MIRC Case Studies

The RSNA Medical Imaging Resource Center (MIRC) free software tools have been adopted at radiology sites worldwide. *RSNA News* has published a series of brief case studies of successful MIRC users:

New Teaching File Tools Make MIRC Easier Than Ever

RSNA News, April 2011

Marc Kohli, M.D., knew that making teaching files with RSNA's Medical Imaging Resource Center (MIRC) was simple—now it's even easier, thanks to a new development from their PACS vendor.

MIRC Moves Files with the Most Powerful Anonymizer in the Industry

RSNA News, October 2008

Needing a powerful anonymizer to share images across institutions in a joint study characterizing liver lesions, Daniel Rubin, M.D., M.S., turned to the MIRC Clinical Trials Processor (CTP) tool.

Phone Lines Light Up After MIRC Goes Down

RSNA News, August 2008

After an outdated piece of hardware caused his MIRC system to malfunction, Lawrence Tarbox, Ph.D., learned just how much users value the tool.

MIRC's Customizable Features Facilitate Easy File Transfer

RSNA News, June 2008

Faced with the prospect of using CD-ROM or other "hard" media to collect, sort and archive thousands of files from the Women's Health Initiative Memory Study (WHIMS-MRI), Lisa Desiderio, R.T. (R) (MR) CCRC, decided to let the images come to her.

MIRC Clinical Trials Processor Enables Cardiac CT Research

RNSA News, February 2007

A user for more than three years, J. Jeffrey Carr, M.D., M.S., took advantage of the open-source nature MIRC to conduct quality imaging research for large-scale studies in cardiac CT.

MIRC Teaching Files Do What PACS Lacks

RSNA News, November 2006

Aiming to create two teaching file cases but dissatisfied with his institution's PACS module, Mike Haman, R.T.(R)(CV)(CT), turned to MIRC helped him solve the age-old dilemma of achieving more without spending more.

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New Teaching File Tools Make MIRC Easier Than Ever

Marc Kohli, M.D., and his colleagues in the Department of Radiology at Indiana University Purdue University Indianapolis (IUPUI), knew that making teaching files with RSNA's Medical Imaging Resource Center (MIRC) was simple—now it's even easier, thanks to a new development from their PACS vendor.

Marc Kohli, M.D.

RSNA News, April 2011

"We learned of the Teaching File and Clinical Trial Export (TCE) functionality provided by our vendor," Dr. Kohli said, referring to FUJIFILM Medical Systems U.S.A., the first vendor to support the TCE profile designed by the Integrating the Healthcare Enterprise (IHE®) project. What this means, essentially, is that images can be sent from the PACS to MIRC with a simple mouse click.

Contrast this with alternative methods of exporting images from a PACS—copy and paste or screen capture. "Being able to complete a teaching file document at the point of care from the PACS workstation eliminates steps and streamlines workflow," Dr. Kohli said. "I'm also excited that with the next generation of MIRC, radiology departments will have access to powerful anonymization tools to cut even more steps from the process."

Copying and pasting become even more tedious when dealing with an entire study, versus individual images, Dr. Kohli added. "There really isn't an easy way to create good teaching files with full image sets without either a lot of custom programming or TCE."

Dr. Kohli also appreciates the multiple teaching file tools, including PowerPoint and image editing software, that MIRC offers. "And MIRC is an application that has an open standard format, allowing developers from around the world to create software that works with MIRC documents," he added. "There's even a developer who created an iPhone/iPad application. That wouldn't have been possible with a proprietary format.

"One thing that has limited my creation of teaching files is that I don't want to get stuck with a bunch of information in files that become obsolete when the developer writing the software abandons the project," Dr. Kohli added. "Because MIRC uses open standards, and because it's backed by the RSNA, I know that I'll be able to access my files now and in the future."

"When we talk to radiologists about product enhancements, the request we always hear is 'quick and efficient,'" said Jim Morgan, Fujifilm's Vice President of Medical Informatics. "All of our Synapse products are designed to satisfy this request while also delivering high quality imaging results. The TCE/MIRC integration is fundamental to advancing radiological education and Fujifilm is proud to be able to support RSNA and IUPUI with this important endeavor."

MIRC CTP Moves Files with the Most Powerful Anonymizer in the Industry

RSNA News continues its series of profiles on real-world Medical Imaging Resource Center (MIRC®) users with Daniel Rubin, M.D., M.S., a clinical assistant professor of radiology at Stanford University Medical Center, research scientist at Stanford Informatics and director of scientific development at the National Center for Biomedical Ontology. Dr. Rubin and his colleagues have been using the clinical trials processor (CTP) tool, based on MIRC technology, for about seven months in a study characterizing liver lesions.

Daniel Rubin, M.D., M.S.

RSNA News, October 2008

"We needed to customize the system to anonymize particular fields and name the cases in a particular way according to the requirements of the research study," said Dr. Rubin. "CTP is open-source and scalable and offered the flexibility and features we need."

The researchers have set up and successfully tested CTP's image sharing capabilities as they plan for a joint project to share images with other institutions, said Dr. Rubin. "When other institutions are involved, the de-identification is absolutely critical," he said. "There are multiple steps in the pipeline—you need the DICOM receiver, you need the image anonymizer and then you need a DICOM sender. CTP lets institution A configure it to receive an image from the PACS, then anonymize it and ship it off to institution B. At institution B, CTP receives images and then stores them in a local image archive."

Especially useful is CTP's ability to customize anonymization based on any field within the DICOM image, as well as its ability to filter DICOM images using a flexible scripting language, Dr. Rubin said. "Some files that are secondary captures might have personal health information (PHI) burned into the image," he said. "With CTP, you can avoid the potential glitch of most anonymizers, which take a secondary capture image and anonymize the DICOM headers but haven't anonymized PHI contained within the image itself. We can enter some rules to recognize secondary capture images and not send them at all. In that regard, CTP has proven very powerful and flexible for image transmission."

CTP also gives the researchers options for manipulating images, said Dr. Rubin. "They're not locked in to a single pre-specified workflow that any particular vendor provides," he said. "In addition, CTP provides a Web-based way of browsing the images you receive, like a mini-PACS, and you can download them using a Web browser and then delete the images off the server when you're done with them."

For details about CTP installation and different customization options, Dr. Rubin urges potential users to consult the CTP wiki at MIRCwiki.RSNA.org. "It's very straightforward for anyone who has any kind of technical background," he said. "You're going to need to work with someone who knows to install the application on a server, but it's no more difficult to set up and install than MIRC."

Phone Lines Light Up After MIRC Goes Down

RSNA News continues its series of profiles on real-world users of RSNA's Medical Imaging Resource Center (MIRC™). Lawrence Tarbox, Ph.D., research assistant professor at the Mallinckrodt Institute of Radiology at Washington University in St. Louis, and colleagues at the Electronic Radiology Lab have learned just how much users value the system.

Lawrence Tarbox, Ph.D.

RSNA News, August 2008

"A professor of mine said the way to tell if a system is valuable is to shut it down and see how many people notice," said Dr. Tarbox. "Well, MIRC can't be down for more than a day before people start hollering."

Dr. Tarbox and his colleagues maintain a MIRC site that serves as a gateway for Washington University researchers to get their non-configured scan data back to the lab. MIRC provides them with one destination on the clinical network from which they can then transfer data to different sites.

Their MIRC system, created in 2004 with custom modifications that are now a part of the standard MIRC package, does more than a PACS, Dr. Tarbox said. "We catalog data for the researchers and they can go pick them up as Zip files, with or without personal health information," he said. "This is a bona fide HIPAA repository and people can send things here that wouldn't normally go to a PACS, such as raw CT scan data prior to reconstruction."

There have been few complications outside of a minor, yet memorable, setback about two months after installation. The memory load became too much for the outdated equipment to handle. "At the time, we were working with basically hand-me-down hardware," Dr. Tarbox explained. "Our files are raw collected data, from the actual detector, that come in DICOM format. These are huge files, some a couple of gigabytes."

After someone in the department discovered the system was malfunctioning and shut it down, Dr. Tarbox received a deluge of calls from users concerned that they "couldn't send to Goldfinger." Turns out Goldfinger—much of the department equipment is named after James Bond characters—was shut down "because the system literally smoked," said Dr. Tarbox. "We pulled it to see if it was just wires or something trivial, but it turns out it actually smoked the motherboard."

A hardware upgrade has since prevented any crashes resulting in data loss, said Dr. Tarbox, and system users now trust MIRC as they conduct projects including a multicenter trial of sickle cell disease in children. Researchers in the lab are also working with manufacturers on alternate ways to reconstruct CT images from raw detector data.

For new MIRC users, Dr. Tarbox offers this advice: "Don't be afraid to ask questions. There are tons of folks out there using it and most of them don't mind answering. And don't give up too soon because once you've got the hang of it, it's amazingly simple to use."

MIRC’s Customizable Features Facilitate Easy File Transfer

This month' featured real-world user of the RSNA Medical Imaging Resource Center (MIRC™) is Lisa Desiderio, R.T. (R) (MR) CCRC, neuroradiology research project manager in the Department of Radiology at the University of Pennsylvania (Penn). Desiderio spoke highly of the customizable features that allow users to tailor MIRC precisely for their individual needs.

Lisa Desiderio, R.T. (R) (MR) CCRC

RSNA News, June 2008

Faced with the prospect of using CD-ROM or other "hard" media to collect, sort and archive thousands of files from the multisite MR substudy of the Women's Health Initiative Memory Study (WHIMS-MRI), Desiderio and colleagues decided to let the images come to them instead.

Using MIRC's Field Center application, the Penn MR Reading Center received 1,422 MR studies—each containing approximately 360 images—directly from MR imagers located at 14 different sites.

MIRC was tailored specifically for WHIMS-MRI, which examined the occurrence of cerebrovascular disease in 1,450 post-menopausal women who received hormone therapy during the Women's Health Initiative (WHI). Most WHIMS-MRI sites had the MIRC software installed by their own IT administrators, who worked by phone with MIRC support staff to test the program.

"The data were in DICOM format and no specific processing was involved, with the exception of anonymizing personal health information," Desiderio said. MIRC staff helped set up features to remove patient information from the files and assign identification numbers to each study participant, enabling a seamless transfer without compromising patient privacy or consuming staff time.

Minimal work was needed to start transferring files afterPenn confirmed receipt of a test scan,said Desiderio. MIRC personnel helped remotely install updated versions of MIRC software as they emerged during the course of the study.

As data were received through the MIRC server, Penn staff reviewed images and then transferred them to a dedicated workstation. The transition will be even more efficient, she said, as increased workstation capabilities are added to MIRC. "Advanced imaging techniques like MR spectroscopy, perfusion and diffusion tensor imaging along with computer-aided detection systems would allow for improved methods of image analysis," she said.

MIRC was a fast, efficient and user-friendly method of transmitting images, especially from multiple sites, said Desiderio. "The anonymization feature, with no interruption at the local site's PACS, also proved useful for a clinical research trial," she added.

MIRC Clinical Trials Processor Enables Cardiac CT Research

RSNA News continues its profiles of real-world users of RSNA's Medical Imaging Resource Center (MIRC). This month's user is J. Jeffrey Carr, M.D., M.S., a professor of radiology in breast and cardiovascular imaging and director of the Image Lab at Wake Forest University. Dr. Carr talked about how using MIRC helps him manage seemingly unwieldy volumes of clinical trials data.

J. Jeffrey Carr, M.D., M.S.

RNSA News, February 2007

Ask him what he likes best about MIRC, and Dr. Carr will cut right to the chase: "It just works," he said.

It's easy to see how Dr. Carr, who is tracking data for several multicenter clinical trials involving thousands of participants, would appreciate that basic utility. The MIRC Field Center application allows the quick transfer of data from remote sites while maintaining confidentiality, security and positive identification of research participants, he said. He added that the application is still useful even in cases employing more traditional image transfer methods—that is, compact discs sent via overnight mail—as MIRC can process the images and route them to the Picture Archiving and Communication System (PACS).

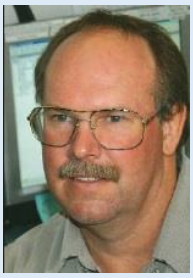
"We have implemented the MIRC suite of tools in a variety of ways to facilitate our research," said Dr. Carr. One example is the MIRC Toolkit, he said, which has been useful for editing DICOM fields when identification numbers have been erroneously entered.

A user for more than three years, Dr. Carr said not only does the MIRC software work, so do the people. A subcommittee of the RSNA Radiology Informatics Committee oversees MIRC. "We have had a continuous dialogue with MIRC people at RSNA about current and future needs of researchers related to deidentification, the Health Insurance Portability and Accountability Act, unique study identifiers and firewall issues," Dr. Carr said. "In all cases the open source nature of the MIRC project has resulted in improvements that have really made a difference in how we do quality imaging research in large and small studies."

Dr. Carr has used MIRC for two studies related to the Women's Health Initiative of the National Heart, Lung, and Blood Institute (NHLBI), as well as NHLBI's Coronary Artery Risk Development in Young Adults (CARDIA) study, comprising the cardiac CT exams of more than 3,300 participants.

MIRC Teaching Files Do What PACS Lacks

This month RSNA News begins profiling real-world users of RSNA's Medical Imaging Resource Center (MIRC). Kicking things off is Mike Haman, R.T.(R)(CV)(CT), Radiology Information Systems/Picture Archiving and Communication Systems (RIS/PACS) Coordinator at Loma Linda University Medical Center in California. Haman talked about how MIRC helped him solve the age-old dilemma of achieving more without spending more.



Mike Haman, R.T.(R)(CV)(CT)

RSNA News, November 2006

In the radiology department at Loma Linda University Medical Center, 30 attending radiologists and 35 residents and fellows perform about 265,000 procedures a year. Aiming to create two teaching file cases per resident rotation on each service, but dissatisfied with the module offered on their PACS, the physicians looked to Haman for a solution.

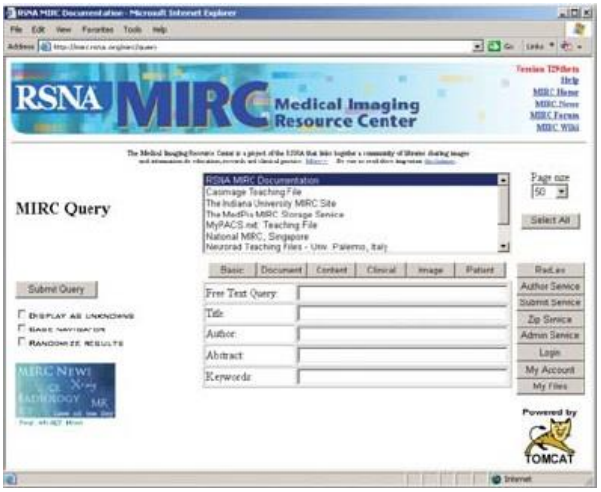
Just one RSNA 2005 hands-on class, along with a poster session led by a physician using the same kind of PACS as Loma Linda, was all Haman needed to give MIRC a try. "I promptly put a test MIRC site on my PC and was successfully sending images from PACS to MIRC in the space of an hour," he said.

Haman said he changed just one MIRC default setting, so that it captures and displays PACS comments when receiving a file. Assigning each file a specific user—rather than the file coming anonymously from the PACS— enables easier searchability later, he said.

MIRC provides complete flexibility in defining teaching file templates, and Haman said he's still trying to get consensus on his department's preference. He said he's also learned to work with extensible markup language (XML) to make refinements to MIRC documents.

Running a production MIRC site has required adequate infrastructure—Haman said he is fortunate the Radiology Library Committee funded a 3-terabyte server to devote to MIRC, which he backs up regularly.

"MIRC is in our data center and should be treated like any other hospital application," Haman said. "Could you imagine losing many hundreds of hours of work if it went down?"



Available free of charge to the medical imaging community, RSNA MIRC software can be used to create a teaching file system for public or private use. The software can also be used by clinical trials sites to manage and exchange images.

RSNA®

The Half Dozen

MIRC quick tips from user Mike Haman, Loma Linda University Medical Center:

1. Document a backup strategy.
2. Designate a MIRC server and treat it just like another hospital application.
3. Establish a standard template of searchable fields.
4. Prevent MIRC from becoming littered with anonymous documents.
5. Use a test system.
6. Access the MIRC User Forums to troubleshoot problems.

Radiologists are starting to use MIRC for more and more types of files, Haman said. His institution's diagnostic ultrasound program is interested in using it for both lecturing and testing.

Haman said he's confident that with feedback from users like him, MIRC's usefulness will grow. He said he would like to see certain fields automatically populated with standard language and codes, and users given the ability to create their own dropdown menus.

"I have not found another way we could do this as cheaply," he said. "Companies doing this are beyond my price range, and though I could have done this with one of my old servers, I wouldn't have felt comfortable with it long term. The old teaching file system lasted 50 years—now that I have started MIRC, it will not be replaced any time soon."