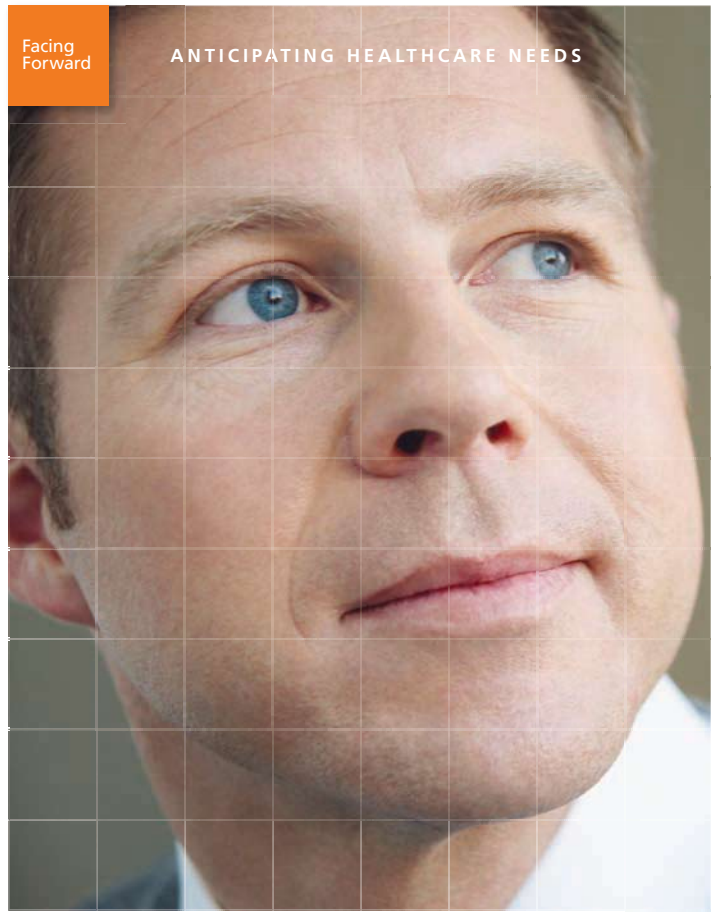
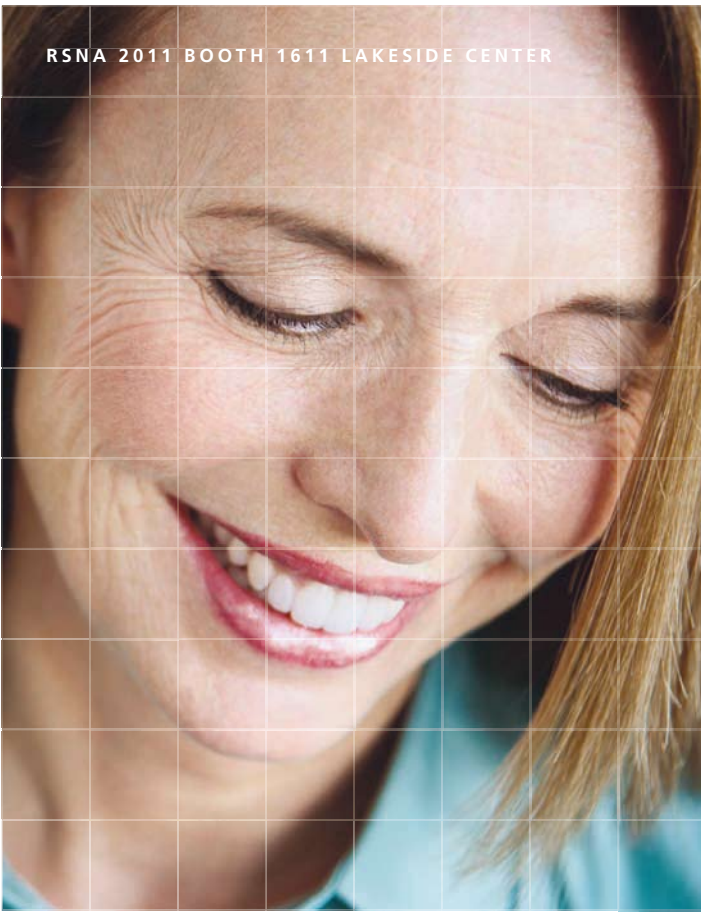


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Facing
Forward

ANTICIPATING HEALTHCARE NEEDS



COMMITMENT
IN THE
FACE OF
CHANGE.

A SUPPLEMENT TO IMAGING ECONOMICS

Carestream

COMMITMENT IN THE FACE OF CHANGE.

The world of healthcare is changing faster every day. New treatments. Growing challenges. Evolving technologies. Yet, some things remain constant. Namely, people. Like a patient's hopes, fears, and need for expert care. A doctor's commitment to providing exactly that.

And Carestream, where *our* commitment to innovation drives us to continually raise the bar for image capture and management.

It's really pretty simple: like you, we're committed to helping improve the health and lives of people around the world.

COMMITMENT IN THE FACE OF CHANGE.

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By Diana L. Nole



ACTIVE COMMITMENT

In today's complex and ever-changing health-care environment, "commitment" means listening to providers and creating solutions that address the issues they face.

A friend of mine pointed out an ironic reality regarding our society and the sharing of information. When we apply for a mortgage, the bank has immediate access to our credit rating, debts, assets and a host of other financial information. Yet if we end up in the emergency room, it is unlikely that the clinical team will be able to view our medical history. When it comes to our finances, we are "open books." But when it comes to our health, we remain medical mysteries to the very people who could save our lives. The need for secure sharing of information across the healthcare enterprise and across institutions is just one of the key trends shaping the radiology profession today. The digital imaging and healthcare IT systems Carestream Health offers serve a transformational purpose for providers and, ultimately, for patients. Every day, we work toward improving the information flow between radiology and the electronic medical record. As an industry, we are working toward an environment in which radiologists could view patient information, such as symptoms or chronic conditions, from the EMR since this data could influence their diagnosis. This type of information exchange is known as contextual decision support.

Moreover, our RIS supports the first phase of Meaningful Use requirements. CARESTREAM Vue RIS is 2011/2012 compliant and was certified as an EHR Module by the Certification Commission for Health Information Technology (CCHIT®) in October 2011. Both our RIS and PACS easily share data with EMR systems to expedite the exchange of patient information and to assist health care facilities in meeting Meaningful Use requirements.

Radiation dose reduction is another important concern for suppliers and healthcare providers. At Carestream, we are committed to an "Image Gently" initiative in which we continually

look for new ways to reduce radiation exposure in pediatric as well as adult patients. Consider, for example, our DRX platform. Carestream's standard DRX-1 detector uses gadolinium scintillator to provide high-resolution imaging for general radiology applications. Our optional cesium DRX-1C detector offers exceptional image quality and improved DQE (detective quantum efficiency) for dose-sensitive applications such as pediatrics, orthopedics, and other general radiology exams. We also offer the ability to view data in layers to help enhance the ability to detect conditions at an early stage and to more precisely locate tumors or abnormalities.

At Carestream, a genuine commitment to our customers begins with listening and we look at issues from our customer's perspective. Every day we learn from providers large and small about the constraints they face and the problems they need to solve. We know, for example, that healthcare reform brings with it unique and unprecedented hurdles, and that providers are also under pressure due to capital restraints. We respond by focusing our energy on solutions that can help providers do more with less, enhance efficiency and boost productivity—all while helping improve patient care.

In today's environment, genuine commitment to the customer is a tall order. For us, commitment is more than a word, it is the driving force behind everything we do. As we look toward the future, Carestream is investing in several new initiatives aimed at improving the quality of imaging, information exchange and ultimately patient outcomes.

In the pages that follow, you'll meet some of Carestream's talented people, and learn about our innovative products and, most importantly, hear directly from some of our customers. We hope these stories will shed some light on what commitment means at Carestream Health.

Diana L. Nole
President, Digital Medical Solutions
Carestream Health



A SINGLE DETECTOR PLATFORM. A FAMILY OF DR SOLUTIONS.

Out of Carestream's commitment to innovation comes our DRX family of products – based on a platform that lets you use the same wireless detector, software, and graphical interface across all your equipment. We call this seamless compatibility the *X-Factor* – supporting high-quality images, faster workflow, and an enhanced standard of care.

Now, we're designing a new family member: the highly maneuverable, DRX-Revolution Mobile X-ray System!*



COMMITMENT IN THE FACE OF CHANGE.

*Not Commercially Available

By Paul Mendel

ABOVE THE CLOUDS

Whether you're below, in, or ahead of the cloud computing trend, a good PACS vendor provides the options you want and the flexibility you need.

Rick Adams immerses himself in high technology every day, and when it came time to select a new PACS, he chose an onsite system. Adams is PACS administrator at St. John Medical Center, of Tulsa, Okla., which conducts 330,000 studies per year.

After an exhaustive vendor search, Adams selected a Carestream PACS system, now running on a server with a hefty capacity of about 42 terabytes. Adams needed the space because he wanted to access 7 years of imaging exams—without a lengthy data migration—as well as a decade of reports.

Advanced user functionality and faster delivery of imaging studies have since improved service for offsite radiologists and referring physicians. “The new Carestream PACS synchronizes patient metadata across multiple PACS to provide automatic access

rized users can quickly view current and prior reports or imaging studies. It's no small achievement, considering that the St. John system spans four hospitals, including the 721-bed flagship Medical Center, three smaller hospitals, 14 imaging centers, and three urgent care centers.

With all the images onsite, retrieving old studies from the archive is relatively problem free. For Adams, it provides a peace of mind that he believes extends to physicians and referring doctors.

Keeping Referring Physicians Satisfied

Adams is also excited about Carestream's zero footprint Vue Motion Viewer that avoids the need for Adams to load software on user workstations, PCs and other devices—which administrators appreciate.

Ultimately Adams wants to extend the reach of the viewer to mobile devices. The Vue Motion Viewer is not yet FDA cleared for use on mobile devices in the U.S., but Adams predicts referring physicians will love it once the technology is available.

“Mobile devices allow referring physicians to see the imaging exam or key images and view the report. I think mobile access will cut down on how much referring doctors call radiologists. Right now, we have orthopedic groups who are fired up to get this because they all carry around iPads, and if they are out at dinner and somebody calls for a quick referral, the image quality is not diagnostic but it's good enough to handle that application.”

Particularly in the case of orthopedic trauma, which tends to generate dramatic images, orthopedists can use Vue Motion Viewer to quickly decide if surgery or stabilization is called for. In the past, it usually meant a trip to the hospital. “Apple is doing a really good job marketing the iPad and it's being widely used by referring physicians. The more referring physicians you can keep happy, the better off you are.”

The PACS also integrates smoothly with Adams' existing HIS and 2-year-old RIS via a Mitra broker that allows authorized users to easily review the exam order, radiology reports, and imaging studies. This streamlined workflow has replaced previous manual processes for retrieving patient records. Faster access to records is especially important in the trauma center where past radiology reports and imaging exams can be pulled immediately using the patient name.

Radiologists and clinicians throughout the health care system appreciate the platform's advanced streaming technology that quickly delivers large imaging exams, even over 10 megabit connections. This allows productive access from remote locations.



Radiologist John Fitter, MD, views an MRI of a cervical spine. St. John's Carestream PACS enables radiologists to view current and prior exams for any patient from any onsite or offsite workstation.

to prior exams,” said Adams. “This allowed us to avoid a costly, time-consuming data migration. It took just a week to input metadata for 7 years of archived studies into the central PACS database. If a physician looks at a study, and there is a prior exam on the older archive, the system will transfer the image data for review. And these studies are available within 3 seconds.”

After migrating 10 years of reports to the new PACS, autho-

GREATER ROI ON YOUR RIS+PACS INVESTMENT. THAT'S OUR VUE.

Now more than ever, your imaging facility needs maximum value for every dollar spent. Well, meet Vue – a comprehensive suite of imaging solutions designed to make RIS+PACS+reporting more cost-efficient than ever before.

Vue supports productivity with advanced, embedded clinical workflow. Vue is scalable, intuitively easy to use, and provides unsurpassed disaster recovery for business continuity. The bottom line? Higher productivity and lower total cost of ownership.



COMMITMENT IN THE FACE OF CHANGE.

In practical terms, the intelligent software streams full resolution images related to the region of interest first, so radiologists can begin reading immediately while the rest of the study continues to load. Compression is applied to each slice to achieve the twin goals of high speed and image quality.

The platform's PowerViewer builds a single virtual study with real-time volume matching of all relevant studies to automatically register and synchronize in one click. Synchronizing views of the region of interest from multiple data sets makes it easier for radiologists to measure and compare tumors, nodules, and other anatomical structures.

Fully featured mammography tools are also available, with multi-modality breast imaging workstations from Carestream Health installed to equip radiologists to read general radiology and all breast imaging exams on the same workstation. Integration with Confirma CADstream enables the viewing of CAD markers for breast MRI studies at a desktop.

In the past, radiologists used two different workstations for breast imaging modalities, while general radiology exams were read at different workstations in another location. "Being able to deliver exams from all modalities to the same desktop enables faster throughput during peak periods," said Adams. "Radiologists throughout the healthcare system pitch in to read cases."

The Final Decision

Adams acknowledges that "a lot of salesmen" visited the conference rooms at St. John during the PACS decision process. When evaluations began, several companies set up software to get an idea of how it would work in his high-volume environment.

Of all the vendors, Adams says Carestream was the only one who actually came in and demonstrated all the functionality they promoted. "The others said, 'We will be able to do this when you buy it,' but they could not do it right then," he recalled. "That was a big deal for us."

Factor in the ability to take over an existing archive, and a difficult decision became easy.

Ultimately, Carestream representatives chose to emphasize the ruthlessly practical aspects that directly affected day-to-day operations. Too often, says Adams, other companies went after the "wow" factor at the expense of true efficiency. "The things you really need to look at are how the system integrates



"It took just a week to input metadata for 7 years of archived studies into the central PACS database. If a physician looks at a study, and there is a prior exam on the older archive, the system will transfer the image data for review."

– Rick Adams, PACS Administrator, St. John Medical Center



"The cloud-based PACS provides reliability, so workflow is not affected if there is a system problem."

–Maureen Gaffney, RN, RPAC, MHS, Chief Medical Information Officer and Senior VP of Patient Care, Winthrop-University Hospital.

with your operation," said Adams. "As one example, we use PowerScribe, and Carestream integrates really well with that. Ask yourself: Can you drop the new PACS into your existing environment and leverage all the data that you already have? I was able to put it in place, use all my legacy data and legacy servers, and hit the ground running. Carestream saved me from a massive data transfer."

In the Cloud

Adams may have chosen to keep data close to home, but others prefer to store images remotely—using cloud technology. When Maureen Gaffney pondered her options for a new PACS, she ultimately went with a remote cloud-based service. "As an organization, we are growing technologically. We don't have a lot of space in our data center to accommodate a lot of storage, so we were looking at the newer alternatives for information systems like RIS and PACS that also involve storage," said Gaffney, RN, RPAC, MHS, chief medical information officer and senior vice president of patient care at Winthrop-University Hospital, Mineola, N.Y.

Winthrop purchased a cloud-based solution for PACS and vendor-neutral storage along with an on-site RIS that is offered on a pay-per-use basis.

Gaffney opted for the cloud service because it gives her organization an open-ended ability to store images remotely with built-in disaster recovery. "As we become more dependent on technology, we realize that having the ability to retrieve information when we need it, even in times of crisis, is going to be important to our operations and patient safety," said Gaffney, whose department oversees more than 500 exams per day. "The cloud-based PACS provides reliability, so workflow is not affected if there is a system problem."

Prior to Carestream, dissatisfaction mounted due to concerns about Winthrop's existing system from another nationally known vendor. It's not that the vendor was incompetent, but the PACS and RIS (from still another vendor) were not working well together.

Best of breed thinking has its merits, but the added complexity ultimately did not work at Winthrop. "We had less than stellar results with the existing RIS/PACS combination," said Gaffney. "We wanted a new vendor with innovative ideas and a more open-ended technology, and we went with Carestream. We wanted to build a relationship with this company and part-



Winthrop-University Hospital purchased a Carestream cloud-based solution for PACS and vendor-neutral storage along with an on-site RIS that is offered on a pay-per-use basis.

ner with them. They were eager to hear our ideas and work with us to help build a better product."

Growth, Patients, and Peace of Mind

Overseeing a growing radiology department is a stressful endeavor, and Gaffney credits Carestream's cloud PACS/archiving technology with increasing her peace of mind. "We don't have to worry that we have reached a certain number of images, or that we now have to purchase more hardware to accommodate it," she said. "We can push forward and increase our volumes, because our goal is to constantly grow the business. Carestream enables us to expand our business and grow our organization infinitely. We are not restricted to the actual hardware configuration. It grows as we grow."

Gaffney also believes this solution can translate to better care in the long run. "The ability to quickly and easily retrieve prior and current images means we can achieve faster reporting and better care," she said. "This new process improves quality, and the Carestream solution fits right into our patient-focused mission."

Paul Mendel is a contributing writer for *Imaging Economics*.

By Elaine Sanchez Wilson

THEY SAID THEY WANT A REVOLUTION!

Customer input inspired Carestream's new work-in-progress mobile x-ray system.

Radiologic technologists of today abide by the rules of universal precaution. They wear gloves. They bag detectors when going to patient beds to avoid the transfer of disease. They clean their equipment with detergent. But the mobile x-ray imaging unit they drive does not carry any of these tools.

At this year's meeting of the Radiological Society of North America, Carestream Health (Rochester, N.Y.) will preview a work-in-progress development that is the result of extensive market research and customer input. The CARESTREAM DRX-Revolution Mobile X-Ray System, which is not commercially available, is being developed by a design team that has committed to understanding the clinical side of its product.

The new DRX-Revolution will make a technologist's life easier by providing storage space for gloves, sanitizers, markers and paperwork. But the most outstanding characteristic of this new design is immediately obvious: a collapsible column that will slide down to the same height as the body of the portable unit. "This is a very simple thing, but nobody has been really able to produce it successfully in the past," said Diana L. Nole, president of the company's Digital Medical Solutions group.

"As many technologists can attest, there is a common fear of running into someone or something with a portable x-ray machine. The big column in the middle of the unit obstructs an operator's view," said Jimmy Ogle, product line manager. "Our concept was you need that column when you're positioning at bedside, but you don't need it when operators are driving the system down the hall," Ogle said. "In fact, it's a major hindrance."

"We discovered technologists didn't use the grid for mobile imaging because of the challenging workflow parameters. We wanted to be able to enable grid use because it can enhance image quality."



—Diana L. Nole, President of Digital Medical Solutions, Carestream Health

So Long, Square Box with Wheels

Carestream's path to the DRX-Revolution began with a more modest product, its DRX-based mobile retrofit system that allowed cash-strapped facilities to convert existing mobile systems to the wireless DRX detector. The design team then focused on building a new mobile x-ray system from scratch. "We wanted to take our time in developing our own portable x-ray imaging system and do something that

"We want to make sure our design addresses the needs users voiced and that we are being truly innovative with the product."

—Jimmy Ogle, Product Line Manager, Carestream Health



nobody else had ever done before," said Ogle.

"All portable units in the marketplace today, whether they are CR or DR, have an analog tube and an analog workflow. These systems are a square box with wheels that are used for bedside imaging. We really wanted to design and build the DRX-Revolution from the ground up to be a digital portable x-ray imaging system that was easier and more efficient for the technologist to use. All of the capabilities that are built into this new mobile system will be fully integrated so that we are really providing a more efficient process than the traditional analog workflow."

Nole said the development team—consisting of more than 80 people—kept the user in mind when creating the unit's ergonomic design. The team also considered how the system would be designed to incorporate use of a grid. "We discovered technologists didn't use the grid for mobile imaging because of the challenging workflow parameters. We wanted to be able to enable grid use because it can enhance image quality."

The company was also interested in improving imaging for intensive care environments. "These are the patients who get some of the worst x-ray images, yet they are often some of the most critically ill patients in the facility," Nole pointed out.

Tailored Design

Although it is usual practice for a product team to visit sites and compile a list of requirements, Carestream did things a bit differently. Software, hardware and engineering teams accompanied Ogle on more than 50 site visits, where they not only spoke with customers but also observed them conducting mobile imaging exams. Leveraging his own clinical background as a radiographer and radiology administrator, Ogle paid special attention to workflow processes and the challenges operators encountered in using existing mobile imaging systems. "We wanted to account for everything a technologist does at the bedside in our new design," he explained. Ogle even returned to customer sites and showed them design sketches to get their input. "We want to make sure our design addresses the needs users voiced and that we are being truly innovative with the product," he said.

The company traveled to large academic hospitals as well as small to mid-sized community hospitals in North America and Europe. Facilities had varying workflows, building designs and room layouts, which the product team wanted to take into account. "We wanted the design of this system to fit the needs of institutions of all sizes across the globe," Ogle said.

Better Images at Bedside

There are a number of differences between a traditional portable system and an x-ray room, Ogle said. With a portable system, the image receptor does not communicate with the tube head. Instead, the operator performs all the processes manually. Inside an x-ray room equipped with a DR system, the tube knows where the detector is, the detector knows how far the source-to-image distance is and it knows whether there is a grid involved. "In an integrated room, there is a lot of communication and information provided to the operator," Ogle said. "Our task is to develop a portable system that will have all the advantages of a room-based workflow in a mobile device you can use at the bedside."

For example, the same distance and technique is always used in a chest x-ray acquired in a room. With portable imaging, it may be perhaps 50, 60 or 70 inches from the tube head to detector, with no communication of information taking place. "What happens is when a radiologist or internist takes care of a patient in the ICU, and they compare images, they don't know if a change was caused by disease process or the way the image was acquired," Ogle said. "We're trying to standardize all that so that when clinicians make a decision, they know that the image they are viewing was acquired using the same technique. They know that they've used a grid to get the best possible image. Our desire is that the operator can actually look and see what was used on that patient yesterday."

Maneuverability was another key focus. When Carestream invited users to drive the prototype model, testers noticed that it ran very smoothly—actually it felt as if the unit was getting away from them. "This is why you really want customers to help you throughout the design process," Nole said. Now as a result of customer input, a pressure-sensitive handle adjusts to the operator's pace. "If you walk faster, it goes faster with you," Nole said. "If you slow down, it automatically slows down. The design team really tried to observe and think through all of those things."

Other DRX-Revolution features will include a 19-inch touch-screen monitor, a touch-screen tube head monitor, detector and grid holder. A dual-drive system will enable the unit to turn 360 degrees in constrained spaces.

DRX Family Built Around Innovative Detector

When commercially available, the DRX-Revolution will be the newest member of Carestream's successful DRX family built around its innovative wireless DRX-1 and DRX-1C detectors. The family of solutions currently includes the CARESTREAM DRX-1 System, CARESTREAM DRX-Mobile Retrofit Kit, the CARESTREAM DRX-Evolution modular DR suite, the CARESTREAM DRX-Transportable System and the CARESTREAM DRX-Ascend System.

"We've built these digital x-ray systems around our popular DRX detector, which can be used in all our room and mobile-based DRX systems to maximize capital purchases and help organizations better manage radiology-related costs," said Nole. "I don't believe anyone else in the market has the breadth of



An extendable tube head will enable the DRX-Revolution to provide enhanced bedside imaging.



The compact DRX-Revolution will have a collapsible column to improve visibility and safety during transport.

flexible DR imaging solutions we can offer."

Availability of the DRX-Revolution in the U.S. is contingent upon FDA clearance, with worldwide availability anticipated in mid-2012.

In the meantime, according to Nole, customers that want to convert existing mobile systems to the flexibility offered by wireless DR can buy DRX-Mobile Retrofit kit upgrades. "This way, they can achieve the advantages of wireless DR functionality today. And if they buy a DRX-Revolution when it becomes available in the future, they can continue to use their existing DRX detector," she notes.

Elaine Sanchez Wilson is a contributing writer for *Imaging Economics*.



The DRX-Revolution will be designed to share the same wireless detector that works across the entire DRX Family.

It will feature a fully automated collapsible column, to give you clear visibility during transport.

Long tubehead reach is intended to provide optimal positioning over the patient.

The system is planned to include generous onboard storage bins for gloves, sanitizer, markers—whatever you'll need.



*Not Commercially Available



INNOVATION ON THE MOVE, LIKE NEVER BEFORE.

Techs are tired of blindly navigating tall x-ray units through the confines of the ICU, ER and OR. So Carestream is committed to developing a solution. The DRX-Revolution Mobile X-ray System* is being designed as a low-profile, ultra-maneuverable marvel—letting you see where you're going, and getting you there quickly and easily. Like the entire DRX family, the DRX-Revolution will be designed to use the wireless DRX detector.

COMMITMENT IN THE FACE OF CHANGE.



Carestream's DRX family of products are all powered by the wireless DRX detector.

By Elaine Sanchez Wilson

A GROWING FAMILY THAT REALLY DELIVERS Customers discuss the benefits of the DRX family of solutions – in the ER, OR and beyond.

Marjorie Calvetti, MSW, RT, director of medical imaging services at Memorial Medical Center in Springfield, Ill., recalls a particular incident when a patient on the operating table suddenly experienced a decline in condition.

With the use of a wireless DRX detector from Carestream Health, the technologist captured an image in just a few seconds. The surgeon diagnosed the problem and took immediate steps to correct it. As a result, the patient had a positive outcome. "The surgeon spoke to me later and told me the patient was alive because we had DRX technology in the room," Calvetti said.

It is stories like this that keep Memorial Medical Center going back to Carestream to fulfill its imaging needs. A Carestream customer for over a decade, Memorial now uses 15 DRX detectors to retrofit its existing mobile imaging systems and x-ray rooms along with powering three CARESTREAM DRX-Evolution DR suites. This conversion enabled the hospital to bring wireless capabilities to its emergency and trauma rooms, as well as mobile imaging systems that serve the operating suite, ICU and inpatients. The organization also has Carestream's PACS and CR systems.

"The detectors can be used across all DRX systems. In our emergency area, for example, we are able to move detectors between our x-ray rooms and trauma bays to deliver immediate imaging studies wherever they are needed. We also have a dual-detector DRX-Evolution in the ER and we retrofitted our mobile system for the ER with a DRX detector. We converted our entire emergency room to DR with the DRX family, which improves

turnaround time and the standard of care for our patients."

Carestream insiders dub this groundbreaking mobility to move DRX detectors among its room and mobile DRX systems as "the X-factor."

The flexible DRX family of wireless DR systems has been widely accepted because of its image quality, productivity and flexibility—as well as its affordable price.

Larry Kirschner, MS, BSRT, RT(R), FAHRA, director of radiology at Heartland Regional Medical Center of St. Louis, conducted a thorough search of DR vendors.

"We spent a lot of time looking at vendors as part of a full evaluation of the marketplace," he said. "Carestream's wireless, cassette-sized detector offered the image quality, flexibility and mobility we really wanted. Our conversion to DRX systems has significantly improved health care for our patients."

Heartland implemented six Carestream DRX-1 Systems, five Carestream DRX-Mobile Retrofit kits, and two DRX-Evolution systems. Detectors are utilized in existing mobile X-ray systems that service the hospital's ER and OR suites, as well as the general radiology department and a new fluoroscopy room.

Similarly, Robin Wible, CNMT, director of imaging at Memorial Hospital in York, Pa., noticed the company's wireless detectors at a tradeshow and was intrigued. When her hospital's purchasing department gave her the green light to fast track the purchase of DR equipment "our first phone call was to Carestream," said Wible. "We were very impressed by the uniqueness and flexibility of the DRX product." Memorial equipped one x-ray room with a dual detector DRX-Evolution and has implemented DRX detectors in an existing analog room and a mobile unit. The detectors' interoperability for use across multiple imaging systems is a feature that Memorial Hospital greatly values, according to Wible.

Ease of Use

Jeff Callender, RT(R), chief technologist at York, Pa.-based Memorial Hospital, noted that in the case of portable units, many DR detectors include tethers, which are precarious to use in areas with sterile fields. Feeding a detector underneath a table can be difficult in the critical care unit, where patients have IVs and wires. Furthermore, other detectors measure in at 2.5 inches thick, compared to Carestream's thin, cassette-size product.

Because Carestream's equipment uses wireless technology, technologists do not need to worry about bothersome cords interrupting the sterile field for trauma cases or surgical patients. It also streamlines the patient positioning process. "We have tremendous flexibility for positioning because we don't have a cord that can get in the way," Kirschner said.

He added the DRX detectors have facilitated faster access to images. "Our technologists no longer have a stack of CR cassettes for processing," he said, explaining that his hospital generally has 15 early morning portables. In the past, users would use eight cassettes to complete those rounds, travel downstairs and process the CR cassettes, and then return back upstairs to finish the remaining cases. "Now if they're up doing portables, they use the DRX detector for every exam and images are immediately available for viewing on the console or from the PACS." Kirschner estimates that productivity has increased by 50 percent.

According to Callender, physicians appreciate that preview images take only about 3 seconds to process after exposure, with a final image ready in less than 10 seconds. Kirschner agreed, saying surgeons in the OR have commented that they have reduced their exam time for replacement knee or hip procedures by 30 to 45 minutes a case. "It improves care by reducing the amount of anesthesia each patient receives, and it also boosts productivity. The OR can now schedule more cases. Surgeons have more time to visit patients in the hospital and at their offices. It's benefited everyone involved, including the patient."

Customers said they were thrilled that implementing the DR technology contributed to a reduction in the radiation exposure. Kirschner said his department has been able to reduce radiation exposure to patients by 50 percent compared to CR. Wible said her hospital has reduced dose by 30 percent, while attaining higher quality images at the same time.

Memorial Medical of Springfield also achieved gains in image quality while reducing exposures. "Capturing images with higher image quality and more detail gives radiologists more



"Carestream's wireless, cassette-sized detector offered the image quality, flexibility and mobility we really wanted. Our conversion to DRX systems has significantly improved health care for our patients."

– Larry Kirschner, MS, BSRT, RT(R), FAHRA, Director of Radiology, Heartland Regional Medical Center

"We also have a dual-detector DRX-Evolution in the ER and we retrofitted our mobile system for the ER with a DRX detector. We converted our entire emergency room to DR with the DRX family, which improves turnaround time and the standard of care for our patients."



– Marjorie Calvetti, MSW, RT, Director of Medical Imaging Services, Memorial Medical Center



Heartland Regional Medical Center installed a fully-automated dual-detector CARESTREAM DRX-Evolution system in its 45-room ER. It greatly improves productivity in this high-volume, time-sensitive environment.



Heartland Regional Medical Center converted 5 existing mobile x-ray systems to DR with CARESTREAM DRX-Mobile Retrofit Kits. These mobile systems provide immediate image display on the monitor to enhance patient care in the ER, ICU and 10 operating suites.



Equipping existing mobile imaging systems with DRX detectors gives surgeons at Heartland immediate access to images, which can improve patient care by reducing surgery times.

information when they are diagnosing a patient's condition," Calvetti said. "This can enable radiologists to see smaller, more detailed anatomy and provide more accurate reporting. Patients also benefit from the reduction in dose. Radiation has become a significant issue over the years, and we want to give our patients the lowest dose possible."

Patient Satisfaction

Better patient treatment has translated into greater patient satisfaction.

For example, Wible shared that faster turnaround time led to a growth in both volume and efficiency. "Our radiology volumes have been increasing for the first time in the past couple of years," she said. "It used to be that we'd have patients backed up into the hallways waiting to get x-rays from the ER or from our inpatient/outpatient units. We had less volume, but we still had patients waiting to get imaged. Now we have increased volume, but no patient has to wait—and they have definitely noticed that. We owe this to our improved workflow."

Kirschner said the amount of time required for radiographic studies at his hospital has decreased by 50 percent. "It speeds up the care of our patients tremendously," he said. "The technologist also has more time to engage with patients, and this has resulted in improved patient satisfaction scores. Patient satisfaction is a big push in our organization."

Affordable Options

Patients and doctors weren't the only ones who expressed satisfaction over the Carestream detectors. Administrators were thrilled with the cost savings achieved through the company's affordable price point. Retrofitting to DR was an economical option for those on a budget.

"We had a regular fluoroscopy room that we were able to convert to digital imaging because the DRX-1 detector is designed to fit 14 by 17 inch slots used by film and CR cassettes," Wible said. "We didn't have to do any modifications to the room. We just needed to marry the Carestream product into the existing room."

Agreeing, Calvetti said, "With the DRX technology, you can retrofit any room or mobile imaging system. You don't have to replace equipment to get the benefits of DR technology. The fact that you can interchange the DRX detector with multiple rooms makes it so much more cost effective than having a fixed detector that only fits in one room."

Handle with Care

Although they were all impressed with the technology, the customers interviewed cautioned that the DR detectors should be handled with care.

Kirschner purchased an insurance policy on all DR plates, especially because his organization is a teaching hospital. "We



A wireless CARESTREAM DRX detector is now used for mobile exams to achieve exceptional image quality while streamlining patient positioning for seriously ill and injured patients at Memorial Hospital of York, Pa. This detector is shared between the mobile unit and a general radiology room.

have students here," he said. "If someone drops a DR plate, we don't want to end up with a damaged detector. Now if it gets damaged, we can easily replace it."

Wible confirmed this sentiment, saying, "Even though the detector is designed to withstand the rigors of daily use, it's wise to get the extended insurance with a service agreement. You don't want to have to buy a new detector if one gets damaged."

Another precautionary step is to educate users about how to treat the DRX detector. Calvetti notes that because the DRX detector looks like a regular CR cassette, employees might be inclined to treat it like one instead of the advanced piece of technology it is. "With a cassette, you can bump it or drop it and often it is not damaged," she said. "A DRX detector contains sophisticated micro-electronics, even though it looks like a cassette. So we told our team to treat it gently, like a piece of computer equipment."

Seamless Data Exchange

All three hospitals reported that the DRX systems' wireless communications capabilities created a seamless exchange with their PACS systems.

In addition to its other advantages, Calvetti notes that "being able to register a DRX wireless cassette for use in multiple rooms is a huge breakthrough. It further expands the standards these detectors set for converting existing imaging systems to DR technology," she concluded.

Elaine Sanchez Wilson is a contributing writer for *Imaging Economics*.



Equipping an existing mobile system with a CARESTREAM DRX detector speeds access to high-quality images and enhances care for ER, OR and CCU patients, according to Robin Wible, CNMT, Memorial Hospital's Director of Imaging, and Chief Technologist Jeff Callender RT(R).



Memorial Hospital of York, Pa., installed a dual-detector CARESTREAM DRX-Evolution and a DRX-1 system in its radiology department to improve productivity and image quality. The streamlined workflow eliminates patient wait times despite higher imaging volumes.

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COMMITMENT IN THE FACE OF CHANGE.

By Paul Mendel

IT DOES WONDERS FOR WORKFLOW

A busy breast center chose Carestream's PACS and multi-modality breast imaging workstation for its flexibility and features.

When administrators at Park Nicollet Jane Brattain Breast Center (St. Louis Park, MN) went looking for a new PACS and workstation, they allotted plenty of time for what amounted to a sizable decision. When the head-to-head comparisons were over, a unanimous verdict for the Carestream PACS and the company's multi-modality breast imaging workstation quickly emerged.

As a relatively late entrant in the selection process, Carestream nonetheless won the competition thanks to smooth integration with Park Nicollet's existing Centricity RIS, PowerScribe, and CADstream systems.

"I wondered why people weren't out there looking at this amazing PACS solution, so I brought it to our head radiologist so that she could see it," said Kathy Wilson, RTRM, clinical supervisor of Mammography at Park Nicollet. "I told Carestream that this workstation was mammography's best hidden secret. Once you get an opportunity to look at it, you'd be crazy to pass it up."

Wilson believes the move away from a standalone workstation is helping the facility gear up for the future. These days, patients are scheduled in the RIS while a message is sent to the file room so priors can be digitized right away. "When the radiologist sits down in the screening environment, there is desktop integration," explained Wilson. "With one click of the button, a radiologist can pull all priors and reports. If the radiologist needs an MRI report, it's all brought up on a four-bank view workstation for him to see."

If something such as manual dictation is desired, the option is there, as is the ability to do structured reporting where radiologists can type information, create a report, and sign it. "Once he signs the report and is happy with it, he marks it, closes it, and brings up the next patient," said Wilson. "Everything is available by logging into one system instead of logging into various systems. We could not believe Carestream could make it that seamless. That's what we were looking for, but we really did not think it was out there."

A streamlined workflow now helps the center's five locations perform 400 mammography imaging exams a day. Enhanced radiologist productivity enables same-day reporting for all diagnostic and screening exams. Reports on screening exams from remote clinics previously took several days to deliver.

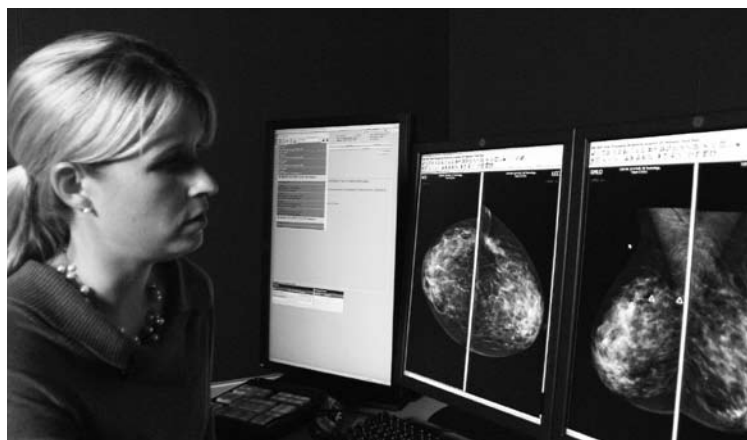
Referring Physicians and Patients

Referring physicians have noticed that reports are much timelier, with some even coming on the same day as the mammogram. "We're reading in the afternoon what we imaged in the morning," said Wilson. "Radiologists are reading in a batch,

and they are not interrupted. In the diagnostic environment, we are reading off a PACS workflow, because we are checking patients as they come in."

Most patients do not know what PACS stands for, but it often translates to fewer sleepless nights for women in high-stress situations. Radiologists and referring doctors see the positive effect on patient care, and they appreciate the tight integration that enables them to log in once and have instant electronic access to patient history, as well as prior imaging exams and reports.

"These workstations allow our radiologists to quickly and easily read exams from all modalities and vendors at a single workstation," said Barbara Luikens, MD, a radiologist who is also the center's medical director.



With Carestream's PACS and multi-modality breast imaging workstation, radiologists at Park Nicollet enjoy desktop integration, and can pull all priors and reports with a single click.

Fingertip Access to Tools, Data

"Every aspect of the workflow is at our fingertips, from prior exams and reports to one-touch voice recognition and specialized tools," said Dr Luikens. "Personalized hanging protocols then enable each radiologist to achieve maximum productivity and ease of use. From a radiologist's perspective, this is an ideal reading environment."

Looking back on the selection process, Wilson attributes the Carestream choice to a stringent look at the facts, and a keen knowledge of her organization's needs. "Sometimes it is hard to do the head-to-head demos when you are choosing a new PACS, but it is worth it if you eventually find an advanced system that can integrate with current technology as well as future advances that are coming down the road."

Paul Mendel is a contributing writer for *Imaging Economics*.

By Paul Mendel

PUTTING THE "FLOW" IN MULTI-SITE RADIOLOGY WORKFLOW

Despite running a thriving radiology practice, management at Dallas-based RadCare went looking for a vendor that could take them up a notch.

Radiology practices hoping to contract with hospitals for teleradiology services are always looking for a competitive edge. Executives at Dallas-based RadCare know the challenges, and they have managed to thrive in a tough environment.

With 80 radiologists and 30 teleradiologists reading 2 million studies per year, RadCare has carved a solid niche. Why change a winning formula? "The big thing for us was a universal worklist and being able to easily bring multiple clients onto a consistent platform," said David Walker, RadCare's COO. "Being able to bring that work onto a single platform allows one radiologist to read

list maximized production and minimized downtime. "If radiologists are only covering two facilities, both of those facilities could go silent at the same time and that translates to 30 to 45 minutes with nothing to read," said Walker. "By the same token, exam volumes at both locations could spike at the same time. With all these fluctuations, it was difficult to keep radiologists active."

Radiologists can now read for several facilities simultaneously, and it's easy to enlist backup to take care of spikes in volume. It's a far cry from a decade ago when a teleradiologist might have three or four different workstations depending on which hospitals they served.

Today it is irrelevant which PACS software the hospital elects to use. "We take all the work from them and put it on one software package, one workstation, and one hardware setup where the radiologists can see everything," said Walker. "On-site radiologists still read using the hospital PACS software. It's only the offsite radiologists that use our software."

Redistributing work in a more efficient manner allows RadCare to deliver cost reductions for the hospital. Volume per shift and income per shift go up as duties are leveraged across a number of different hospitals, avoiding downtime and boosting reads per shift.

According to Walker, Carestream can automatically pull patient information from each hospital's RIS and prior exams from each hospital's PACS system. "I can tell we have received the prior imaging study because my PACS talks to their PACS and matches it up," he said. "With this workflow, our radiologists can easily access prior imaging studies from a hospital's PACS system. In the past, technologists at the hospital had to manually retrieve prior exams for each patient and transmit them to us, which was a cumbersome process that often involved several phone calls. Radiology reports are also automatically delivered back to the appropriate hospital. This workflow is automated and streamlined."

Day, Night, and After Hours

Heckendorn estimates that Carestream technology will quickly pay for itself by dramatically improving radiologist productivity for both daytime and after-hours exams. "We estimated a payback of 5 years based on conservative projections, achieved primarily through process efficiencies," said Heckendorn, a radiology management veteran with experience in both inpatient and outpatient settings.

Initial productivity gains indicate RadCare may well exceed that goal, thanks to time improvements such as stat reports in as little as 20 minutes, and standard reports in about half

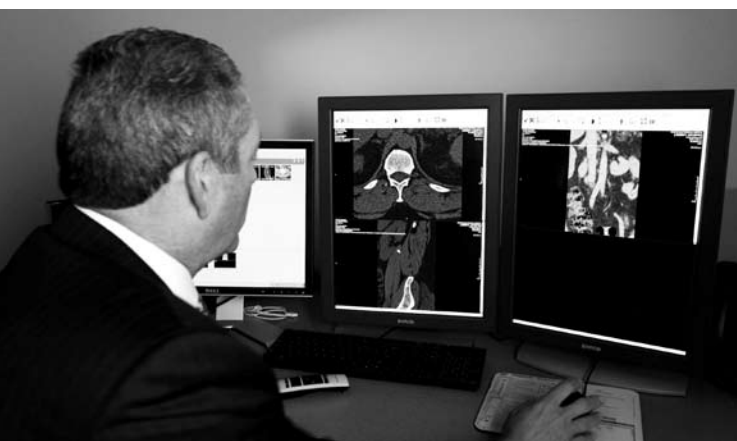


RadCare's COO David Walker (left) and Phil Heckendorn, President and CEO, worked together to implement the use of Vue Connect powered by SuperPACS™ technology, which exchanges information with disparate RIS and PACS systems at any location to create a streamlined multi-site reading workflow.

across multiple facilities."

With several vendors vying for RadCare's business, Walker and Phil Heckendorn, CEO of RadCare, ultimately chose Carestream's Vue Connect, powered by SuperPACS™ technology. The system readily exchanges information with disparate RIS and PACS systems at any location to create a streamlined multi-site reading workflow.

Prior to the Carestream solution, RadCare radiologists had to log on to multiple worklists. Consolidating everything onto one



Radiologist J. Leslie Derdeyn, MD, RadCare's National Medical Director, reviews a patient's imaging study with Carestream's Vue Connect technology.

an hour. "Exams can be automatically routed to specialists for immediate reporting," said Heckendorn. "In addition, our after-hours teleradiologists can deliver a final read because they have access to prior imaging studies and all the patient information. This eliminates the standard practice of obtaining a preliminary overnight read followed by a final read the next day.

"Equipping teleradiologists to function like onsite radiologists creates dramatic savings for health care providers," continues Heckendorn. "For radiology groups like ours, Vue Connect with SuperPACS is a double win because it increases capacity and also significantly reduces non-billable hours for our radiologists and teleradiologists."

All that added capacity means more imaging studies than ever are moving around. According to Walker, many systems are only able to handle image data sets as a whole and cannot communicate with PACS from multiple vendors and facilities, which is essential for RadCare's workflow. In contrast, Carestream uses an intelligent system of metadata indexing to identify patient records on any vendor's PACS. "The metadata index shows that a prior exam is available, and then the Carestream platform enables the radiologist to download and view that imaging study from any type of PACS platform," Walker notes.

Another advantage is speed and validation that a complete exam has been received. Carestream has an intelligent streaming process that is similar to streaming video. This eliminates RadCare's previous problem where remote radiologists would receive an incomplete exam due to a transmission

interruption or error.

"The Carestream system validates that the entire study has been received, and it also speeds the delivery of large data sets over cable modems and other connections used by remote radiologists," said Walker. "Streaming allows a radiologist to see the first image in a few seconds, rather than waiting 5 minutes or more for all the images to come through. So it allows the radiologist to begin reading immediately."

As he works out some of the inevitable small kinks, Walker reports "big gains" as radiologists get more comfortable with the entire system. Variability from hospital to hospital is no longer a problem thanks to Carestream's streamlined approach. "Carestream went into this with a willingness to partner with us to stay on the cutting edge," said Walker. "That leaned us in their direction. We need to stay a step ahead of our competitors, and we need a vendor with that same mentality."

Paul Mendel is a contributing writer for *Imaging Economics*.

OPTIMAL ARCHITECTURE

According to Heckendorn, Carestream's new platform offers his practice the following benefits:

- An intelligent infrastructure that tracks the patient name, identification number, and imaging services provider for each exam. This prevents mishandling of patient information in a multi-site workflow when patients have the same name or accession numbers. It also enables radiology reports to be automatically communicated back to the correct site.

- A global patient worklist that is accessible to any radiologist regardless of location. Patient exams can be automatically routed for reading by subspecialty radiologists.

- Integrated voice recognition and advanced reading features are also available to any radiologist, anywhere.

- Ability to exchange information with RIS and PACS from different vendors at each individual hospital or healthcare provider. Prior exams are automatically delivered to radiologists, eliminating the cumbersome process involved when healthcare facilities manually forward prior imaging studies.

- Specialized streaming technology speeds image transmission and allows radiologists to begin reading the study as the first images arrive, instead of waiting for the entire exam to be received.

P. Mendel

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COMMITMENT IN THE FACE OF CHANGE.

By Elaine Sanchez Wilson

WHAT'S UP WITH THE CLOUD?

The forecast is bright with a new works-in-progress that will empower patients to manage their own imaging data.

The passage of the Health Information Technology for Economic and Clinical Health (HITECH) Act in 2009 brought swift changes regarding privacy and security requirements previously imposed under the Health Insurance Portability and Accountability (HIPAA) Act of 1996.

Cristine Kao, Carestream Health's marketing manager for global healthcare IT, also noticed two other trends. Healthcare organizations are looking for ways to provide better services and eliminate the fragmentation that patients may experience as they receive treatment and care. At the same time, a push toward "consumerized" healthcare has patients demanding more from their physicians. Keeping these needs in mind, Carestream is developing a works-in-progress* patient portal that seeks to streamline workflow while also empowering patients to manage their own care. The product will be powered by the company's cloud computing technology. The portal is intended to replace the traditional practice of having patients carry their medical images and reports to specialists or other physicians on film, CDs or DVDs. Instead, users will receive a unique log-in ID and a secure password in order to access their individual health records—automatically and immediately. "This portal is designed to allow patients to grant access to their referring physician or other caregivers," Kao said. "Patients will be empowered since they are the ones granting access and managing their own data."

After the portal's launch, patients will not need to worry about losing CDs or remembering to bring them to various doctor appointments. Easy electronic access to cloud-based imaging data will also reduce the need for duplicate exams and the resulting radiation exposure. Kao explained that clinicians today may elect to perform additional imaging procedures in the advent of a missing CD. "By having information readily available wherever the patient is, that's where the benefit of cloud technology will really show its versatility."

Commitment to Cloud

Carestream's cloud-based offerings began in 1997 with archiving services. Recently, Carestream updated its cloud portfolio to include two more services: the CARESTREAM Vue Cloud PACS and Vue Cloud Community.

"Customers were asking us, 'If you can archive the images on the back end and help me save money over time, can you do this for our front-end application as well?'" Kao said. "Now that we've built the infrastructure, customers are

demanding expanded cloud offerings."

Cloud-based PACS functionality is ideal for healthcare providers of all sizes that want to decrease their investment in infrastructure and are attracted to the predictable operational cost offered by pay-per-use. This flexible business model is an economical option for customers who want to upgrade their outdated PACS capabilities while avoiding significant ongoing capital investments.

Workstations enable customers to access their images onsite, while monitoring of reports will be permanently handled off-site. Benefits for radiologists include native 3D post processing tools, which mitigates the need to go out and purchase third-party applications. Also a clinical results notification tool helps doctors collaborate with other clinicians.

Typical PACS installations generally take around six months to a year to install depending on the size of the site, but Carestream's cloud-based solution is targeted to require only three to six months, Kao said. "Because the cloud infrastructure is already built, we can mainly focus on training, change management and the workflow redesign."

A second portfolio under the company's cloud umbrella is its Vue Cloud Community, a cloud-based service that grants clinicians on demand access to images and reports no matter where



"This portal is designed to allow patients to grant access to their referring physician or other caregivers."

—Christine Kao, Marketing Manager for Global Healthcare IT, Carestream Health

they are located. Specifically, it offers secure connections for authorized stakeholders, such as radiologists, specialists, referring physicians, and patients—facilitating workflow between resources that are onsite and offsite. It also eliminates the need to implement a costly common infrastructure for use by affiliated or independent enterprises.

"We're helping our customers better serve their customers, which is the referring community," Kao said.

Carestream now manages 30 million imaging studies (1 petabyte of data) in 10 different clouds worldwide.

* Not Commercially Available

Elaine Sanchez Wilson is a contributing writer for *Imaging Economics*.

FACING FORWARD: COMMITMENT TO THE FUTURE.

As quickly as the world of healthcare is changing today, it will only accelerate as we move into tomorrow. But whatever challenges arise, Carestream will strive to see them coming. We'll be listening and learning. Supporting our customers' success. And applying our passion for innovation to deliver solutions that improve the lives of people around the world.

That's our commitment – one we share with healthcare professionals everywhere. Together, we'll face whatever challenges the future holds.

COMMITMENT IN THE FACE OF CHANGE.

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