SIIM 2007 Hot Topic 7
DICOM Update

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Overview

- New objects & services (*David Clunie*)
- Network Configuration (*Rob Horn*)
- Application Hosting (*Lawrence Tarbox*)
DICOM Update

- More enhanced & new technology image objects
- Additional dose encoding objects
- More SR-based results & CAD objects
- More 3D work on registration & segmentation
- Structured display
- Communication of display parameters
- Document encapsulation
- Specimen identification
- Substance administration query/verify
- Unified worklist
- Frame level retrieval
Enhanced Image Objects

- Initially MR, then CT, then XRA/RF
- Sup 43 (WIP) - 3D Ultrasound
- Sup 110 (LB) - Ophthalmic Tomography
- Sup 116 (FT 2007/01) - 3D X-Ray
  - Cone beam CT & tomosynthesis
  - General purpose & dentistry
- Sup 117 (DLB) - Enhanced PET
  - Harmonize cardiac/respiratory gating with CT/MR
- Sup 125 (PC) - Breast Tomosynthesis
Enhanced Image Objects

- "Old" objects
  - Single frame
  - Not up to date with technology changes (MDCT)
  - Too much optional, ambiguous, or proprietary

- "New" (enhanced) objects
  - Multi-frame (faster performance, better compression)
  - Better organized (volumes, dynamic contrast)
  - Encode advanced acquisition technique
  - Mandatory rather than optional terms & attributes
Dose Encoding

- Increasing international public and regulatory scrutiny of radiation dose from imaging
- Existing encoding in images & PPS inadequate
- Need persistent object related to irradiation events
- SR-based encoding
- Sup 94 (FT 2005/11) - Radiation Dose Report
- Sup 127 (PC) - CT Radiation Dose Report
- CP 687 - Dose Reporting for Mammography
CT Radiation Dose Reporting

- Significant concern about radiation dose of screening MDCT exams
- Difficult to estimate/monitor from images alone
- Acquire, store and analyze information about “irradiation events” separately from images
- IEC defines metrics
- DICOM defines encoding in Sup 127 (as SR objects)
- ACR and FDA “encourage” adoption
- NEMA (vendors) commit to timely implementation
Results SR and CAD

- **CAD**
  - Sup 126 (WIP) - Colonoscopy CAD

- **Results reporting**
  - Sup 128 (PC) - Cardiac stress testing
  - Sup 129 (WIP) - Electrophysiology
  - Sup 130 (WIP) - Ophthalmic refraction
3D-related Objects

- **Registration**
  - Sup 73 (FT 2004/01) - Rigid & Fiducials
  - Sup 112 (FT 2006/08) - Deformable

- **Segmentation**
  - Sup 111 (FT 2006/08) - Raster
  - Sup 132 (WIP) - Surface
    - Sup 131 (WIP) - Implant Description
Display & Presentation

- **Sup 123 (WIP) - Structured Display**
  - How to layout specific images
  - As opposed to hanging protocols, which are rules for a class of images
  - Dentistry initiative, general mechanism

- **Sup 124 (WIP) - Communication of Display Parameters**
  - For managing display device calibration
  - Centralized storage of QC results
Document Encapsulation

- For storing and distributing “external” documents within PACS
  - Digitized paper
  - Page oriented results
  - Other structured document formats
- Sup 104 (FT 2005/03) - PDF
- Sup 114 (FT 2007/01) - CDA (HL7)
Integration of Images and LIS in Anatomic Pathology

- Sup 122 (WIP) - Specimen Identification
- Renewed interest by pathology group
- Original attempt was too simplistic

Workflow objects in LIS

- Patient
- Operation
- Accession
- Part
- Block
- Slide
- Image
- Location within Slide

In the normal clinical environment, an image can be associated with a Part, a Block, or a Slide.

In some situations, an image can be further associated with an area of a Slide, for example, one can specify an x,y,z location on a slide (see coordinate microscopy IOD).

One can always image a small region of a gross specimen. This would be associated with a Part and with a comment describing the field (i.e., "tumor").

One could imagine an image of material from two Parts in the clinical environment; this image would probably be associated with the Accession.
Other work ...

- Substance administration query/verify
  - E.g., for modality to check contrast sensitivity

- Unified worklist
  - Re-visit use cases for General Purpose Worklist
  - 1:1 scheduled:performed steps
  - Push (notify) & pull (query) models for tasks

- Frame level retrieval
  - For large (enhanced) multi-frame images
  - E.g., to view an SR reference to a subset of frames
Conclusion

- DICOM continues to track modality technology advances
- Revisiting outmoded objects
- Increasing diversity of SR for results
- Greater 3D emphasis as registration, segmentation and fusion become routine
- Other innovative work in new areas …