The Society for Computer Applications in Radiology

PACS PLANNING AND DEPLOYMENT: COMMON ISSUES

THIS PAST YEAR, after four years of experience with an in-house developed picture archiving and communication system (PACS), I have been fortunate to participate in deploying a commercial, clinical PACS working with a talented and energetic team and a supportive vendor-partner. As a result, our planning and installation went quite smoothly. I would like to share with you some observations from our experience that seem to be common themes, based on my discussions with colleagues and the panel discussion at SCAR 97. The following issues always seem to surface during planning for PACS, and after the system becomes operational.

Bidirectional Modality Interface

The absence of bidirectional modality interfaces between modalities and the radiological information system (RIS)/PACS results in a need for excessive human monitoring of the image data acquisition function. Examples include the necessity to enter demographics and exam numbers at the modality keyboard, a notoriously error-prone process. This results in image data being held in a queue pending inspection and resolution by a warm body. This would be largely remedied if a downloaded modality worklist were available from the scheduling system. An additional problem results from the inability to signify and verify successful completion of image data transmission from the modality. An exception are the computed radiography/RIS linkages developed by several vendors, at least two of which are quite tightly integrated today. The computed tomography (CT), magnetic resonance (MR) and digital fluoro vendors need to emulate this example.

Open Wavelet Compression Standard as Part of Digital Imaging and Communications in Medicine (DICOM)

At the time I am writing this, at the end of July, there has been failure to develop a consensus and plan of action between the radiology community and the vendors regarding an open wavelet compression standard. The very high compression ratios attainable while maintaining clinical image quality still astound me, and the benefits in storage and

bandwidth requirements are obvious. We need to exercise our leadership as digital imaging professionals to promote and adopt such a standard quickly. We also need to establish clinical guidelines for safe wavelet compression parameters.

Image Distribution Using Web Technology

Once you deploy PACS within the radiology environment, you quickly encounter the following problem, and the litany goes like this: to achieve the economic benefits of PACS, you must remove film at the front end (and the back end). Once you remove film, the clinicians still need easy access to image data and reports. In either a large monolithic institution or a traditional community environment, maintaining and updating hundreds or thousands of image capable workstations or PC's is not realistic. Web browsers and tools solve that problem. I have seen at least one dramatic demonstration of 12 bit data to the desktop, and I'm sure that the many creative people working in this field have things in store for us that we could only dream about two or three years ago. The power of web tools and web-enabled image retrieval is awesome. Whether internet or intranet, appropriate security appears to be coming soon.

Widespread Deployment

As I mentioned earlier, I have the privilege of working with a special team at the University of California at San Francisco: a network engineer, database and RIS interface programmer/analyst, DICOM programmer/analyst, clinical applications expert, and a supportive vendor. What will happen when we try to deploy these systems more widely in traditional community hospital environments without this level of team support? It is going to be difficult, significantly more so than RIS deployment. But with good planning, additional field experience, and integration of the items I mentioned above, we will be successful.

Cost-Benefit Justification

Before one has the pleasure of dealing with the four previous issues, one must prevail in convincing their organization to invest in this technology. PACS represents a large capital investment for a health care institution. We (people like you and me who belong to SCAR and read the *Journal of Digital Imaging*) are often called upon to prepare

business plans or similar documents to justify the capital expenditure. In its simplest form, the economics of PACS is the tradeoff of depreciated capital equipment for expense savings in the area of personnel and supplies. These analyses become difficult because there are benefits that accrue to the institution outside of the radiology department, and often it is difficult to get a handle on these numbers. Second, the economic argument is easier to make for the digital modalities than computed radiology (CR) replacement for conventional radiology. However, many clinicians realize greater benefit, particularly in the acute care setting, from CR than with the cross-sectional modalities in PACS. Third, there are indirect as well as direct cost-savings that need to be calculated, and that can be difficult.

It is very helpful to develop a supporting role for

key members of the hospital administration and medical staff. Early success in deployment with reliability, up-time and image quality usually result in a ground-swell of support for additional deployment within the institution, and availability of image data and reports to clinicians. Even though some of the benefits are difficult to quantify, it quickly becomes obvious that PACS is a better way to practice medical imaging.

David Avrin, MD, PhD
Chairman, SCAR
Sacramento Radiology Medical Group
Co-Director, Clinical PACS
University of California at San Francisco
davrin@radiology.ucsf.edu