Strategies for Management of Prior Analog Exams

Following a Conversion to Digital Imaging

A White Paper for Radiology Professionals

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Contents

I. Executive Summary

The move to PACS provides a full range of benefits, from more precise image analysis to enhanced workflow and image communication beyond the enterprise. However, going digital is not a matter of black and white. Lurking in the difficult-to-manage gray area is a file room full of prior hardcopy images that sites must retain, typically for five to seven years, to meet statutory retention requirements. Some studies, such as pediatric exams, must be kept for up to 28 years. During that time, these hardcopy images provide essential information for comparison with current studies even after new digital management systems are in place. In fact, one of the most pressing questions involved in a digital transition is how to manage prior hardcopy exams.

The situation is even more difficult for full field digital mammography (FFDM) applications since comparison with new studies is an integral part of daily workflow. Sites must retain and have ready access to these files for a period of not less than five years, or not less than ten years if no additional mammograms of the patient are performed at the facility.

This white paper examines the strategies available to manage prior hardcopy images through their full retention time. It also offers an in-depth look at how an analog film management and on-demand conversion service can provide a valuable solution.

II. Strategies for Prior Analog Image Management

Once an imaging site converts to a digital environment, there is no single correct answer for the management of hardcopy images. Even the best strategy involves some degree of trade-off. However, the good news is that if a facility carefully examines all its options and the nuances involved, it can adopt a solution that best meets its needs and supports high quality image interpretation in an efficient, cost-effective environment.

In general, sites may adopt one of the following strategies for managing existing hardcopy exams.

A. Maintaining the Analog Archive

The most straightforward strategy is to utilize existing images in their native format and to work going forward with both hard- and softcopy exams in a hybrid environment. This approach eliminates the expense involved in scanning prior exams into digital format as discussed below. However, from a workflow perspective, this strategy is anything but straightforward, and the resulting inefficiencies may cost imaging sites more in staff time and lost radiologist productivity than the savings realized with other seemingly more costly options.

In particular, in a hybrid environment, resources must be devoted to maintaining dual-format archives, to retrieving images from both hard- and softcopy systems and to returning them to the appropriate locations. In this scenario, the costly, inefficient file room generally becomes a major bottleneck in imaging workflow.

More significant, however, are the difficulties for radiologists comparing images across formats. Optimal viewing conditions for digital images differ significantly from those for hardcopy images. Creating a work space that marries the two is extremely challenging. Moreover, switching between the two formats is inefficient and adds a level of distraction that may hamper the radiologist's ability to read films with precision.

B. Converting the Entire Analog Archive to Digital

Another option is to scan the entire archive of existing films to create a fully digital environment. While more desirable from a workflow and clinical perspective compared to a hybrid environment, the cost can be prohibitive.

Sites must budget $30,000 to $60,000 for a quality medical grade film scanning system. Additionally, they must allocate significant staff hours to the conversion process. Many sites also will want to keep their original film as a backup, which will occupy onsite space or incur warehousing expenses.

Sites scanning prior exams must also budget time and expense for staff training. Staff must be educated about proper anatomical positioning and consistent entry of demographic information for exams. For some modalities, manual input of more detailed information is required, such as film positioning and sequencing information for multi-image CT and MRI studies. In some cases, descriptive information on specific exams must be typed into appropriate RIS and PACS fields.

A typical 300-bed hospital has a volume of about 150,000 exams annually with 4.5 images per study. If it scans seven years' worth of data, the total is 4,725,000 images. Assuming each image requires 20 seconds to scan, the time required for scanning alone is 1,575,000 hours. Time for retrieval of images from files, removal from jackets and input of any further information required is additional.

While the scanning project is underway, sites must devote a physical area of the department to this, and plan a layout that makes sense from an ergonomic and logistical perspective.

Clearly, this is a significant project that a site must fully understand before pursuing.

Another way to implement this strategy is to outsource the scanning process to a commercial service. However, this elevates cost further.

Special considerations for mammography

Because of the high image quality necessary for mammography, a special high-resolution scanner or scanning feature is necessary, adding to the cost. Such a scanner also should support DICOM MG standards that enable capture of information about the mammographic views as well as related data essential for integration into a PACS.

In addition, staff will need training to recognize other specific, required information about each scan that cannot be automated. In short, digital conversion of mammography film is a complex process, and a site should thoroughly understand what it entails in advance.

C. Converting Analog Images to Digital As Needed

A third option is to scan images as needed to create digital files. This has the obvious advantage of minimizing conversion costs by eliminating scanning of films that will never be used, while at the same time providing radiologists with a consistent format for image comparison. Overall, this may be the most cost-effective strategy when both hard and soft costs are considered.

On the negative side, however, is the need to maintain a hardcopy file room until the last study has reached its required retention time, and to devote staff hours to the training for and execution of the scanning process. Further, a site must incur the expense of film scanner purchase.

As a growing number of imaging sites convert to a digital environment, specialized service providers that manage the hardcopy archive offsite and scan images on demand are arising. For many imaging sites, these providers offer a practical and cost-effective option. This option is discussed in greater detail in the next section.

Special considerations for mammography

Naturally, mammography film conversion on demand must meet the same criteria as digitization of the entire mammography archive, as described above. Therefore, the process is far more complex than selective conversion of general radiographic studies.

Because of this, sites may want to make a strategic decision to utilize a provider for mammography archive management and image conversion only, even if they do not do so for their general radiology images.

III. Outsourcing Analog Archive Management and Digital Conversion On-Demand

As an alternative to implementing the strategy in-house, outsourcing file room management and film conversion on demand offers the benefits of eliminating the storage space required to maintain the hardcopy file room, the purchase of a costly scanning device and the staff time dedicated to analog archive maintenance and digitization of images. Given this, outsourcing these functions may provide a more cost-effective and practical solution for many imaging sites.

A number of firms provide a complete menu of these services, including SOURCECORP® (www.srcp-tap.com), which has provided its innovative TAP™ (Total Archiving Program) solution since 1986. While features vary, on a global level these file room management and film conversion providers share much in common.

A. The Service Paradigm

A file room management and on-demand conversion service provider generally maintains a site's existing analog images in a file room at the provider's location. When an imaging client requests a prior exam for comparison with a new study, images are immediately digitized into a standards-based DICOM format, encrypted for security and transmitted to the site over the Internet or through a private network (VPN) connection. Many providers also will scan-in patient demographics and image identification information such as accession number, master patient index and more, as desired, and include this as part of the file.

Upon receipt, the imaging site usually stores these files in their PACS for use with the upcoming case and thereafter permanently archives them digitally. With these images now stored onsite, the service provider destroys the hardcopy data following Healthcare Insurance Portability and Accountability Act (HIPAA) guidelines.

The speed of the digital connection between the provider and imaging site will significantly affect the efficiency of the system as a whole. For example, a 40 MB image can be sent using an OC3 line in seconds and on a T1 line in minutes, but other connections demand more time. Transfer speed must be taken into account to build in sufficient lead time for a study to reach the imaging site when needed. Sites must balance the cost of a high-speed digital connection against the workflow efficiencies realized.

Special considerations for mammography

Because of the complex regulations governing mammography, the large image file size, and the special features necessary, providers typically cover mammography images under a special service that complements their general radiology offerings. Sites that keep general radiology films in-house might consider outsourcing mammography only due to the complexities involved. This includes the longer statutory retention time required for mammography, the need to compare every screening image with prior patient images, as well as the strong clinical benefits and workflow efficiencies of image comparison across the same format.

On-demand mammography film digitization services must support the same high image quality that is necessary for reading and comparing breast exams in analog format. As mentioned above, special high-quality scanners are required to accomplish this. These scanners must go beyond DICOM compatibility to support DICOM MG standards, which enable capture of a full range of data regarding mammography view-patient orientation and image laterality, for example. A mammography provider should have staff who are specially trained in scanning and coding breast images.

B. Selecting a Vendor for Conversion On-Demand

When closely examined, file room management and on-demand image conversion providers vary considerably on a range of factors. Working with a provider represents a true partnership. After all, an imaging site will be entrusting this organization with its entire history of medical images and relying on it to transmit digital images quickly and reliably to keep the wheels of radiology turning. Selecting the right provider to meet a site's specific needs is crucial.

Sites should discuss their operation in detail with potential partners, examine service contracts carefully and consider the factors below.

SOURCECORP's TAP solution, operating since 1986, meets all of these criteria and would be an excellent choice for an imaging site of any size.

• Analog Exam Removal, Inventorying and Database Production

A provider will be responsible for managing a site's entire analog archive. To ensure streamlined operation and accountability throughout the relationship, both parties must be clearly informed about which specific studies are stored with the provider. Therefore, the relationship should begin with a thorough provider-conducted and verified inventory of every patient jacket in the offsite archive. This inventory must be updated on an ongoing basis and will be most practical if implemented in digital format.

• Secure Managed Operations Center

Make sure that a provider's file operations center is state-of-the-art with reliable heating and cooling as well as flood and fire protection and that sufficient resources are devoted to maintenance. Additionally, investigate the physical file storage system and administrative filing practices. These are all crucial to the success of an archive outsourcing plan.

• Image Scanning, Demographic Data, Formatting

Look for a provider that uses top-of-the-line automated scanners for this important function. For general radiology images, scanning at 2k spatial resolution and 8-bit grayscale will assure good image resolution.

Mammography images should be about 4k x 5k and 12-bit resolution. Naturally, files should strictly comply with the latest DICOM standards. Only with strict adherence to these guidelines will sites be assured reliable access to diagnostic quality digital images. A provider should incorporate demographic and other related data in each digital study.

Typically, images are compressed for fast, reliable transfer to the imaging site over IT connections. Lossless compression, such as JPEG 2000, will ensure they remain at diagnostic quality.

• IT Expertise and Resources

Also investigate the general IT expertise of providers since this is crucial to the program. Vendors should be able to offer and support a range of connections, from T1 lines to virtual private networks (VPNs), and to guide sites through the process of selecting the appropriate balance of cost and speed.

Additionally, providers should also offer some type of Web-based application to automate study requests, rather than requiring sites to individually telephone or email these. A number of vendors, such as SOURCECORP, have convenient Web portals to streamline the image access process. In most cases, this will involve integration of the electronic hardcopy image database created at the start of the program to provide a comprehensive catalog of patient records on file.

Additionally, providers should be committed to remaining technologically state-of-the-art through appropriate upgrades. This includes emerging standards for DICOM, compression algorithms, digital communications infrastructure and more. Providers also should have IT staff available for immediate resolution of any technical problems.

Finally, consider that IT needs can be difficult to predict in today's rapidly evolving healthcare environment. A vendor that can support such related issues as digital image backup and archiving also can be advantageous.

• 24/7 Conversion and Transmission

It almost goes without saying that a supplier must maintain the same dedication and around-the-clock hours as the imaging sites it serves. Make sure the provider does.

• Meeting Special Needs

Selecting a provider that is flexible enough to meet a site's individual needs also is important. For example, occasionally radiologists may request AST (automated segmentation technology) of CT, MRI or ultrasound images, which involves dividing multiple images from a single sheet of film into separate DICOM files to enable cine/stack PACS reading.

Inquire in advance whether a provider will be equipped to meet special requests.

• All-Inclusive Services and Appropriate Pricing

As the keeper of your analog archive, the provider should offer a full range of file management services. If not, a site may find itself managing some aspects of its archive long distance or risk violation of government regulations. From the initial file jacket packing and transportation to the offsite file room to image destruction after statutory retention times, these necessary services are all performed most efficiently by the provider.

Additionally, most of these services should be included in a comprehensive per-study or per-patient jacket storage fee or charges will become complex and difficult to track.

• Image Security

Ultimately, it's your responsibility. So, be certain that a provider meets all (HIPAA) regulations for image storage, file destruction following retention time and digital transmission of scanned images. For digital transmission, images should be encrypted following ACR/NEMA guidelines.

• General Considerations

An imaging site also should consider the general management, history and reputation of a provider. How long has the provider been in business and how robust is its client roster? Does it have a strong background in DICOM services and clearly understand how an imaging department functions? What about staff turnover? These are all factors that should figure into an imaging site's selection process. Naturally, a site also should speak with at least three client references.

Special considerations for mammography

All of these considerations are even more important for demanding mammography applications, in which quality is paramount. Again, mammography requires a specialized scanner, conformance to DICOM MG standards to support image view data and specialized staff to input certain information manually.

IV. Digital Archiving and Backup of Mammography Images

FFDM images make enormous demands on a digital archive. Individual image files may be as large as 25 MB, compared to standard x-ray images which range from 5 to 8 MB, and studies often require multiple views. Moreover, the Mammography Quality Standards Act (MQSA) requires that mammography images be stored for up to 10 years using lossless compression. HIPAA dictates that significant security, data integrity and related measures be met. Therefore, any site converting to FFDM must examine and meet new demands on its digital archiving system. These demands come with significant associated costs.

A. Outsourced Digital Archive and Disaster Recovery Providers

Outsourcing digital archiving for mammography, in particular, has distinct advantages. An outsourced archiving service provides unlimited scalability, alleviating sites of the need to predict and acquire archiving hardware to meet expanding needs. Further, sites do not need to devote resources for archive maintenance. And because most service providers continually upgrade their storage systems, technical obsolescence is eliminated.

As a service offering, most outsourced digital archiving is billed under a fee-for-service structure, in which up-front capital expenses are eliminated. Most significant, the overall costs of the archive may be less than implementing in-house storage because the provider amortizes its expenses across multiple customers, and sites benefit from an economy of scale.

Along with primary archiving, most managed digital archive services also provide cost-effective data backup packages, enabling imaging sites to enjoy the same benefits for this service as they do for primary archiving.

B. Special Considerations for Provider Selection

When evaluating potential digital archiving partners, select a company that specializes or has extensive experience in DICOM file storage and is extremely knowledgeable about healthcare rules and regulations. Again, carefully investigate the service's technology, storage facilities and pricing. And ask for three references from medical imaging clients.

Recognizing that new PACS sites face difficult decisions about digital archiving, in addition to analog archive maintenance, some image on-demand conversion providers, such as SOURCECORP, also offer archiving of digital images as an integral part of their service. Digital archiving and backup fees incurred through an on-demand conversion provider may be less than if a site contracts independently for these services.

V. SOURCECORP TAP (Total Archiving Program)

The SOURCECORP TAP (Total Archiving Program) solution is one of a few specialized medical imaging file room management and on-demand film conversion services in the nation. SOURCECORP has a history of more than 27 years in the field. Today, it manages more than 12 million patient film jackets, supporting more than 100 medical facilities, and seamlessly scans 600,000 images into DICOM format annually.

Through its decades-long involvement in the radiology field, SOURCECORP TAP is uniquely positioned to meet the specific needs of medical imaging clients. It is a comprehensive, time-tested program that enables an immediate conversion to a fully filmless environment, complete with all the benefits.

A. The Time-Tested TAP Paradigm

TAP implementation begins with a thorough needs assessment and establishment of a comprehensive conversion plan with a detailed timeline. The program includes hardcopy file removal from the imaging site, electronic inventorying, establishment of a secure VPN connection and on-demand 24/7 scanning services. General radiographic images are scanned in 2k spatial resolution and 8-bit grayscale. Mammographic studies are converted to MQSA-compliant DICOM images in 4k x 5k x 12-bit resolution using VIDAR CAD PRO scanners, the de facto standard for quality FFDM scanning.

An audited patient database is provided to the contracting facility listing all patient jackets entered into the program. This is delivered complete with detailed patient demographics, including codes for mammographic and pediatric studies. File storage is fully HIPAA compliant, and electronic transfer to the imaging site uses advanced encryption. The complete service is fully HIPAA, DICOM, JCAHO and EPA compliant.

The SOURCECORP TAP solution meets all the criteria presented in Section III., B. *Selecting a Vendor for Conversion On Demand*, pages 4 to 6.

Dedicated to meeting the highest industry standards, TAP is continually enhancing its platform to meet evolving technologies and client needs. TAP also offers significant flexibility and will work with clients to meet all special requests.

B. TAP / InSite One FFDM Digital Archiving and Disaster Protection

As part of its integrated menu of offerings, TAP provides optional secure digital archiving and disaster recovery for FFDM images through partner InSite One, the recognized leader in DICOM archiving. InSite One's digital archiving platform is seamlessly integrated into the TAP solution, ensuring that imaging sites have full access to mammography images through their PACS following on-demand exam conversion. As part of this program, all images are stored redundantly in InSite One's two geographically distant, secure data centers. TAP's mammography component, in partnership with InSite One, provides a cost-effective, infinitely scalable digital archive. The technology is continuously upgraded to eliminate any concern with technological obsolescence and is professionally maintained to eliminate the need for IT support.

C. SOURCECORP TAP History

Today's advanced TAP solution traces its roots to 1981, when the firm was founded to provide computerized 35mm microfilming and archiving services to radiology sites internationally. After merging with a major PACS provider in 1984, as the DICOM standard emerged, the program introduced digital scanning services in 1986 under the TAP brand name. In 1998, TAP was acquired by SOURCECORP, a major provider of business process outsourcing solutions and specialized high-value consulting services in a broad range of fields. Today, the TAP program benefits from the specialized expertise due to its long history in radiology and the broad-based experience and support of a major national corporation.

For additional information about SOURCECORP TAP, contact Stanley Burch, 1.800.568.5800, sburch@srcp.com

VI. Conclusion

When an imaging site converts to a digital environment, management of the hardcopy archive of prior exams can pose significant challenges. These challenges are even greater for mammography studies. Because some studies, such as pediatric images, must be maintained in hardcopy for as long as 28 years, prior exam management is an ongoing issue that must be addressed.

Imaging sites generally select one of three strategies for prior exam management: maintenance of the analog archive with ongoing work in a hybrid image environment, conversion of all analog images to digital, or strategic as-needed image conversion. For many sites, the latter provides the best cost/benefit.

If selective conversion is adopted, for many imaging sites, outsourcing analog archive maintenance and imaging scanning is a beneficial strategy. Sites should work with a service provider specializing in radiology that meets key criteria, from high-resolution scanning to secure film storage. Selecting a flexible provider that will adapt to meet a site's needs also is advisable. The SOURCECORP TAP solution meets the full range of these criteria.

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