ABSTRACT

Healthcare organizations are no longer asking if they should deploy virtualization and cloud computing models, but instead are focused on how. In fact, many already have taken an important first step in their cloud journey by virtualizing and standardizing their infrastructure. ITaaS, another phase in this journey, provides healthcare organizations with the opportunity to lower operational costs, restructure from capital to operating expenses, and improve service levels. This white paper offers best practices regarding the technology infrastructure, business processes, and IT organizational structure to help healthcare providers maximize the value and impact of ITaaS across their organizations.

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EXECUTIVE SUMMARY

Healthcare providers are facing the dual challenges of achieving EMR meaningful use milestones while managing shrinking margins. As a result, health IT organizations are investing in agile IT infrastructures that meet “always on, access anywhere” requirements at a reduced cost. In fact, providers are no longer asking whether they should deploy virtualization, cloud computing, and ITaaS models, but are focusing on how to best deploy these strategic projects.

An IT-as-a-Service (ITaaS) foundation enables healthcare organizations to stand up new technologies, service delivery methods, and consumption models geared toward the needs of their internal customers. In addition, ITaaS enables organizations to accelerate deployment of key healthcare applications and extend mature services to non-affiliated systems, providing additional revenue streams.

Key ITaaS technology enablers include a cloud-based, highly automated technology infrastructure, as well as an online catalog of standardized business, IT, and clinical services that clinicians and administrators can directly consume.

Through this approach, IT can reduce costs dramatically while accelerating the delivery of new IT services to help improve organizational collaboration. Achieving these results requires careful planning, significant stakeholder support, and expert execution.

This white paper provides best practices to guide IT organizations along their multi-phased ITaaS journey. By following these recommendations, IT organizations will be well prepared to address the challenges and maximize the rewards of an ITaaS transformation.
INTRODUCTION

Healthcare organizations are under growing pressure to respond to Affordable Care Act (ACA) mandates and meet EMR meaningful use requirements. These demands are driving many organizations to adopt new business models that will enhance patient care delivery and outcomes at a lower IT cost. To enable this transition, many organizations are implementing IT-as-a-Service (ITaaS) to help lower operational costs, restructure costs from capital to operating expenses, improve service levels and accelerate deployment of key healthcare applications (Figure 1).

**Figure 1 – ITaaS Drives Significant Cost Savings**

<table>
<thead>
<tr>
<th>IT Cost Comparison</th>
<th>Legacy - 100%</th>
<th>ITaaS - 76%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cloud Services</td>
<td>33%</td>
<td>11%</td>
</tr>
<tr>
<td>External Services</td>
<td>20%</td>
<td>20%</td>
</tr>
<tr>
<td>Internal Labor</td>
<td>14%</td>
<td>16%</td>
</tr>
<tr>
<td>Software</td>
<td>14%</td>
<td>9%</td>
</tr>
<tr>
<td>Hardware</td>
<td>6%</td>
<td>3%</td>
</tr>
<tr>
<td>Telecom</td>
<td>4%</td>
<td>2%</td>
</tr>
<tr>
<td>Facilities</td>
<td>2%</td>
<td>1%</td>
</tr>
<tr>
<td>Legacy</td>
<td>20%</td>
<td>18%</td>
</tr>
</tbody>
</table>

Where do the savings come from?

- **Hardware and Software:**
  - Focused reference architectures
  - Increased standardization

- **Internal & External Labor:**
  - Service-focus, automation, and orchestration eliminate work
  - Refocus resources from engineering and provisioning to capacity and performance management

- **Facilities and Telecom:**
  - More performance, flexibility, and capacity with greatly reduced footprint
  - Hybrid cloud adoption moves workloads off premise for additional savings

- **Non x-86 Legacy:**
  - ITaaS platforms create ability to replatform legacy proprietary systems without sacrificing performance or availability

With ITaaS, IT organizations at integrated delivery networks (IDNs), healthcare systems, and hospitals can operate as an internal "service provider of choice" and "broker" of services from third-party service providers to meet the growing needs of clinical and business users. In addition, healthcare IT organizations are able to extend their reach to external enterprises involved with care collaboration, such as ambulatory care, physician offices, skilled nursing facilities, home healthcare and other smaller, healthcare providers.

This new service-oriented approach moves beyond traditional IT complexity and rigidity by decoupling services from physical hardware assigned to specific applications. Instead, compute, storage, networking, security, and availability services are pooled, aggregated, delivered, and managed by intelligent, policy-driven software in a highly virtualized environment. The result is an IT infrastructure optimized for clinical and business agility, high performance and availability, and greater efficiency (Figure 2).
Implementing ITaaS is a multi-phased journey, and not one to be taken without a defined strategy and well-defined project milestones. IT organizations are encouraged to team with vendors that possess a broad range of IT and healthcare knowledge combined with experienced resources to address specific projects.
INITIAL CONSIDERATIONS

To help begin your ITaaS journey, EMC provides jump-start workshops and professional services to assess existing environments and ITaaS readiness. Such offerings include guided visioning sessions and workload assessments for rationalization of application inventories.

In addition, EMC can help your organization create an ITaaS roadmap incorporating a service delivery framework (Figure 3) and defining the best practices needed to bridge technical and financial gaps with current capabilities and goals. Your organization can accelerate roadmap development by using EMC’s cloud selection tools that define required capacities and provide the most efficient migration path for each application. These tools help eliminate complex analysis while improving accuracy and expose the risks of cloud transformation before engaging in these transitions.

![Service Delivery Framework](image)

**Figure 3 – Service Delivery Framework Enables Improved Service Model**

**Identify and solidify business and clinical objectives**

As you embark on ITaaS initiatives, it’s critical to gain consensus among your stakeholders, including clinical leads, nursing, radiology, surgery, finance, human resources and other departments, on the future state envisioned for the organization and its affiliates.

The IT organization must then assess its existing landscape and readiness, including clinical workloads, capacity, data growth rate, security infrastructure, and level of regulatory compliance. From here, you can determine what changes are needed to support agreed-upon business and clinical objectives.

**Conduct an application inventory**

By conducting a comprehensive inventory of all applications, your organization can define patterns of computing use and identify opportunities for improvement. During this process, EMC can help your team group applications into portfolios according to requirements for HIPAA, performance, business continuity, and user device selection and delivery.

**Perform a healthcare workload analysis**

Next, your organization should perform a workload analysis of all applications in each business unit and clinical department across the enterprise. This analysis will help identify which stakeholders are using specific applications, how these applications are being used, and the key performance indicators (KPIs) for availability, capacity utilization, system response times and other measures.
EMC provides software tools and professional services as you map users to workloads and determine business and clinical priorities, impact, and risk of each workload. The resulting requirements define opportunities for application rationalization and IT service management activities. They also ultimately shape the data center consolidations and migrations needed to deploy infrastructure-as-a-service, software-as-a-service and eventually platform-as-a-service.

**Leverage best practice methodologies**

To align IT services with business needs and enable ITaaS, many IT organizations have adopted IT Service Management (ITSM) methods including those based upon the Information Technology Infrastructure Library (ITIL). Organizations also are embracing recommendations from the National Institute of Standards and Technology (NIST), which publishes guidelines on cloud computing and security.

In addition, ITaaS roadmaps should include plans for adopting Common Security Frameworks (CSFs) from organizations such as HITRUST, which define the need for information governance, risk and compliance (GRC) tools and methods. IT should prepare to use recommended technologies that satisfy requirements emerging from security and risk assessments conducted for attestation during meaningful use stages.

**Align IT services with clinical and business needs**

Transitioning to ITaaS is a fundamental shift in how IT is built, run, delivered, and consumed. To help with this process, EMC has developed a healthcare specific-process that facilitates the mapping of required stakeholder services to ITaaS methods and technologies. Foundational ITaaS capabilities can include infrastructure, desktop, and backup-as-a-service capabilities. On top of this ITaaS foundation, providers can then incorporate aggregated clinical and business services.

Examples of EMC Global Services to help build healthcare-specific ITaaS frameworks include:

- **EMC Cloud Advisory Service** develops an enterprise cloud strategy for transformation to ITaaS, including business case development; workload analysis for private, public and hybrid cloud models; operational transformation of skills, roles and processes; and execution roadmaps.

- **Cloud Infrastructure Service** defines the right architectural design for a specific cloud and ITaaS strategy such as hybrid, public, and private, and enables organizations to accelerate adoption and benefits of cloud technology solutions, including converged infrastructures.

- **Cloud Optimized Applications Services** help organizations accomplish their application rationalization and modernization objectives to accelerate virtualization of mission-critical applications. These services also enable platform-as-a-service, application replatforming and application infrastructure optimization.

- **IT Operations and Service Management Services** provide capabilities for an agile cloud operating model, including financial management and chargeback, service catalogs and service portal development, service orchestration and service automation, service design and workflow optimization.

- **End-user Computing Services** accelerate the move to desktop-as-a-service using technologies like VMware® View™ and incorporating mobile platforms.

- **Software Lifecycle Automation Services (DevOps)** accelerate the software development process through automated infrastructure provisioning and tighter integration between application developers and operations.
Evaluate staffing and training requirements
Transforming IT into a service provider also expands opportunities for your staff to broaden their technical expertise, deepen their role as consultants, and create additional revenue streams for the organization (Figure 4).

Some of your IT staff may need to be repositioned as business analysts, who work closely with clinicians and other users to define, meet and measure requirements for IT services. Others will be focused on ensuring consistent service delivery, whether services are delivered internally or are brokered by IT via external technology, software, and service providers.

Organizations must also evaluate roles and skill sets to determine what staff training or hiring will be needed for the transition to ITaaS. In addition, they will need to evaluate if any IT functions should be augmented by application partners and consultants.
BUILDING A VIRTUALIZED CLOUD INFRASTRUCTURE

Healthcare organizations can leverage a comprehensive portfolio of solutions and services from EMC to incorporate virtualization, cloud computing, and ITaaS capabilities. The foundation begins with a cloud-based infrastructure that provides efficient resource utilization, high application availability, agility in provisioning IT resources, and high performance.

Standardize and virtualize

It’s not unusual for larger healthcare systems to begin their ITaaS journey with multiple data centers and highly diverse, multi-vendor infrastructures. As healthcare organizations evolve as a result of merger and acquisition activities, these disparate environments often become more difficult to manage and grow.

To streamline IT, EMC recommends standardizing key components such as servers, operating systems, storage, and networking. Standardization allows IT to treat infrastructure as a consolidated asset and focus on building business and clinical value. Standardizing is also an important step in virtualizing the infrastructure.

With virtualization, IT can decouple the infrastructure from physical systems, enabling greater agility in managing resources for diverse workloads. Virtualization also facilitates consolidation because less hardware is needed. With virtualization also comes greater opportunity for automation, which enables self-service capabilities.

EMC solutions for meeting technical requirements

Key considerations for building your cloud infrastructure should include:

Performance and reliability

Healthcare providers can leverage the EMC VMAX Cloud Edition, which is engineered to meet the performance, availability, and scalability demands of a private and hybrid cloud. It also supports multi-tenancy, which allows physicians, nurses, administrators, finance officers, clinical employees and other groups to allocate their own private space in the cloud.

Four key advantages of the VMAX Cloud Edition include:

• A pre-configured and purpose-built solution to accelerate time-to-service configuration and delivery
• Automation of day-to-day tasks to reduce operational burdens and costs
• Self-service control through portals to improve tenant experience with the option to nest services in existing service catalogs that are provided via secure REST APIs
• Predictable linear pricing, which allows IT to focus on growing and consuming services without lengthy negotiation and procurement processes when additional capacity is required
**Accelerated deployment for multi-tenant environments**

To simplify and speed deployment of cloud infrastructures, healthcare providers are investing in converged infrastructures, such as VCE Vblock Systems, which provide infrastructure-as-a-service to support multi-tenant environments (Figure 5).

![Figure 5 – Current Healthcare Solutions for Vblock Systems](image)

By seamlessly integrating best-in-class compute, network, and storage technologies from industry leaders, Cisco, EMC, and VMware, Vblock Systems provide dynamic pools of resources that can be intelligently provisioned and managed to address your changing IT demands.

Vblock Systems automate many of the tasks associated with integrating, validating, and managing infrastructure to improve IT efficiency. VCE offers end-to-end accountability, unified management, and single support for the converged, ITaaS-enabled infrastructure, allowing healthcare providers to focus on accelerating EMR meaningful use objectives for improved care delivery.

**Backup-as-a-service solutions for data protection**

To protect data in the cloud, healthcare providers should also consider backup-as-a-service (BaaS). Benefits provided by EMC’s BaaS solutions include:

- Acceptable recovery time objective (RTO) and recovery point objective (RPO)
- Scalable and elastic capacity limits
- Metered usage based on factors such as size, number of copies, and data age, among others
- Appropriate granularity of recovery at the file or directory level
- 100 percent hands-off management or user-friendly portals
- Active background processing for data collection and backup without requiring users to manually start backups
- Healthcare-specific security, especially in multi-tenant deployments
To enable BaaS, EMC offers a range of backup solutions, such as EMC Avamar deduplication backup, Avamar with EMC Data Domain deduplication storage, EMC NetWorker backup and recovery and EMC Data Protection management solutions. These integrated solutions meet backup requirements across the entire healthcare organization.

By using an integrated delivery platform with data duplication, your organization can significantly increase backup and recovery performance while reducing IT and management costs. These BaaS solutions can be deployed at your site or an external data center operated by a service provider. In addition, elements of the solution can run on tenants’ premises.

EMC also offers professional services that accelerate adoption and time to value of your backup investments. For example, the EMC Backup Infrastructure Assessment can transform your backup operations by providing an end-to-end assessment of your backup environment and supporting infrastructure, including a review of operational processes, procedures, competencies, and service level objectives.

Business continuity and continuous availability

For maximum availability, EMC provides an active-active distributed storage configuration to attain zero RTO if total site loss occurs. Unlike array-based replication solutions, EMC VPLEX enables 100 percent storage availability by stretching storage clusters across data centers.

In addition, VPLEX supports a wide range of operating environments because it has been tested and certified with all of the mainstream clustering tools. EMC also works closely with healthcare software providers to certify their solutions for VPLEX environments.

By "stretching" or "extending" storage, VPLEX allows single clusters to be implemented across data centers instead of assigning clusters to separate data centers. In addition, VPLEX enables a single cluster to be spread across healthcare-specific application environments. This allows VPLEX to provide shared storage across array boundaries, enhancing high availability and disaster recovery design and operations.

VPLEX enables users to dynamically move information across platforms located in the same data center or separate sites. This data mobility enables increased capacity and utilization, enhanced performance, and dynamic scaling, among other benefits.

Trusted IT infrastructure: security and governance

Security and governance are paramount requirements for delivery of healthcare ITaaS environments. IT must protect against both outside threats and internal security breaches. Healthcare-specific security solutions from RSA provide the adaptive and risk-based authentication needed in cloud environments.

Governance ensures monitoring of thresholds to ensure providers stay within their risk tolerance. This applies to security, but also to business continuity, IT configuration management, and HIPAA compliance.

To achieve comprehensive governance, the RSA Archer eGRC solution allows healthcare organizations to build collaborative programs that manage data security and mitigate risks (Figure 6). Archer eGRC enables IT to ensure HIPAA compliance while automating security framework business processes and gain critical visibility into risk and controls.

![Figure 6 - Active Governance with a Single Platform](image-url)
With the flexible Archer eGRC platform, business and clinical users can tailor components, create supporting applications, and integrate them with multiple data sources without touching a single line of code. The RSA Archer eGRC Community and Exchange solutions provide an active user community with an online exchange of applications, content, services, and integrations.

The benefits of the Archer eGRC solution include:

- **Efficiency** – Users can ask a question once and use the results to demonstrate compliance with multiple regulations and healthcare security frameworks.

- **Automation** – Automation of workflow, risk-based scoping, data collection, assessment scoring, and findings generation and notifications to reduce administration.

- **Accountability** – Assignment of accountability at all levels of the healthcare enterprise hierarchy and infrastructure.

- **Collaboration** – Enablement of users across business silos such as health information management (HIM), finance, clinical operations, and legal, to collaborate and align common processes for managing clinical and business data, as well as protected health information (PHI).

- **Visibility** – Ability to gain a complete view of exposure and gaps across a healthcare organization by relating risks and audit findings to objects such as controls, objectives, processes, facilities, and technologies, as well as integrating risk management with key business and clinical processes.

**End-to-end computing platform**

Healthcare organizations can deploy the VMware vCloud® for Healthcare, which provides an end-to-end-care cloud computing platform for exchanging information and delivering products and services that can lead to better availability of healthcare systems (Figure 7). Flexible and customizable, it is a comprehensive framework supporting the entire IT care environment—from point-of-care to the most critical patient-care systems—to help safely accelerate the transition to truly connected care.

![Figure 7- VMware vCloud for Healthcare](image-url)
Designed to future-proof the entire IT care environment, vCloud for Healthcare enables organizations to:

- **Reduce costs**: Decrease data center and capital costs by as much as 60 percent and without sacrificing compute performance.

- **Increase mobility**: Deliver desktops and clinical workspaces that roam with clinicians, providing fast access to applications and data—without requiring multiple passwords—in a workspace that is always on and readily available.

- **Protect information privacy**: Reduce the threat of lost or stolen personal healthcare information (PHI) by keeping all data in the data center—not on PCs or mobile devices. Whether users log in onsite or remotely, the experience is just like using a local application.

- **Enhance security**: Position security services exactly where they are needed—from application segmentation to trust zone maintenance.

- **Maintain compliance**: Continuously and automatically monitor and update infrastructure and applications, as well as support detailed discovery and assessment across physical and virtual systems for central control of changes and configuration.

- **Achieve interoperability**: Move applications between virtualization and cloud platforms—to private, hybrid and public clouds and back again. Because VMware supports open APIs, organizations can also streamline management and control of workloads across clouds.

**TRANSFORMING IT PROCESSES**

An ITaaS framework better positions your organization to speed service delivery and reliably support the dynamic needs of your customers in a highly-automated and agile infrastructure. In this environment, the business and clinical departments will be able to rapidly provision resources and incur costs based on usage.

**Build a service catalog**

A key enabler of an “as-a-service” model is the development of a service catalog to help facilitate the transformation from a custom-engineering organization to one where standard offerings are the norm (Figure 8). EMC can help your organization create a service catalog.

![Figure 8 – The Service Catalog: A Unified View of the Full Range of Services](image)
EMC recommends that IT should create a service catalog according to the results of initial assessment of services. Using a service portal, an effective service catalog should:

- Improve response time to business and clinical needs through automation, self-service, and enhanced visibility into IT performance and usage
- Enhance operational and management efficiencies for further control by automating service delivery
- Achieve financial transparency as IT effectively meets SLAs and lowers capital and operational expenditures over time

IT also will want to evaluate how those services are consumed via the service catalog.

One way is through an "app" store—an online portal that users access for services. In designing an app store, IT should enable role-based access so that doctors, nurses, pharmacists, administrative managers, and others can choose from a tailored set of offerings relevant to their respective functions.

Further customizing the app store portal for secure patient access also helps the provider track recovery and provide follow-up instructions after a patient is discharged—a critical component in reducing readmission rates.

**Enable financial accountability**

IT will need systems and processes to capture usage and chargeback—or show-back—to individual departments for IT services consumed. Key considerations in developing a chargeback process include:

- Detailing all factors that determine actual costs to deliver services
- Showing greater transparency of business performance and value
- Tracking details of services rendered clearly and accurately
- Transferring budgets from IT to business and clinical departments
- Enabling IT and users to be more prudent and reduce over-allocation of resources
- Supporting IT’s "marketing" of competitive offerings to the business

**Align IT roles with needs of the enterprise**

With ITaaS, much less time is needed to build and maintain technology assets so IT can now focus on orchestrating service delivery and consumption. This will require new roles and broader skill sets.

Rather than depending on individual specialists in compute, storage, or networking, IT will need to transition staff to becoming cloud architects and administrators. Primary roles must fundamentally shift from handling password restores and "keeping the lights on" activities to analyzing business requirements and designing services to meet them.

In addition, IT will need to market its services to the healthcare organization, requiring additional skills and programs. As a service broker, IT will also need to perform market analysis of public cloud offerings and determine which ones should be integrated into the service catalog.

**Transform IT processes**

IT processes will need to evolve from creating and administering silos of compute, storage, and networking to horizontal strategies based on management of the cloud infrastructure as a whole. New processes also must be established to manage service-level agreements for cloud services and not just server or storage capacity and performance. Procedures for design standards and adding new services to the service catalog also will need to be incorporated.
From a broader perspective, IT will need new processes for capturing the strategic direction of the healthcare organization and integrating it into the service delivery framework.

**Redefine the IT service delivery process**

With ITaaS, the service delivery process will need to evolve. The whole concept of delivering ITaaS revolves around a prompt and efficient response to the needs of the business. As a result, traditional iterative configuration and service development cycles that issue releases on a quarterly or semi-annual basis are no longer acceptable.

IT should adopt an agile development and delivery methodology with an iterative and incremental approach so that service updates can be moved into production quickly and efficiently. Instead of three-month or six-month cycles, IT should strive for monthly or more frequent releases to meet the needs of its most demanding stakeholders.
CONCLUSION

An ITaaS model positions IT to speed delivery and support of essential business, clinical, and IT services to clinicians and administrators across the healthcare organization, providing significant value to the entire enterprise.

Through consolidation and virtualization, IT can expect dramatic cost savings by reducing physical hardware and associated energy costs, as well as through more efficient resource utilization. A virtualized infrastructure also helps providers integrate workloads from mergers and acquisitions faster and more cost-effectively and with significantly less risk. In addition, a cloud infrastructure allows for a more agile and efficient response to changing business demands—whether deploying a new PACS solution, upgrading an EHR application, or absorbing financials from a recently acquired hospital.

Healthcare providers also can explore new revenue opportunities by providing ITaaS offerings to other hospitals, clinics, and physician offices. The agility and security of a cloud infrastructure enables numerous possibilities, such as EMR-as-a-Service, PACS-as-a-Service, Analytics-as-a-Service, or Backup-as-a-Service delivered to organizations without resources to support these services on their own.

EMC provides healthcare providers with a comprehensive portfolio of ITaaS solutions and services that will allow your organization move your ITaaS strategy forward—at whatever your stage of adoption. EMC can help you capture the benefits of ITaaS with an infrastructure optimized for virtualization and cloud and built on unsurpassed, innovative storage, backup, security, and anywhere access technologies.

CONTACT US

To learn more about how EMC products, services, and solutions can help solve your business and IT challenges, contact your local representative or authorized reseller—or visit us at www.EMC.com.

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