White Paper

Operational Benefits of Citrix Application and Desktop Delivery

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Administrative Benefits of Citrix XenApp and XenDesktop

The rapid technology changes that have occurred in recent years have transformed the business landscape. In particular, virtualization spawned a new paradigm for IT based on consolidated, shared resources that can be distributed as needed. Although the server infrastructure was the first environment to benefit (with those benefits experienced widely as the market matured), it is far from the only one.

Application and desktop virtualization is another area where virtualization technology can, and does, make a huge difference. No longer viewed as a risky or bleeding-edge choice, desktop virtualization (encompassing mobile devices as well) is now a mainstream practice. Similarly, evidence abounds that application virtualization provides huge operational benefits and can be very cost effective.

This paper examines the benefits of Citrix XenDesktop, XenApp, AppDNA, and EdgeSight—desktop virtualization and application delivery solutions that have proven to be extremely beneficial for many use cases in a wide range of organizations. Please note that XenDesktop and XenApp are available in various editions. This paper focuses on the recently released XenDesktop Platinum Edition, which includes all the features and functionality of both XenDesktop and XenApp.

Challenges Related to End-user Desktop Delivery

Helping employees to be productive often starts with providing a user station to allow them to work. The desktop PC has been the business world's primary productivity tool for close to 30 years, but recent technology advancements have resulted in a proliferation of alternate endpoint devices including laptops, netbooks, smartphones, and tablets that enable workforce mobility. It is now common for employees to use a combination of these devices every day to do their jobs. For IT, the increase in the number and types of devices makes endpoint management and maintenance a more daunting task, one that can drive up staffing requirements and costs.

In traditional environments, desktops are deployed, patched, upgraded, and managed individually, making those tasks time-consuming and cumbersome. OS upgrades must be rolled out over time (a painful and laborious process, as anyone who is in the middle of a Windows XP migration project can confirm). And of course, if a site failure occurs, it will take time for all employees to get back to productivity, one machine at a time.

In one survey of North American IT managers responsible for overseeing desktop and mobile computing strategies, ESG uncovered numerous challenges organizations are experiencing in regard to employees' endpoint devices.[1] Those challenges relate to:

- Operational costs required to support end-users/client access.
- Operating system deployment and upgrade time/complexity.
- The ability to provide a consistent computing experience for remote and mobile workers.
- Rapid recovery of end-user desktop environments and data in the event of a disaster.

Desktop Virtualization Can Help

Given these challenges, it is not surprising that desktop virtualization has become extremely popular. It is now a mainstream technology that delivers significant benefits to workers, IT, and the company's bottom line. For example, some organizations that deploy a virtual desktop infrastructure can keep field-based employees productive without requiring them to return to the office to locate information or complete a task. At other organizations, desktop virtualization supports expansion—for example, enabling the addition of integrating additional productive employees in hours instead of days or weeks. Additionally, corporate-wide OS migrations from Windows XP to Windows 7 occurring in recent years have provided an ideal opportunity for many organizations to implement desktop virtualization.

[1] Source: ESG Research Report, *Desktop Virtualization Market Evolution*, February 2013. All ESG research references and charts in this white paper come from the above-linked report unless otherwise noted.

How popular is desktop virtualization today? According to ESG research into desktop environments, one-third of surveyed respondents reported using desktop virtualization currently, with another 23% citing plans to deploy it within the next 12 months. Another notable statistic is that the more endpoint devices an organization must manage, the greater its interest in desktop virtualization. Forty-five percent of organizations with 5,000 or more endpoint devices reported leveraging desktop virtualization technologies, compared with 32% of organizations with fewer than 1,000 endpoints. As the challenges escalate, organizations are recognizing the need to turn to virtual desktop solutions.

Operational Benefits for Users and IT

The benefits of desktop virtualization solutions such as Citrix XenDesktop and XenApp are varied, and they affect both end-users and IT:

- Although the **CapEx savings** inherent in desktop virtualization receive lots of attention and have driven much adoption, users also report substantial **operational benefits that accrue over time**, including better resilience and improved security.
- **Improvement in total cost of ownership** (TCO) is another commonly identified value associated with desktop virtualization among current and potential users.
- **Simplification** is a commonly cited adoption driver, considering the fact that some deployments can be complex. Thus, it's not surprising that current and potential users of desktop virtualization technology point out the easy implementation and subsequent ease of long-term management as being important.

For end-users, learning that virtualization enables them to be truly mobile—with the ability to access their tools and information wherever they are—has been quite an empowering discovery. This empowerment then translates into productivity. And for their employers, that added-productivity benefit comes on top of the reductions they see in support/maintenance costs.

Citrix amplifies these benefits further with additional toolsets—including AppDNA (only for Platinum Edition) for application migration, EdgeSight for performance and availability management, and XenDesktop Platinum Edition. XenDesktop Platinum Edition not only includes all the features in the Enterprise Edition, but is also the most comprehensive edition that includes the following features and functionality:

- Server-hosted XenApp applications, which provide secure access to Windows apps on iOS, Android, Mac, and Windows devices for on-demand access from anywhere.
- Citrix SmartAccess (enabled by Citrix Access Gateway and other Citrix components), which provides secure remote access to XenDesktop.
- Desktop performance monitoring enables administrators to monitor performance and availability for XenDesktop, XenApp, and endpoint systems with Citrix EdgeSight technology.
- WAN optimization that leverages Citrix CloudBridge, a software-based network-acceleration plug-in client designed to improve performance. More importantly, Platinum Edition users receive the VPX virtual appliance, so they can accelerate WAN performance for remote (plug-in) and branch office (VPX appliance).
- HDX Insight (Citrix NetScaler monitoring plus Citrix EdgeSight), which provides IT with in-depth visibility into the end-to-end user experience across the network, including visibility into ICA protocol performance to help administrators oversee operations and, if needed, troubleshoot issues.
- Application compatibility and migration software (Citrix AppDNA) makes it easier for admins to migration application packages between operating systems environments and remediate any compatibility issues.

IT departments are under increasing pressure to provide complete access to data and applications to end-users at any time, from anywhere, via any device. With a virtualized desktop, employees work from different locations using essentially the same interface on various devices. The combination of that familiar interface and the opportunity to

use smartphones, tablets, and laptops (including devices with different operating systems) keeps employees productive at the office, in transit, or at remote locations—when and where it's convenient for them to work.

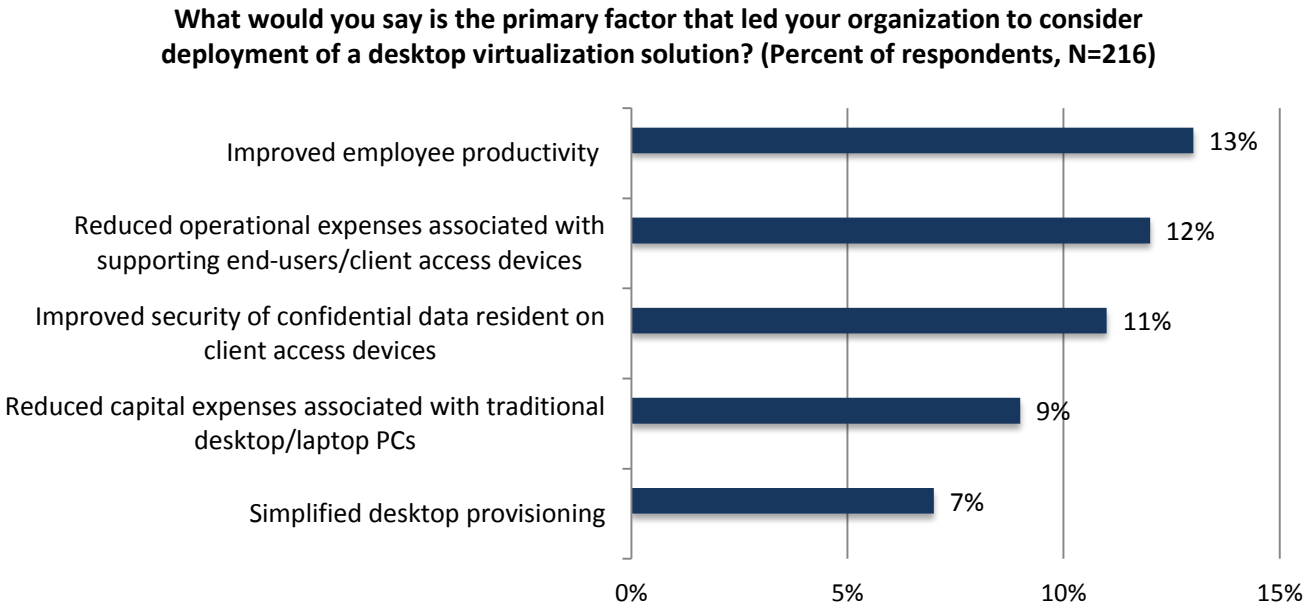
In addition to this enhanced user experience, desktop virtualization brings crucial benefits to IT. Most notable among them are reductions in operational costs and the capability for IT to maintain oversight of a mobile workforce that is using multiple devices. Specifically, desktop virtualization simplifies and accelerates the completion of tasks tied to client management, ongoing administration, and help-desk/incident management.

For example, desktop virtualization can make application deployments, upgrades, and patching projects faster and simpler: Instead of having to install patches on each workstation individually, IT can roll out a new desktop image to all endpoints, which will activate upon boot-up. Not only does this capability speed the patch process, but it also ensures that no end-user stations lag in product updates or security features.

Operational Improvements Drive Desktop Virtualization Adoption

ESG has investigated what drives organizations to consider and ultimately adopt desktop virtualization. When ESG asked survey respondents to identify the primary factor that led them to consider deploying desktop virtualization, improved employee productivity and reduced operational expenses (OpEx) associated with supporting end-users/client access devices were selected by 13% and 12% of the respondents respectively, making them the top two most popular responses (see Figure 1). Other notable factors included improved security of confidential data, reduced capital expenses associated with traditional desktops/laptops, and simplified desktop provisioning.

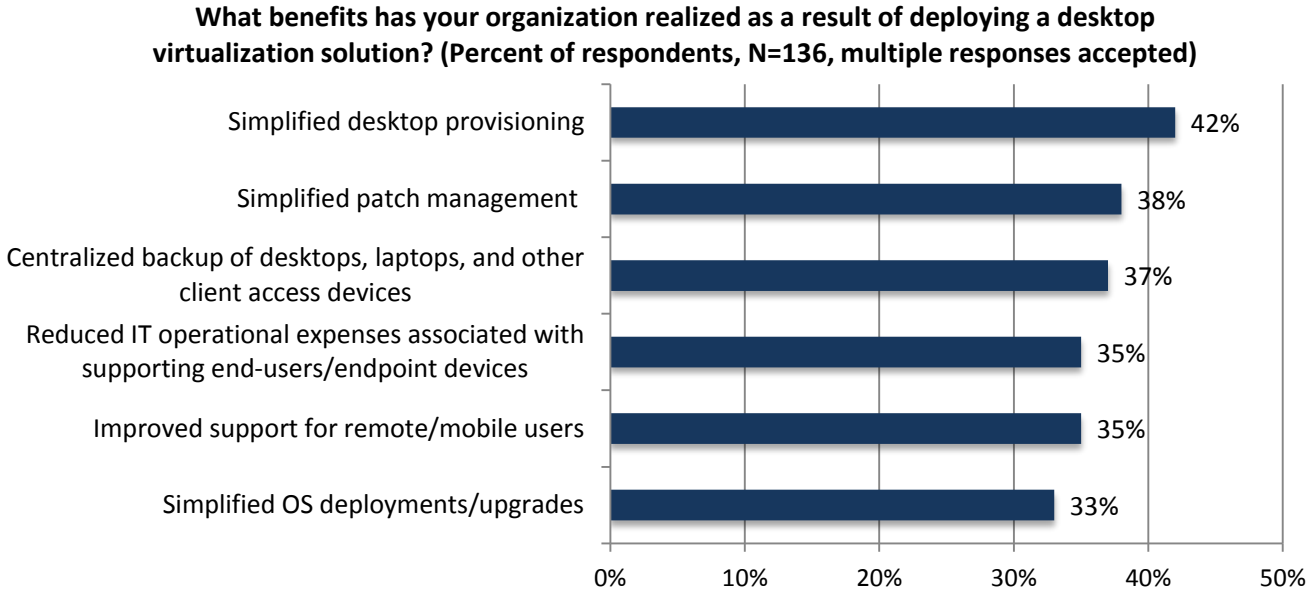
Figure 1. Top Five Factors that Led Organizations to Consider Desktop Virtualization



Source: Enterprise Strategy Group, 2014.

Employee productivity and OpEx topped the list of factors driving respondents to consider desktop virtualization, but what benefits did they *actually* experience? Figure 2 shows the top-five cited benefits that respondents reported, all of which describe operational improvements.

Figure 2. Benefits Experienced from Deploying Desktop Virtualization



Source: Enterprise Strategy Group, 2014.

Among the surveyed IT managers, simplified desktop provisioning (42%) and patch management (38%) were the most commonly cited benefits. Those two improvements alone can save an IT team many headaches by eliminating the need for individual machine deployments/upgrades and ensuring that end-users have up-to-date systems quickly and easily.

Another benefit centered on centralized backup of client access devices. Backup is a perennial challenge that consumes significant time. And for many organizations, keeping up with the protection of all devices is nearly impossible. As a result, backups are not always completed for all endpoint devices successfully. But with centralization, organizations are at lower risk for data loss.

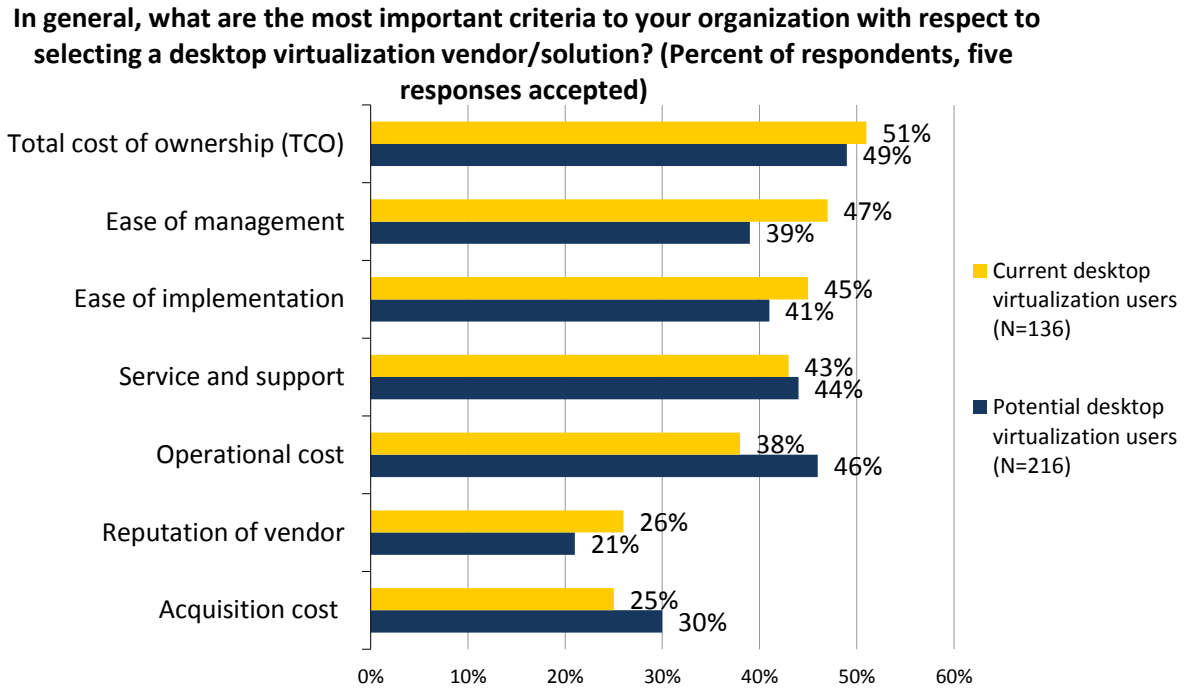
These and other factors lead to more benefits, namely, reduced OpEx associated with supporting end-users and their endpoint devices, and improved support for remote and highly mobile users in particular. In turn, the better support improves productivity and data security.

Respondents who adopted desktop virtualization reported other advantages as well. The point is, although some technologies generate more hype than actual benefit, that isn't the case with desktop virtualization. Real companies with common IT challenges are improving their environments by implementing these technologies.

Selecting a Solution

ESG research also reveals that organizations are willing to make initial upfront investments in desktop virtualization solutions in order to increase efficiency and cost savings over the long haul. When asked to identify the most important criteria in selecting a desktop virtualization vendor/solution, 51% of current and 49% of potential adopters chose TCO as the most important criteria, making it the most popular response (see Figure 3). Of course, TCO is always a key part of the equation—it is more revealing that the next most common responses relate to ease of management and implementation, service and support, and operational cost. Taken together, it is a clear indication of how important the *operational benefits* of a desktop virtualization solution are, outweighing factors such as vendor reputation, acquisition cost, and certified support for specific applications.

Figure 3. Most Important Criteria When Selecting Desktop Virtualization Vendors/Solutions



Source: Enterprise Strategy Group, 2014.

Actual Benefits Realized by Citrix Customers

ESG spoke with several Citrix customers who are using Citrix XenDesktop for desktop virtualization and XenApp for on-demand application delivery. These customers described the operational benefits they enjoy in regard to client management, administration, help desk, and other IT services.

Of great interest was the level of consistency across organizations in different industries with different structures and goals. Citrix was credited with delivering performance, simplicity, and reduced operational costs, helping to bridge different operational needs, including supporting different operating systems and the widespread adoption of mobile devices. Provisioning improvements and thin client implementation also were mentioned.

Large School District

This U.S. school district has about 25,000 users and six campuses. First, the IT manager was able to upgrade easily from Windows XP to Windows 7 and Office 2010 and, at the same time, extend the useful life of older desktops using Citrix XenDesktop and XenApp. Machines more than 10 years old are used as thin clients; the XenDesktop VM image mimics having Windows 7 and MS Office 2010 installed directly on each machine. Also, the school uses XenApp to deliver desktop shortcuts, various common business applications, and school-specific software to virtual any physical devices using the Citrix Receiver. With much less time and effort than had been expended previously, all users now enjoy upgraded platforms and applications.

iPads and netbooks are used in student labs. The Citrix Receiver is loaded onto iPads so that students can access a virtual desktop there as well. For the school's IT group, it's a big help. (ESG research has shown that the time, cost, and complexity of management tasks is exacerbated by the need to support devices running non-Windows operating systems and the need for specialized OS versions for mobile devices.) The Citrix solution made the task simple.

When asked about the difference in provisioning endpoints with Citrix XenDesktop and XenApp compared with the traditional method, the IT manager called it a "pretty radical change." There is no more need to do massive amounts of imaging individually for each PC, which had been consuming a lot of storage. The multiple steps

involved in provisioning a desktop the traditional way required 45-60 minutes per machine; the Citrix solution reduced that time to less than five minutes per machine—representing a roughly 90% efficiency improvement.

The school's IT organization also saw significant improvements with Citrix FlexCast Management Architecture (FMA). Citrix continues to build features and benefits into FMA that enable the IT organization at an operational level to have a superior performance experience with the underlying database.

FMA offered new levels of scale and manageability. "Instead of using two or three different consoles to manage the environment, we used a single farm—a single console that was able to see all of the servers, all of the students, and all of the desktops at the same time." This was a significant improvement over prior implementations and fit perfectly into IT's delivery strategy while enabling the Citrix administrators to become more efficient with daily operations.

Problem resolution has also been dramatically improved and the number of desktop support calls have been reduced. The IT manager said, "We have run into several situations that we were not prepared for, but because of Citrix and this technology, we have been able to overcome them." For example, the night before standardized tests were to be administered, IT staff realized that the testing lab's machines were running 64-bit Windows 7, but the online test application would only support 32-bit. With a traditional endpoint upgrade process, the team would have been up all night re-imaging machines. Instead, they used XenDesktop Provisioning Services to deliver a 32-bit Windows 7 disk to the machines in 30 seconds. When the machines were rebooted, the new image was in place.

Other benefits:

- With XenDesktop Provisioning Services, the IT team doesn't have to worry about hard drive failures. (Hard drives are the most common failing component in the school district's machines.)
- The IT team can be proactive with patches, which is vitally important with Microsoft products. In the past, they could only handle Microsoft patches reactively, and they were concerned that the delays made them vulnerable.
- The support staff need less time than ever before to fix large or widespread issues.
- The team can re-image a whole campus in a day; therefore, they can do it regularly. In the past, the lengthy individual re-image process meant they could only upgrade a machine every two to three years.
- Any error on a master-image disk will be propagated to all replicated machines, which encourages the staff to pay a great amount of attention to detail.
- FMA-enabled USB mapping that helps overcome complex USB scenarios including USB redirection and the ability to lock down USBs for testing or potentially for new devices in the environment.
- Citrix leverages the 64-bit Microsoft SQL technology that has improved response time and memory bottlenecks that the school district had in the past. Previously, the database would have to offload locally to clear up any lost connections, and that would, in turn, create potential performance problems that the IT staff had to address. The use of FMA has eliminated the issue.

Citrix Partner

At the recommendation of Citrix, very large Citrix customers such as the major U.S. school district described above commonly work with a seasoned technology partner for large implementations. One Citrix technology partner with annual billings of more than $2 billion has found that large clients such as this school district experience compelling operational benefits with Citrix XenApp and XenDesktop in terms of speed, scalability, multiple OS support, staffing efficiencies, streamlined failover for disaster recovery, and simplified BYOD management.

The Citrix partner's practice manager/engineering manager in charge of virtual environments noted that his team found that in these large virtualization deployments, customers achieve the best results when they dedicate even a single person to the management of that environment. The deployment of virtual desktops typically enables customers to reduce the number of IT staff involved in image-refresh tasks, allowing them to focus on other efforts.

Clients of this Citrix partner are always looking for a good way to gauge application performance. Fortunately, XenApp and XenDesktop are now built on the FMA, which enables management of multiple operating systems from a single consolidated set of management tools. One benefit of FMA is that in many cases, the size of a virtualization admin team in charge of image refreshment and maintenance can remain stable over time as that team adopts a more centralized application-delivery methodology. The practice manager reported that through the use of the FlexCast Management Architecture, "There's less to maintain, fewer things that need to go on an image, and a lower frequency of needed updates. Sometimes, whole processes can be removed from the equation permanently. And FMA facilitates the scaling out of this level of support to thousands of end-users."

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—Practice manager, Citrix partner

FMA offers the operational benefit of running apps and desktops from a unified platform (versus separate environments for apps and desktops). The manager reported dramatic results for customers trying to reduce the time needed to push out images to their end-users. For example, one client had previously been using technology that made it all but impossible for its IT team to automate image pushes and image deployments, necessitating a complete reliance on manual methods—in other words, IT had to take temporary possession of each device because push mechanisms just weren't working. Now, this client leverages Citrix FlexCast Management Architecture for full XenDesktop deployments using the combined Citrix XenApp and XenDesktop architecture available across the entire 7.x platform. "Everything is fast and centralized now," the practice manager said.

In particular, clients who contend with heavy graphical file usage (especially the school district in which both students and teachers use Windows MovieMaker software) are finding that even when hampered by non-optimal hardware, FMA/XenDesktop 7 boosts performance to a degree significant enough to satisfy all end-users.

As the practice manager said, "The Citrix FlexCast Management Architecture helps me do what I want to do: It's not to arbitrarily push technology at our clients; it's to actually solve their business problems."

Deploying Citrix has dramatically simplified clients' mobility issues, regardless of whether those organizations emphasize corporate-owned devices or embrace BYOD. In either instance, Citrix provides a common fabric for deployment and security. "The beauty of Citrix solutions," according to the practice manager, "is that they cover the whole BYOD spectrum—from organizations with tightly controlled, corporate-owned devices, to organizations where employees are responsible for supplying all their own gear, including laptops. Citrix XenApp and XenDesktop support BYOD in any number of ways, resulting in real cost and time savings for these organizations."

Life Insurance Company

With more than 100,000 employees globally, this large insurance firm faced several challenges related to pushing out technology updates to its North American operations groups. The core IT team of about 100 people outsourced many functions in order to focus their own efforts on developing an enterprise architecture and providing first-line support for day-to-day operations. According to a senior enterprise architect there, the IT organization supports more than 600 applications and about 3,500 end-users—60% using laptops and 40% using desktops.

The company has been simultaneously migrating employees to Windows 7 and moving toward thin client adoption. (The firm's parent company already has some 25,000 Citrix-supported thin clients.) It also aims to sharply reduce the number of applications it supports. Those apps that remain will be virtualized using Citrix XenApp.

The company is utilizing Citrix AppDNA to gain visibility into application issues relative to users, workgroups, and devices. Because AppDNA is well-suited for Windows XP migration, XenDesktop, XenApp, and Windows Server initiatives, the company has made AppDNA a mandatory step before deploying any applications. On an ongoing basis, new applications will also be analyzed with AppDNA.

For example, at this firm, AppDNA helps with XenApp upgrade efforts: Pre-deployment testing is conducted in a siloed Citrix XenApp environment to confirm performance in a multi-user environment. An additional "gate" encourages developers to analyze their applications using AppDNA. Code must score/show "all green" indicators on the target platform before acceptance.

The company anticipates significant overall time savings in application deployment and management from using AppDNA as well as reduced time and labor associated with QA activities. AppDNA will also help with patch management: It allows immediate identification of files that have been changed and help to clarify where dependencies could make the changes problematic.

Users have been very satisfied with the XenApp-/XenDesktop-based application deployment, reporting that MS Office now runs faster than it did natively on their laptops. Furthermore, Citrix is making it possible for the company to plan to provide a "zero-touch image" so that a staffer can simply click a mouse button to initiate a migration over a period of a few hours or overnight.

Global Law Firm

ESG also spoke with the remote-access architect for a worldwide law firm with 21 offices and 5,000 employees. This manager is responsible for the complete Citrix environment. Currently, the firm uses XenDesktop primarily for applications that import many types of client data into internal systems. The intake process requires a significant amount of batch processing on numerous machines, and the machines all share a single image from XenDesktop. IT also uses XenDesktop for short-term testing on secondary desktops. The IT group is working to replace traditional desktops with virtual ones for several reasons. For example:

- There is a notable difference in how long it takes to get back to productivity if a problem with a workstation occurs. Traditional re-imaging causes a day of downtime for each user. With Citrix, the team can simply provision a new desktop, and the job is done. The user is back to productivity within minutes.
- During new-employee onboarding, the IT staffer who creates a new account can also provision the desktop; no tasks need to be handed off to other staff. The IT manager said, "This makes things go much quicker and makes it more reliable." The improvement has streamlined and simplified both hiring and termination processes.
- XenDesktop provides options for help desk staff, including resetting a user's workstation to get employees back in operation faster. The manager noted that his end-users are mostly lawyers with very high hourly billable rates, so diminished productivity would be extremely costly to this firm.

The organization uses XenApp quite heavily as well. The manager stated that the attorneys prefer to avoid carrying their laptops around, so thin client laptops are available in conference rooms and for visiting attorneys. These thin clients have no local applications, only a browser and XenApp-virtualized applications. When users log in, they have access to cases they are working on and other back-office productivity applications. Our contact mentioned that this arrangement provides a more productive work environment: "There is more availability, and people have more flexibility in where they can work. They have their main office, their home office, their car office. They just keep adding more offices."

Any devices not owned by the company, including non-Windows laptops, can only be used with Citrix, not VPN, to ensure isolation. In addition, documents can only be edited using XenApp. This enables the firm to easily maintain the strict styling of law firm documents by enabling only Microsoft document editors on virtual applications delivered by XenApp.

The Bigger Truth

For many years, IT organizations spent enormous amounts of time and money supporting and managing desktop computing environments. It became even more challenging due to the proliferation of remote-work policies/practices, the growing numbers of corporate applications, the increasing use and support of alternative endpoint devices such as smartphones and tablets, and ever-tightening IT budgets. It has been a daily struggle for IT to keep pace with application updates, software patches, security vulnerabilities, and help-desk requests—all while holding the line on costs. What's more, regulatory compliance mandates and information security concerns made effective desktop management an even higher priority as companies look to lock-down desktops to minimize risk.

As ESG has discovered, the desktop and application delivery landscape is changing**.** Trends such as "bring-your-own-device" and modern, new application delivery models such as those offered by Citrix are forcing IT organizations to re-evaluate the manner in which digital workspaces are provided to employees. (A majority of the organizations ESG surveyed say they are investigating and pursuing various endpoint and application delivery models.)

ESG's discussions with Citrix customers confirm that solutions such as XenApp and XenDesktop are making endpoint-related management tasks—deployments, patches, upgrades, incident management, expiring users, etc.—significantly simpler and faster. As a result, workstations are being maintained and protected in a more efficient and timely manner, while operational costs are reduced. IT can provide enhanced support for remote users, as well as mobile-device access via a familiar UI with all the required applications at hand. Application and desktop virtualization can, in some cases, even enable a reduction in office real-estate because employees don't require corporate-issued desktop PCs and a place to work.

Citrix application and desktop virtualization solutions can make employees more productive, minimize IT time and effort, and reduce operational costs. As one customer said, "The Citrix software has helped us by leaps and bounds. It's been a lifesaver for us, and I just can't say enough about it. It's just been amazing." High praise indeed, and evidence of the enormous impact that some IT improvements can make.

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