

PACS Roundtable

*Vendors
discuss what
you need to
know when
purchasing
a PACS*

As PACS continues to grow in acceptance across the radiology spectrum, RT Image asked some of the major PACS vendors to give advice to first-time potential customers looking to go filmless.

Q For facilities looking to implement PACS, what is a good starting point?

Amy Coers Koenig: First, determine your goals. What does your organization hope to accomplish by implementing PACS? This can range from decreasing costs and workflow inefficiencies to increasing patient safety and personnel satisfaction. Be specific and realistic.

Second, do an inventory of current equipment and confirm modalities are DICOM-compliant. Plan to replace modalities that are not DICOM-compatible or to purchase the necessary equipment needed for DICOM communication.

Then, interview various imaging stakeholders to ensure the initial plan meets their needs. For example, if your organization stops printing film, how will the emergency department, operating suites and referring physicians access digital images?

Finally, select a team to assist in the selection process. This should include radiologists, a representative from each user group, as well as referring physicians.

Bob Cooke: There are a few basic environmental issues that need to be examined: 1) The state of digital acquisition within the facility across all imaging modalities; 2) The state of the technological infrastructure, such as networking and desktop PCs. Are these technologies current, or will they need to be upgraded as part of the PACS installation?

Other issues to consider include the facility's inclination for doing integration work (Do you need a turnkey system, or do you just need software?), the relationship with the IT department and is there an overall enterprise storage strategy? and do you have capital or is operational financing the way to go?

Zohar Elhanani: A PACS administrator should start with a basic needs assessment. What is the cost of image distribution and management (record keeping, distribution/redirection, diagnosis management and film storage) for the facility's DR/CR, CT, MR, digital angio, digital mammo, nuclear medicine, ultrasound and other digital image data? How many radiologists currently serve the facility and what is the outlook for the future? When and where do physicians read images? What

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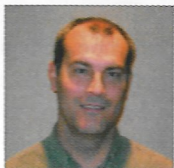
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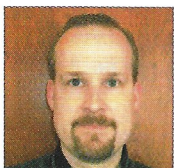
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tele-radiology systems are in use? If none, could this technology improve patient care and physician productivity? What is the radiologist's current workflow and load? What are the needs of the referring physicians? Would remote reading obviate the need for a more fully staffed facility? After concluding such assessment, look at the most functional, cost-effective solution in the marketplace.

Chris Henri: Start with "easy wins" and build upon the successes. One example would be emergency departments in hospitals, where rapid image access is so important and film-only environments suffer from lost films and limited access.

Another example is conversion of existing digital modalities (like CT, MRI and ultrasound) to softcopy. These are easy because the images are digital to begin with and the modalities themselves are almost always already DICOM-ready. This also means that these modalities are more affordable to convert to PACS. (Compare conventional X-ray, where it is necessary to purchase new imaging equipment or even retrofit rooms typically by introducing CR and/or DR.)

For CT, MR and ultrasound, it is also generally accepted that good quality off-the-shelf color monitors are sufficient for diagnostic purposes, as opposed to CR and DR, which most people feel require high-brightness, monochrome monitors. This is very significant in terms of cost to enter the PACS world. Color monitors typically cost five to 10 times less than their high-resolution monochrome counterparts.

Thus, starting with CT, MR and ultrasound allows a facility to start with minimal expense and build confidence and experience before tackling the high-volume side of things (conventional X-ray). Starting with these modalities will also bring savings in time spent by technicians who are presently used to printing films. Thus, efficiency gains are also easily "won."

Peter McClennen: I think the first thing would be a really deep needs assessment, as in the person looking for PACS really goes deep into what exactly would make them an ideal partner and what the characteristics of that partner should be from a PACS perspective because PACS is such a long-term investment. It is very different from a piece of capital equipment in that it becomes an infrastructural component.

I think the first step is understanding that specific customers' needs assessment and then lining up [that assessment] with the vendor's strengths. So before they embark on an in-depth research and development process where you may send that out to 15 or so vendors, you should line up what your needs are with what the perceived vendors' strengths are.

Trade shows are a great opportunity because you can see all of the vendors in one place. You can actually get right to the people there at the trade shows as you move forward to on-site presentations and on-site demonstrations.

Henri "Rik" Primo: Organizational: These facilities should start by establishing a PACS steering committee to define strategy and to assess needs. This steering committee should be a multidisciplinary group consisting of representatives from the CEO, CIO and CFO's offices,

radiology, other "-ologies," nursing, maintenance, etc. The steering committee will provide input to an implementation team.

Technical: If there is an RIS, investigate if this RIS can be integrated with the PACS. If not, make first RIS purchase or upgrade decision and run RIS for some time before going to PACS.

Deployment: After radiology is PACS-enabled, externalize the PACS as soon as possible. A good starting point is to implement PACS in the emergency room.

Doug Schroepfel: First, make a case for PACS. If there is a question of whether to buy HIS/RIS or PACS first, buy PACS first so that you can immediately start saving on film costs and administration. A PACS solution should be complete, meaning that it should replace all radiological film with digital imaging solutions.

Determine the actual film costs each year and estimate the amount of money and time you are spending working with and maintaining film. This can include the time RTs spend waiting for film to print/process, the number of people/hours required to maintain the film library, lost time/customer satisfaction due to lost or misplaced films, etc. All of this will give you justification when going to your facility's administrators when you request permission to buy your PACS.

Select a PACS vendor who will be able to provide a quick return on your investment, based on the costs you are trying to save. Talk with customers of the PACS vendor and gauge their satisfaction with the vendor, and the actual savings they are experiencing as a result of implementing the PACS.

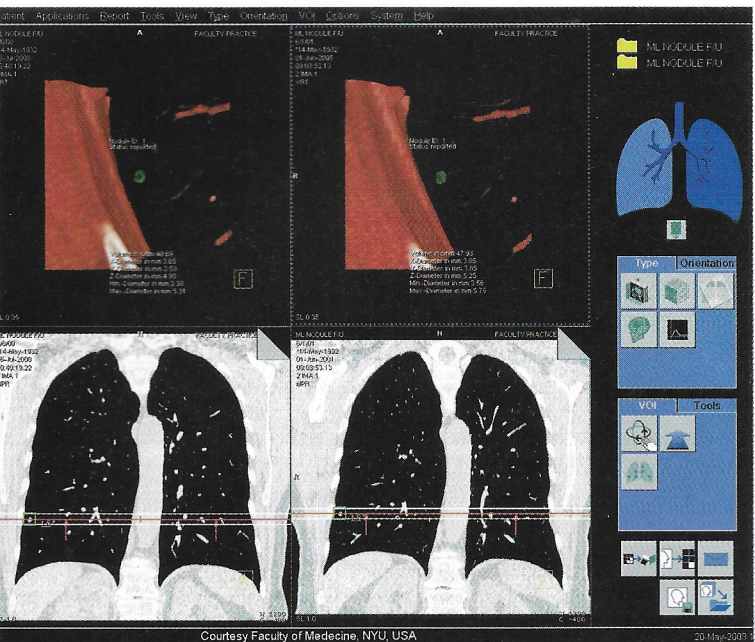
As far as actual implementation, for hospitals, start with the radiology department. Get all modalities sending [information] to the PACS and get the primary image readers (radiologists) reading from the PACS workstations. This will eliminate the need to archive film and immediately eliminate that large cost.

Q What should you look for when selecting a PACS vendor?

A Coers Koenig: It's critical to select a PACS vendor who's willing to examine the entire patient workflow and not just focus on displaying and manipulating images. The system selected should show all the information needed for different roles and provide access to other technologies such as voice recognition and dictation. It's important to confirm the current software is compatible with what the vendor provides. Solutions should be non-proprietary so when another solution is added, the PACS will interact.

Also, a PACS vendor should accommodate the needs of an entire facility in regards to image storage so that only one purchase is required. For example, if a cardiology department is interested in storing images online, confirm the vendor can do this and address radiology needs.

Elhanani: In this era of rapidly changing technology a key element is flexibility and scalability. For many small and medium-sized centers PACS is still a very scary term. It implies spending up to millions of dollars. One should look to a vendor



Courtesy Faculty of Medicine, NYU, USA

Q What do you say to a potential customer who shudders at the price for PACS?

A Cooke: PACS is more than just an investment in infrastructure; It is an investment in the future of radiology and improved patient care. And for many of our customers, it is becoming a cost of doing business. Via our software-only solution and unique licensing models, we at Fuji are identifying better ways to bring affordable PACS to facilities of all sizes.

Elhanani: That customer is probably not talking to the right vendor. The promise of PACS is economically and effortlessly connecting to digitally acquired data, eliminating the logistics of film handling and lost or misplaced films and increasing the overall efficiency of radiology reading, over-reading and referring physician access. Early PACS were cumbersome, expensive, inefficient and required computer savvy super-techs to manage their operation. Many systems still fall into this category. Newer, thin client, Web-based PACS systems leverage the power of the Internet using faster, less-expensive computers and larger, less-expensive data storage solutions.

Jurovitsky: The best way to address the price issue is to show the customer a competent and conservative feasibility study specific to their own enterprise. Most deployments based on modern technology can be very cost-effective. In fact, in most of the cases, a positive cash flow can easily be realized.

Primo: I would recommend that this customer make an estimate of what the cost would be not to choose PACS. Look at film costs, staff costs for film archival, archival costs, distribution of films and reports in the enterprise. Also look at quality issues, such as time between exam and report, distribution time of results, hassle to retrieve films for radiologists and referring physicians and lost films. For productivity, look at how you can do more exams with better quality and still remain with the same staffing levels.

Q What considerations will potential customers need to address when looking for a PACS to suit their specific needs?

A Coers Koenig: When considering a PACS, it's critical to obtain outside feedback to confirm the system will provide all departments with access to needed information and the appropriate technology.

Healthcare providers should consider their unique workflow and plans to alter this in order to benefit efficiency. PACS provides an ideal time to not only go filmless but also paperless. Changing a process once rather than many times ultimately provides employees with more stability.

Existing technology infrastructure should also be considered. If referring physicians must be able to view images from ICU, will the infrastructure support that viewing in an acceptable amount of time? Do the devices on the floor and other locations have enough power to accommodate access?

who can provide a great solution at an affordable price. Key is a Web-based image management platform, enabling immediate, fully functional and lossless viewing of images anywhere at anytime in real time. Finally, look for a vendor who has a robust installed base of satisfied users.

Henri: A proven track record in servicing facilities and architectures similar to your own; A reputation for satisfied clients (not just in terms of product, but also in terms of support/service rendered); Someone to work with whom you trust; Flexibility – Don't purchase a "one-size-fits-all" solution. Vendors who sell solutions primarily to only one segment of the market (e.g., only large hospitals or only small clinics) probably won't be able to adapt to fit your specific needs, so you'll be the one making the compromises; Expertise, experience and access to the people in their organization who have it; Good value (cost), but not ahead of the items listed above; A vendor whose philosophy matches your own. If you find that the vendor can suddenly drop their price by \$100,000 to match someone else's quote, what does that say about them? Why would you want to commit yourself to them for the long term? And if you catch them neglecting to mention "hidden costs," how can you trust them?

Alex Jurovitsky: Competence in conducting the needs evaluation and solution design process. PACS is not an off-the-shelf item. Each solution is designed based on the specific needs of the customer's work and data flow; Core technology. Only the latest Web-driven solutions should be considered; Vendor's focus on the referring clinicians' community and the PACS's ability to support their needs, as well as support the radiologists' needs. PACS is no longer just a radiology centric solution.

Daryl Tom: Look for vendors that can ensure your investment and secure your data. You want them to be innovative, experienced in IT and have a broad understanding of integration with the enterprise IT.

Henri: Among the considerations, customers should look at: Ability to integrate with their RIS; Overall functionality; Architecture that “fits” the environment (e.g., distributed vs. centralized architecture when multi-sites are involved); Conformance to standards (DICOM and HL7) and assurances that data remains accessible via the standards should the PACS need to be replaced; Hardware replacement expectations; Solutions for image access outside of the core enterprise; HIPAA compliance; Software upgrade schedules and road map (Do these exist? Will these be included or cost extra? What timelines? Difference between “upgrades” and “new versions?”); Online vs. offline storage requirements; Support model employed by vendor (Is anything monitored automatically remotely, or do you need to place a call to report every problem? What can or cannot be fixed remotely?), Costs ... and hidden costs? Upgrades? New versions? Extra training? Fees for connecting new imaging equipment? Fees for extra user licenses (DICOM and/or Web)? Fees for extra DICOM services (e.g., modality worklists, query-retrieve)? Fees for study volumes beyond certain thresholds? Limits on concurrent number of users? Fees for HL7 (RIS) interfacing? Costs to add extra storage (e.g., cost to add disk space)? Fee per service call?

Jurovitsky: DICOM and modality worklist compliance of the existing modalities; The ability of the existing or to-be-acquired RIS to successfully interface with the prospective PACS vendor; Internal support infrastructure to deal with the multi-system environment containing RIS, PACS, dictation/voice recognition, network and image and results distribution outside of the image-producing enterprise; data and workflow and network bandwidth for multi-location facilities. For multi-locations, radiologists’ location, sub-specialty and study location have a tremendous impact on the architecture of the PACS solution; Safety and transportability of the data short- and long-term. The acquired PACS solution should provide an easy customer-driven process to migrate data from one vendor’s archive to another without being held a hostage.

McClennen: I think it is the nuances of their workflow in that all PACS aren’t created equal and all PACS aren’t created for your specific site. You need to have a system that is flexible enough and customizable enough to meet the customer’s workflow vs. the customer’s workflow having to change to meet the vendor’s product.

Schroepfel: Is the PACS a complete solution for all of your imaging modalities? Will you need to call multiple vendors to get problems resolved? Does the PACS vendor have the technology to replace all film with digital images? And can the vendor accomplish this affordably? Will the vendor be able to scale its PACS operations to meet your increased volume efficiently?

Q What do you consider to be the key provisions in a maintenance contract?

A **Elhanani:** Several items are key. One is 24-hour support and a hotline backed by a service performance guarantee program, such as is offered by many dealers. Another is remote access to the system when needed, using standard, Internet-based tools.

Henri: Key provisions include: All software upgrades to be included; All hardware to be supported for its useful life (i.e., about four years, five years maximum); Expected response times at all hours; Downtime limitations; Clearly specified escalation paths; and what is “included” vs. not included in terms of fees.

Jurovitsky: The key provisions of the contract should contain inclusion of software upgrades, 24/7 availability, on-site and phone response time commitment, up-time guarantee and, in cases of software only acquisition, a clear definition of responsibilities and problem handling.

McClennen: I think depth of service is number one in that the maintenance contract offers a level of service. Moving beyond a traditional maintenance contract is key. You should include things such as software obsolescence and education, so that it’s more than a maintenance contract; it’s a full, comprehensive support contract beyond just keeping the PACS running.

Schroepfel: There should be clear definitions of what is covered by the maintenance contract. Look at fee structures, including: Is there a “per incident/visit” fee in addition to the annual fee for technical support issues? When new features become available, do you have to pay to get them? Do you have to pay for bug fixes? What if the bug fix requires on-site support? When hardware is faulty or becomes obsolete, is it fully covered by the maintenance agreement?

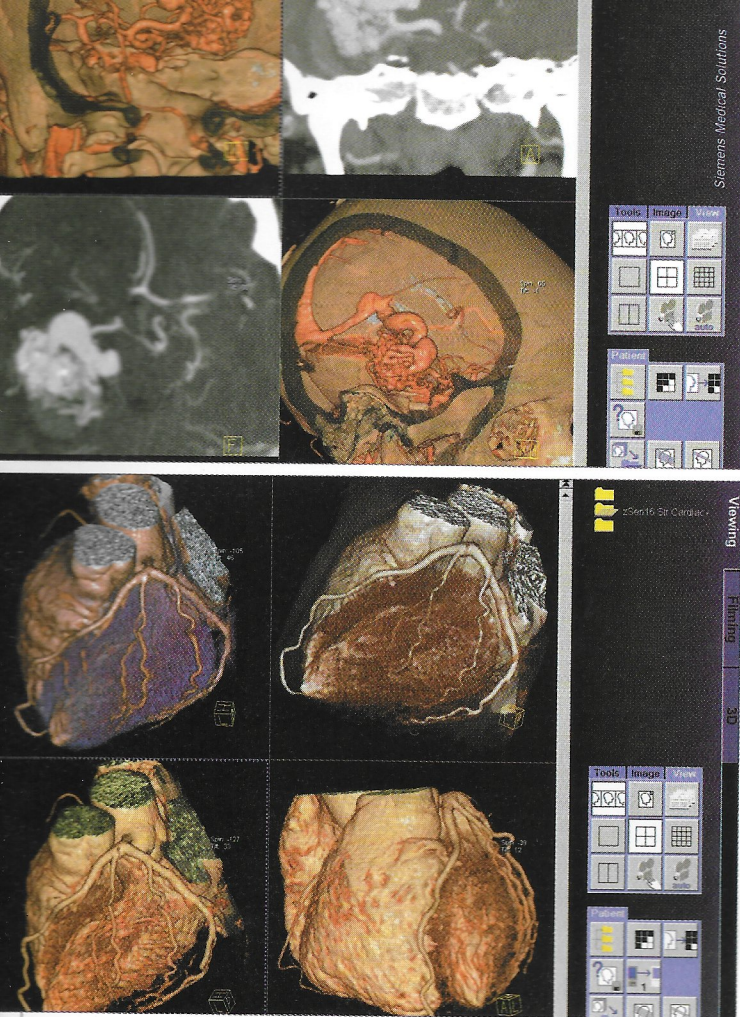
Tom: A one-stop shopping approach for support is important. It is not efficient to deal with multiple vendors on support issues. Look for a vendor that will take ownership for the entire IT-solution. You should also get yearly SW updates, with fast responses from knowledgeable engineers.

Q How do you handle the variety of training requirements that exist among radiologists, RTs, administration personnel and other staff members?

A **Coers Koenig:** Planning is key. Each user type requires documentation and sessions focused on their specific duties – not just general sessions attempting to cover all aspects of the PACS. Before training, the future state of the workflow should be determined with all the changes to be implemented. “Super users” should be identified for all roles and given time to train and answer questions. This should not be done as part of the normal shift.

Once in the training sessions, the trainer should focus on overall workflow – not just feature functionality. If significant workflow changes are occurring outside of PACS, these should be addressed as well during training. While the PACS vendor should handle training of the system, a member of the healthcare provider’s staff should handle training of the workflow.

Each user also requires continuing education. After a user has utilized the system for a few weeks, they’ll most likely have questions and need a refresher class. Refresher courses should be scheduled at regular intervals to ensure staff is taking full advantage of the PACS investment.



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Cooke: We typically train the trainers. We identify the super users in the account (those who are likely to use the technology most often and adapt to it well) to help spread the word. Technologists play a key role in this process.

For radiologists, we usually work one-on-one. And for those outside the main radiology department, we typically conduct larger group training sessions. This is also due in part to the fact that people outside the department typically have more experience with a computer application. We are also pleased to be able to rely on our simplified user interface; we've kept it consistent with operating environment conventions (such as Microsoft), making it easier to use.

Jurovitsky: The best way to handle the training is to give a uniform initial training to all users with the exception of the PACS administrator, who should be trained more extensively, particularly on PACS administration issues.

Due to the fact that any PACS deployment will have an impact on workflow, it is very useful to revisit the training after a certain period of use. At that point the users will know better what the issues are and each type of user can be helped with their own problems in maximizing the benefits of PACS.

McClennen: The radiologists have a very different training requirement than the RTs and the administrative personnel. It's a blend of on-site training, remote training and classes held at our education center. What we would like to see is utilization of all three, but specifically for the administrative personnel and the personnel that are going to be training the other users in the institution

to come to a class so they can block out all of the other requirements of their daily job and just focus on learning their new product.

Primo: A training committee should be formed and training programs for the PACS users (e.g., radiologists, surgeons, other specialties, nurses, etc.) [should be established]. The content of each training program should address the different needs. For instance, an orthopedic surgeon will need to study ortho templating software, a nurse will need to study image and report access through the Web, etc.

Schroepfel: Generally, if the radiologists are happy, the rest of the staff follows suit. The majority of the training time should be spent with them.

Depending on the level of support from the PACS vendor, the PACS administrator is the second most important training need. A well-trained PACS administrator can keep the entire operation running smoothly and can provide additional training to other staff.

RTs can usually be trained in small groups, depending on technical ability.

In general, users come with all levels of technical ability. From one user to the next, you don't know how technically savvy they will be. The important thing is to concentrate on the fundamentals. The training agenda should have a very specific list of topics that the user absolutely must know in order to run the system. No other material should be presented until the user has a basic competence in these areas.

After presenting the material to users, you should have them demonstrate to the trainer that they are able to perform the essential tasks. The trainer should then reinforce to the users that they have mastered the basics that will allow them to do their job. Anything else they learn is simply "icing on the cake," as they say.

This is especially important to "techno-phobe" users. Make them feel proud about what they have learned and make them feel confident about their ability to do their job in a PACS environment. Then the fear will disappear and be replaced by excitement.

If you are dealing with a technically advanced user, the basics may consume only a fraction of the training time. Trainers should take advantage of this and keep them interested by showing them advanced features and troubleshooting. After all, they will be a valuable resource after the trainer leaves in educating other users.

Tom: Super users from different groups are trained first and will train the other users based on a train-the-trainer concept. Offer training targeted on different user groups. Philips supplies an e-learning tool to radiologists, technologists and referring physicians that will train them on the user-interface in 30 to 40 minutes max.

Q What factors should be considered when deciding to go with a facility-wide simultaneous conversion to PACS vs. a gradual deployment over a longer period?

A **Coers Koenig:** Generally, we recommend a gradual deployment of PACS. This enables healthcare providers to work through the

process and technology adjustments one site at a time. Attempting to convert too many sites simultaneously limits the availability of super users. Also, healthcare providers should have their own super users and not solely rely on the vendor to provide these. A provider's personnel is better equipped to answer the process questions that are generally more prevalent than feature and functionality questions.

Cooke: There is no good way to slowly pull off a Band-Aid.

Elhanani: In a system-wide conversion, the key is user training, clinician communication and buy-in. We find an initial step toward this digital workflow involving a standard Web-based imaging solution (Web server) to enable both the facility's referring physicians and on-call radiologists to access the data using standard PCs. This is the first step into a digital environment, which can be expanded into full-blown PACS or a simple scale up of the Web-based platform as a result of this initial adoption by the facility. While this takes commitment from a centralized hospital/radiology administration, gradual deployment is often more effective in decentralized clinical settings, where word-of-mouth and successful mini-installations then convert the rest of the institution to go filmless and enter the digital 21st century of medical care.

Henri: The factors to consider are: Available budget; Size of facility (number of people to be trained) and geographical considerations; Relative experience with PACS; Project management abilities on both sides (client's and vendor's); Expected and desired timelines (whether realistic or not); Readiness of the users, mentally and emotionally.

Jurovitsky: This is mostly a budget issue. While gradual deployment – such as cross-sectional modalities first, plain film second – may work better financially, it is mostly suitable for free-standing imaging centers, where the plain film component is relatively small and therefore may not always be very cost-effective in the digital transition. In hospitals, partial deployments usually create confusion about where radiologists and clinicians should look for studies. It also creates a number of problems with cross-correlation and comparisons of studies residing on a different media.

McClellenn: To get the cost savings that most people build into their returns on investment, you need to go fairly quickly. What we've seen is that customers want to go quickly now. You don't see the slower phase-ins like you did in the past because there is not a question any more about the adoption.

Generally, it's very quickly adopted within the institution. What you end up having is a pretty aggressive roll-out plan that goes either modality by modality or facility by facility. They convert to filmless operations, generally, within 90 to 120 days across the institution.

Primo: The full benefits of PACS are only experienced when the complete enterprise is on PACS. It is prudent to do a phased implementation, but the transition period needs to be minimal. Working in a hybrid situation is the worst of both worlds. In order not to lose track, a formal project engineering and implementation method should be followed.

Schroepfel: For hospitals, our experience has proven that the best plan is a gradual conversion starting first with the entire radiology department. This starts the process of cost savings immediately, particularly in the area of film and film archiving. It also develops a "center of knowledge" within the facility that is the foundation for growth and stability. Once the radiology department is comfortable, workstations can be added to the ED, nursing stations and other parts of the facility. If users in these new areas have questions, they can always drop by radiology for pointers. This also applies to extending the PACS outside the environs of the hospital – it should be done after the radiology department is stable and comfortable in using the PACS.

For smaller clinical environments, convert the entire facility first. Then, if desired, extend the PACS outside the facility once the procedures are stable and users are comfortable.

Tom: It is necessary to look at the complexity and size of the organization. Does the customer still need access to legacy systems? The capacity of the organization to deal with such a change and available budget are also considerations.

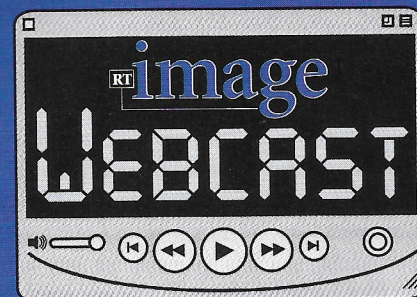
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