IHE-RO Technical Committee
MINUTES

November 5-7, 2009
8:30-5:30 p.m.

Oak Brook, IL

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.

Attendance:

Name	Organization	Email	11/5	11/6	11/7
Bruce Curran	Rhode Island Hosp.	Bcurran1@lifespan.org	X	X	X
Stuart Swerdloff	Elekta	sswerdloff@impac.com	X	X	X
Walter Bosch	ATC	bosch@wustl.edu	X	X	X
Bill Bennett	Elekta / CMS	bill.bennett@cmsrtp.com	X	X	X
Chris Pauer	Tomotherapy	cpauer@tomotherapy.com	X	X	X
Mark Sinclair	VisionRT	msinclair@visionrt.com	X	X	X
Kurt Weimann	Siemens	Kurt.weimann@siemens.com	X	X	X
Ulrich Beifuss	BrainLAB	Ulrich.beifuss@brainlab.com	X	X	X
Harold Beunk	Nucletron	Harold.beunk@nl.nucletron.com	X	X	X
David Wikler	IBA	David.wikler@iba_group.com	X	X	X
Scott Mark	Thirdway	SJM@pobox.com	X		
Koua Yang	Philips	Koua.yang@philips.com	X	X	X
Sanjay Bari	Elekta	Sbari@impac.com	X	X	X
Justin Cambra	Accuray	jcambra@accuray.com	X	X	
Uli Busch	Varian	Ulrich.Busch@varian.com	X	X	X
Eugene Remi	Elekta	Reugene@impac.com	X		
Chris Carr	RSNA	ccarr@rsna.org			X

I. Call to Order - 11/5 @ 9:00 am
   a. Welcome and Introduction [sign-in sheet]
   b. Approval of Agenda - approved
   c. Lunch Ordering
   d. General Schedule for this Meeting

II. Reports and Updates
   a. IPDW (Thursday PM, Friday)

- 11/5 @ 15:50 – Review of Chris Pauer's changes to IPDW profile.

Proposal to make Image Acquisition, Image Registration, and Patient Positioning steps optional.

- Discussion of options ("building blocks" for imaging, registration, positioning, and treatment) *vs.* specifying all meaningful combinations cstone to develop IPDW?
- Possible courses
    - Split profile into IPDW and DW?
    - Make steps optional?
    - Store images, SRO in DW
    - Simplify IPDW to DW; use DPDW for more complex use case?

- 11/6 @ 14:00 – resume discussion of IPDW
- In order to adhere to the profile, a TDD must support all four transactions: imaging, registration, positioning, and delivery. All four steps may not occur on every session.
- Could set UPS in Progress for all worklist items, as long as imaging, registration and correction are completed prior to treatment (legal/billing issue) – report actual completion times at UPS Final Update.

- Current serial model can support interlocking by the TMS
- Parallel model (set all worklist items in progress at start) does not support interlocking by the TMS

- Locking of multiple, sequential procedure steps: in the Serial Model, if only the first UPS is set in progress, another station could query for (and retrieve) the remaining procedure step(s).

- Profile must provide:
    - Time when things happen (need not be in real time)
    - Ability to re-order imaging
    - Reliable information for charge capture

- TMS gives proposed list of procedure steps, User can re-order
- Sequence interlocking is not enforced by profile

- Open Issues:
    1. Current IPDW profile does not support TDDs that do not include verification steps – need a second profile that does not include verification
    2. Performed PS Step Start Time and End Time – do these times reflect the N-ACTION time or time of substantial activity? (Could use code sequence to record time of substantial activity.)
    3. Can TMSs support multiple, concurrently active procedure steps?

4. Can TDD record approval of images, or must this take place at the TMS? Are there mechanisms in UPS response that reflect approval? Do we need to have an explicit Approval Procedure Step?
5. An N-Set in transaction UPS Final Update [RO-21] or UPS Completed/Canceled[RO-26] could be used to record the Perfomed PS start and end time.

- Proposed scheme For IPDW profile:
  1. TDD queries and retrieves a set of all worklist items for patient under treatment: Q/R for UPSs that match station and time range (TMS may preselect available patient(s) – either one patient at a time or all patients in time window)
  2. TDD has all worklist items for selected patient
  3. Performance of steps can be re-ordered by user (in a logically consistent manner) without cancelling steps
  4. Sequential processing of worklist items is being debated, but by the end of the session, all PS must be completed or canceled.
  5. Order of performance is recorded in Scheduled PS start times. Times may not be reported in real time, but will be
  6. Positioning is not optional TDD must be able to perform positioning.

- ➔ ACTION (Stuart): Two profiles ready for review by Jan 2010 meeting

- ➔ ACTION (Walter): ascertain (from Dave Murray) whether Performed PS start and end times reflect the N-ACTION times or the times of substantial activity. This distinction is quite important to us in recording the sequence of verification and treatment for billing purposes. Is there a problem to interpret as time of substantial activity? Do we need to insert a code sequence macro to encode the start and end of substantial activity? (Reply from Dave: PPS times refer to real-world activity – suggests we confirm this understanding with WG6)

- 11/7/09 @11:00 – Sanjay: question regarding Worklist Input Information Sequence for partials
  - IPDW Profile specifies contents of the Input Information Sequence: “all input objects that will ultimately be needed to perform the specified procedure step and no others”
  - Which actor determines what objects are needed, and hence, to be included in the Input Information Sequence? Specifically, should the IIS contain only top-level objects, or all the objects that are referenced through the top-level objects.
  - This issue is especially critical for completion of partial delivery.

RT Treatment Summary Record references, but does not contain the information in RT Treatment Beam Record instances.
    - Suggestion: If top-level object is required to reference other objects, these objects may (but need not) be included in IIS.

- Summary (11/7/09 @11:50)
    - UPS Input Information Sequence (IIS) in IPDW Profile will contain a comprehensive list of objects that must be retrieved for delivery. (DICOM hierarchical SOP Instance Macro (C.17.2.1) is used to reference objects.)

    - **Action** → establish list of IIS items relative to procedure codes.
    - Use case involving incomplete delivery (3 beams: 1 completed, 1 partially delivered, 1 not delivered) will be used to evaluate profile.
    - For interrupted delivery, the IIS will explicitly contain reference to Treatment Records.
    - Wording specifying SOP classes to be supported in RO-20 (Retrieve Worklist Item from TMS) is vague – needed to make clear.
    - Discuss (a) whether retrieval must occur *before* or *after* the UPS Treat PS is set In Progress (stale cache issue for Treatment Records?) or (b) whether UPS Treat PS In Progress should be interlocked by TMS based on changes to real-world treatment history.

b. Dose Compositing (Friday)

- 11/6 @ 8:40 Review of Dose Compositing Profile
- Edited Dose Compositing Document
- No Deformable Spatial Registration for now
- Reviewed whether we need Dose Reference Plan instance → NO (closed issue)
- Updated transaction references
- Compositing Planner produced Simple Dose (plan dose) instance
- → Add Simple Dose Storage for Compositing Planner and update transaction references in Process Flow Diagram
- → Change "Simple Dose" to "Single Plan Dose"
- → Add Compositing Planner Actor to text and diagrams Section 3.W in Vol 2
- → Change "Simple Dose Storage" to "Single Plan Dose Storage" [RO-DC4]
- → Change "Simple Dose Retrieval" to "General Dose Retrieval" [RO-DC1]
- → Replace "Composite Dose Storage" [RO-DC2] and "Composite

Dose Retrieval" [RO-DC3] with General Dose Retrieval

- Bruce posted edited version (10.5) to www.aapm.org/bbs @ 13:30
- Comments by Koua
- Edits by Walter (10.5_wrb) on BBS 11/7 @ 7:45

- 11/7/09 @ 10:00 – Review of revised Dose Compositing Profile document
  - "Composite Dose Viewer" → "General Dose Viewer",
  - Registered Composite Dose Viewer → Registered General Dose Viewer
  - → Remove Registered Dose Retrieval transaction form Archive in table X.1-1 (not referenced in document)
  - → Cleanup process flow diag (Simple Dose Storage → Single Plan Dose Storage)
  - → Add Table 3.X.1 Expected Attributes for RT Dose Module in General Dose Retrieval transaction
  - → Request the WG7 analyze the problem of identifying measured doses (e.g., from exit dosimetry, PET scan, 3D dosimeters, etc.)
    - Possible addition of Dose Type (3004,0004) defined term(s) for MEASURED dose
    - Frame of reference of measured dose? Profile requires registration with (planning CT) Frame of Reference.
  - Review of open issues in Dose Compositing – no outstanding open issues
  - Review re-use of Registered Structure Set Retrieval [RO-15] transaction. Dose compositing actors not called out in existing TF document – do we need to revise or define a new transaction? →NO
  - → Profile Draft (version 10.6) ready for vote to Public Comment at IHE-RO TC T-con Dec 3

c. Discrete Positioning profile (Thursday AM)

- 11/5 @ 9:55 – Last sub-group T-con was 7/15/09. Scope of profile is interplay of treatment delivery device with one or more verification/monitoring devices in a multi-vendor environment. Actors: treatment delivery coordinator, treatment delivery device, patient verification system, position registration system, patient positioning device(s), patient position monitoring system.
- Objects needed for profile to get to frozen draft status: 4-5 pairs of re-positioning request, result objects to accompany UPS (for input, output sequences). WG-7 to prepare draft for review at Dec 2009 meeting, so it can be presented to WG-6 in March 2010.

- Method to describe transformation geometry was developed at DICOM WG-7 Newport Beach (7/09) meeting. Exception handling must be reviewed. (Concern about behavior with multiple positioning devices.) *Precision* of positioning is not currently handled by profile.
- Sub-group meeting planned for Munich (before December WG-7 meeting) to work on draft.
- Action: Uli to update document on BBS (Dec 2009) to reflect latest discussion. Interested parties to contact Uli Busch to be included in sub-group.

d. Finalize agenda for Jan 25-29, 2010 (11/7/09 @ 9:15)
    - 2010 Profile Development (2011 Trial Implementation)(0.5 days)
    - IPDW (Review for Public Comment)(1 day)
        1. Non-Position-Verification Profile
    - DPDW (2 days)
    - Dose Compositing (?Public Comment Response)(0.5 days)
    - CPs (2 x 1 hour sessions)
    - Domain Pre-testing
    - Report from WG7 on Patient Positioning & 2nd Generation RT

e. MITA RT Section Meeting (Thursday AM)
- 11/5 @ 9:20 – Bruce proposed to NEMA RT Section that they work to create a standard for treatment machine characterization to include geometry, beam modifiers, capabilities. This is *not* expected to be DICOM (i.e., not patient information), but might be XML. Stuart has volunteered to coordinate working group to assess feasibility and report to RT Section. The IHE-RO TC is likely to be the initial user of such a specification, but this effort should be carried out separately (under NEMA auspices). Need to define scope with care and assure that the framework is extensible. Need to start by writing Use Case. Initial feasibility study is expected to take about 1 year.
- 11/5 9:40 – Discussion of hardware/software interface for beam gating. Agreement to continue work (feasibility study?) on a standard for this interface. Colin Winfield is chair of this working group. May evolve into an IEC specification? Fail-safe considerations? FDA recognition may ease regulatory approval.

f. 2009 Connectathon (Thursday PM)
- 11/5 @ 11:15 – 2009 Connectathon results have been approved by IHE-RO Planning Committee and released to vendors. Integration statements (informal statements based on engineering versions tested at Connectathon) have been received by Bruce. ASTRO wants links to

public (web) documents for released products. IHE-RO Planning Committee is concerned that Connectathon successes be linked to released products, and may withdraw "successes" if vendors fail to release products within agreed upon timeframe.

- ASTRO to publish RFP language for soliciting bids. Concern was expressed that customers may ask for IHE-RO adherence without understanding what is involved. Proposal for white paper to educate users regarding IHE-RO profiles and how their actors correspond to specific clinical requirements.
- Discussion of connectathon results in exceptional situations (fan-in/fan-out < 3). Reporting of test results for situations with fewer than three available input/output actors were consistent with precedents in other IHE domains.
- Discussion of access to connectathon data and efforts underway to tie access to Connectathon Registration Data Use Agreement.
- Test Tools discussion: Fee schedule for 2010 approved by ASTRO is the same as 2009 for new profiles, but adds "past profile surcharge" of $2000 for vendors who have not previously participated (and paid) for test tools. Vendors who succeeded in 2009 with inadequate number of test partners to report success will be allowed to re-test in 2010 at a substantial discount.

III. New Business

a. Addressing commitment to developing new profile – Review of Proposed 2010 Development Profiles from PC (Thursday PM)

- 11/5 @ 13:35 Review of Use Cases
  (a) Residual Dose Optimization – combination of Actors:
    - Dose Compositing Profile Compositing Planner Actor and
    - Adv RT Objects Integration Profile Consumer/Producer Actors
  - 11/7/09 @14:20 – review of Residual Dose Optimization Use Case

1. Issues in re-planning based on prior RT Plan instance(s) for re-calculation of dose from prior plans:
   a. no interoperable means to communicate machine models,
   b. existing IHE-RO ARTI Profile does not address RT Dose storage, and
   c. existing IHE-RO ARTI Profile does not address brachytherapy or ion plans.
2. Fractionation information (from RT Plan fraction scheme or RT Treatment Record) is needed to calculate effective prior dose, but this requires the user to assume radiobiological model and parameters. One would not need to interpret the

plan in detail, but only to extract basic dosimetry information.

3. We can provide for compositing of physical and effective doses, provided the user is able to interpret prior doses in terms of their effectiveness. It is expected that this can be accomplished using the Dose Compositing Profile currently in development.
4. Progress has been made in interoperable use of prior plans, but full integration would require a multi-year effort.
5. Support for deformable registration in needed for proper compositing of prior doses in many clinical cases. It is expected that extensions for deformable registration will be incorporated into profiles as a consensus is developed in its clinical application.
6. Many of the situations described in the Use Case refer to product features, rather interoperability issues.

(b) Structure Template Creation, Import, Export (Saturday AM)

- Structure types include parameters (prescription dose, margin size, laterality),
- Language-independent codes *vs.* ROI labels
- Represent structure types using DICOM tags:
  - ROI Interpreted Type
  - ROI physical Properties Sequence,
  - ROI Identification Code Sequence, or
  - new tag(s)
- Possible code schemes or libraries: SNOMED, ATC dictionary, SNOMED, etc. with extensions, etc.
- Import/Export of treatment-protocol-specific structure templates as XML, etc.

- 11/7/09 @ 15:15 – Review of Use Case characteristics
  1. Specify template of structures for a given clinical or clinical trials protocol
  2. Global library of (language-independent) code values
  3. Support for localization of displayed ROI names

- Open questions:
  1. How to represent codes (including prescription, margin, type parameters) in RT Structure Set? Could use (a) ROI Physical Properties Sequence (b) ROI Identification Code Sequence, or (c) New tags. (Option (c) would require work by WG7.)
  2. Action: Bill B. to carry out limited feasibility study to evaluate options.

3. Action: Bruce to evaluate use of ROI Identification Sequence.
4. Link to Uniform Tissue Names document on ATC web site: http://atc.wustl.edu/resources/RTOG-ATIC/ATIC-ATC_Uniform_Tissue_Names.pdf

(c) Authentication and Authorization
- ITI Enterprise User Authentication Profile and Cross Enterprise User Authorization Profile – Are these profiles in use? We need to know what the response has been to these profiles.
- It is not clear that there is a single, agreed upon standard or method (LDAP?)
- This issue is bigger than IHE-RO → punt for now
- Action (Bruce): Investigate how widely the IHE-ITI XEUA Profile is used.
- Jan 2010 IHE Connectathon will test 9 service providers, 18 users for the XEUA Profile
- The XEUA use case is much broader than RO – wait until adopted more broadly in the healthcare enterprise.

b. Test tool and test data development (11/7/09 @ 15:40)
- IHE-RO will try to fund integration of additional, existing test data from 2009 Connectathon.
- We anticipate test tools will be needed for dose compositing.
- What changes will be needed for IPDW Test Tool? TDD-compatible test data: plans, verification images; relax sequential constraints?

c. Vendor implementation of profile – Bruce has received Integration Statements for Released Products

d. Publishing Integration Statements
- need to provide link to IS document on a public web site
- IHE Integration Statement database (IS registry) and IS page (on www.ihe.net)

e. 2010 Meeting Schedule (11/7/09 @ 9:30)
1. Jan 25-29, 2010, Hampton Inn, Mt. View, California
   - DPDW
   - Use cases for 2010-2011 cycle
   - Outstanding issues for 2009-2010 cycle
2. Domain Pre-Testing (tentatively, June 2-11, 2010)

- Granada, Spain – Julio has indicated availability
- BrainLAB in Munich, Germany is also available for these dates

3. 2010 Connectathon – Sept 20-26, 2010
   - Mon 9/20 judge, setup day
   - Sat 9/25 TC meeting (all day)
   - Sun 9/26 (9am–12pm) TC meeting at Residence Inn
4. ASTRO 2010 Oct 31 – Nov 4, 2010 in San Diego, CA
   - Thu 11/4 – Sat 11/6 at or near ASTRO meeting
   - Hotel arrangement? Scripps?

➔ New time for teleconferences: Thursdays, 12:00 – 2:00pm ET

f. Point-to-Point IHE-RO Testing

- 11/7/09 @ 8:55 – Discussion of one-to-one testing in the situation in which there are an inadequate number of actors for connectathon testing. No consensus for change.

g. TMS participation in IHE-RO Profiles and Connectathons

- 11/7/09 @ 8:45 – Brief discussion of suggestion that TMSs participate in testing of Advanced RT Integration Profile as Consumer Actors. (Concern regarding interoperability of ARTI profile at the level of treatment delivery.)

h. IHE-RO Technical Committee Co-chair Elections

- 11/7/09 @ 9:40 – Stuart and Bruce have expressed willingness to continue serving as IHE-RO TC co-chairs
- ➔ Bruce to ask Sunita to solicit additional nominations and send out letter ballot to voting members.

i. Re-use of Transactions – discussion with Chris Carr (11/7/09 @14:15)

- Ok to re-use transactions with new actors.
- Avoid unnecessary references to specific actors in sections specifying transactions.
- Change proposals can be used to clean up unneeded specifics in existing profiles.

IV. Future Meetings

a. IHE-RO Technical Committee
   - Jan 25-29, 2010, at Hampton Inn, Mt. View, California

- DPDW
- Use cases for 2010-2011 cycle
- Outstanding issues for 2009-2010 cycle

- Domain Pre-Testing (tentatively, June 2-11, 2010)
  - Granada, Spain – Julio has indicated availability
  - BrainLAB in Munich, Germany – also available on these dates
- 2010 Connectathon – Sept 20-26, 2010
  - Mon 9/20 judge, setup day
  - Sat 9/25 TC meeting (all day)
  - Sun 9/26 (9am–12pm) TC meeting at Residence Inn
- ASTRO 2010 Oct 31 – Nov 4, 2010 in San Diego, CA

b. Related meetings
- ESTRO Sept 12-15, 2010, Barcelona, SP
- AAPM Annual Meeting July 18-22, Philadelphia, PA

c. IHE-RO Potential Future Teleconferences:
- ~~Wednesday~~ Thursday, December ~~2~~ 3, 2009 (12:00 - 2:00 p.m. EST)

V. Adjourn 11/7/09 @ 16:07
