<div align="center">

IHE-RO Technical Committee
Face-to-Face with Conference call
September 26, 27, 2013 at 8:30-5:30 PM ET
September 28, 2013 at 8:30-12:00 ET

</div>

5

<div align="center">

Technical Committee Chairs:
Bruce Curran, MS, ME
Chris Pauer, Accuray

</div>

10

<div align="center">

IHERO Task Force Co-Chairs
Dick Fraass, Ph.D., FAAPM, FASTRO, FACR
John Buatti, MD

</div>

15   **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*
20   *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.*

25   Broad sections of this agenda might be moved around depending on what we want to focus on.
The first morning is filled with specific items, but we will range from there. There may be effects from the Leadership meeting on Sep. 22 that will affect our discussion.

30   ATTENDEES

Name	Affiliation	Thu 9/26/13	Fri 9/27/13	Sat 9/28/13
Chris Pauer	Accuray	X	X	X
Walter Bosch	Wash. Univ. / ATC / IROC	X	X	X
Bruce Curran	Brown Univ./ASTRO	X	X	X
Sanjay Bari	Elekta	X	X	X
Christof Schadt	Brainlab	X	X	X
David Wikler	IBA	X	X	X
Koua Yang	Philips	X	X	X
Uli Busch	Varian	X	X	X
Jim Percy	Elekta	X	X	X
Harold Beunk	Consultant		W	

X = in person,   W = via web conference

35   MINUTES

September 26 - Morning
- 8:30-9:00 Settling and Setup
- 9:00 – 12:30 Morning Session
40
  - Meeting was **CALLED TO ORDER** at 9:00 am on 9/26/13
    - ☐ _Discuss Agenda for Morning. – Items for discussion were reviewed
    - ☐ _Approval of minutes from August Teleconference. – **APPROVED without objection**

  - Review of Planning Committee Meeting / Results
45
    1. Re-organization of IHE-RO committee structure approved by ASTRO Board
       a. ASTRO Oversight Committee (a.k.a. Task Force) – chairs B. Fraass, J. Buatti, Committee includes PC, TC chairs, and several additional ASTRO members.
          i. Now a member of the ASTRO Science Council.
          ii. Responsible for budgets and reporting for reporting to ASTRO
50
          iii. To meet by teleconference every two months
       b. ASTRO Clinical Advisory Sub-Committee consists of clinicians (physicians and physicists) advises
          i. To Provides use case prioritization and guidance
          ii. To create publications: summary (one-pager), theory of operation (5-page)
55
             pair with TC
          iii. Web site development
          iv. Spin-off projects as TBN Sub-Committees
       c. IHE-RO Planning Committee – clinical physicists and vendors (currently any IHE members that have expressed interest in the RO domain)
60
          i. Judging panels
          ii. Development and prioritization of use cases
       d. IHE-RO TC
          i. Profile development and maintenance
          ii. Assess feasibility of work items from PC
65
          iii. Test tool development
          iv. Testing requirements for profile
          v. Support/coordinate connectathons
    2. IHE-RO is viewed as important
       a. Identify low-hanging fruit, i.e., profiles that can be developed successfully in the
70
          next 18-24 months
       b. Progress is perceived a slow. In part, this is due to inadequate leadership from the PC and inadequate communication between TC and PC. There is a large "parking lot" of undeveloped use cases.
       c. Communicating the clinical relevance of IHE-RO Profiles. Suggestion to start
75
          from clinical workflow and identify the Profiles that address workflow problems.

  - Test Tool Vendor Updates
    1. ICT reported release of Test Tools on Aug 12, 2013.
    2. Test tool results from May Connectathon have not yet been submitted to Bruce. (Only
80
       one vendor has submitted results.) Connectathon results remained embargoed until Test Tool results are submitted.
    3. ICT has proposed a change to the Test Tool development and support model to an annual contract. This would allow them to develop the tools year round, with support, updates, and bug fixes as needed.
85
       a. MOTION: IHE-RO TC expresses support for developing an annual test tool contract

with the expectation that this will not have a substantial impact on vendor fees. Seconded. <mark>APPROVED</mark> with no objections, no abstentions.
- b. The TC recognizes that ASTRO will put out an RFP for such a contract. The TC feels that ICT would be an acceptable bidder.
- c. <mark>ACTION:</mark> Bruce and Chris to communicate TC resolution to Amber/PC

- ▪ Other Activities
  1. Twice-annual formal connectathon testing
     a. Limited testing could allow *re-testing* for Actors that did not have sufficient test partners in a previous test event.
     b. Issues
        i. More frequent testing would require a larger pool of judges.
        ii. Assuring an adequate number of test partners. It may be easier for vendors to justify participation in a second *formal* testing than informal pre-testing.
        iii. Twice annual testing would require commitment to test (or support testing) with sufficient lead time to plan testing resources and make travel arrangements.
     c. <mark>DECISION</mark>: Consensus that minimal commitment that supplemental testing could take place beginning in Fall 2014 for profiles in which there were inadequate test partners at regular formal test events. It is the intention of the TC to provide full, formal testing at both test events in future years.
  2. Bruce, Chris and Walter met with Dr. Sudhartha Baxi (Australia, New Zealand) on 9/22/13 to discuss IHE-RO activities and possible testing in Australia.

- ▪ Support Activities
  1. Walter reported on activities of the IHE-RO Technical Support contract with Washington University including
     a. Domain Pre-Testing support:
        i. creation of test datasets using D. Clunie's DICOM conformance test tool *(dciodvfy)*
        ii. archive round-trip testing automation
     b. Test script development is ongoing for DICOM Conformance checking and to address specific issues in Profile adherence.
     c. Work with Steve Moore at WU Electronic Radiology Lab to implement Gazelle test support tools
        i. ARTI Profile entries in Gazelle Master Model database
        ii. Collection of test instructions documents for inclusion in Gazelle

  2. Pre-Testing Preparations, Actions, Deadlines
     a. <mark>ACTION:</mark> Vendors to communicate intent to test at Domain Pre-Testing. Vendors need to communicate the number of participants for Brainlab security/logistics and Test/Judging resources – Chris to contact Amber.
     b. <mark>ACTION:</mark> Bruce to ask Amber to submit a news article to IHE central to publicize the Domain Pre-Testing event in the IHE Newsletter.
     c. <mark>ACTION:</mark> Walter to request Gazelle accounts for vendors
     d. <mark>ACTION:</mark> Bruce to submit connectathon dates to encompass the fall (usual pre-testing date) in 2014. Initial minimal commitment is to have the fall date available for makeup/re-testing of profiles that could not be completed in the spring. If resources allow, the fall testing would cover testing of other profiles, as well.
     e. <mark>ACTION:</mark> Vendors to send any shipment tracking number to Christof for equipment shipped to Brainlab.
     f. Brainlab will supply Archive, but retrieval is by Q/R only. Brainlab will supply a manual C-Move service for those without Q/R. The Brainlab archive will use a

new AE Title and IP address. Participants should plan to use previous AE Titles and IP addresses. <mark>ACTION:</mark> Participants to update any changes in AE configuration to ihe-ro.org.

    g. Testing: Mon-Fri 8:30-5:30pm; Monday is set up day.
    h. Meeting times: Sat, Mon, Tues 8:30-5:30
    i. Expected participants: Accuray 2, Varian 3, Philips 2 Elekta 3, RaySearch 2, Support (Bruce, Walter, Bill) 3, ICT 1

- Other Group Updates –
  1. DICOM (Uli) – WG-7 Update – WG-6 comments on proposed workflow procedure codes
  2. ASTRO (Bruce) – IHE-RO is a prominent activity under Science Council. Success of IHE-RO is important to ASTRO.
  3. ROSSI (Chris) – reports presented on error message reporting and on standardizing RT prescriptions. QA sub-group proposing distribution of guidance on QA of new products. ROSSI website to go live.

- o 12:30 – 1:30 Break

September 26 - Afternoon
    o 1:30 – 5:30 Afternoon Session
       ▪ Group Discussion of Use Cases

Topics pick list:
- Documentation
  - o One-page Overview Document preparation for existing profiles
  - o Theory of Operation Document preparation for existing profiles
  - o Updates to wiki.ihe.net
  - o Clinical Overview of Profile Relevance
- Image Registration – group 1
  - o MMRO-III (includes non-CT primary) - $1 / 1.5 / 1.25 = 3.75$
  - o Deformable Registration - $3 / 1.5 / 2 = 6.5$
- Treatment Delivery – group 2
  - o IPDW - $3 / 2 / 2 = 7$ (already at Public Comment)
  - o DPDW – $1 / 1 / 3 = 5$
  - o TDW-2 - $3 / 3 / 0 = 6$
  - o ARTI-2 - $2 / 3 / 3 = 8$ (TMS to TDD content profile)
  - o RT Image / Cone Beam CT $2 / 2 / 3 = 7$
- TMS/TPS – group 3
  - o ARTI with FFF (ARTI-3? ARTI w/FFF?) – $3 / 3 / 2 = 8$
  - o Prescription / Physician's intent – $2 / 2 / 2 = 6$
  - o Structure Set Templates – $2 / 1 / 1.5 = 4.5$
  - o Query / Retrieve – $2.5 / 1.5 / 2 = 6$
- TMS to HIS
  - o HL-7 / CT Sim
  - o Use Case: Communication of 2D and 3D dose to Radiology in a manner compatible with existing technology – survey Radiology profiles for common transactions. Treatment planning type application could put out dose object that is compatible with Radiology image display.
  - o Radiation Oncology Workflow Exchange with HIS

Drivers:

- Low-Hanging Fruit
  - Structure Set – consistent naming for clinical trials, registries, plan evaluation
  - CT-SIM – Patient demographics issues in clinic is a constant pain…
  - Query/Retrieve – (TPS retrieval of items is a possible "win")
  - Possible first steps to Rx display profile
- Planning Committee Priorities
- Profile coverage of "holes" in the clinical workflow? (Mika chart)
- Rankings (weight 0-3, 3=best)
  - Speed of definition?
  - Speed of implementation?
  - Clinical significance?

- Agenda Items
  - ARTI (Fri afternoon, in two groups)
    - **TDPC (**Treatment Delivery-Plan Content)
      - Review by Plan type
        - Look up attributes that need to be added or removed as transported
      - Are options really optional or are they required?
      - Naming of profile
      - One page overview
    - **TPPC** (Treatment Planning-Plan Content) – was ARTI-II
      - Common Transactions with ARTI
      - Naming of profile: rename as TPPC
      - One page overview
  - First generation Prescription Display support
  - RT Image / Cone Beam CT (Fri. morning) = Treatment Delivery-Image Content (**TDIC**)
    - Provision of reference image for TDD
    - Acquisition of verification image by TDD
  - MMRO-III (Thurs. afternoon)
    - Issues
      - Address "edge" cases, e.g., re-registration of hybrid PET-CT to correct registration errors.
      - How many registrations are allowed in a REG object?
      - Support for well-known FoR?
      - Compatibility with Radiology profiles?
      - The Radiology Image Fusion (FUS) profile, supports more than two Frames of Reference.
    - DECISION: There shall be exactly two items, each with a distinct Frame of Reference, in the Registration Sequence of the Spatial Registration object. One item (not necessarily the first item) is a self-reference (with an identity transformation).
    - For discussion Friday morning: Creator Images Stored (RAD-4.18) Transaction is required to store images in a new Frame of Reference.

        *** adjourn for the day at 5:30pm ***

September 27 - Morning
- 8:30 – 12:30 Morning Session
  - MMRO-III Discussion [document vers. 1.4] (continued from Thursday afternoon)
    1. The capability to assign a new Frame of Reference when correcting registration of hybrid series was discussed.
    2. Two situations in which image series are stored by a Registrator were discussed. The question

of whether the *same* Transaction can be used for both was considered:

   a. Store a series as new instances with a new Frame of Reference (using the Creator Images Stored Transaction?).
   b. Store a resampled image series as new instances (using the Creator Images Stored Transaction?).

3. The Radiology Fusion Profile has use-case specific constraints on transactions.
4. ==ACTION:== Uli and Christof to request guidance from Radiology Domain (Kevin O'Donnell and Rob Horn) during WG-6 on re-use of Transactions and how to express context-specific constraints on the re-use of Transactions in IHE-RO Profiles. The following content items are expected to be useful for Image storage when a new Frame of Reference is assigned or re-sampled images are stored: Referenced Image Sequence, Source Image Sequence (General Image), Contributing Equipment Sequence (SOP Common).
5. Does this Profile address the use of Well-Known Frames of Reference? DECISION: include a warning in the Profile: "The Use Cases addressed by this profile do not include mutual registrations to a well-known FOR."
6. Discussion of how to indicate the relationship between segmentations (RT Structure Set) and the image(s) from which they are derived. (Open Issue #1) DECISION: Add note that reliable determination of the source of contours is currently not possible under DICOM 2011 standards.
7. New names for actors in MMRO-III? This is not *necessary* since Actors are always specified in the context of a Profile. DECISION: Keep existing Actor names.
8. Implications of 4D imaging? Consensus that 4D Imaging is not addressed by this Profile. (This issue may be addressed in the context of deformable imaging at a later date.)
9. ==ACTION:== Document vers. 1.4 to be posted on ihe-ro.org DONE.

- ==ACTION:== Implications of removing Archives from Content Profiles (Christof and Bruce) – to be discussed after Domain Pre-Testing
- ==ACTION:== Draft CP for BRTO regarding "Referenced Fraction Group Sequence" entry (Bruce) – to be presented after Domain Pre-Testing
- Review of Test Tools RFP for TDW-II
  - TDW-II is in revision 5.1. All open issues have been addressed, except for decision on one concept code for the scheduled parameter sequence of the UPS that indicates Treatment or Continuation.
  - ==ACTION:== The TDW-II profile is to be discussed after Domain Pre-Testing in Munich.
  - ==ACTION:== Uli to sort out the Concept Code for Treatment Delivery Type with WG-6.
- Review of Test Tools RFP for QAPV - QAPV Profile is being prepared (IHE) for Public Comment.
- Prescription Automation
  1. Discussion of Prescription Automation Use Case (2007), ROSSI Prescription Proposal (2013)
  2. First generation RT objects can express top-level prescription, but there are scoping uncertainties. 1st Gen DICOM RT objects are inadequate for complete prescription.

September 27 - Afternoon
  - 12:30 – 1:30 Break
  - 1:30 – 5:30 Afternoon Session
    - Prescription Automation (continued)
    3. TC consensus that it is appropriate to start development of two profiles:
       a. Intra-departmental Prescription Profile – DICOM 2nd Gen RT Physician Intent IOD should be adequate for this Use Case. ==ACTION:== Sven Siekmann (Brainlab), Mark Pepelea, and Chris to draft a one-page overview for review at Munich meeting.
       b. Cross-Departmental (HL7) profile to convey (some) patient prescription information to HIS. HL7 has no specific provisions for RT prescriptions, including dose-per-

structure constraints. Version 2.5.1 is recommended standard at this point. Investigate transactions shared with CT Sim and IHE-J RO (ESI) ACTION: Koua and Bruce to draft a one-page overview for review at Munich meeting.

4. ACTION: Chris to add one-page template to ihe-ro.org (help from Bruce). DONE
5. ACTION: One-page overviews to be drafted for all existing Profiles:

Profile	Name	Volunteer(s)
ARTI	Adv. RT Objects Interoperability	Jim
BRTO	Basic RT Objects Interoperability	Jim
DPDW	Discrete Positioning & Delivery Workflow	Uli
DCOM	Dose Compositing	Walter
IPDW	Integrated Positioning & Delivery Workflow	Uli
MMRO	Multi-Modality Image Registration for Rad. Onc.	Bruce
MMRO-II	Multi-Modality Image Registration for Rad. Onc. II	Bruce
QAPV	Quality Assurance with Plan Veto	Chris
TDW	Treatment Delivery Workflow	Uli

- ARTI Successor (now to be named Treatment Planning-Plan Content)
  1. ACTION: Christof to draft ARTI successor profile including
     a. Stereotactic Actor – re-organize
     b. Source-wedge distance
     c. Fluence mode
     d. High-Dose Technique
     e. TMS Transaction re-organization. Single TMS Actor with all transactions optional.

- Naming of *new* Integration Profiles:
  o **Treatment Planning-Plan Content (TPPC)** *was* **ARTI Successor (TMS)**
  o **Treatment Delivery-Plan Content (TDPC)** *was* ARTI Treament Delivery.
  o **Treatment Delivery-Image Content (TDIC)**
  o All existing Profiles retain their current names.

- TDPC (Treatment Delivery Plan Content)
  1. Addresses C-Arm Linac only.
  2. Include Treatment Record content? Yes, for now.
  3. Single pair of Producer and Consumer Actors with options per beam type?
  4. Does TMS produce a well-formed plan? Complete? Precision of parameters?
  5. ACTION: Uli to draft one-page overview of TDPC for review in Munich, Oct, 2013.
  6. A "TDW+ Plan Content Details_2011-1007.xls" spreadsheet document discussed at TC meeting Oct, 2011 in Miami may have useful information?

- TDIC (Treatment Delivery Image Content) *was* "RT Image / Cone Beam CT"
  1. TMS sends reference images to TDD
  2. TDD stores acquired patient positioning images to TMS
  3. Specify required content of images and spatial registrations
  4. The profile may also address the creation of images outside the TMS, i.e., by a TPS. Will need

to include import of plan and DRRs from TPS to TMS.
350
     5. ==ACTION==: create one-page overview of profile. Done. Copy to be posted on ihe-ro.org.
     6. ==ACTION==: Chris to create location on ihe-ro.org for one-page overviews.

*** adjourn for the day at 5:30pm ***

355

September 28 - Morning
- o 8:30 – 12:30 Morning Session
    1. Future Meetings
360
       a. IHE-RO 2014 Q1 TC Meeting - Feb 24-29 (4.5 days) – Tentatively in San Diego, CA
       b. IHE-RO Connectathon, Fairfax, VA - Apr 28–May 3, TC mtg May 5-6(7?)*
       c. IHE-RO Post-ASTRO TC meeting, Sep (17?)*18-20, San Francisco
       d. IHE-RO Domain Pre-Testing – Oct 6-14(15?)*, *tentatively Baden, Switzerland*
          * Consider extending TC meetings after ASTRO, and test events.
365
    2. Other meetings through 2014
       a. Nov 18-22, 2013 DICOM WG-7, Washington, DC
       b. Jan 6-10, 2014 DICOM WG-6
       c. Jan 22-28, 2014 DICOM WG-7 Ion Group
370
       d. Mar 24-28 WG-7, TBD (*Vienna?)*
       e. Mar 31 WG-6, Vienna
       f. Apr 4-8 ESTRO, Vienna
       g. Jun 8-14 PTCOG, Shanghai
       h. Jul 20-24 AAPM, Austin, TX
375
       i. Sep 14-18 ASTRO, San Francisco, CA

    3. Domain Pre-Testing Oct 21-29, 2013 in Munich

    4. Elections
380
       a. TC Industry Chair, Chris Pauer's term will end in Nov 2013.
       b. ==ACTION:== Email to Amber to call for nominations for industry co-chair for the TC.
       c. Plan to hold elections after Domain Pre-Testing in Oct.

    5. Action Item Review
385

    6. Other Topics
       a. IHE-J Testing issue
       b. Update of wiki.ihe.net content.
          i. ==ACTION:== Bruce, Christof, Uli to clean up wiki.ihe.net during Domain Pre-Testing
390
             (Bruce has editing permission).
          ii. ==ACTION:== Chris to ask Amber to update meeting attendees and voting members on
              wiki.ihe.net.
       c. HL7-based Profiles
          i. Enterprise Scheduling Integration - Japan ESI-J (to be re-named) – currently in
395
             Trial Implementation, but the impetus for implementation has been removed. This
             profile is rather specific to Japanese requirements. Expected to be retired at some
             point.
          ii. "CT-Sim"
          iii. Prescription Automation (Cross-Department)
400
       d. Set draft agenda for TC meeting in Munich
       e. Query/Retrieve in Radiation Oncology (QRRO) Profile proposal – concept presented by

Christof.

 i. Example Use Cases for Q/R
  1. Retrieve images, structure set(?), plan(?) from an Archive, CT, or CT-Sim
  2. Query PACS or other modality for secondary images, etc. (MR, PET, REG, ...) to be used in treatment planning.
  3. Retrieval of plan and associated images, structure set, dose for re-planning or clinical trial/registry dataset submission.
  4. Retrieval of plan and related treatment records, planning images, structure set, verification images, registrations from TMS
  5. Retrieval of latest state of the RT Course (2nd Gen RT)
  6. Retrieval of RT Plan and RT Dose and associated objects for dose accumulation from prior treatments from PACS, TMS, TPS

 ii. Technical Considerations
  1. Speed of retrieval
  2. Multiple dataset sources
  3. Identification at patient, series, object level
  4. Partial retrieval? (may not apply to RT)
  5. Availability of C-Find Latest service?

 iii. ACTION: Christof to update draft of Query/Retrieve concept. Haken and Christof to draft one-page overview for this profile.

f.

7. Meeting adjourned at 11:30am