IHE User Success Story

Mayo Clinic

IHE-based Integration Success Story of PACS, RIS, Imaging Modalities and HIS

Jacksonville, FL, USA

MAYO CLINIC
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Introduction
This document describes an integration success story of a PACS, RIS and HIS at the Mayo Clinic in Jacksonville, FL. Instrumental in the integration were the implementation of Integration Profiles and Transactions as defined by the Integrating the Healtcare Enterprise initiative (IHE). (1,2) While the system has been in clinical use for many years, the integration is an ongoing project, and more Integration Profiles will be supported in the coming years.

Institution
Mayo Clinic Jacksonville is a multi-specialty outpatient clinic providing adult medical and surgical care. The instution is comprised of the main outpatient clinic campus, which includes a 6 bed Outpatient Surgery Center and Breast Imaging Center, located in Jacksonville just 3 miles from the Atlantic Ocean, a 289-bed hospital located 9 miles west of the main Clinic campus and three off-site Primary Care Practices. These centers are located at: Jacksonville Beach, St. Augustine, FL., and adjacent to St. Luke's Hospital. The clinic serves a population of 1.1 million people with a daily throughput of approximately 750 (surgical and medical) patient appointments and 1000+ Radiology exams per day.

Goals
It has been the vision of the Radiology Department and its Chairman, Jerald H. Pietan, M.D. to establish an electronic environment (filmless + paperless)that improves efficiency, increases the integrity of the related Health Information, and optimizes patient care. After the SIENET PACS (3) implementation, softcopy reporting is now carried out by the radiologists using the MagicView workstations. Images are distributed to physicians throughout the Clinic campus, as well as the hospital and off sites, for desktop viewing via the Magic Web application either directly from the Electronic Medical Record or separately from a desktop icon. The image management and archiving are centralized and fully digital.

Achieving this goal depended on implementing modality work list data and DICOM-HL7 services, messages and communication (4) (5) to achieve integration between HIS/RIS/EMR and Imaging Modalities. Results, including the associated image pointer data, are also sent to a Cerner clinical data repository.

Project
Mayo Clinic Jacksonville policy is to deploy Imaging Services integrated with the IT systems, and to adhere to industry standards. All interfaces (>25) were written in concert with HL7 or DICOM. IHE integration profiles and the IHE technical framework are valuable tools in achieving this level of efficiency through integration.

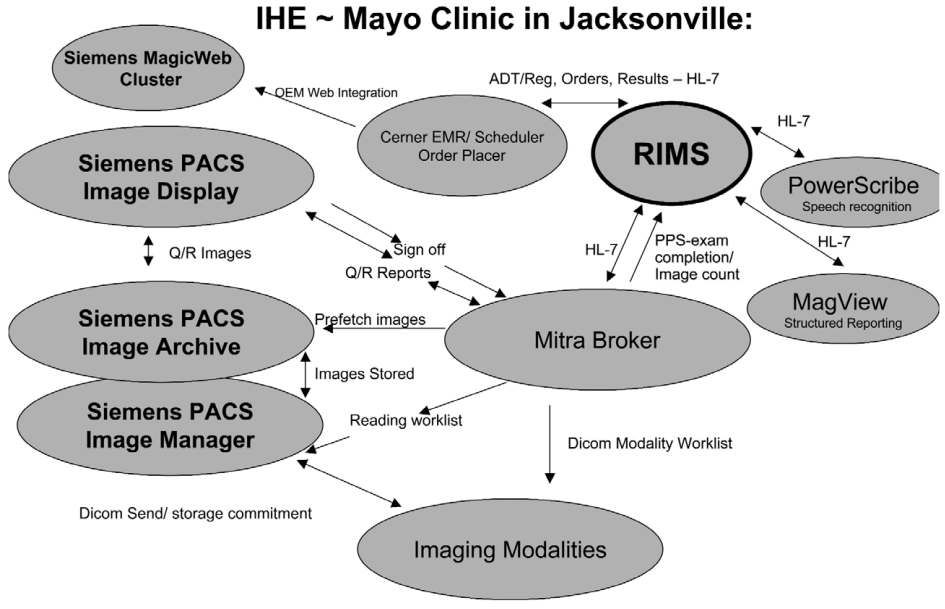
Mayo evaluated the desired workflow, and flow of data, and determined what could be automated with DICOM 3.0 and HL7 services, communication and messaging to improve workflow and to maintain data integrity.

Benefits
The benefits of integration that we have experienced include:
- Increased data integrity between RIS and PACS with the use of Modality Worklist and RIS order interface.
- Increased ease of tracking outstanding procedures that have not completed the ordered, performed, read, and resulted workflow with RIS worklisting. This information is interfaced from several systems.
- Ease of retrieving prior result information with use of prefetching from the archive.
- Ubiquitous availability of images and reports throughout the campus.
- Integration with tools other than DICOM/HL-7 would have resulted in project specific implementations, expensive and difficult to maintain.

Conclusion
Applying IHE-based integration offers a common sense approach to interconnect Imaging Modalities, Imaging Management (PACS) and Radiology Information systems (RIS), using established standards. This standards-based, multi-vendor implementation results in effective communication of images and patient data within the enterprise, without the expense and effort to purchase and implement vendor specific redundant interfaces.

Based on our current experience we expect that IHE will continue to help us going forward in achieving a high level of systems integration efficiently, enabling secure access to vital information for optimal patient care.

IHE ~ Mayo Clinic in Jacksonville:



Clinical information and imaging systems involved in the integration project

St Lukes Hospital

Modality Equipment
Gen Diagnostics: 1 Siemens Digiscan 2T, 3 Siemens Multix (1 in ER), I Siemens 3D tube crane w/upright bucky, 4 Siemens Siremobile 2000 C-arms, 2 AMX/6 Mobilett, 1 Fluroscan mini C-arm, 1OEC 9800, 1OEC 9600 C-rm, 1 OEC 9800 C-arm in GI Lab, 2 OEC Cysto rooms. Mammo: 1 Mammomat 300. GI: 2 Siemens Siroscope SX. Interventional Radiology: 1 Siemens Polystar Top; 1 Siemens Multistar Top/DPP; 1 Siemens Biplanar NeuroStar. CT: 1 GE LghtSpeed; 1 Siemens Volume Zoom. MR: 1 GE Short Bore Echo Planar, 1 Siemens Sonata 1.5T. US: 3 Acuson Sequoia; 1 GE, 2 Siemens G50. NM: 5 ADAC Pegasys; 1 ADAC Vertex Classic; 1 ADAC Forte, 1 Siemens Orbiter Gamma Camera

Automated Radiology Practice Equipment/Systems
Storage: 1 MS E450 RAID, (shared PDIR and STK w/MC)); Interpretation: 10 MV100, 3 MV300, 1 TeleRad MV1000 server. Clinical Viewing: 7 MV1000, 4MV300, MagicWeb. QC/CR Readers: 7 MV1000, 3 Fuji 5000 Plus. Image Processing/mgmt: 2 MV1000, 1 Leonardo, 1 CT Perfusion, 1MV300 w/CD Burner, 1 Kodak LS85LF Digitizer w/Magic Read. Dictation: 12 PowerScribe Speech Rec Stations, 5 Concurrent Remote Telerad Lic, Direct dictation/transcription to RIS.

Mayo Clinic

Modality Equipment
Gen Diagnostics: 1 Siemens FD/Direct Digital Chest unit, 7 Radiographic (6 Siemens- including 1 FD/Direct Digital, 1 Philips), Mayo Building: 1 Siemens Radiographic, Off Sites: 3 Siemens Radiographic, GI: 2 Philips R&F; 1 Siemens Remote R&F. Mammo: 4 Siemens Mammomat 3000, 1 E, 1 LoRad Stereotacatic, 1 Siemens Upright Bx. CT: 1 GE LghtSpeed, 1 GE CTI, 1 Siemens Volume Zoom, 1 Siemens Sensation 16; MR: 1 GE 1.5 Echo Planar; 2 Siemens Symphony 1.5; 2 Siemens Sonatas, 1 Siemens Espree 1.5T 'Open Bore'. US: 4 Acuson Sequoia; 1 ATL, 3 Philips ATL. NM: 3 ADAC Vertex Plus; 1 ADAC Vertex Classic, 1 ADAC TransCam, 1 Scinticor/first pass; 5 ADAC Pegasys, 1 Siemens PET scanner. Other: 1 AMX, 1 C-arm, 1 Cysto.

Automated Radiology Practice Equipment/Systems
Storage: 1 PDIR E450, MITRA broker (w/backup) 2 MS Supreme RAIDS, 7.2 TB ASM RAID, 1 STK Powderhorn. Interpretation: 20 MV1000, 1 MV300. Clinical Viewing: 22 MV1000, MagicWeb. QC/CR Readers: 13 MV1000, 3 Fuji 5000 Plus, 8 Fuji Smart CR. Image Processing/Mgmt: 3 MV1000, GE Analyze, 2 Leonardo, 1 MV300 w/CD Burner, 3 Kodak LS85LF Digitizers w/Magic Read. Dictation: 40 PowerScribe Speech Rec Dictate Stations; MagView Structured Reporting, Direct dictation/transcription to RIS.

HIS : Cerner

RIS : RIMS (Mayo Foundation) / PowerScribe SR/ MagView Mammo Structured Reporting

Which IHE Integration profiles have been implemented by these systems
Scheduled workflow SWF (partly, due to modified version of MPPS ~EFID transaction~ of Sienet to RIMS)
Patient Information Reconciliation - Magic Synch
Presentation of Group Procedures - Linking of multiple studies to a report
Access to Radiology Information - Report

Which transactions defined in the Technical Framework do these systems perform
Patient Registration
Order Placer management
Procedure scheduled
Modality worklist provided
Modality Images stored
Image Manager
Images Availability Query
Query Images
Retrieve Images
Image Display
Print request with Presentation LUT
Query reports
Retrieve reports