IHE-RO Technical Committee

November 4-6, 2010
8:30-6:00 p.m.

San Diego, CA

Technical Committee Chairs:
Bruce Curran, MS, ME
Stuart Swerdloff, PhD

IHERO Task Force Co-Chairs
Jatinder Palta, Ph.D.
Prabhakar Tripuraneni, M.D., F.A.C.R., F.A.S.T.R.O.

Mission Statement: *The American Society for Radiology Oncology (ASTRO) has formed a multi-society Task Force to undertake an initiative to promote the Integration of the Healthcare Enterprise (IHE) – Radiation Oncology (RO), fostering seamless connectivity and integration of radiotherapy equipment and the patient health information systems. The Task Force will include members from ASTRO, RSNA, American Association of Physicists in Medicine (AAPM), the American College of Radiology (ACR) and the Medical Imaging and Technology Alliance (MITA). In addition, members of the International community have also been invited to participate in IHE-RO. The IHE-RO Task Force, in close collaboration with radiotherapy product manufacturers, will develop appropriate integration profiles for radiation therapy and setup a demonstration of seamless communication among the full array of radiotherapy products.*

Attendance

Name	Company	Email	11/4	11/5	11/6
Bruce Curran	RI Hosp./ASTRO	bcurran1@lifespan.org	Y	Y	Y
Stuart Swerdloff	Elekta	stuart.swerdloff@elekta.com	Y	Y	Y
Walter Bosch	Wash. Univ./ATC	bosch@wustl.edu	Y	Y	Y
Rishabh Kapoor	U. Florida	rkapoor@ufl.edu	Y	Y	Y
David Murray	Tomotherapy	dmurray@tomotherapy.com	Y	Y	Y
Chris Pauer	Tomotherapy	cpauer@tomotherapy.com	Y	Y	Y
Ulrich Busch	Varian	ulrich.busch@varian.com	Y	Y	Y
Sue Reilly	Elekta	sue.reilly@elekta.com	Y	Y	Y
Mark Pepelea	Philips	mark.pepelea@philips.com	Y		
David Wikler	IBA	david.wikler@iba_group.com	Y	Y	Y
Peter Selby	Medcom	pselby@medcom-online.de	Y		
Norman Trapp	Siemens	Norman.Trapp@siemens.com	Y	Y	Y
Christof Schadt	BrainLAB	christof.schadt@brainlab.com	Y	Y	Y
Koua Yang	Philips	koua.yang@philips.com	Y	Y	Y
Sanjay Bari	Elekta	sanjay.bari@elekta.com	Y	Y	
Padonaja Chilla	Philips	padonaja.chilla@philips.com	Y		

Meeting Minutes

I. Call to Order
   a. Welcome and Introduction [11/4/10 @ 8:50] – Bruce Curran reviewed patent and anti-trust issues.
   b. Approval of Agenda [11/4/10 @ 9:20]

II. Reports and Updates
   a. Finalize agenda for Jan 24-28, 2011
   b. IHE-RO Planning Committee [11/4/10 @ 9:40]
      - Planning Committee discussions
        II> Profile Throughput – In response to the IHE-RO PC concerns, the TC is attempting to improve its process to maximize productivity and will work with PC on use case definitions that will further this effort.
        III> Help for the PC
          a. Clarification/drafting of IHE-RO Use Cases – needed prior to PC T-con Dec. 20, 2010.
          b. Draft CPs related to DICOM tags are needed prior to Dec 7, 2010 WG-7 meeting.
        IV> Updates
          a. Planning committee has released an RFP template
          b. IHE-RO has high visibility at ASTRO.
          c. Bruce Curran and Ramesh Rengan interview (see http://www.youtube.com/watch?v=uJ8cxD7MT54)

   c. Use cases for 2011-2012 cycle (1+ day)
      - PC Voting [11/4/10 @ 13:30]
        II> Structure Set Templates – Richard, Sha, and Sasa to work with Walter
        III> New ranking of Profiles
          a. Patient Safety still highest (60)
          b. Radiation Oncology Workflow Exchange (39)
          c. Prescription Automation (29)
          d. Structure Templates (29)
          e. Anonymization (27)
          f. User Authentication and Authorization (will be tabled until further notice)
        IV> ASTRO/ROI National Radiation Oncology Registry – Comparative Effectiveness
          a. IHE-RO use case? Definition of "collator" actor and interface to TPS, TMS, HIS, RIS, etc.
          b. Rishabh Kapoor – Rad Onc Workflow Exchange presentation
        V> Patient Safety [11/4/10 @ 14:40]

a. Stuart Swerdloff – report on ASTRO vendor/professional society meeting (11/2)
    i. Interoperable communications
    ii. Patient coordinates
    iii. Standards for processes
    iv. Plan checking software
    v. Round-trip communication (semantic) checks
    vi. MLC positioning errors
b. TC to assist PC in drafting a use case based on RT manufacturers' safety commitment (Response needed before Dec 20, 2010 PC T-con.)
    i. Radiation Therapy Pre-treatment QA Verification and Approval
    ii. Verification of Beam Modifying Accessories
    iii. Patient Positioning Confirmation

c. Review of AAPM TG-201 draft – brainstorming session [11/5/10 @ 9:00]
    i. Data Transfer QA across all systems (imaging → TPS → TMS → TDD → TMS/TPS)
        1. Data transfer integrity
        2. Semantic interoperability across systems
        3. Data consistency when plans are modified
        4. Redundant representation of plan ("2nd channel")
    ii. Risk alerts?
    iii. Check interoperability/validation status of data sources?
    iv. Validate data prior to next step in workflow?
    v. Training (weak link in mitigation?)
    vi. Error/warning messages – more standardized way to convey warning: content and format, active vs passive dialogs, etc.
    vii. Safe response to communication failures? Legacy systems?
    viii. Patient specific QA, including contouring QA?
    ix. QA Workflow: Redundant check of plan in 2nd Check system with results reported to TMS
    x. Plan summary (DICOM encapsulated PDF) created by TPS, exported to TMS, and displayed at TDD; supports digital signatures (in DICOM or PDF).
    xi. Methods for verifying (barcoding, etc.) treatment accessories (per MITA/Advamed pledge)
    xii. Recording for TDD that are not connected to a TMS → TDW profile
    xiii. Plan modifications
    xiv. Dose tracking

xv. Workflow support for daily QA, e.g., via "portal dosimetry", database consistency check, retrieval of plan MD5 digests, etc.
xvi. Forbid undocumented/unverified changes to treatment plan outside the TPS.
xvii. "Semantic Cop" proposal: evaluates instances of a plan (at TPS, TMS, TDD) against a set of constraints.
xviii. Communication of iso-center in CBCTs

d. **Possible Safety-Related Use Cases** [11/5/10 @ 14:00]

i. Plan Approval ➔ David Murray to Draft Use Case

1. Approval (a) by Physician approval (at TPS), (b) Physics 2nd Check approval (at TMS), and (c) IMRT verification in phantom
2. Failure modes (unapproved plan treated): (a) change machines w/o QA, (b) plan revision (wrong plan treated)

ii. TPS Screen Capture PDF

1. Plan report (PDF with screen capture);
2. Displayed at TDD for reference and approval prior to delivery
3. DICOM encapsulated, references RT Plan instance

iii. Plan QA Checker (Automated Quality Agent (AQuA)) – evaluate plan against a set of constraints ➔Bruce to draft

1. Structured interface to plan QA device(s)
   a. semantic analysis of plan
   b. "MU check" 2nd check of dosimetry
2. Could include 2nd check re-calculation of dose to dose reference points
3. Physicist checks and approves appropriateness of semantic checks and dose tolerance of 2nd check before first treatment.
4. 2nd check is repeated before each treatment using physicist-approved tolerances.
5. Could also interface to portal dosimetry, etc.

iv. Online patient-based QA workflow, via beam- or exit fluence detectors.
v. IMRT-QA software
vi. Workflow Manager constraints

e. **Further Discussion of Plan QA Checker (AQuA)** [11/6/10 @ 8:50]
    i. Interaction diagram (David Murray) for Supp 96 style workflow: manages communication with an SCU actor and retrieval of (plan, etc.) objects form an archive. Could split Semantic Cop into two components: one that manages interactions with SCU and archive (more generic), and one that performs analysis of retrieved data (more use-case specific). Need to specify input objects and checking instructions. Dave has posted diagram to BBS (11/6/10).
    ii. Sample use case for the IHE-RO PC: secondary meterset calculation. Split out workflow (enables "forcing function") and data analysis (existing technology).
    iii. Actor to be named <u>Automated Quality Agent</u> (AQuA)
    iv. Ultimately, (a) checking internal consistency of plan data (with respect to safety constraints) and (b) comparison to a redundant ("second channel") plan representation are *complementary approaches* and should *both* be pursued.

f. Structure Set Templates [11/6/10 @ 9:50]
    i. Walter, Bruce, and Bill Bennett to review three options identified at Nov 2009 IHE-RO TC meeting in Chicago.

g. Radiation Oncology Workflow Exchange with HIS [11/6/10 @ 10:00]
    i. Flow of patient registration and demographics information: ADT → TMS → CT Sim, TPS, etc. Investigate use of IHE-Radiology Scheduled Workflow as a starting point (see IHE Radiology TF vol. 1, section 3).
    ii. Three pieces were identified:
        1. **Demographics: ADT + CT Sim/Acquisition (imaging) ➔ Stuart and Rishabh to draft and recruit assistance from TBD CT Sim vendors.**
            a. **Identified gap: Who places the order for the CT Sim modality/image acquisition and what transactions/actors will be specified.**

2. Schedule sharing (enterprise schedule integration): order fulfillment and billing (involves communication back to HIS) – longer-term project
3. RO scheduled workflow.
4. **Bruce to formulate response to PC, including longer-term nature of RO scheduled workflow.**

d. Discussions on previous supplements

- 2007 Dosimetric Planner (30 min) [11/4/10 @ 11:00]

  II> Discrepancy in document as to whether a Dosimetric Planner can *import* a dosimetric plan. Note: this is inconsistent among the diagram (no), actor description text (no), and transactions table (yes).

  a. **Correction Proposal (Stuart to write/circulate by Dec 10):** Remove Dosimetric Plan Retrieval [RO-9] entry from Geometric Planner transactions in the transactions table in Appendix A of Technical Framework (all versions)

- 2008 MMR-RO Profile (60 min) [11/4/10 @ 11:15]

  II> Transactions review – review of RT Structure Set Storage and Retrieval transactions in 2007 BRT and 2008 MMR profiles; discussion of re-use of transactions *versus* context-specific constraints. While there is substantial overlap, subtle differences were found in these contexts.

  a. ➔ Decision *not* to consolidate transactions

  b. Variability of content by Actor and Profile remains challenging; proposed solution is use of Content Profiles.

  c. Section 3.13.4.1.2 and 3.16.4.1.2 have SCP and SCU reversed. Correction required.

  d. Norman will check diagrams and post proposed corrections.

  e. Review of DICOM CP 926 (Common Instance Reference Module (see DICOM Part 3, Section C.12.2)) and MMR profile [11/6/10 @ 11:35]

     i. **The DICOM Standard has changed:** the Referenced Series Sequence (0008,1115) was a Type 1 – this was problematic if there was nothing to reference (i.e., when no image instances are referenced and only frames of reference are referenced). It is now a Type 1C (required if instances are referenced).

     ii. The MMR-RO profile mandates referencing of the Frame of Reference, but *not* the instance references.

iii. A threat to interoperability exists for Actors that were written and tested using pre-CP926 revisions of the DICOM standard.
iv. **Stuart to incorporate Change Proposal for the MMR-RO Profile: Add the following text to Message Semantics of the RO-13 Utilize Spatial Registration Transaction in Vol. 2 of the TF: "The presence of the Referenced Series Sequence (0008,1115) in the Common Instance Reference Module must not be relied upon. (The Type of this DICOM Data Element was changed from 1 to 1C in 2009.)"**

III> Final text
a. Stuart to Incorporate corrections and Reformat as Supplement
b. Vote on Supplement final text by email (or Jan 2011 meeting at the latest)

- 2009 ART Profile (2-3 hrs) [11/4/10 @ 16:00]
  II> **Sue and Bruce: "change profile" –** review of DICOM attribute requirements for ART Beam Techniques (see "ARTI RT Beams 101104.xls" spreadsheet)
    a. ARTI Profile document has been restructured to make it consistent across Beam Types
    b. Open issues are flagged (color code) in spreadsheet
  III> Some open questions to be discussed – review of spreadsheet
    a. Bruce will re-structure document as a Supplement
    b. Homework: TC members to review revised ARTI profile document and spreadsheet (see BBS) and provide feedback to Bruce. Changes to be reviewed at WG-7 meeting Dec 2010.
    c. Specific attributes discussed (yellow cells in spreadsheet):
      i. Block Mounting Position (shall be SOURCE_SIDE): Bruce to discuss with Harold Beunk to determine if PATIENT_SIDE can be included (i.e. handled safely).
      ii. Beam Limiting Device Rotation Direction: does any TPS or TDD support change in rotation direction within an IMAT/VMAT beam?
      iii. Source to Surface Distance: "Required if Patient Setup Technique (300A,0180) is FIXED_SSD" (Type: R+*) or Blank (Type: "") depending on Beam Technique
      iv. High Dose Technique Type: "If present, shall be NORMAL" is ok for Arc Beam Technique

IV> Three Transactions missing for Archive Actor (see BBS posting in ARTI thread by Norman Trapp Oct 27, 2010)
   a. Stereotactic Arc Beam Producer | Stereotactic Arc Beam Storage | R | RO-ARTI-31
   b. Basic Static MLC Beam Producer | Basic Static MLC Beam Storage | R | RO-ARTI-33
   c. MLC Arc Beam Producer | MLC Arc Beam Storage | R | RO-ARTI-35

- 2010 TDW & impact of Supp 96 (30 min) [11/4/10 @ 10:00]
  II> David Murray (WG-7 chair) reviewed status and summarized recent changes in DICOM Supplement 96
     a. WG-6 expects to approve Supp 96 for 2nd letter ballot at Nov 2010 meeting. Summary of changes: Assignment of Transaction UID (SCU); IIS restructuring; previous procedure reference; PS Progress Description string; Final State requirements; Study UID supplied by SCP optional at SCU; Input readiness state; changes in data/time attributes; changes in text to CS
     b. Supp 147 – 6 hours of review with WG-6
  III> Implications of changes to Supp 96 for TDW and future Workflow profiles? – discuss 11/6/10 afternoon.
     a. Clarify which versions of supplements are in use in TDW. There are some significant differences between supplement versions (Uli to double check exact version November 19th, 2010, other vendors to confirm by November 30th, Dave to post to BBS by December 10th, 2010):
        i. Supplement 96 frozen draft (x, dated yyyymmdd: fz2+1, 20071008?) + Instance (Hierarchical) Macro.
        ii. Supplement 74 frozen draft (fz2+6, 20100511?)
     b. New Profiles, **including IPDW**, should use released version(s) of Supplement 96 and 74.
     c. Leave for a future discussion what to do if TDW implementers wish to transition to released supplement versions. TDD vendor(s) expressed interest in prototyping backward compatible implementations (which would currently be out of the scope of the TDW profile)**.**
     d. Once the update is made, move to Final Text in a vote (letter ballot), or Jan 2011 meeting at latest.

- IPDW and DPDW updates (30 min) [11/4/10 @ 10:30]
  II> Discussion of use of delivery instructions *versus* use of input information sequence for encoding delivery (imaging, positioning) parameters
  III> IPDW is currently in development **➔Uli will extract profile text as a *supplement* prior to Jan 2010 meeting**
  IV> DPDW (treatment session manager orchestrates delivery sequence with multiple, discrete devices) – involves "real-time

control for gating/tracking" Use Case (Colin Winfield is chairing Gating Interface Standard working group within NEMA)

e. January 2011 IHE-RO TC Meeting Agenda Items
    - IPDW (<0.5 day)
    - DPDW (0.5 -1 day)
    - TF/Supp Cleanup and Approval for ARTI, MMR-RO, TDW (0.5 day)
    - Safety Related Profile (1-1.5 day)
    - Structure Templates Update (2 hrs)
    - Pre-planning Workflow (ADT + Sim/Acquisition) (1 day)

III. New Business
a. White Papers
    - Deformable Registration – Norman Trapp
    - Segmentation Storage – Christof Schadt Christof Schadt
    - Ion Therapy Beam Techniques as extensions to ARTI Profile: addressing safety issues for emerging technology – David Wikler
    - Relationship between ADT/CT Sim; RadOnc Departmental Scheduled Workflow; Enterprise Schedule/Billing/HIS integration (how the Profiles get connected… to create the larger scale workflow). – Stuart and Rishabh

b. Exchange of prototype DICOM 2nd Generation RT objects to facilitate development of interoperability profiles: Deformable Spatial Registration, Segmentation, Surface Segmentation, etc.
    - ATC to host exchange
    - Disclaimer: "Prototype data for research purposes only , not representative of any commercial implementation." (Walter and Bruce to write readme file.)
    - Consensus: create **WG-7 task force**; limit access to members of task force (Add to Dec 2010 WG-7 agenda)

c. TF 3.0 is mixed, not in final text. We need to move various supplements to Final Text (which contain: MMR-RO, ARTI, TDW). Rather than re-use 2.x or 3.x, create a TF 4.0 that contains the Final Text supplements as of end of January 2011, and release TF 4.0 as Final Text as soon as reasonable (edit can't take place sooner than end of Jan 2011 meeting). Dose Compositing will need to wait for a connectathon before we move it to Final Text.

IV. Future Meetings
a. IHE-RO Technical Committee Face-to-Face Meetings
    - **Meeting** January 24-28, 2011 in Mountain View, CA
        1. 8:30 – 6:00 M-Th; 8:30 – 12:00 Fr

2. Hotel information to be forthcoming shortly

- **Domain Pre-testing** May 3-12, 2011 (TC meeting May 3-6, Setup May 7, Testing May 9-11, Half-day wrap-up meeting May 12)
  1. Venue: Elekta (Stockholm)
  2. Profiles: Dose Compositing, IPDW, new actors on old profiles

- **Connectathon 2011** – ASTRO HQ, Fairfax, VA, Sept. 13-19, 2011 (pending availability)
  1. Setup Sept 13
  2. Testing Sept. 14-17
  3. TC meeting Sept 19-20 (noon)

- **ASTRO 2011** - Tentatively Thurs 10/6/11 – Noon Sat 10/8/10

b. Related meetings

- ESTRO
  1. ESTRO Physics Conf. May 8-12, 2011, London
  2. ESTRO Ann Mtg. Sept 23-27, 2011, Stockholm, SW
- AAPM Annual Meeting
  - July 31-Aug 4, 2011, Vancouver, BC
- ASTRO Annual Meeting
  - Oct 31 – Nov 4, 2010 in San Diego, CA
  - Oct 2-6, 2011, Miami, FL
- PTCOG, May 8-15, 2011 in Philadelphia
- WG-7
  - Dec 7-10, 2010 (MITA, Washington, DC)
  - Mar 29-Apr 1, 2011 (Munich)

c. IHE-RO Potential Future Teleconferences:

- Thursday, December 16, 2010 (12:00 - 2:00 p.m. EST)

V. Adjourn