Virtualizing the Clinical Desktop: The Bridge to an Improved Provider Experience

WHITE PAPER
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IDC HEALTH INSIGHTS OPINION

The American Recovery and Reinvestment Act of 2009 (ARRA) created incentives for providers that demonstrate meaningful use of clinical information technologies. This has resulted in a proliferation of point-of-care computing, dramatically increasing the number of client machines and applications that provider IT teams need to manage. Providers are implementing complex clinical systems — such as computerized physician order entry (CPOE), electronic medical records (EMRs), and health information exchange (HIE) — with challenging architecture and support issues. At the same time, the demands on availability, uptime, security, mobility, and performance for point-of-care computing are high, while the limited budgets to implement, secure, and manage the devices running these systems require close attention to costs and value. Looking forward, provider organizations must ensure that their significant investments in EMR can be securely and reliably delivered to caregivers. It's important that they do not overlook or minimize the importance of the platform to deliver the "last mile" of EMR and CPOE technology. They will also need to focus on cost control — including IT and datacenter costs — data sharing, and new analytics to perform in an accountable care environment under healthcare reform.

For provider organizations, tools that improve the clinical desktop user experience, including improved performance of clinical applications, mobility, ease of access, and efficiencies for users, are becoming critical. Client virtualization technology is increasingly being used by providers to realize these advantages, including:

● Helping to make clinical systems easier to access and use and adding mobility for providers with tools such as single sign-on and session mobility, allowing providers to arrive at adoption levels required to demonstrate meaningful use

● Improving security by removing data from endpoint devices while accommodating provider endpoint device preferences

- Providing a flexible, agile platform to support current initiatives and prepare for future change and growth

With both costs and quality of care as key priorities for provider organizations, IT managers will seek to optimize their infrastructure. Client and server virtualization technology provides proven cost savings and demonstrated improvements to the performance, availability, and security of provider applications. These reliability improvements and efficiencies are demonstrated at a provider organization we spoke to, and a case study of this implementation is included in this white paper.

IN THIS WHITE PAPER

This White Paper is presented by IDC Health Insights and sponsored by VMware. The objectives were to gain insights into:

- The decision-making process for investment in desktop virtualization by hospitals

- The qualitative benefits experienced by a provider organization that invested in VMware virtualized clinical desktop solutions

- The importance of desktop virtualization in unleashing the benefits of replacing paper processes with clinical applications

To meet these objectives, IDC Health Insights conducted an interview with a provider organization that has adopted virtualized clinical desktops. The provider organization was identified by VMware, and the interview was conducted in May 2011. The key findings from IDC Health Insights' primary research with this organization are summarized in this document.

SITUATION OVERVIEW

As the healthcare industry seeks to implement and drive widespread adoption of clinical computing including EMR and CPOE, performance and availability of applications for clinicians are critical. In the hospital environment, solutions such as virtualized clinical desktops are increasingly playing a role in bridging the gap between available IT resources and satisfaction of care providers' requirements.

Client or desktop virtualization, when applied to the clinical desktop, provides a tool that can help provider organizations to:

- Deliver enhanced performance, uptime, and availability to caregivers using clinical applications

- Reduce the possibility of data loss and breaches that result in added mandatory penalties and brand-damaging publicity

- Improve productivity for clinical staff by incorporating single sign-on capabilities, session mobility, and secure access to clinical applications on mobile devices

- Drive caregiver workflow efficiencies and improve service levels provided by IT staff implementing, managing, and maintaining clinical systems

- Enable providers to reach adoption levels of clinical applications required to achieve meaningful use and quality for incentives

Client or desktop virtualization provides a tool that can help provider IT organizations to:

- Create the foundation of a private cloud internally, leveraging the agility of virtualized private cloud to deliver not only virtualized servers but also clinical and administrative applications, networking, desktops, and other applications to leverage and extend existing virtualization platform investments

- Manage HIT efficiently as services from a single location in a dynamic datacenter while reclaiming resources that were devoted to supporting individual endpoint devices

- Increase security by controlling information and keeping protected health information (PHI) off endpoint devices, helping provider organizations to comply with and reduce risks associated with HIPAA regulations, privacy, and security breaches

- Lower operating expenses by redirecting IT resources from routine help desk calls to new projects and higher-level issues of adoption

- Provide an improved level of service to end users via managed services

SOLUTION DESCRIPTION

Virtualized Clinical Desktops

IDC defines client virtualization as a client computing model that leverages a range of software and virtualization solutions to improve upon the limitations associated with the traditional distributed desktop environment. Often, organizations (and solution vendors) will use a combination of client virtualization, delivery, and management technologies to provide IT resources to end users in a virtualized environment. The term *client virtualization* is used to describe all

technologies associated with virtualizing the end-user computing experience, while the term *desktop virtualization* caters to technologies that virtualize only the end-user desktops. For example, according to IDC, application virtualization is a client virtualization technology but not a desktop virtualization technology.

IDC categorizes client virtualization into four buckets: desktop virtualization, application virtualization, virtual user session, and user virtualization. In this white paper, IDC Health Insights evaluates the benefits of virtualized clinical desktops using client virtualization technology.

The Role of the Virtualized Clinical Desktop in Care Delivery

The clinical desktop plays an important role in facilitating the migration from paper-based to electronic care delivery in ambulatory and inpatient healthcare settings. When providers move to electronic ordering and clinical documentation, productivity loss is inevitable in the initial stages, but careful implementation and attention to the desktop environment can help to minimize this initial productivity loss and ramp up the learning curve more quickly to improve workflow and allow providers to return to former productivity levels with the new electronic tools. Features enhanced by a virtualized clinical desktop — such as single sign-on, continuous sessions that allow for mobility, as well as high performance, uptime, and availability — can improve the provider experience with the desktop and help to drive adoption. Providers need rapid access to technical support when there are issues, and desktops need to be ubiquitous and available for provider use in the care environment. Virtualized clinical desktops allow provider organizations to provision clinical desktops that are optimized to support providers; allow the use of multiple endpoint device options to suit the provider's preference, care setting, and needs; and offer the mobility, performance, and availability that are required on the devices. Virtualized clinical desktops let IT professionals centralize support to streamline operations and focus on the most pressing implementation and adoption issues. At the same time, virtualized clinical desktops keep data within the datacenter, minimizing security risks associated with vulnerable endpoint devices and simplifying compliance with HIPAA security and privacy regulations for protected health information. Virtualization also provides superior options for backup and disaster recovery of data and applications.

A key goal of healthcare organizations that are implementing clinical systems in the current environment is to reach the levels of adoption and electronic transactions that are required to successfully demonstrate meaningful use and earn ARRA incentives. To arrive at meaningful use, providers need to not only purchase systems but also adopt systems across the care environment and staff, use the systems

to document care, meet or exceed specific thresholds for electronic transaction volumes, and report on quality measures documented in the electronic systems. This is a complex problem for IT and clinical leaders driving implementations, particularly given the tight deadlines they must meet to maximize incentive payments under ARRA. The incentives will help to defray the costs of the clinical systems and infrastructure implemented to support them; but if providers are to demonstrate meaningful use and receive these incentives, many requirements must be met, and implementations must be successful. Desktops, devices, and features that facilitate adoption of EHR and CPOE make it easier for providers to adopt — and IT to manage — the new applications and will help make providers more likely to successfully achieve meaningful use.

Virtualization Is the First Step Toward Cloud Computing

While the demands of ARRA are significant, providers cannot focus solely on meeting these requirements; they must accomplish meaningful use in the larger context of healthcare reform. Healthcare reform is moving forward simultaneously, and both private and public insurers are working to establish accountable delivery networks (ADNs) and accountable care organizations (ACOs) that coordinate care to drive improved outcomes and reduce costs. Outcomes-based reimbursement will compel healthcare organizations to undergo significant transformation to improve efficiency and effectiveness. Emerging care and reimbursement models will encourage providers to reorganize into care teams that improve care coordination and collaboration across the continuum of healthcare settings. Working and profiting in the accountable delivery environment will require providers to collaborate extensively with payers, as well as other providers in the community and their newly engaged patients, and build the capabilities to conduct extensive analysis of their operations and clinical care to optimize service delivery and implement and track interventions that can help them to compete in the new environment.

As providers approach the needs of healthcare reform, it is clear that successful healthcare organizations will need to create a flexible, agile platform for the future that minimizes the cost and complexity of change. Operating in the new networked delivery environment will require extensive data sharing and access to electronic health information, modernization of applications and architecture, and the ability to consume software-as-a-service (SaaS) applications; cloud computing is increasingly becoming an imperative to meet these challenges. Virtualization is the first step toward accessing the agility of cloud computing and will allow healthcare organizations to build the platforms they will need for the future, after meaningful use.

VMware Solution Description

VMware View is a client virtualization solution that leverages the VMware vSphere datacenter virtualization platform, enabling hospitals to deliver server, client, and application virtualization services from a shared common datacenter architecture or private cloud. These solutions, combined with other tools supplied by VMware partners such as user authentication and single sign-on, will allow providers to modernize and virtualize the clinical desktop and many of its component applications, thereby improving the experience for providers. Healthcare providers will need to retain the use of many legacy client/server clinical applications in their environments, but at the same time, they will need to consume newer, SaaS-based applications. VMware virtualization platforms allow providers to do this without building and maintaining a separate architecture for each situation.

Utilizing VMware's solutions for the virtualized clinical desktop moves clinical computing from a PC-centric to a user-centric model. This empowers caregivers with session mobility, secure anywhere access to multiple clinical applications, and device independence. As the desktop is modernized, IT will be able to secure and optimize legacy Windows environments, increase reliability, quickly upgrade EMR/CPOE applications, and improve overall caregiver experience and satisfaction.

The healthcare technology environment, and particularly the clinical applications in use in the provider setting, has many unique characteristics and architectural considerations that need to be taken into account when virtualizing the desktop. Legacy applications will persist, but they will need to work alongside newer, SaaS-based applications. VMware has worked closely with independent healthcare software providers and its partners to develop client and application virtualization solutions optimized for use in the healthcare environment and capable of supporting a reliable, secure, validated blended architecture for new and legacy applications at the point of care.

VMware's healthcare ISV partners supporting VMware solutions include, but are not limited to, leading clinical application vendors such as Allscripts, CareFusion, Cerner, Fujifilm Medical, GE Healthcare, Kronos, McKesson, MEDITECH, and Siemens. In addition, VMware offers the following joint VMware point-of-care solutions that facilitate virtualized clinical desktops, in combination with:

- Imprivata to support single sign-on and user authentication across the VMware View point-of-care solution

- Cerner and marketed as Cerner Instant Access

- Converged infrastructure capabilities from EMC, Cisco, and VMware marketed as VCE's Vblock – AlwaysOn Point of Care

- Converged infrastructure from NetApp and marketed as FlexPods

- Dell and MEDITECH and marketed as Mobile Clinical Computing for MEDITECH (MCC4M)

The extensive partner network and the depth of collaboration with healthcare vertical vendors allow providers moving to client virtualization to take advantage of VMware's established best practices, understanding of and experience in the healthcare provider space, and, often, capabilities specific to clinical applications already in use at provider organizations.

BENEFITS

The key IT benefits associated with desktop virtualization and identified by the case study in this white paper fall into the following areas:

- Availability and accessibility of clinical applications

- Security of PHI is improved because data resides only in the datacenter, not on endpoint devices

- Improved performance of applications

- Lower cost to manage and support applications (IT productivity), lower cost associated with support of endpoint devices, and longer replacement cycles for aging endpoint devices that can be converted to use as thin-client machines hosting the virtual desktop

- Improved backup and disaster recovery options

- Mobility, including access to applications from mobile devices

- Improved productivity of clinical staff as a result of continuous sessions, single sign-on, and improved availability and performance

- Improved caregiver satisfaction with clinical desktop performance

While these IT improvements are certainly impressive in their own right, enhancing quality of care and patient safety is a top priority for the healthcare industry as a whole. Desktop virtualization can be a critical component of IT strategies to achieve these goals in healthcare. The following case study illustrates the advantages of virtualized clinical desktops in a hospital that is an early adopter of client virtualization.

MidMichigan Health

Founded in 1944, MidMichigan Health is an integrated health system that is headquartered in Midland, Michigan. The health system serves 12 counties with four hospitals as well as urgent care centers, home care, nursing homes, physicians, medical offices, and other specialty health services. The flagship Midland hospital is a 300-bed hospital, while the other three hospitals operated by the health system range from 50 beds to 85 beds. The health system has 200 employed physicians, while another 200 physicians in the community enjoy privileges at its hospitals.

MidMichigan Health began its implementation of EMR and CPOE in 2009, and it made the decision to implement a virtualized clinical desktop in concert with the new clinical systems from the outset. The clinical desktop project is planned to include access to EMR and CPOE, as well as additional clinical systems, the hospital's HIS, single sign-on and authentication tools, radiology applications, and document management and email systems. The goal was to provide everything providers use during the workday on the unified desktop to enhance productivity and ease adoption of the clinical tools. The hospital chose to put thin-client devices with access to the desktop in each patient room to help drive use and adoption and increase the time providers spend with patients. The cost of the thin-client devices is approximately one-third the cost of the fat-client devices previously in use, lessening the initial and replacement costs for hardware going forward. The implementation has been phased: EMR is in use hospitalwide, and CPOE is currently used by the emergency department and by anesthesiologists. A hospitalwide CPOE rollout is planned. The current applications will enable the health system to meet stage 1 meaningful use requirements in 2012, both for the inpatient facility and for its employed physicians who qualify as eligible providers.

Prior to the implementation, MidMichigan used paper-based medical records that were scanned and available through a Web portal. As the hospital migrated to EMR, the virtualized clinical desktop was implemented simultaneously. VMware was selected as the virtualization vendor as a result of its strong partnership with Cerner, the hospital's chosen EMR and CPOE vendor, and VMware's experience and leadership in the space. MidMichigan uses VMware View supplied as Cerner Instant Access to support the virtual clinical desktop.

The objectives of the virtualization initiative at MidMichigan included improving ease of use for providers, driving clinical performance, enhancing security, and making the system easier for IT staff to manage. According to Ryan Winn, the CIO at MidMichigan, the virtualization project has not had an impact on IT service levels because the virtualized desktops are easier to support than the old

fat-client environment, and there have been few struggles. "Our problems that we've had from an EMR perspective have been higher-class problems in the sense that they're dealing with application capabilities and workflow-type issues rather than dealing with the type of things you don't want to think about, like performance," said Winn. MidMichigan has also found that the virtual desktop is made more compelling, and benefits expanded, as a result of using it in combination with user authentication tools and single sign-on.

The IT team at MidMichigan also reported that the virtualized clinical desktop has made adoption of the EMR go more smoothly. Providers find that the system is easy to use and highly available and that adoption has been less of an issue than expected. Providers have expressed satisfaction, but there has also been an uptick in patient satisfaction as well because the in-room workstations mean that providers spend more time with the patients in their rooms than in the halls. MidMichigan is moving forward aggressively to roll out CPOE across additional departments and hospitals and is considering expanding the virtualized environment to include administrative and financial departments, ambulatory providers, and clinics.

FUTURE OUTLOOK

Business and IT Issues for Desktop Virtualization

Virtualization of the clinical desktop, as demonstrated by the case study in this document, presents a compelling value proposition for hospitals that wish to both meet the needs of providers adopting clinical applications and improve IT operations and service levels. The hospital we spoke with saw the following improvements:

- Increased productivity of providers using clinical desktops, associated with single sign-on and session mobility, as well as improved access to and availability of applications

- Improved workflow as a result of ease of use for clinical applications, fewer clicks during navigation between applications and sessions, and the ability to facilitate mobility with continuous, roaming sessions and mobile devices

- Enhanced application and data security as a result of improved user authentication technology and centralization of data in the datacenter

- Improved IT service levels because teams are able to centralize support and infrastructure, reduce the number of operational issues they need to respond to, and concentrate on the higher-level aspects of functionality adoption concerns

- Improved patient satisfaction when in-room devices are used to enter data and physicians spend more time with patients during care delivery

It is clear that the issues associated with legacy healthcare applications will persist, and healthcare organizations will need to continue to maintain and support these applications in the future. The hospital profiled in this paper reported that virtualized clinical desktops represent an important tool to handle the complexity, unpredictable nature, and support issues associated with the ongoing use of legacy clinical applications.

Demonstrating meaningful use and thereby accessing the associated federal incentives are critical concerns for provider organizations. Once systems are implemented and the functionality is in place, provider adoption and appropriate use of the features for documenting care electronically still present significant hurdles to accomplishing meaningful use. Technologies such as virtualized clinical desktops, which help drive provider satisfaction and make providers more efficient when using the new clinical applications, are an important addition to the required clinical applications and can help make organizations successful in the journey to meaningful use.

DESKTOP VIRTUALIZATION CONSIDERATIONS

Desktop virtualization may not be right for some user populations in healthcare. Net-new virtualization projects may initially add some complexity to infrastructure for some organizations, but in many cases, they are able to reduce complexity compared with the legacy infrastructure already in place. When implementing client virtualization, including virtualized clinical desktops, organizations can leverage existing server virtualization infrastructure and skills. Clinical applications vendors have historically hindered the advance of virtualization across the industry — because many have been slow to embrace virtualization or to certify the performance of their products in a virtualized environment. However, clinical applications are increasingly available for virtualization as providers demand it and vendors acknowledge the need to support this platform for the clinical environment.

Proper care and planning should be taken when implementing desktop virtualization to ensure that it is an efficient approach for utilizing all of the application services that a specific user, or class of users, is accustomed to accessing.

CONCLUSION

With stimulus funding in the mix and healthcare reform on the horizon, U.S. hospitals are racing to implement EMR, CPOE, and HIE technology in time to meet deadlines and receive maximum funding from federal incentives. It is predicted that most U.S. providers will

take advantage of stimulus funding to install EMR and CPOE by 2016. This will bring EMRs into use by the majority of providers and dramatically increase the responsibility of hospital IT departments in supporting clinical desktops and applications.

Tools such as virtualized clinical desktops will be required to support these additional clinical desktops while maximizing the productivity of both IT and clinical resources. As healthcare providers continue to migrate from paper to electronic records, workflows will change and evolve in the care environment, and clinical desktops need to support these changes. The availability, reliability, security, and backup of endpoint devices — such as the clinical desktop — are becoming increasingly critical to achieving meaningful use, mitigating adverse patient outcomes, and managing the risk of litigation. Providers are demanding a consumer-like end-user experience, with high usability and flexibility in endpoint device choices, and IT is struggling to meet this demand with traditional applications and architecture.

Many traditional server-based computing architectures will not be able to deliver the scale and service levels required to provide a highly available, end-to-end EMR environment, and providers are increasingly recognizing this and moving to virtualized clinical desktops to meet the needs of EMR users. The benefits that accrue from clinical desktop virtualization projects include the ability to improve performance and availability of desktops, assist in achieving meaningful use, manage desktops more efficiently, stretch IT resources and capabilities, improve productivity for providers, add mobility, and improve security in the expanding clinical computing environment. In addition to the benefits providers will reap now from moving to virtualized clinical desktops, the flexibility and scale of these deployments will serve to support them in the future, as demands continue to evolve for meaningful use, healthcare reform, and accountable care.