



CUSTOMIZED PACS FITS LIKE A GLOVE

Philip Manly, CEO Connect Imaging says, , “Our goal is to help you work the way you want or need to. We do this by using modules to do specific tasks you want done, tailoring the configuration to your workflow.”

What are the main challenges of implementing modular PACS?

Integration and client expectations top the list! In a sense, PACS has to integrate the facility’s past, present and future. Almost every facility has a ‘past’ to deal with, starting with the funds that are in the current budget. So when designing a PACS for an existing facility, the first task is determine where funding will come from. Next is to determine that the required infrastructure is in place. Why? Because infrastructure upgrades take time, coordination--and money. Next, it’s crucial to know what other software--RIS, HIS, practice management, dictation--needs to be integrated with the PACS. Those are the ‘past’ issues.

The specific modalities (CT, MRI, ultrasound, etc.) already in place also affect configuration; they are part of the ‘present’. Concurrently we examine how the facility now directs its workflow--and whether facility personnel want to reorganize that workflow.

Finally, what modalities does the facility plan to add? Those are the ‘future’ issues. In the end, PACS is just a tool. The challenge is to configure not only in a way that makes “sense” but also in a way that will accommodate to the client’s present workflow and leave room for growth--and to do all this within the budgetary constraints.

Clients often need help to identify and allocate the resources that will be required to implement PACS. You could do an entire article on that topic! Infrastructure that will accommodate PACS is a crucial element to have in place. Too often, that need isn’t recognized until late in the planning process.

At Connect Imaging, we’ve learned to factor all of this in early, and to track progress towards agreed upon goals through project management. Doing that avoids unpleasant surprises at the time of installation.

Client expectations can be another challenge in implementing PACS if those expectations are not made clear to the vendor. Therefore, some questions are important to ask early. First, what does the client want the PACS to DO? People agree on two things. They want to have studies where they want them, when they want them, and they want the system to be effortless to use. Second, what markers, beyond eliminating most film and chemistry costs, will indicate a successful PACS installation to this client?

Outcome markers need to be identified, agreed upon and prioritized. Examples are increased productivity, faster throughput, shorter waiting times for patients, ease of operation, the ability to check status of studies, the ability to correct errors, a way for users to deal with interruptions without losing their ‘place’, a way to compare legacy studies with current ones.

How can productivity tools provide solutions to such challenges?

Productivity tools are, essentially, the modules we’ve developed to achieve user-defined outcomes. These modules provide solutions to common challenges when they are applied to workflow. In addition, the architecture of our software modules incorporates design elements that recognize how people use PACS in the real world.

Because the design for a purpose-built PACS stems from a specific facility’s workflow, we make sure that we identify and document their existing workflow. Only then do we ask, “Does it make sense to do it this way?”

If it doesn’t make sense, this is the time for the client to take advantage of the opportunity to redesign workflow. After analyzing the overall situation for a final workflow plan, we break that workflow into task-oriented pieces and decide what software modules will be applied to handle each of them.



We can draw from more than 15 modules, each designed to do a specific job. Some do very simple things, some handle complex tasks.

The core modules are a file handling module and a diagnostic viewer--we have two of each--plus a HIPAA module. The HL7 module integrates the PACS with HIS/RIS systems where those are in place or being installed.

The diagnostic viewer displays study images to the radiologist so he or she can read them. The file handling module serves the same functions a file room does. We also have specialized optional modules.

Some modules run in the background, requiring no user input. Others are designed for the PACS administrator or the radiological technologist to manage studies, track status, etc. Another allows correction of mistakes in archived studies. Our distributor module, critical for complex workflows, lets the user set up customized rules for forwarding studies. Some flexibility in combining the modules facilitates customization. For example, studies can be reviewed for errors by a technologist before they go to the PACS, or be routed directly to the PACS and corrected later if needed. The PACS design that evolves, though, will fit the user like a favorite pair of gloves, because it has been assembled with user-defined goals in mind.

Within the facility are radiologists and other physicians, hospital administrators, IT personnel, radiology managers, PACS administrators, radiological technologists. All may be users of the PACS. But each user group views the acquisition of PACS differently, interacts with PACS differently and has different needs. We developed user profiles to ensure that our PACS identifies and addresses the needs of all of these, down to referring physicians

Our user interfaces and software architecture were designed by a cognitive neuroscientist to facilitate reading studies and to minimize wait time. Productivity is further enhanced through designing modules that operate PACS in the "real world" environment where unexpected things happen. Data is sometimes input incorrectly. Legacy studies need to be compared. An individual study may need to be burned to CD or even printed to film to accompany a patient being transferred to a trauma center. People are interrupted and need to find their 'place' when they return. We can address each of these and more.

How long does it take to design an individualized system?

Design is embedded in a larger process. Financing is a bigger cause of delay than design issues. Most imaging departments plan their budgets a year or more in advance. We can refer them to leasing firms who are familiar with our work. But sometimes, they have to wait. Mandated procedures within the purchasing process can also add to delays. When a client has financing ready to go, the process moves much faster.

The time required for design is a function not only of the complexity of the workflow, but on how clear the prospective customer--the facility--is about what they want. Clients who seek us out tend to have complicated workflows, and often no single person has a full understanding of what will be involved.

The initial contact provides information that is really important, but it isn't the whole picture. Let's follow the process. Someone calls, or they see us at a trade show. They are thinking about PACS, so we talk. Often what they say they want turns out to be not what they actually want.

If they are interested, this first contact provides enough to work up a preliminary estimate for budget purposes. That takes a week to ten days. Generally that interaction is also enough to give a sense of whether there is likely to be a good fit.

If the facility shows interest after they receive the initial written proposal, I explore their plans for funding. If it seems appropriate, I offer to make a site visit. The purpose of that site visit is not to make a presentation, but rather to learn more about the prospective client's needs. For that reason, I set two conditions for making a site visit. First, I need access to people in different user groups and in certain departments. We can meet either sequentially or in a group. Second, I need to observe the imaging department in action.

The person who first contacted me will have given his or her perspective on what the PACS related goals are, but when I interact with representative people from different departments at the facility, see them interact, and observe imaging department personnel at work, I get a wider and more accurate perspective.

Setting up the site visit can take two to four weeks, since the schedules of multiple people are involved. The site visit itself requires at least half a day, but may last an entire day or even more. At the end of that time, both sides have a much clearer understanding of what we can accomplish together. The next step is to work up a final quotation. That takes a week or two, depending on the complexity of the workflow. Another revision may be necessary because of budgetary constraints. When we reach agreement on a PACS proposal, the client signs a contract. When we receive the initial deposit, we order hardware and block out time for installation.

In your view, what are the benefits of implementing an individualized PACS system for workflow and image distribution needs?

Our goal is to take existing workflow and automate it, rather than force users to change workflow to accommodate the way the architecture of the PACS directs it. Our user interface minimizes stress on all users, from beginner to expert level, allowing them to do their best work. The facility will save money by going filmless. But the true efficiency gains from PACS come from having the PACS do automatically what you already do manually.

What do you feel are the real markers for ROI from the implementation of PACS systems for a radiologist/imaging center/hospital?

The first marker that people tend to use is to compare the cost of PACS to the cost of their present film-based system. Many other PACS vendors come up with expanded cost per study figures in an effort to justify the cost of their PACS. Yes, we can replace an existing film based system with a PACS for less than the department's current film and chemistry costs. However, that's not the most important benefit--though it is



important. To me, a PACS installation is a success when users say that they can't imagine how they would operate without it, because it makes their work so much easier.

What is unique about the ViewBox? What technologies have been adopted for the system to give its uniqueness?

ViewBox is the diagnostic reading module used by the radiologist. As noted earlier, the radiologist's primary need is for efficient interaction with the software. Each radiologist develops automatic habits in using software, because doing so results in lower cognitive load and faster performance. ViewBox supports these with mouse-based and other one-touch commands that don't require the user to remove his/her eyes from the screen while reading a study. ViewBox also limits the number of conceptual steps required for any viewing task. For example, ViewBox remembers previous settings. It provides special-purpose functions which more accurately match the radiologist's task organization. It uses predefined preferences. ViewBox limits the number of mouse clicks or other actions required for frequently used functions, especially those used multiple times while reading a single study. All of these features combine in ViewBox to make the radiologist's job easier.

But radiologists want more than ease of use and good ergonomics. They want to save time. And, they hate waiting for studies. So what happens when a department adds a new multi-slice CT?

Fortunately, we anticipated the need to be able to display very large data sets as quickly as the system displays x-rays. With very large data sets, an on-time download type system is too unwieldy.

Instead, our PACS handles very large data sets in two steps. First, it forwards the study automatically to the workstation, so there is no delay in downloading it over a network. Second, it automatically preloads the study into physical memory. In this way, a radiologist using ViewBox can switch between studies in a few seconds.

What is the importance of customizing/individualizing PACS solutions?

For a user to feel comfortable interacting with a PACS, the software has to accommodate to the user's workflow, not force

the user to accommodate to the PACS' architecture. From what we have seen, this is easier to achieve with modular PACS. Modularity has a potentially important impact on purchasing decisions, too. The true cost of each module can be evaluated based on its impact on workflow. We'll tell the client what the trade off is. Modularity openly acknowledges that all facilities experience limits to their resources. Balancing PACS costs against hardware upgrades, salary increases, and the addition of other modalities is easier when the client understands the monetary cost and functional trade off for each module.

What differentiates you from other solution providers?

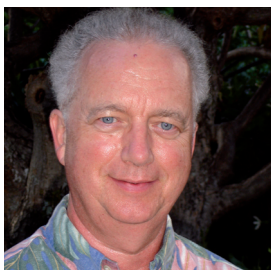
Lots of things make us stand out. From day one, we home in on user-defined goals, and help the user to achieve them. Our user interface and software architecture were designed by a cognitive neuroscientist with the goal of making the radiologist's work easier. Our support and service team is unequaled, with optional 24/7 access to live personnel and the capacity to shadow a user in real time. Modular construction with transparent pricing allows the client maximum flexibility in determining the best allocation of resources for a specific facility. Finally, we recognize that there is no longer just one PACS market. Segmentation means that today, PACS can be found in hospitals, clinics, and free-standing imaging centers, but also in large orthopedic practices, cardiology centers and neonatal intensive care units.

The workflow within each category is different. With so many potential niches, the idea of a single solution to fit all users has become an obsolete concept. Our modular approach allows us to address each of these market segments through facilitating their workflow.

Modularity also facilitates dealing with integration issues with the different modalities and with other software systems--and almost every facility has some integration issues.

By comparison, large companies experience difficulty in customizing solutions. They have put many resources into developing one or more systems, but those systems aren't especially flexible.

Finally, we LIKE solving problems for people, and we value competency. We're not the only game in town, but we think Connect Imaging is the best PACS for clients with complex workflow.



Philip J. Manly, M.S., CHP, DABR, CEO of Connect Imaging, enjoys solving practical problems for real life configurations. Connect Imaging is an outgrowth of that interest and his experience as a medical physicist in Hawaii and the Western Pacific. Manly is one of fewer than 70 medical physicists in the United States who hold certification from both the American Board of Health Physics and the American Board of Radiology.