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Thought Leadership Paper
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Why Faster Refresh Cycles And Modern Infrastructure Management Are Critical To Business Success

Research-Based Insights Into The Connection
Between Modern Server Infrastructure And
Business Agility

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www.dell EMC.com/servers

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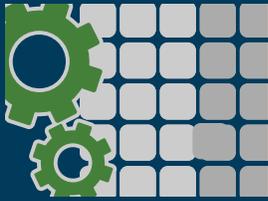
Executive Summary

Pursuing business agility to truly impact business transformation requires embracing IT as a core competency. Having the most up-to-date IT infrastructure to support the scale and complexity of a changing application landscape is crucial to this. Companies must champion this imperative by refreshing server infrastructure, adopting software-defined data center (SDDC) principles, and modernizing their IT management processes. Those that do will propel business innovation and deliver superior customer experiences with fast, secure, reliable business technology.

In December 2018, Dell EMC commissioned Forrester Consulting to evaluate the business value of refreshing servers and infrastructure in enterprise IT departments. Forrester conducted an online survey with 508 IT infrastructure technology decision makers at companies with 100 or more employees in seven countries to explore this topic. We found that although companies are adding data center capacity to support emerging technology workloads, they retain aging servers for longer than they should. We also found that while most organizations have an SDDC strategy, they have made minimal progress. This results in applications that underperform against business needs and infrastructure that hinders the agility of both IT and the business. On the contrary, investing in modern servers yields many business and technical benefits, especially for the organizations that have embraced modernized IT as a core competency.

KEY FINDINGS

- › **Servers are not being refreshed quickly enough.** On average, 40% of server hardware deployed at company data centers is more than three years old. Companies are adding capacity to support emerging workloads, but they retain aging hardware for four years on average, which is longer than ideal.
- › **The consequence is a lack of agility and unmet business needs.** Aging infrastructure and limited progress on SDDC technology adoption are hindering IT organizations from meeting business needs. The result? Time-consuming application updates, application performance that does not meet end user needs, and infrastructure that cannot effectively support emerging workloads like artificial intelligence and machine learning.
- › **Modern servers deliver important business and technical benefits.** Many companies are reaping benefits from adopting modern servers. Technical benefits include greater reliability, performance, speed, and scalability. More importantly, business benefits include improved employee productivity, business innovation, and customer experience.
- › **Those that embrace modernized infrastructure management practices earn the most benefits.** Companies with a modernized approach to their infrastructure (“Modernized” firms) are investing in emerging technologies at a faster pace than “Aging” firms. As a result, they are driving greater benefits from their server investments and delivering applications that better meet end user needs.



Companies refresh server hardware every 3.98 years, on average, resulting in a high proportion of current infrastructure (40%) that is more than three years old.



Modern servers deliver employee productivity, innovation, and customer experience benefits. Firms with modernized IT reap these benefits at greater rates.

Companies Retain Server Hardware For Longer Than They Should

The realm of what is possible within a company's data center has evolved tremendously since Forrester declared 2013 “year one” of the software-defined data center.¹ Adoption of converged and hyperconverged infrastructure has reached 93%, and 94% of firms feel they have made at least some progress toward automating infrastructure provisioning, configuration, and change management tasks.²

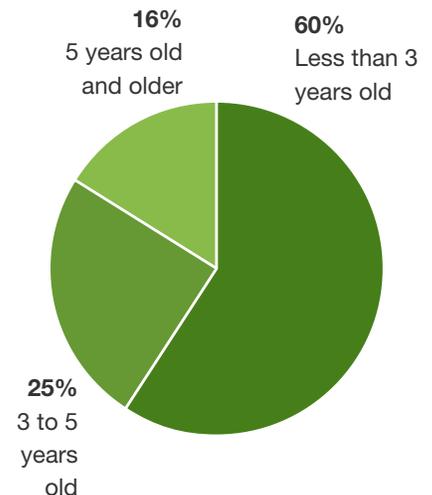
Yet, despite these advancements, half of today's data centers house infrastructure that dates back to before “year one” of the SDDC revolution (in other words: servers that are six years old or older). Companies that retain these aging servers risk being left behind as savvy firms embrace more modern infrastructure. In surveying 508 IT infrastructure decision makers at global companies, we found that:

- › **On average, 40% of server hardware is more than three years old.** Nearly half of these aging servers (16% overall) have passed the five-year mark (see Figure 1). Rapid technology changes put firms that retain older servers at a disadvantage because modern servers (those less than three years old) better support the scale and complexity of an evolving infrastructure-as-code landscape. Respondents whose entire server fleet is more than three years old report higher costs and slower time-to-market as the top consequences of retaining their aging servers.
- › **Companies are adding capacity to support emerging workloads.** IT leaders are focusing more on greenfield than brownfield: Respondents reported plans to purchase an average of 51 servers next year to replace aging infrastructure and an average of 61 servers for net-new capacity. Two-thirds of next year's server purchases (67%) will be used to support emerging technology workloads, including internet of things (IoT), additive manufacturing, computer vision, predictive analytics, and edge computing (see Figure 2).³ This indicates that companies are shifting their budgets toward building digital transformation capabilities that yield greater innovation.
- › **However, they retain aging hardware for four years on average, which is longer than ideal.** Respondents reported an average refresh cycle of 3.98 years, with 51% of companies waiting even longer than four years to replace aging servers (see Figure 3). This is a problem due to 2017 US tax law changes encouraging accelerated depreciation.⁴ Leading global accounting firms also recommend assuming a useful life of three years for computer hardware and using a straight-line depreciation method.⁵ Waiting four years to replace hardware also puts workloads at a significant disadvantage. Modern servers support higher volumes of virtualization and containerization, faster deployment, streamlined management features, and more agility to tie application deliverables to hardware with APIs built for infrastructure-as-code.

Figure 1

40% Of Servers In An Average Company's Data Center Are More Than Three Years Old

Distribution of server ages:



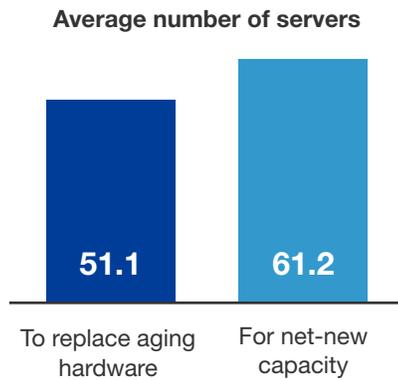
Base: 489 global IT infrastructure technology decision makers
Source: A commissioned study conducted by Forrester Consulting on behalf of Dell, December 2018



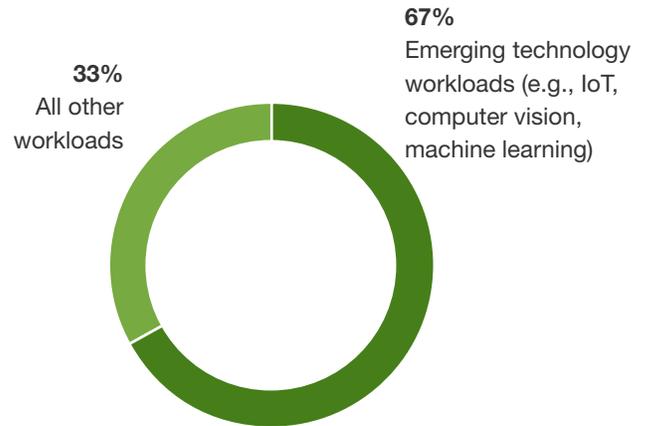
Older servers limit virtualization and containerization capabilities, hindering a firm's business agility.

Figure 2
Companies Are Adding Capacity To Support Emerging Workloads

Planned server purchases in the next year:

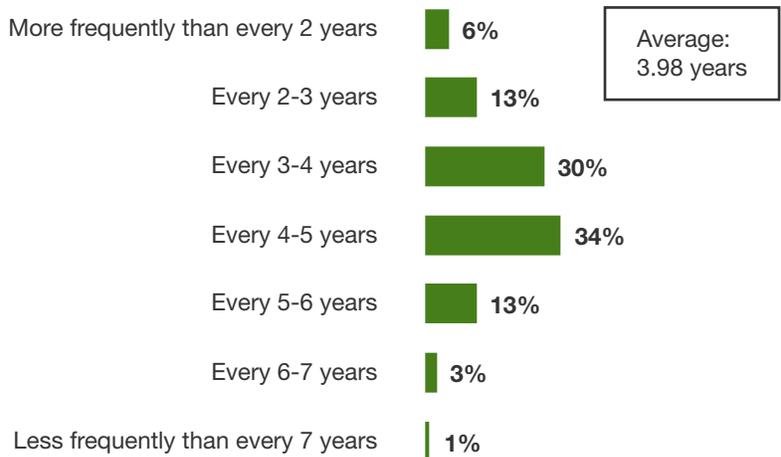


Proportion of planned server purchases to be used toward the following workloads:



Base: 508 global IT infrastructure technology decision makers
 Source: A commissioned study conducted by Forrester Consulting on behalf of Dell, December 2018

Figure 3
Frequency of server refresh cycles:



Companies retain their servers for four years, on average, which is longer than recommended for depreciation and can negatively impact system performance.

Base: 508 global IT infrastructure technology decision makers
 Source: A commissioned study conducted by Forrester Consulting on behalf of Dell, December 2018

Aging Hardware And Limited Progress Toward SDDC Impede Business Needs

Up-to-date infrastructure is critical on its own, but it is only one piece of the IT modernization puzzle. With workload and data volumes rising exponentially while the size of IT organizations grows modestly (at best), automation and virtualization are critical to keep pace with business needs. IT leaders now embrace different levels of abstraction by using automation tools, containers, software-defined networks, and composable infrastructure.⁶ But despite overwhelming interest in adopting SDDC — 95% of firms see value in SDDC as a long-term strategy — only 27% of the firms we surveyed have begun implementing a full SDDC strategy. Additionally, only 20% of respondents feel they have made “excellent” progress toward automating infrastructure provisioning, configuration, and change management tasks. Our survey further revealed that:

- › **Integration complexity and manual processes impede SDDC progress.** IT decision makers cite integration complexities arising from multiple vendor offerings and multicloud environments as primary barriers to implementing their SDDC strategies. Manual processes, security challenges, and lack of alignment between IT and line-of-business stakeholders also hinder progress toward SDDC (see Figure 4). Meanwhile, cost concerns are less of a problem; only 20% of respondents felt lack of budget to invest in the necessary infrastructure is a barrier to implementing their SDDC strategies.



While 95% of firms see value in SDDC as a long-term strategy, only 27% have made significant progress in implementing SDDC technologies.

Figure 4

“What barriers, if any, has your organization faced in implementing its software-defined data center strategy?”
(Showing top five responses)



Base: 482 global IT infrastructure technology decision makers
Source: A commissioned study conducted by Forrester Consulting on behalf of Dell, December 2018

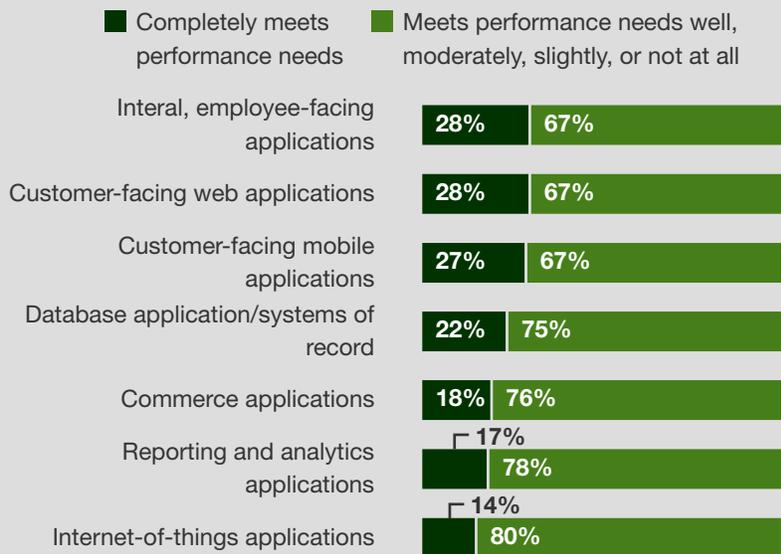
Integration challenges, multicloud complexity, and manual processes are the biggest SDDC barriers.

Only 20% of respondents consider lack of budget a barrier to SDDC adoption.

- › **As a result, firms struggle with time-consuming updates and applications that do not meet end user performance needs.**
Aging servers and limited SDDC progress are taking their toll on IT productivity. On average, it takes most IT organizations days, weeks, or even months to deploy new versions of applications in their data centers. Further, less than 30% of IT leaders feel the performance of various on-premises applications completely meet the needs of end users. IoT, analytics, and commerce are among the application categories with the biggest performance gaps (see Figure 5).
- › **Aging infrastructure cannot effectively support AI/ML workloads.**
Latency can quickly become an issue for workloads that require large amounts of parallelized computation, like AI and machine learning (AI/ML), if compute and memory are not architecturally close together. IT leaders recognize this, which is why 68% consider the locality of compute and memory important or critical to their burgeoning AI/ML workloads. Companies are investing in new servers to support these workloads: On average, 13% of servers purchased next year will be used toward predictive analytics/machine learning or deep learning.

Figure 5

“For the applications that run on-premises in your organization’s data centers, to what extent does application performance meet the needs of end users?”



Base: 508 global IT infrastructure technology decision makers
Source: A commissioned study conducted by Forrester Consulting on behalf of Dell, December 2018



Older servers impede the user experience: Less than 30% of on-premises apps completely meet end user needs.

Modern Infrastructure Supports Secure, Fast, Reliable Apps That Drive Business Innovation

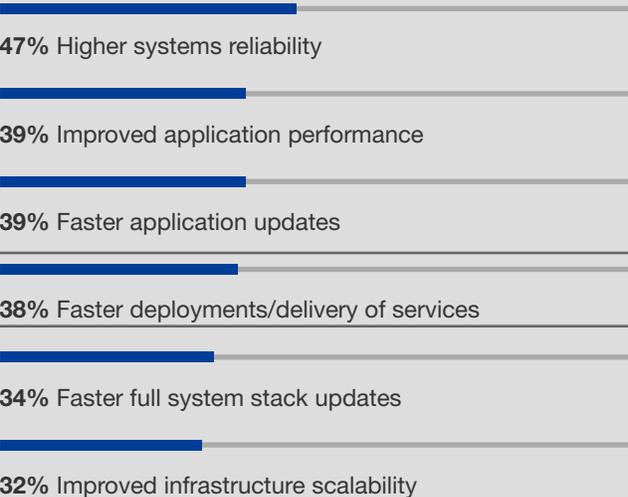
Even as they progress on their SDDC journeys, companies can reap significant benefits from updating their server hardware in particular. Our survey revealed that (see Figure 6):

- › **Modern servers help companies deliver greater reliability, performance, speed, and scalability.** Nearly half of respondents (47%) credited their implementation of modern servers with driving higher systems reliability. Nearly 40% also cited improved application performance, faster application updates, and faster deployments as benefits. Improved management features and increased reliability helped IT organizations achieve greater operational efficiencies in managing their data centers. For example, respondents reported a 31% average reduction in time spent on troubleshooting and 28% less time spent on deployments.

Figure 6

“Which, if any, of the following benefits has your company realized from replacing aging servers (three years old or older) with modern servers (less than three years old)?”

Technical benefits



28% Average reduction in time spent among those who reported this benefit

Business benefits



39% Average reduction in time spent among those who reported this benefit

Base: 480 global IT infrastructure technology decision makers
 Source: A commissioned study conducted by Forrester Consulting on behalf of Dell EMC, December 2018

› **Server upgrades also drive business benefits like employee productivity, security, innovation, and better customer experience.** Faster, more reliable applications deliver better end user experiences, which is why increased employee productivity (42%) and improved customer experiences (36%) are among the top-cited benefits when replacing aging servers with modern servers. Productivity gains — within the IT organization and beyond — have given 36% of firms greater ability to support innovation efforts and have enabled nearly a third of companies to reduce their time-to-market by an average of 39%. Modern servers also support better data center security, a benefit that 41% of respondents cited.

FIRMS WITH HIGHER INFRASTRUCTURE MATURITY DRIVE GREATER BENEFITS FROM THEIR INVESTMENTS

Although companies are already realizing significant business and technical benefits by deploying modern servers, their investments can have greater impact when combined with modernized IT processes and supporting technologies. Our survey included a maturity framework to assess the extent to which companies embrace modernized IT as a core competency, as defined by progress toward a series of infrastructure and automation attributes (see Figure 7). While only a small portion of companies in our survey (13%) qualified as completely “Modernized,” they also represent the best of what’s possible through modern server infrastructure and automation.

Figure 7

Modernized IT Maturity Framework Overview



Modernized IT

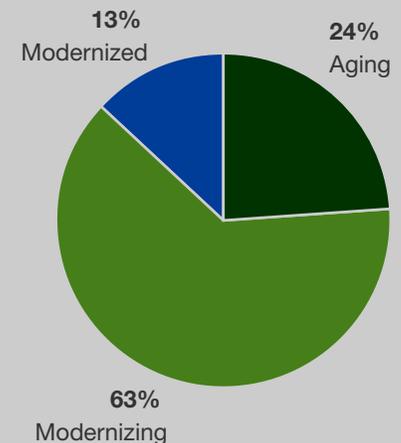
Defined by:

- Percent of on-premises production servers that are virtual machines
- Workloads entirely or mostly supported by all-flash storage arrays
- Percent of on-premises applications supported by scale-out storage
- Commitment to SDDC technologies as a long-term strategy
- Percent of on-premises applications supported by converged and hyperconverged infrastructure
- Number of environments that have data protection solutions deployed
- Progress toward automating infrastructure provisioning, configuration, and change management tasks
- Number of server infrastructure tasks that are entirely or mostly automated
- Degree of self-service capabilities for provisioning on-premises IT resources

Base: 508 global IT infrastructure technology decision makers
 Source: A commissioned study conducted by Forrester Consulting on behalf of Dell, December 2018

13% of survey respondents qualified as having the most mature, “Modernized IT” infrastructure and automation capabilities.

Distribution of maturity levels:

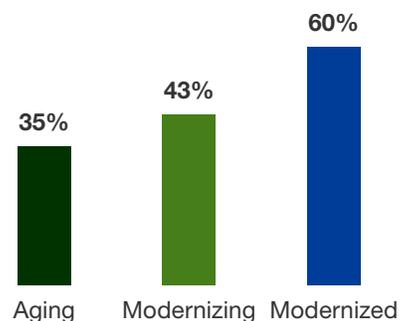


In comparing the survey results of Modernized firms against Aging firms — those that have made the least progress toward modern server infrastructure and automation — we found that:

- › **Modernized firms are investing in more computing power to support emerging technologies.** Those who qualified as Modernized in our survey are building competitive advantage with more powerful data centers to run their business apps. They plan to purchase an average of 126 servers next year, while Aging firms plan to purchase 83 servers.⁷ Modernized companies plan to use these data center investments to support more advanced and emerging technology capabilities. They are much further along in the adoption of infrastructure-as-code (IaC), outpacing Aging firms' adoption of software-defined storage, networking, and compute by 2x or more, and using containers at 1.8x the rate of Aging firms. Furthermore, Modernized firms are much more likely than Aging firms to dedicate new server capacity toward emerging workloads like IoT, additive manufacturing, and augmented/virtual reality.
- › **Their investments and approaches help Modernized firms deliver applications that better meet end user needs.** IaC enables workload flexibility and optimized performance down to bare metal.⁸ Capitalizing on their IaC advantage, Modernized firms can optimize application performance by moving workloads where they belong at any given time. On average, Modernized firms report they can move 60% of their workloads between on-premises, public cloud, and edge environments, compared to just 35% for Aging firms (see Figure 8). The combination of modern servers, supporting software, and mature infrastructure management processes that Modernized firms have deployed helps them deliver on-premises apps that are up to 3x more likely to meet end user needs than Aging firms' apps (see Figure 9). This puts Modernized firms at a significant competitive advantage because high-performing applications yield superior customer experiences and support greater employee productivity.
- › **Modernized firms drive greater benefits, at a faster rate, from their server investments.** With up-to-date servers, high-performance applications, and IT management processes that leverage automation and virtualization, Modernized companies reap significant benefits from their server refreshes. Faster application updates and improved infrastructure scalability are among the top technical advantages, with Modernized firms more than twice as likely to cite these benefits. Modernized firms also reap more business benefits from newer server investments where it matters most: data center security, employee productivity, improved customer experience, and increased innovation (see Figure 10).

Modernized firms build competitive advantage with more powerful data centers, adoption of infrastructure-as-code, and investing in infrastructure that supports emerging technology workloads.

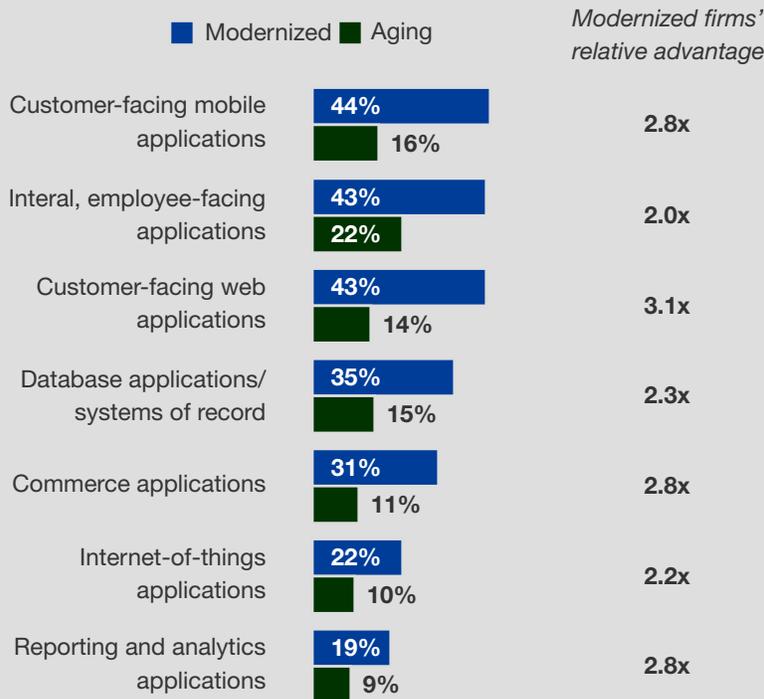
Figure 8
Percent of workloads IT can move among on-premises, public cloud, and edge environments:



Base: 503 global IT infrastructure technology decision makers
Source: A commissioned study conducted by Forrester Consulting on behalf of Dell, December 2018

Figure 9

Percent of respondents who feel on-premises application performance “completely meets” the needs of end users, by maturity level:

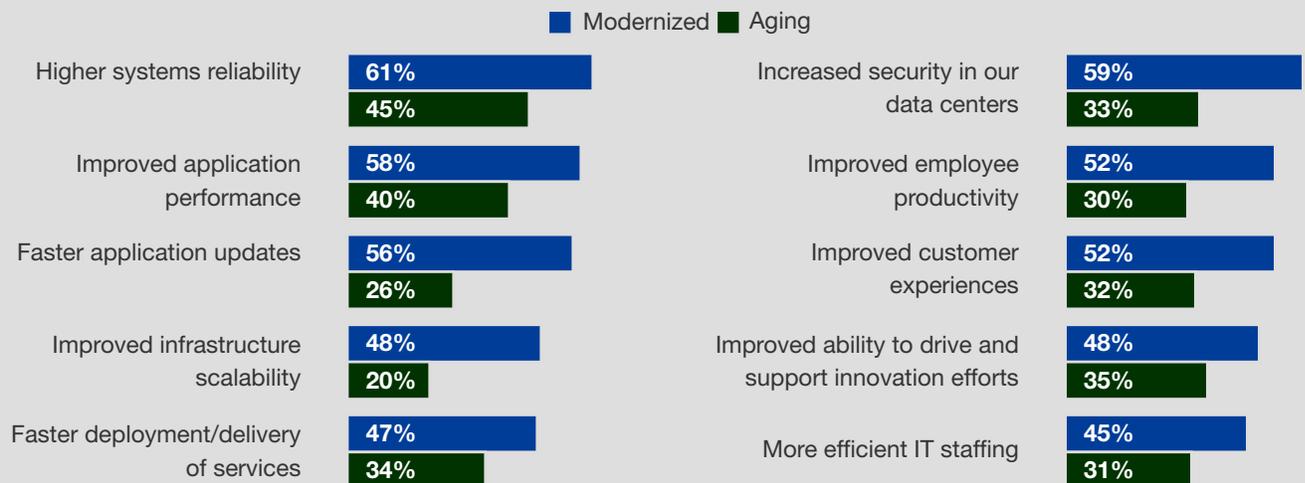


Modernized firms leverage modern servers, SDDC technologies, and automation to deliver applications that are up to 3x more likely to meet end user needs than those delivered by Aging firms.

Base: 503 global IT infrastructure technology decision makers
 Source: A commissioned study conducted by Forrester Consulting on behalf of Dell, December 2018

Figure 10

“Which, if any, of the following benefits has your company realized from replacing aging servers (3 years old or older) with modern servers (less than 3 years old)?”



Base: 503 global IT infrastructure technology decision makers
 Source: A commissioned study conducted by Forrester Consulting on behalf of Dell, December 2018

Key Recommendations

Delivering secure, fast, reliable software that supports business innovation and agility requires companies to embrace modernized infrastructure, from automation and virtualization tools down to the server hardware. Forrester's in-depth survey of IT infrastructure technology decision makers about server modernization yielded several important recommendations:



Refresh your servers more frequently — ideally less than every three years. This is not the usual story of buying newer hardware just to replace the old. Our research shows that modern servers enable organizations to adopt more emerging technologies at a faster rate. In addition to the copious technical benefits, modern hardware has a profound impact on business benefits such as better customer experience, employee productivity, and innovation.



Invest in a more holistic SDDC strategy. Many of the organizations we surveyed have evolved some of their hardware to be software-defined, whether it be compute, storage, or networking. Few take a comprehensive approach, investing in all of these technologies and combining them with automation and infrastructure-as-code. Those that do reap better rewards faster.



Watch for common modernization road bumps. As firms modernize, some common challenges bubble up. Integration challenges between multiple vendors — particularly between multiple clouds — are most frequently cited. Lack of automation is another common road block, with some companies continuing to rely on manual processes in a way that just doesn't scale in the cloud era. Leverage best practices from integration experts and OEMs that have addressed these challenges with their customers before.

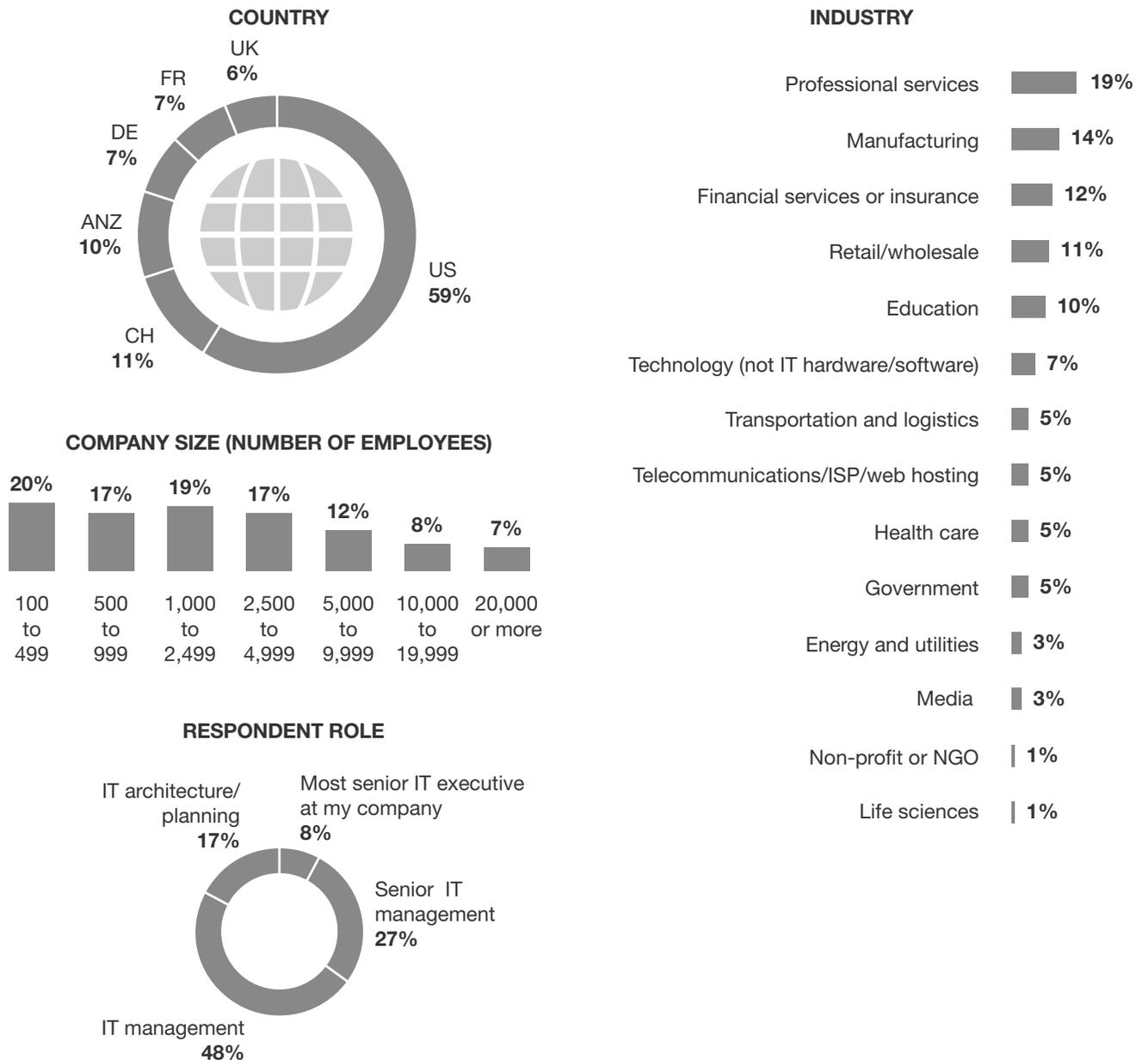


Measure success with modern key performance indicators (KPIs). “Time-to-deploy infrastructure” and “server-to-admin ratios” are commonly brought up as important metrics to track. However, equally important are metrics borrowed from continuous delivery — for example, mean-time-to-approve changes, rework rate, unplanned work rate, and team attrition.⁹ These can tell you if your modernization efforts are succeeding or stalled.

Appendix A: Methodology

In this study, Forrester conducted an online survey of 508 organizations across industries in the US, the UK, Germany, France, Australia, New Zealand, and China to evaluate the business value of refreshing servers and infrastructure in enterprise IT departments. Survey participants included decision makers in IT management and IT architecture/planning roles with significant purchase involvement for servers and/or virtualization/private cloud. Questions provided to the participants asked about infrastructure technology adoption, management and automation practices, server refresh cycles, progress toward SDDC, and benefits of replacing aging servers with modern servers. Respondents were offered a small incentive as a thank you for time spent on the survey. The study was completed in December 2018.

Appendix B: Demographics/Data



Base: 508 global IT infrastructure technology decision makers
 Source: A commissioned study conducted by Forrester Consulting on behalf of Dell, December 2018

Appendix C: Supplemental Material

RELATED FORRESTER RESEARCH

“The Software-Defined Data Center Comes Of Age,” Forrester Research, Inc., October 30, 2017.

“Reform Legacy Operations For Composable Infrastructure,” Forrester Research, Inc., January 19, 2017.

“Become A Unicorn With Infrastructure-As-Code,” Forrester Research, Inc., September 19, 2018.

Appendix D: Endnotes

¹ Source: “Server Virtualization Predictions For 2013,” Forrester Research, Inc., March 15, 2013.

² These stats came directly from our survey. Base: 508 global IT infrastructure technology decision makers. Source: A commissioned study conducted by Forrester Consulting on behalf of Dell, December 2018

³ For more information about these emerging technologies, see “The Top Emerging Technologies To 2018,” Forrester Research, Inc., July 11, 2018.

⁴ Source: “US Tech Market Outlook For 2018 And 2019,” Forrester Research, Inc., July 2, 2018.

⁵ Source: “2018 Worldwide Capital and Fixed Assets Guide,” EY, 2018 (<https://www.ey.com/gl/en/services/tax/worldwide-capital-and-fixed-assets-guide---country-list>).

⁶ Source: “The Software-Defined Data Center Comes Of Age,” Forrester Research, Inc., October 30, 2017.

⁷ To calculate these averages, we used the midpoints of ranges provided to survey respondents to convert the ranges to numbers (e.g., a range of 51 to 100 servers was converted to 75.5 servers). We then weighted the data to control for different company size distributions across maturity segments.

⁸ Source: “Become A Unicorn With Infrastructure-As-Code,” Forrester Research, Inc., September 19, 2018.

⁹ Source: “Use Four Key Categories To Measure What Matters In Continuous Deployment,” Forrester Research, Inc., February 9, 2018.