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How four facilities succeeded in their transition to digital and how the FUJIFILM team helped them put all the pieces together.

FUJIFILM's customized approach to training makes your transition more comfortable and your technologists more confident.

There are no shortcuts to the successful implementation of digital imaging. Careful planning, patience and experience are needed to bring a film-based radiology service into the world of digital x-ray and PACS. The quality of the relationship between vendor and customer is also of utmost importance. Users who receive good training and technical support typically find the transition to a digital environment to be both personally satisfying and a major boon to department efficiency.

FUJIFILM Medical Systems offers professional services that train and support its customers. A seasoned team of Imaging Specialists and Digital Solutions Advisors helps users optimize their utilization of FUJIFILM digital x-ray and Synapse® PACS. On-site training for physicians, technologists and support personnel is at the core of this service.

Digital x-ray requires a rethinking of the radiographic work process. When done well, digital x-ray improves diagnostic accuracy, presents images with consistent image quality, can reduce patient exposure to radiation by decreasing the need for retakes and saves storage space. Unlike film, the images can be easily accessed from multiple sites on interactive PACS workstations. Digital x-ray data can be manipulated to improve radiographic quality and many technical errors can be overcome. Images can be corrected to normal density and features of interest accentuated or suppressed without having to repeat the exposure.

Understanding the process vs. just knowing what button to push enhances your technologists' capabilities.



The physics of film-screen radiography are mostly unchanged when converting to digital x-ray systems. However, it is important to understand the similarities and differences. Understanding digital x-ray allows the technologist to maximize their current technical experience and challenges them to learn new computer skills. Digital x-ray takes imaging to a higher level, noted Melanie Bishop, a FUJIFILM Imaging Specialist.

“A lot of technologists have used film-screen systems their entire professional lives, so switching over to CR in a few days of training can be intimidating,” Bishop said. “The challenge for many is to understand exactly what’s happening with the images and how they can continue to attain a good image with low dose.”

Part of how Bishop does this is to teach analogous methods for acquiring image data that previously was expressed by an H&D curve with film-screen systems. This graphical way of representing how a given film records tone values when



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developed under specific circumstances is replaced in FUJIFILM CR by the s value.

“I explain to the technologists that the s value is based on the dose they provide to the imaging plate, and that dose is inversely proportional,” Bishop said. “It’s at this point I explain that an s value that’s too low is one where they’ve used too much dose, and that one that’s too high is when they’re not using enough. By explaining things this way, they begin to understand what they need to know to optimize an image.”

Extraordinary training comes from extraordinary training professionals.

Bishop is one of FUJIFILM’s team of Imaging Specialists, each of whom spends several days training staff at sites where FUJIFILM digital x-ray and/or Synapse have been installed. All are board-certified technologists, and many have been educators or directors of radiology in community hospitals and university departments. Between them, FUJIFILM’s Imaging Specialists have accumulated more than 700 years of training experience in digital imaging.

“The application to which an Imaging Specialist is assigned depends on his or her skill set,” noted Anne Semanik, FUJIFILM’s Director of Professional Services. Some specialists are more oriented to PACS, while others have first-hand experience with digital x-ray. Once they have mastered one product line they gain knowledge in the other.

What distinguishes FUJIFILM Imaging Specialists is their ability to listen to and assess the ability of people within a radiology organization, and to provide the proper level of training in response. In addition to on-site training, FUJIFILM will soon provide customers with the option of taking Web courses. Additionally, FUJIFILM offers an advanced “CR Champions” course — a five-day intensive training program that provides 23.5 hours of continuing education credit. This course is designed for radiology technologists who have at least three months’ experience with digital x-ray and who seek advanced skills so they can train others and more fully exploit the capabilities of the technology.

“It is our goal to not only teach people how to use digital x-ray and PACS but to do so as painlessly as possible,” said Imaging Specialist Bill McCoy. “I do this by showing compassion for what they’re doing and listening to what they say, as opposed to just walking in and giving a canned speech on what to do,” McCoy said. “We have to be technically competent, but teaching skills are also important. We talk to people at their level, so they learn what they need to know to do their jobs well. We need to make sure that the customer is fully satisfied with the product after it’s been delivered. And the only way they’re going to be satisfied and use it to its fullest utility, is if they know how to use it properly.”

In the vignettes that follow, several typical users of FUJIFILM digital x-ray and PACS describe their experiences with the training provided by McCoy and his fellow Imaging Specialists.

Rose Medical Center, Denver, CO

At Rose Medical Center FUJIFILM turned skeptics into believers.



The quality of printed digital x-ray films was a priority for the team engaged in digital conversion at Rose Medical Center in Denver, CO. Despite the fact that the films were only an interim step until PACS workstations were installed, PACS Administrator Andrea Patterson knew she could ill afford to alienate her in-house customers during this transition.

Patterson, together with her FUJIFILM Imaging Specialist, Melanie Bishop, developed an installation plan to address the concerns of the critics and ultimately to win their endorsement of digital x-ray.

“We have some physicians who have been here for quite a while and who were initially opposed to bringing in a PACS and converting our department to filmless operation,” Patterson said. “Within the first couple of months, these same physicians were totally on board. They’re very happy with the quality of the images.”

The objective, Patterson said, was to make the film appearance similar to what the physicians were accustomed to while attempting to

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conserve the additional gray-scale content that digital x-ray images provide. “Melanie made a couple of trips between start-ups for our CR and PACS to work with our radiologists, referring physicians and techs on optimizing image quality according to their preferences,” Patterson noted.



“I’m a huge stickler on planning, which is why I’m so impressed with how well this implementation has gone. Melanie has been great to work with.”

Rose Medical Center, where about 150,000 imaging exams are conducted annually, made its migration to filmless operation between May and August 2004. The facility now has FUJIFILM’s single plate system, the SmartCR® and the FCR XG-5000 multi-plate high capacity system in the main radiology department, a second XG-5000 in the emergency department, and another SmartCR in the operating room. An additional XG-5000 will soon be installed in the radiology department, at which time the SmartCR will be moved to the intensive care unit.

All users have migrated to PACS with the exception of some orthopedic surgeons and neurosurgeons who still request film for the operating room. Images not read on PACS workstations are downloaded to CDs for review on standard PCs. Despite their early doubts, neurosurgeons at Rose are now sold on the advantages of digital imaging.

“They’re so excited about it,” Patterson said.

A multi-tiered approach to training has multiple advantages.

Bishop focused much of her energy at Rose on physician training. The first part of the hospital to go filmless was the emergency department, which because of its high demand for imaging services, received her special attention. “Melanie went to the ED, sat down at their review stations and caught doctors on the fly. She explained the system, provided hands-on training and answered their questions as they worked,” Patterson said.

On another occasion Bishop sent out flyers inviting physicians to an after-hours open house, at which Bishop provided hands-on training for diagnostic and review stations and provided a forum for answering questions. About 15 doctors attended, leaving with a better understanding of PACS.

Digital x-ray training for the 60 or so technologists was more regimented. Each was responsible for attending a 90-minute on-site training session held over the course of four days between 7 am to 6 pm. Additional training was available for those who wanted or needed it, including a 7 am question-and-answer session conducted six weeks into the digital conversion.

Now that the technologists have become comfortable with digital x-ray, some are asking about additional functionality, Patterson said. Several have commented that they would like to be able to review images more thoroughly on FUJIFILM’s technologist workstations, called the Flash IIP console, and utilize advanced QC tools such as magnification and other forms of image manipulation. “They’re getting used to the system and are looking for that extra edge now,” Patterson said. “One of our technologists who works in the ED said that if he can see images ahead of time, he can better anticipate what the doctors need. We want to respond, and FUJIFILM is helping us.”

As a technologist herself, Bishop understands how digital x-ray can empower its users. “What I’ve learned is that digital x-ray will make a good tech even better,” she said. “The technology is automated, but CR makes them think a little more about other factors, like positioning, centering and collimation. I think of CR as increasing their brain power.” Understanding digital x-ray technology can make technologists more valuable employees.

Gundersen Lutheran Health System, La Crosse, WI

A teaching hospital learns fast and gains a competitive edge.



Photo: Robert J. Hurt © Gundersen Lutheran

Photo: James Tritch © Gundersen Lutheran

The dream of many institutions to have diagnostic images available on computers distributed throughout their facility has been realized at Gundersen Lutheran. With the click of a mouse, an integrated Synapse PACS and electronic medical record (EMR) allows physicians throughout the healthcare system to review images that accompany all radiology reports.

Gundersen Lutheran's La Crosse campus has a 325-bed teaching hospital and a 350-physician clinic and is one of the nation's largest specialty group practices. The imaging department that serves both does approximately 150,000 exams a year. This includes reading images sent electronically from five regional clinics and six regional hospitals throughout the region surrounding La Crosse, WI.

A complex facility needs simple solutions.

Because of its web-based architecture, Synapse makes images available at any PC to which it is networked. That makes electronic images available to physicians in exam rooms, offices, nursing stations and many other locations throughout Gundersen Lutheran. In addition, the medical center has installed about 200 high-resolution workstations in each clinical area and on each hospital floor. Physicians reading x-rays on desktop computers who may need to see more detail on a particular image therefore have easy access to high-level PACS workstations. Radiologists at Gundersen Lutheran interpret images from 18 diagnostic PACS workstations both in-house and in the region.

"The people at FUJIFILM put a lot of effort into helping us get to where we are today with our EMR-PACS," said Sue Einerwold, Clinical Manager for Diagnostic Radiology. "Part of the justification for our PACS was to have monitors throughout the campus so that our doctors would have easy access to the images. FUJIFILM worked very closely with us to make sure it was done right."

The digital imaging project began in mid-2002 when the emergency room went filmless with the first FUJIFILM CR reader installation. This was followed by trauma imaging, portable x-ray, and the critical care unit. All the specialty modalities were then added to the PACS. The x-ray department was only partially filmless until mid-2003 when the conversion was completed.

The only experience Gundersen Lutheran had had with digital imaging when initiating the project was at its Onalaska Clinic, where CR images were acquired since 1997. These images were being read on a mini-PACS.

Among the 30 or so x-ray technologists at the medical center, four outstanding individuals were selected to become in-house trainers. After preliminary review of materials provided by FUJIFILM, this group trained exclusively with Jon Lilly, the FUJIFILM Imaging Specialist assigned to the facility. By the time the digital x-ray and PACS systems went live on Memorial Day weekend, the in-house trainers were ready to roll.

"The FUJIFILM team was here the whole first week, in multiple shifts. They came early and went home late," Einerwold said. "Jon came in to do rounds with our day staff so they were comfortable with the new modality, and stayed into the evening to make sure he connected with our night folks."

"The in-house trainers stayed with him the first 48 hours and learned CR thoroughly. Then we gradually pulled in other members of the staff through the rest of the week." The in-house trainers were so skilled in their use of CR that they were able to train much of the staff at four clinics that are part of the Gundersen Lutheran Health System. Additional clinics will install FUJIFILM's digital x-ray technology in the near future.

There were some transitional lessons the technologists needed to learn in order to become proficient with the technology. For instance, "Too dark isn't too dark anymore, and too light isn't too light," Einerwold said. "I thought our technologists did a great job learning it. We have a fairly young staff and everyone was excited about working with digital technology. It was not a hard sell to get them on board." It helps, she noted, that Gundersen Lutheran is populated with many technology buffs.

"There's now a definite tech edge to this department that was missing before," added Einerwold. "Our technologists feel more connected. They don't want to leave diagnostic x-ray."

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Wesley Medical Center, Wichita, KS

We helped a trauma center's transition to be digital be less traumatic.



Brad Bowren has worked with many vendors over his career, and has seen how significantly the quality of technology training can vary. In his estimation, FUJIFILM has distinguished itself by virtue of the sustained attention it pays to customers, which assures that users of its products can do their jobs well.

This level of service is personified by Ruth Burress, who persevered in her follow-up to the initial digital x-ray and PACS training to make sure the project was proceeding smoothly, said Bowren, who is Imaging Services Manager and Co-PACS Administrator at Wesley Medical Center. "I don't care how good the training a vendor provides may be. I've learned that as soon as their people leave, everybody's got questions," he noted. "Ruth was very good about calling back and asking about what kind of follow-up we needed as well as when we needed her to return."

The digital imaging project at the 750-bed medical center involved the installation of FUJIFILM digital x-ray and Synapse. Ten SmartCR readers and two XG-5000 multi-plate systems were sited, in addition to 70 PACS review stations scattered throughout the facility.

Radiologists are quick to realize a good thing.

"Once we put CT and MR images on the PACS, the users wanted everything else right away," Bowren said. "The physicians and radiologists drove this transition pretty hard. We had CR up from the beginning of the project, but we were still printing film for the archive. Once the radiologists caught on that the CR images were there, they started looking at those online too."

The first people to be trained at Wesley were Bowren and Chris Atchison, the Co-PACS Administrator. Both have extensive clinical backgrounds, but neither had worked with digital x-ray or PACS. The systems administrator training, which was provided by Selvan Rajendran, was an intensive program that provided the advanced training they needed. Both report an extremely positive experience from the training.

"We figured that we were in good hands if all the training was as good as that," he said. "We knew Ruth was going to be our Imaging Specialist, and that she had a great technical background. Ruth has been working with these products for a long time, and really knows the ins and outs so that we can be at our best from the beginning."

Training of the 35 or so technologists who now work with digital x-ray began as soon as the equipment was installed. Bowren and Atchison wanted any operational issues related to digital x-ray settled before the technologists moved on to learn about PACS.



FUJIFILM helps identify a unique solution.

As a level I trauma center, Wesley frequently treats patients of unknown identity. An area of concern for Bowren was finding a way to properly track images from these patients, given the importance of accession numbers in radiology information systems. "When a trauma patient comes in you don't usually have a name, so you can't put in an actual requisition and assign them an accession number in the RIS. We had to find a way to uniquely identify these patients," Bowren explained. With help from Burress, the Wesley team developed a data input protocol using the trauma room number and the date and time of treatment that allows the patient's images to be found on the PACS and later reconciled with the requisition from the RIS.

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Improving workflow is part of the job, too.

The medical center has four main trauma bays in its 60-room emergency department. A FUJIFILM XG-5000 system serves the trauma unit and each bay is equipped with a 30-inch PACS monitor and a Flash IIP console, which assures there's never a log jam for technologists to process images nor for physicians to review them. Bowren explained that this architecture makes it possible to have four different technologists working with four different patients using four different pieces of equipment, keeping technologists working as efficiently as possible.

"We have it set up so that once the image goes into the IIP you can go straight to the bedside monitor and pull it up. The doctors like having the large monitor right there beside the bed," Bowren said. "Everyone is happy with our trauma solution."

Perhaps happiest with the transition to digital x-ray are the younger technologists, who, having grown up computersavvy, continue in many cases to teach the rest of the staff. Some of the more experienced technologists were initially traumatized at seeing film processors removed from the medical center, and film and cassettes made obsolete. They have since become more comfortable with digital x-ray, once they learned how easily an image can be optimized if they make an error.

"This is not like learning to work with the other imaging modalities, which are already digital. Some technologists have to re-learn things they've known forever," Burress said. "That's where we come in: our job is to go in and teach so they are comfortable with the transition. It's the technologists who are on the front lines in this process."

Froedtert Memorial Lutheran Hospital, Milwaukee, WI

Improving workflow and optimizing image quality was a surprisingly simple process at Froedtert Memorial.



When the radiology department at Froedtert Memorial decided to complete its conversion to digital x-ray, it sought to make the technology as simple to use as possible. It was supported in this commitment by staff from the Froedtert School of Radiologic Technology, which provided invaluable inhouse training of technologists. The end result: the fast and relatively painless adoption of technology that has easily met expectations for improved technologist workflow and optimal image quality.

At the time Froedtert decided to complete its digital x-ray conversion in 2002, it was already using cassette-based CR systems in the ER, the GI division and for portable exams. The transition to include Flash IIP consoles opened up new and better protocols for data entry that immediately enhanced technologist productivity, said Tom Hanson, Supervisor of Diagnostic Radiology at Froedtert.

"The older style of data entry that we formerly used worked very well, but was not as flexible," Hanson noted. "With a Flash IIP computer and monitor in each exam room, the technologist first shoots the view, IDs it right there, inserts the cassette into the 5000 reader, goes back to the room, where the image is sent for review. This was a beautiful set-up that proved to be so efficient that we ended up using it throughout our general diagnostic areas."

About 55 technologists received training in all aspects of digital x-ray at Froedtert. Imaging Specialist Jon Lilly first provided instruction in the basics of digital x-ray operation, followed by additional visits to teach advanced QC features and to tweak image quality according to departmental preferences, Hanson said.

"The training we received from FUJIFILM was just outstanding. I was impressed with the time Jon gave us and his willingness to come back and help us," the radiology supervisor said. "He was there for us when we needed him, either by phone or in person."

One of the customized features of the Flash IIP console that Hanson especially likes is called Auto Exam Select or procedure code mapping.

"What we did, with FUJIFILM's help, was to go into the IIP software and tell it, anytime you see this procedure code, call up this exam and these views on the IIP," he explained. "It has eliminated several button clicks or screen touches, improving our tech's efficiency, eliminating errors and making the system even easier to use."

Helping the technologists learn digital x-ray were instructors from the radiologic technology school, including one charged with employee development. In addition, Lilly worked with several technologists who became In House Trainers and who, in turn, have

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helped their colleagues learn the system.

“When John came back the second time, he did multiple sessions with all the techs — four or five at a time — and took them through all the features at a more in-depth level,” Hanson said. “We wanted to enhance the workflow for our technologists, and I feel that we have definitely accomplished that.”



FUJIFILM brings expertise and experience to the multiple systems challenge.

In addition to In House technologist trainers, the radiology department at Froedtert was also fortunate to have IT staff that could assist with the transition to digital imaging. There are advantages to having a single vendor provide a site with digital x-ray, a RIS and a PACS, but this is not how things usually happen in the real world, Hanson said.

“Trying to get disparate computer and IS systems to talk to each other — which was our situation — can be a challenge,” he said. “FUJIFILM was willing to tackle this and had a great deal of experience to offer. They worked well with our own people, who could tell where the messages were being passed to and from, and in what format. They all worked well together and made the interfaces work.”

Why technologists never want to go back to film.

Perhaps the most common sentiment expressed by users who have adopted digital x-ray is that “we’ll never go back” to conventional x-ray exams. When asked to account for this loyalty to the technology, Imaging Specialist Rex Profit offered the following thoughts:

“A lot of this has to do with the repeat factor. In the past, technologists had to repeat the study if they missed the exposure. They get frustrated, especially if they have to repeat it three or four times and still don’t get it right. With digital x-ray, they have the ability to possibly salvage the image if they have their exposure factors in the ballpark, and if they’ve properly positioned the patient. With FUJIFILM, they have access to the original image data and can go back to do some post-processing manipulation and save the image. This dramatically drives down their repeat factor.

“The average analog repeat rate runs 6% to 8% or even higher. Most departments drop below 1%, some even down to 1/2% in repeats, once they go to digital x-ray and become proficient. This provides significant cost savings for almost all departments, both in film and man-hours. This has been documented. Not having to do repeats is also a big psychological boost for a lot of technologists.”

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There is CR and there is FCR. FUJIFILM Computed Radiography (FCR) is chosen by more hospitals than any other brand. FCR is clinically proven in over two decades of day-in, day-out, clinical usage. And FCR is the digital x-ray solution for every application with the industry's one and only complete technology-consistent line of digital x-ray equipment. FCR...there is a difference.



Synapse® is a powerful, flexible, and easy to use software product based on an advanced web-based architecture. Our technology, when combined with our people, produces a solution that can provide performance improvements across the healthcare enterprise and improved diagnostic service through sophisticated tools that aid in the interpretation of increasingly complex exams.