**IHE-RO Technical Committee**
**March 23-25, 2009**
**8:30 AM-5:00 PM**
**ASTRO HQ, Fairfax, VA**

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

**In attendance:**

| **Name** | **Company** | **3/23** | **3/24** | **3/25** |
|---|---|---|---|---|
| Stuart Swerdloff | Elekta | X | X | X |
| Bruce Curran | RIH/Brown Univ | X | X | X |
| Walter Bosch | ATC/Washington Univ | X | X | X |
| Christof Schadt | BrainLAB | X | X | X |
| David Nelson | Philips | X | X | X |
| Koua Yang | Philips | X | X | X |
| Harold Beunk | Nucletron | X | X | X |
| Mark Sinclair | VisionRT | X | X | X |
| Brian Moravecky | Sun Nuclear | X | X | X |
| Justin Cambra | Accuray | X | X | X |
| Uli Busch | Varian | X | X | X |
| David Murray | TomoTherapy | X | X | X |
| Stephen Vastagh | MITA | X | PM | |
| Sunita Ranjitkar | ASTRO | X | X | X |
| Ashutosh Shirsat | Siemens | | Webex | Webex |
| Phillip Jacob | IMPAC | | PM | |
| Jatinder Palta | UFL | | PM | |
| | | | | |

**2/23 9:00am**

1. The minutes from February 25th were approved.
2. **Prescription Automation** – Bruce reviewed work of DICOM WG-7 on Prescription Automation
   → Spend several hours discussing near the end of the meeting
   - Requires frozen draft of DICOM standard; should be ready for Domain Pre-testing 2010, Connectathon 2011

3. Discussion of QA Use Case
   - Beam data standard?
   - DICOM Structured Reporting may be a viable approach for QA data reporting

4. Discrete Positioning and Delivery (delayed until Uli and Dave arrive)

5. Report on IHE-J RO Enterprise Schedule Integration Profile between HIS and OIS
   a. HIS is used for scheduling including RO, billing initiated by HIS
   b. Meeting in New Zealand, Feb 2009 with TMS vendors
   c. Profile (on BBS) in good shape, but not quite ready for public comment

    d. "Broker" between HIS (handles Japanese) and TMS (demographics in English)
    e. Uses HL7 messaging
    f. IHE-J formal membership in IHE International? Bruce to check on status, Stuart to communicate with IHE-J
    g. Ask for feedback from HIS vendors via IHE Radiology Domain
    h. IHE-J RO Connectathon in 2011

6. Basic Interoperability and Multi-modality Registration Profiles to be tested at 2009 Domain Pre-Testing
    a. Critical resources: test monitor time? Long hours?
    b. Invitation to add RO to IHE Product Registry
    c. Connectathon deadlines
        i. Vendors need to commit to participate before Domain Pre-Testing
        ii. At end of Connectathon: judges list what was tested, ASTRO fee reconciliation

**Dose Compositing (Walter)**

1. Dose Compositing Plan (not needed. See CP_938 comments below.)

2. Do we need a Dose Reference plan? NO. See CP_938 comments below.

3. Consumer is (Registered) Dose Viewer
    a. Existing (Registered) Dose Viewers consume Dosimetric Plan object – will not work for brachy plans
    b. Define a new Compositing Dose Viewer (see below)

4. Compositing Dosimetric Planner accepts a single dose and spatial registration
5. See CP_938 (LB Mar 09) – Adds Dose Summation Type = (3004,000a) = PLAN_SUMMATION and allows multiple values in Referenced RT Plan Sequence (300c,0002)
    a. A Dose Reference Plan is not needed.
    b. If any of the summed plans is a Dosimetric Plan, the first item in the Referenced RT Plan Sequence must be a Dosimetric Plan (for legacy Dose Viewers)

6. Can the Dose Compositor *scale* constituent RT Doses? Yes: document scaling in Dose Comment

7. Need **new Composite Dose Viewer** to support composite RT Dose, i.e. with Dose Summation Type = PLAN_SUMMATION and multiple values in Referenced RT Plan Sequence

8. RT Dose IOD Attribute Requirements for Composite Dose
    a. **Dose Type**: If *any* contributing dose has Dose Type = EFFECTIVE, the Composite Dose must have Dose Type = EFFECTIVE.
    b. **Dose Summation Type:** Composite Dose has Dose Summation Type = PLAN_SUMMATION (see CP_938)
    c. **Referenced RT Plan Sequence:** Composite Dose has Referenced RT Plan Sequence containing SOP Instance Macro references to each constituent RT Plan. If any of the summed plans is a Dosimetric Plan, the first item in the Referenced RT Plan Sequence must be a Dosimetric Plan (for legacy Dose Viewers)
    d. **Tissue Heterogeneity Correction**: has items representing all tissue heterogeneity correction techniques used in computing all constituent doses.

**Discrete Positioning and Delivery (Uli) 3/23/09 4:25pm**

Three Interoperability Profiles (**a** can be combined with **b** or with **c**):
    a. Discrete Positioning Workflow = before treatment delivery

b. Discrete Delivery Workflow = treatment delivery w/o monitoring
c. Discrete Delivery and Monitoring Workflow = treatment delivery with monitoring

Actors:

a. Patient Positioning and Verification System (PPVS) = acquires patient position before delivery
b. Patient Positioning Monitoring System (PPMS) = acquires patient position during delivery
c. Treatment Session Manager (TSM) = manages acquisition of patient position and treatment delivery
d. Treatment Delivery Device (TDD)
e. Archive (or TMS)

Discussion regarding combined TDD and TSM.

Hardwire standard for real-time control of treatment delivery?

**Adjourned 3/23/09 at 5:40pm**

**Start 3/24/09 9:00am**

**Documents posted to http://wiki.ihe.net ( → Technical Frameworks → Radiation Oncology)**

- Trial Implementation
  - TF v. 2.2 (Image Registration Integration) vols. 1 and 2
  - TF v. 3.0 (Integrated Positioning and Delivery Workflow) vols. 1 and 2
- Public Comment
  - Supplement (Advanced RT Objects Interoperability and TMS Upload) vols. 1 and 2
- Final Text
  - TF v. 1.6 (Basic Treatment Planning) vols. 1 and 2

**Status of Technical Framework v. 3.0 (Integrated Positioning and Delivery) Document**

- Not yet ready for Final Text, since "best practice" is not yet established
- Continue with "Trial Implementation" for now to gain experience

- On some treatment delivery systems, there are work items that are never scheduled
  - Does *unscheduled* workflow result in the creation of a UPS?
  - Constraints on what is returned in UPS results sequence?
  - Limit of one *scheduled* work item per UPS

- In a situation where there is unscheduled, performed PS (performed in conjunction with a scheduled PS), the information specifying the unscheduled PS must be encoded and communicated. There is strong disagreement where and how this info must be encoded and communicated. Two options for encoding/communication:
  - Part of output sequence of the scheduled PS
  - Creation of a new UPS scheduled by the TDS

- In the Integrated Positioning and Delivery Profile (exactly) four PS are specified
  - (TF 3.0 Vol. 1, Section 6.2): Acquire Images, Perform Registration, Adjust Patient Position, Deliver Treatment
  - (Vol. 2 3.17.4.2): *Exactly four* sequences shall be returned by the TMS in response to query from TDS

- The first three PS (Acquire Images, Perform Registration, Adjust Patient Position) may not be *scheduled* for a given patient. **Change wording** of TF from "exactly four procedure steps" to "as scheduled by the user for the treatment device."

- Not all PS need be scheduled
- Not all performed PS need to have been scheduled

Updated Wording (from Uli)

For the Worklist Query for Positioning and Delivery transaction, the collection of Unified Procedure Steps (UPS C-FIND response in the 'pending' state) which shall be returned shall contain all UPS suited for the performing device as scheduled by the user in the TMS for the specific patient and treatment session. The performing device shall specify the procedure code it handles in its DICOM conformance statement.

**From Dave Murray:**

In the workflow profile volume 1, add the following paragraph back in as Section 3.5.3 (or somewhere better if you can find a place):

Treatment Completion

An important use case associated with treatment delivery is that of treatment completion following a delivery interruption.

- If the delivery interruption is of a transient nature (e.g. a temporary issue with the delivery machine, or a patient position issue caused temporary interruption of the delivery), then the Performing Device may choose to manage the completion internally, and notify the TMS that the UPS has finally completed normally.

- If the delivery interruption leads to the UPS being moved to the 'CANCELED' state, this requires that a new UPS be scheduled (for example, if the completion requires replanning, or needs to be performed in a different time slot). The TMS shall then manage the new UPS, specify a Text Value of 'CONTINUATION' in the Scheduled Processing Parameters Sequence when returning a query result (see Sections 3.13.4.1.2.1 and 3.14.4.1.2.1), and also supply the UIDs of necessary RT Plan, RT Beams Treatment Record, and RT Treatment Summary Record instances that fully specify the nature of the completion.

**Discrete Positioning and Delivery (Uli) 3/24/09 1:10pm**

- **Check direction of arrows in Process Flow diagrams for consistency with Radiology Profiles (arrows indicate event initiation, rather than direction of data flow)**
- Note: this profile makes use of the 2nd generation DICOM RT Positioning Request IOD (defined in Supplement 147). Use of this IOD assumes frozen draft of this IOD in the DICOM standard, which is expected prior to Domain Pre-testing 2010, for Connectathon 2011
- Review of Process Flow Diagram for Discrete Positioning
  - **Action:** Change name of RO-DPD-02 to indicate Retrieval of Device Position Information
  - **Note:** transaction to Store Position Acquisition Results to Archive [RO-22] only supports images. What about non-image-based PPVS? Data standard for position information? Use Modality Images Stored transaction from Radiology Profile?
  - **Action:** split "Archive" actor into "Archive" and "TMS" actors: Images are stored in Archive, other position information to be stored in TMS.
  - What is scope of PPVS actor
- **Open questions:**
  - Separate "PPVS" into two actors: (1) PPVS = Patient Position Verification System and (2) PPRS = Patient Position Registration System?
  - Is repositioning done by PPVS or PPRS?

- How is non-image Patient Position information communicated (to archive or TMS)?
- Use UPS to Request RT Position Modification [RO-DPD-03]?
- Add User Authorization to Perform Patient Position Modification at TDD *before* "Adjust Patient Position"
- Need separate PPD (Patient Positioning Device) Actor (e.g. robotic table top)?
    - The PPD may be distinct (3rd party) from TDD
    - There may be more than one PPD.

**2:45pm (Stuart taking notes)**

Need to have a concrete sub-group with member list for working on the Discrete Positioning profiles. This group needs to have regular t-cons. <Action Item> Stuart to send out email to iherotech mailing list to gather and create this list.

**Discrete Delivery Workflow:** Missing communication to TMS. Uli pointed out that Sup 74 should cover all of this. Need to explicitly reference Sup 74**.**

**Discrete Monitoring Workflow:**
Treat UPS = UPS for (beam) Delivery

**PPMS interaction:** Review Integrated Positioning and Delivery to see if paradigm of UPS In Progress and N-SET type of transactions can be re-used to express "I'm starting" and "I'm ready" semantics (for the PPMS to express that to the TDD/TSM).

Bruce asked if there was the possibility of choosing a Standard (not DICOM, but a hardware standard such as CAN BUS) for sending the "out of tolerance" or "big red button" signal.
TC suggests we refer the issue to NEMA RT-Vendors and that IHE-RO will pay close attention to suggestions of NEMA RT-Vendor statement.
Change text from "Peer-to-peer specified behavior…" to "Out of Scope of the profile".
Also, identify the situation is more than just "out of tolerance" to include the various "Additional Monitoring Action" enumerated values (in the Monitoring Instruction IOD), at least in discussion.

**Action Item** <Christof to refer issue to NEMA RT-Vendor group>

Specify at least that there are two possible paths when "out of tolerance":

a) Some internal correction is taken, e.g. re-do of Positioning.
b) Treatment is terminated (non-NORMAL termination status).
c) Not some simple internal correction, and possibly out of scope (but "clean-up" path needs to be described).

Is Store Position Registration Results to Archive [RO-20] mandatory near end of Beam Delivery in the Monitoring profile? What object is involved (RT Patient Position Monitoring Result). No longer that transaction. Need new name/number for transaction. Also, RO-22 (Store Position Acquisition Results) gets eliminated in favor the one "store monitoring results" transaction.

Discussion of whether an MPVS (Machine Parameter Verification System) may fit in to the general scheme of the Discrete Positioning profiles.

How does one address the PPMS indicating "out of tolerance" transition (or state) while beam is *not* active.

Major concern about how to address that the real time (mission critical) aspect of monitoring feedback is not addressed explicitly: Questions about whether Integration statements need to have disclaimer.

Suggestion that the name of the profile and the actor include wording similar to "Non-Interventional Monitoring" or "Passive Monitoring".

Need to communicate with Monitoring vendors…

Desire to include at least brief discussion of "Prescription Automation" Wednesday morning**.**

**Action:** Stuart to use 9/08 Boston meeting minutes to remind members to hold Discrete Positioning T-con

**Action:** Bruce to poll members regarding intentions to participate in Integrated Positioning Pre-testing and Connectathon.

**For 3/25:**

- Prescription Automation
- Dose Compositing WP (5min)
- Timelines
- T-con dates

**Adjourned for 3/24 @ 5:25pm**

**Start 3/25 @ 9:00am**

**Dose Compositing Supplement**

- No new transactions, but has constraints on RT Dose IOD attributes
- Working Group: W Bosch, B. Curran, K Yang, H Beunk, C Schadt
- Goal: Supplement ready for Technical Committee approval for Public Comment in early Nov 2009
- T-con: Early May
- Bruce to provide template
- Walter to format WP text as Supplement and forward to Stuart

**RFP for Test Tools for Advanced Objects Integration Profile**

- No new SOP classes
- Diagram(s) need to be updated since they reference 2007 actors/transactions. Also need to add TMS Actor

**Prescription Automation**

- Depends on RT Physician Intent IOD (still in development in WG-7). It is not clear that this IOD will be ready for a 2010 Profile.
- Review of Use Case on wiki.ihe.net
- Additional details must be specified:
    - Which actor generates? … consumes?
    - What additional information is needed to generate the prescription?
    - Does a generic "producer"/"consumer" model work?
- Collect natural language prescriptions from clinical users
- Need a description of the process surrounding the prescription:
    - How is it used?
    - Who produces it?
    - Who uses it?
    - When is it modified?
    - How is approval/revision managed?

- What is the scope of Prescription Automation? Is it integrated with image retrieval or plan review?
- Usage of Physician Intent object is deliberately broad

- Need to verify that it is possible to use RT Physician Intent in the near term without the rest of the 2nd Gen RT objects.
    - References to other 2nd Gen objects would be unused initially.
    - What about anatomy references?

- Prescription Automation profile
    - Involves workflow (worklist management): diagnosis, prescription, approval, revision, treatment planning, plan review, plan approval, treatment delivery
    - Addresses Prescription content
    - First use of 2nd Gen DICOM RT objects (need to verify standalone use of a subset of IODs)

- Could define multiple versions of Physician Intent IOD for Initial Physician Intent, Plan Specification, etc. (like Geom Plan, Dosim Plan, …)

- **Action:** Bruce and Stuart to draft a clinically meaningful description of Prescription Automation Use cases including (1) Physician Intent and (2) Dosimetric Prescription, as well as full departmental process, for feedback from IHE-RO Planning Committee and vendor applications developers.

- **Working Group:** B. Curran, S. Swerdloff, D. Murray, U. Busch, H. Beunk, K. Yang, J. Cambra, W. Bosch

- **Meeting schedule**
    - T-con mid-to-late May 2009
    - Working group to meet after AAPM in conjunction with DICOM WG-7 meeting

- **Goal:** Profiles ready for Technical Committee approval for Public Comment in early Nov 2009

- It is not expected that this profile will be ready for the 2010 Connectathon – consensus to re-schedule for 2011.

**Adjourn 3/25 @ 11:30am**

**Future Meetings**

1. IHE-RO 2009 Test Schedule:
    - 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)

2. IHE-RO 2009 TC Face-to-Face Meetings:
    - Nov. 5-7, 2009 post-ASTRO, Chicago area
    - Jan 25-29, 2010, location TBD

3. IHE-RO Potential Future T-cons:
    - Wednesday, April 22, 2009 at 12:00 - 2:00 p.m. ET
    - Wednesday, May 20, 2009 at 12:00 - 2:00 p.m. ET
    - Wednesday, July 15, 2009 at 12:00 - 2:00 p.m. ET

- Wednesday, August 12, 2009 at 12:00 - 2:00 p.m. ET
- Wednesday, October 14, 2009 at 12:00 - 2:00 p.m. ET
- Wednesday, December 2, 2009 at 12:00 - 2:00 p.m. ET

4. Related Meetings:
    - AAPM, Jul 26-29, 2009, Anaheim, CA
    - DICOM WG-7, July 30-31, Aug 1, Aug 3-4 (noon), 2009, Los Angeles area
    - DICOM WG-7, Dec 8-11, 2009, (tentatively, in San Diego area)
    - ESTRO Aug 30 – Sep 3, 2009, Maastricht, NL
    - ASTRO Annual Meeting, Nov.1-5, 2009, Chicago, IL

IV. Adjourn