

Optimizing Performance with Frequent Server Replacements for Enterprises

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IDC Opinion

Servers are the backbone of modern IT infrastructure. They support the computational requirements of the entire application portfolio of an enterprise organization. However, their life span is finite. A new generation of servers performs much better than its predecessors. Still, is this outperformance worth it?

As businesses digitize themselves, seek long-term resiliency for their current business models, and explore new revenue-generation opportunities, server infrastructure shifts from a cost to an asset. In other words, it generates tangible return on its use. The worth of server infrastructure to a business is much different than it used to be. Over time, the value of current server infrastructure depreciates. As this occurs, organizations must evaluate the cost benefits of procuring new servers compared with the cumulative costs (maintenance, upkeep, outages, etc.) of running older servers.

Chief information officers (CIOs) and IT leaders must select the optimal time to replace all or part of their existing server infrastructure. There is a mindset that pushing out server-refresh initiatives is prudent when business priorities change or cash needs to be preserved.

Most IT leaders acknowledge that infrastructure consisting of older servers requires more care and attention, but they believe that they can:

- ▶ **Delay server replacements** to reduce cost
- ▶ **Rely on server virtualization technologies** and oversubscribe existing server infrastructure for tackling short- and medium-term requirements for existing applications
- ▶ **Shift on-premises spending to public cloud infrastructure** as a service for provisioning new applications, without examining the long-term implications of inter-application dependencies

IDC believes that while on the surface these approaches appear to be sound strategies, they are expensive and risky in the long run. Extensive IDC research indicates:

- ▶ **Aging servers are expensive to maintain**, mostly due to indirect costs. Older servers are less reliable, and this has a direct but negative impact on the service quality of the infrastructure.
- ▶ **Server virtualization cannot make up for IT resiliency issues**, especially if the underlying server platforms are unreliable.
- ▶ **Ad hoc moves to the public cloud can be expensive in the long run.** Cloud services present their own set of challenges, which can become complex to manage, especially when a portion of the infrastructure is on-premises.

To adequately measure the total value of a server, direct and indirect costs must be calculated. While direct costs are easy to identify, indirect costs are more discreet and can accumulate quickly. Indirect costs resulting from underperforming servers can include increased IT spend on maintenance, increased server downtime, lower employee productivity, and decreased customer satisfaction and/or retention.

IDC recommends that CIOs and IT leaders prioritize the upkeep of on-premises server infrastructure specifically by adopting more frequent replacement cadences that will help optimize their server performance. By developing trusted partnerships with IT vendors that act as extensions of the IT department, organizations can become better equipped to measure the metrics needed to determine the optimal replacement cadence for their server infrastructure.

Methodology

This white paper discusses the findings of a study commissioned by Dell Technologies and Intel. The study sought to determine the quantitative and qualitative impact of timely and delayed server infrastructure refreshes in midsize and enterprise organizations. For its analysis, IDC relied on empirical data obtained via in-depth interviews with 18 IT decision makers and a web survey of 707 IT practitioners and decision makers at midsize and large enterprises (as defined in terms of the number of employees) familiar with the impact of server replacements on server performance, server costs, IT support costs, and business operations. Additionally, IDC's observations, insights, and recommendations are based on over six decades of research and intelligence on the IT infrastructure industry and markets. All monetary values are in U.S. dollars (USD).

Situation Overview

It's clear that the world is becoming more digitized. IDC estimates that by 2025, approximately 65% of gross domestic product (GDP) will be digitized. However, there is still a long way to go. IDC estimated that at the end of calendar year 2020, less than 20% of enterprises had undergone a digital transformation (*IDC FutureScape: Worldwide Digital Transformation 2021 Predictions*, IDC #US46880818, October 2020). By 2023, direct digital transformations are expected to comprise the majority (53%) of all ICT investments (the acquisition of equipment and computer software that is used in production for more than one year), growing at a 15.5% compound annual growth rate (CAGR). To survive over the next decade, enterprises must digitally transform themselves at an unprecedented pace and scale. Enterprises that successfully make this transition are demonstrating a competitive advantage with regard to revenue growth and operating profits.

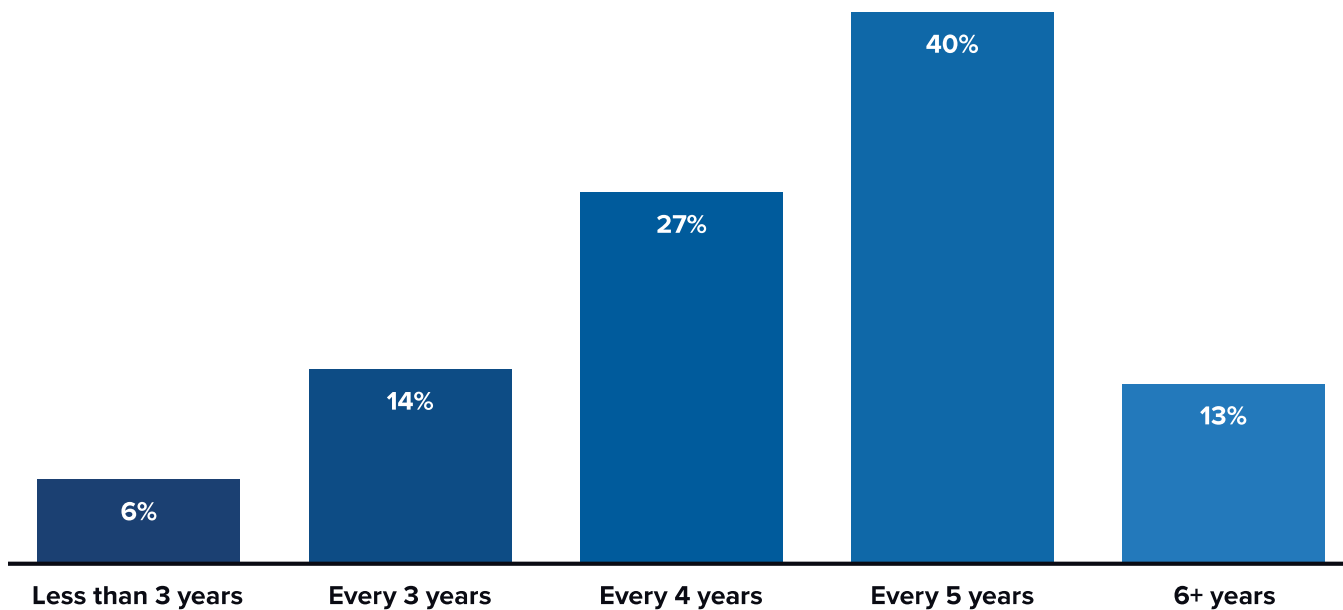
Digital transformation requires modern infrastructure. It is more powerful and easier to configure and manage. The latest infrastructure has key automation and orchestration capabilities. These capabilities increase staff efficiency, streamline processes, and minimize human errors. Enhancements to modern infrastructure are made possible through advancements in hardware, software, resource abstraction, and process technologies.

Historically, the total cost of ownership (TCO) has been a motivating factor for CIOs and IT decision makers, who used it to rationalize infrastructure replacements despite tightening budgets. Using this financial metric, enterprises can estimate the total costs of procurement, management, maintenance, and decommissioning over a device's life cycle. Yet for digital businesses, this metric fails to consider any indirect costs or benefits attributed to the hardware. By placing more weight on procurement costs, delayed replacements can appear to be cost-effective. However, new server infrastructure with enhanced automation features can increase business efficiency and value by reducing manual tasks, human error, and unplanned downtime hours, resulting in improved employee productivity. To improve business value, influential decision makers (i.e., CIOs and IT leaders) should consider additional factors that measure organizational efficiency and productivity when contemplating when to replace server infrastructure.

Financial Costs of Delayed Server Replacements

IDC consistently finds that enterprises benefit financially from timely server replacements. However, IDC also finds that many enterprises still fall into the trap of neglecting timely server replacements, with more than half (53%) of enterprise survey respondents reporting long replacement cadences of five or more years (Figure 1).

FIGURE 1
Enterprise Server Replacement Rates
(Replacement Cadence)

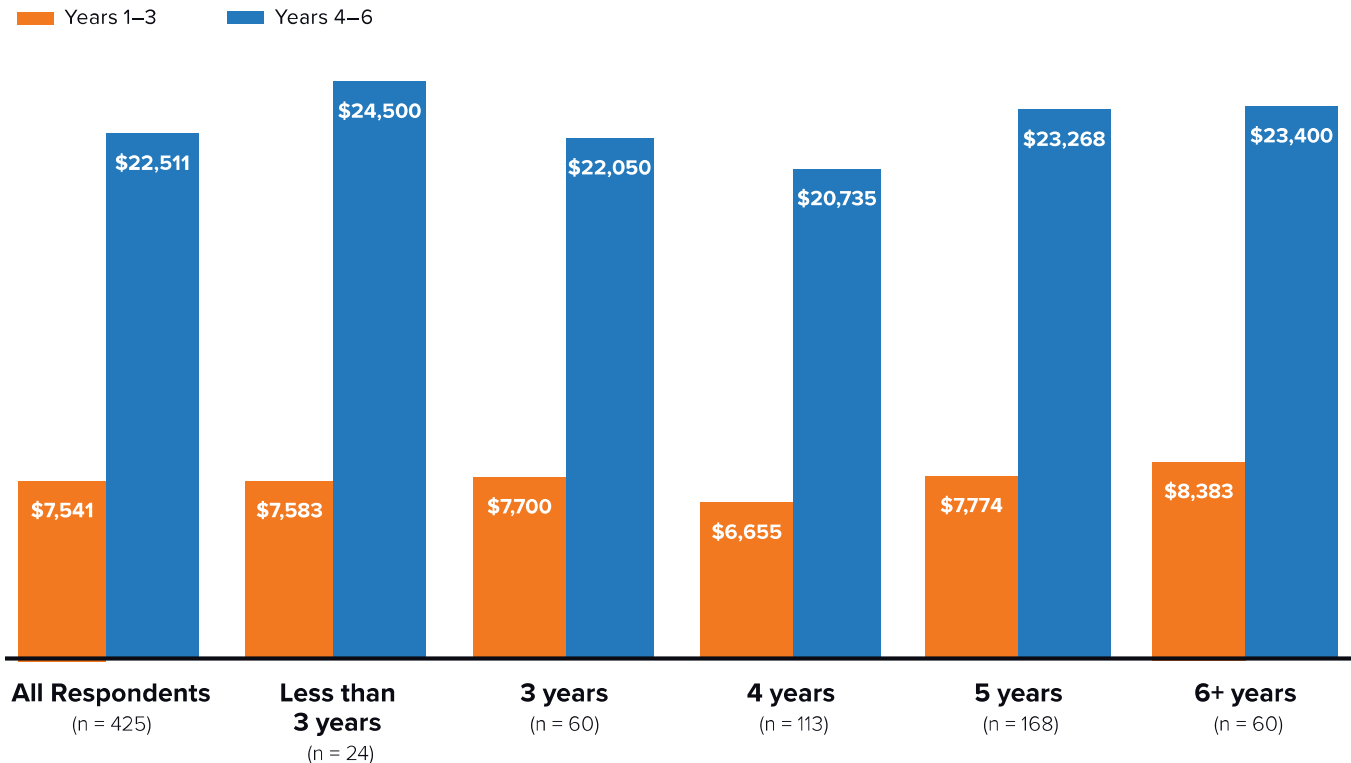


n = 425, Base = organizations with more than 500 employees
Source: Dell Server Upgrade 2020 Research, IDC, 2020

IDC’s findings show that the longer a server stays in the infrastructure, the more expensive it is to operate. Respondents indicated that their expected annual server operating costs after four years would be three times greater than operational costs expected immediately following a server replacement. On average, enterprise respondents reported an average annual operating cost of \$7,541 per server immediately following a server replacement (years 1–3). As the server ages, respondents predicted that operational costs would reach a high of \$22,511 (up 199%) during years 4–6. These trends hold regardless of the respondent’s current replacement cadence (Figure 2). Even respondents who indicated that their average replacement cadence is three years expected that the cost of operating servers during years 4–6 would increase.

These findings indicate that after the third year, procuring a new server becomes more economical than maintaining existing infrastructure. Every dollar spent on server operating costs directly competes with the cost of a new server. Organizations that hold on to servers after year 4 spend more in operating expenses than they would to procure a new server. For enterprises with particularly tight operating budgets, such tangible costs can quickly add up, even with a moderate server infrastructure footprint.

FIGURE 2
Differences in Expected Annual Server Operational Cost Following a Server Replacement, Enterprise Organizations, Years 1–3 and Years 4–6
 (Planned Replacement Cadence)



n = 425, Base = organizations with more than 500 employees | Multiple dichotomous table - total will not sum to 100%. Source: Dell Server Upgrade 2020 Research, IDC, 2020

Organizational Benefits of Timely Server Replacements

IDC finds that enterprises benefit in a variety of ways from timely server upgrades. Newer servers are more reliable, more powerful, and more resilient due to improved technologies. As a result, organizations that replace servers more frequently realize service-quality improvements and business benefits.

Service-Quality Improvements

Service-quality factors ultimately show up in how well the business can rely on its infrastructure. The better the service quality, the more scalable the business is in terms of meeting its objectives.

Enterprises reported significant service-quality gains following timely server upgrades, with the most gains being reported by organizations that adopt four-year replacement cadences (Figure 3, next page).

- ▶ **Faster application performance is a leading indicator of how the business benefits from a server upgrade.** Within the enterprise demographic, respondents cited an average 24% improvement in application performance.
- ▶ **Computing density is a combination of the number of servers consolidated with each server cycle and the (increased) number of virtual machines per server.** Enterprise-sized organizations reported a 19% improvement in virtual machine density and a 23% improvement in server consolidation.
- ▶ **IT staff productivity measures the reduction in time spent by IT staff on tactical activities.** Within the enterprise demographic, respondents cited:
 - **21% reduction** in IT staff time spent on compliance
 - **21% reduction** in IT staff time spent on routine, manual infrastructure management
 - **17% reduction** in IT staff time spent on security
- ▶ **Fewer hours spent on tactical activities means there are more hours available for strategic priorities.** Redeploying IT staff to focus on automation, for instance, can have a compounding effect (the more a company automates, the more time a company has for automation). Respondents cited a 24% increase in infrastructure automation and a resulting 22% increase in the number of servers managed per admin (due to automation).

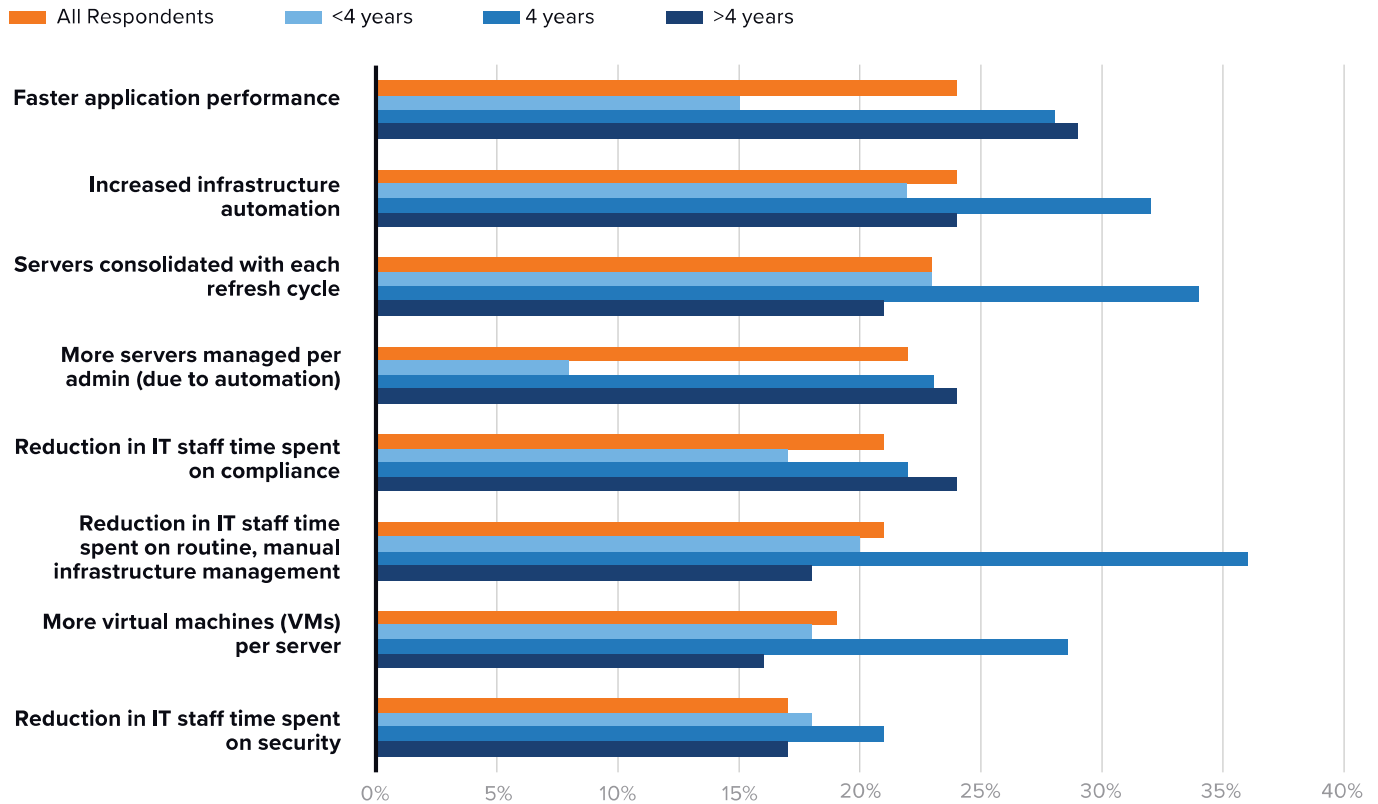
Recognition of the benefits of server replacements varies among influential decision makers. C-level executives generally view service-quality factors as being more positively affected, reporting improvements over 20% for all factors listed above, specifically calling out application performance. IT and information systems (IS) managers followed closely behind, reporting large improvements over 20% in eight out of 10 service qualities listed above.

FIGURE 3

Service-Quality Improvements Experienced by Enterprise Organizations by Replacement Cadence

(Mean Score)

Q. What percent impact did replacing aging physical servers have on the following service-quality factors?



n = 425. Base = organizations with more than 500 employees | Multiple dichotomous table - total will not sum to 100%. Source: Dell Server Upgrade 2020 Research, IDC, 2020

Business Factors

Business factors indicate the level of success an organization has obtained when fulfilling its internal and external objectives and how server infrastructure impacts these objectives.

Enterprises reported significant business gains following timely server upgrades, with the most gains being reported by organizations that adopt replacement cadences of four years or more (Figure 4, next page).

- ▶ **Improved revenue-centric factors include direct impact to the business itself.** Respondents at enterprises cited a positive impact of 19% on revenue growth, 15% on business agility, and a reduction of 14% in time to market for new products and services.
- ▶ **Improved customer-centric factors include how well the business can instill confidence in its new and existing customers.** Here, respondents cited a 20% improvement for customer experience and 21% for customer satisfaction and retention.

- ▶ **Improved internally focused factors include how well the business is taking care of itself.** Here, respondents reported impressive numbers, which include a positive impact of 18% on IT spend on innovation (versus maintenance), 22% on employee retention, 17% on employee productivity, and a reduction of 21% in compliance violations.

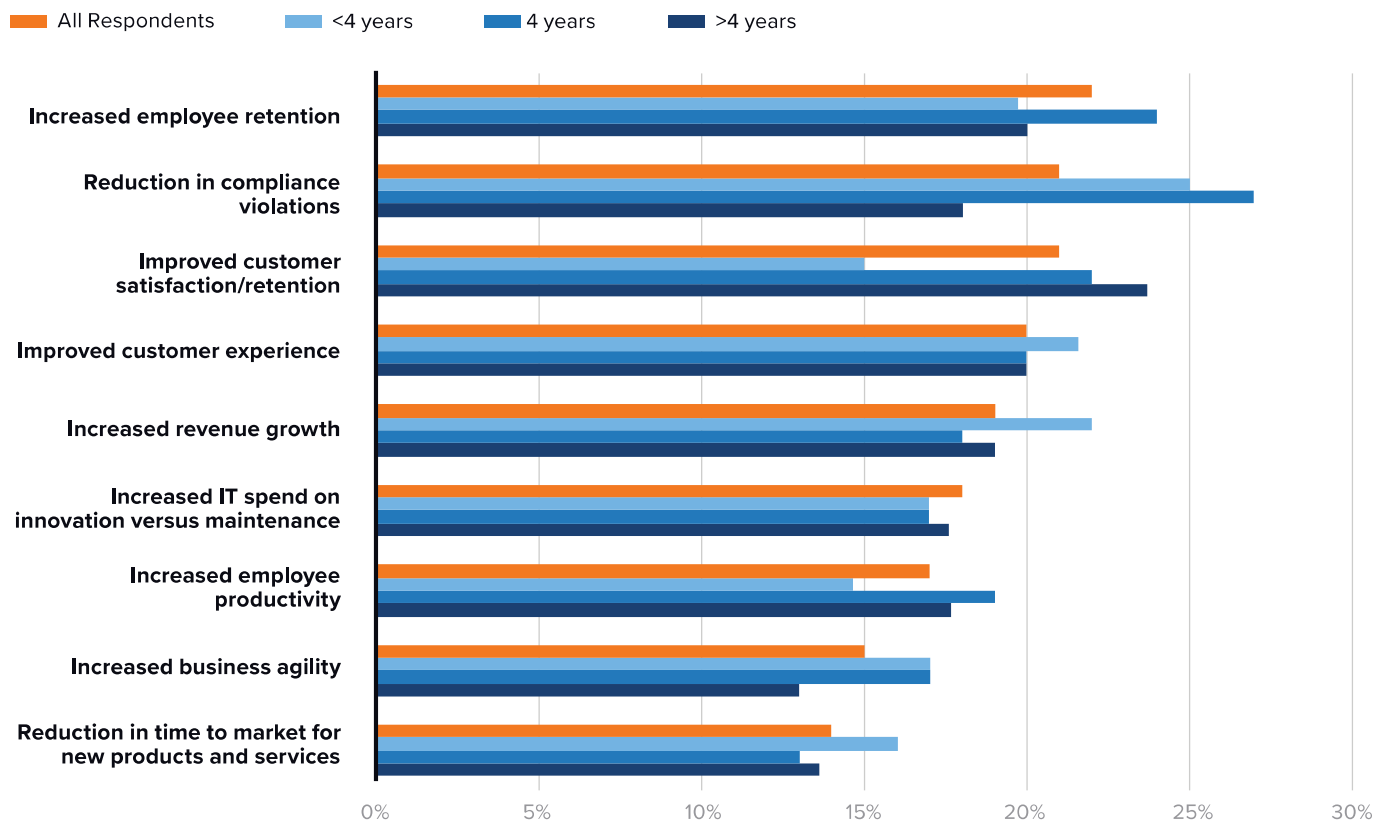
IT and IS managers reported more significant improvements to business factors compared with the average respondent across IT. They reported:

- ▶ **23% reduction** in compliance violations
- ▶ **23% increase** in revenue growth
- ▶ **23% improvement** in customer satisfaction/retention
- ▶ **21% improved** customer experience
- ▶ **22% increased** IT spend on innovation versus maintenance

**FIGURE 4
Business Improvements Experienced by Enterprise Organizations by Replacement Cadence**

(Mean Score)

Q. What percent impact did replacing aging physical servers have on the following business objectives?



n = 425, Base = organizations with more than 500 employees | Multiple dichotomous table - total will not sum to 100%. Source: Dell Server Upgrade 2020 Research, IDC, 2020

Small Frequent Improvements Result in Larger Gains

All respondents reported improvements in service quality and business factors following a server refresh. However, enterprises with longer replacement cadences (four years or more) generally reported a greater magnitude of service-quality and business-factor improvements following a server replacement. This leads many organizations to assume that the goal is the greatest possible magnitude of improvement and, therefore, that the longer cadence is better. The reality is in fact the opposite.

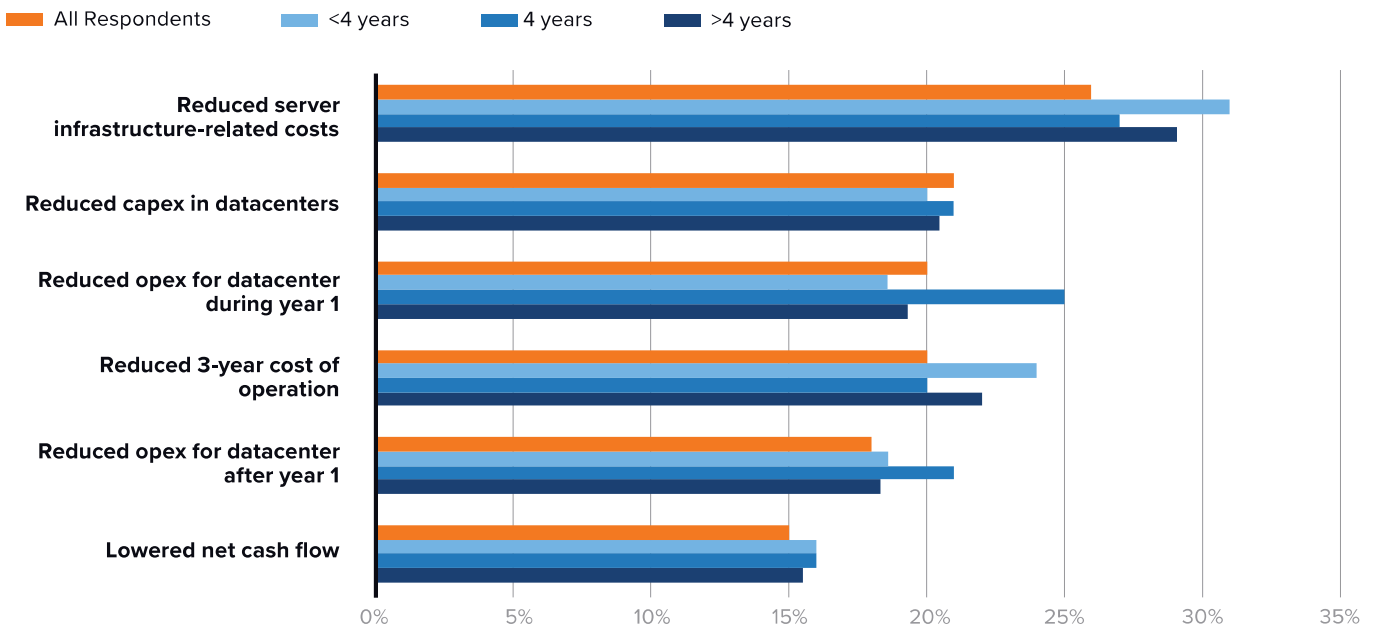
The longer a server stays in the infrastructure, the greater its negative impact, resulting in the appearance of more significant positive impacts when it is finally replaced. To optimize server performance, more frequent replacement cycles can result in a lower magnitude of service-quality and business-factor improvements; larger improvements indicate that the business is operating in a suboptimal condition once the server is past its peak operational life.

Enterprises with replacement cadences of four-plus years generally report a greater magnitude of capital and operating savings in comparison to improvements to net cash flow (Figure 5). As with service-quality and business-factor improvements, the key here is to go not for larger and less frequent increments in costs, but for smaller and consistent ones. Longer but larger cost improvements do not factor in intangible costs such as employee productivity, unplanned downtime, and the resulting impact to business. This can cause many decision makers to assume that the longer a server is used, the cheaper it is to do so.

FIGURE 5
Server-Related Costs Experienced by Enterprise Organizations by Replacement Cadence

(Mean Score)

Q. What percent impact did replacing aging physical servers have on the following operational and capital expenses?

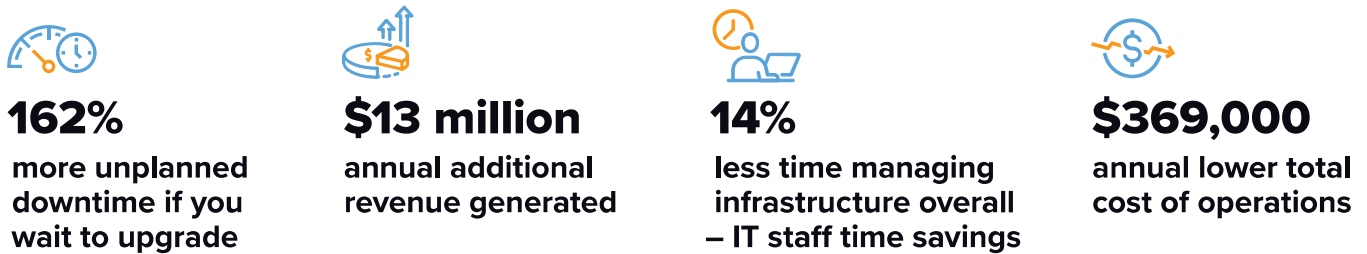


n = 425, Base = organizations with more than 500 employees | Multiple dichotomous table - total will not sum to 100%
 Source: Dell Server Upgrade 2020 Research, IDC, 2020

The Calculated Value of Timely Server Upgrades

IDC’s analysis demonstrates that enterprises that replace their servers frequently will see a total per-server cost advantage when compared with more lengthy replacement cycles. More specifically, a company with 1,000 employees that runs 200 business applications on 27 servers will reduce its total cost of ownership for server operations by 22% for a three-year replacement cycle compared with a six-year replacement cycle. **Figure 6** provides a snapshot of the business value of timely server upgrades.

FIGURE 6
Business Value Snapshot of Server Replacements



n = 425, Base = organizations with more than 500 employees
Source: IDC, 2021

Impact on Operating Costs

The study found that the cumulative operating costs quickly add up when organizations wait to upgrade their servers beyond an optimum period (which is currently considered to be four years or less). Importantly, costs go up exponentially rather than in a linear fashion: Costs increase significantly in years 4–6 of a server’s life span and substantially outweigh the initial costs of buying a new server.

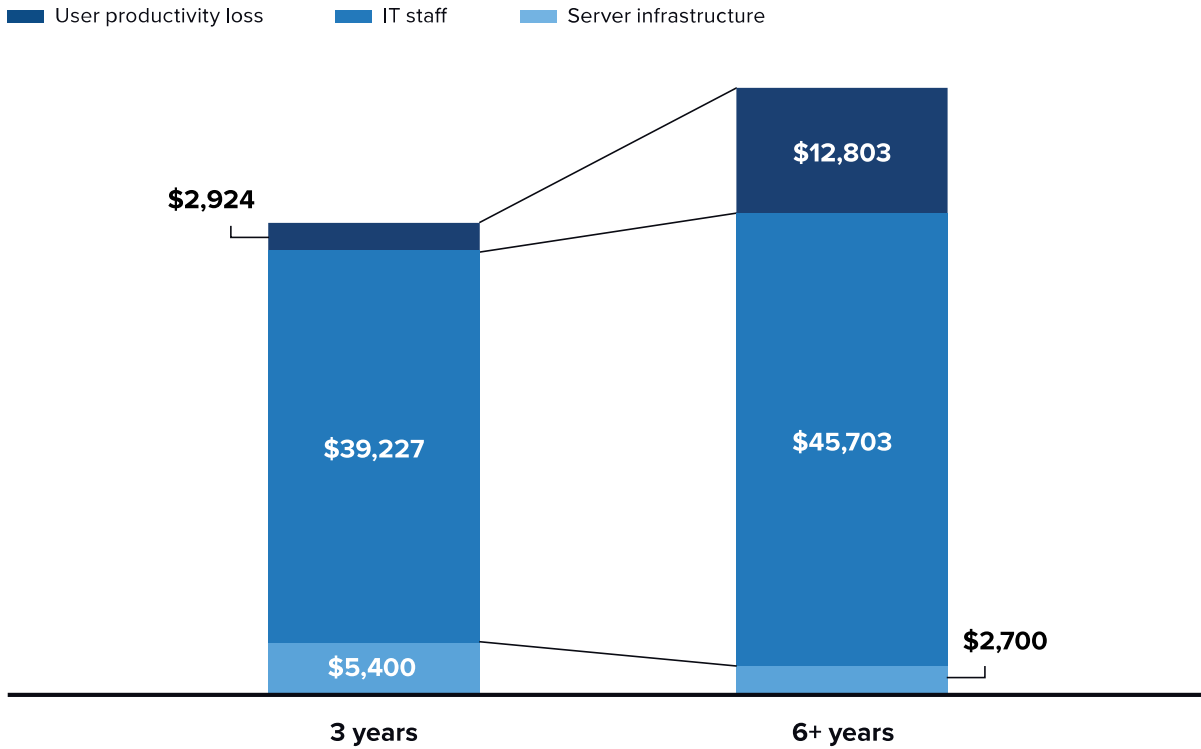
The annual per-server operating cost averages \$47,551 for organizations that replace their servers every three years (**Figure 7**, next page). For enterprises that refresh every six-plus years, the annual per-server operating costs increase to \$61,206. The difference starts at \$6,100 and reaches nearly \$14,000 at the end of year 6. By choosing not to upgrade servers in a timely manner, organizations end up not only incurring higher costs but also exposing their businesses to more risk. IDC found that the average enterprise organization reports 162% more unplanned downtime if it waits until year 6 to upgrade.

The advantages of timely server replacements also impact the top line. Research with enterprises shows that on average, 16% of server downtime results in revenue loss of up to \$250,000 per incident. Organizations with three-year replacement cycles experience roughly half the downtime and half the loss of revenue as respondents with replacement cycles of six-plus years do. In a modeled environment with 27 servers, less downtime enables an enterprise organization to generate \$13 million more in revenue per year.

FIGURE 7

The Business Value of a 3-Year Server Replacement Cycle — Annual Costs per Server (Planned Replacement Cadence)

(Planned Replacement Cadence)



n = 425, Base = organizations with more than 500 employees
Source: Dell Server Upgrade 2020 Research, IDC, 2020

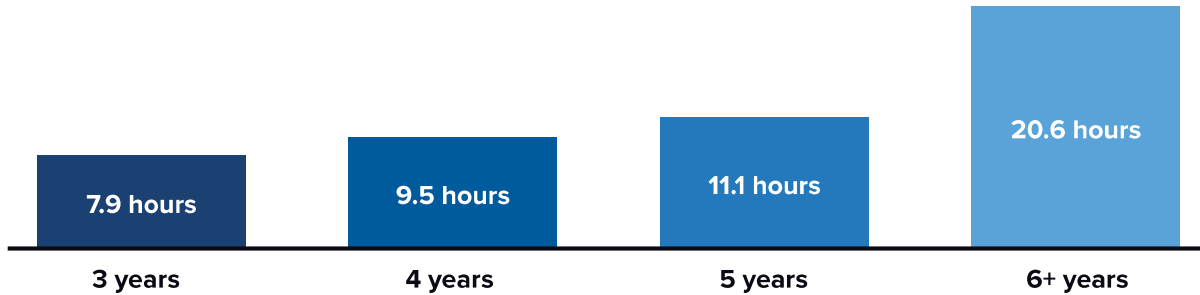
Impact on IT Staff Productivity

IDC found that timely server upgrades can save the typical enterprise up to 3,299 IT staff hours annually. This is time saved that would have been spent deploying, running, and supporting an aging server infrastructure.

Figures 8 and 9 (next page) illustrate the typical impact on staff productivity among the different replacement-cycle cadences.

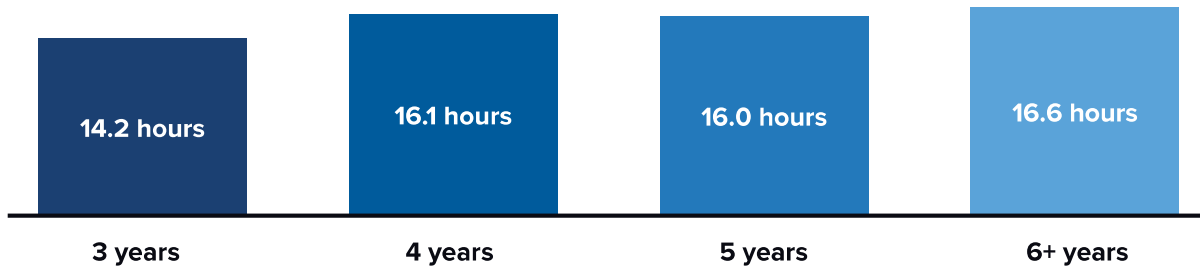
- ▶ **Unplanned downtime is costly, but the impact on staff productivity is even more crucial.** In a typical 27-server infrastructure that consists of servers beyond their optimal life span, unplanned downtime is more than doubled, from 7.9 hours to 20.6 hours per employee per year.
- ▶ **IT staff requirements per server per week increase from 14.2 hours to 16.6 hours.** This additional time is spent on maintenance and troubleshooting activities, which would be largely absent in newer server infrastructure.

FIGURE 8
Unplanned Server Downtime Hours per Employee per Year
 (Planned Replacement Cadence)



n = 425, Base = organizations with more than 500 employees
 Source: Dell Server Upgrade 2020 Research, IDC, 2020

FIGURE 9
IT Staff Time Requirements per Server per Week
 (Planned Replacement Cadence)



n = 425, Base = organizations with more than 500 employees
 Source: Dell Server Upgrade 2020 Research, IDC, 2020

Total Cost Benefits

Servers are expensive to procure and maintain. However, optimal procurement and replacement cycles can result in cost savings over time.

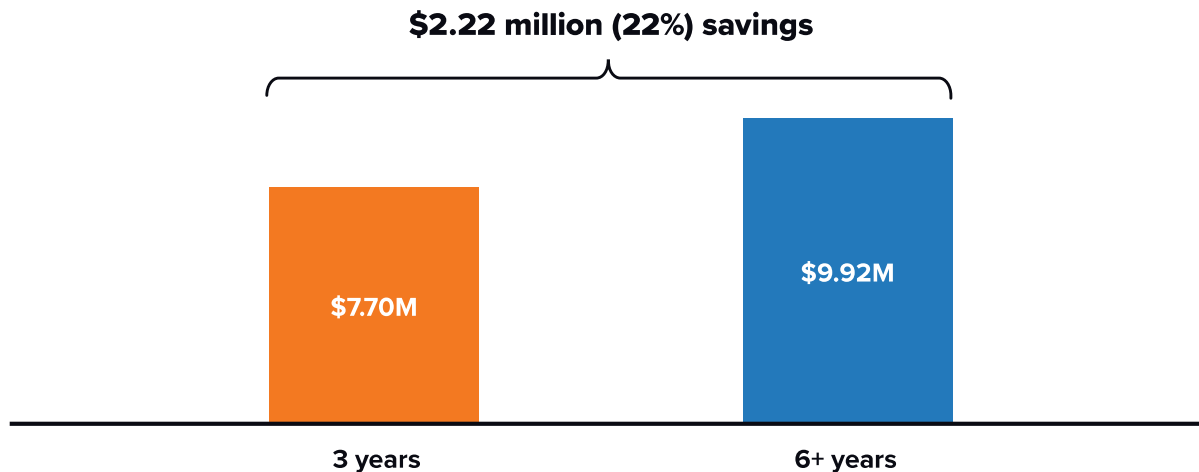
Enterprise organizations benefit from timely server upgrades through reduced operational costs in the short/medium term and capital expenses in the long term. Enterprise organizations that replaced their server infrastructure every three years reported a 36% reduction in server infrastructure-related costs and a 16% reduction in three-year operation costs. For these respondents, shorter replacement cadences led to a 22% reduction in datacenter-related capital expenses, a 24% reduction in datacenter-related operating expenses during the first year, and a 25% reduction in opex datacenter costs during subsequent years.

When all direct and indirect costs are considered, the cost savings resulting from a three-year replacement cycle surpass the cost savings gained with a six-year replacement cycle. On average, organizations with 1,000 employees that run 200 business applications on 27 servers save \$2.22 million when replacing all of their servers twice, rather than once, during a six-year period (Figure 10, next page).

FIGURE 10

Total Cost Benefits

(Planned Replacement Cadence)



n = 425, Base = organizations with more than 500 employees
 Source: Dell Server Upgrade 2020 Research, IDC, 2020

Essential Guidance for IT Buyers

Pursue Component Upgrades When They Make Economic Sense

IDC research finds that during normal circumstances, most organizations resist performing component upgrades. If component upgrades are performed, they typically occur at the end of the server life span and are most prevalent among midsize companies.

IDC’s study found that roughly half of surveyed enterprises do not perform component upgrades at all. Of those that do, the vast majority do so at the end of server life, indicating that it is looked at as a bridge to extend the optimal server life. This may be a meaningful strategy if such servers are redeployed for non-mission-critical or test and development environments, where unplanned downtime is never a critical business-stoppage issue. However, organizations — and especially enterprises with limited staff resources — should be careful not to rely on component upgrades to extend the server life span, and to minimize the number of downtime hours or production and revenue correlated with longer replacement cycles. Component upgrades, no matter how extensive, do not extend the optimal life of the core pieces of the server.

Instead, IDC recommends that enterprises prioritize investments in analytics and reporting capabilities to monitor their server infrastructure. They must ask their vendors to provide tools that help measure their current workloads so they can make more informed decisions on new server purchases. This enables a seamless transition.

About Dell Technologies and Intel

Dell Technologies

Dell Technologies is a leading provider of IT products and services for enterprises. Dell's extensive portfolio of IT products and services spans servers, storage, data protection, networking, converged and hyperconverged infrastructure, software-defined datacenter and cloud platforms, as well as enterprise infrastructure software in the virtualization, storage, security, and data protection markets. In the server market specifically tailored for enterprises, the vendor's portfolio comprises various form factors designed to serve a variety of performance- and capacity-optimized workloads that organizations rely on for hosting their current and next-generation applications.

Dell PowerEdge servers are designed with key features that enable organizations to transform their IT operations and infrastructure. PowerEdge servers are available in rackmount, modular, and tower models. There are options for compute- and storage-intensive configurations. The Dell OpenManage systems management portfolio helps tame the complexity of IT infrastructure with intuitive tools that work together to deliver automated, repeatable processes, based on unique policies, enabling effortless management. The combined features and capabilities of PowerEdge servers and OpenManage systems management tools deliver time and resource savings, with automation and intelligent management.

Intel

Intel provides solutions and services that drive digital transformation, leading to enhanced business outcomes. Intel's server processors deliver the capabilities to support datacenter infrastructure and applications, from cloud and in-memory analytics to HPC and AI. Intel's server processor portfolio includes the Intel Xeon Scalable Processor and Intel FPGA-based acceleration solutions. The Intel Xeon Scalable platform provides a foundation for datacenter agility and scalability, as this innovative processor provides high levels of capabilities and convergence across compute, storage, memory, network, and security. Intel's FPGA-based acceleration solutions help end users move, process, and store data quickly and efficiently. As workloads and traffic patterns shift, Intel FPGAs can anticipate needs and bring optimized hardware acceleration to bear on critical points. Additionally, Intel offers technologies that expand the memory and storage capacity of the datacenter. Intel's memory and storage portfolio includes Intel Optane Persistent Memory, Intel Optane SSD, and Intel QLC NAND Technology. With Intel's Optane Persistent Memory, end users can improve performance levels in memory-intensive workloads and virtual machine density. The Intel Optane Solid State Drive (SSD) helps eliminate datacenter storage bottlenecks and allows for large data sets. This storage solution can accelerate applications, reduce transaction costs for latency-sensitive workloads, and improve overall datacenter TCO. The Intel QLC NAND Technology helps shrink HDD system footprints, reduce costs, and enhance performance.

Conclusion

Maintaining a modern server infrastructure is becoming a critical success factor for enterprises in most industries. End-user expectations have risen to the point at which IT is expected to be ubiquitous in the same way electricity is. Unexpected outages and downtime can have a direct impact on revenue and customer satisfaction — hence the need for modern server infrastructure. However, IDC recognizes that maintaining a regular replacement cycle is not always easy or simple. Cost is often the primary challenge, as upgrading servers requires capital expenditures that involve budget allocation. Coordination across multiple IT departments and business units can also be challenging. The scheduling of the required resources often involves reallocating staff from other projects. These inhibitors may lead to delays and hesitation in the upgrade cycle.

Yet despite the challenges, there are distinct benefits to proactively maintaining a modern server infrastructure. Overall, the complexity within the server infrastructure is simplified, as IT can reduce the amount of legacy hardware, tools, and processes. Keeping servers up to date enables IT staff to take full advantage of enhanced management tools to drive efficiency as well as optimize systems to improve application performance. Replacing servers ensures that infrastructure is tailored to current application requirements. As business needs change, so do application needs. By proactively replacing each server at the optimized time, IT can better maximize the value it delivers for the business and reduce costs.

About the IDC Analysts



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Heather West is a Senior Research Analyst within IDC's Enterprise Infrastructure practice. In this role, Heather contributes to semi-annual Server and Storage Workloads Trackers, primary market research, and custom data modelling.

[More about Heather West, Ph.D.](#)



Ashish Nadkarni
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Ashish Nadkarni is Group Vice President within IDC's Worldwide Infrastructure Practice. He leads a team of analysts who engage in delivering qualitative and quantitative research on computing, storage, and data management infrastructure platforms and technologies, via syndicated research programs (subscription services), data products (IDC Trackers), and custom engagements. Ashish's vision for his team is to take a holistic, forward-looking, and long-term view on emerging as well as established infrastructure-related areas in the datacenter, in the cloud, and at the edge. His core research starts with an objective assessment of heterogeneous, accelerated, fog, edge, and quantum computing architectures, silicon, memory, and data persistence technologies, composable and disaggregated systems, rackscale design, software-defined infrastructure, modern operating system environments, and physical, virtual, and cloud computing software. It is complemented by research on current and next-gen applications and workloads, vertical and industry-specific use cases, emerging storage and server form factors and deployment models, and upcoming IT vendors. Ashish also takes a keen interest in tracking the ongoing influence of open and open-source communities like OpenStack and Open Compute Project on infrastructure.

[More about Ashish Nadkarni](#)

Message from the Sponsor

Do your servers need replacing?

Dell Technologies offers Live Optics, a free tool that anyone can use to collect and visualize data about their IT infrastructure and workloads. Live Optics provides a method of impartially documenting server/storage configuration and performance as well as observing file characteristics of data. If you decide to share your data with Dell, they can provide you with a free A3 report that helps quantify whether your existing servers need replacing.

[Learn more about Live Optics](#)



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