

Thinking Systems Corp.

Molecular Imaging PACS Solutions at the University of Miami

By Xiaoyi Wang

THE DEPARTMENT OF RADIOLOGY AT THE University of Miami (UM) Leonard M. Miller School of Medicine is one of the leading institutions in the world, and it is recognized for consistently providing quality patient care, cutting edge research, and academic excellence. The nuclear medicine program at the Leonard M. Miller School of Medicine has produced many top-notch physicians who specialize in nuclear medicine.

Through partnerships with industry leaders and with technical guidance from Mike Georgiou, PhD, associate professor of radiology and director of basic science operations in nuclear medicine, UM has established a technologically advanced molecular imaging platform. The platform uses advanced technologies from multiple modalities and PACS.

FORMING A PARTNERSHIP

The partnership between St. Petersburg, Fla.-based Thinking Systems and UM began in 2004 when the university's radiology department began enhancing its oncology diagnostic imaging program at the Sylvester Comprehensive Cancer Center with advanced PET-CT technologies.

As part of the initiative, Thinking Systems was selected, in conjunction with Philips Gemini PET-CT scanner, to provide comprehensive oncology diagnostic imaging for tumor detection. Through a collaboration with Georgiou and the UM physicians, led by George N. Sfakianakis, MD, professor of radiology and pediatrics and medical director of the division of nuclear medicine, an advanced and comprehensive PACS framework was established. The PACS framework encompasses advanced clinical solutions for PET-CT, SPECT-CT, nuclear cardiology, general nuclear medicine, and integration with the Enterprise IDX ImageCast PACS (Philips iSite® is the PACS component).

"One of the most attractive attributes of the Thinking Systems molecular imaging solution suite is the ease of use while it maintains comprehensive elaborate functionality," says Georgiou. "Despite formidable obstacles, Thinking Systems helped us accomplish all of the key goals that we established when we evaluated various PACS solutions."

SETTING ATTAINABLE GOALS

At the beginning of the project, the team set the following goals:

Image archiving. To provide image archiving for PET-CT data from Philips Gemini PET-CT scanner and nuclear cardiology and general nuclear medicine data from Philips/ADAC gamma cameras. This measure was to include archiving of raw and processed data from all devices.



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Data conversion. To provide means to convert Philips/ADAC Pegasys proprietary data to DICOM 3.0 data. This data conversion was crucial for enabling data archiving, processing, analysis, and review.

Workstation functionality. To provide diagnostic PACS workstation with PET-CT fusion functionality for Philips Gemini PET-CT data and nuclear cardiology imaging processing and quantification analysis functionality. In addition, to provide diagnostic PACS workstation functionality for general nuclear medicine review of all image types, raw and processed, with a variety of display templates, image manipulation tools, and color tables.

Web-based solutions. To provide thin-client Web-based solutions with workstation capabilities for PET-CT, nuclear cardiology, and general

nuclear medicine.

PACS Interfacing. To interface with the IDX ImageCast enterprise PACS to provide key images and processed displays for referring physicians.

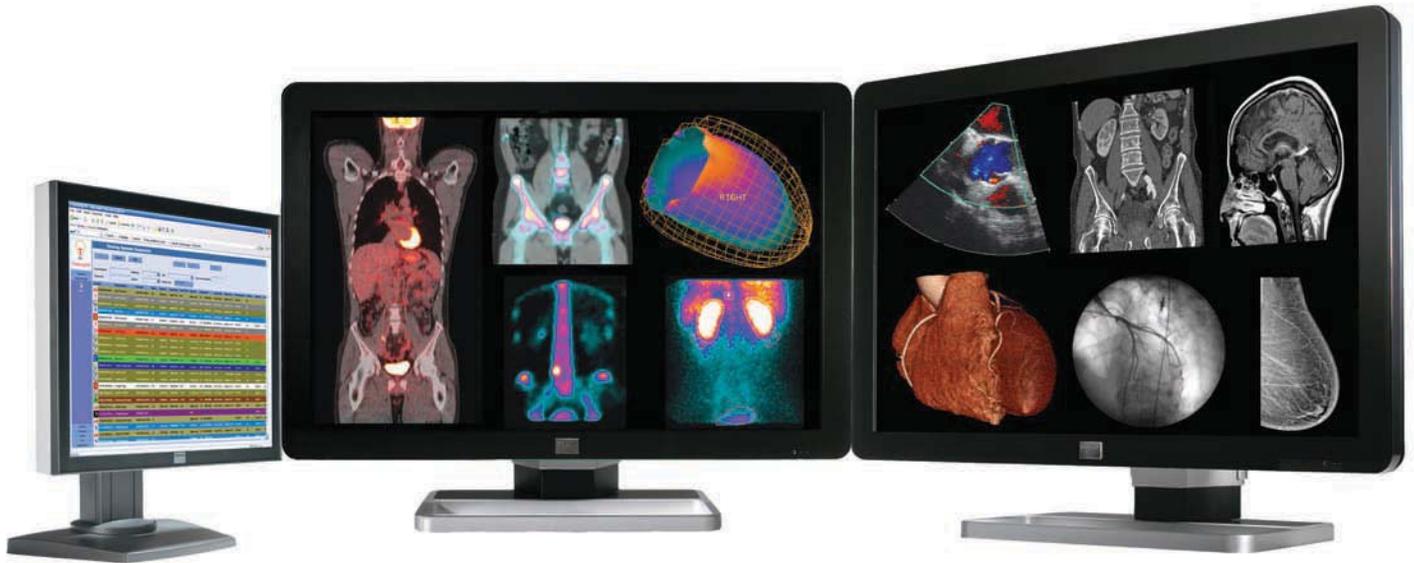
As the project evolved, the scope of the project expanded. With the expansion of the facilities, a remote facility with molecular imaging modalities was added to the molecular imaging PACS network. When a Siemens SPECT-CT was installed later, it was necessary to include SPECT-CT fusion functionality to the platform.

The biggest change in the scope was the requirements to integrate with the enterprise IDX ImageCast PACS to provide enterprise capability for molecular imaging, especially PET-CT fusion. With the increasing data volume, long-term data archiving for raw and processed data was shifted from the department archive server to the enterprise IDX ImageCast archive server. Providing thin-client integration with IDX ImageCast PACS for PET-CT fusion capability throughout the enterprise from any IDX ImageCast PACS access point was also required for integration.

The end goal was to provide an ultimate Enterprise molecular imaging PACS solution to address the needs of radiologists, cardiologists, oncologists, and other referring physicians, with a radiology PACS that was already in place.

THE FINAL IMPLEMENTATION

The initial requirements were met by implementing a department PACS to handle molecular imaging. Data archiving was handled by our multi-modality ThinkingPACS™ server. Philips/ADAC Pegasys data conversion was handled by our NuGateway™ DICOM gateway. Diagnostic workstation requirements were met by our PACS workstation MDStation™ with the molecular imaging application suites, and our ThinkingWeb™ thin-client application server allowed us to meet Web requirements.



ThinkingPACS/ThinkingRIS

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In addition, our TechStation™ enabled nuclear medicine technologists to perform appropriate quality control and assurance of the images and relevant demographic information. The TechStation also included a set of display functions, image manipulation tools, DICOM network transfers (query/retrieve), and DICOM media support (import, export). The deployment went smoothly and the system went live within a week.

In order to make the integration with IDX ImageCast work, we had to introduce a new component – our ModalityBroker™. The primary function of the ModalityBroker is to act as a go-between to bridge the gap between molecular imaging and a conventional radiology PACS. The ModalityBroker enables bi-directional data flow between IDX ImageCast PACS and molecular imaging devices, regardless of whether they are DICOM or non-DICOM.

With the integration, the system architecture, workflow, and dataflow changed significantly in the back-end. The front-end workflow was simplified and changed from a departmental workflow to an enterprise workflow.

The most significant evolutions took place on the clinical applications end. As part of the partnership with UM, Thinking Systems' clinical applications for PET-CT fusion and nuclear cardiology have gone through several rounds of significant enhancements based on suggestions and feedback from the nuclear medicine physicians.

The end result of this implementation is an enterprise molecular imaging PACS solution that enables quality and efficiency for molecular imaging.

CAPITALIZING ON THE BENEFITS

The benefits achieved through this implementation have been significant. For instance, centralized data archiving for molecular imaging utilizes the existing enterprise radiology PACS. No more CD/DVD or MOD are needed.

In addition, there is a uniform platform for diagnostic interpretation for molecular imaging subspecialties, including PET-CT, SPECT-CT, nuclear cardiology, and general nuclear medicine. Interpreting physicians don't have to move between workstations to read different types of studies.

Also, the vendor-neutral platform provides consistent clinical applications and workflow, regardless of the source of the data. Clinicians don't have to rely on any particular equipment provided by the device manufacturer in order to interpret certain studies. There's no need to learn how to use these systems either.

Clinicians have enterprise-wide access to molecular imaging solutions from any computer with PACS access. They can go to any computer with access to IDX ImageCast PACS and be able to perform PET-CT fusion with SUV measurement, fusion adjustment, triangulation, size measurement, current/prior study comparison, and any tasks they would do on a dedicated PET-CT workstation.

Efficiency and productivity have also improved. With one single platform, clinicians can accomplish tasks better and faster, which translates into better patient care.

Xiaoyi Wang is president, co-chairman, and co-founder of Thinking Systems Corp. in St. Petersburg, Fla. He is also a key architect and developer of Thinking Systems' ThinkingPACS™ and ThinkingRIS™ products. Wang's expertise enables him to work with his team to design and develop comprehensive PACS/RIS systems.

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