DICOM Educational Conference
Brisbane, Australia

SEPTEMBER 27-28, 2018

DEPLOYING DICOM EFFECTIVELY

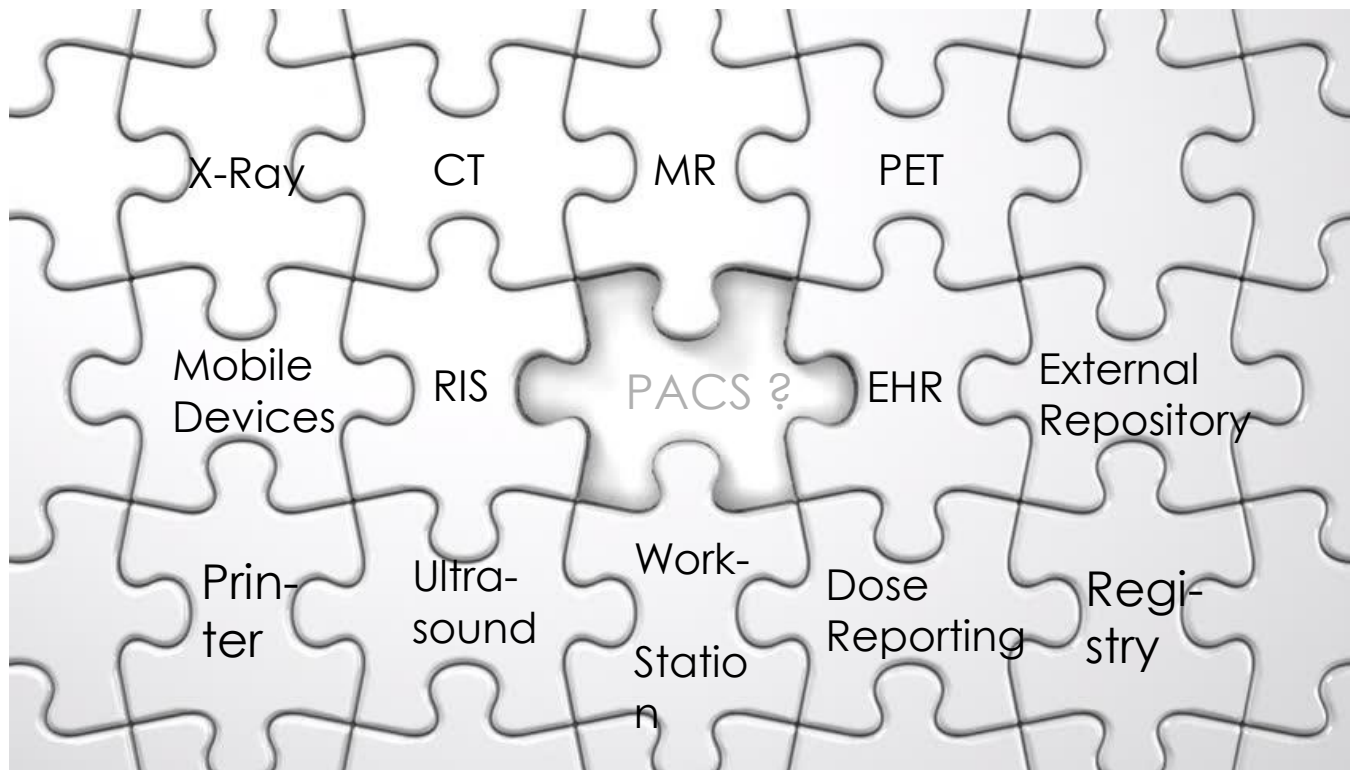SIEMENS HEALTHINEERS

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Agenda

- Introduction

- Steps of effectively deploying DICOM based systems

- New developments in DICOM to support effective deployment

Deploying a New System - Where to start ?

Steps for effectively deploying DICOM Systems

- Planning

- Purchasing

- Installation

- Maintenance

- Troubleshooting

Planning

OR HOW TO FIGURE OUT WHAT YOU NEED

Before you even start …

- Remember
  - Not one single solution fits all environments
  - Standards like DICOM help integration but are not a „one stop shop"
  - The customers owns the deployment

Therefore ...

Identify what you need

- What are the workflows that need to be supported, e.g. for a PACS:
    - Information sharing inside the department, across departments or even across enterprises
    - Access Information through mobile devices
    - Support for advanced display features (3D visualization, segmentation, CAD, ….)
- What type of data need to be supported?
- What other systems are part of the environment?

⇒ IHE may give some guidance

How IHE can help?

- IHE defines profiles, which address interoperability issues in specific clinical scenarios

    - Implementation guides, which define how to use underlying standards for these scenarios.

    - Examples are Scheduled Workflow, Cross-Enterprise Document Sharing, Radiation Exposure Management, …

- IHE provides the opportunity to test these profiles against other vendor implementations at the so-called Connectathon

Identify DICOM Features and underlying Technology

- Basic DICOM features

  - Send and receive of imaging objects (e.g. between Modalities, PACSs and Workstations)

  - Query and retrieve of imaging objects (e.g. between PACS and Workstations)

  - Provide Patient and Procedure Information through Modality Worklists (e.g between RIS and Modalities)

- Some more advanced DICOM features

  - Reliable Storage of images

  - Workflow Management

  - Exchange of report information, key images, image manipulations, scanner protocols, …

- Underlying Technology

  - Conventional DICOM Services based on TCP/IP

  - Web Services using REST

Purchasing

THE DEVIL IS IN THE DETAIL

How to translate clincal workflow into DICOM

- Some DICOM Terms you may run into

    - Service Object Pair (SOP)

    - Information Object Definition (IOD)

    - Service Class User and Service Class Provider

- Some examples:

    - My CT scanner shall be able to send images to the PACS:
      The CT scanner shall support the CT Image Storage SOP Class as a SCU

    - My CT Scanner shall be capable to receive the worklist from the RIS
      The CT scanner shall support the Modality Worklist Information Model – FIND SOP Class as a SCU

$\Rightarrow$ Compare those features across all product's DICOM Conformance Statements

What is the DICOM Conformance Statement

- Document describing the DICOM implementation of a specific product following a well defined standardized format

- Can be used to compare functionality of two different products based on supported SOP Classes

SOP Class	UID	SCU	SCP
Transfer			
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Yes	Yes
…			
Workflow Management			
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31	Yes	No

- Provide lots of technical details that can be used for configuration and trouble shooting

Could the new system easily be integrated into my environment

- Compare the DCS, pay attention to specifc SOP Classes, e.g.
  - Storage
    - Enhanced multiframe objects vs single frame objects
    - Features for advanced visualization: Presentation states, fusion objects, segmentation objects, …
    - Structured Reports (for communication of measurements, CAD results or dose information, …)
    - Key Object Selection Documents and their usages (flagging Key Images, as a manifest for cross-enterprise document sharing or image object change management)
    - Supported Transfer Syntaxes
  - Is Workflow management needed, e.g. support for?
    - Modality Performed Procedure Steps for tracking acquisition workflow
      - Support for additional information like dose, material usage information, cancelation reasons, ….
    - Unifiedf Procedure Steps for worklist management
    - Storage Commitment for reliable storage

Installation

HOW DO WE MAKE IT WORK

Configuration of systems

- General Configuration parameters
  - Host name, AE title, Port for local and remote systems
  - Web Service end points
- Service specific parameters
  - Extended negotiation parameters
  - Transfer syntaxes
- System specific Configuration parameters
  - Supported Services
  - Code Sets
  - Acquisition Protocols
- ⇒ Refer to the DICOM Conformance Statement for details.

Maintenance

Ensuring Interoperability when

- Adding new DICOM devices to the system configuration

- Upgrading existing systems to a newer version

- Adding additional code set

- Enabling additional licensable features

Troubleshooting

What to do, when DICOM Communication is not working

- Ensure network connectivity (ping, DICOM Verification Requests)

- Check DCS for technical incompatibilities, status codes, …

- Use publicly available tools for

  - Capturing network traffic

  - Review DICOM Header content

  - DICOM Object validation

  - Simulators provided in validation toolkits

New Developments in DICOM to help effective Deployment

Conformity Assement   (Supplement 207)

- The current DICOM standard contains a lot of conformance related requirements but no information on how to assess conformance

  - Currently conformance is assesed by vendors themselves

- Regulatory Initiatives throughout the world are working on conformity assesment programs.

- Extend DICOM standard with

  - additional conformance clauses

  - test scenario's, test cases, and guidance on conformance assessment reporting.

  - ⇒ Provide one framework, that vendors can comply to

Impact on effective deployments

Supplement 207 will provide

- A standardized verification framework, that will lead to better verified products

  - Products relased will be conforming to their DICOM Conformance Statement

- A proper way of documenting evidence of the validation activities for DICOM feature.

⇒ Faciltiate better integration of products into clinical environments though

  ⇒ better assessment of compatibility of DICOM implementations

Revisions to the DICOM Conformance Statement Template (Supplement 209)

- Current DICOM Conformance Statements

  - tend to be long and incomplete,

  - vary between vendors,

  - lack important information

  - and require a lot of technical background knowledge

- New work item to improve content and structure of DCS to

  - Better meet needs of all user groups (clinical, sales, service, engineering…)

  - Better facilitate comparability of different product's DICOM functionality

  - Avoid ambiguities/inconsistencies between different vendor documentation

- A survey was performed to identify pain points and areas for improvement

Areas of improvement

- Less repetitive information

- More concise representation of information (e.g. in tables)

- Improve documentation of networking services

- More consistent documentation of IODs created

- Better documentation of private attributes, SOP Classes

- Provide documentation of display capabilities

- Information that belongs together should be in one place

- More information in overview

- Provide template in addition to normative text

New Structure

1. Overview
2. Table of Contents
3. Introduction/Disclaimer
4. Product Description
5. Service and Interoperability Description
6. DICOM Configuration
7. Network Communication Details
8. Security

Impact on effective deployment

- More easily find information relevant for different user groups

- Better facilitate comparability of different product's DICOM functionality

- Avoid ambiguities/inconsistencies between different vendor documentation

- Address topics currently not addressed (e.g. display features)

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Thanks for your attention