

April 24, 2006

Getting Digital Radiology on Track — Infrastructure Makes It Run

By Laura Gater

Radiology Today

Vol. 7 No. 8 P. 8

If digital radiography (DR) is the train, the facility's infrastructure is the track. A DR system—defined broadly as either digital direct radiography (DDR) or computed radiography (CR) for this article—won't get you where you want to go without the necessary network, software, and hardware that enables the DR system to run efficiently.

“Many people focus on buying the equipment and don't think through what is needed to make the equipment run,” says Laura Serrano-Haggard, radiology marketing manager at Cerner Corporation. “They think of the physical layout and considerations for that.”

Radiology departments that are changing over from a film-based imaging system to a digital one obviously have a lot of changes ahead of them. While doing their best to keep up with the project, sometimes they overlook setting up their network infrastructure beforehand. You'll have to do it one way or the other, but it's simply a less costly, less frustrating, and more satisfying transition if you think about it up front.

Planning Ahead

“Radiology and IT departments need to make sure that the area is wired correctly for networking, that connectivity is adequate and may need to add additional viewing protocols if necessary. Make sure that there is additional storage space on the PACS network and that PACS is configured to handle more work. Any time you add significant work to the radiology environment, you need to look at upgrading the PACS memory and storage. If the radiology department had problems with bandwidth, it would have been addressed before any new equipment was added,” explains Bill Waters, vice president, Technology Specialty Sales, Cerner Corporation, Kansas City, Mo.

In the past, the IT department was usually not brought in to help with radiology equipment purchases, but now, due to the technological considerations involved, IT is usually involved in the process from early on. That benefits both the vendor and the radiology department, according to Tom Ottilo, an engineer with the systems design and implementation team at GE Healthcare. The purchase and implementation is now IT driven, and the IT department has the knowledge to make the right decisions about the entire project.

Amit Sharma, Sg2 Consultants, Skokie, Ill., acknowledges that some healthcare facilities do “put the cart ahead of the horse” by purchasing DR equipment without first having a RIS or PACS. They spend a lot of money on printing images on film, which defies the purpose of DR.

Use Your Vendor

Ed Heere, president and CEO of PACS developer CoActiv Medical Business Solutions, agrees that the vendor should be involved from the start of planning.

“We demand meetings up front and ask a lot of questions outside the RFP [request for proposal] so the customer understands the implications of what they're asking for. Too much information is better than too little. Some companies may intentionally leave out some information that will cause unpleasant surprises later. Sometimes the DR salesman doesn't understand IT very well,” says Heere. “A lot of people tend to use a canned RFP statement and make a PACS decision without understanding the process involved. The ideal is to have the vendor come in, see what the existing infrastructure allows, and explain what specific configurations are needed. Communication is the key. Involve the IT department in the understanding of PACS requirements.”

Two vendors may be involved in the project (at least): one for the RIS/PACS and another for the DR equipment itself.

“I think it’s becoming less common for hospitals and imaging facilities to purchase a DR system without having the necessary infrastructure. Some of the smaller community hospitals don’t always know what they’re biting off,” notes Heere.

The cost of installing the infrastructure, when installed prior to or at the time of purchasing a DR system, is actually negligible when compared with the cost of doing it afterwards. In other words, it is more difficult to go back and install or upgrade infrastructure after the DR equipment has been purchased and installed.

Facilities that are planning an investment in DR have to think about networking, which is a big consideration, says Waters. One purpose of DR is to increase the volume of patients, which in turn increases the amount of information going through a facility’s computer network. Whether or not the facility has wireless operations, it needs to be capable of high-speed communication to maximize DR.

“Most vendors, to my knowledge, will not sell a DR system to a facility that does not have the necessary infrastructure in place,” says Ari Maizel, Sg2 Consultants. “Our ideal recommendation would be to have the information technology infrastructure in place, then upgrade the system to DR to make best use of the digital environment. In an ideal scenario, the facility would have a clinical information system in place first as well, with EMR [electronic medical record]/RIS and PACS.”

Some vendors do sell DR as a “box solution,” Ottilo says, “but DR is not a case of “one solution fits all.” Often his team needs to customize a solution for the radiology department to accommodate DR.

“If we don’t get called in up front—before the sale—the customer buys the concept, has a lot of pieces of the puzzle, and has to piece it all together,” he states. “The better things are defined at the start, and an assessment made, the better the facility will be able to accommodate the modality. Implementation will go so much smoother.”

Technical Considerations

The radiology department is usually on its own routing segment or dedicated network to keep the large amounts of information and images from slowing down the entire network. Even a several-minute download time or transmission time can noticeably affect an entire network. The entire facility should be on a high-speed network to support and optimize PACS/RIS. Sharma recommends a network that is capable of transmitting a minimum of 100 megabytes per minute.

“The technology infrastructure should have isolated bandwidths between the modalities and the PACS system, workstations set up in proper locations, well integrated with RIS. The network needs to be properly designed so it’s not creating a log jam outside the department,” says Waters.

Although the radiology department should be on a separate network, it can be accessed from dedicated workstations placed strategically throughout the facility; for example, in the intensive care unit, emergency department, and surgery department, in addition to radiology. Outside users will have access to the general hospital network, but not the radiology network. Medical images increasingly need to be viewed by people all across the facility. Doing that job digitally involves huge amounts of information and data.

“A year ago, a 200-image CT exam was the norm. Today it’s not unusual for radiology departments to have a 3,000-image CT exam, which means a lot more information is being transmitted from that scanner, and a lot more data must be moved [and] stored,” Heere notes. While a six-view DR study of the foot and ankle isn’t the bandwidth monster that a 3,000-image CT, digital mammography typically produces from images at very high resolutions.

While digital x-rays don't generate the number of images as CT, they still represent most of the patients and exams. That volume makes modality worklist a "must-have" component of a DR system. It provides the communication between the RIS, PACS, and modality, and thus, is a huge efficiency driver, says Sharma.

Serrano-Haggard points out that if the technologist must manually key in the information that's automatically handled with modality worklist capability, it slows workflow and defeats one major advantage of DR.

"People forget about the modality worklist capability. It closes a very important loop," she says.

"I think it's important to understand the capabilities of the equipment and what's provided when DICOM services are provided with equipment at the purchasing price. Many times the vendor will say that the equipment is DICOM compliant, but the equipment is not DICOM enabled [for DICOM Print, DICOM Send, and DICOM Modality Worklist]. The customer needs to ask that the equipment be made DICOM enabled," explains Penny Reiman, a product director for Misys Healthcare Systems. Reiman says those key features you need may or may not be included in any basic agreement. If not, you have to go back and purchase those features.

Challenges

Maizel points out that radiology departments must continue to scale the size of PACS storage and the size of the network to keep the DR system running efficiently.

"DR is a high-cost technology that doesn't bring in any additional reimbursement, although it improves the efficiency of the radiology department. The challenge is getting the funds to upgrade the network and storage," he says. "From our experience, a lot of organizations don't have a problem with the capital funding for the DR equipment, but rather with the annual costs necessary to maintain and upgrade the DR system."

Serrano-Haggard emphasizes the importance of having enough storage space on a PACS to allow for growth. An inadequate amount of storage space can slow down the PACS, especially if new DR equipment is added. Patient flow, data flow, and storage are all critical components of the PACS, and something that affects one element will eventually affect all three areas.

"As the technology increases, the quality of images and the demand on the PACS network will be greater," agrees Heere.

Another infrastructure challenge may affect the decision to choose DDR or CR, says Serrano-Haggard. "I think that the age of the facility does matter if choosing DDR over CR, facilities need to think about the physical infrastructure in order to maximize DDR and take into account patient flow design, which affects volume and speed," she says.

All in all, purchasing a DR system need not be a blind experience. With careful planning and utilizing vendor knowledge as well as the knowledge of your IT and radiology departments, this mission can be successfully accomplished.

"DR improves productivity in the radiology department, increases efficiency, reduces costs, and provides more revenue opportunities," explains Maizel. "The investment in the technology infrastructure that is needed to support the DR and the resulting increase in volume is very important and will improve services."

— *Laura Gater is a freelance healthcare writer based in Indiana.*