Emerging PACS Trends that Increase Imaging and Diagnostics Efficiency and Effectiveness

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Of PACS and Radiology

- Radiology invented PACS, which in turn re-invented radiology and that re-invented PACS
  - The cycle goes on and on and on……. And it is not going to stop anytime soon.

- Emerging PACS Trends that Increase **Imaging** and **Diagnostics** efficiency is **workflow** and **culture** (localization) dependent.

- This presentation will touch on vender neutral trends and topics

1) Adoption of PACS is on the rise

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- This is important in view of the long term view of film-less imaging

- The rising adoption of PACS redefined how data transfer is conducted (speed and security) as it affects workflow.

- Within a cluster, the trend is how to share images more timely and effectively to ensure efficiency

- For referrals, the trend is how to best incorporate these images (usually given in a CD/DVD)
  - Are the 'source' clean?

1) Adoption of PACS is on the rise (cont')

- However, the rising adoption of PACS means the original purpose of PACS is more widespread
    - Images Any Time, Any Where (which no duplication of films)

- This enables the diagnosing physician to access images acquired outside their facility or even out of their state / cluster
    - The available of prior studies not only aid the interpretation but also prevent the patient from repeating the exam (saving money and reducing radiation dose).
    - In events of emergency, these priors studies might be a life saver

1) Adoption of PACS is on the rise (cont')

- In addition to the above points, with the proliferation of PACS, the drive for tele-radiology increases.
  - Needs drives market demand -> Improves technology, reduce cost

- With rising adoption of tele-radiology
  - Advantages for direct patient care (second opnions, expertise consultation)
  - Out-of-hours imaging services
  - Education and Training

- And of course -> continual evolution of PACS and Radiology (the cycle goes on)

2) Enterprise Imaging

- It is without doubt that radiology department plays an important role in the modern day hospital

- However, as diagnostic imaging moves beyond the radiology department to the healthcare enterprise, the need to integrate data from clinical specialties across the medical continuum

- This is simply because the clinicians wants to see the patient records as a whole
  - Via the Electronic Patient Record

2) Enterprise Imaging (cont')

- A recent research study conducted by Vendrome Group indicates that Radiology 'still rules' for PACS implementations with Cardiology and Pathology catching up

Departments with PACS

Radiology — 97%

Cardiology — 34%

Pathology — 7%
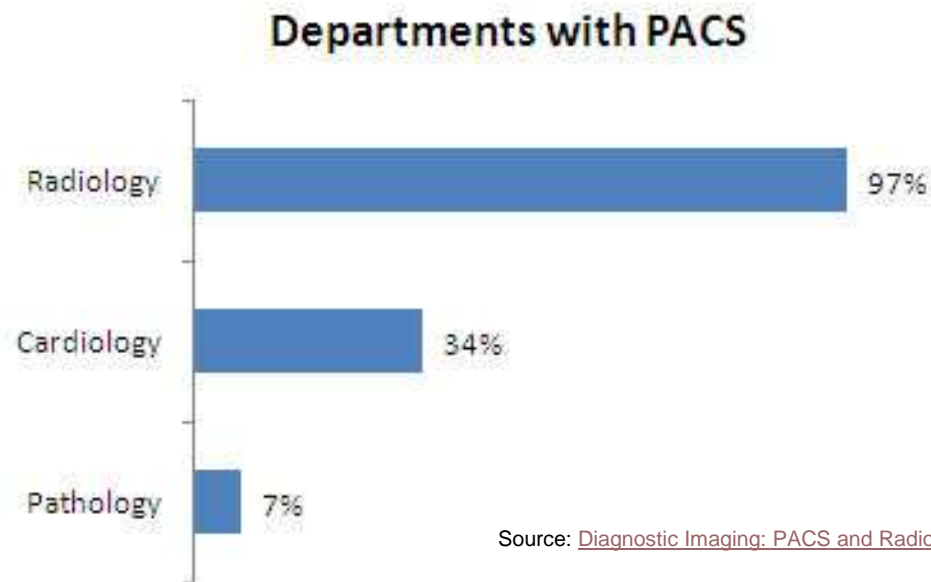
Source: Diagnostic Imaging: PACS and Radiology Information Systems"

2) Enterprise Imaging (cont')

- Why does it actually makes sense?
  - Imaging is part of a larger picture where all specialties share resources and information in a coordinated manner

  - Operationally Streamline and Cost saving
    - Instructure – network components, a shared archive (centralised data storage)
    - The manpower and expertise to maintain the systems

- Benefits of an integrated Radiology and Cardiology PACS extends beyond the IT department, beyond Management (cost savings)
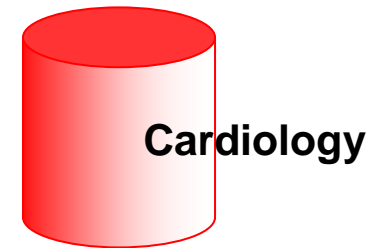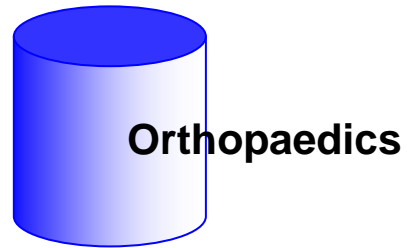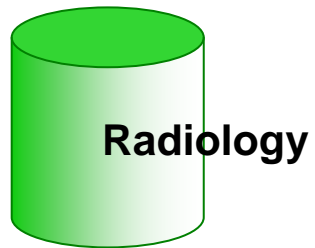
2) Enterprise Imaging (cont')

- The real benefit is for the diagnosing physician, be it a Radiologist or Cardiologist

  - There are some overlapping between the two medical disciplines
  - The ability to review all relevant images
  - The advantage – comprehensive views with ease, within the same workstation brings tremendous benefits the patient
  - The diagnosing physician need not spend time going to another workstation, relogin etc, (interpretation process is not interrupted as well.
  - This is important to ensure diagnostics efficiency and effectiveness

2) Enterprise Imaging (cont')

Radiology

Orthopaedics

Cardiology

Enterprise Imaging

Pathology

Ophthalmology

Endoscopy
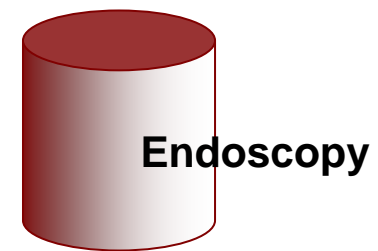
3) DICOM Structured Reporting

- DICOM Structured Reporting (DICOM SR) is a supplement under the DICOM Standard that caters for the exchange of structure data between systems.

- A method of describing data elements in a systematic manner so it can be recognized by all devices (conforming to the DICOM SR standard).

- This effectively extends the virtues associated with image transfer standards using the DICOM format.
  - Vendor neutral exchange of data
  - A system of encoding structure data
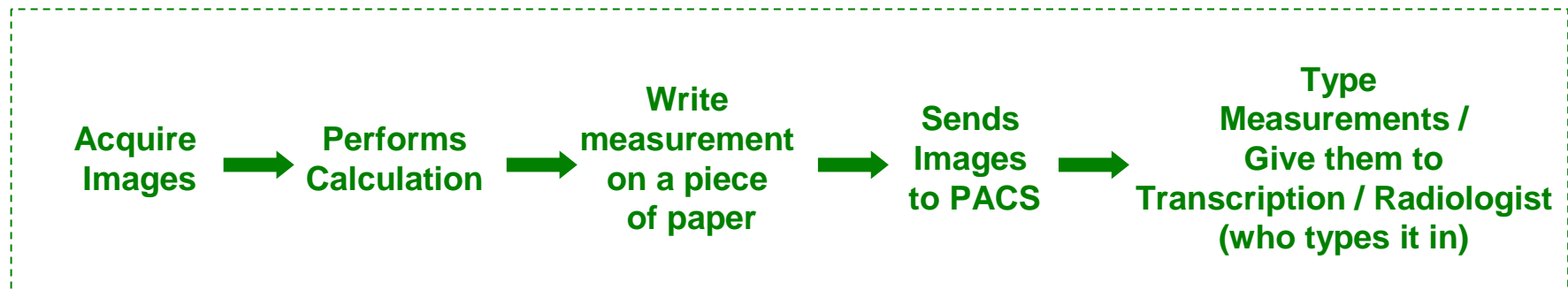
3) DICOM Structured Reporting (cont')

- Contrary to what the name implies, DICOM "Structure Reporting" is not limited to just reports

- Caters to a wide range of data including, measurements, waveforms, logs (e.g. hemodynamics) among many others.

- DICOM SR is not a new standard
  - An official supplement since 2003
  - Gaining (fast) adoption in recent years and is set to be the "way to go" for measurements transfer (especially among ultrasound vendors)

3) DICOM Structured Reporting (cont')

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- Taking the example of the Ultrasound workflow

Acquire Images → **Performs Calculation** → **Write measurement on a piece of paper** → **Sends Images to PACS** → **Type Measurements / Give them to Transcription / Radiologist (who types it in)**

Without DICOM SR

Acquire Images → **Performs Calculation** → **Sends Images & Measurements to PACS**

With DICOM SR

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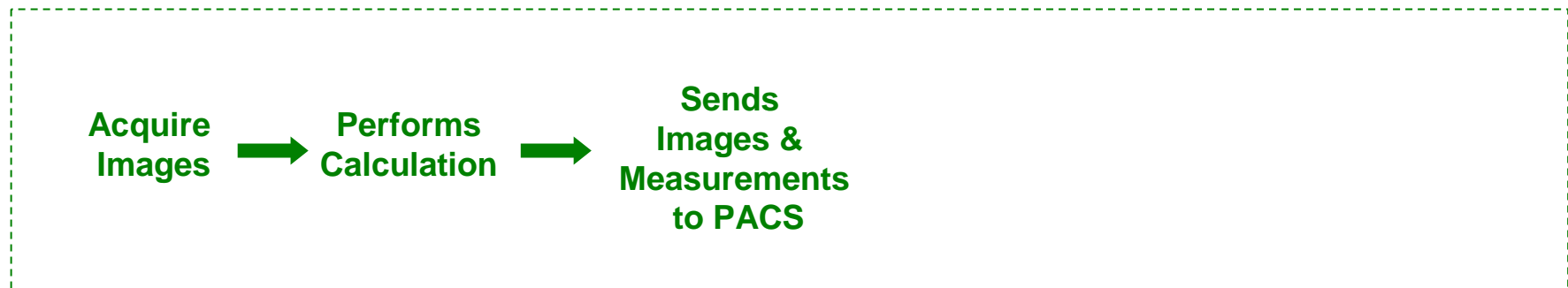
3) DICOM Structured Reporting (cont')

- Using DICOM SR
  - Typographical errors are eliminated
    - Errors can be introduced during the writing (wrote them wrongly, in an unreadable manner) or typing in

  - Workflow
    - Reduce reporting turnaround time.
    - The Sonographer can perform more procedures
    - Concentrates of patient (as opposed to copying measurements)
    - Overall efficiency and diagnostic process is improved

4) Unified Communications

- Recent study by the University of Maryland indicates the cost of poor communications in US hospitals at $12 billion per year

  - One of the key findings was that unnecessarily long hospital stays such as the time and resources squandered due to the long time taken to discharge patients accounts for 54% of total losses.
  - Solution to these inefficiencies rests largely in investment in information technology that would help streamline communication among hospital caregivers.

- Full study can be download from www.rhsmith.umd.edu/CHIDS/pdfs_docs/ResearchBriefings/ CHIDS-ResearchBriefing-Vol3Issue1a.pdf

4) Unified Communications (cont)

- Fundamentally put, Unified communications (UC) refers to a trend in business to simplify and integrate all forms of communications.

- UC offers the opportunity to remove traditional communications barriers by 'integrating' both real-time (synchronous) communications like telephone calls, voice mails etc with message based (asynchronous) communications like email, fax etc into a single medium.

  - Allows an individual to send or receive a message on one medium and received on another
  - Example, one can receive a voice mail message and then read it in their email inbox using a unified communications program.

4) Unified Communications (cont)

- Fundamentally changes the paradigm

  - Redefine how communication are done while reducing the cost required to acquire and maintain the underlying infrastructure required for both types of communications.
  - Will also have a profound effect on the way we conduct meetings, perform training and communicate in the future.

- What does it translate for medical imaging informatics?
  - Innovative ways to simplify workflow, enabling better ROI, both monetary and beneficial gains.

4) Unified Communications (cont')

- Healthcare, a communication intensive environment
  - Healthcare workers needs to communicate effectively among themselves as well with the patients in order to ensure sastifactory patient care.
  - Yet quite often, they are bound by the hassle and nature of traditional communication devices.

- Improving patient care by enabling seamless communication and collaboration by helping relay the Information via either synchronous or synchronous medium based on how they set the rules on how, when, where, and on what devices they want to be contacted,
  - This elimates healthcare workers from playing 'phone tag' and spend more time with their patients.

5) Clinical Depth on PACS Workstation

- PACS Workstation has traditionally provided simplistic tools, leaving the complicated reprocessing functions (e.g. for Mammo, CAD, CT, MRI, PET-CT, 3D/4D Ultrasound) to the OEM provided workstation.

- This results in a negative impact on workflow.
  - The diagnosing physician having to access multiple workstations (sometimes located in a different location) in order to gain access to advances tools.

- Many PACS providers are starting to offer integration to 3rd party applications (Tera Recon, TomTec) that have gain clinical acceptance.

5) Clinical Depth on PACS Workstation (cont')

- The trend of providing clinical depth onto the PACS workstation translate to;

    - Complete diagnostic capabilities from one station
    - Users can access all applications from one review station; no more jumping back and forth between computers for various functionalities
        - This increase Imaging and Diagnostics Efficiency
        - Increases productivity as it reduce the total turnaround time for reporting

    - One Click -> One Study -> One Workflow

5) Clinical Depth on PACS Workstation (cont')

- Important consideration:
  - Ensure that that 'integration' is context sensitive.
    - Reduces number of clicks to search and load a patient study
    - Seamless interaction reduces the likelihood of human error

  - Remember, there are many 'layers' of integration
    - (Integrate =/= Interface)

Other Interesting Trends – Mobility

- "Mobility" is the 'new black'

- New Generation type of mobile computing (Tablet PC)
  - Technology to suit the workflow of other physicians (Emergency), paramedical professional and nurses.
  - Provides more points of access to images to enhance diagnostic effectiveness .

- Mobile Imaging equipment
  - Portable x-ray, ultrasound, CT, MRI and more!)
  - Image acquisition 'without barriers'

Other Interesting Trends – Mobility (cont')

- Wireless Networks

  - Transmission of data not only from PACS Server to Workstation but also from modality to PACS Server.

  - Wider adoption of wireless access can contribute to expand the scope of image distribution.

- Web Based Designed Solution

  - Web based PACS Workstation for ease of deployment
    - Enables ease of access to images for diagnosis
  - Effective transmission of DICOM Images over low bandwidth?

Other Interesting Trends – Web 2.0

- Utilization of Web 2.0
  - To foster Relationships, Collaboration, and Connections in medical imaging
  - Increase opportunities of not only peer-networking but also education and continual professional education.
  - Increase Imaging and Diagnostics Efficiency and Effectiveness

Thank You

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