Research Insights Report

VDI Study: Embracing Hyperconverged Infrastructure to Support the Demands of Virtual Desktop Environments

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Digitally Transforming with Virtual Desktop Infrastructures and Hyperconverged Infrastructure

Organizations continue to embrace digital transformation and it starts in the data center. They recognize the value in evolving and innovating a modern and dynamic infrastructure to deliver the right set of services to end-users who have high expectations and little patience when those expectations are not met. As such, organizations are turning to technologies that can satisfy not only end-users, but also IT demands. Organizations are prioritizing technology that enables operational efficiency, improved agility, and reduced risk. Two such technologies that organizations deploy to satisfy these requirements are virtual desktop environments and hyperconverged infrastructure (HCI).

ESG recently performed research to better understand the progress organizations are making with their virtual desktop infrastructure (VDI) initiatives and the relationship and advantages HCI can offer VDI deployments. The research consisted of a survey of 250 IT decision makers responsible for their organization's data center infrastructure and/or endpoint devices. Respondents were based in North America (US and Canada) and employed at organizations with 1,000 or more employees and $100M+ in annual revenue. Organizations represented in the sample included a broad cross-section of industries, such as manufacturing, financial services, health care, and retail/wholesale, among others.

Virtual Desktop Infrastructure

Virtual desktop infrastructure serves as an alternative PC delivery model in which applications, operating systems, user data, profiles, and/or entire end-user environments are run on infrastructure in an organization's data center and projected or delivered to a user's endpoint device. By consolidating the infrastructure and streamlining management of thousands of end-user desktops, organizations can reduce costs while improving operational efficiency and resource utilization. VDI enables organizations to embrace an on-the-go workforce that seeks more mobility and freedom in how applications and data are accessed while ensuring reduced levels of risk. According to ESG's research, 77% of organizations currently utilize VDI technology in their IT environments, with an additional 15% planning to use it within the next 12-24 months.

77% of organizations currently utilize VDI technology in their IT environments.

68% of organizations utilize HCI within their data centers.
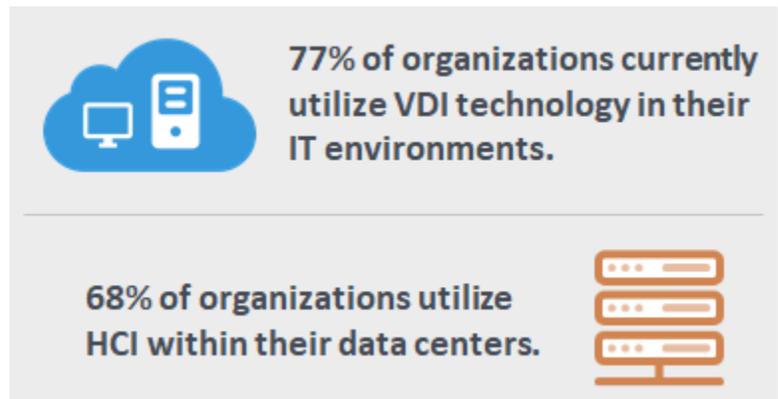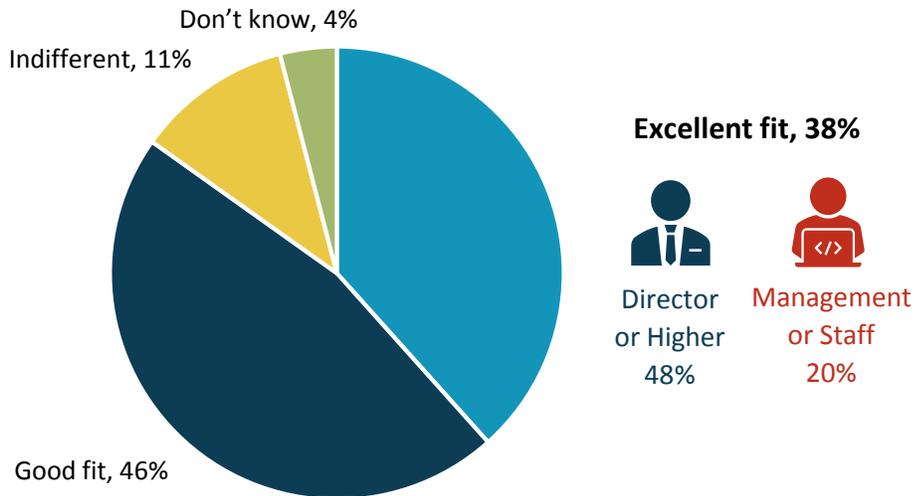
Hyperconverged Infrastructure

Hyperconverged infrastructure consolidates common IT infrastructure resources, including storage, compute, networking, and virtualization, into a tightly integrated building block that can easily scale to meet future application requirements. With HCI, organizations can consolidate infrastructure, reduce management silos, become more agile, better scale to meet the needs of current and future requirements, and benefit from a cloud operating model—and they can do it more cost-effectively than when using legacy 3-tier infrastructure (separate server, storage, and networking devices) or converged infrastructure (CI). The HCI market has exploded over the last few years, with ESG research showing that 68% of organizations utilize HCI within their data centers. And of that 68%, younger enterprises are more aggressively deploying HCI into their environments to deliver a modern infrastructure to support current and future business and application demands.

Aligning VDI with HCI

When looking at the two technologies together, there are numerous areas of alignment associated with simplicity, efficiency, agility, and scalability. In fact, ESG research shows that more than 84% of respondents see HCI as a good fit for VDI. Further, executives are 2.4x more likely to view HCI as an excellent fit for VDI than IT management and/or staff.

Figure 1. Aligning VDI with HCI

Which of the following best describes your view of the fit between VDI and hyperconverged infrastructure? (Percent of respondents, N=250)

Don't know, 4%

Indifferent, 11%

Excellent fit, 38%

Director or Higher 48%

Management or Staff 20%

Good fit, 46%

Source: Enterprise Strategy Group

So where are organizations today in their adoption of both technologies together? When asked if their organization uses HCI to support VDI environments, 92% of respondents said "yes." This highlights the value in aligning both technologies. But there are different paths to adoption. ESG research found that half of organizations had initially deployed VDI on a legacy 3-tier infrastructures with siloed servers, storage, and networking, and then migrated (or are in the process of migrating) to HCI. The remaining organizations built their VDI environment on HCI from the ground up.

The State of VDI

While numerous IT priorities exist as organizations look to digitally transform operations, VDI remains a top priority relative to other digital transformation initiatives, including the embracement of cloud technologies, leveraging analytics, implementing an agile development practice, and utilizing next-generation technologies like AI. In fact, 63% of organizations consider the implementation of VDI a top-five priority over the next 12-24 months. There are two interesting perspectives within this fact. Of those who consider implementing VDI the *most* important priority, 77% held the role of director or higher.

Those that have successfully implemented VDI and have seen business value from doing so want to continue embracing it. With that in mind, ESG asked respondents what their organization's VDI strategy was going forward in terms of having all or most employees using virtual desktops or just certain types of employees. In response, 58% of organizations reported looking to standardize on VDI technology for all employees over the next 12-18 months. When breaking down the results by those organizations that view VDI as a top-five priority, that percentage jumps to 76%. Further, executives are 2x more likely than management to prefer that the entire organization leverage VDI.

76% of organizations that view VDI as a top-five priority are looking to standardize on VDI technology for all employees.

Deployment Factors and Benefits

As organizations look to prioritize VDI adoption, ESG sought to understand the factors that led to the deployment of VDI and the results are shown in Figure 2. The data highlights the value of turning to VDI for risk reduction and operational simplicity. While improving security by centralizing sensitive data was the top response, the subsequent responses all centered around simplicity: simplifying the process of rolling out new applications and updates; simplifying OS patching, updating, and upgrading; and simplifying desktop provisioning. These factors are all meant to simplify IT team members' lives. And that simplification can directly benefit end-users. The easier the process, the faster (usually) it can be completed. The faster it can be completed, the sooner the virtual desktop user can benefit from the improvements. As such, improving end-user productivity rounded out the top-five factors leading organizations to deploy VDI.

Figure 2. Factors Leading to VDI Deployments

Which of the following factors led your organization to deploy (or consider) a VDI solution? (Percent of respondents, N=250, multiple responses accepted)

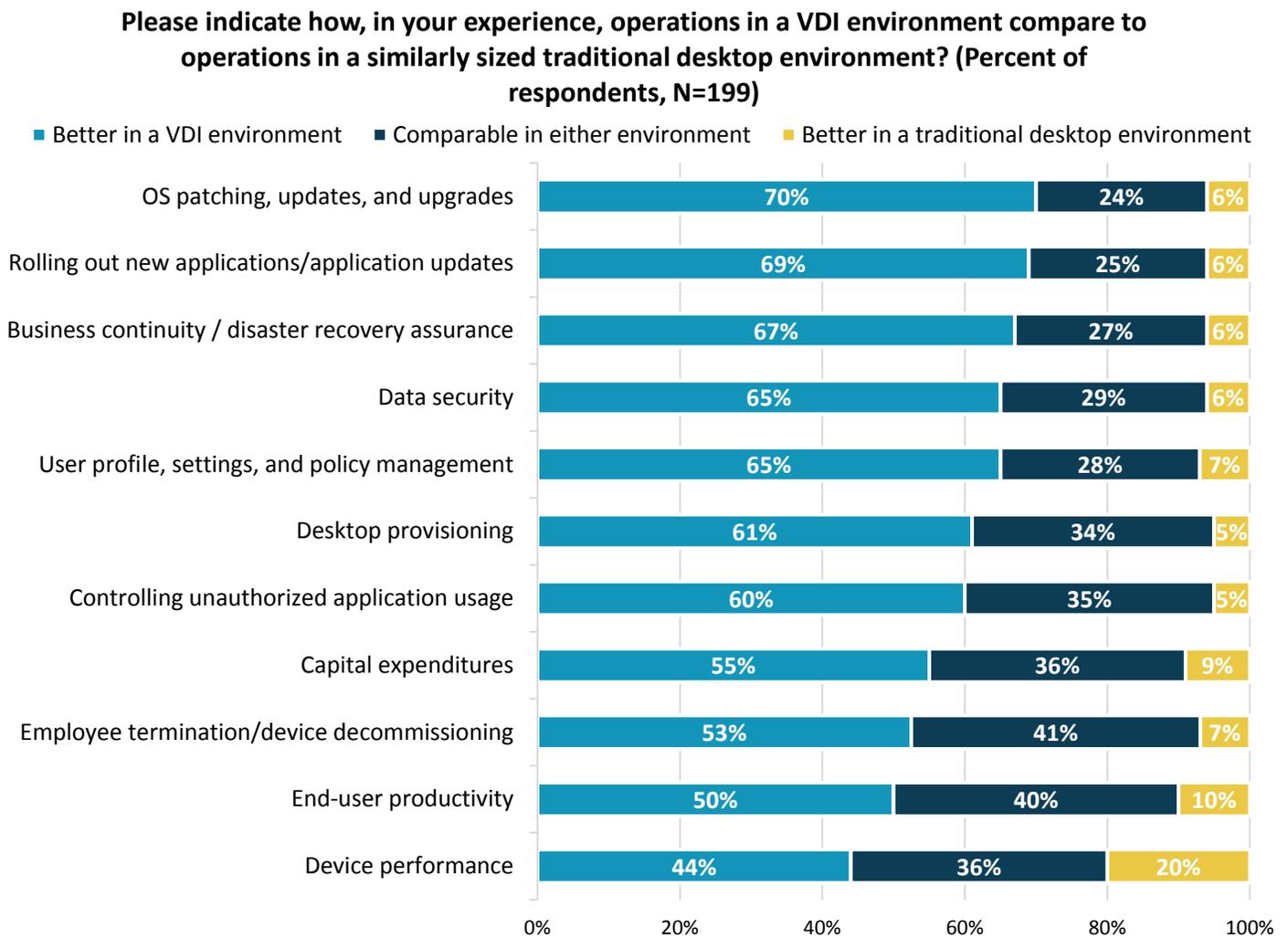| Factor	Percent
Improved security by centralizing sensitive data	58%
Easier to roll out new applications/application updates	54%
Simplified OS patching, updates, and upgrades	48%
Simplified desktop provisioning	48%
Improved end-user productivity	46%
Improved business continuity/disaster recovery (BC/DR) by centralizing backup of desktops/laptops	45%
Simplified management of user profiles, settings, and policies	44%
Improved/predictable performance	44%
Reduced capital expenses associated with traditional desktop/laptop PCs	40%
Reduced unauthorized application usage or configuration changes by end-users	37%
Improved employee termination/device decommissioning process	31%

Source: Enterprise Strategy Group

When breaking down the data by those that currently utilize VDI and those that plan to and/or are interested in using VDI, discrepancies are uncovered that highlight how prospective users are underestimating the ability of VDI to help reduce business risk. Compared with non-users' expected benefits, those that utilize VDI are:

- **36% more likely** to see improvements to security by centralizing sensitive data.

- **41% more likely** to see improvements to business continuity/disaster recovery (BC/DR) by centralizing backups of desktops/laptops.

- **90% more likely** to see a reduction in unauthorized application usage or configuration changes by end-users.

VDI Compared with Traditional Desktop Environments

For those organizations that currently leverage VDI, ESG sought to understand how leveraging virtual desktops was perceived in comparison with the previous mode of operation. Respondents were asked to indicate how, in their experience, operations across a number of lifecycle management stages compared with a similarly sized traditional desktop environment. The results are shown in Figure 3. Users validated that VDI is the preferred desktop delivery service model in nearly all aspects. Particularly impressive was the fact that VDI outnumbers those that prefer traditional desktops for patching, updates, and upgrades by 12:1, application agility by 11.5:1, BD/DR by 11:1, and data security 11:1.

Figure 3. The Operational Impact of a VDI Environment

Please indicate how, in your experience, operations in a VDI environment compare to operations in a similarly sized traditional desktop environment? (Percent of respondents, N=199)

■ Better in a VDI environment   ■ Comparable in either environment   ■ Better in a traditional desktop environment

	Better in a VDI environment	Comparable in either environment	Better in a traditional desktop environment
OS patching, updates, and upgrades	70%	24%	6%
Rolling out new applications/application updates	69%	25%	6%
Business continuity / disaster recovery assurance	67%	27%	6%
Data security	65%	29%	6%
User profile, settings, and policy management	65%	28%	7%
Desktop provisioning	61%	34%	5%
Controlling unauthorized application usage	60%	35%	5%
Capital expenditures	55%	36%	9%
Employee termination/device decommissioning	53%	41%	7%
End-user productivity	50%	40%	10%
Device performance	44%	36%	20%

Source: Enterprise Strategy Group

Leveraging HCI to Achieve VDI Goals

With organizations turning to HCI to better meet agility, scalability, and operational simplicity goals, it's no surprise that executives in particular are optimistic that HCI can help their organizations achieve VDI technology-related goals. An overwhelming number of executives (77%) believe HCI already has or could improve end-user satisfaction for VDI users, while 75% believe HCI already has or could help their organization achieve its overall goals for VDI technology.
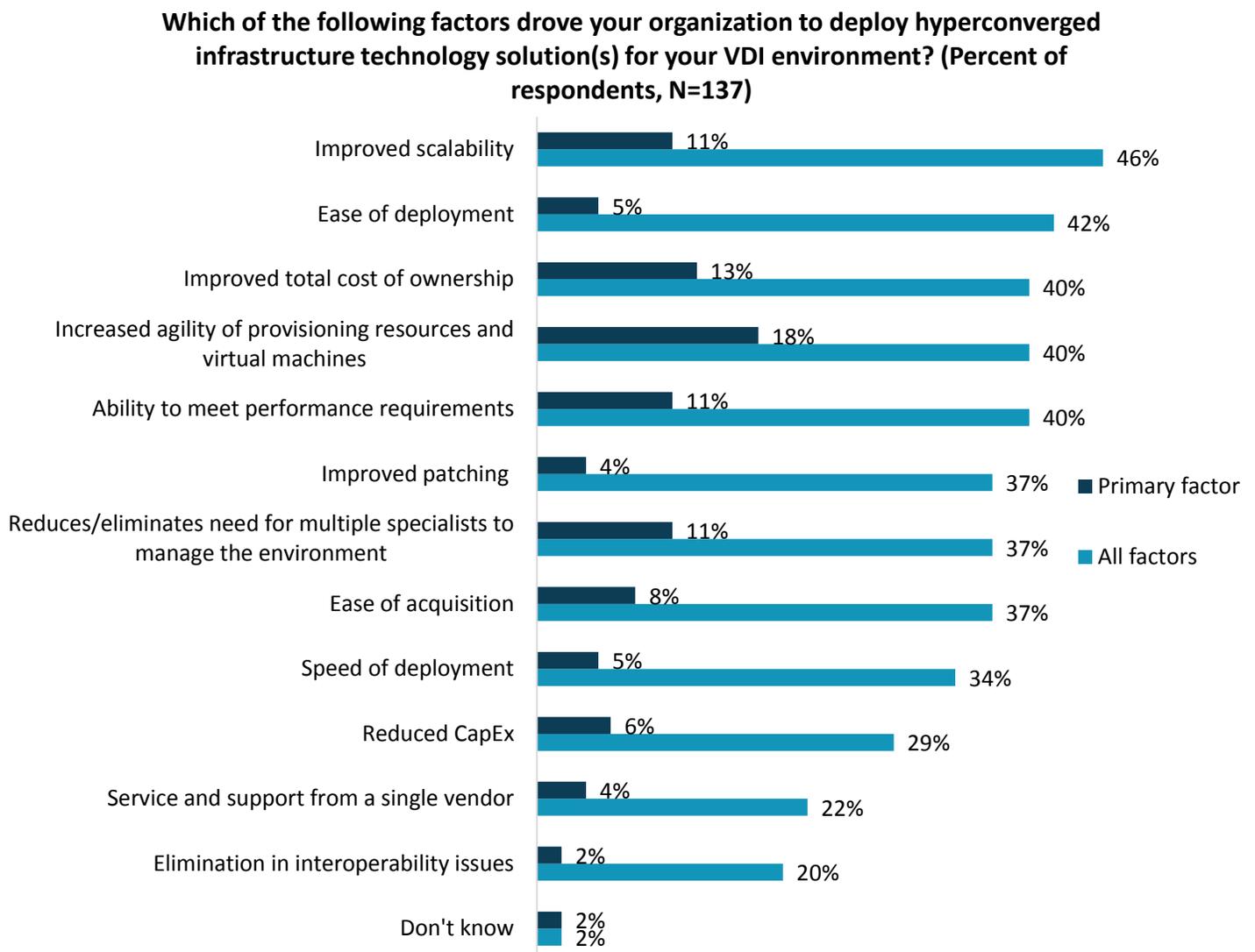
77% of executives believe HCI already has or could improve end-user satisfaction for VDI users, and 75% believe HCI has or can help their organization achieve its goals for VDI technology.

Factors Driving HCI Adoption to Support VDI

With that in mind, it is important to note what factors drove the adoption and deployment of HCI for VDI environments. Figure 4 highlights adoption factors, showing improved scalability and ease of deployment as the top two choices. But when looking at just the primary factor, increased agility of provisioning resources and virtual machines and cost savings through improved total cost of ownership (TCO) serve as the top two primary factors. When evaluating HCI solutions to satisfy VDI requirements, this list of factors should serve as a starting point for organizations to identify key selection criteria in the type of HCI system deployed.

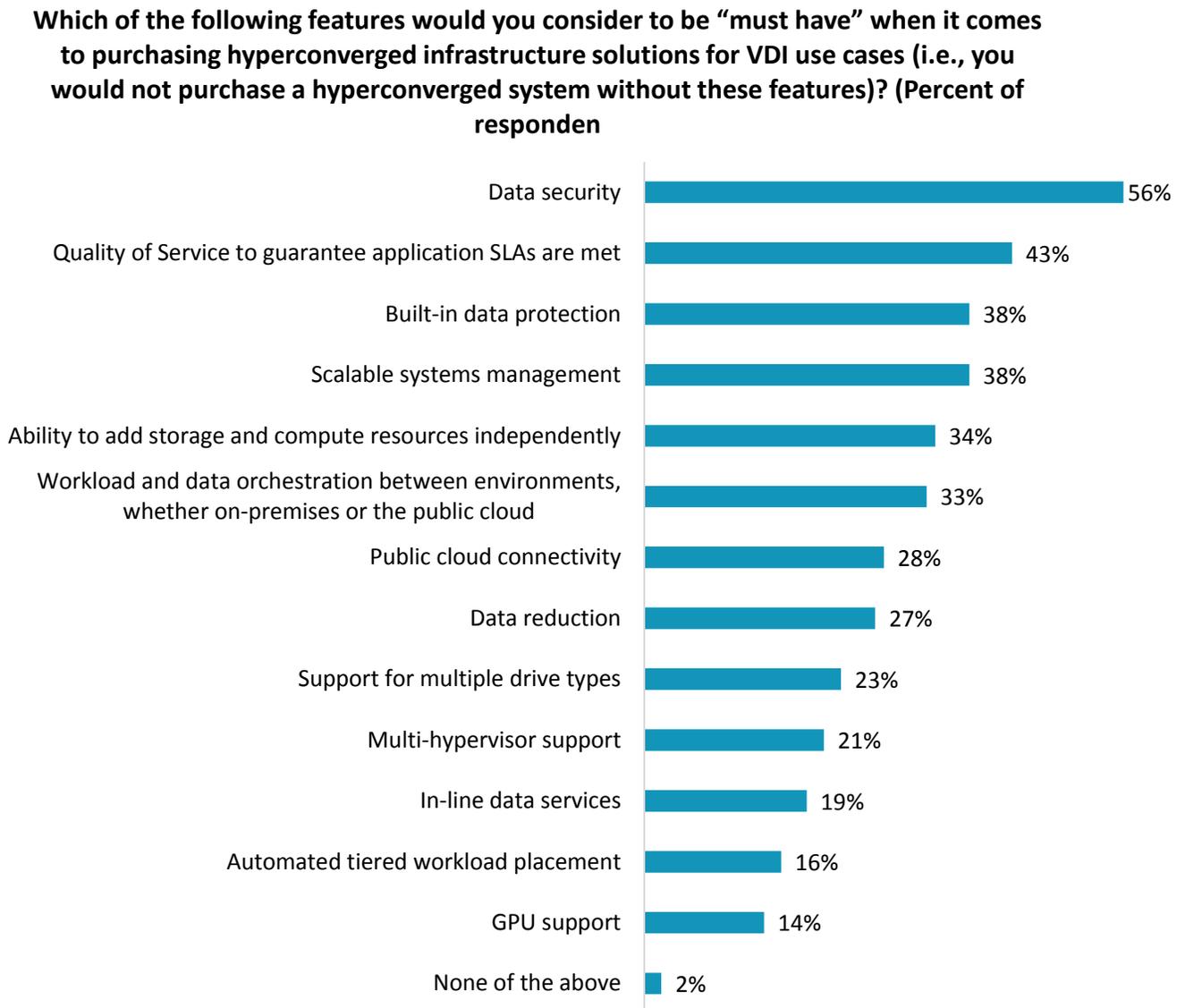**Figure 4. Top Factors Driving HCI Adoption to Support VDI**

Which of the following factors drove your organization to deploy hyperconverged infrastructure technology solution(s) for your VDI environment? (Percent of respondents, N=137)

Factor	Primary factor	All factors
Improved scalability	11%	46%
Ease of deployment	5%	42%
Improved total cost of ownership	13%	40%
Increased agility of provisioning resources and virtual machines	18%	40%
Ability to meet performance requirements	11%	40%
Improved patching	4%	37%
Reduces/eliminates need for multiple specialists to manage the environment	11%	37%
Ease of acquisition	8%	37%
Speed of deployment	5%	34%
Reduced CapEx	6%	29%
Service and support from a single vendor	4%	22%
Elimination in interoperability issues	2%	20%
Don't know	2%	2%

Source: Enterprise Strategy Group

'Must Have' Features to Support VDI

Once understanding the factors driving adoption of HCI, what should organizations look for in an HCI solution to support their VDI environment? Figure 5 highlights the features that an HCI solution must provide in order for organizations to invest in it. Data security tops the diverse list of "must haves" with 56% of respondents saying they would not purchase an HCI system unless it featured data security assurances, nearly half (43%) citing quality of service to guarantee application SLAs are met, and 38% citing built-in data protection. Other must haves include scalable systems management (38%), the ability to scale compute and storage independently (34%), and workload and data orchestration between environments, whether on-premises or in the cloud (33%).

Figure 5. HCI 'Must Haves' to Support VDI

Which of the following features would you consider to be "must have" when it comes to purchasing hyperconverged infrastructure solutions for VDI use cases (i.e., you would not purchase a hyperconverged system without these features)? (Percent of responden

Feature	Percent
Data security	56%
Quality of Service to guarantee application SLAs are met	43%
Built-in data protection	38%
Scalable systems management	38%
Ability to add storage and compute resources independently	34%
Workload and data orchestration between environments, whether on-premises or the public cloud	33%
Public cloud connectivity	28%
Data reduction	27%
Support for multiple drive types	23%
Multi-hypervisor support	21%
In-line data services	19%
Automated tiered workload placement	16%
GPU support	14%
None of the above	2%

Source: Enterprise Strategy Group

- **Data Security** — With an ever-expanding attack surface, data breaches are becoming rampant and more sophisticated, and organizations must mitigate potential threats without compromising on security, resiliency, or manageability at scale for mission-critical applications. While increased mobility and access to data and applications in

VDI environments helps improve end-user productivity, new security challenges must be faced to better protect corporate data that is accessible through all endpoint devices that access the network.

- **Quality of Service** — Many data center modernization initiatives involve consolidating multiple application workloads with varied business criticality, performance, data protection, and security requirements. VDI often entails consolidating user desktops with a wide variety of profiles and business criticality. Quality of service (QoS) for VDI environments is especially critical to ensure various VDI workloads continue to meet the high expectations of end-users, whether it be a bootstorm or steady state performance. To guarantee SLAs are continuously met, organizations should look at intelligent QoS policies that can be automated and assigned to address specific application/workload SLAs, without having to identify precise performance requirements. Service levels associated with each QoS policy must automatically prioritize resources in real time to ensure mission-critical workloads always meet their services levels, even during periods of resource contention or degraded mode conditions. By automating policy changes, IT has the agility to support the business as application priorities and workloads change. In addition, data protection QoS policies ensure snapshots are prioritized and automated to align with the constantly changing data protection needs of the business. Policy-based security, in the form of assigning encryption and keys, also simplifies meeting security and compliance SLAs.

- **Built-in Data Protection** — With a goal of avoiding downtime due to lost user data, an effective data protection solution is essential. Client machines must be backed up on a consistent basis, and VDI makes it easier by centrally hosting and managing machines, workloads, and data. But in VDI environments, persistent and non-persistent virtual desktops require a solution that enables the configuration of backup policies to ensure fileshares and personal files and folders are regularly protected. This includes ample backup retention periods as different data sources may have different retention requirements to satisfy compliance standards. It should be noted that while personal virtual desktop backups are important for persistent VDI environments, in non-persistent environments, as long as the master virtual desktop is backed up, other VM images can regularly be deleted after a user logs off. This enables IT to take back control of data backup activities and eliminate dependencies of hand holding users to properly back up their own data. VM volumes, file shares, and personal data folders can then be centrally configured for backup or replication. With the right HCI solution, centralized backup management and native data management integration can truly simplify how IT ensures effective data protection.

- **Flexibility to Scale and Manage Systems** — The ability to scale specific requirements, whether compute, storage, or GPU, addresses specific resource bottlenecks, greatly aids IT in planning of scaling, and optimizes TCO. In VDI environments, the ability to effectively scale depending on the number of users and the type of user could significantly change resource allocation. In other words, a knowledge worker who mainly utilizes office collaboration applications will have a different resource requirement than a heavy VDI user who is using a video editing application. Further, ensuring configuration flexibility to address current user counts as well as providing simplified, predictable scalability to address future user counts and demands is essential as organizations look to expand virtual desktop footprints throughout their organizations.

The Bigger Truth

Organizations recognize the value of digitizing their method of desktop delivery. While the traditional desktop delivery model of laptops and desktops is still quite prevalent, the benefits that can be yielded from a virtual desktop environment are irrefutable. Through simplified provisioning and deployment, centralized management, and improved visibility and control, VDI can enable organizations to better meet end-user endpoint requirements.

To reap the benefits of an effective and efficient VDI deployment, organizations must prioritize selecting and deploying a properly aligned infrastructure that can satisfy the current and future end-user demands of their desktop environment. HCI enables IT to deliver higher levels of efficiency, better scalability, and improved agility, all while reducing capital and operational costs. By utilizing HCI to support VDI, IT can ensure end-users get a predictable and consistent virtual desktop experience that can easily scale to meet the expected growth of VDI environments across an organization.

When evaluating HCI solutions to deliver the right level of service based on user count, type of user, or expected levels of growth and performance, a clear set of requirements has emerged. It is imperative the HCI platform provide security, quality of service guarantees, data protection, and flexible scalability from an infrastructure and management standpoint. Vendors offering these capabilities should be able to successfully address the virtual desktop infrastructure requirements of their customers.

For information on how Pivot3 can deliver the intelligent infrastructure required to support current and future VDI requirements, visit: pivot3.com/solutions

Appendix: Research Methodology and Respondent Demographics

To gather data for this report, ESG conducted a comprehensive online survey of IT infrastructure decision makers from private- and public-sector organizations in North America. The survey was fielded between April 18, 2019 and May 6, 2019.

To qualify for this survey, respondents were required to have a high level of familiarity with the organization's desktop and mobile computing environment. Additionally, all respondents must be IT decision makers responsible for their organization's data center infrastructure or endpoint devices. Finally, all respondents must have been employed at a large enterprise, defined as organizations with 1,000 or more employees and with $100M or more in annual revenue.

After filtering out unqualified respondents, removing duplicate responses, and screening the remaining completed responses (on several criteria) for data integrity, a final sample of 250 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.
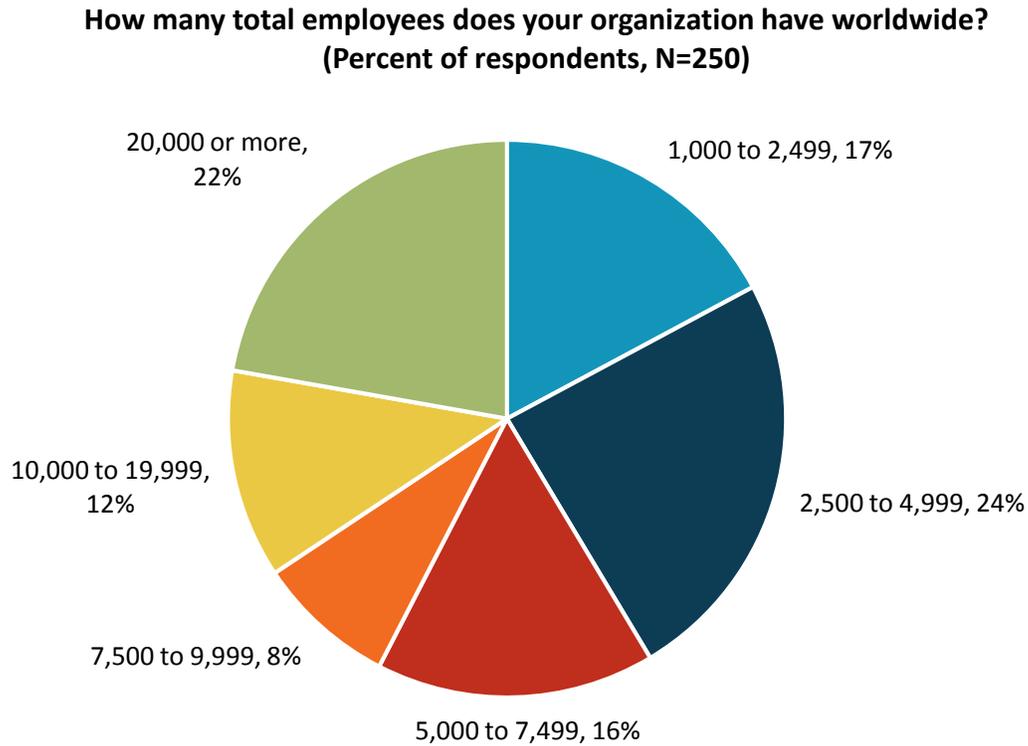
Figure 6. Survey Respondents, by Job Responsibility

Which of the following best describes your current responsibility within your organization? (Percent of respondents, N=250)
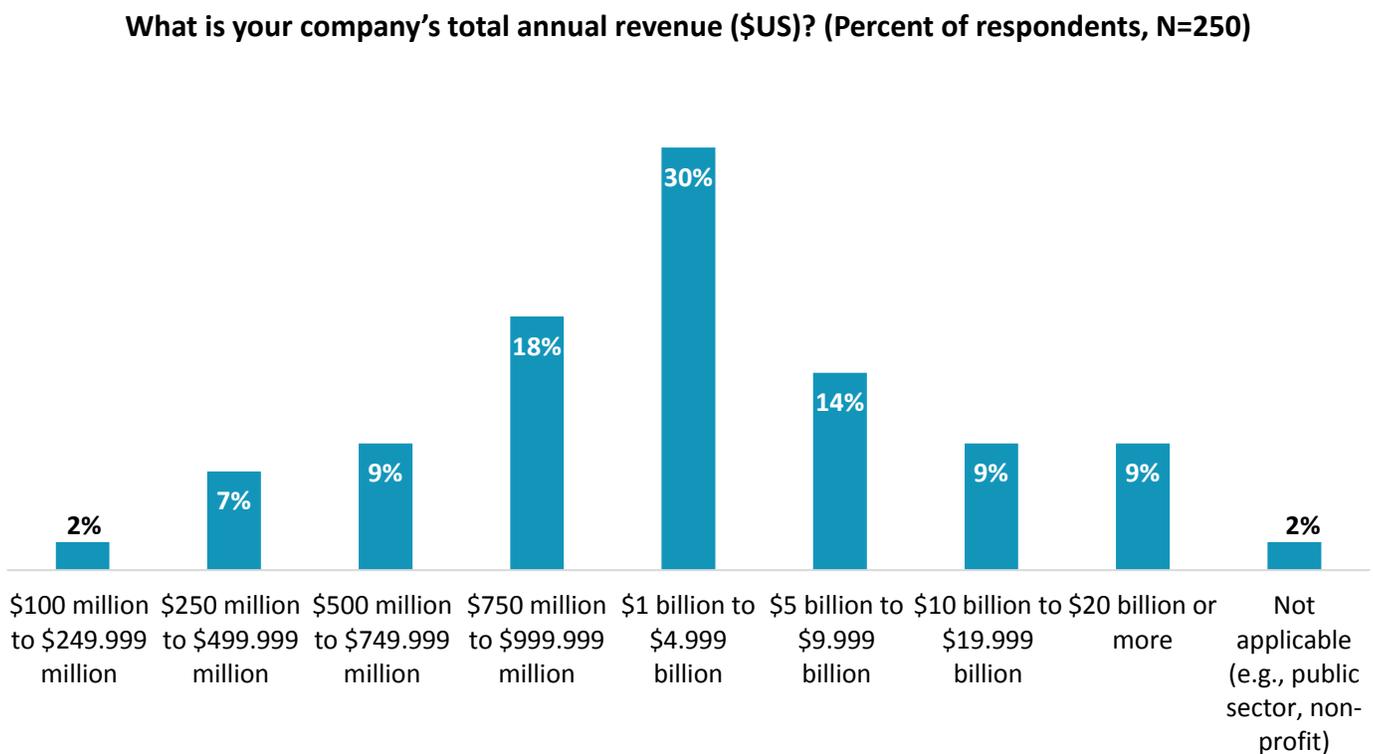

IT staff / individual contributor, 11%
Most senior IT executive (i.e., CIO or equivalent), 32%
IT management (e.g., IT manager, IT architect, etc.), 22%
Senior IT management (e.g., Director of IT, VP of IT, etc.), 34%
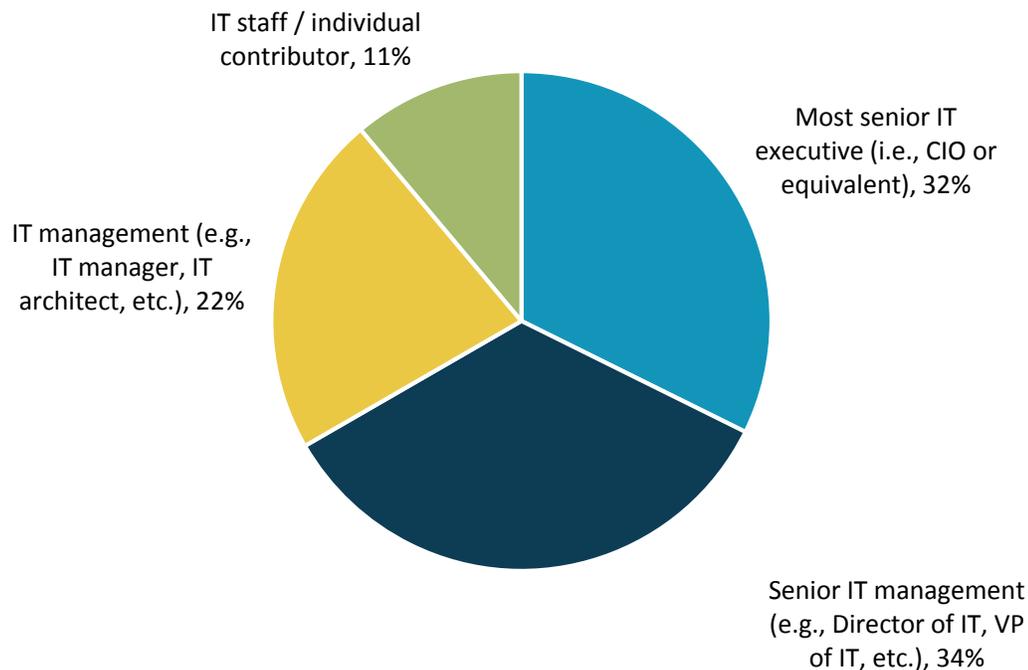
Source: Enterprise Strategy Group

Figure 7. Survey Respondents, by Company Size (Number of Employees)

How many total employees does your organization have worldwide?
(Percent of respondents, N=250)

- 20,000 or more, 22%
- 1,000 to 2,499, 17%
- 2,500 to 4,999, 24%
- 5,000 to 7,499, 16%
- 7,500 to 9,999, 8%
- 10,000 to 19,999, 12%

Figure 8. Survey Respondents, by Company Size (Revenue)

What is your company's total annual revenue ($US)? (Percent of respondents, N=250)

Category	Percent
$100 million to $249.999 million	2%
$250 million to $499.999 million	7%
$500 million to $749.999 million	9%
$750 million to $999.999 million	18%
$1 billion to $4.999 billion	30%
$5 billion to $9.999 billion	14%
$10 billion to $19.999 billion	9%
$20 billion or more	9%
Not applicable (e.g., public sector, non-profit)	2%

Figure 9. Survey Respondents, by Industry

What is your organization's primary industry? (Percent of respondents, N=250)

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