DICOM Medical Image Management
the Challenges and Solutions – Cloud as a Service

Gunjanbhai Patel
Engineer
Medical Software and
Healthcare IT Developer
Bangalore, India
Outline
• Introduction
• Challenges
• Solutions
• Cloud Computing Services
• Summary
• References
“Now days, in connected world, we think instant, convenient and highly secured communication.

Why should healthcare IT be an exception, when the inability to quickly obtain vital medical DICOM images and patient study information and reports can have life-threatening consequences?” asks to any PACS/RIS service providers

Healthcare IT-driven revolution Organization – Like Hospitals, Radiology Centers, Workstations, PACS Systems etc.

- Investing in the modest Healthcare IT systems and technologies
- With the clear goals of reducing operating costs with Improving healthcare outcomes and deliveries
- Focusing on Healthcare Quality Managements

DICOM Images management and Solutions – Cloud as a Services
DICOM Imaging Challenges in India Scenarios:

1. Radiology Department in Hospitals and Clinical Imaging Centers are not connected on same DICOM Network
   - Collecting DICOM from Modalities
   - Non-DICOM data from other medical Devices
     - Ex. ECG Medical Devices or to use and installed Analog Imaging Devices

2. PACS and RIS system administrators continuously challenged with interoperability issues
   - Installed Modalities are old refurbished and with No/Digital DICOM compliance supports and limited DICOM services features

3. Teleradiology Center
   - DICOM Networking and Diagnostics Imaging Data Access system problems due to lack of IT Infrastructures at Remote Location
   - In rural area there is Network speed and its Availability issue and Language Barrier Problems in India
4. Expanding Radiology and Modalities Imaging systems, but the lack of entire DICOM network workflow
   - Investing on Highly Cost - Installing new Hardware and Software with latest updated technology and advance features
   - In India referral physicians or doctors don't have Computer, so they examine on Paper-Film that brings by technicians and takes more time compare to Digital Imaging Systems

5. Lack of DICOM/IHE/HL7 Standards awareness and its importance
   - Doctors, Technicians, PACS Administrator, Hospital IT staffs

6. Any disaster of PACS/Digital Imaging systems
   - Severe power loss in the Natural Disaster-affected area
   - Complete collapse of the public utility infrastructure locally or centrally digital image management systems

7. Adherence to appropriate DICOM Imaging Security policies and system
Distributed computing is coming in the new forms as Cloud computing and all component model services are accessed via internet browsers.

It allows consumers and providers to use applications without installation and access their medical images files, application development and maintenance at any computer with internet access.

Moreover, Cloud computing technology will solve this situation
- DICOM Medical Imaging Management
- DICOM NEMA standards compliance and services support
Cloud Computing

- The NIST organization Defined: “Cloud computing is a model for enabling everywhere, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.”

- Types of Cloud Computing Models:
  - SaaS (Software as a Service)
  - PaaS (Platform as a Service)
  - IaaS (Infrastructure as a Service)

- Cloud Computing model “customers” plug into the “cloud” to access IT resources which is provided “on-demand”
  - Internet based computing where virtual shared resource provides software, infrastructure, platform, device and other resources
  - Services to customers on a pay-as-you-go basis.
  - It focuses on as a lower cost delivery model for Healthcare IT services
Architecture for the Solutions

Cloud as a Service

INTERNET

CLOUD PACS

CLOUD DATABASE

Hospital 1

Hospital 2

WORKSTATION

MODALITY

ANY PACS

WORKSTATION

MODALITY

ANY RIS

DICOM INTERFACE

DICOM INTERFACE

March 2013 DICOM International Conference & Seminar

DICOM Medical Image Management the Challenges and Solutions – Cloud as a Service
Cloud Computing Services

SaaS
- DICOM Supported Application
- DICOM Imaging Tool
- Non-DICOM Device Applications

PaaS
- Middleware Services
- DICOM Protocol Upper Layer
- Operating Systems

IaaS
- PACS/RIS Systems
- Network Router
- Cloud Databases

Consuming
Building
Hosting
Cloud-as-a-Services for Solutions

- It offers meaningful use healthcare IT solution, Helping to hospitals and Radiology Imaging Service providers on same DICOM connected network protocol
- Medical Images are managed by centralized administration system in virtually shared Cloud PACS or Cloud Images Database server and balanced client supply needs
- No need for the individual access points to maintain any of the DICOM standards services
- DICOM Services are enabled Universal and On-Demand supply
  - Network Access to a shared pool of rapid flexibility
  - DICOM Configurable computing services and Images resources
Summary

- DICOM on cloud computing is bringing the on-demand software model to desktop or mobile and tablets, in a single login environment w/o installing additional Hardware or Software
  - Based on your specific needs, you can turn on new functionality
  - Sharing studies with a colleague is just one click away.
  - No need of USB/CDs, VPNs and Paper Filmless images

- DICOM Cloud Computing promises and Meaningful Use
  - Provides Robust cloud computing based DICOM Imaging Storage Solutions at Low Cost and High Measurable - “Pay-as-you-Go”
  - Enables Instant Retrieval of DICOM images and reports on Demand Anytime and Anywhere through virtually shared Cloud PACS or Cloud Imaging Server Database
  - Disaster recoverability which can be a natural solution some of the problems we faced for long-term medical image archive
References

http://dicom.nema.org/

http://www.IHE.net/

http://www.nist.gov

http://www.acr.org/

Thank you for your attention!
Gunjanbhai Patel

gunjannpatel@gmail.com

Medical Software and Healthcare IT Developer

Bangalore, India