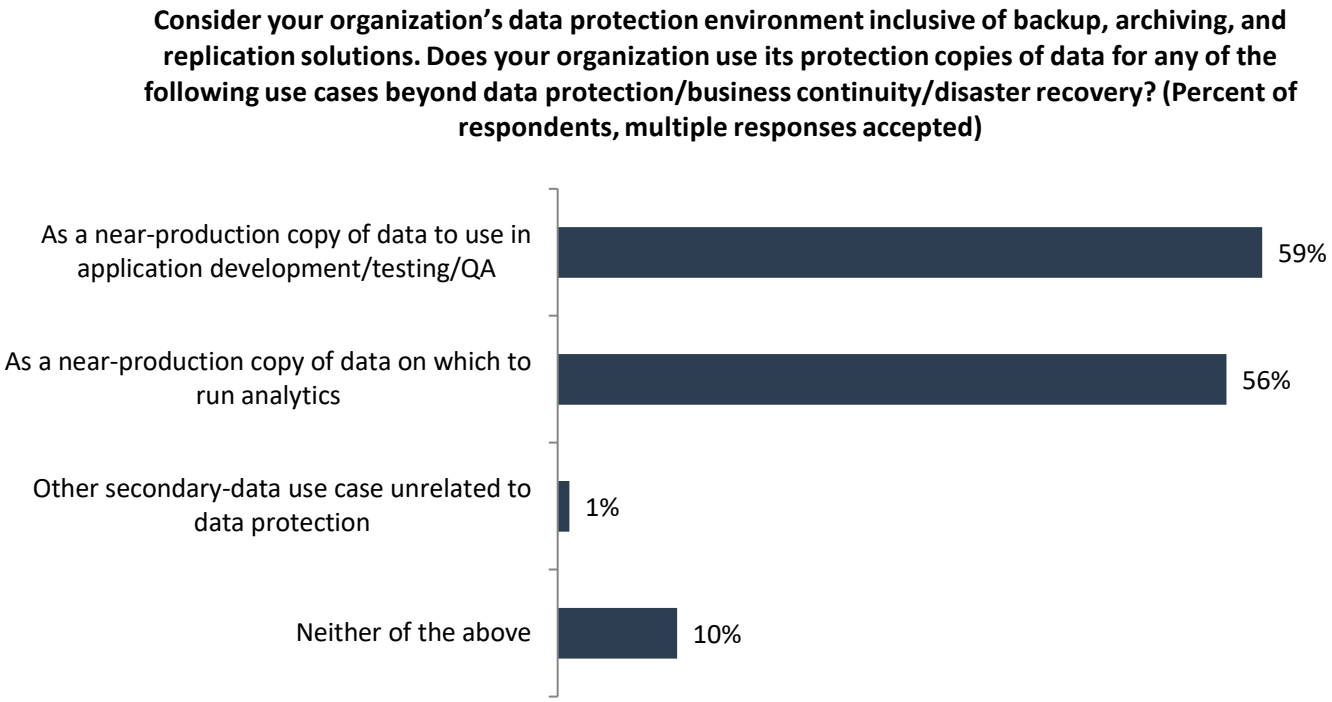
Source: Enterprise Strategy Group

Figure 14. Presence of Analytics-fed Business Processes



Source: Enterprise Strategy Group

Figure 15. Organizational Propensity to Use Secondary Storage for Application Development, Analytics

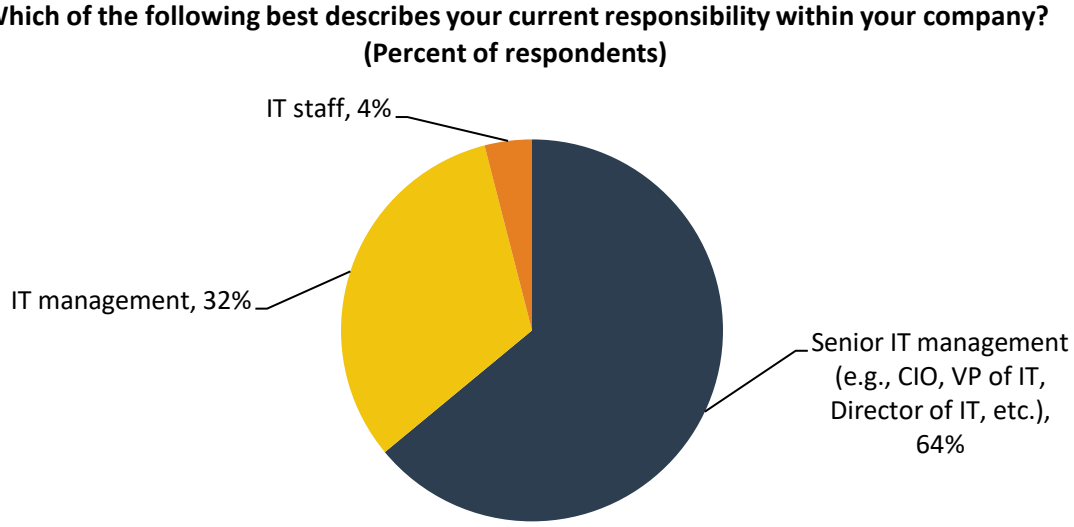


Source: Enterprise Strategy Group

Appendix III: Respondent Demographics

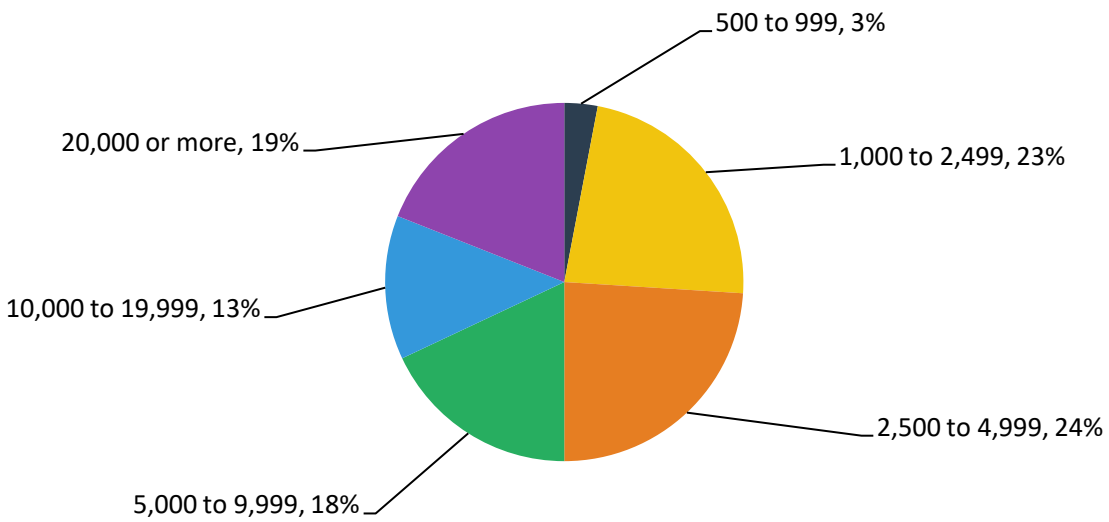
The data presented in this report is based on a survey of 800 qualified respondents. The figures that follow detail the demographics of the respondent base, including individual respondents' current job responsibilities, as well as respondent organizations' total number of employees, primary industry, and annual revenue.

Figure 16. Survey Respondents, by Job Responsibility



Source: Enterprise Strategy Group

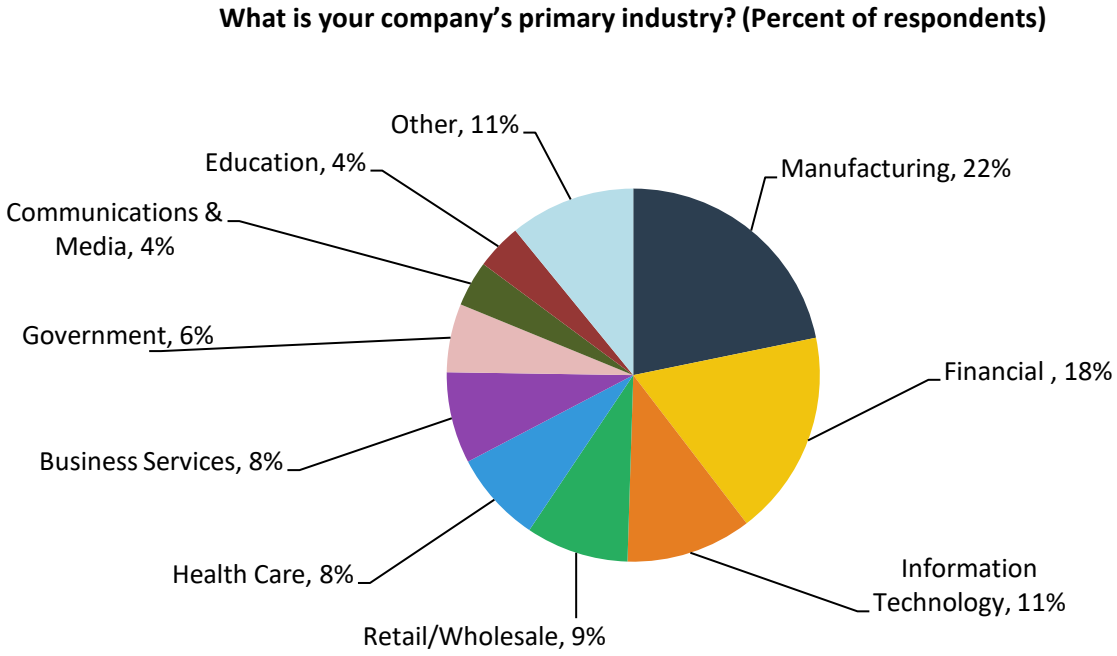
Figure 17. Survey Respondents, by Number of Employees



Source: Enterprise Strategy Group

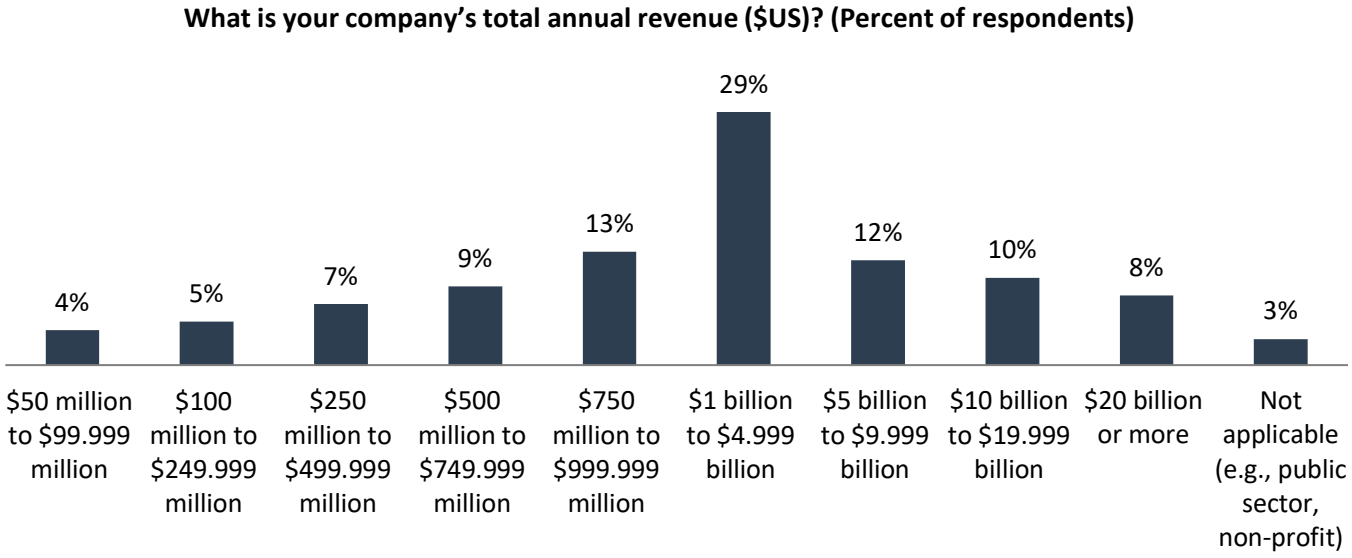
Respondents were asked to identify their organization's primary industry. In total, ESG received completed, qualified responses from individuals in 21 distinct vertical industries, plus an "Other" category. Respondents were then grouped into the broader categories shown in Figure 18.

Figure 18. Survey Respondents, by Industry



Source: Enterprise Strategy Group

Figure 19. Survey Respondents, by Annual Revenue



Source: Enterprise Strategy Group