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Do I Have a Migration Issue?

Data migration and next-generation image management strategies

By Larry Sitka

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Data migration problems and costs are directly related to and the result of the previous and current selection of an image manager or archival system. Data migration can be a very expensive hidden information technology (IT) expense if a strategy is not in place taking into account for:

- the dynamic content of the data
- the age of the information
- the storage media and, ultimately, the physical proximity of the information

Whether or not your enterprise has any existing DICOM base storage systems or is interested in going digital, the problem of data migration exists in every PACS implementation unless the strategy selected supports migration of old, current and future DICOM data. Current and future migrations costs are directly related to the selection of a vendor and its implementation.

Therefore, when considering migration, step back and ask, "Why do I have a migration issue?" A careful plan can avoid this nightmare in the future.

Following Moore's Law with a Twist

The direction of computing in the healthcare industry and many others can easily be represented in a quick statement: "Using the powers of many to complete a multitude of tasks." But, can 10 relatively cheap computers working together do more work than one large centralized system doing the same job but at 10 times the price?

Computing power and storage media costs just a fraction of what it did five years ago.

Moreover, this trend has continued in the past, and will in the future, so the enterprise needs to take advantage of this trend to its fullest extent. The standards bodies are beginning to recognize the benefits of collaborative and extensible computing, as in DICOM federation, DICOM aggregation and grid-computing models are becoming the basis next-generation archival systems.

Vendor Interview

The future of your enterprise DICOM data, both small and large, should be the most important issue at hand. If it is not carefully implemented today, it will cause a much greater expense than just going filmless tomorrow. Every site should ask the following questions and expect the corresponding answers.



Data migration problems and costs are directly related to and the result of the previous and current selection of an image manager or archival system. When considering migration, a careful plan can help avoid any future nightmares.



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Image Manager Strategies

Does my enterprise own the data or does the vendor selected in my PACS deployment own the data? To answer this question, one must propose a question to the vendor. Your new solutions should allow you access to all data, prior and current, regardless if you are going to use it for traditional PACS or for migrating the data to another vendors' platform.

Thus, your new vendor should provide you with the migration tools at no additional cost. If there is any cost to migrating your data due to proprietary database information and storage formats now or in the future, then you truly don't own your own data.

Will my new vendor allow me to choose my own hardware platform within realistic recommendations and guidelines? Can the solution scale up and out? A vendor should allow the enterprise to purchase computing power as small as a laptop and as large as a multi-processor system, depending upon the needs of the enterprise.

In addition, those systems should work together to solve single workflow computing tasks. The enterprise should be able to purchase the vendor's package in a software and support-only model. Set-up and integration of these new platforms should be measured in hours or days, as opposed to weeks or months.

Also, the vendor's software should be capable of running on a laptop or a multi-processor system without changes to the software stack. The vendors software should be able to run in unison with one, two, three or "x" number of systems to meet the current and future workflow.

Will my new vendor allow me to use multiple storage technologies? Does the vendor virtualize storage? When storage is virtualized you can mix and match multiple storage technologies in your enterprise. This, in turn, can provide a lower total cost of ownership or even a higher level of user satisfaction. In addition, storage virtualization combined with configurable business logic gives you the ability to manage when and where your data is stored so you can take full advantage of the declining cost of storage. This is commonly referred to as information lifecycle management (ILM).

Will my new vendor allow me to buy what I need now, given my current throughput, and provide an "extensible" architecture when I need it to be (hardware, software and storage)? The vendor should allow for a single system install and additional systems as required to meet the current and future workflow and storage needs. These systems should appear as a single system on the network, a DICOM Service Bus (DSB). The DSB is a means to ask any node on the network for DICOM service (store, find, move other workflow) and the bus takes care of providing the most appropriate processing of the request.

Further, the current lifecycle of computer hardware is about three years. Thus, the system selected needs to be able to interact and add a second, third or additional systems to the enterprise, without requiring a forklift hardware or software upgrade. If this is accomplished then the initial system may be removed and the workload shifted to the other more leading-edge systems seamlessly.

Will my new vendor allow my enterprise to pick a best-of-breed visualization technology for the different departments? Given the various needs and requirements of each department or "ology," your archival solution should offer technology that does not

handcuff you to a single viewer. Specialty-specific viewing technologies are evolving at a rapid pace, and it is impossible for any one PACS vendor to keep pace with this innovation. To accommodate multiple viewing technologies, a selected vendor should allow for a standards-based open systems approach to other product selection.

Does the new vendor support cross enterprise aggregation or DICOM federation? Given that most healthcare enterprises are merging, acquiring or, at a minimum, considering sharing information with other enterprises (Regional Health Information Organization, or RHIOs) the new solution must be capable of sharing and aggregating results across multiple enterprises systems.

DICOM federation, also referred to as DICOM aggregation, provides the image manager with the capability of sharing information across vendors, making the enterprise look like one big system. In a similar manner to the way Google operates, a request is made into the enterprise. That request is then presented and processed by one or many computers and the results are sent back to your screen on a single page. Although the requester is not required to worry about where the query went or who handled the service, the results are presented on a single page, as if from a single system. This, in turn, displays the data at the point of need.

Can the enterprise be managed from one location on a single desktop? Given a grid-based aggregated computing environment, numbering in the hundreds of systems, all systems must be capable of centralized management. An administrator should be able to access any system on the network for both workflow and configuration through a single click on a centralized graphical user interface.

Is the vendors' software forgiving and are the diagnostic tools built in to do the job? Software must be written in a forgiving manner. Because DICOM lacks any form of conformance testing, it is open to interpretation by each vendor. Thus, the software implemented by the selected vendor must make up for these discrepancies.

Additionally, the vendor must provide the diagnostic tools used to diagnose a wide variety of problems and symptoms; therefore, system uptime will be kept to a maximum.

Does the vendor provide for future migrations within its own application (vendor A to vendor A)? Typically, this would be used if you decided to change out your storage media mid-way through the life of your new solution. Migration of studies should be seamless if performed within the same vendor. In order for a vendor to have the ability to be agnostic to storage, they must enable you to seamlessly migrate data between storage technologies. (e.g., migration from a SAN to NAS to CAS or implementation of a future HSM to take advantage of removable media technologies). Your enterprise should be able to switch storage systems every year if needed.

Does the new vendor offer seamless integration to legacy and multi-vendor environments? Similar to the way a router on a network provides access to multiple machines, the vendors' software should be able to access multiple legacy archives or PACS through DICOM, thus creating a peer-aware environment. Legacy integration is increasingly important, enabling you to preserve, extend and unlock the value of your existing investments.

Data Migration Strategies

How much does my enterprise value the data and its quality? Does my enterprise need to bring the old data up-to-date now that we have a radiology information system (RIS)? Does the vendor support reconciliation and synchronization of the studies, both current and prior? During migration, is it possible to detect studies in conflict on a source archive that may have issues when sending to the destination archive?

Your new vendor should provide a rich set of automated data migration and data synchronization technologies, both for your new data and for your existing or legacy data set that is already stored across your enterprise.

Can my enterprise utilize my current investment (archive) while migrating to the new platform and maintaining access to all images during and after migration? During migration the vendor needs to keep access open to the system being migrated so that prior studies can be utilized and migrated immediately upon request.

Additionally, the vendor selected needs to be able to look both locally and remotely to the other archive; this is commonly referred to as DICOM federation or aggregation and is a technology that is becoming increasingly important in our industry standards bodies.

What is the cost of maintaining my legacy archive? Typically this is measured in service contract cost and personnel efficiency.

Migration fees can be funded by utilizing the cost of the current service and maintenance contracts on the older archive. These costs can range from tens of thousands to hundreds of thousands, annually.

Can I intelligently control the migration flow and order, allowing the most relative data to be migrated first? Further, am I able to select exactly what data set to be migrated, thus not migrating data that is no longer important? In essence, the migration service must be fully configurable, allowing you to tune its progress up and down based upon daily, nightly or other workflow requirements. For example, a system that is undergoing migration still needs to be accessed for priors and is usually limited by drive access. Because of this, careful control must be maintained on the amount of requests for studies from that system via the migration software.

Moreover, the migration system, along with the image manager, must be able to throttle up and throttle down the number of requests from the migration tool based on the number of outstanding ad-hoc requests and the number of drives on the source system.

Can the migration software organize data movement by media ID? Given that most legacy systems utilize tape or optical media for primary storage, care must be provided. In addition, increased performance can be obtained by controlling the order in which the studies are retrieved from a single piece of media. This will reduce, if not eliminate, the interchange of media between drives and changers.

Also, if tape is the supported media, it will reduce the "shoe-shine" effect of the tape going back and forth in the drive.

Can the migration software be integrated with the enterprise worklist so that jobs queued for migration will be automatically

bumped in priority should an event get scheduled for any particular patient in the migration queue?

The migration system should interact with the new image manager and enterprise hospital information system/RIS through the enterprise worklist. This interaction should detect patient priors already in the migration queue and automatically bump the order of the priors to be migrated ahead of the other studies in the queue. Thus, when a patient is scheduled, all priors are available, including the data that currently resides in the legacy archive.

Conclusion

When selecting an image manager, make sure to test the architecture and philosophy of each vendor being considered to avoid data migration and general interoperability headaches in the future. The system should support a model that allows for both distributed computing and extensible user extension.

Further, migration should not be offered as a "add-on" or "extra cost" to any purchase; migration should be part of the image manager strategy and included within the software purchase, both inter-vendor and intra-vendor.

— Larry Sitka is founder and lead software engineer at Acuo Technologies LLC (www.acuotech.com), St. Paul, Minn. Shannon M. Werb is chief technical officer at Acuo Technologies. Questions and comments can be directed to editorial@rt-image.com.

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2570 Boulevard of the Generals, Suite 220, Norristown, PA 19403
p. 800-983-7737 | f. 610-644-3688 | e. info@rt-image.com