



Information Technology Infrastructure Answers to 10 Key Questions

The growing use of computers, especially the increased reliance on information technology to support clinical care, has made information technology infrastructure a hot-button issue in the health care industry. Faced with the need to improve both reliability and availability, many health care IT leaders are taking a step back and examining their information technology infrastructure options. This whitepaper answers 10 key questions that IT leaders might have as they begin to consider making IT infrastructure changes.

In many businesses, when computers go down, employees might grumble because they'll have to log some hours in the evenings or on the weekend to make up the lost time. Or, they might cheer because they have an excuse to chat around the water cooler.

When computers fail in health care organizations, though, the implications stretch far beyond matters of personal convenience; patients' lives could be at risk, says William J. Lewkowski, CIO of Metro Health, a 238-bed hospital in Grand Rapids, Mich.

"Because everything we're doing as a business and health care organization relies on the technology we implement, and because more of what we're doing becomes electronic and digitized daily, the infrastructure is constantly being tested. It's getting much more volume, and therefore increased expectations of performance by the users. The solution has got to be one that is fast and won't go down. But probably the most important thing is that we are now relying on this infrastructure for life-critical applications," Lewkowski says.

The life-and-death nature of health care has prompted many executives, including Lewkowski, to consider information technology infrastructure changes, both in the data center and in the client environment.

Information technology infrastructure has become a hot button issue for the health care industry — causing many leaders to take a step back and examine their operations. In the process, leading organizations, such as MetroHealth, are finding that change is, indeed, warranted.

Metro Health, for example, has implemented blade PCs with Hewlett Packard's Consolidated Client Infrastructure (CCI). The CCI solution centralizes desktop computer and storage resources into easily managed, highly secure data centers, while providing end-users with the convenience and familiarity of a desktop environment. With CCI, end-users can gain access to their personalized environment, including applications and data files, from almost anywhere in the world. In addition, CCI enables hospitals to enhance data security and business continuity while reducing total cost of ownership.



CCI consists of a client access tier that typically uses a thin client instead of a traditional PC, a compute tier with racks of PC blades, powered by processors from Advanced Micro Devices, Sunnyvale, Calif., and a resource tier that includes mass storage, network printers, applications servers and other networked resources, all housed inside the data center (see Chart 1). The system also includes a suite of tools for managing devices inside and outside of the data center, all from a single console (see Chart 2).

Making the change to a new infrastructure such as CCI, however, cannot be taken lightly. This white paper can help healthcare executives begin to analyze the merits of making an information technology infrastructure change by providing answers to a number of pressing questions:

Question #1: Why should health care organizations consider changing their information technology infrastructure?

Certainly, the fact that computerization can literally play a life-saving role is reason enough for executives to continually strive to optimize their technology infrastructure.

Many organizations, however, don't address the infrastructure issue until their organizations change. For example, when leaders at Metro Health announced that the entire hospital would be moving from its current landlocked 13-acre campus, Lewkowski, the

CIO, decided that it was the right time to consider an information technology infrastructure overhaul as well.

"Because of the large change and move to a new campus, we stepped back and didn't automatically just follow the technology path that we had traveled in the past. We asked HP what they would be willing to do for us and how they could help us achieve our technology visions above and beyond the constant upgrading of technology," Lewkowski says.

In addition, as an increasing number of clinical functions are becoming automated, choosing, implementing and maintaining a computer infrastructure is emerging as an even more critical and pressing task for health care leaders.

At Metro Health, for instance, the infrastructure needed a shot in the arm to support the organization's increased emphasis on clinical systems, such as electronic medical records, patient scheduling, clinical documentation and picture archiving and communication systems.

With these systems, Metro Health's clinicians — like many others across the nation who are becoming more dependent on computerized clinical programs — were becoming reliant on real-time access to patient information. As a result, the information technology department had to come up with an infrastructure that was highly reliable, efficient and had a continuous capability to support these clinical computing activities.

(CHART 1)

Consolidated Client Infrastructure Tiers

- Access Tier**
 - HP t5000 series thin clients
 - Windows-based PCs
 - Workstations
 - Microsoft RDP as transport protocol between end-user and data center
- Compute Tier**
 - HP bc1500 blade PC (1:1 relationship between end-user and blade pc)
 - Dynamic Allocation Software or static design
- Resource Tier**
 - Storage pool
 - Application/file servers
 - Network printers
 - Other networked resources
- Management Tier**
 - Microsoft Active Directory
 - HP Rapid Deployment Pack
 - Altiris A-client (for thin client)

(CHART 2)

Components of HP Consolidated Client Infrastructure

- Hardware**
 - Thin Clients
 - Blade PCS
 - HP Blade System PC Blade Switch
 - Hp Storage Works
 - Printers
- Software**
 - HP CCI Software Suite
- Services**
 - Data Migration Services
 - End-User Workplace Management
 - Implementation Services
 - Outsourcing Services
 - Rapid Deployment Pack Support Services
 - Software Technical Support
 - Total cost of Ownership Assessments

Question #2: What issues do health care organization leaders need to consider when contemplating information technology infrastructure changes?

To start, health care executives — just like leaders in all other industries — need to take a broad look at information technology infrastructure and decide if anything can be gained from making a switch.

For example, executives need to specifically determine if new alternatives can help them address basic issues of “IT economics” by reducing overall IT costs, improving the quality of service, mitigating risk and enhancing business agility.

Adding to the challenge, however, is the fact that health care leaders also should consider a plethora of industry-specific issues such as:

- Compliance with HIPAA requirements
- Complex security demands
- Industry consolidation
- Aging IT infrastructure
- Increased pressure from regulatory bodies and the public to increase the quality of care

And to make matters even more complicated, health care IT professionals need to determine if all this can be accomplished without compromising the end-user’s experience. Because health care organizations have, for many years, struggled to win staff buy-in for computerization, most leaders are reluctant to make any changes that would result in decreased computer use among clinicians and other staff members.

Question #3: Why should the venerable distributed desktop PC infrastructure be replaced?

Since their infusion into the market in the 1980s, distributed desktop PCs have become pervasive. Even though these PCs have been the standard for more than two decades, health care IT professionals are now starting to question the status quo.

Certainly, like other health care organizations, Metro Health was looking for a change because of some of the limitations inherent in the desktop PC environment.

As computer applications become more central to health care — and specifically as they emerge as a staple of clinical practice itself — health care IT professionals are finding that distributed computing environments

often do not offer the needed reliability and flexibility. Desktop PCs fail too frequently and do not offer users the mobility required by today’s clinical computer applications.

For example, with a traditional PC, a clinician who moves from room to room must initiate a completely separate login and boot sequence each time they go to a new room. This involves time and effort, resulting in lower worker efficiency in terms of the number of patients who can be managed over a shift or during rounds.

In addition, because applications are distributed to desktop PCs via servers, IT professionals are required to maintain and support each individual machine. As a result, IT leaders are coming to the realization that distributed computing infrastructures often place a significant drain on staff resources, time and money.

Question #4: Can alternative information technology infrastructure models offer any benefits to health care organizations?

Thinking outside of the traditional infrastructure box can help health care executives identify a number of potential advantages that are associated with alternative infrastructures.

For example, a bevy of benefits are readily apparent as organizations switch to virtual computer infrastructures. Via virtualization, organizations can pool and share IT resources so utilization is optimized and supply automatically meets demand. As a result, organizations become more adaptive and are capable of capitalizing on change.

CCI is a key component in creating such virtual infrastructure environments. CCI dynamically allocates a one-to-one connection between each user and an individual blade PC. With this strategy, each user has a dedicated computer resource running a single instance of the operating system, providing an enhanced, personalized desktop that can be remotely accessed through enterprise networks over the Internet.

CCI eliminates many of the limitations and complexities of shared processing architectures such as server-based computing. CCI is also entirely transparent to end-users, replicating the PC experience with which they are familiar.

Most important, CCI results in improved agility and availability. Dedicated resources are allocated transparently when an end-user accesses the network. For example, if a blade crashes, the user merely logs on again and is automatically assigned to another blade PC.

In addition, end-users gain continuous access to the data and applications they need, regardless of location. For example, users can leave their desks without closing applications, connect from another location, and continue working, without losing time re-establishing their work environment. A clinician, for example, could access the same desktop, applications and data from an office-based PC in the morning, from a laptop at the patient's bedside in the afternoon and then from a home-based PC in the evening. Users can also move from room-to-room in a hospital and regain immediate access to their session. CCI enables this "follow-me roaming" capability that preserves the user session even when users disconnect and reconnect several times.

This technology enables health care organizations to provide a virtual IT infrastructure that helps health care organizations meet their challenges while also lowering the total cost of ownership.

The virtual infrastructure results in a bevy of benefits for organizations. CCI can specifically help organizations:

- Provide greater integrity and security for end-user data
- Lower desktop total cost of ownership
- Improve remote access to data and applications for end-users
- Respond quickly to changing customer and market demands
- Deliver continuously available and predictable user experience
- Enhance service levels

- Reduce risks associated with traditional desktop computing
- Deliver unmatched data integrity and security
- Improve business agility
- Bolster productivity by providing a consistent user experience

Question #5: Can CCI lower total cost of ownership?

In addition to these benefits, CCI can also help improve an organization's bottom line. In fact, CCI can lower the total cost of ownership by up to \$726 annually per user per year by:

- Dramatically reducing the need for desk-side support through the use of a thin client with a solid-state design that has no moving parts, resulting in a longer product lifecycle and fewer repair incidents.
- Significantly reduce the frequency of lengthy calls to the help desk by enabling recovery from most failures in less time than it takes to reach the help desk
- Reducing the staff required to manage end users resources and information by consolidating PCs, user data and software into a single or limited set of data centers.
- Reducing information technology and system administration costs. With CCI, there is little need to install, move, add or change computer terminals.
- Reducing power requirements by utilizing efficient blade PCs and thin clients, instead of traditional desktop PCs. (see chart 3)

(CHART 3)

Potential Yearly Savings From CCI

	Desktop PC	% Savings	CCI	\$ Savings
Acquisition cost	\$233	(50%)	\$350	(\$117)
Help desk and break/fix support	\$531	70%	\$159	\$372
System administration, software development, and IMACs (Install, Move, Add, Change)	\$572	80%	\$114	\$458
IT administration	\$82	10%	\$74	\$8
Power consumption	422	25%	417	\$5
	\$1440	50%	\$714	\$726

Question #6: Can CCI offer operational benefits to health care organizations?

With CCI, an organization’s IT professionals can efficiently and cost-effectively ensure that computing resources are up to date and available.

Devices inside and outside the data center can be managed from a central console, significantly reducing the need for desk-side system support and speeding problem resolution. Also, there is greater confidence that updates and patches are successfully deployed because the blade PCs are in the data center. As a result, organizations can offer users increased reliability.

The relative ease of support has made it possible for Baptist Healthcare System, one of the largest not-for-profit health care systems in Kentucky, to support all business offices remotely, which would have been impossible with distributed desktop PCs, according to Tom Gillroy, client server analyst.

“We were looking for a solution that was quick and easy to implement and would be easier to support than traditional desktops,” Gillroy explains.

The reliability of the hardware has made it easy for Baptist to offer this remote support.

“We haven’t had to touch the thin clients at all,” says Mark Bos, manager of client server infrastructure. “If we have a thin client failure, which is more rare than a desktop PC failure, it is very simple for a user to replace it from the few spares we keep on hand.”

IT operational benefits include:

- Eliminating most PC deskside support
- Reducing help desk calls
- Eliminating PC staging and deployment
- Improving software tracking and compliance
- Providing remote services and access
- Improving reporting and performance tracking

Question #7: Can CCI offer a satisfactory user experience?

Although health care organizations are striving to improve and get more out of their IT infrastructures, many leaders are wary to let go of the distributed desktop infrastructure, simply because users have become so comfortable with desktop PCs.

As a result, when leaders at Baptist decided to consolidate five business offices across the state into one, the IT department wanted to provide a solution that was secure, reliable, easy to manage and, most important, user-friendly. After evaluating several options, the Baptist executives decided to implement HP’s CCI in part because it most closely reproduced the traditional PC experience.

With CCI, users are actually benefiting from an improved computer experience, according to Bos. (See chart 4)

(CHART 4)

End-User Experience Comparison

End-user scenario	Current experience with distributed desktop PCs	CCI experience
Hardware failure	Places call to the IT help desk, resulting in a loss of productivity for end-user and potential loss of data. IT resources are involved in break/fix activity.	User is automatically logged off of the affected blade and is prompted to log into a new blade; they are up and running again in minutes. IT “rips and replaces” the failed blades as their schedule allows.
Remote worker	Spends time downloading and uploading large files to local systems, exposing both the data and the network to security threats.	End-users can access data behind the firewall from practically any location and don’t have to download large files to a local system to work on them, increasing both productivity and security.
Automated data backup and retention	Majority of files stored locally on access device exposing it to loss theft, etc. Hardware failure or they leads to days or weeks of lost productivity and potential loss of customer data.	IT controls datacenter backup policies, enabling stronger regulatory compliance.

“Users in the business office like the thin clients,” Bos says. “When we consolidated the facilities, we had a mix of new and veteran employees. We found the learning curve with the thin clients to be very short.”

In fact, the transaction speed and familiar look and feel for users has meant that CCI is nearly invisible to users, says Gillroy, the client server analyst at Baptist.

“That’s exactly what we wanted. We wanted a solution that would be imperceptible to users, allowing them to focus on their work and not on the technology they were using,” Gillroy says.

CCI offers an improved user experience because:

- End-users are untethered from the fixed desktop
- The personal desktop can be accessed from any location, including home computers
- Downtime to recover from hardware and software failures is reduced
- User data is backed up on an enterprise-wide basis, and RAID can be used on centralized storage to eliminate the impact of an individual hard drive failure on data availability and preservation
- The Microsoft XP Pro operating environment offers a superior user experience
- Maintenance, including virus scans, hot fixes and patches can be performed in off-prime hours

Question #8: Can CCI mitigate risk by offering improved security?

Improved data security is one of CCI’s greatest benefits. With CCI, security is greatly enhanced because sensitive data is removed from the desktop, according to Baptist’s Bos.

“There is no data on the thin client,” Bos says. “If a unit were to disappear overnight, security wouldn’t be a concern. All the data is centralized inside a secure data center.”

With data stored centrally, CCI helps eliminate the risks posed when sensitive data is housed insecurely in user areas or not backed up properly. This approach enables better privacy controls for both patient and organizational data.

Plus, responsibility for the maintenance of the system is transferred from end-users to the

organization’s IT department. Because accountability for anti-virus and data protection is moved to the data center, the risk of theft, data loss, malfeasance, and noncompliance with software licensing terms is greatly diminished.

CCI offers enhanced security because:

- Intellectual property/corporate data is stored in a central location
- No end-user data is stored on the access devices
- Access to private information can be more easily controlled
- HP Thin Clients can be easily locked down to eliminate data vulnerabilities
- The technology architecture enables implementation of enterprise wide data backup best practices

Question #9: Can CCI help health care organization comply with HIPAA?

CCI goes beyond offering basic security benefits and actually helps health care organizations comply with HIPAA requirements (see chart 5).

“The improved security of CCI will help us more easily comply with the HIPAA requirement to keep patient data in a secure location,” says Baptist’s Bos.

Question #10: Can CCI offer improved availability to resources and enhanced agility?

While CCI offers health care organizations substantial operational and cost advantages, perhaps the greatest benefit comes from the increased availability of resources and agility that is inherent with the system.

CCI results in higher availability of mission-critical systems for health care organizations. For example, a clinician could assess the same desktop, applications and data while moving from an office-based PC in the morning to a laptop at the patient’s bedside in the afternoon to a home-based PC in the evening. What’s more, if an access device fails, a clinician can easily get to the same data and applications on any alternative device — without waiting for the information technology department to service the failing equipment.

Such availability is important as organizations begin to implement a bevy of clinical systems, including electronic medical records, patient scheduling and registration, clinical documentation and billing, picture archiving and communications systems (PACs). With these systems in place, users need reliable real time access to patient information, says Baptist's Bos.

"CCI could be part of the solution to provide medical staff with the convenient access to

medical information they need to make timely decisions about patient care," Bos says.

In addition, users do not have to worry about malfunctioning machines — as is the case in a traditional desktop PC environment, Bos says.

"If a blade goes out of service, the system just points the user to a new one. Then we just rip and replace the blade, and the image gets restored automatically. That's a very attractive management feature," Bos adds. ■

(CHART 5)

CCI and HIPAA

HIPAA Focus	How CCI Addresses HIPAA Focus
Strong policy	Centralized PC assets and storage in data center leading to greater control enables policy implementation
Authorized data access only and authentication of users	Additional layers of security beyond strong policy by using a smart card
Disaster recovery	Centralized data storage mirrored between sites, can be securely accessed from any location
Auditability	Controls and reporting of asset usage down to the user level
Physical security control	No end-user data stored on access device; Processing and storage "locked" up in the data center
Secure communication	RDP provides 128-bit encryption between data center and access device
Software integrity disciplines	Locked down environment enables best practices for anti-virus, software download, application usage, etc.
Periodic vulnerability assessments	Centralized architecture will smooth out vulnerability auditing
Documentation	Centrally managed assets



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