Update on ATC DICOM WG7, IHE-RO, and Vendor Efforts

Walter R. Bosch, D.Sc.

ATC Meeting

June 19, 2008

Philadelphia, PA

DICOM: 2nd Generation RT Objects

- Some limitations of current DICOM RT objects
  - Complex referential structure means changes in one object may necessitate changes in others objects just to maintain referential integrity.
  - Difficulty in retrieving a collection of RT objects for a given phase of a patient's treatment
  - New DICOM objects offer better representation for image segmentation
  - Multiple uses of RT Plan for prescription, plan development, approval, delivery.
  - Complex conditions of a common RT Plan object used in multiple contexts, many optional attributes

DICOM WG-7 Activities

- New RT objects (larger number of smaller objects)
  - Workflow instructions
  - Physician Intent, RT Planning Prescription objects
  - RT Course (“container”) object – support for unmanaged workflow, clinical trials submissions
  - Use new DICOM segmentation (surface, volume) and registration (rigid, deformable) objects
  - Radiation Set (fraction group)
  - Separate radiation delivery objects per treatment modality: C-arm Photon Beam, C-arm Electron Beam, C-arm Ion Beam, Tomotherapeutic Photon beam, Non-isocentric Photon Beam

DICOM WG-7 Meeting Schedule

- WG-7 meetings addressing the design of 2nd - generation DICOM RT objects
  - Los Angeles (ASTRO) - Oct 30 – Nov 2, 2007
  - Las Vegas - Dec 10-14, 2007
  - April 22-25, 2008 – NEMA HQ
  - June 16-19, 2008 – Albuquerque
  - Oct. 21-24, 2008 – Tampa

IHE-RO Update

- ATC is an **Organizational Member of the International Integrating the Healthcare Enterprise** (IHE) as of March 6, 2008, and remains fully committed to supporting the mission and vision of IHE in Radiation Oncology.
  - Active participation in IHE Radiation Oncology Technical Committee
  - Distribution of IHE-RO Test Data and Test Tools via ITC Secure FTP server
  - Participation in 2008 IHE-RO Connectathon Test Committee (Jul 31 – Aug 5, 2008, Houston)

IHE-RO Profiles

- 2007 IHE-RO Profile
  - Basic Treatment Planning Inter-operabilty Profile was tested at Aug 2007 Connectathon
- 2008 IHE-RO Profiles
  - Multimodality Registration Profile to be tested at Aug 2008 Connectathon in Houston and demonstrated at ASTRO 2008
  - Treatment Delivery Workflow Profile is not yet ready for Connectathon
- 2009 IHE-RO Profiles
  - Advanced Plan Integration – Electrons, Dynamic plans, Compensators, Bolus, Dose compositing
  - Extended Objects / Actors – New imaging modalities
  - Enterprise User Authentication

ITC Support of Treatment Planning Vendor Data Submission Efforts

- **BrainLAB**
  - Received DICOM data 5/29/2008 (CTs, RTstruct, RTplan, RTdose, Rtimages)
  - RTdose was not multi-frame; Beams missing ITC required iso-center position
- **CMS**
  - Received incorrectly registered RTdose for HFP patient
  - CMS agrees and is investigating
- **Nucletron**
  - SPOT-Pro (brachy seed) is ATC compliant as of 4/7/2008
  - Received US images from Wm Beaumont (3/26/2008) and Nucletron (pre-release software) – deemed too far from DICOM standard
- **SonoTECH** (European HDR planning system)
  - Vendor Complete as of 4/11/2008
- **Tomotherapy**
  - Clarification re availability of Hi-ART 3.x with DICOM export capability (6/6/2008)
- **Varian Eclipse**
  - Have received non-compliant data from multiple sites (frequently from Japan)
  - Data processed at ITC with non-production import code

Nucletron DICOM Ultrasound Issues

- Unable to view images with standard DICOM viewers.
- Significant deviations from DICOM Ultrasound Multi-frame Image Information Object Definition
- Among problems noted by ITC:
  - Only one frame per file (expect multiple frames)
  - Number of pixels expected from header attributes does not match the number of pixels actually present in each image file
  - Image files include Image Plane Module (not defined in the current version of ultrasound objects).
- Dr. Matthews has reported problems to WBH and Nucletron