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Medical Image Resource Center 2002: An Update on the RSNA's Medical Image Resource Center

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The Radiological Society of North America has launched a project called the Medical Image Resource Center (MIRC) to establish a community of Web-based libraries of imaging information, including teaching files, other educational materials, and research data. This system would enable radiologic professionals to create and publish such materials more easily and to gain more convenient access to new and existing materials. An overview of the project, a brief summary of the overall requirements and objectives, and a brief description of the progress and ongoing plans for MIRC are presented.

THE CREATION of a Medical Imaging Resource Center was first proposed in the Spring of 1998 during a Strategic Planning Committee meeting of the Radiological Society of North America (RSNA). The Committee recommended that the Board of Directors consider the development of a universal image archive. The Board subsequently elected to adopt the proposal and support the project.[1]

An overview of the rationale and early history of the RSNA's Medical Imaging Resource Center (MIRC) is available in a previous report published in the *Journal of Digital Imaging*.[2] Briefly, MIRC was initiated to remove obstacles for those who wish to obtain or share medical images and related information for academic purposes or clinical decision support. Currently, medical image files typically are found in clinical repositories or local teaching files that are inaccessible to most users or on the Internet—at academic sites such as MedPix[3] and Eurorad[4] or on hundreds of smaller, independent sites. No comprehensive index organizes information across these many resources.

Additionally, investigators participating in the collection, distribution, and analysis of images for single or multicenter clinical trials do not have a standardized method to contribute, archive, and share these images for research purposes. Researchers working in areas such as computer-aided diagnosis, image compression, or image enhancement often are limited by the vast resources required to identify, capture, and archive relevant images and related information.[2]

MIRC PROGRESS REPORT

The basic requirements for the MIRC were defined in early 2001 by the RSNA's MIRC committee, members of the RSNA's Electronic Communication Committee, and the MIRC project manager. The concept evolved from a single, centralized library to a community of distributed libraries, each managed locally but cooperating in such a way that a user can search all or any part of the community with a single query. MIRC sites are intended to store, index, and distribute teaching files; other educational materials such as audio, video, and text presentations; scientific papers; technical documentation; software; and image datasets for

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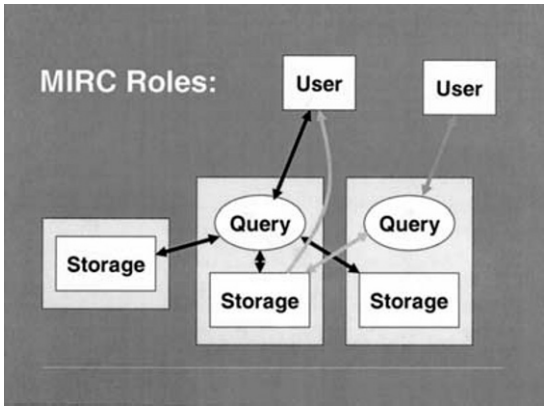

Fig 1. A model of MIRC roles. Users are Web browsers. When searching for documents, a user interacts with a query service that passes the search criteria to one or more storage services, each of which is responsible for indexing only its own information. The query service collates the search results and passes them back to the user. After selecting a document from the search results, the user obtains it directly from the storage service that has it. The rectangular boxes at the bottom illustrate how a site can be implemented with or without a query service and still participate in the MIRC community.

research. MIRC also has the potential to facilitate the distribution of medical images and related information in support of clinical trials, although at this time, the requirements for clinical trials support are not defined fully.

The MIRC project has progressed substantially during the past year as was shown during a live presentation at the annual meeting of the RSNA on November 29, 2001. The RSNA MIRC site has become operational for testing purposes and currently contains a small number of teaching file cases, as well as technical documents that provide details of the MIRC project itself and the XML (extensible markup language) schemes used to communicate between MIRC sites. The first academic MIRC site was implemented at the University of California, San Francisco by Wyatt Tellis and Jeremy Durack with documentation obtained from the RSNA's MIRC site. Additional documentation is being added continually to the RSNA's MIRC site with the intent that other sites will become members of the MIRC community. The source software for the RSNA's MIRC site implementation will be made available on the MIRC site during the next few months.

Rather than requiring a specific schema for documents on all MIRC sites, MIRC accommodates any information storage schema, including an RSNA-defined common schema for optional use by any MIRC community member.

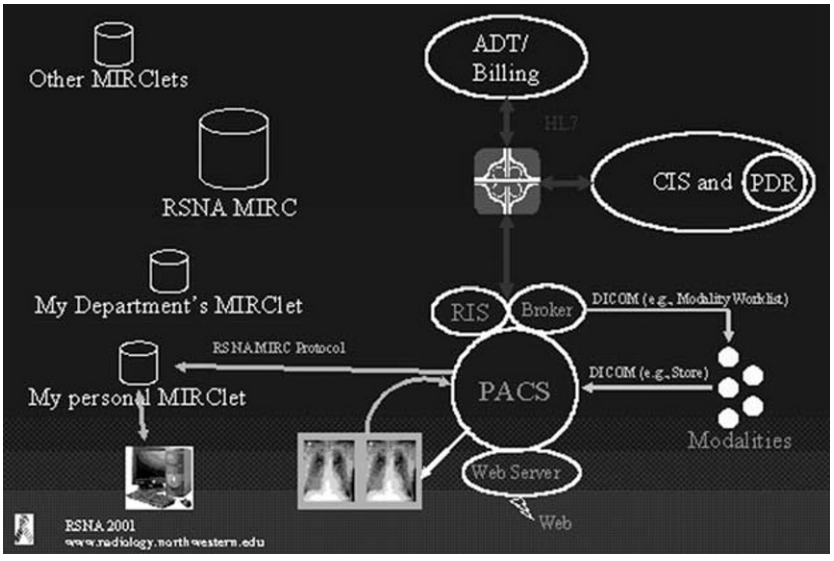

Fig 2. Integration of MIRC services into enterprise information systems. The conventional enterprise information system is represented by the PACS, RIS, clinical information system (CIS), patient data repository (PDR), and admission, discharge, transfer (ADT), and billing systems. The broker typically serves as an interface device between the PACS and other information systems. The Web server provides Web-based access to this enterprise information system. Departments and users can run small versions of the MIRC application (the MIRClets) to provide MIRC functions on smaller scales. Access to the RSNA MIRC or other MIRClets greatly expands the amount of information accessible to the system and so to end users.

Any MIRC site can function as either an access point for users to search the community, called a *query service*, or an indexed information library, called a *storage service*, or both. A query service provides a point of access to the entire MIRC community. It provides a query form to the user, distributes the search criteria to all selected storage services, collates the responses, and presents them to the user. A storage service responds to the query received from the query service, searches its index for documents meeting the search criteria, and returns abstracts and URLs (uniform resource locators) of the matching documents to the query service (Fig 1).

With this approach, users access query services through standard Web browsers. MIRC sites can choose to implement query services or rely on query services at other sites. Storage services can be standard Web servers providing static documents or database-driven systems providing dynamically generated pages. Three approaches to indexing a storage service can be implemented. The RSNA uses an XML indexing tool and creates an XML index file for each document stored on its storage service. The University of California San Francisco (UCSF) site, however, uses its internal database to index its dynamically generated documents. Additionally, the RSNA site also provides an indexing service for standard Web servers, allowing a webmaster to export a complete site index to the RSNA indexing tool and manage the site's index remotely.

The RSNA MIRC site will maintain a list of all MIRC sites, allowing query services to update their list of storage services as often as they desire. MIRC is defined to be a community of peers; however, and communication with the RSNA site is not required. The responsibility for the content of a site lies with its management. The RSNA will have its information peer reviewed, but other sites may have different policies. As the MIRC community grows, the RSNA anticipates that its site will provide only a relatively small fraction of the total number of images and other documents. The RSNA plans to include a substantial amount of the content captured from its annual meetings on the RSNA MIRC site, along with the peer-reviewed contributions of member authors.

In the future, the RSNA anticipates that MIRC will be part of an integrated clinical and educational health care information system and will play an important role in clinical decision support and patient care, education, and research (Fig 2). David Channin, a member of the RSNA's MIRC committee, has strongly advocated that mechanisms for accessing and adding content to MIRC should be included in the IHE (Integrating the Healthcare Enterprise) initiative, an ongoing effort to encourage the health care imaging and information technology industries to implement standards-based methods of information sharing. An ''MlRC teaching file integration profile'' would define the transactions required to link a picture archiving and communication system (PACS) workstation or other diagnostic viewing system to MIRC. This possibility will be discussed during this year with the IHE planning and technical committees.

CONCLUSION

The Medical Imaging Resource Center project has made substantial progress during the last year, and advances this year will increase both its function and scope. The key goal of the MIRC project has not changed: to provide imaging-related resources to the medical community, advance training and decision support for radiologists and other health care practitioners, increase participation in research projects and clinical trials, and ultimately improve patient care and outcomes. Additional information and updates can be found on the RSNA's website.[5]

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