# RADIOLOGY INFORMATICS COMMITTEE (RIC) ANNUAL REPORT 2016

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 oversees a set of informatics projects designed to advance medical imaging to improve the quality, safety and efficiency of patient care. In 2016, the RIC made significant progress on these projects, achieving several important milestones, which are summarized below.

## Reporting

The Reporting initiative of the RIC (http://www.rsna.org/Reporting_Initiative.aspx) has created a library of structured radiology report templates (radreport.org) to enable more efficient reporting systems and generate more consistent higher value reports. The Reporting Subcommittee, chaired by Dr. Charles Kahn, has made over 250 templates available online in the template library representing best practices in radiology reporting. These templates have been downloaded or viewed more than 3.7 million times.

RSNA convenes the Template Library Advisory Panel composed of representatives from the RSNA and the European Society of Radiology responsible for translating, developing and reviewing templates for the RadReport library. Access to the Open section of the RadReport library (https://open.radreport.org/) is also available for ESR members to access using their ESR login credentials. The Open library is designed to enable the radiology community to contribute templates and download and review templates contributed by others.

The Reporting committee is also working with industry and the standards community (including DICOM, HL7 and IHE) to facilitate adoption of structured templates in commercial systems and clinical practice. The 252 templates in the RadReport Select template library are compliant with the IHE Management of Radiology Report Templates (MRRT) profile, which defines a standards-based method to exchange and use structured reporting templates. Nuance Communications, the vendor of the PowerScribe 360 reporting product has indicated that its software will soon be able to ingest MRRT templates automatically for subsequent use by radiologists. In combination with DICOM Part 20, which provides a schema for radiology reporting templates and the transformation of template-based reports into the HL7 Clinical Document Architecture (CDA) format, these standards enable radiologists to efficiently generate consistent high-quality reports and communicate them to other care providers and patients.

## RadLex

RadLex is a comprehensive lexicon of radiology terms for diagnostic reports, decision support and indexing and retrieval of radiology information resources. The RadLex subcommittee, chaired by Dr. Ken Wang, continues to expand and refine the RadLex radiology lexicon (www.rsna.org/RadLex.aspx)

and to promote its adoption and use. Using RadLex improves the clarity of radiologists' communications, provides better access to information for decision support and helps researchers analyze radiological data. The development of RadLex is partly supported by contracts with NIBIB.

The RadLex Playbook provides standardized names for radiology procedures across all modalities. The Core Playbook, which provides a set of terms optimized for clinical applications, is available for download and implementation in radiology information systems. Radiology and EMR systems include the ability to include a coded procedure name for radiology orderables. The RadLex Committee has published a User Guide that shows how Playbook can be used in these systems *de* novo or by mapping to existing names. EMR vendors such as Epic Systems have expressed their willingness to incorporate Playbook into the foundational set of procedure names they distribute with their systems. The ACR and the National Decision Support Company are currently working with Dr. Wang and other members of the RadLex Playbook group to map the Playbook to ACR Common, ACR's system for representing radiology procedures.

The RadLex Committee is working with the Regenstrief Institute, under a contract from NIBIB, to harmonize RadLex with LOINC clinical terminologies. This project will deliver a single unified terminology for naming radiology procedures. LOINC applies universal code names and identifiers to medical terminology related to electronic health records and it is a U.S. Federal standard for exchange of clinical health information. The joint team has completed the integration of Playbook names for CT, MR, ultrasound and nuclear medicine procedures. The project will be completed by September of 2017.


**RSNA Image Share Network**

Image Share is a network for patient-controlled sharing of medical images and reports developed with leading research institutions and vendors under a project funded by the National Institute of Biomedical Imaging and Bioengineering (NIBIB). The project implements standards for patient-controlled sharing of imaging information. Dr. David S. Mendelson of Mount Sinai Medical School is the principal investigator for the project.

The Image Share Network (www.rsna.org/Image_Share.aspx) is currently enrolling patients at eleven sites, with additional sites in the process of joining the network. Patients at participating sites are given secure ID and password information they use to retrieve their images and reports into free accounts with personal health record (PHR) account providers (Ambra Health, formerly DICOM Grid, 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. As of November 2016 more than 28,000 patients have enrolled in the network.

RSNA is working with a number of industry partners to expand the network to include their customers for imaging management systems. Both lifeIMAGE and Ambra Health have agreed to incorporate the ability to connect to the Image Share Network in their image management systems. Each of these vendors has such systems in place at hundreds of user sites. lifeIMAGE has begun testing these capabilities in their product installations at a number of sites. RSNA also recently joined the CommonWell Health Alliance, a consortium of vendors and users dedicated to enabling secure,

network-based exchange of health information. CommonWell, which has a rapidly growing network of more than 150,000 users, is currently developing its Image Sharing Use Case, which will use the same standards on which the Image Share Network is based.

In 2016 RSNA launched a new program for validation of the image sharing capabilities of radiology systems. The Image Share Validation Program is based on IHE standards for image sharing used in the Image Share Network. RSNA has partnered with two experienced testing organizations, the Sequoia Project and the Mallinckrodt Institute of Radiology at Washington University in St. Louis to administer the program and conduct the testing. Seven vendors successfully completed testing under the 2016 pilot program. A new round of validation testing will be offered in 2017.

Open source software and technical documentation produced by the project are made freely available to software developers and other interested groups. The architecture of Image Share is based on standards published by the IHE initiative (see below). These documents, called IHE profiles, describe the use of standards to achieve interoperability of health information technology (HIT) systems. Image Share adopts 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 International (ihe.net) is a non-profit organization whose mission is to enable seamless and secure access to health information. IHE publishes and maintains implementation guides called IHE profiles that detail the use of standards to achieve interoperability in health IT. IHE grew out of an initiative launched by RSNA in 1997 and now includes eleven active clinical and operational domains and more than 175 member organizations worldwide. Dr. Mendelson serves as co-chair of the IHE International Board and chair of the RIC IHE Subcommittee.

The IHE Radiology Domain committees developed new specifications this year to extend the Mammography Image profile to address Digital Breast Tomosynthesis (DBT) and to extend the Radiation Exposure Monitoring profile to address nuclear medicine (REM-NM). For 2017, the committees plan to work on profiles addressing the following:

- Enterprise Scanner Protocol Management
- Critical Finding Follow-up and Communication
- Standardized Operational Log of Events (SOLE)

IHE USA, another non-profit organization launched by the initiative, oversees the annual IHE North America Connectathon, the largest interoperability testing event in health IT. Participation at the 2016 event, January 25-29 at the Global Center for Health Innovation in Cleveland included more than 80 vendors and more than 120 systems. The Connectathon allows vendors to test systems for their compliance with IHE profiles and their ability to exchange information effectively with those of industry peers.

**MIRC**

For more than 15 years, the RSNA has been providing free software tools to meet the research and educational needs of radiologists Medical Imaging Resource Center (MIRC - www.rsna.org/MIRC.aspx). In 2016, RSNA transitioned the open source tools provided by MIRC including the Teaching File System (TFS) and Clinical Trials Processor (CTP), to become a community supported open source project.

*Teaching File System (TFS)*

TFS is used by radiology sites to create, share and manage their departmental teaching files. Sites can run TFS securely inside their firewalls and enable users to send images directly from PACS. TFS de-identifies images, keeps them in the author's secure queue until published and allows the author to add as much detail to the case as desired. There are approximately sixty public TFS sites with over 60,000 cases hosted using MIRC software worldwide.

*Clinical Trials Processor (CTP)*

CTP provides secure Internet communication of image datasets for multi-site clinical trials worldwide, including projects of the National Cancer Institute such as the Cancer Imaging Archive (TCIA). CTP includes tools for removing protected health information (PHI) and managing secure transmission of imaging data. CTP offers powerful capabilities for removing protected health information from DICOM images for use in research.

**Quantitative Imaging and Biomarker Alliance (QIBA)**

The RIC collaborates with other RSNA committees on several QIBA-related projects. Kathy Andriole, PhD, leads an ad hoc review committee to review abstracts for the Quantitative Imaging Reading Room (QIRR) exhibit area at the annual meeting. For 2016, this area showcased 22 exhibits of software and analytical tools, some of which are derived from partnerships between industry and academia.

Dr. Bradley Erickson, MD chairs the oversight committee of the Quantitative Imaging Data Warehouse (QIDW), which provides online data storage to support QIBA-related projects. The oversight committee, consisting of members from RIC and QIBA, is responsible for policies regarding data curation security, management and support. Over 127,000 images and related objects have been uploaded to support 420 registered users and nine active communities using this reference data to test and validate algorithms.

**RSNA/ ACR Joint Effort for Common Data Elements**

RSNA is working jointly with the American College of Radiology to define a set of common data elements (CDEs) for radiology reporting and decision support.  Each CDE represents a concept or feature with a controlled set of potential values. They are applicable to a variety of applications including radiology reporting, decision support and research.  A joint work group was put in place to scope out the project and has begun identifying the best method for developing and publishing CDEs for radiology. A pilot website (RadElement.org) was put in place to store and display sample data elements.

**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. This year the RIC led a successful multi-society ACGME lobbying effort which included the RSNA, ACR, SIIM, ABR, Radiology RRC and the ARRS for inclusion of Radiology as a sponsor for the newly created CI fellowship program. There is now RSNA representation in the development of CI fellowship milestones and content for the ACGME. Members of the RIC have also continued to work with the American Medical Informatics Association (AMIA), the organizing body for the practice board exam and fellowship, to help create imaging informatics content for the CI practice examination and will continue to work towards promoting inclusion of imaging informatics content into the fellowship curriculum and testing materials.

**Informatics Education at RSNA 2016**

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, and William Weadock, the RIC's liaison to the RSNA Refresher Course Committee, helped organize over 40 informatics refresher courses, split between traditional didactic and hands-on computer workshop formats. In 2016, the chairs assigned topic leaders for the informatics courses to coordinate course content. The topics and their leaders were IHE: David Mendelson and Brad Erickson; Health Policy: Curt Langlotz; Quality: Ramin Khorasani; and Reporting: Chuck Kahn. Some interesting 2016 course topics include machine learning in image analysis, federal health IT policy, ergonomics, Big Data, hands-on 3D printing courses, open source applications for imaging, Internet resources, cloud solutions for radiology, and education tools.

- RSNA-sponsored projects were represented in these sessions as well, including overviews of the RSNA Informatics Projects, IHE, MIRC, the Radiology Reporting initiative, RadLex and 3-D Printing.
- The RSNA Image Share Validation Program exhibit promoted this effort to broaden adoption of standards-based exchange of medical images
- The 3-D Printing Demonstration and Showcase provided a complement to the many hands-on and didactic courses on 3-D Printing at the Annual Meeting by showing the increasing clinical significance of the technology and its connection to medical imaging. RSNA also introduced its first Special Interest Group (or SIG) in 2016, which is dedicated to the topic of 3-D Printing.
- The AI and Machine Learning in Radiology Demonstration: The Eyes of Watson presented the emerging role of computers as intelligent assistants to radiologists in reading and reporting on medical images.

Imaging informatics is a rapidly accelerating, moving target guided by innovations in industry and regulations driven through government mandates. I am proud to say that the members of the RIC and RSNA staff have worked tirelessly to remain on top of all of the major changes and have helped to

develop both new standards and processes to exploit new technologies for organized radiology and to meet the challenges for the future.

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*