RSNA RIC ANNUAL REPORT 2013

The mission of the RSNA's Radiology Informatics Committee (RIC) is to promote education and research pertaining to critical emerging technologies, digital imaging and healthcare information systems. The RIC fosters cooperation among imaging professionals and industry to drive innovation and advance medical imaging to improve the quality, safety and efficiency of patient care. In 2013, the RIC made significant progress in its work and achieved several notable milestones, which are summarized below.

RSNA Image Share Network

RSNA has worked with leading research institutions and vendors on a project funded by the National Institute of Biomedical Imaging and Bioengineering (NIBIB) to create a network for patient-controlled sharing of medical images and reports. The goal of the project is to expand the number of sites and patients participating and to establish a nationally adopted set of standards for patient-controlled sharing of health information. Dr. David S. Mendelson of Mount Sinai Medical School is the principal investigator for the new contract phase.

The Image Share network (http://www.rsna.org/Image_Share.aspx) began enrolling patients at five major research sites in 2011. RSNA has begun an ambitious program to expand the network. Three large community radiology sites have been added so far in 2013. Additional sites nationwide are in the process of joining the network.

The initial participating sites in the project— Mayo Clinic, Mt. Sinai Medical Center, University of California – San Francisco, University of Chicago Hospitals, University of Maryland Health Systems and Washington University in St. Louis, collaborated in the development of an open-source software program called the Edge Server. An Edge Server installed at each participating site gathers selected images and reports from departmental radiology systems and sends them to a secure image repository. The repository, called the Image Clearinghouse, is provided by a vendor, lifeIMAGE, under a subcontract with RSNA.

Patients are given secure ID and password information they use to retrieve their images and reports into free accounts with one of the personal health record (PHR) providers (Dell, DICOM Grid, itMD and lifeIMAGE), participating in the network. Patients can use their accounts to store images and share them with care providers as they wish. A help desk has been established for ongoing patient support.

The technical documentation and open source software produced by the project are made freely available to software developers and other interested groups. In 2013 the Edge Server software was enhanced to enable direct site-to-site transfer of images and reports and support for research and clinical trials.

The architecture of Image Share is based on standards published by the Integrating the Healthcare Enterprise (IHE) initiative. These documents, called IHE profiles, describe the use of standards to achieve interoperability of health information technology (HIT) systems. Image Share adapts the IHE Cross-enterprise Document Sharing (XDS) profile, which is used in health information exchanges in the US and worldwide.

Integrating the Healthcare Enterprise (IHE)

IHE (http://www.rsna.org/ihe.aspx) is a non-profit organization, whose mission is to enable seamless and secure access to health information whenever and wherever needed. RSNA is a founding member. IHE International, which publishes and maintains IHE profiles and technical frameworks, now includes 13 active clinical and operational domains and more than 600 member organizations worldwide. Dr. David S. Mendelson serves as co-chair of the IHE International Board and chair of the RIC IHE.

IHE USA oversees the annual IHE North America Connectathon, the largest interoperability testing event in health IT. Registration included 180 systems for the 2013 event. Planning for the 2014 event, which takes place January 27 – January 31, 2014 at the Hyatt Regency Chicago includes testing of new capabilities required to meet Meaningful Use certification criteria.

The IHE Radiology domain published significant new work in 2013, including the following profiles for trial implementation:

- Invoke Image Display (IID): allows the user of an Image Display Invoker, typically a nonimage- aware system like an EHR, PHR or RIS, to request the display of studies for a patient, and have the display performed by an image-aware system like an Image Display (PACS).
- Management of Radiology Reporting Templates (MRRT) specifies a data model for templates that can be transmitted between systems. It also specifies the template features that reporting applications should support.
- Radiology Scheduled Workflow.b (SWF.b) updates transactions in the foundational profile for intra-department workflow to use recently release version of the HL7 standard and other enhancements.
- Stereotactic Mammography Imaging (SMI) is designed to provide complete storage and retrieval of DICOM stereotactic breast projection x-ray image data, with sufficient display capability to allow optimal visualization of images for the purpose of consultation or second opinion.

Reporting

The Reporting initiative of the RIC (http://www.rsna.org/Reporting_Initiative.aspx) has built a growing library of structured radiology report templates, using RadLex® and other standard

terminologies, which enable more efficient reporting systems and generate more consistent reports and higher quality data. The Reporting Subcommittee, which is chaired by Dr. Curt Langlotz, with Dr. Chuck Kahn serving as vice chair, has published over 200 templates that are available online in the RSNA template library (radreport.org). These templates have been downloaded or viewed more than 800,000 times. They represent best-practices that can be adapted to local practice patterns.

The Reporting committee is working with industry and the standards community (including DICOM and IHE) to facilitate adoption of structured templates in commercial systems and clinical practice. This year Dr. Langlotz led the effort in the IHE Radiology that resulted in publication of the Management of Radiology Report Templates (MRRT) profile that defines a standards-based method to exchanges and use structured reporting templates. As co-chair of DICOM Working Group 8 – Structured Reporting, Dr. Kahn contributed to development of a schema for radiology reporting templates and the transformation of template-based reports into the HL7 Clinical Document Architecture (CDA) that will be published in 2014. Industry has been engaged throughout the development process to encourage early adoption.

RadLex

The RadLex subcommittee, chaired by Dr. Daniel Rubin, continues to expand and refine the RadLex radiology lexicon (http://www.rsna.org/RadLex.aspx), and to promote and facilitate its adoption and use. RadLex provides radiologists with a free knowledge resource to improve the clarity of their communications enable improved access to educational materials and help researchers in analyzing radiological data. The development of RadLex is partly supported by contracts with NIBIB.

The first comprehensive release of the RadLex Playbook was made this year. The Playbook provides standardized names for radiology procedures in CT, Ultrasound, MRI, radiography, fluoroscopy, and nuclear medicine procedures. Playbook names for interventional radiology procedures are to be published early in 2014.

RadLex now encompasses more than 58,000 items. Development of the RadLex terminology in 2013 has focused on the detailed anatomy of the knee, lymph nodes and prostate, and descriptors for breast imaging and liver lesions. A thyroid terminology group has recently been formed. The RadLex Breast Imaging Subcommittee is also working on using natural language processing of mammography reports to expand the breast terminology with synonyms and non-sanctioned terms.

The RadLex Committee has expanded relationships with industry, standards organizations, other medical societies and government agencies to refine RadLex and promote its adoption. In September RSNA completed a project, funded jointly by the Department of Defense and

NIBIB, that included mapping Playbook procedure names to the “chargemasters” at Department of Defense healthcare facilities. The ACR has been an early adopter of the Playbook to provide procedure names for data submitted to the ACR’s Dose Index Registry. RSNA is working with the Regenstrief Institute, under a new contract from NIBIB, to harmonize RadLex with LOINC clinical terminologies. This project will deliver a single unified terminology for naming radiology procedures. The RadLex terminology is used in numerous RSNA services and applications, including the MIRC Teaching File System and Clinical Trials Processor, educational assets such as *RadioGraphics* and Radiology, *myRSNA* and Reporting templates.

MIRC

The RSNA Medical Imaging Resource Center (MIRC - http://www.rsna.org/MIRC.aspx) provides free software tools to meet the research and educational needs of radiologists. The two most well known and widely used tools are the Teaching File System (TFS) and Clinical Trials Processor (CTP).

Teaching File System (TFS)

TFS is used to create, share and manage teaching files. With minimal effort, radiology sites can set up TFS as a departmental teaching file. It can run securely inside a firewall and receive images submitted by users directly from PACS. Submitted cases reside in a draft queue, accessible only to logged in users, until the author publishes them. MIRC de-identifies images and allows the author to conveniently add as much detail to the case as desired. It provides detailed access control and enables grouping cases to use in conferences.

Under the leadership of the MIRC subcommittee chair Dr. Krishna Juluru, work in 2013 has focused on promoting adoption of TFS and improving data collection about the TFS user community. The TFS software has been modified to allow submission of key data, including: 1) the number of active sites, 2) number of users, 3) number of documents, 4) number of time documents are view.

The MIRC subcommittee has improved support for TFS users, including creation of new instructional videos and Web pages for TFS administrators and users. They have reached out to program directors to inform them about the capabilities and features of TFS. They also published the TFS Security and Features White Paper (http://www.rsna.org/tfs.aspx).

Clinical Trials Processor (CTP)

CTP is used for secure Internet communication of datasets for multisite imaging clinical trials. CTP supports a growing number of multi-site clinical trials worldwide, including many projects of the National Cancer Institute such as the Cancer Imaging Archive (TCIA). CTP includes powerful and flexible tools for removing protected health information (PHI) and managing

secure transmission of imaging data. CTP technology is incorporated into RSNA's image sharing Edge Server to support secure transmission of image data between care sites. A CTP re-design subcommittee was convened in 2013 with the goals of improving the user interface and making it easier to configure for common research use cases. The new interface incorporates simple step-by-step pulldown menus to individually configure and support multiple trials with a single instance of the program.

Quantitative Imaging and Biomarker Alliance (QIBA)

RIC collaborates with other RSNA committees on several QIBA-related projects. Kathy Andriole, PhD has worked with RSNA staff to successfully incorporate the Quantitative Imaging Reading Room (QIRR) exhibit area at the annual meeting into the meeting program and meeting abstract submission system. This area showcases novel pre-commercial software and analytical tools some of which is derived from partnerships between industry and academia.

Dr. Andriole has also spearheaded implementation of the Quantitative Imaging Data Warehouse (QIDW) to support QIBA-related projects. A prototype implementation of QIDW was brought on-line in 2013 for use by QIBA members. Over forty five thousand images have been uploaded to support eighty-four registered users and ten active communities who are using this reference data to test and validate algorithms. QIBA is currently evaluating the prototype and making recommendations for new feature requests. The system includes security controls, role-based privileges and user group creation, simple data upload/download capabilities, deidentification using MIRC CTP and basic search, indexing and discovery. A QIDW oversight committee has been formed consisting of members from RIC and QIBA to develop policies regarding data curation security, management and support.

RSNA Imaging 3.0 Summary

RSNA and the American College of Radiology are coordinating their information technology activities to support a new ACR initiative known as Imaging 3.0™. Keith Dreyer, DO, chair of the ACR's Information Technology and Informatics Committee (ITIC), approached the RIC in February 2013 regarding the desire to coordinate activities. A joint RSNA, ACR, and SIIM task force has drafted an "informatics activity grid", which is a common vision that lists the IT projects and activities necessary to support Imaging 3.0, and identifies areas where additional coordination between the organizations may be useful. A flowchart showing how the related IT systems and initiatives connect to one another is also planned. An all-day joint RIC/ITIC summit will be held this winter to coordinate and prioritize initial collaborative activities.

International Participation
In an effort to promote international outreach and enhance collaboration with allied organizations around the globe, the RIC has added Dr. Emanuel Neri to its committee roster. Dr. Neri is a faculty member of the University of Pisa and president of the European Society of Medical Imaging Informatics (EuroPACS). Dr. Neri is helping to identify and foster areas of mutual informatics collaboration between the European Society of Radiology (ESR) and RSNA.

Clinical Informatics Board Certification
The ACGME recently approved a clinical informatics (CI) board certification process and fellowship pathway to formalize training of future informatics health-care leaders. This very important development is a critical step towards validating informatics as an adjunct clinical specialty. Since imaging informatics is an essential component of CI, the RIC has been actively working with the American Medical Informatics Association (AMIA), the organizing body for the practice board exam and fellowship, to promote inclusion of imaging informatics content into the new CI core content and the upcoming CI fellowship pathway. The RIC also organized a multi-society ACGME lobbying effort which included the RSNA, ACR, SIIM, ABR, Radiology RRC and the ARRS to support the initiative and request modifications that are in alignment with the current imaging informatics fellowships.

Informatics Education at RSNA 2013
RSNA continues to provide an array of informatics education, with courses evolving to meet the needs of practicing radiologists, researchers and educators. RIC members Drs. Marc Kohli, William Boonn, William Weadock and John Eng, the RIC's liaison to the RSNA Refresher Course Committee, helped organize a set of 32 informatics refresher courses, split between traditional didactic and hands-on computer workshop formats. Topics included advanced visualization and analysis, DICOM data manipulation, cloud computing, natural language processing, Internet resources for radiologists, dose monitoring and quality assurance.

Over thirty other informatics topics were presented in courses in both traditional and hands on formats. Topics included rapid application development, open source applications for imaging, Internet resources, literature searches (presented by the National Library of Medicine), 3D interactive visualization, cloud solutions for radiology, radiation exposure monitoring, ergonomics, and radiology education tools. RSNA-sponsored projects were represented in these sessions as well, including an overview of RSNA Informatics Projects, IHE, MIRC, the Radiology Reporting initiative, RadLex, and the personalized myRSNA Website and the Quantitative Imaging Biomarkers Alliance (QIBA). The meeting also included sessions addressing the impact on radiologists of "meaningful use" incentives from the Department of Health and Human Services (HHS) and the Centers for Medicare and Medicaid Services (CMS).

Image Sharing Demonstration at RSNA 2013
The RIC organized a showcase demonstration of informatics technologies and standards developed under its several projects at the RSNA Annual Meeting. The demonstration included:

- Exchanging images and reports between care sites and sharing them with patients using personal health records (PHR).
- Creating template-driven structured radiology reports
- Using real-time video sessions on wireless devices between radiologists and referring physicians to communicate critical findings
- Monitoring and benchmarking radiation dose in local and national settings
- Ordering and scheduling using procedure names from the RadLex Playbook
- Exporting image data for education and research

Seventeen organizations, including vendors and researchers, took part in the demonstration.

I am extremely grateful to the entire RSNA RIC committee for their tremendous and tireless creative efforts; this group never ceases to amaze me!

Special thanks go to the fantastic RSNA staff for their support, encouragement and for making all things possible.
The RIC is always seeking ways to improve radiologic care through informatics and to promote the interests of practicing radiologists to the imaging and health IT industry, government agencies and the broader healthcare community.

We welcome the comments and participation of all RSNA members, and others interested in our work. You can forward comments, questions and suggestions to us at informatics@rsna.org.

--Adam Flanders, MD – Chair, RSNA Radiology Informatics Committee