Case Study | Innovative Radiology, P.A., in Houston, Texas

Carestream Teleradiology Solution Accelerates Business Growth of Houston Practice, Improves Service to Referring Physicians

"We are much happier with the performance, the accuracy and the speed of our practice, since moving to Carestream's Vue for Teleradiology."

-- Dr. Randall Stenoien, M.D., Radiologist and founder of Innovative Radiology

"For more than a decade, Innovative Radiology has interpreted imaging exams for physicians in the Houston area. Until recently, we utilized a standard radiology information system (RIS) to capture patient data, schedule interpretations and distribute reports and images. This changed in 2013, in response to requirements of Meaningful Use—a core element of the Obama Administration's effort to encourage more and better use of electronic health records. When our existing RIS manufacturer did not offer an upgrade to meet the new government criteria, Innovative Radiology turned to Carestream Health."

The solution was Carestream's Vue for Teleradiology*. This module moved the teleradiology workflow from RIS-driven to PACS-driven. This eliminated Innovative Radiology's dependence on local radiology information systems, yet still allowed collaborating radiologists to use whichever RIS they preferred.

Today, the practice Dr. Stenoien founded a decade ago uses Vue for Teleradiology to manage services for approximately 35 sites in the Houston area. Most of its 14 radiologists are sub-specialists, focusing on neurology, musculoskeletal imaging, nuclear medicine, oncology and intervention.

Studies are routed to specific radiologists, when their specialized expertise is needed. *"We are using the tools of PACS to integrate our practice and allow us to do what we do best,"* Dr. Stenoien says. *"Our neuroradiologist reads the neuro and spine cases; those of us focused on mammography or oncology get those. This integration enables us to stay busy and stay stimulated."*

The Innovative Radiology practice serves more than 35 Houston-based hospitals, physicians' offices, clinics and imaging centers that together report on some 300,000 procedures per year. It is one side of the radiological coin minted by Dr. Stenoien. The other side is Houston Medical Imaging (HMI), which operates three Houston imaging centers performing about 40,000 radiological exams annually and serves as the foundation for Innovative Radiology.

From the outset, Dr. Stenoien has worked with physicians in the Houston area, who have referred patients to HMI facilities and transmitted results of exams done at their own facilities to Innovative Radiology for interpretation.

"We want to provide top-notch imaging, excellent interpretation, and a robust infrastructure through which we can distribute reports and images to our doctors, make them happy and ensure that they send us more patients, so we can continue to grow our business," Dr. Stenoien says. *"In this healthcare climate, in which reimbursement continues to decline, the way you can make up for the decline is through more volume."*

*Vue for Teleradiology is pending release by July 2014.

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In their new teleradiology practice, Dr. Stenoien and colleagues use PACS-based native reporting to prepare and transmit interpretations that can be embedded, easily and efficiently, into electronic medical records by referring physicians. Not only do these reports satisfy Meaningful Use criteria, but they also satisfy a key directive of the American College of Radiology—that interpretations be made with complete availability of relevant collateral information, including previous imaging studies, electronic medical records, and details on the patient's clinical symptoms and preliminary diagnoses *(ACR White Paper on Teleradiology Practice: A Report From the Task Force on Teleradiology Practice)*.

Taking teleradiology to a new level

"Some teleradiology companies focus exclusively on report delivery," according to the ACR paper. *"Besides devaluing our specialty and undermining the role of the radiologist as an independent expert in diagnostic imaging and a fully engaged member of the consulting team, this practice further commoditizes the product of our efforts."*

CARESTREAM Vue for Teleradiology helps teleradiologists avoid commoditization by providing the detail, structure and quality images that support interpretation with confidence. Rather than depending blindly on the interpretation of a distant radiologist, the referring physician sees the basis for the interpretation. This is provided in the body of the report, which the referring physician can examine using a Carestream technology called Vue Motion—a universal viewer that allows the physician to access the images upon which the report is based.

"There's something reassuring, I think, for referring physicians when they can pull up a study," Dr. Stenoien says. *"Even if they don't interpret it, they can gauge the quality of the study and see the content of the report; this provides a sense of satisfaction that it is a good report. They can believe in it and make clinical decisions to provide better care for their patients—comfortably and confidently."*

Referring physicians can gain this confidence with minimal effort. Those working with Innovative Radiology receive a link to Vue Motion in the HL7 message that brings the radiology report. A single click on that link launches the zero-footprint, vendor-neutral browser, which serves as a portal to the images, as well as the tool for viewing them.

"You don't need to install an extra application," notes Nikola Flajc, an IT support specialist at Innovative Radiology. *"It doesn't matter if you're using Internet Explorer, Firefox, Safari or Google Chrome. Vue Motion works with anything."*

Sports-medicine specialist, Dr. Omer A. Ilahi of the busy Southwest Orthopedic Group describes Vue Motion as being very intuitive, and an advantage to his practice. *"You simply click on the link and the images come up,"* he says.

Vue Motion is a welcome change from the CDs that patients at one time brought to Dr. Ilahi. The images on these discs were captured at an imaging center near Dr. Ilahi's orthopedics office in Pasadena, TX, some 15 miles away from HMI. They were hand delivered to Innovative Radiology for interpretation. Now the images from this imaging center are transmitted electronically to the PACS at HMI, where Innovative Radiology interprets them and reports to Dr. Ilahi with a Vue Motion link that allows direct access to both the conclusions and images.

"For me, as a clinician, I've typically got a bunch of patients waiting," Dr. Ilahi says. *"I've got to be as efficient as possible."*

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The way it was

For a decade, Innovative Radiology had operated without the benefits of such technology. But it wasn't easy. Even when Dr. Stenoien's group was linked electronically to referring physicians, they relied on a single RIS to create multiple registration centers. Referrers had to manually register patients in the RIS. Workflows were based on the RIS, which guided the images and patient information to the radiologist. This required a great deal of coordination and system integration.

On any one day, thousands of images were sent to Innovative Radiology from dozens of different systems. The reporting was not integrated, so the radiologists would have to log on to the RIS, select the study, then log on to the PACS to read the cases. There was no effective way to use structured reporting, and no easy way to drop images into reports.

"It was a bit clunky," Dr. Stenoien says.

Then a new era dawned, one that thrust Innovative Radiology into an unplanned transformation.

"It was time for 'meaningful use,'" Dr. Stenoien recalls. *"Our RIS vendor—a big vendor—decided they were not going to support Meaningful Use. So we had to find an alternative."*

This was challenging for Innovative Radiology, a relatively small practice of hardly more than a dozen radiologists reading a few hundred thousand studies a year. *"We couldn't afford to spend two or three million dollars on a new solution,"* he says. *"So when I visited the Carestream development center and they demonstrated this teleradiology project, I knew this was the solution I was looking for."*

Dr. Stenoien stopped trying to find a RIS that would integrate his practice, and chose instead to move to a PACS-driven system. Referring physicians were free to use their information systems to capture patient information prior to the exam. Vue for Teleradiology provided the information the staff of Innovative Radiology needed.

Before Vue for Teleradiology, the RIS was the linchpin that held the network together, explains IT support specialist Nikola Flajc. *"The RIS distributed the reports; it was our connection to the images,"* he says. *"Now we bypass the RIS."*

Innovative Radiology has the option, however, of communicating with radiology information systems still being used by their referring physicians. *"If somebody from a different office would like to communicate through their RIS, that's not a problem,"* Flajc says. *"We can send messages to their RIS—but we give them the option of becoming totally independent. With us, they no longer have to depend on the RIS."*

The result? A process that used to take hours now takes just minutes.

The benefits can be impressive. Using both RIS and PACS requires twice the effort of PACS-driven teleradiology. Flajc notes that two log-ins were needed: one through the RIS to get the report, the other through the PACS for the images. Not so using the new teleradiology paradigm.

"By logging into Vue Motion, (the referring physician) is able to view the images and see the report on the side at the same time," Flajc says.

This accessibility is accomplished without changing the workflow of the referring physician. This is true regardless of whether the imaging procedure is performed at the referrer's facilities or at HMI.

"We don't change anything on the referring physician's end," he says. *"They can use their patient ID and their accession number.* ***Once our radiologists read the study and have the final reports, we are able to send them precisely where they need to go without interruption."***

Making the transition

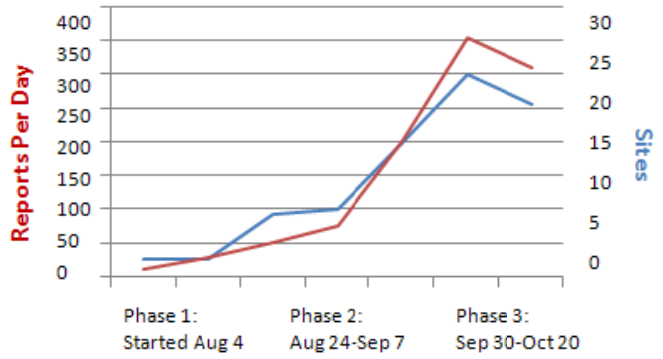
Innovative Radiology's use of teleradiology began August 4, 2013. The first phase lasted two weeks during which two radiologists at Innovative Radiology were connected with two low-volume sites. About 40 studies from up to seven referring physicians were read daily. All involved digital radiography (DR). Order entries were created at HMI using Carestream's Vue Motion. Report distribution was by fax. There was no email distribution and neither billing nor interface with the Houston healthcare information exchange (HIE) was possible.

Phase Two began August 24. Continuing for two weeks, this was a leap forward in both study volume and sophistication. About 25 studies, including DR, PET, CT and ultrasound, were interpreted daily by three radiologists at Innovative Radiology. Studies were referred by 16 physicians from a single site, Oncology Consultants. Order entries using Vue Motion were created at the client site. Emails notified referring physicians that results were available via fax and Vue Motion. Billing and HIE HL7 interfaces were established.

Phase Three began September 30. During this three-week period, the network was expanded to include about 30 client sites, including HMI and other large imaging centers. Within one week, 14 radiologists at Innovative Radiology were filing

between 300 and 400 DR, PET, CT, ultrasound, MRI and nuclear medicine reports. Any of up to 2,000 physicians were referring studies for interpretation.

The CARESTREAM Vue for Teleradiology solution has allowed Innovative Radiology to increase study volume, workflow and overall productivity—which is good for patients and good for business.



On the highest volume days, reports were transmitted to as many as 25 different sites. Most involved digital radiographs (22 sites), CT (16), MR (13) and/or ultrasound (13). As done previously, order entries were created remotely using Vue Motion. Results were transmitted by fax or Vue Motion. Billing and HIE interface were available.

By January 2014, more than 35 sites were connected to Innovative Radiology using Carestream technology. Vue Reporting had been implemented to manage workflow, enabling voice recognition, as well as adding key images and patient dose data to the report.

How it is today

Innovative Radiology staff now log into a single application, Carestream's Vue for Teleradiololgy, which generates the worklist of cases, allowing administrators to assign cases that open automatically in specific radiologists' queues.

Vue for Teleradiology provides a simple "Read Request" web portal. The data entry workflow is simple to deploy, using HL7 integration. The reports are easier to generate and more complete than when Innovative Radiology was using a RIS.

It provides the background needed by the radiologist to form a comprehensive diagnosis. It describes the order and patient history, information coming from the exam, and whether there are any worksheets or prior reports.

Structured reporting and voice recognition are built into the platform. Images can be dropped easily into reports. Advanced tools, such as Carestream's Lesion Management, can be leveraged, outlining the lesion in images, plotting graphs, and calculating percentage change over time.

"All of a sudden (with the adoption of Vue for Teleradiology), our reports gained extra dimensionality," Dr. Stenoien says. *"And referring doctors got the ability to directly access their patients' images."*

The tool for this distribution is Carestream's Vue Motion. This browser had been available previously to physicians referring patients to Dr. Stenoien's practice, but it was not readily accessible. This changed through its tight integration with Vue for Teleradiology.

"Now that referring doctors have direct access to Vue Motion, they're adopting it, enjoying it and utilizing it to a much higher degree," he says. *"Ultimately, that is going to help us as a group. We're going to get more centers to read;* ***we are going to have more patients referred to Houston Medical Imaging; and we're going to get busier."***

The ease of using Vue for Teleradiology and the expertise of Dr. Stenoien's group have convinced Dr. Shikha Bharaktiya at the Endocrinology Clinic of Texas, P.A. in Houston to send ultrasound studies to Innovative Radiology for interpretation, even those done in her own office.

"I enjoy dealing with patients and discussing what we can do to fix their problems," she says. *"So if the imaging (or interpretation) gets done elsewhere, then I have that time to sit and discuss the results with the patients and possibly what we can do to make them feel better."*

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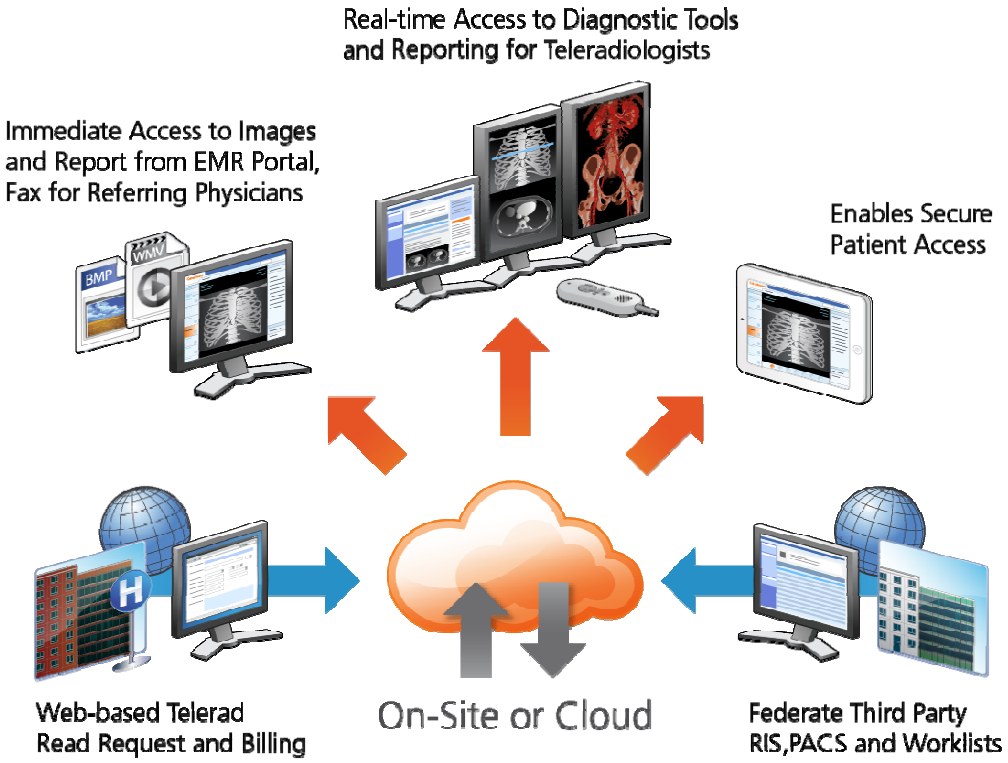


Technological evolution

In its evolution to PACS-driven teleradiology, Innovative Radiology met government and professional criteria. The practice also increased the level of care provided to referring physicians and patients. This evolution has been ongoing for a decade.

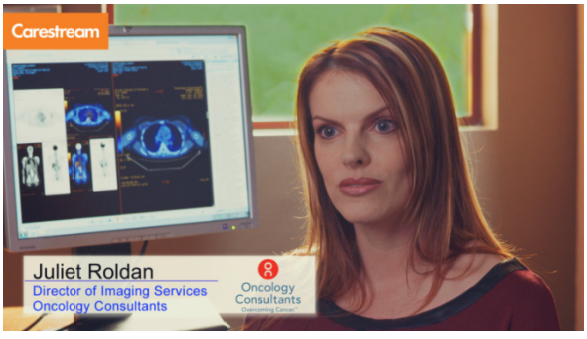
From the beginning, Dr. Stenoien and colleagues have collaborated with Carestream. In 2004, the company installed its CARESTREAM PACS. In 2011, Carestream installed Vue Motion, which allowed access to exam data archived on HMI servers. CARESTREAM Vue Motion was used to search for patient studies by criteria, such as location, status, and modality. It was easily accessible by radiologists in the practice through their CARESTREAM PACS.

Dr. Stenoien and his colleagues could call up reports including basic information, critical results and key images, as well as view the study with any number of basic tools. These include native 3D, MIP and MPR.

The power of Vue Motion was amplified by the next step in this technological evolution, CARESTREAM Vue Reporting, which married image review and the dictation process to enable speedy delivery without compromising critical value. CARESTREAM Vue Reporting reduced errors through structured reporting, increased diagnostic value through embedded qualitative and quantitative analyses, and provided the basis for multi-site collaboration. In doing so, it reduced on-going operational costs and streamlined clinical collaboration by incorporating hyperlink navigations directly to the image.

The adoption of Carestream's Vue for Teleradiology module extended the use of these Carestream technologies to the referral base. Vue for Teleradiology interfaces with other Carestream technologies, providing the expanded infrastructure to build out Innovative Radiology's network to improve communications with referrers.

It provides easy access to Vue Motion not only for Innovative Radiology staff but for their referring physicians. The HL7 message sent to referring physicians that carries the radiology report also carries the link to Vue Motion, which can access the entire set of images upon which the report is based.



"The value of that with our practice, Oncology Consultants, is that we have all of the images and reports," says Juliet Roldan, Director of Imaging for Oncology Consultants. *"As soon as (the report is) dictated, it's immediately available to the referring physician. So we have physicians who pull it up on their iPad or on their phone. They can do it from home; they can do it from work."*

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Vue for Teleradiology and its associated technologies, particularly Vue Motion, give Dr. Stenoien and his practice a competitive edge. They offer the ability to develop a closer relationship with referring physicians.

"It's one thing to send in a report with diagnostic conclusions. It's another to call a physician and say, 'Why don't you pull up this study and look at image 14 so we can discuss the air bubbles we are seeing there,'" he says. *"When you get to engage with the doctor, and actually talk about a study and share images, you develop a relationship. That's the fun part of medicine—relationship building."*

The technology underlying this relationship between radiologist and referring physician can also foster a bond between caregiver and patient. Oncology Consultants, a cancer treatment practice in Houston, uses Vue Motion to communicate with patients.

"We use laptops on carts to log on and, when the patients are being roomed in for their clinic visit, we're reviewing the results of the study with them," Juliet Roldan says. The Carestream technologies can also serve as a powerful marketing tool, according to Dr. Stenoien, who leverages the Carestream technology to forge a relationship where none had been before.

"I'll call a doctor and say, 'I've got this interesting case; would you like me to send you a link?'" he says. *"As they begin to discover Vue Motion, they get intrigued and very enthused. It's something nobody at the hospital can offer; nobody at (competing) imaging centers."*

Carestream technology delivers both tangible and intangible results. Diego Roldan, general manager of the radiology practice, explains that referring physicians want accurate interpretations fast. With Carestream technology, they get that and more.

"I am able to send an email to the referring physician immediately after a report is finished, telling him on his smart phone that the report is ready and he can immediately access that report and the images," Roldan says. *"That is power."*

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