DICOM Structured Reporting
Overview

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on Structured Reporting
The scope of DICOM SR is the standardization of structured data and clinical observations in the imaging environment.

SR objects record observations made for an imaging-based diagnostic or interventional procedure, particularly those that describe or reference images, waveforms, or specific regions of interest.

Most important in the stages before report creation
Why do you need to know about DICOM SR?

• DICOM SR is the standard to exchange structured data produced in the course of image acquisition or post-processing, where:
  – Leveraging the DICOM infrastructure is easy and desirable
  – Results should be managed with other study evidence

• Replaces legacy kludges
  – Manually transcribed worksheets, screen scrapes from analysis apps, one-off integrations

• Examples
  – Sonographer measurements
  – Computer-aided detection results
  – QC notes about images
  – Radiation dose reports
  – Image exchange manifests
DICOM SR is not "Structured Data Entry"

- Hierarchical pull-down menus for results capture or report creation is often denoted “structured reporting”
- DICOM does not standardize applications or data entry techniques
- Structured data entry is a valuable means of creating SR content *in certain circumstances*
  - Standard SR templates and value sets can support the implementation of structured data entry forms
Key Aspects of DICOM SR

- SR documents are encoded using DICOM standard data elements and leverage DICOM network services (storage, query/retrieve)
- SR uses DICOM Patient/Study/Series information model (header), plus hierarchical tree of “Content Items”
- Extensive use of coded nomenclature
  - Allows use of vocabulary/codes from non-DICOM sources (especially LOINC and SNOMED, possibly RadLex)
- Templates define content constraints for specific types of documents / reports
SR Content Item Tree

Arrows are parent-child relationships
• Contains, Has properties, Inferred from, etc.

Content Items are units of meaning …
• Text, Numeric, Code, Image, Spatial coordinates, etc.

… or units of structure
• Container
DICOM SR Example

Hierarchical tree structure

Measurements with related method and statistical properties

Encoded with DICOM attributes

External codes (LOINC)

EDD from LMP

11779-6
The Problem of SR Flexibility

- A document creator can put in anything in any structure
- A document reader must handle every possible document
- Need to constrain the SR content to enable meaningful receiving applications
  - Structure
  - Content
SR Templates

• Like IODs, but for SR content
  – Define attributes (concepts), required/optional, and allowed values
  – Specify hierarchical structure of sections and subsections (containers)

• Specified for a variety of uses, often in conjunction with specialty societies
  – OB/GYN, vascular, echo, and IVUS ultrasound
  – X-ray, CT, and MR angiography
  – Mammo, chest, and colon computer-aided detection
  – Radiation dose
DICOM SR Object Classes

- General use **Enhanced** and **Comprehensive** - Text, coded content, numeric measurements, spatial and temporal ROI references (any template)

- **CAD** - Automated analysis results (SOP Class per CAD template)

- **Key Object Selection** (KO) - Flags one or more images
  - Purpose (“for referring physician”, “for surgery”, …) and textual note
  - Used for key image notes and image manifests (in IHE profiles)

- **Procedure Log** - For extended duration procedures (e.g., cath)

- **Radiation Dose Report** - Projection X-ray; CT
Summary

- DICOM SR is the standard for exchange of structured data / clinical observations in the imaging environment
- DICOM SR leverages existing imaging infrastructure and toolkits
- DICOM SR is constrained by templates and SOP Classes to improve interoperability for specific use cases
For more information

- DICOM Standard
  ftp://medical.nema.org/medical/dicom/2008
  - Part 3: SR SOP Classes (Section A.35), SR Modules (Section C.17)
  - Part 16: Templates (Annex A)

- David Clunie’s introduction to DICOM SR
  http://www.pixelmed.com/srbook.html

- IHE use cases for DICOM SR
  - Radiology Technical Framework Vol 1: Key Image Note (Section 8), Evidence Documents (Section 14)
  - Cardiology Technical Framework Vol 1: Evidence Documents (Section 7)