Iron Mountain Reduces Medical Image Storage Costs

By Brian Babineau

June 2009
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Introduction

Health care providers are increasingly adopting digital medical imaging technologies to enhance diagnostic capabilities and improve patient care. While positively impacting health care service delivery, the expanded use of medical image technology also creates several challenges for providers, including maintaining consistent retrieval performance and completing data backup and disaster recovery operations. These processes become more complex due to the data explosion driven by the growing number and size of images stored. Providers must also comply with national, state, and local regulations which include information security and retention mandates—the latter of which increases costs as they require organizations to retain images, vital to an Electronic Health Record (EHR), for many years.

Simply put, more medical images equates to sizeable storage costs and information management burdens for any health care provider. Most hospitals do not have adequate IT resources or storage expertise to deal with these trends. The introduction of Picture Archiving and Communication Systems (PACS) has helped providers address some of the information management issues created by medical image technologies by centralizing and archiving images regardless of the modality that created them. PACS and other medical image management software solutions do not, however, tackle the more significant long-term archive storage capital and operating costs. In fact, in order to be effective, these solutions must be supported by storage solutions which scale and remain accessible as the amount of data generated and saved in PACS increases over time.

With PACS applications driving information management, health care providers are now turning their attention to these medical image archive storage challenges. The traditional approach to medical image archive storage—constantly buying new storage systems and running them in-house—can be a very expensive proposition in the face of rapid medical image data growth. Storage costs manifest in upfront acquisition expenditures as well as ongoing operational expenses such as IT staff salaries, power to run and cool the systems, and purchases of backup and disaster recovery infrastructure. When evaluating all of these storage costs—especially as capacity requirements explode—providers are often flabbergasted and look for an alternative.

One such option is a medical image archive storage service delivered via a cloud-based storage model, which shifts capital and operational burdens to a storage service provider. The cloud storage service provider ensures the medical images are saved, secured, and protected and, most importantly, accessible to the health care entity. In return, the customer pays a subscription fee to save and access their medical images, making medical image archiving a manageable, predictable operating expense. In addition to eliminating upfront storage capital purchases, the health care provider no longer has to worry about complex storage and data protection operations and can repurpose capital investments for more strategic initiatives.

Iron Mountain’s Digital Record Center for Medical Images is one example of a cloud storage service designed for medical images. Though cloud-based services are relatively new offerings for most, Iron Mountain has been delivering them for years—offering data protection and e-mail archive solutions delivered via the cloud. Iron Mountain also has earned the trust of many health care providers since the firm already stores analog films. By combining cloud-based service expertise and established trust within the health care industry, Iron Mountain’s Digital Record Center for Medical Images enables providers to take advantage of advancements in medical imaging technology while still controlling archive storage costs.

The Medical Image Archive Storage Challenge

Information Growth

Medical image data growth is driven by several factors. An increasing number of health care providers are introducing medical imaging technology to expedite patient diagnosis and treatment, while simultaneously reducing their patients’ cost of care. Medical departments—including radiology, pathology, cardiology, and
oncology—are all finding new ways to leverage medical imaging solutions. And, as providers find new ways to use medical imaging, they are investing in more modalities—the systems which actually generate the studies. In a 2008 report, the US Centers for Disease Control and Prevention estimated that there were nearly 30,000 MRI and CT scanning systems worldwide in 2006, up from 7,200 in 1995. ¹

Newer modalities also contribute to storage growth as they create more images per study when compared to older systems. As upgrades are made to 256 slice CT scanners from 64 slice CT scanners, the amount of medical image data a provider generates will grow exponentially. As an example, The Medical University of South Carolina saw that the amount of data it generated each month grew by a factor of 25 over a ten year period as a result of implementing newer medical image technology.² Further, images are also captured in higher resolution formats thanks to significant technology advancements that have brought ‘high definition’ to the medical industry. As a result, a typical multi-slice CT scanner produces hundreds or thousands of images per study, depending on the study protocol. At 0.5 MB per image, this can translate to hundreds of megabytes—and, in some cases, over a gigabyte—of data for a single study.

As additional research proves the cost savings—and, more importantly—the patient benefits of medical imaging technology, the number of studies completed grows, which in turn generates more data to be stored.

Information Retention

In addition to dealing with image-related data growth, health care providers are required by various laws to save medical records for specified periods of time. Retention requirements vary based on a number of criteria, including age of the patient, type of study performed, results of a study, and where the provider is located (each state in the US has its own medical record retention rules). Example retention requirements include:

- **California:** Hospitals must maintain medical records for a minimum of seven years following patient discharge, except for minors. Records of minors must be maintained for at least one year after a minor has reached age 18, but in no event for less than seven years.³
- **Florida:** Hospitals shall retain inpatient medical records, emergency room records, and outpatient/clinical records for seven years after the last entry. X-ray films are to be retained for seven years.⁴

The lack of consistency in the US, mostly due to varying state retention regulations and HIPAA rules, has led many providers to simply retain medical records for the life of a patient. A June 2008 study by the American Health Information Management Association indicated that 50.6% and 52.5% of hospitals permanently retained adult and minor medical records, respectively.⁵

The move to an Electronic Health Record system, due primarily to various government and insurance incentives, is also driving medical image retention. The American Recovery and Reinvestment Act of 2009, (ARRA—also known as the economic stimulus package of 2009)—includes $36B in reimbursements and incentives for providers that implement EHR systems over the next several years. As more medical imaging studies are performed during the normal course of care, they will constitute a larger portion of a patient’s record and be subject to the same retention requirements as paper-based medical records.

Ambiguities in medical record retention policies applying to medical images, and the technical challenges of managing images have forced health care IT organizations to save information for lifetimes. One thing is for certain: the longer images are saved, the bigger and more complex archive storage and data protection environments become.

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¹ http://www.cdc.gov/nchs/data/hus/hus08.pdf#089.
² http://www.diagnosticimaging.com/display/article/113619/1188947.
³ California Code Regs. Tit. 22 Section 70751, 71551 (c) (1993).
⁵ http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2430773&rendertype=table&id=T4
Data Protection Requirements

Medical record retention requirements are not the only rules impacting how information is managed. In the US, providers must implement backup and disaster recovery plans to meet HIPAA mandates. Under the Contingency Plan Standard (Section 164.308) and Device and Media Controls Standard (Section 164.310) in the HIPAA Security Rule, covered entities—including providers—must have:

- **A data backup plan** which requires covered entities to “establish and implement procedures to create and maintain retrievable exact copies of electronic protected health information.”
- **A disaster recovery plan** that establishes (and implements as needed) procedures to restore any loss of data.
- **An emergency mode operation plan** which mandates covered entities to “establish (and implement as needed) procedures to enable continuation of critical business processes for protection of the security of electronic protected health information while operating in emergency mode.”
- **Contingency plan testing and revision procedures.** These procedures should be implemented by providers to test and, if necessary, revise and optimize their backup, disaster recovery, and emergency mode operation plans.
- **Data backup and storage** to prevent information loss when transitioning to new technology. Providers can address this by “creating a retrievable, exact copy of electronic protected health information, when needed, before movement of equipment.”

Because these rules, like many other regulations, are not prescriptive, organizations can implement a variety of solutions to address them. Providers should already have backup policies in place as part of IT Standard Operating Procedures (SOPs). However, addressing the disaster recovery and emergency operations plan can be more challenging. Best practices dictate that providers should, at a minimum, have one copy of their medical image backups offsite in the event that a disaster strikes a facility or campus. The second site should be regionally separate from the provider’s data center, ensuring that it will not be impacted. Providers can achieve this by sending tapes to a trusted disaster recovery provider or by replicating medical archive storage systems to a second location. The former is a cumbersome process as providers have to manage all the tapes and the latter is extremely expensive because providers have to buy a second storage system as the replication target.

Regardless of how many medical images a provider creates or how long they have to save them, data must be appropriately protected. While the regulations do not state what specific technologies a provider should use, there are best practices for backup and disaster recovery that providers can use as guidelines before selecting a solution to implement those procedures.

**Security is Not Optional**

In complying with HIPAA Security Technical Safeguards (Section 164.312) and several other privacy-related regulations, providers must take appropriate measures to secure electronic protected health information, including medical images. Security and privacy requirements extend to all aspects of the storage environment, including data protection and disaster recovery—representing another burden on already stressed health care organizations. Securing medical images can be more challenging compared to other aspects of electronic protected health information as they are often transmitted between providers if a patient moves or seeks additional care from another entity. Providers may address data at rest and data in flight with encryption—but IT then has to manage all of the keys.
Understanding Medical Image Archive Storage Costs

After creation, medical images are often stored locally in the imaging modality. The images are then sent to a PACS solution, where they are made available for use by radiologists and other clinicians. At this point, the images are often joined with others from different modalities. As time passes, the PACS solution moves the images to an archive for long term retention (it tracks where the images are at all times to ensure access). Significant costs arise when providers begin buying large volumes of storage capacity to underpin the medical image archive. What's more, the archive storage expenses go well beyond the acquisition cost for disk capacity: organizations must pay for software licenses which facilitate replication and/or backup of their medical images. In many cases, this may entail deploying a second system in a second location for disaster recovery purposes. The storage devices also occupy a significant amount of data center floor space and consume a great deal of power to run and cool the systems. Of course, with these investments comes a need for adequate IT staff to run all of the systems and execute the often complex and costly backup and disaster recovery operations.

The Upfront Expense

The most obvious expense is storage system acquisition cost, which often represent 15-25% of the total storage expenditures. Storage system investments can vary widely, depending on the performance and availability characteristics of the system. Ideally, medical image archives—which are typically static (non-transactional) files—would run on denser, and therefore less costly, storage systems. However, some of these systems do not have the performance required to keep images easily accessible. As a result, customers store less data on a system, boosting performance but wasting valuable capacity. Failing to use all available capacity leads providers to buy more storage systems sooner than anticipated.

Some providers choose to buy more expensive, better performing storage systems which ensure images can be accessed as archives grow in size. However, this is an extremely costly proposition—one that is very difficult for budget-strapped health providers to maintain.

With unpredictable image growth and inconsistent retention requirements, providers often purchase more capacity than is needed to prevent against running out. Overbuying storage increases initial storage investments and introduces the risk that they may not use some of the capacity for a few years.

Beyond Hardware

When purchasing a storage system for a medical image archive, providers may also need to consider add-on software solutions such as replication, resource management, and snapshot capabilities. Replication facilitates disaster recovery, which also requires the purchase of at least one additional system (as the target of the replication operation). Providers experiencing rapid data growth may need resource management to monitor capacity utilization, and performance metrics, ensuring that the system does not run out of room or slow to the point where images cannot be quickly accessed. Running a storage environment without resource management is the equivalent of flying an airplane without radar: it can be done, but the risks are high. Snapshot technologies are just one example of several solutions that facilitate non-disruptive backups—something that every provider needs to implement in a medical archive so image access is not compromised during data protection operations.

Most storage systems and backup software offerings are licensed or priced based on capacity. As providers experience rapid data growth in their medical archives, software costs will also increase.

Operating Costs

When implementing a medical image archive, providers often fail to account for “hidden” costs that are not part of the initial hardware or software purchase. Companies often get caught by surprise because they forget to incorporate the following into their storage operating budgets:
• **Data center floor space.** While many IT departments believe that all data center space is created equal, most health care providers try to minimize the IT system’s footprint in order to maximize research and patient treatment space. As medical image archives expand, they can consume a large portion of data center space; this worsens if providers do not reach high storage system utilization. Given that data center space can cost anywhere from hundreds to thousands of dollars per square foot to build—depending on the exact location and design—a provider may not be able to add other production IT systems to foster research or enhance productivity if medical archive storage consumes too much space.

• **Energy (power and cooling).** Between January 2008 and January 2009, the cost per kilowatt hour in the US increased by 8% to $9.75.\(^6\) Constant fluctuations in utility costs make it difficult for an IT department to predict how much powering data center equipment will cost. However, a more challenging scenario emerges when providers add systems, including storage, but need to procure additional power to run and cool them. If power is scarce, utility costs will be higher. If no additional power is available, providers must reconfigure data centers—an expensive and complex proposition—or rent additional data center floor space—also a very costly alternative.

• **Labor.** Due to budget constraints, many provider IT staffs are already overwhelmed. As medical image archives grow and new systems are added, IT has to worry about managing new devices as well as running backup and disaster recovery processes. In many cases, this will necessitate the hiring of additional resources or require that service levels be cut as existing staff may be unable to maintain all of the systems adequately.

• **Ongoing maintenance.** Storage system warranty coverage can vary. Most systems carry a three year warranty, but some solutions require a maintenance fee to be paid in the second and third years of the asset’s depreciable lifecycle. Storage software maintenance is usually 15-20% of the solution’s list price and must be paid 90 days after the initial purchase.

• **Upgrades and data migrations.** When a storage system warranty runs out, providers may choose to buy new systems rather than pay to maintain outdated technology. This process forces IT departments to migrate images to the new storage system. If a new revision of storage system software (snapshot, replication, etc.) is released, the provider must find time to complete the upgrade. Additionally, data migrations due to hardware obsolescence can be so complex that providers pay for specialized professional services—an unplanned expense—simply to complete the project in a desired timeframe. Software upgrades may not be as cumbersome, but they do present risk as IT may need to take an archive application offline to prevent any data loss during the upgrade operation.

**Peripheral Investments**

Because providers have to back up medical image archives and implement a disaster recovery plan, they must budget for technology purchases in addition to the storage capacity. If a provider chooses to replicate medical images to a second location, it needs to buy the tertiary storage system, replication software, and network bandwidth. The latter may require the provider to upgrade its existing bandwidth or purchase a new connection to the remote site. As an alternative to replication, some providers may elect to backup data to tape, which requires an investment in a scalable tape library (or multiple libraries, depending on the amount of data) and adequate tape media to create an onsite and an offsite copy of all the images. When a provider uses disk or tape for data protection, all of the aforementioned storage-related operating expenses apply to these systems as well.

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\(^6\) [http://www.eia.doe.gov/cneaf/electricity/epm/table5_6_a.html](http://www.eia.doe.gov/cneaf/electricity/epm/table5_6_a.html)
Iron Mountain’s Medical Image Archive Storage Alternative

Cloud-Based Storage

Many providers attempt to reduce medical image archive storage costs by retaining older information on tape or other removable media. While more economical, the images are not readily available to caregivers, which could negatively impact patient care. Others purchase extremely inexpensive disk devices offering sub-par performance which, due to a lack of software functionality, are difficult to backup and operate. These cost cutting measures represent a few of the shortsighted methods providers turn to in an effort to control medical image archive storage spending. While these approaches may have an immediate impact, they may also create risk or prove to be more costly in the long-term.

Providers now have an alternative to gain control over all aspects of medical archive storage costs: cloud-based storage delivered as a service. To take advantage of these offerings, health care customers send archived medical images to a storage service provider responsible for service level agreements pertaining to information accessibility, security, data protection, and disaster recovery. While the images are stored at the storage service provider, the health care organization maintains ownership of, and access to, the medical images.

The benefits of shifting medical archive storage to a service provider include:

- Reducing the total cost of storage and eliminating the need for capital for medical image archive storage purchases
- Improving disaster recovery as a copy of data is automatically stored offsite. The images can be quickly retrieved mitigating the risk of data loss or archive application downtime.
- Reducing information management complexity, including data migrations. IT merely has to configure PACS and other EHR systems to send data to the service provider, who ensures service levels related to accessibility, security, data protection, and disaster recovery are met.
- Moving storage costs from an unpredictable capital budget line item to an operating expense that varies based on the amount of information being saved per month (or per year). Customers pay for only the storage capacity that they actually use, avoiding expenses associated with overbuying capacity.
- Shifting the security compliance burden to a third party. The service provider is responsible for making sure that proper data protection and disaster recovery processes are in place and medical images are always accessible.

Iron Mountain’s Digital Record Center for Medical Images

When a health care provider looks to utilize a cloud-based storage service, it is not enough to simply look for the lowest price per gigabyte. The storage service provider must be able to integrate with a variety of PACS applications, in addition to having the ability to secure, backup, and copy images for disaster recovery purposes. Most importantly, the service provider must be able to consistently deliver against service levels to ensure images are always accessible to caregivers. In particular, a health care provider should carefully review the provider’s experience and resources to respond in an actual disaster as this is a primary value of the service.

Storing paper and film-based medical records for nearly 2,000 North American hospitals, Iron Mountain already exemplifies the most sought after quality in an onsite storage provider: trust. Additionally, Iron Mountain has extensive experience delivering other cloud-based storage services with its LiveVault and Connected Backup solutions. While cloud-based storage services are relatively new to many, Iron Mountain already has nearly 20 petabytes of data stored in its data centers around the world and offers proven expertise in responding to major disasters. The Digital Record Center for Medical Images solution leverages years of Iron Mountain trust, experience, and long-term viability to deliver a reliable cloud-based archive storage service for medical images.
To utilize Iron Mountain’s Digital Record Center for Medical Images, a health care provider simply configures its PACS application to send information to an onsite storage appliance provided by Iron Mountain. This process is simple and straightforward, thanks to integration with many PACS solutions including McKesson, GE, Kodak, Cerner, and Agfa, amongst others. The appliance then transmits the data over a secure network (usually a VPN) to an Iron Mountain data center.

Iron Mountain ensures that data is not altered or deleted while stored in their data centers. Medical images are saved in Iron Mountain’s highly secure, underground bunker and then replicated to a second, geographically separate, underground bunker. With redundant Internet connections, firewalls, and physical security (armed guards and employee key card access) protecting these data center bunkers—as well as hierarchical access controls to the actual storage solutions on which the images are saved—data is extremely secure. To access images, physicians log on to their PACS application, which retrieves the images from Iron Mountain’s data center. This process functions exactly as if the images were stored locally, ensuring PACS workflows remain unchanged.

Providers pay a monthly fee for the Digital Record Center for Medical Images service based on the volume of data that is actually stored. In return, Iron Mountain provides regular monthly reports that give health care providers metrics regarding their archived storage under management.

**Justifying an Investment**

ESG recently modeled the potential cost savings a typical health care provider could achieve through Iron Mountain’s Digital Record Center for Medical Images offering. The five year cost model assumed:

- A health care provider completed approximately 200,000 medical image studies in the first year, equating to approximately 3 TB of new storage (this capacity estimate factors in data compression). The number of studies completed increased 3% per year for the next four years.
- The provider entered the five year period with a 3 TB medical image archive backfile that needed to be stored in addition to the newly created content.
- The size of a medical image study (measured in gigabytes) increased at 3% per year.
- The provider purchased a storage system to meet its five year capacity and backfile needs in the first year.
- Iron Mountain’s pricing for its service which includes storage of two copies of the medical images in two separate data centers and networking fees.

ESG utilized its own research to determine the acquisition, operating, and maintenance costs for an onsite storage solution and associated software including:

- Two dollars per gigabyte for initial acquisition cost of storage hardware and software—a conservative figure which could easily double depending on the storage solutions a provider is evaluating or currently running. This cost represents a storage system with ATA-disk drives connected via a standard file system (NAS) or object file system (CAS) with snapshot and resource management software.
- Software maintenance is incurred 90 days after the initial purchase; hardware maintenance is paid in the fourth and fifth years.
- For every dollar spent on storage hardware and software, a provider typically pays $1.40 per gigabyte in operating expenses. These operating expenses include power, data center floor space, and labor and can vary depending on local utility prices and level of IT staff expertise.
- Providers could achieve 75% storage system utilization in an onsite solution.

Based on the assumptions, a provider would need to store nearly 22 TB of medical images over the five year period. If a provider chose to purchase and run its own onsite storage solution, the estimated expense would be approximately $580,000. In the same five year period, Iron Mountain’s Digital Record Center for Medical Images would cost just over $360,000—a 60% savings over the onsite storage alternative (see Figure 1). The cost savings jump to 240% if the provider chooses to replicate the onsite storage solution to a secondary location for disaster recovery purposes, a capability that is provided by the Iron Mountain Digital Record Center for Medical Images solution as part of the standard service offering.
Iron Mountain Reduces Medical Image Storage Costs

Customers can save with Iron Mountain’s Digital Record Center for Medical Images because they avoid all storage-related operations expense, which make up 86% of total onsite storage costs (see Figure 2). In addition to the five year benefit, the first year cost for the Iron Mountain service is 2X less than that of the capital outlay for an onsite storage solution (4X if two systems are purchased to support replication). These savings can be attributed to a number of factors, including Iron Mountain’s "pay as you go" pricing model. Providers pay a monthly fee based on medical image archive storage consumption. An onsite storage system requires the provider to “buy ahead” so they have enough capacity for future growth. In this comparison, customers need to store 22 TB of data, but have to buy 35 TB of storage due to RAID configuration overhead and the inability to utilize 100% of an onsite storage solution due performance penalties that occur as systems fill up.

**FIGURE 1. FIVE YEAR STORAGE TCO MODEL – IRON MOUNTAIN CLOUD-BASED STORAGE SERVICE COMPARED TO ONSITE SOLUTIONS**

**Estimated Five Year Medical Archive Storage Costs**

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<td>Iron Mountain Digital Records Center for Medical Images</td>
<td>$1,230,307</td>
</tr>
<tr>
<td>Onsite Storage Solution (without replication)</td>
<td>$580,154</td>
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<tr>
<td>Onsite Storage Solution (with replication)</td>
<td>$363,023</td>
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Source: Enterprise Strategy Group, April 2009

**FIGURE 2. FIVE YEAR STORAGE TCO MODEL – ONSITE STORAGE CAPITAL AND OPERATING COSTS**

**Breakdown of Five Year Onsite Storage Solution Costs**

- Total Onsite Storage Capital Expenses (Hardware & Software Acquisition and Maintenance): $93,701, 16%
- Total Onsite Storage Operating Expenses (Labor, Power, and Data Center Space): $481,920, 84%

Source: Enterprise Strategy Group, April 2009.
Further, Iron Mountain includes disaster recovery capabilities as part of its monthly fee—two copies of an image are stored in two geographically dispersed underground data centers at all times, whereas an onsite solution requires the customer to buy two separate storage systems, potentially build out a second data center, or implement an offsite tape backup process. For this exercise, ESG only modeled the disk-based replication option. If customers leverage tape for backup and recovery, these expenses should be added to the onsite storage costs for an accurate comparison against a cloud-based storage service such as Iron Mountain's.

With an onsite storage solution, providers may experience additional costs if they choose to upgrade their medical image archive storage system after the third year. This upgrade would require an additional significant capital outlay in the fourth year when existing storage hardware and software is replaced.

A cloud-based medical image archive service, such as Iron Mountain’s Digital Record Center for Medical Images, offers several benefits, including significant cost savings. That being said, every health care provider should conduct the proper due diligence process to justify using a service instead of an onsite storage solution. A simple total cost of ownership (TCO) calculation, such as the one completed by ESG, can provide enough insight into whether or not a cloud-based service is the most cost effective approach. Unfortunately, many providers never complete this exercise or fail to consider all the storage operating costs and peripheral investments needed to adequately run an adequate onsite medical image archive.

**Conclusion**

In a recent ESG research study of nearly 500 organizations, 59% of the health care respondents indicated that they were planning to spend more money on IT in 2009 when compared to 2008, the largest percentage response of any industry. ESG believes that one of the catalysts for this increase in IT spending, despite the current economic conditions, is new investments in medical imaging modalities, PACS solutions, and EHR systems. These technologies will generate more data that providers will need to save, exacerbating already out of control storage costs.

As medical image archive storage capacity increases, providers continue to buy more systems and hope that IT can run them while properly executing backup and disaster recovery operations. However, providers rarely pay attention to storage costs until the next system is purchased, a migration occurs, or service is impacted. If they did, they would realize that these costs include much more than the storage hardware. In some instances, the total storage expense is not the biggest issue: it is the unpredictability of when the cost will be incurred or when the next system will need to be purchased.

To their credit, many providers have tried to cut medical image archive storage costs as money saved can be repurposed into other IT initiatives that support new research or improve overall patient care. Many of these initiatives, such as replacing tape systems with disk-based alternatives, are merely stopgap measures that do not address the associated storage operating expenses. Providers that want to cut most storage costs and remove the uncertainty of what the next expense will be should evaluate medical image archiving via a cloud-based storage service. These solutions are easy to setup, offload much of the operational burden from IT, turn storage expenses into a simple monthly fee, and most importantly, keep images as accessible as if they were stored onsite.

The cost savings gained by moving to a cloud-based medical image archive are tangible, as evidenced by the example cited in this paper. Providers should conduct their own TCO studies and compare onsite storage to an alternative like Iron Mountain’s service. This comparison should take into account ALL the storage costs, including operating expenses, as this will lead to a more educated decision. If the provider believes that cloud-based storage service will save them money, Iron Mountain’s Digital Record Center for Medical Images—bolstered by integration with PACS applications, highly available and extremely secure data centers, and a legacy in storing other health care information—is a formidable option.