

The web-deployed PACS advantage: A better investment



INTRODUCTION

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In today's competitive healthcare market space, choosing the right picture archiving and communication system (PACS) is critical to efficiently and profitably conduct the business of radiology. In the past, many radiologists and clinicians have settled for PACS solutions that meet their most rudimentary requirements for study annotation and digital storage. Today, this situation is complicated by more sophisticated demands for faster throughput, access to a wider variety of modalities, more diverse dissemination and accessibility to secure information, and maximizing the productivity across the radiology landscape and dealing with HIPPA requirements.

Radiology departments and groups that are seeking increased revenue growth and improved patient satisfaction are beginning to take market share away from competitors who are content with whatever PACS they have enjoyed over the past 3–5 years. Most of these systems are either client-server or web-based solutions.

It is becoming clear that pioneering PACS providers are now offering a third avenue of PACS that circumvents the traditional limitations of the older architectures. By taking advantage of this new architectural approach, radiologists are better positioned to win market share as healthcare dollars are more fiercely battled for in the radiology marketplace.

A BRIEF HISTORY OF OLDER PACS USAGE

The PACS workstation has been both a blessing and a curse for the past 20 years. Radiologists initially hailed the coming of PACS as a means for increasing the number of images they could read and for extending a certain amount of freedom by making studies accessible away from close proximity to the film library. But, the potential for increased productivity and flexibility has also brought with it greater complexity in demands for image analysis and the need for interoperability across a multitude of modalities, platforms, and information systems.

There is constant change in the way the imaging sector performs the business of radiology – staffing changes, modalities upgrades, interaction with other health management information systems and the needs of a wider base of referring physicians. NovaRad South calls this systemic drift. The entire environment in which the PACS is housed is never stationary, but constantly morphing into greater degrees of complexity along with other systems with which a given PACS must interact such as differing hospital information systems and referring physicians.

The challenge of systemic drift is to find a PACS that evolves along with the environment in which it is housed without entailing additional costs. This dynamic relationship is not an easy thing to discover. The current paradigm is to pay for upgrades and design changes over and above the costs covered in routine annual maintenance fees. This model is a challenge to those who wish to efficiently plan and budget for the future costs of PACS operations.

“FAT” CLIENT: A GOOD START

When PACS finally moved to a Windows-based environment, it did so in what is called client-server design. This is also known as a “thick client” or “fat client.” The PACS host PC relies upon a software application separately installed on whatever PC wants to obtain access to the PACS system.

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This application relieves the server of much of its actual processing burden, pushing it down to the client level while also freeing up band-width for the server to perform other functions.

Unfortunately, this design also requires more human resources than many radiology departments and imaging centers possess. Resources for trouble-shooting and routine PC/server maintenance are examples. Flexibility of use is often very limited in the thick client approach. Only certain workstations can access the server. The ability to conduct reads anywhere anytime is frequently not an option here.

Perhaps more importantly, in times of peak patient demand, the number of simultaneous client requests can lead to slower response times due to server overload. This affects the load times for the radiologist to access specific studies and to save their interpretations and annotations back up to the server.

“THIN” CLIENT: A REACTION TO SHORTCOMINGS

This led to the fashionable shift toward more web-based solutions. These are the “thin client” approach, a design contrasted to thick client in that there are no applications deployed by the server at all. Instead, the server itself performs all the computational roles. This reduces the need for maintenance of an on-site thickclient machine thereby lifting some of the burden of the architecture on the human technical support staff in the radiology department, clinic, or imaging center.

Unfortunately, thin clients are also limited by the capacity of the server. Initially, the robust computational capacity of network servers was greater than the demand placed upon them by various PACS solutions. But, as changes continued and as PACS have become more sophisticated, thereby more demanding, once more webbased solutions have hit a ceiling that often reduces access and upload times for specific radiology studies.

Additionally, web-based solutions often require some degree of technical resources to create virtual private network (VPN) “tunnels.” Basically, these are secure conduits from the web server to various accessing workstations. These require deployment by a qualified network specialist as well as occasional support that is outside the periphery of a routine PACS maintenance contract. So, once more, there is this demand for IT resources that are not readily available to every radiologist.

Another trade-off with the web-based solution is the loss of much of the functionality of a client-server solution. The web itself is a limiting factor here. More sophisticated annotation capabilities simply aren't possible when the computation capacity resides in a remote location.

Moreover, thin client architecture is limited by the capabilities of the workstation. Often the latest updates in the web-browser or in popular media architectures such as Flash or Java will grind the entire communications process to a crawl.

Remember, the C in PACS stands for “communications.” Most stagnant PACS models have become severely tested and somewhat antiquated with the systemic drift of various media drivers, computational capacity, and increasingly sophisticated interpretation tools. The slower the load times for images and studies, the slower the radiologist can work. Ultimately, it means a slow-down in revenue generation and efficiency.

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WEB-DEPLOYED: THE NEW OPPORTUNITY

Few PACS systems currently have the capability to transcend the various limitations of thick and thin client options, but pioneering systems are now available in a new “web-deployed” model that is far more accommodating to change.

In the web-deployed options, the PACS server itself loads the app as needed at the PACS workstation. This circumvents possible efficiency bottlenecks due to incompatibilities between various technology types on the PC and the latest version of the PACS viewing and interpretation interface.

Web-deployed PACS offers all the advantages of thick and thin client designs. It affords the flexibility of a web-based PACS. The radiologist can access studies securely from any internet connection without concern for which version of Flash or Java the workstation might have installed. There is no need for the creation of VPN tunnels. It retains the original power of functionality in the client-server PACS.

This is the best of both worlds and is the optimum situation in dealing with the future changes inherent in systemic drift. Web-deployment offers a hybrid environment that accommodates all reading patterns.

Web-deployment is an innovation few PACS companies’ currently offer. Newer firms lack the experience and the breadth of time to offer this approach through a truly vetted process of complete testing based upon real world results from clients in the field. Meanwhile, several of the original PACS vendors have had more difficulty making these rapid changes because of the need to accommodate legacy customers with backward compatibility and due to the significant costs of changing their existing PACS architecture and infrastructure.

The few pioneering PACS vendors who have made this fundamental change and successfully installed it across the spectrum of their client base, however, understand that a web-deployed PACS are proactive by nature. They anticipate the next wave of radiology demands and capabilities such as the possible migration away from the PC to other platforms such as various wireless, touch-screen devices like the popular iPhone or slate/tablet workstations. Further advancements in voice dictation, 3-D rendering, report distribution, and the accommodation of more advanced modalities that require terabytes of bandwidth using media programming languages that are currently being tested, and interfacing more readily with the use of electronic medical records by healthcare providers give us a glimpse of our openended future. This future will be limited by traditional distributed architectures which makes web-deployment even more appealing.