Business Value Highlights

382%
five-year ROI

8 months
to payback

47%
lower five-year cost of operations

63%
more efficient IT infrastructure teams

99%
less unplanned downtime

52%
faster to deploy new virtualized applications and desktops

Business Value of Cisco Compute Infrastructure for Virtualized Applications, Desktops, and Workstations

EXECUTIVE SUMMARY

Virtualized applications and desktops are a key component in work-from-home, intelligent workspace, and future-of-work transformations. Prior to the worldwide pandemic, economic disruption, and social unrest in early 2020, organizations were already moving forward with these transformations; these disruptions served to accelerate the rate and depth of the event.

This acceleration did not, however, change the underlying technical realities of virtualization. Virtualized applications and desktops are still highly sensitive to performance degradation. The infrastructure resources used to provide compute and storage to the software need to be located as close to the data and applications being provided as practically possible. The operations and management of the brokers, hardware, and network components require time, focus, and attention.

These requirements are not unusual; in fact, they underlie the workload allocation decisions in most enterprise IT environments. IDC research indicates that these environments tend to stabilize at about 33% public cloud IaaS, about 34% hosted and private cloud, and about 33% dedicated hardware, with focused surveys showing that virtual desktop infrastructure (VDI) mirrors the overall balance.

IDC interviewed organizations running virtualized applications, desktops, and workstations for professional graphics on Cisco infrastructure, including Cisco UCS and Cisco HyperFlex solutions (collectively "Cisco infrastructure for VDI"). Interviewed Cisco customers rely on their ability to deliver timely and high-performing VDI services to their employees and customers. They reported achieving strong value by upgrading with Cisco infrastructure for their VDI environments, which IDC projects will be worth $1.07 million per organization ($61,400 per 100 VDI users) by:

- **Lowering operational costs** through efficiencies in managing infrastructure and optimizing infrastructure costs to run like VDI workloads

- **Minimizing productivity and revenue losses** by bringing down the frequency and duration of unplanned outages affecting virtualized workloads and ensuring business resiliency through centralized management of virtualized devices

- **Meeting business needs for virtualized functionality** by enabling faster delivery of new virtualized applications, desktops, and workstations

- **Increasing employee productivity levels** by delivering higher-performing virtualized applications, desktops, and workstations for professional graphics

SITUATION OVERVIEW

In December 2019, a novel coronavirus with pandemic potential was detected; four months later, it had spread across the world, sparking a global natural disaster and economic disruption. This event accelerated but did not fundamentally alter trends that were already in motion in the work environment, forcing the rapid adoption of all technologies that enable remote work experiences. Upticks in hardware sales (both client devices and datacenter infrastructure) accompanied large surges in public cloud subscriptions; security and networking software as purchased alongside application and client virtualization and workflow, process automation, and service enablement software along with low-code/no-code development platforms were also utilized.

This rapid acceleration came on top of already robust growth and changes in application and desktop virtualization software. Vendors had already begun to market managed services bundling software with cloud IaaS (desktop as a service, or DaaS) and provisioning leased desktops directly from the factory with fully virtualized environments (PC as a service, or PCaaS). Many have moved to subscription models for their control planes and associated operational software, while Microsoft released Windows Virtual Desktop (WVD) with multiuser session capability, dramatically cutting per-user infrastructure cost. Intelligent workspaces, with the ability to coordinate edge computing devices, as well as disaggregating applications, artificial intelligent security, and adaptive workflows, have started to emerge after almost 20 years of empty promises.

These changes were part of the long-term trend to bring virtual desktop infrastructure (the compute used to run software, aka VDI) and virtual client computing (VCC) software (used to monitor, operate, and provide virtualized applications and desktops) into the same

architecture and cost structure as server and compute resources. IDC research indicates that, globally, organizations are achieving the following balance of infrastructure resources:

- About 33% public cloud IaaS

- About 34% hosted and private cloud

- About 33% dedicated hardware

Of these, about 67% of resources are available "locally," within a datacenter operated or contracted by the individual enterprise. This distribution is driven by the fundamental logic of virtualization; the software to provide the virtual sessions and the resources to drive them need to be located as close as possible to the applications/data the sessions access to ensure a seamless experience.

Virtual desktop infrastructure has the same operability and reliability requirements as any other mission-critical infrastructure. Disruptions in the infrastructure have immediate and measurable negative impacts on both end-user productivity and user experience; degraded performance, anywhere in the chain of devices from the virtualization compute to the end-user device, has the same effect. This sensitivity has led to an increase in analytics and monitoring both within the virtualization software providers and, equally importantly, in the underlying VDI systems themselves.

CISCO INFRASTRUCTURE FOR VDI

Cisco UCS and HyperFlex are computing solutions built on stateless hardware that is fully programmable via policy. The environment deploys from service profiles based on those policies in an automated fashion, allowing for rapid deployment and provisioning and adaptive reconfiguration as the business environment changes. In addition, the stateless design allows for the inclusion of additional resources (compute, storage, network, etc.) as required.

To facilitate this flexibility, Cisco has combined its internal architectural expertise with customers' practical engineering practices to create Cisco Validated Designs, preconfigured solutions that support a variety of use cases. These solutions provide tested configurations that can then be adapted to specific workloads and environmental situations.

This combination of stateless infrastructure and policy-based configuration is well suited to the dynamic nature of virtual desktop infrastructure requirements. VDI typically needs a high level of both availability and flexibility to gather and release resources as required by its

low-latency and high-variability requirements; this balance can be difficult to maintain with more stateful architectures.

THE BUSINESS VALUE OF CISCO INFRASTRUCTURE FOR VDI

Study Demographics

IDC conducted research that explored the value and benefits for organizations in using Cisco infrastructure (Cisco HyperFlex or Cisco UCS) to support their VDI systems and environments. The project included nine interviews with individuals at organizations who have experience and knowledge about the benefits and costs of using Cisco infrastructure to run their VDI workloads. Interviews covered a variety of quantitative and qualitative questions about the impact of using Cisco infrastructure for VDI on their IT operations, businesses, and costs.

Table 1 presents study demographics and profiles of interviewed organizations. While there was significant diversity among interviewed organizations in terms of size, geography, and industry, they all relied on virtualized applications, desktops, and workstations as a core element in their IT and business operations. The organizations interviewed had an average base of 21,314 employees (2,500 median) and revenue of upward of $6.2 billion per year ($426.2 million median). In terms of geographical distribution, four organizations were based in the United States, with the remainder in Austria, Sweden, China, India, and Japan. From a vertical industry standpoint, industries represented included the higher education (three), manufacturing (two), education services, financial services, IT service provider, and nonprofit sectors.

TABLE 1 Demographics of Interviewed Organizations

	Average	Median
Number of employees	21,314	2,500
Number of IT staff	244	26
Number of business applications	925	150
Annual revenue	$6.20 billion	$426.2 million
Countries	United States (4), Austria, Sweden, China, India, and Japan	
Industries	Higher education (3), manufacturing (2), education services, financial services, IT service provider, and nonprofit	

n=9   Source: IDC, 2020

Choice and Use of Cisco Infrastructure for VDI

Interviewed organizations discussed the rationale behind their choice of Cisco infrastructure to run their VDI environments. Some of the key factors they focused on were the ease of deployment and their confidence in the overall reliability and performance. They also cited the ability to run the Cisco infrastructure efficiently and cost effectively compared with competitive alternative solutions. Study participants elaborated on these selection criteria:

- **Better VDI performance, NYU Shanghai:** *"We chose Cisco HyperFlex for our VDI workloads because its performance is much better than the other HCI solutions we considered. We did some tests to compare Cisco and another HCI vendor, and Cisco is faster and more stable."*

- **Strong performance and ease of management, Region 14 ESC:** *"Cisco UCS is the workhorse for us. It does the labor, and we don't have to bother with it … Once we plug everything into it that you want, we don't bother with it anymore, we just use whatever is plugged in."*

- **More efficient use of compute and storage capacity, Hoganas:** *"We chose Cisco HyperFlex because it is a more robust solution … We can basically leverage way more horsepower, share it among different people, and not have to buy every engineer a fancy workstation."*

We chose Cisco HyperFlex for our VDI workloads because its performance is much better than the other HCI solutions we considered. We did some tests to compare Cisco and another HCI vendor, and Cisco is faster and more stable.

—NYU Shanghai

Table 2 presents data on the VDI environments that interviewed organizations are running on Cisco infrastructure. As shown, these organizations were using a combined average of 15 Cisco HyperFlex and Cisco UCS infrastructure machines in total to support their VDI operations. A substantial number of employees — 1,738 in total on average per organization — rely on Cisco infrastructure to deliver the virtualized applications and computing platforms they use to perform their jobs on a day-to-day basis. Study participants reported having an average of 145 virtualized applications and 712 virtual desktops that run on their Cisco HyperFlex and Cisco UCS infrastructure platforms.

TABLE 2 Cisco Infrastructure for VDI Use by Interviewed Organizations

	Average	Median
Total number of Cisco HyperFlex machines/Cisco UCS systems	15	12
Number of virtualized applications	145	100
Number of virtual desktops	712	200
Number of virtualized workstations for professional graphics	41	0
Number of users of virtualized applications, desktops, and workstations	1,738	250

n=9   Source: IDC, 2020

Business Value and Quantified Benefits

IDC's research demonstrates the strong value for Cisco customers in running virtualized applications, virtual desktops, and virtual workstations on Cisco HyperFlex and Cisco UCS infrastructure solutions. Interviewed organizations reported benefiting from cost and staff efficiencies, improved performance, and increased agility. Interviewed Cisco customers described these benefits:
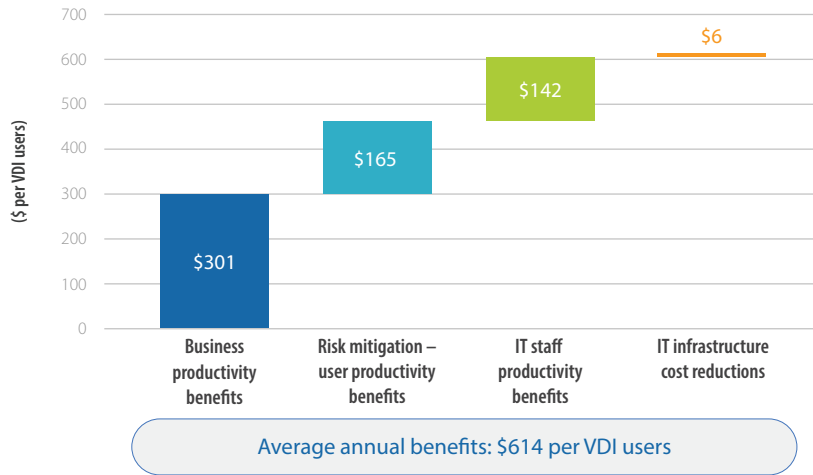
- **Ability to address user needs:** *"The soft ROI is where we get the big benefit with Cisco UCS. Now, VDI can be used any time, any place, anywhere. We're not locked down to desk/local environments anymore … We've expanded from 500 to 2,000 desktops."*

- **Ability to support business with timely infrastructure:** *"The turnaround time with Cisco is fabulous, and that's important in any business. You cannot ask for two months for any new hardware deployment … You have to deliver the solution as soon as possible and enable the organization to start earning more business."*

Based on interviews with Cisco customers, IDC calculates that they will achieve value worth an annual average of $614 per VDI user ($1.07 million per organization) in the following areas (see Figure 1):

- **Business productivity benefits:** Employees benefit from faster delivery and improved performance of virtualized applications, desktops, and workstations with Cisco infrastructure solutions. IDC puts the value of higher productivity at an annual average of $301 per VDI user ($522,700 per organization).

- **Risk mitigation — user productivity benefits:** Study participants face fewer business interruptions with Cisco infrastructure by reducing the frequency and impact of unplanned outages. IDC projects that they will realize benefits worth $165 per VDI user ($286,000 per organization) in higher productivity and revenue.

- **IT staff productivity benefits:** IT infrastructure and help desk teams benefit from having consolidated, automated, and high-performing IT foundations for their VDI workloads. IDC estimates that the value of IT staff time savings and productivity gains will be $142 per VDI user per year ($247,500 per organization).

- **IT infrastructure cost reductions:** Interviewed customers lower their infrastructure capital and operational expenses with Cisco infrastructure solutions. IDC calculates that they will lower operational costs related to power and datacenter space costs by an annual average of $6 per VDI user ($10,900 per organization).

> " *The soft ROI is where we get the big benefit with Cisco UCS. Now, VDI can be used any time, any place, anywhere. We're not locked down to desk/local environments anymore … We've expanded from 500 to 2,000 desktops.* "

FIGURE 1 Average Annual Benefits per VDI User

n=9   Source: IDC, 2020

Infrastructure-Related Staff Efficiencies and Cost Savings

> **"** *A lot of the reason we went with Cisco to run our virtualized workloads is because of the management capabilities … The ability to create machine profiles across all of our infrastructure was a big reason.* **"**
>
> —DENSO

Organizations providing virtualized applications, desktops, and workstations can only realize the full benefits of VDI if they can manage and scale cost effectively and with ease. Cisco infrastructure — including Cisco HyperFlex and Cisco UCS — is designed to optimize operational costs related to running VDI workloads, including scalability, simplified management, and cost-effective hardware. Interviewed organizations highlighted the advantages for their IT infrastructure and help desk teams from running VDI workloads on Cisco infrastructure, noting that they can manage their compute, storage, and networking resources from a single console. Study participants commented on these efficiencies with Cisco hardware:

- **Strong management capabilities, DENSO:** *"A lot of the reason we went with Cisco to run our virtualized workloads is because of the management capabilities … The ability to create machine profiles across all of our infrastructure was a big reason."*

- **Single VDI platform more efficient to manage:** *"We have one resource dedicated to server and storage administration with Cisco HyperFlex, and about 25% of this person's time is for VDI workloads. With the previous infrastructure, it was 33% because we had to manage separate server and storage platforms."*

Table 3 shows the benefit of Cisco infrastructure for teams responsible for managing and provisioning infrastructure resources to run their organizations' VDI environments. More

effective utilization of network, compute, and storage resources, coupled with smart management tools, made it possible for interviewed organizations to deploy and manage VDI environments with just 1.4 team members on average, as opposed to needing almost 4 staff members with their previous and/or other infrastructure environment. As shown in Table 3, Cisco customers have achieved 63% average efficiencies for their IT infrastructure teams supporting VDI environments.

TABLE 3 Impact on IT Infrastructure Management Team

Average per Organization	Previous/Other Solution	With Cisco Infrastructure for VDI	Difference	Change (%)
Staff time to manage infrastructure for equivalent workloads — FTEs per organization	3.8	1.4	2.4	63
Hours of staff time per 100 VDI users per year	410	151	259	63
Equivalent value of staff time to manage infrastructure per organization per year	$379,100	$139,700	$239,400	63

n=9   Source: IDC, 2020

> **"** The Cisco team helped us build in enough capacity to our Cisco VDI platform so that we can scale out just by physically adding memory and CPU without any additional cost … We're avoiding $10,000 per year in additional capacity because we have this scalability with Cisco. **"**
>
> —Hoganas

IDC also analyzed the infrastructure costs for running like VDI workloads with Cisco infrastructure. Study participants reported that they have both lowered up-front capex investment requirements and reduced operational costs related to power usage, datacenter space allocation, and other factors. These savings were made possible by having a more consolidated infrastructure platform that enabled efficient use of compute/storage resources, along with functionality such as storage compression that served to lower capacity needs. IDC calculated that Cisco infrastructure resulted in 15% lower costs for running equivalent VDI workloads. Study participants commented on these cost-related benefits:

- **Lower VDI costs from improved scalability, Hoganas:** *"The Cisco team helped us build in enough capacity to our Cisco VDI platform so that we can scale out just by physically adding memory and CPU without any additional cost … We're avoiding $10,000 per year in additional capacity because we have this scalability with Cisco."*

- **Optimized storage infrastructure costs for VDI workloads, NYU Shanghai:** *"We only need 40TB for our VDI workloads because Cisco HyperFlex enables compression. With a more traditional approach, we would have needed between 60TB and 80TB … The overall cost would be more with a traditional infrastructure approach, probably around 30% more than with Cisco HyperFlex."*

Figure 2 illustrates that IT staff and infrastructure cost efficiencies combined to provide significant value for interviewed organizations, enabling them to run their virtualized environments at an average 47% lower cost. IDC calculated that this will provide Cisco customers with cost and staff time savings of over $700 per VDI user over a five-year period.

FIGURE 2 Five-Year Cost of Operations

n=9   Source: IDC, 2020
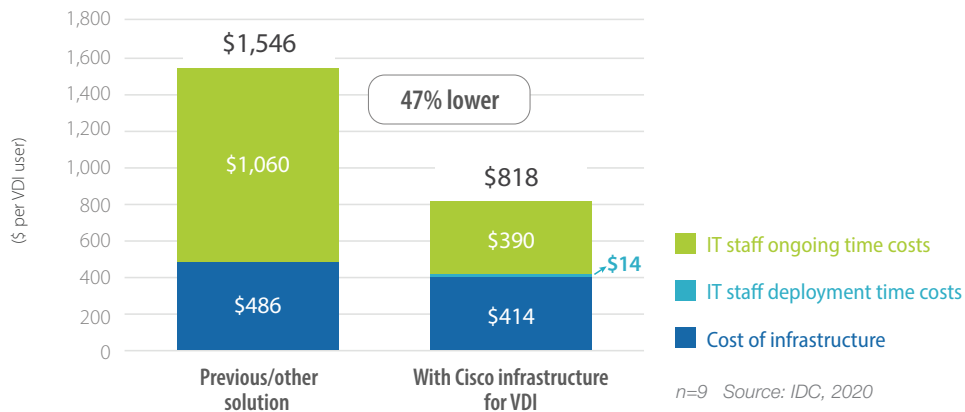
Reliable Infrastructure for VDI Operations

Cisco infrastructure provides a foundation that enables VDI systems to be deployed and run in a robust fashion. Significant numbers of end users at interviewed organizations depend upon the availability of virtualized applications, desktops, and workstations for their day-to-day work, making high levels of reliability crucial. Study participants verified that Cisco infrastructure provides a highly available and resilient foundation for their VDI environments that has minimized user- and revenue-impacting outages and/or performance degradation. They commented on these benefits:

- **Benefit of strong reliability, Region 14 ESC:** *"Everything is always up, and everyone can access our systems from anywhere at any time. Cisco UCS is just really reliable. There is no more downtime."*

- **Zero unplanned outages mean no VDI-related business losses:** *"We've literally had zero downtime since we put in Cisco HyperFlex. If we were using traditional servers, it would probably be two to three outages per year at two hours each completely affecting all of our users … Also, manufacturing would stop, and we could lose up to $100,000 per hour."*

As shown in Table 4, study participants reported almost no impactful downtime occurring after the deployment of Cisco VDI, with each VDI user losing less than three minutes of productive time per year due to unplanned outages. This meant significant reductions in operational

risk and related benefits in the form of higher user productivity and revenue. Interviewed organizations reported reducing and/or avoiding productivity losses worth an average of $275,200 and revenue losses worth $127,500 per organization per year.

TABLE 4 Impact on Unplanned Downtime

	Previous/Other Solution	With Cisco Infrastructure for VDI	Difference	Change (%)
Unplanned outages per year per organization	9.5	0.3	9.3	97
MTTR (hours)	2.7	0.9	1.8	65
Hours of lost productive time per user per year	4.3	0.0	4.3	99
Value of lost productive time per year in FTEs per organization	4.0	0.0	4.0	99
Value of lost productive time per year per organization	$278,200	$3,000	$275,200	99

n=9   Source: IDC, 2020

Improved VDI Agility

Having an infrastructure that enables fast and timely provisioning of VDI functionality for new VDI users and workloads is vital to an organization's ability to fully leverage the promise of VDI. Cisco infrastructure is preconfigured for deployment of virtualized workloads, which allows for rapid provisioning of new applications, desktops, and workstations for professional graphics. Study participants commented on how they were able to scale up resources for their user base in an agile fashion and do so quickly and efficiently:

"Cisco UCS has made us more agile and responsive to business demand because we can get new VDI features to users faster … Releasing a new feature now takes on average a few hours, whereas it took a few days before."

- **Providing ability to grow VDI environment on demand:** *"Having Cisco HyperFlex helps with our VDI agility because we plug a server in and everything gets configured. For VDI, we can grow on demand. To add more users, we just buy a new server, plug it into the rack … and we are good to go. It's as simple as this. Before, it would take a week to increase capacity."*

- **Ensuring user access to new features:** *"Cisco UCS has made us more agile and responsive to business demand because we can get new VDI features to users faster … Releasing a new feature now takes on average a few hours, whereas it took a few days before."*

- **Ease of deployment and ability to scale, Chuo University:** *"The deployment period with Cisco HyperFlex was very short … It only took one week including the planning. We haven't done an expansion yet but expect it will be very easy and we're looking forward to it."*

These proof points are quantified in Figure 3. As shown, the use of Cisco infrastructure reduced, by more than half, the time required to deploy new virtualized applications and desktops.

FIGURE 3 Impact on Deployment of Virtual Applications and Desktops

n=9   Source: IDC, 2020
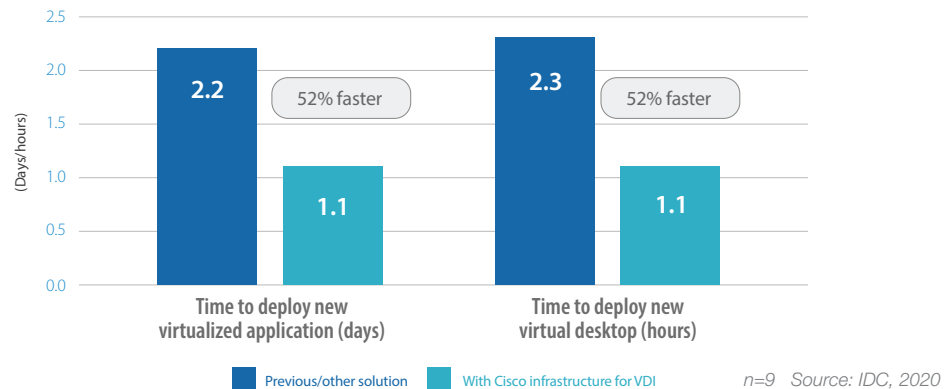
IDC also evaluated the impact of Cisco infrastructure on user productivity in terms of timely delivery of VDI functionality. As shown in Table 5, on average, faster delivery of virtualized desktops and workstations enabled higher productivity for over 750 users per organization. This was further quantified as a 17% improvement, yielding an annual business value of $78,000 per organization.

TABLE 5 Higher User Productivity: Faster Deployment of
Virtualized Desktops

	Per Organization	Per 100 VDI Users
Number of impacted users	753	43
Average productivity impact	17.0%	17.0%
Net productivity gain — FTEs	1.1	0.06
Value of higher productivity	$78,000	$4,500

n=9   Source: IDC, 2020

Improved VDI Performance

Because VDI operations are centralized in the datacenter, high performance is essential to avoid infrastructure-related service degradation that might directly or indirectly cause latency, outages, and/or interruptions that could negatively impact end-user experience and productivity. Strong performance for virtualized applications, desktops, and workstations is therefore an integral part of productive work experience. In this study category, interviewed organizations cited key benefits such as reduced latency, faster application performance, quicker login, increased accessibility to virtualized desktops and workstations, and overall higher satisfaction with their VDI resources:

> **"** *By upgrading to Cisco HyperFlex for our VDI workloads, we've increased performance by 30–50%. With increased compute resources with Cisco HyperFlex, we changed our model so that every virtual desktop user gets their own dedicated VM machine. That helps with performance …* **"**

- **Improved user experience:** *"With Cisco UCS and HyperFlex, our VDI users no longer have to wait on things because of a performance impact in the terminal server or the remote lag, which could be 10 seconds up to 5–10 times a day per person. People would get annoyed because work would have to stop. This doesn't happen anymore."*

- **Much improved VDI performance and fewer user-impacting issues:** *"By upgrading to Cisco HyperFlex for our VDI workloads, we've increased performance by 30–50%. With increased compute resources with Cisco HyperFlex, we changed our model so that every virtual desktop user gets their own dedicated VM machine. That helps with performance … "*

Table 6 drills down on the impact for interviewed organizations of running their virtualized applications, desktops, and workstations on Cisco infrastructure in terms of end-user productivity. As shown, improved performance of these VDI workloads has a direct and quantifiable impact on user productivity levels.

### TABLE 6 Higher User Productivity: Improved Performance

	Per Organization	Per 100 VDI Users
Virtualized applications		
Number of impacted users	986	57
Average productivity impact	1%	1%
Productivity gain — FTEs	7.2	0.41
Value of higher productivity*	$75,500	$4,300
Virtualized desktops		
Number of impacted users	712	41
Average productivity impact	1%	1%
Productivity gain — FTEs	5.2	0.3
Value of higher productivity	$363,800	$20,900
Virtualized workstations		
Number of impacted users	41	2
Average productivity impact	1%	1%
Productivity gain — FTEs	0.3	0.02
Value of higher productivity	$20,700	$1,200

* A 15% operating margin assumption has been applied.

n=9   Source: IDC, 2020

Figure 4 provides summary data on higher end-user productivity resulting from the use of Cisco infrastructure to run virtualized workloads. The data combines unplanned downtime benefits with performance benefits shown in Table 6, resulting in an annual average of 12 hours per user of additional productive time, the equivalent of over $45,000 in value from higher productivity per 100 VDI users.

FIGURE 4 Overall Impact on User Productivity

n=9   Source: IDC, 2020
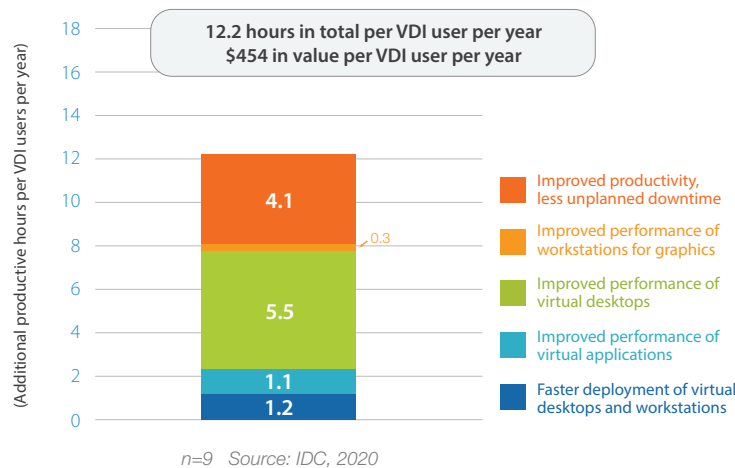
Better Ability to Respond to Changing Conditions

Organizations must constantly adapt to changing business and operational conditions, as demonstrated by the current COVID-19 pandemic. For interviewed organizations, being able to deliver high-performing VDI functionality to their employees and customers has been critical to their ability to maintain operational continuity. As interviewed organizations coped with these challenges, they reported that they have leveraged the strong functionality of Cisco infrastructure to support remote workforces and maintain operational continuity during the pandemic:

- **Enables flexible response and increased VDI use during COVID-19:** *"Cisco UCS for VDI has enabled us in the way we were able to continue classes and work with everyone working from home during COVID-19. If we did not already have this infrastructure in place, it would have been really hard to make adjustments in the time they were needed."*

- **Ease of enabling mobile access during COVID-19, Region 14 ESC:** *"Coronavirus is one example of when Cisco UCS for VDI has enabled mobility for our organization. Our management was concerned about finding a way to get people working remotely. We simply set up a website where they installed a client and we were ready to work the same day."*

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—Region 14 ESC

ROI Summary

IDC's analysis of the financial and investment benefits related to study participants' use of Cisco VDI is presented in Table 7. IDC calculates that, on a per-organization basis, study participants will achieve total discounted five-year benefits of $3.82 million ($219,800 per 100 VDI users) in IT infrastructure staff efficiencies, better user productivity, and lower costs as described. These benefits compare with projected total discounted investment costs over five years of $0.79 million on a per-organization basis ($46,600 per 100 VDI users). At these levels of benefits and investment costs, IDC calculates that these interviewed Cisco VDI customers will achieve a five-year return on investment (ROI) of 382% and break even on their investment in eight months.

TABLE 7 ROI Analysis

	Five-Year Average per Organization	Five-Year Average per 100 VDI Users
Benefit (discounted)	$3.82 million	$219,800
Investment (discounted)	$0.79 million	$46,600
Net present value (NPV)	$3.03 million	$174,200
Return on investment (ROI)	382%	382%
Payback period	8 months	8 months
Discount rate	12%	12%

n=9   Source: IDC, 2020

CHALLENGES/OPPORTUNITIES

Companies were already adopting application and desktop virtualization technologies at an accelerated rate prior to the worldwide pandemic that started in November 2019. This adoption was driven by companies providing "flexible work" benefits, with an average of 6% of a company's workforce being able to work from home on a specific day and 20% being able to work from home at least one day a week. Before the pandemic, companies were, on average, looking to expand that benefit by 50%, with up to 30% of the global workforce able to work from home at least one day a week.

The pandemic accelerated this trend, forcing companies to adopt full-time work-from-home practices for 60% of the global workforce for an indefinite time period as a business continuity measure. This sudden, forced adoption led to rapid contracting and purchasing of infrastructure, including public cloud infrastructure for virtualizing applications and desktops.

Business continuity is a necessary exercise, especially given the unstable long-term outlooks for the pandemic. However, the emergency nature and high stakes of business continuity also tend to embed specific technologies (rather than solutions) deeply into the organization. "If it works, don't touch it" is a common refrain during troubled times, and it is easy to lose focus on evolving past the moment to reshape the future.

This focus brings with it the opportunity to modernize existing architectures as the peak remote work requirements pass, allowing older software and infrastructure to age out gracefully. This will require a sustained level of IT asset and capacity management, especially over the next three-year period, which is somewhat unusual in today's organizations.

The second challenge arises in much the same way as the first. The sudden nature of the crisis has driven organizations to rapidly expand their public cloud infrastructure for virtualization. This accelerated the existing trend toward creating a balanced portfolio of resources, as public cloud infrastructure represented only a small portion of the existing infrastructure used to run virtual desktops and applications. As shown throughout this study, the intense need to focus on provisioning speed rather than performance and usability is, in the long term, unsustainable.

As we move away from the crisis and into a new normal where remote work is broadly accepted, balancing provisioning speed with performance and usability creates an opportunity to quickly rebalance the VDI portfolio to meet the modern application environment. Intelligent, careful operations and management at this moment can leave the organization well positioned to move forward both with basic business functionality and with efforts intended to transform the organization and its future of work. To meet this opportunity, the organization will have to both mature its asset management processes and leverage integrated operations tools that can predict and manage capacity in radically new ways.

CONCLUSION

The virtualization of applications and desktops is a critical component of the future of work, both in the near-term sense of business continuity in the face of disaster and in the long-term sense of full digital transformation. It plays a role in the creation of the intelligent digital workspace — the next evolution of the familiar "desktop" environment. As such, virtualization capability needs to be high performing and flexible and able to rapidly adapt and scale across all three operating environments (public cloud, private cloud, and dedicated hardware).

IDC's research underscores the importance of IT infrastructure to providing a high-performing and flexible VDI environment. Interviewed Cisco customers reported achieving strong value by using Cisco HyperFlex and Cisco UCS to run their virtualized applications, desktops, and graphical workstations. In particular, study participants have enabled their employees as they leverage higher-performing, reliable, and more flexible VDI capabilities to do their jobs. The result has been both quantifiable benefits in the form of higher employee productivity levels and benefits that are more challenging to quantify, including having the ability to deploy and extend virtualized workloads on short notice in support of business operations. Combined with IT infrastructure cost and IT staff efficiencies, interviewed organizations reported that the use of Cisco infrastructure has generated value that IDC quantifies as worth an average of $1.07 million per organization ($61,400 per 100 VDI users), which would result in a five-year ROI of 382%.

APPENDIX

Methodology

IDC's standard business value methodology was utilized for this project. This methodology is based on gathering data from organizations currently using Cisco infrastructure solutions — Cisco HyperFlex and Cisco UCS — to run virtualized applications, desktops, and workstations. Based on interviews with organizations using Cisco infrastructure solutions for VDI workloads, IDC performed a three-step process to calculate the ROI and payback period:

1. **Gathered quantitative benefit information during the interviews using a before-and-after assessment of the impact of using Cisco infrastructure for VDI.** In this study, the benefits included IT cost reductions and avoidances, staff time savings and productivity benefits, and revenue gains.

2. **Created a complete investment (five-year total cost analysis) profile based on the interviews.** Investments go beyond the initial and annual costs of using Cisco infrastructure for VDI and can include additional costs related to migrations, planning, consulting, and staff or user training.

3. **Calculated the ROI and payback period.** IDC conducted a depreciated cash flow analysis of the benefits and investments for the organizations' use of Cisco infrastructure for VDI over a five-year period. ROI is the ratio of the net present value (NPV) and the discounted investment. The payback period is the point at which cumulative benefits equal the initial investment.

IDC bases the payback period and ROI calculations on a number of assumptions, which are summarized as follows:

- Time values are multiplied by burdened salary (salary + 28% for benefits and overhead) to quantify efficiency and productivity savings. For purposes of this analysis, IDC has used assumptions of an average fully loaded salary of $100,000 per year for IT staff members and an average fully loaded salary of $70,000 for non-IT staff members. IDC assumes that employees work 1,880 hours per year (47 weeks x 40 hours).

- The net present value of the five-year savings is calculated by subtracting the amount that would have been realized by investing the original sum in an instrument yielding a 12% return to allow for the missed opportunity cost. This accounts for both the assumed cost of money and the assumed rate of return.

- Further, because using Cisco infrastructure for VDI requires a deployment and migration period, the full benefits of the solution are not available during deployment and migration. To capture this reality, IDC prorates the benefits on a monthly basis and then subtracts the deployment time from the first-year savings.

Note: All numbers in this document may not be exact due to rounding.

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