Napier India Medical Imaging Informatics Symposium
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About binaryHealthCare

- binaryHealthCare is a Social Enterprise that strive to improve healthcare (and saving lives) through advocating the importance of Health IT as an enabler for “better patient care at lower cost”
  - by raising the standards of health informatics through training, continuing education
  - and providing a vendor neutral community / hub to enable knowledge exchange and collaboration.

- binaryHealthCare maintains and work in tandem with following web portal/ communities to serve its mission.
About binaryHealthCare (con’t)

- PACSAadminday.com
  - Celebrates the medical imaging informatics profession (including support staff) by paying tribute to their relentless efforts throughout the year with the International PACS Administrator Appreciation Day

- ClubPACS.com
  - A vendor neutral, global, online (and free) community managed by health IT professionals for health IT professional, serving as the avenue for sharing best practices, education, networking, and helping ease the implementation of ‘Paperless’ in healthcare
About binaryHealthCare (con’t)

• binaryHealthCare.com
  • Serves as a vendor-neutral knowledge management repository, providing thought leadership pertaining to IT topics, Healthcare Informatics and its relevant industries (Biomedical Engineering, Medical Imaging, Health Informatics, Telemedicine etc.) with a specific focus in Asia Pacific

• There are more initiatives coming up in 2011

• binaryHealthCare covers more than medical imaging informatics
Topics To Be Covered Today

- Imaging Informatics Essentials
- The Health Informatics Eco-System Overview
- Tips on Selecting the Right PACS for the Right Clinical Discipline
- Vendor Neutral Archive (VNA) Introduction
Medical Imaging Essentials
Objectives

- To equip you with an overview of medical imaging informatics and the common clinical information systems in this segment (e.g. RIS, CVIS, PACS)
Imaging Informatics Essentials

• First important fact:
  • There is no standard Core Body of Knowledge (CBOK) mandated for the new exciting industry of medical imaging informatics (not yet).

• Second important fact:
  • Medical Imaging Informatics is not limited to just radiology
  • The core clinical information systems in medical imaging – PACS (Picture Archiving & Communication Systems) is not limited to just images.
A (very) Brief History of Time

- Radiology invented the concept of PACS

- ‘Father of PACS’
  - The late Samuel J. Dwyer, III, PhD
  - Electrical Engineer by training
  - Last appointment was Professor of Radiology, University of Virginia, Charlottesville
  - Together with Andre Duerinckx organized the first International Symposium on Picture Archiving and Communications Systems for Medical Applications in 1982.
The role of Technology in Radiology

• Radiology has experienced technological growth in the last 20 years

• Procedures become more complex
  • E.g. CT, MRI, PET
  • Large volume medical images being generated (esp 256 slice CT)
  • Impossible to medically interpret them if they are printed on conventional films, the volume is simply overwhelming
  • Image manipulation for medical diagnosis purposes (3D reconstruction, Computer Aided Diagnostic and/or Surgery)
PACS as a necessity

- PACS (Picture Archival and Communication Systems) and it is literally invented by the radiology community due to a need to improve diagnostic capabilities.

- It is a solution that is born out of real-world needs and these needs are so effectively fulfilled that PACS these days are no longer limited to only medical images or strictly for the radiology discipline.

- PACS has evolved to encompass waveforms, PDF attachments and adopted by other clinical disciplines like cardiology, pathology, orthopaedics, ophthalmology, dental etc.
PACS as a necessity (cont’)

• A film-less imaging department is no longer a fantasy as it has been realized with advancements in technology.

• The amalgamation of the Picture Archival and Communication System (PACS) into the modern radiology department is no longer an argument of necessity but rather, a decision of ‘when’.
Evolving Discipline

• Medical imaging informatics is at its ‘evolution stage’ and it will continue to evolve for quite some time

• Medical Imaging Informatics is about clinical workflow that benefits the patient, technology only serves as an enabler
The Health Informatics Eco-System Overview
PACS does not work alone

• There are three main categories of information systems adopted in the healthcare enterprise - **Administrative, Financial and Clinical**

• Next to the Electronic Medical Records (EMR), PACS can be considered to be one of the most significant clinic information systems in the healthcare enterprise
The Eco-system

- **Electronic Medical Records (EMR)**
  - The electronic versions of paper-based medical records
  - Allows the medical records to be easily accessed, process and shared (securely) across the healthcare enterprise to facility effective patient care.
  - Includes all types of information pertaining to patient – blood test, ECG recordings, medical images, pharmacy prescription, laboratory results
  - Gets the relevant information from the various clinical information systems (e.g. HIS, LIS, RIS, PACS etc).
The Eco-system (cont’)

• **Hospital Information System (HIS)**
  • Usually a text-driven information system that supports basic clinical and support information needs of a hospital
  • Common system components of HIS include;
    • MPI - Master Patient Index (to identify patient records)
    • Scheduling and Appointments
    • Financial Administration and Billing
    • Inventory management

• Brings very little clinical value
The Eco-system (cont’)

• **Radiology Information System (RIS)**
  • Used by the radiology departments to store, manipulate and distribute patient radiological data and images
  • The system generally comprises of;
    • Patient tracking
    • Procedure scheduling
    • Result reporting
    • Medical Image tracking capabilities

• **Cardiovascular Information System (CVIS)**
  • The cardiovascular equivalent to RIS except it is designed for cardiology department (the workflow is very different).
The Eco-system (cont’)

• **DICOM Boxes / DICOM Convertors**
  • Also known as ‘Frame Grabbers’
  • Devices used to ‘bridge the gap’ for modalities that does not support DICOM standards
  • Intercepts images from modality and ‘DICOMises’ them before sending them to the designated PACS
  • Some of these devices also help to generate modality work-lists.
The Eco-system (cont’)

- **Picture Archival and Communication Systems (PACS)**
  - A clinical information system that
    - acquires, transmits,
    - stores, retrieves,
    - and displays digital images
    - and patient related information
  - from imaging modalities and communicates the information (medical images and its metadata) over a network to enable remote real-time access to these medical images for
    - review,
    - enabling diagnostic,
    - reporting
    - and consultation.
What Comprises of a PACS?

• A simplistic description of PACS would be;

  • **Picture**
    • Digital diagnostic image
  
  • **Archival**
    • Electronic storage & retrieval
      (no lost films/images!)
  
  • **Communication**
    • Computer network (multiple access, Information System integration)
  
  • **System**
    • Control of the processes
      (integrated technology)
Basic Components of PACS

• Acquisition Devices
  • Modality, Film Digitizer

• Transmission
  • Network (LAN, WAN, GPRS)

• Storage
  • Online, Nearline, Offline
Basic Components of PACS (cont’)

- **Workstation**
  - Diagnostic, Clinical, Review

- **Monitors**
  - Medical Grade (5MP, 3MP, 2MP, 1MP)
Basic Components of Simplistic PACS (cont’)

- Acquisition Device
- Server for PACS
- Storage
- Workstation & Monitors

Simplistic Depiction of a PACS solution
PACS Success Formula

- PACS breaks down the traditional physical and time barriers associated with image transfer, retrieval, and display. It revolutionised the traditional workflow.

- Operational Advantages
  - Reduces time spent on film processing and handling
  - Eliminates physical storage space required for film and reports
  - Offsets film and chemical expenses
    - Tremendous savings for your healthcare enterprise
PACS Success Formula (cont’)

• Benefits to Patients
  • Eliminate unnecessary repeats of procedures (saving cost and minimizing radiation) due to elimination of lost films
  • Reduction of turnaround time, hence faster diagnosis and an effective treatment plan
PACS Success Formula (cont’)

• Benefits to Diagnosing Physicians (e.g. Radiologist)
  • Simultaneous / real-time access to images
  • Ability to compare previous studies instantaneously
  • Elimination of lost film
  • 1 workstation for ‘everything’ – operational effectiveness
  • Remote consultation made possible (Tele-medicine)
  • All these translate to reduction of waiting time

• Fundamentally – “Image Access Anywhere, Anytime”
PACS as an Enabler

• An effective implemented PACS solution can serve not only as an enabler in the imaging department but also the healthcare enterprise by;

  • Demonstrating a quick Return-On-Investment
  • Facilitates physician buy-in for effective health informatics
  • Extending benefits to the healthcare enterprise via EMR
Tips on Selecting the Right PACS for the Right Clinical Discipline
Category of PACS

• **Modality PACS**
  • Standalone, modality specific

• **Departmental PACS**
  • Digital Archiving, Workflow efficiency, multi-modality

• **Hospital PACS**
  • Filmless environment, intra-hospital

• **Enterprise PACS**
  • Inter-hospital, tele-imaging
Assessing a PACS

- There is no cookie cutter formula but there are some guidelines to
  - Help avoid potential pitfalls
  - Ease in the selection of the relevant clinical PACS
Assessing a PACS (cont’)

• Assess the following aspects when selecting a PACS
  • Organizational Readiness
    • Technical & Operational Readiness
  • Clinical discipline (granularity versus motion)
  • Workflow (linear versus non linear reporting)

• Radiology vs Cardiology vs Orthopedic vs Pathology etc
  • Differences in network design, medical grade monitors selection
  • Differences in diagnostic tools (e.g. MIP & MPR)
  • Differences in web distribution format
Assessing a PACS (cont’)

• Have all stakeholders involved, the selected PACS solution will be used by many persona, not just the clinicians

• Determined what you really need, to separate the bells and whistles
Assessing a PACS (cont’)

- Future-Proofing your investment
  - Scalability
  - Ease of Upgrades (any data migration required?)

- The above is just a ‘helicopter view’, actual process can be complicated (but not impossible)
There’s Something for Everyone

- Enterprise PACS
- Tele-Imaging
- Filmless Environment
- Hospital PACS
- Vendor Neutral Archive (VNA)
- Departmental PACS
- Digital Archiving
- Modality Specific
  - Mini PACS
Vendor Neutral Archive
Introduction
What is Vendor Neutral Archive

- Vendor Neutral Archive (VNA) is a much misunderstood term in the world of medical imaging informatics.
- Depending on whom you are talking to, the definition of VNA differs from person to person.
- So what exactly is VNA?
  - Is VNA just another DICOM Archive?
  - Is VNA another name for Enterprise Archive?
The Time Before DICOM

- Interoperability was a huge problem
- Replacement of 1 component to another vendor translates to a total replacement
Multi-Modality PACS

- Communicate with ease between modalities of different make and model with PACS and Film Printers

Typical multi-vendor modality installation in a radiology department
Multi-PACS Environment

- Workflow issues for shared modalities (not only physicians)
- Multiple storage and maintenance
Multi-PACS Environment (cont’)

• What if you had to change one of PACS?
  • Multiple interfaces to change
  • Hefty work involving data migration
Multi-PACS Environment with EMR

Vendor A’s CT Scanner
Vendor A’s Modality Workstation
Vendor A’s Radiology PACS
Vendor B’s Cardiology PACS
Vendor D’s EMR
Vendor D’s EMR Client

Vendor B’s Ultrasound
Vendor C’s MRI Scanner
Vendor C’s Modality Workstation

Typical Multi-PACS Environment with EMR interface
Multi-PACS Environment with EMR (cont’)

- The problems with Data Migration still exists except with more worries as there is an interface to the EMR

- Workflow issues for shared modalities and shared PACS (extending beyond the imaging department to the entire healthcare enterprise)

- Multiple storage and maintenance and skill-set x 2
With a VNA

Vendor A’s CT Scanner
Vendor B’s Ultrasound
Vendor C’s MRI Scanner
Vendor C’s Modality Workstation
Vendor A’s Modality Workstation
Vendor Neutral Archive
Vendor B’s Clinical Workstation
Vendor C’s Ultrasound
Vendor A’s Diagnostic Workstation
Vendor D’s EMR
Vendor D’s EMR Client

Typical Architecture with VNA component
VNA – Another Layer of Interoperability

- Simply put, VNA
  - Decouples the traditional segment of PACS and workstation by providing vendor neutrality in the archival segment,
  - Empowers your facility to achieve vendor neutrality not only from modalities but also workstations
  - Most importantly, your medical imaging data is not ‘constrained’ or ‘restricted
  - Translates to possibility of no downtime if events of data migration or upgrades
More on VNA

- VNA must empower you / your facility in
  - Data Ownership
  - Data Sharing
  - Data Access

- Ask yourself
  - Do you really own your facility’s data?
  - Are you able to migrate your medical imaging data to another PACS solution quickly and with ease?
  - Without being ‘held at ransom’ from your existing PACS solution provider?
More on VNA (cont’)

• The ability to
  • Own your imaging data
  • Effectively sharing them (with ability to normalize the DICOM images)
  • Across the different clinical disciplines and
  • Allowing access of these medical images to enable collaboration across the medical image lifecycle
More on VNA (cont’)

• Will help your facility
  • Save cost
  • Streamline workflow
  • Achieve better patient’s safety and quality of care.

• The topic of VNA is huge and will take more than a few slides to be effective communicated

• Contact me if you want to find out more about Vendor Neutral Archive and how it will change the world of medical imaging informatics.
More Information

- binaryHealthCare
  - Lots of whitepapers on the topic
  - http://www.binaryHealthCare.com

- ClubPACS
  - An avenue for detail discussion
Questions?

- For further information, please contact;

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