IHE-RO Planning Committee Minutes
September 25-27, 2008
7:00 AM – 9:00 AM
Douglass Room of the Westin Waterfront Hotel, Boston, MA

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 Therapeutic Radiology and 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 National Electrical Manufacturers Association (NEMA). 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.*

In Attendance

Name	**Company**	**Email**	**Dates**
Bruce Curran	RI Hosp/ASTRO	bcurran1 AT lifespan.org	25, 26, 27
Andrea Morgan	Calypso	amorgan AT calypsomedical.com	25
Tim Thurn	LAP	t.thurn AT lap-laser.com	25, 26
David Neustadter	Navotek	david.n AT navotek.com	25
Christof Schadt	BrainLAB	christof.schadt AT brainlab.com	25, 26, 27
John Sarafa	CMS/Elekta	sarafa AT cmsrtp.com	25, 26, 27
Stuart Swedloff	Elekta	sswerdloff AT impac.com	25, 26
Ashutosh Shirsat	Siemens	ashutosh.shirsat AT siemens.com	25, 26, 27
Bernd Becker	Siemens	bernd.becker AT siemens.com	25, 26, 27
David Murray	TomoTherapy	dmurray AT tomotherapy.com	25, 26
Uli Busch	Varian	ulrich.busch AT varian.com	25, 26, 27
Walter Bosch	ATC/ASTRO	bosch AT wustl.edu	25, 26, 27
Harold Beunk	Nucletron	harold.beunk AT nl.nucletron.com	25, 26
Rob Howe	Vision-RT	rhowe AT visionrt.com	25
Peter Selby	MedCom GmbH	pselby AT medcom-online.de	25, 26, 27
Scott Johnson	Philips	scott.l.johnson AT philips.com	25, 26, 27

Meeting Notes

I. Call to Order 9/25/08 @ 8:45am
   a. Welcome and Introductions (Curran, Swerdloff)
   b. Reminder on Conflict of Interest and anti-trust Guidelines (Curran)
   c. Approval of Agenda 9/25/08 9:00am

      1. Treatment Delivery Workflow
      2. Extension of 2007 Profile
      3. Review of 2008 Demonstration
      4. Planning Committee Use Cases
         a. 2009 Public Demonstration Discussion
         b. IHE-RO_J Profile Proposal
         c. PC Use Case Prioritization
      5. Dose Compositing
      6. Future Meetings – 2009 Meeting Schedule
         a. December 2008 Meeting

II. Treatment Delivery Workflow (D. Murray) – 9/25 AM
   a. Review of 2008 Treatment Delivery Workflow Profiles (latest version is 2.1, available on BBS): Discrete- and Integrated Positioning and Delivery
   b. Discussion of discrete positioning and delivery:
      1. Discrete PPD can provide (a) position correction instructions and/or (b) real-time position information update.
      2. Standards for (a) patient position status and (b) surface/fiducial location.
      3. Procedure: position acquisition, calculation of offsets, correction of position
      4. Flow of information from PPD to TMS? …directly to TDD/couch?
      5. PPVS Scenarios:
         - Pre-beam positioning (with re-verification) – addressed by this profile
         - Beam-on Position Verification/Gating – Beam Interlock options:
            - Soft interlock (N-EVENT) – cannot be used reliably to shut off beam?
            - Hard interlock (out of scope for IHE-RO)

   c. <u>Pre-beam Positioning:</u>

      1) **Patient Position Setup Acquisition:** A Patient Position Verification System (PPVS) obtains any initial setup data needed from the archive (e.g. Patient Setup IOD, Surface Segmentation IOD, Spatial Fiducial IOD, CT Image IODs, projection RT Images), and any other specific data needed (e.g couch angle transforming from patient to room coordinate systems) is supplied in the Patient Position Setup Reference Acquisition Instruction IOD (to be developed in WG7). The PPVS then acquires the patient position information

(e.g. images, surface, or fiducial information), and stores it back to archive, and indicate completion to the TSWM.

2) **Registration:** A PPVS determines the relationship between the current and desired patient position, stores the information (e.g. a Spatial Registration IOD) in the archive, and signals UPS completion to the TSWM. It may also indicate whether or not the patient is in position for treatment.
3) **Positioning:** The TSWM instructs the TDD to reposition according to user input and the results supplied in the previous step (unless it considers that the position is within tolerance). Open Qn: Does PPVS information or ok/nok status need to be streamed to the TDD or TSWM during this process?
4) **(optional) Reverification:** The TSWM may request the PPVS to reverify the position one or more times. This is done by repetition of workflow steps 1-3 as many times as necessary (but where step 1 does not require additional patient setup information).
5) **Treatment Delivery** continues as normal.

Treatment Course Workflow Manager (TCWM): The workflow manager responsible for scheduling simulation, planning, delivery of a particular fraction, replanning, communicating with external information systems (such as the HIS or RIS etc) as necessary.

Treatment Session Workflow Manager (TSWM): The workflow manager responsible for coordinating the steps involved in a particular fraction delivery, e.g. setup and verification, communicating with the TCWM as necessary.

d. Beam-on Verification

The best approach in the general case is probably to mimic external verification in Supplement 74. However, a viable solution would be to pull and modify the discrete profile (see below). The modifications would be those discussed above, plus adding a mechanism to enable the PPVS to know the beam being treated and some other details (this could be accomplished by using the Supplement 96 event notification mechanism, perhaps with some extensions).

e. Verification Action Plan

Action: Pull workflow integration from the 2008 Technical Framework. Create a framework for trial implementation that has integrated workflow, and use this for the formal connectathon in 2009. Based upon discrete workflow pulled out, develop a version that better addresses the systems in the market per the use case described above. Attempt to do this for the 2009 profile, which would probably be demonstrated in 2010 (this may be a challenge!). If necessary, the additional discrete material will be pulled from the 2009 profile. Uli has agreed to edit the new discrete framework. Others who will help include Bernd, Christof, and Andrea. These people and the other PPVS manufacturers will form the working subgroup.

f. Test Data for Treatment Delivery Workflow Connectathon
   - Vendors to provide simple RT Plan instances to Bruce for use in Workflow Testing
   - Bruce to issue call for participants in December, to get commitment and start test data process.

New DICOM RT and IHE-RO participants

As follows (all making patient position verification and monitoring stuff):

- Peter Selby, MSc, Research and Development, **MedCom**, Gesellschaft fur medezinische Bildverarbeitung mbH, Rundeturmstrasse 12, D-64283 Darmstadt, Germany. Tel +49 6151 95147 19, pselby AT medcom-online.de
- Rob Howe PhD, VP Development, **Vision RT Ltd**, Daws House, 33-35 Daws Lane, London NW7 4SD, United Kingdom. Tel +44 20 8906 6620, rhowe AT visionrt.com
- David Neustadter PhD, VP Innovation, Navotek Medical Ltd, POB 201, Yokneam Industrial Park, Yokneam 20692, Israel. Tel +972 72 270 9020 ext 104, david.n AT navotek.com
- Tim Thurn, Product Mgr Medical Division, LAP GmbH Laser Applikationen, Zeppelinstr 23, 21337 Lueneburg, Germany. Tel +49 4131 9511 96, t.thurn AT lap-laser.com.

III. Dose Compositor Actor Discussion – 9/25 PM

Two Use Cases for Dose Compositing:

1. Registered Dose Summation – accept two Plan/Dose pairs and Spatial Registration object; resample one of the doses into the Frame of Reference of the other; and store the sum along with a dummy plan that references the other two.
2. Compositing Dosimetric Planner – generate plan based on spatially related prior dose: transform prior plan/dose into Frame of Reference of new CT and structure set; store new plan and dose (and composite dose?).
3. Discussion
   - There was a significant amount of discussion on whether (a) the transactions for this functionality already existed, (b) the functionality desired by the Planning Committee was actually in addition to the basic transaction (e.g. planning on existing dose), or (c) was the Use Case as it existed useful. With regard to (a), the current profile only allows one Dose Object to be retrieved. This would work with a plan where existing dose was read in, but not necessarily where two plans (even if one was from the

'current' planning system) were read in and summed. Current profiles do not provide for writing out the summed dose (useful in clinical trials and doses where decisions are being made). As to (b), no one disagreed, though the Use Case as described on the wiki does not include the re-planning (that is included in another proposed Use Case). As to (c), there are examples in the Brachy Use Case, the Clinical Trials Use Case, and the case of summing multiple fraction groups where this appears to be needed,

Need to define new transactions:

- retrieve RT Ion Plan
- store RT Ion Plan
- store minimal RT Plan object (use existing RT Plan storage transaction?)

IV. Planning Committee Use Cases - 9/25 PM

- Prescription Automation
- Brachytherapy, Proton Plans
- Re-Treatment (Registered Dose Summation) – also needed for Brachytherapy
- Structure/Aperture display on Treatment Verification Image (Cone Beam, Radiographic Images, Gating/Fluoro)
- User Authentication and Authorization
- Registration Transfer (TMS to TDS)
- Clinical Trials – Standard Structure Names, Dose Constraints, object requirments (some overlap with Prescription Automation)

V. Extension of 2007 Profile (Advanced Objects for 2009 Profile) – B. Curran 9/26 AM

Bruce presented a 2009 Advanced Objects Template spreadsheet identifying requirements for DICOM attributes per module for the 2007 Profile and Advanced Objects (based on proposal by S. Johnson and consensus from Munich meeting).

- Need to decide on the Actors to be defined
- Identify behavioral issues that must be solved

Which Actor will consume the Plans generated for Advanced Objects?

- TMS? If so, what will the TMS do with the plan?
- TDD?

Review of Advanced Objects discussion in March 2008 Munich meeting minutes.

Questions to be answered:

- **Image Datasets**
  - **Allow Decubitus Positions? No.** Images in Decubitus position represent a very small minority of clinical cases. (Planner actors may support Decubitus, but IHE-RO will not test this condition.)
  - **MR allowed as Primary Data? Optional.** Use of MR as primary image requires patient external contours and density override.
  - **Support for 4D image datasets? Not in 2009 profile.**
  - **Support for Enhanced CT/MR objects? Not in 2009 profile.**

    - **Multi-Series Combiner? Yes.** The ability to combine disjoint series is already implemented in 2007 Contourer, but *not* the 2008 Registered Contourer. This Actor factors out handling of multiple disjoint image series.
    - **Slice Registrator? Place in new SRS profile**..
    - **Multiple Contourer Options? No. Single (Registered) Contourer for 2009 Profile. Optional support for MR as primary image dataset.**
- **Structure Sets**
    - **Allow Bolus? Yes.** Dosimetric Planner must accept Bolus contours.
    - **Allow Density Override? Yes.** This is required to support Bolus and to handle MR as primary, and contrast, prostheses, etc. in CT.
- **Geometric Planner**
    - **Can read existing Geom Plans? Yes.** Can read in and edit existing Geom plans.
    - **Can store a new Structure Set? Optional.** Used for adding bolus contours to structure sets.
- **Dosimetric Planner**
    - **Can read existing Dose Plans? Yes. Must be able to read plans in compatible classes (Beam Types). Can edit the plan and recalculate dose.**
    - **Can store a new Structure Set? Optional.** Used for adding bolus contours to structure sets.
- **Plans**
    - **Beam names must be 16-char unique? Yes. Support 64 characters of DICOM VR. The first 16 characters shall be unique within the plan.**
    - **Plan intent should be mandatory? Yes. Could allow verification as well as patient treatment types. Shall be one of the Defined Terms in the 2008 standard.**
    - **Support for Tolerance Table in RT Plan? No new behavior.**
- **Plan Delivery**
    - **Should a TMS be an actor? Yes.** Perhaps a new actor called a Delivery Preparer (or ????)
    - **Should a TDD be an actor? Not in 2009 Profile.**

VI. Review of DICOM attribute requirements for Advanced Objects – B. Curran 9/26 PM

- See updated 2009_AdvancedObjectsTemplate spreadsheet

VII. Beam Types for Advanced Objects – B. Curran 9/27 AM

- See updated AdvancedObjects_BeamTypeConstraints_2008-0927 document for detailed results of discussion.

- Review of Beam Modifiers to be supported for each Beam Type
    - Initial Beam Types with Owners (see BC document for finals):

- Static – B. Curran
- Motorized Wedge – B. Curran
- Virtual Wedge – B. Curran
- Arc – J. Sarafa
- Conformal Arc – J. Sarafa
- Step and Shoot – S. Johnson
- Sliding Window – B. Curran
- IMAT / VMAT – U. Busch
- Electron – B. Curran

- Beam Modifiers (see BC document for finals):
  - Jaws
  - MLC
  - Bolus
  - Block
  - Compensator
  - Static Wedge
  - Motor. Wedge
  - Virtual Wedge
  - Applicator
  - Accessories

- Example: requirements for RT Plan attributes for IMAT/VMAT (U. Busch)

- Open Questions:
  1. Single *vs.* Multiple Profiles for Advanced Objects/Beam Types?
  2. Single Actor with Options *vs.* Multiple Actors (one for each Beam Type)?
  3. Should RT prescription support Dose Reference Sequence?
  4. Should DPlanner be required to retrieve (Structure Set) from Archive by UID using C-MOVE?
  5. Should DPlanner requirements for Table Top Displacements in Setup Module be changed to R+?

- Goal is to have profile(s) ready for public comment at end of Dec 2008 IHE-RO TC meeting and ready for trial implementation in Feb. 2009

- Action Items:
  1. Beam Type owners will do the following before the Oct 21, 2008 WG-7 meeting:
     a. Write a definition of Beam Type
     b. Update entries of Beam Types/Beam Modifiers table with all appropriate Beam Modifiers for their Beam Type.
     c. Update entries of Beam Type Constraints table with constraints on attributes for their Beam Type.
  2. Bruce Curran will create spreadsheet for RT Beams Module with comments for each Beam Type and circulate by Oct 1

3. Scott Johnson will summarize the Transaction options for circulation to group by Oct 10
4. Bruce will ask Sha Chang how compensators are ID-ed.

VIII. IHE-RO/Japan Use Case – 9/25 PM

IHE-RO/J proposed a HIS to Oncology Information System profile using HL-7.

- Involves scheduling of treatment planning and treatment and notification that patient has been treated.
- This use case may be somewhat Japan-specific, but may also apply to other countries.
- Stuart Swerdloff has volunteered to be liason to IHE-RO/J. Stuart will email TC members to invite their HL-7 experts to join this effort..

IX. Future Meetings – 2009 Meeting Schedule

a. IHE-RO TC Meeting, Dec. 15-19, 2008, Mountain View, CA, @ Hampton Inn
   - Work on Discrete Patient Positioning Profile – Monday 12/15
   - Review Drafts of Advanced Object 2009 Profile Extensions – 1 day
   - Work on 4.0 Profiles – Use Cases from Planning Committee
   - IHE-RO/J Use Case

   Bruce to schedule conference call near end of Oct WG-7 meeting regarding Prescription Automation

b. IHE-RO 2009 Test Schedule: (Bruce will confirm ASTRO travel support.)
   - Domain Pre-Testing – June 3-9, 2009, Erlangen, Germany (Siemens)
   - Connectathon – Sept. 14-22, 2009, Fairfax, VA (ASTRO HQ)
     (9/14 test prep, 9/15 setup, 9/16-19,21 testing, 9/22 wrap-up)

c. IHE-RO 2009 TC Face-to-Face Meetings:
   - March 23-25, 2009 (2.5 days) Washington, DC 2010 Content Development
   - Nov. 5-7, 2009 post-ASTRO, Chicago area
   - Jan 25-29, 2010, location TBD

d. IHE-RO T-cons:
   - Week of Oct. 14th, 2008 Prescription TCON
   - Week of Nov 14th, 2008 Progress on TF 3.x
   - Add'l TCONs to be scheduled

e. Related Meetings:
   - DICOM WG-7 Oct 21-25, 2008, Charleston, SC
   - DICOM WG-7 Mar 17-20, 2009, Washington, DC
   - AAPM, Jul 26-29, 2009, Anaheim, CA
   - ESTRO Aug 30 – Sep 3, 2009, Maastricht, NL

- ASTRO Nov.1-5, 2009, Chicago, IL

X. Review of 2008 Demonstration / Public Demonstration 2009 – Options
- Informational IHE-RO Booth
- No demonstration in IHE-RO booth?
- “Ask your vendor about IHE-RO” signage
- Booth-to-booth demonstration (like RSNA), e.g. with “Passport”?

XI. Adjourn – 9/27 11:40am