

**IHE-RO Technical Committee
Face-to-Face
December 9-12, 2019 at 8:30-5:30 PST
December 13 8:30-12:00 PST**

**Technical Committee Chairs:
Scott Hadley, PhD
Chris Pauer**

**IHERO Working Group Co-Chairs
Bruce Curran, MS, ME, FAAPM, FACMP, FACR, AAPM / VCU Health
Bridget Koontz, MD, Medical Director, RO Services, Duke Regional**

Mission Statement: *The American Association of Physicists in Medicine (AAPM) sponsors a multi-society Task Force to undertake an initiative to promote the Integration of the Healthcare Enterprise (IHE) – Radiation Oncology (RO). Originally formed by the American Society for Radiation Oncology (ASTRO), it fosters seamless connectivity and integration of radiotherapy equipment and the patient health information systems. The Technical Committee of IHE-RO will undertake use cases defined by 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.*

Attendees:

Name	Affiliation	Email	12/9	12/10	12/11	12/12	12/13
Chris Pauer	Sun Nuclear	chrispauer@sunnuclear.com	Z	Z	Z	Z	Z
Walter Bosch	Wash. Univ.	wbosch@wustl.edu	X	X	X	X	X
Jill Moton	AAPM	Jill@aapm.org	X	X	X		Z
Michael Owens	Reflexion	mowens@reflexion.com	X	X	X	X	X
Jingkun Hu	Reflexion	jhu@reflexion.com	X	X	X	X	
Thomas Schwere	Varian	Thomas.Schwere@varian.com	X	X	X	X	X
Bob Pekarek	Accuray	bpekarek@accuray.com	X	X	X	X	X
Jim Percy	Elekta	Jim.percy@elekta.com	X	X	X	X	X
Jon Treffert	Raysearch Labs/ ProNova	Jon.treffert@raysearchlabs.com	X	X	X	X	X
Richard Voegele	Brainlab	richard.voegele@brainlab.com	Z		Z		
Stefan Pall Boman	Raysearch Labs	Stefan.p.boman@raysearchlabs.com	X	X	X	X	
Sanjay Bari	Elekta	Sanjay.Bari@elekta.com	X	X	X	X	X
David Wikler	IBA	David.Wikler@iba-group.com	X	X	X	X	X
Rickard Holmberg	Raysearch Labs	Rickard.Holmberg@raysearchlabs.com	X	X	X		
Scott Hadley	U. Mich.	swhadley@umich.edu	Z	Z	Z	Z	Z
Johannes Stahl	United Imaging	Johannes.Stahl@united-imaging.com	X	X	X	X	Z
Andreas Lindstrom	Raysearch Labs	Andreas.lindstrom@raysearchlabs.com	X	X	X	X	

Marcus Bergman	Raysearch Labs	Marcus.bergman@raysearchlabs.com	X	X	X	X	
Mark Weismeyer	Standard Imaging		Z				
Bruce Rakes	Mevion		Z				
Harold Beunk	ICT	Harold.Beunk@ict.nl		Z	Z	Z	
Stina Svensson	Raysearch Labs	Stina.svensson@raysearchlabs.com			Z		
Rishabh Kapoor	VCU/VHA	Rishabh.kapoor@va.gov			X	X	X
Tucker Meyers	EPIC	tucker@epic.com			X	X	X
Christof Schadt	Brainlab	christof.schadt@brainlab.com			Z		
Bruce Curran	AAPM / VCU	bhcurran@gmail.com			Z	Z	Z
John Stamm	EPIC	jstamm@epic.com				X	X
Mats Asell	Elekta	Mats.Asell@elekta.com				Z	
Randy Norton	Elekta	Randy.Norton@elekta.com				Z	

X = In person, Z = Zoom video conference

30 **Minutes:**

- I. Call to Order at 8:40 am PST, Mon. Dec. 9, 2019.
a. A quorum was present.

35 II. Topic 1: Level Set

- a. Review Agenda
i. Agenda for the week was reviewed. Topics were arranged to accommodate schedules and permit remote participation by off-site members.
- b. Approve Minutes
40 i. Minutes from the Nov. 14, 2019 TC Teleconference were reviewed and approved without objection.
- c. Updates on IHE-RO activities
i. Planning Committee
1. Call for nominations for vendor co-chair of PC to go out 12/9/19
45 ii. Working Group, Steering Committees – no update at this time.
iii. Domain Coordination Committee
- d. AAPM
i. Invoices to be sent to participating vendors. Fees remain unchanged.
- e. DICOM WG-7 Update
50 i. WG-7 met in November. Work focused on tomotherapeutic and robotic radiations, radiation dose.
- f. AdvaMed and Standards Effort
i. Final phase of RT3 Machine Characterization is in process. The standard is expected to be released by the end of the year.
- 55 g. IHE-RAD
i. Michael Owens reached out to IHE-RAD regarding development of a 4D Image Import Profile. IHE-RAD appears unlikely to address this profile in the near term.

The group discussed developing such a profile within IHE-RO. Some concern expressed regarding adoption for RO vs RAD profiles.

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III. Topic 2: Treatment Planning–Plan Content-Brachy (TPPC-Brachy) and Treatment Delivery Record Content (TDRC) for Brachy

a. The TC reviewed version 2.1 of the TPPC-Brachy Profile Draft (saved as version 2.2).

b. Open Issues

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- i. (2) Chapter 7 content has been defined (closed)
- ii. (4) List of Transactions has been defined (closed)
- iii. Representation of applicator/seed contours: referenced (segmented) ROI vs. coordinates. The content of the RT Structure Set IOD is not currently covered by this Profile. Brachy working group needs to assess this.

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1. ACTION 191201: Jill to set up Brachy sub-group teleconference to define applicator/seed content (RT Structure Set vs. RT Plan).

iv. Plan transfer use case is well-understood. Are there any *options* for plan transfer? Treatment recording use case has been moved to TDRC-Brachy.

c. Actors defined

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- i. HDR Plan Producer / Consumer
- ii. PDR Plan Producer / Consumer
- iii. LDR Permanent Plan Producer / Consumer
- iv. LDR Temporary Plan Producer / Consumer
- v. TMS

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d. Transactions

i. Defined Transactions – the TC reviewed Transactions

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1. HDR Plan Storage
2. PDR Plan Storage
3. LDR Permanent Plan Storage
4. LDR Temporary Plan Storage

ii. (Corresponding) Transactions are required for Producer and Consumer Actors

iii. All Transactions are optional for TMS

iv. Transfer of DICOM content from Producer to Consumer

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1. The Profile specifies DICOM C-Store, but other forms of transmission (Web services, media, ...) are acceptable.

2. Details regarding the method of transfer are covered by Workflow Profiles.

e. DICOM Content (RT Plan IOD)

i. Module Requirements

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1. Prescription – work remains to be done

ii. Source Isotope Name (300A,0226) – Profile specifies format: <Element>-<Number of protons> (e.g., Ir-192)

iii. Brachy Accessory Device Sequence – TODO suggested: “If HDR, this sequence should contain at least one item”?

iv. Referenced ROI Number – need to clarify requirements for RT Structure Set.

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f. TC review of TDRC-Brachy version 2.1 (saved as version 2.2).

i. Transfer of DICOM content from Producer to Consumer

105

1. The Profile specifies DICOM C-Store, but other forms of transmission (Web services, media, ...) are acceptable.

2. Details regarding the method of transfer are covered by Workflow Profiles.

ii. Patient Setup Module (DICOM Type U): Is this required for any brachy use case?

Are there specific conditions that govern its use? TODO: brachy sub group to define.

iii. ACTION 191202: Jim Percy to communicate questions/open issues with Yuri N.

IV. Topic 5.5: IHE-RO Technical Framework

- a. The TC reviewed IHE-RO_TF_Vol3_Rev0.1_2019_12_07.docx.
- b. Section 7.2.2 Propagation of Common Patient Information – governs identification of newly created DICOM instances.
- c. Interoperable exchange of information requires consistent identification.
 - i. Exceptions may arise from correction of erroneous values and changes in demographics.
 - ii. The IHE-RAD Patient Information Reconciliation (PIR) Profile addresses reconciliation.
 - iii. Propagation of information: “copy” vs. “inherit” ?
 - iv. Suggested wording: Interoperable exchange of information requires consistent identification. Producing Actors should reconcile inconsistencies to enable interoperable exchange. Consuming Actors must handle inconsistent data safely.”
- d. Some of the material in Vol 3 is redundant with Critical Attribute Mapping section in Vol 2 Appendices of the existing TF.

V. Topic 3: Profile Disposition / Status

- a. BRTO-II – being incorporated into TF; DICOM WG-07 is proposing a CP to remove Attached Contours in the RT Structure Set. The TC should consider preparing a CP to remove/replace the high-definition contour option for Contourers in BRTO-II.
- b. CDEB – to be discussed later this meeting.
- c. CPRO – deprecated
- d. DRRO – to be discussed later this meeting.
- e. DCOM – in TI (limited implementation)
- f. FDII – IHE-RAD has limited bandwidth for this: IHE-RO to take up this profile?
- g. HIS – to be discussed later this meeting.
- h. IPDW – to be discussed later this meeting.
- i. MMRO-III – being incorporated into TF
- j. RXRO – first 2nd Gen RT Profile
- k. QAPV – dormant
- l. QRRO – to be discussed later this meeting.
- m. ROTH
- n. ROIT – awaiting standard development
- o. TDIC
- p. TDPC – discuss TDPC-Ion?
- q. TDRC
- r. TDW-II – has been tested
- s. TPIC
- t. TPPC
- u. TPPC-Ion

VI. Topic 3.5: CT Shift Clinical Impact Statement

- a. Thomas Schwere presented a clinical use case for (a) communicating offset between laser setup point and treatment isocenter and (b) for annotating the reference point location (e.g., using RT ROI Interpreted Type in the RT Structure Set)
 - i. Uses Table Top {Vertical, Lateral, Longitudinal} Setup Displacement (300A,01D2)
 - ii. There is no explicit relationship between setup reference location(s) (laser setup point(s)).
 - iii. DICOM first gen RT supports both absolute and relative machine locations (couch translations). Relative positions must be interpreted as offsets from the initial setup location for all beams.

- 160 b. To support this Use Case, an addendum (CP) to TDPC is needed. A new Profile is probably not needed.
- c. Proposed RT Plan CP (for DICOM WG-07)
- 165 i. Add Setup UID to identify setups with the same reference location
- ii. Add reference to setup point location (POI) ROI number in the referenced RT Structure Set.
- d. **ACTION 191203**: Jim Percy to investigate RT ROI Interpreted Type Defined Term for Setup Reference Location
- e. **ACTION 191204**: Jim Percy to draft CP on Setup UID and Setup point ROI number
- 170 f. **ACTION 191205**: Thomas Schwere to investigate mapping from DICOM 2nd Gen codes to 1st Gen Defined Terms

VII. Topic 5: TPPC – Ion

- a. **ACTION 191206**: David Wikler to draft a note to clarify relationship between slabs and slots for RT Ion Plan.

175 VIII. Topic 4: Any further action on PC use cases?

- a. Scanning Tank Use Case
- i. Capture of data from scanning water tank (or other phantom) dose measurements.
- 180 ii. The TC discussed use of RT Dose (point dose) to represent scanning dose measurements, RT Structure Set for phantom geometry, RT Plan/RT Beam Record for beams.
- iii. AAPM TG-11 “Information Transfer From Beam Data Acquisition Systems”
- b. This Use Case is to be reviewed by AAPM QA Committee. May be considered by IHE-RO later.

185 *[Adjourn for the day 12/9/19 at 5:25pm PST]*
[Resume meeting 12/10/19 at 8:40am PST]

IX. Topic 7: DPDW / IPDW / TDIC

- 190 a. Thomas Schwere presented vers. 2.1 draft 3 of the IPDW Profile (saved as draft 4).
- i. Storage of Position Acquisition and Registration Results is no longer optional.
- 195 ii. UPS are grouped into Treatment Sessions, identified by a Treatment Session UID.
1. Currently, this is used only in the UPS. This UID is analogous to the Accession Number in radiology, and distinct from UPS Transaction UID.
2. The Treatment Session UID is created by whoever initiates the treatment: for online treatments, the TMS creates the UID. For offline treatments, the TDS initiates the treatment and creates the UID. In the latter case, the TMS must accept (and reconcile) Session UIDs created by the TDS.
- 200 3. Adding Treat Session UID to RT Beams Treatment Record was discussed. The DPDW/IPDW subgroup will discuss further.
4. Adding Treatment Session UID to TDW-II was discussed. This change should be included with other changes (including reconciliation of treatment records) when the Profile is revised (to TDW-III).
- 205 iii. **ACTION 191207**: Sanjay Bari to start Use Case discussion on reconciliation of offline delivery artifacts.
- iv. Patient positioning per Treatment Position Group
1. Treatment Position Group (2nd Gen concept) defines a set of treatment positions that share a single registration.

- 210 a. Profile draft includes examples showing multiple groupings of 6 beams
in 3, 2, or 1 Treatment Position Groups (with 3, 2, and 1 {acquisition,
registration, and correction} steps, respectively).
- b. Suggestion to add Treatment Session UID to these examples.
- 215 c. What if an acquisition is re-used for a second Position Group? – If the
Acquisition is missing in the second Position Group, that is an
indication to re-use the (most recent) Acquisition from the prior
Position Group. This use case (e.g., multiple liver metastases) is
relatively common. Link Registration UPS to Acquisition UPS.
- d. Ad-hoc acquisition/registration/correction can be accommodated – can
reference related, prior scheduled UPS.
- 220 2. Further discussion was deferred to sub-group.
- v. ACTION 191208: Jon Treffert to document DPDW Use Cases from Dec 2019
imaging vendor workshop.
- vi. ACTION 191209: Sanjay Bari to document Adaptive Planning Use Cases
- 225 b. David Wikler presented “Workflow Definitions in Positioning Review” (powerpoint to be
distributed the TC).
- i. 2D/2D (4 dof) vs. 2D/3D (6 dof) image registration.
1. 6 dof registration uses “daily DRRs” (re-projected from CT) to match acquired
Patient 2D images
- 230 2. TMS uses Imager Modeled Geometry, Actual Gantry Angle, and Spatial
Registration to generate DRRs for positioning review.
- a. Option 1: compute dynamic reference DRR from CT in TDS
- b. Option 2: compare TPS DRR and TDS DRR (ok for commissioning)
- c. Option 3: re-compute reference in TPS (too complex)
- 235 ii. RT Image/TDIC issues for Positioning Review
1. Positioning Review can use the DICOM *with assumptions* (But this is a hack.)
- iii. Possible alternatives
1. Extend the DICOM X-ray Receptor Coordinate System by adding X-Ray
Image Receptor Pitch and Roll Angles
- 240 2. Characterize the geometry of the imager as IEC Imager CS (4x4 matrix).
- iv. IHE-RO definitions for Positioning Review
1. Fusion Display of acquired and reference images:
- a. w/o registrations for patient position verification
- 245 b. with registration computed by PDS for patient registration
- c. w/o registration computed by PDS for patient registration
- d. with new registration computed by Positioning Review application
2. Issues/Transactions Needed
- a. Storage of position correction instruction (infer from RT Record?)
- b. Storage of daily DRR RT Image produced by the PDS
- 250 c. Exchange of reference DRR images between TPS and TMS (TPIC)
- d. Exchange of reference between TMS and PDS is implicitly defined
- e. Need 9-dof characterization of imager geometry.
- v. Options for documentation of Positioning Review were discussed:
1. Re-match CT and reference image
- 255 2. DRR with presentation state
3. DRR without presentation state
4. Static image (screen captures)
- c. ACTION 191213: David Wikler to clarify use cases for positioning review in TDIC

- 260 d. **ACTION 191214**: David Wikler to draft a CP to specify full geometric parameters for imagers.
- e. **ACTION 191215**: Jon Treffert to draft and forward to David TDIC definition for annotation of imaging off-treatment-position.
- f. **ACTION 191216**: Thomas Schwere to draft specification for Transactions in IPDW, based on Use Cases in TDIC.

265 X. Topic 8: DICOM CP 1866

- a. The TC reviewed the text of DICOM CP 1866, which adds Anatomic Segmentation Property Types for head/neck anatomic structures.
- 270 b. Several coding schemes were discussed. The TC was supportive of the effort to enhance DICOM code scheme for Segmentation Properties.
- c. The group discussed the role of IHE-RO in driving implementation of Segmentation Property Type Codes. A review of the mapping of TG-263 to UMLS (superset of SNOMED) was suggested as a helpful resource for adoption of anatomic segmentation codes.
- 275 d. **ACTION 191210**: Walter Bosch to draft CP for BRTO-II to incorporate Segmentation Codes in DICOM Content sections. (mandatory for BRTO-III?)

XI. Topic 9: Prescription Profile (RXRO)

- a. The TC reviewed RXRO Profile draft version 0.15.
- 280 b. Code Schemes for Treatment Site Code (ICD-O-3) and Diagnosis Codes (ICD-10) were discussed.
- c. Dosimetric Objectives for Targets – Should Enhanced Physician Intent *prohibit* specification of non-target intent? No, however, consumers must preserve and propagate all information in the Enhanced Physician Intent. Removed requirement that all conceptual volumes referenced in the Dosimetric Objective Parameter Sequence be targets.
- 285 d. Added Scott Hadley as Profile author.
- e. **ACTION 191211**: Chris to incorporate changes in RXRO Profile, update dates and version numbers and save as version 0.16.
- f. **ACTION 191212**: Chris to forward updated RXRO to domain coordination committee for Public Comment.
- 290 g. **DECISION**: The TC approved the RXRO Profile for Public Comment 12/10/19 without objection.

XII. Topic 6: RO Treatment History (ROTH)

- 295 a. The TC reviewed version 0.1 of the ROTH Profile draft.
- b. Two Actors (Treatment History Requestor, Treatment History Provider) are defined.
- c. Request for Treatment History could use C-FIND Service or the (proposed) C-FIND-LATEST Service to identify the most recent KOS instance or Structured Report that contains references to treatment data.
- 300 d. Need to identify the Treatment History content to be conveyed.
- i. Data is at the Patient Level.
- ii. Manifest of information objects (and their relationships)
- iii. Represents the state of a TMS
- iv. Identifies the instances that were used to treat a patient (i.e., approved and actually delivered plans and related data)
- 305 e. Potential Content:
- i. DICOM plan information
1. Images, Structure Sets, Plans, Dose, Treatment Record, CBCT, RT Image
- ii. Non-DICOM:
1. OTV Notes

- 310 2. End of Therapy (Treatment Summary) Note
3. Prescription
4. Follow-up Notes
- f. How to represent treatment history “manifest”? Several options were discussed:
315 i. KOS – probably not a good fit, since a KOS instance cannot represent an object hierarchy
ii. DICOM Structured Report
iii. HL7 FHIR defines a manifest file (in JSON format)
iv. Other JSON
- g. Issues
320 i. Patient treated on “specialty” machine – limited data availability
ii. Consider the IHE-ITI XDS Affinity Domain as a means to transport documents.
- h. Priority for ROTH development is defining the manifest.

[Adjourn for the day 12/10/19 at 5:30pm PST]

325 [Resume meeting 12/11/19 at 8:30am PST]

XIII. Topic 10: DRRO Update

- a. Stina Svensson reported on activities of the DRRO working group.
330 i. Registration Code updates have been prepared as a DICOM CP.
ii. The group has been working on test methods and datasets for testing transfer of Deformable Registrations.
iii. There is strong motivation to achieve interoperable transfer of Deformable Registrations. This is essential for validation of algorithms.
- b. Stina reviewed the current draft DRRO Profile with the TC (saved as version 0.4)
335 i. Transaction definitions are still needed for Deformable Registration Storage and Retrieval. Refer to MMRO-III for image retrieval, image storage, dose retrieval, dose storage.
ii. Add Spatial Registration Object Retrieval as (optional) input to Registrator.
340 iii. Add Diagram showing Actors and Transactions
iv. Add Table showing Actors, Transactions, Optionality (Section X.1)
v. Actor Descriptions (X.1.1)
vi. Options (optional Transactions)
vii. Volume 2 contains Transaction specifics
viii. Volume 3 contains DICOM Content
- 345 c. **ACTION 191213**: Stina Svensson to continue edits of DRRO and present updated Profile (vers. 0.5) at Jan 2020 TC teleconference.

XIV. Topic 12: Consistent Dose for External Beam (CDEB) Update

- a. Christof Schadt presented an updated CDEB Profile draft (vers. 0.1.4)
350 b. Updates based on TC discussions in Florida (April 2019) were reviewed.
c. Referenced Dose Reference UID – Primary target is defined *per beam* (in some TMS)
d. Use Case terminology was revised as follows:
355 i. Dose Tracking for specific target(s) – nominal dose to VOLUME or SITE
ii. Dose Tracking for organs-at-risk – nominal dose to VOLUME or SITE
iii. QA for specific points – actual dose at COORDINATE
iv. QA for organs-at-risk – actual dose at COORDINATE
- e. With this definition, for pure dose-tracking the RT Plan is self-contained, i.e., an RT Structure Set is not needed to identify dose references.
- 360 f. Christof will continue revising the Profile.

XV. Topic 13: Basic RT Objects (BRTO) Topics

- 365 a. Christof Schadt reviewed the issue of off-slice (“high-resolution”) contour specification in
BRTO-II. This feature uses the Attached Contours attribute in DICOM to represent
connectivity between contours. Currently no vendors are implementing this feature of the
Profile.
- 370 b. DICOM WG-07 CP (RT145) introduces the following changes:
- 375 i. Contours can be in any planes
 - ii. Contour Spacing specifies spacing between (equally-spaced) contours
 - iii. Contour Orientation specifies direction cosines of contour planes (required if Contour
Spacing is present)
 - iv. Recommended Pixel Spacing (for pixel-based representation)
 - v. Retire Contour Number and Attached Contours attributes
 - 380 vi. Retire Contour Slab Thickness and Contour Offset Vector attributes
 - vii. Contour Image Sequence (Type 3) is no longer needed
 - viii. The new attributes are specified within the ROI Contour Sequence. The possibility of
allowing multiple representations for the *same* ROI was considered. However, this
many-to-one relationship would be problematic for references to ROIs, e.g., for DVHs
or dose references.
 - 385 ix. If these changes are incorporated in an IHE-RO Profile, the existing BRTO-II Profile
would need to be retained.
- c. IHE-RO could create a (content) Profile to cover the new capabilities of the enhanced RT
Structure Set.
- d. How can existing applications be prevented from (mis-)interpreting the enhanced RT
Structure Set? Absence of the Contour Image Sequence (Type 3) makes an Structure Set non-
adherent to BRTO-II (but may still be DICOM conformant).
- e. The CP is to be presented to WG-06 next week (12/16/19).

XVI. Topic 14: Query Retrieve in RO (QRRO)

- 390 a. Stefan Boman reviewed the QRRO Profile draft (version 2.0) with the TC.
- b. The Profile currently includes both hierarchical and relational queries. Some concern was
expressed that there may be little added value in specifying hierarchical queries. Scope and
architecture may be revisited later.
- 395 c. Content categories (RT Structure Set, RT Plan, etc.) are all optional.
- d. DICOM Content is specified in the Message Semantics section.
- e. A list of QRRO Use Cases (version 1.1) was reviewed briefly. Query capabilities should
address these use cases. (May require some additional retrieval/analysis.)

[Break for lunch 12/11/19 11:50am – 12:50pm]

- 400 f. What is the rationale for QRRO?
- i. Inadequate support for RT-specific object content in radiology-based PACS makes it
difficult to query for RT objects.
 - 405 ii. Instance-level queries with multiple RT object Instances within a Series.
- g. ACTION 191214: Stefan Boman to update QRRO Profile draft with input
- h. ACTION 191215: Chris to remind TC members to review updated Profile draft

XVII. Topic 13.5: Profile Priorities

- 410 a. Concern was expressed that the level of Profile development effort should match the
availability of relevant products.
- b. How do we assess the level of commitment of vendors to product development?

c. Profile Development Priorities

- i. The TC surveyed members present to determine the anticipated number of products to be tested as Actors in IHE-RO Profiles as a measure of interest in current and future Profiles. Results are recorded in the Technical Framework Profiles Disposition table on the Profiles page on the ihe-ro.org wiki. (A copy of this table as of 3:55pm 12/11/19 is shown below.)

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Technical Framework Profiles Disposition

Order	Name	Next State	Last Action or State	Test Tools?	Any interest to test ever?	New Priority	Interest for 2020	Interest for 2021
1	BRTO II	Published for TI, next Publish to TF	Final Text	Yes	Yes	X	6	7
2	MMRO-III	Publish to TF	Final Text	Yes	Yes	X	6	6.5
3	TPPC	Publish to TF	Final TExt	Yes	Yes	X	4	4
4	TDPC	Publish to TF- awaiting Connectathon testing	Trial Implementation	Yes	Yes		2P / 1C	3P / 2C
5	TDW-II	Publish to TF- awaiting Connectathon testing	Trial Implementation	Yes	Yes	X	3P / 5C	3P / 6C
6	CDEB	Review for TI after edits	Public Comment		Yes		2C / 3PP / 3RP	2C / 3PP / 3RP
	TPIC				Yes		2P / 2C	2P / 3C
7	TDIC	Review for TI	Public Comment		Yes		2P / 2C	5P / 4C
8	HIS	Draft	Draft		Yes		0	4RO / 1 HIS
8	RXRO	Public Comment	Draft		Yes (4)		0	
	DRRO	Public Comment	Draft	No	Yes (6)			
9	TDRC	Final Text after testing	Trial Implementation	?	Yes		3P / 2C	3P / 4C
	Brachy Plan / Rec.	Public Comment	Draft		Yes (4PP / 4PC / 2RP / 2RC)			
10	Ion Plan / Rec.	Public Comment	Draft	?	Yes (3PP / 3PC / 3RP / 3RC)			
	IPDW				Yes(5PDS / 1TMS)	Higher		
	DPDW				Yes(2 TSM / 1 TMS)	Lower		
11	ROI Template	Public Comment	Draft	No	Yes(3)			
12	QAPV	Publish to TF	TI / No impl. plans	Yes	0			
13	QRRO	Public Comment	Draft	No	Yes (4SCP / 3 SCU)			
	BQAW	Draft	Draft	No	Yes(3)			
	ROTH				Yes(4)			
	FDII				Yes(5)			
	DCOM				Yes(3)			

420

d. Based on the interest survey, the TC proposed focusing efforts as follows:

i. Development Priorities for TC

1. XRTS (HHS)
2. DRRO
3. TDW-II
4. FDII
5. ROTH

ii. Need Test Tools for the following Profiles

1. Immediate

- a. TDRC
- b. Brachy Plan / Record
- c. Ion Plan / Record
- d. CDEB

2. Mid-term

- a. RXRO
- b. TDW-II for ION / Brachy (Records)

3. Long-term

- a. DRRO
- b. FDII
- c. ROTH
- d. XRTS (HHS)

e. Concern was expressed that it is difficult for some vendors to justify travel to all F2F meetings.

i. It was suggested that the topic of future TC meetings be more focused. Group discussion topics according to the type of vendors affected.

ii. **DECISION**: Hold TC teleconference two months prior to F2F meeting to select topics and schedule meeting agenda.

f. Ideas for improving PC engagement

i. Joint PC/TC meeting – teleconference or meeting at AAPM Annual Meeting?

ii. Profile point persons on PC to improve engagement?

iii. **ACTION 191222**: Jill to add PC engagement topic to WG agenda for Jan 3, 2020.

XVIII. Topic 15: Treatment Planning – Image Content

a. TDIC has been approved for Trial Implementation.

b. Informal testing (~2 Producers, ~2 Consumers) is possible in 2020.

c. The method for testing TDIC Actors was discussed.

i. Test data to be provided to TDD Simulator is CT image and RT Plan (setup beam).

ii. Simulator produces DRR or CBCT.

iii. Live test involves a comparison of DRRs (RT Image) or CBCT (CT Image) produced by Treatment Delivery Device (Simulator) with images received and displayed by a TMS.

d. Some discussion took place regarding traceability of simulator vs. device behavior. What document(s) are used by the FDA to document the relationship of these systems?

e. More work is needed to develop the test methodology for this Profile.

[Adjourn for the day 12/11/19 at 5:30pm PST]

[Resume meeting 12/12/19 at 8:35am PST]

XIX. Topic 11: ICT Priorities

- 475 a. The TC discussed priorities for Test Tool development (from discussion on 12/11/19) with Harold Beunk at ICT.
- b. The ICT backlog was reviewed.
- c. The following ICT work items were discussed. These will be discuss further in the Test Tool Committee:
- 480 i. HL7 (v. 2.x) infrastructure development for HIS Profile
- ii. Add CDEB to Content Validator
- iii. Update Content Validator with latest versions of Profiles
- iv. Other Content Validator backlog items
- v. UPS Validator backlog items
- vi. License management
- 485 vii. Updated Documentation of Tool Validation
- d. Licensing for use of test tool
- i. Clarification is needed for right-to-use, source code access, and access to updates for test tools.
- e. **ACTION 191216**: Walter Bosch to request clarification of software licensing terms from AAPM general counsel (to include source code access).
- 490 f. **ACTION 191217**: Harold Beunk to provide updated copy of test tool validation documentation.
- g. **ACTION 191218**: Jill Moton to distribute invitation for next Test Tool call on Jan 7, 2020 at 11:30am ET (5:30pm CET) to entire TC.
- 495

XX. Topic 16: Treatment Delivery Workflow–II

- a. David Wikler presented findings from Connectathon testing of TDW-II
- 500 i. The TDW-II Profile requires that the TDD shall refuse (i.e., must cancel) any treatment with a Workitem Code other than “RT Treatment with Internal Verification”. Proposed change to limit cancellation only to those work item codes that are not supported by the TDD. Any valid code supported by the TDD should NOT be disallowed. May be outside the scope of the Profile but should not restrict other uses, which may even contradict other Profiles.
- 505 ii. Proposal to add support for QA and Simulation work items (and perhaps, others). This should be considered in the next version of the Profile.
- iii. Resumption of interrupted treatments was discussed. *[original discussion 12/12//19, updated 12/13/19]*
1. Three cases for continuation of an interrupted delivery were identified:
- 510 a. Resumption in TDD based on original plan and complete, *original* treatment record(s).
- b. Resumption in TDD based on original plan starting at cumulative meterset previously delivered.
- c. Re-planning in TPS or TMS and treatment of a replacement plan.
2. If records are available at the TMS, it must provide them to the TDD for a resumption. To support resumption in TDD based on the original plan and original treatment record, the TMS must not modify treatment records.
- 515 3. RT Treatment Records that are sent for continuation of treatment must (a) originate from the TDD and (b) be stored with DICOM Level 2 Conformance (non-deletion of private tags).
- 520 4. If the TMS creates a new plan to treat remaining beams as a new Instance UID, the delivery is *no longer* a continuation, but a new plan. In this case, no treatment record is sent.

5. If not all treatment records are available, the BDI indicates cumulative meterset treated and no records are sent. This is a continuation. Previous delivery is recorded manually in the TMS. User must confirm (override?) on TDD to treat.

- b. **ACTION 191219**: David Wikler to update the TDW-II Profile with these clarifications for review at the next TC T-con.

530 XXI. Topic 17: HIS (now XRTS)

- a. Tucker Meyers and John Stamm presented an updated draft (2019-12-12) of the HIS Profile.
- i. The TC reviewed Actors and Transactions. It was suggested to make Actor names more generic, e.g., Intent Producer, etc.
 - ii. Cross-Profile Considerations – includes RXRO.
- b. Rishabh Kapoor reviewed clinical case examples for a discussion of dose contribution to anatomic sites. The dose contribution data model defines sites (anatomy) and treatment phase (concurrently treated set of plan(s)). It specifies a prescription dose (per phase) for each site.
- c. Therapy data model discussion included the following concepts:
- i. Site labels (TG-263 provides nomenclature for segmentation of *individual* OARs and TVs, but it is not clear if it covers sites in the *aggregate*.) consider ICD-O-3 or UMLS
 - ii. Completion status is needed at the Phase level, as well as overall for a treatment course.
 - iii. Stage – TNM, LOINC codes, free text?
 - iv. Treatment Technique – should this be coded? Could use DICOM CID 9511, etc.
 - v. General Techniques (how to characterize?): SRS, SBRT, ...
 - vi. Frequency of delivery: daily, BID, weekly, other?
 - vii. Treatment Devices
 - viii. Concurrent treatment: chemo, surgery (timing, toxicity, ...)

550 [Lunch break 12/12/19 at 12:50-2:00pm PST]

- ix. Status information – approval status (approved, revoked/cancelled, not started), treatment termination reason, reason for revocation. Cancellation is at the Prescription (Intent) level.
 - x. Delivery status: {not begun, incomplete, completed partial, complete}
- d. Volume 3 (HL7 Content) was reviewed. Examples are included as illustration.
- e. Profile name was discussed. New name is “Exchange of Radiotherapy Summary” (XRTS). Transaction identifiers can be assigned as RO-XRTS-*n*
- f. **ACTION 191220**: Chris to add XRTS Profile entry to ihe-ro.org wiki and update clinical impact statement, etc.

560 XXII. Topic 19: Basic QA Workflow (BQAW)

- a. The purpose of this Profile is to facilitate automated transfer from TPS or TDS to QA Applications
- b. Actors: Planning and Delivery Data Providers, Planning and Delivery Analysis Performers, Data Store
- c. Supported Use Cases include both planning and delivery (treatment or QA).
- d. What triggers analysis? Options for requesting analysis include the following:
- i. UPS with object references in Input Information Sequence
 - ii. C-STORE of KOS containing object manifest (need to review KOS capabilities)
 - iii. C-STORE of objects with Storage Commitment Request
 - iv. C-STORE of objects

- XXIII. Topic 16.1: Treatment Delivery Workflow–II (re-visited)
575 a. There is some confusion regarding the require for TDDs using local plan information to assure consistency with retrieved “stub” plans. Applicability of this requirement to TDDs that maintain a cache of previously treated plans was unclear to some implementers. Clarifying text to be added to the Profile.

[Adjourn for the day 12/12/19 at 5:30pm PST]

580 [Resume meeting 12/13/19 at 8:30am PST]

XXIV. Topic 20: HIS (XRTS) Revisited

- a. Tucker Meyer made updates based on 12/12/19 discussion.
i. Glossary (Appendix D) is to be reviewed and refined off-line.
585 ii. Use Cases may include mappings of Actors to actual systems as examples.
iii. Inclusion of DICOM transactions (e.g., among TPS, TMS, TDD) to provide context for triggering of HL7 messages was discussed.
iv. Coded concepts for Intent were discussed further:
1. Technique – type of planning/delivery method
590 2. Modality – radiation type used
3. Treatment accessory – devices to be used in addition to treatment device
4. Related chemotherapy
5. Related surgery
6. Concurrent therapy comment
595 b. ACTION 191221: Tucker Meyers to continue revision of the XRTS Profile draft and post to ihe-ro.org wiki
c. ACTION 191223: Scott H., Bruce C., Rishabh K. to review glossary definitions for clarity.

XXV. Topic 16.2: Treatment Delivery Workflow–II (continued)

- 600 a. See updated discussion [12/12/19] above.

XXVI. Topic 21: Review and Wrap Up

- a. Review Minutes
b. Review Action Items
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XXVII. Future Meetings / Next Agenda [Wed, Dec 11, 2019 at 12:50pm PT]

- a. IHE-RO TC Meetings
i. After AAPM SCM – April 6-10, 2020, Minneapolis, MN (4½ days) – full days on April 6-9, ½ day on April 10 (note change in duration of meeting)
510 ii. After AAPM Annual Meeting – July 15-17, 2020, Vancouver, BC, Canada (Wed 8:30am – Fri 5:30pm)
AAPM Educational Session – Mon., July 13, 2020, 2:45-3:45pm
iii. Profile Development – Sep 28-Oct 2, 2020, proposed at IBA, Brussels, Belgium (fall back to AAPM HQ, Alexandria, VA)
515 ACTION 191224: David to confirm availability of IBA venue for TC meeting in Sep-Oct 2020.
iv. Fall 2020 Connectathon – Nov 16-20, 2020, NEMA HQ, Arlington, VA, Nov 21, 2020 Connectathon wrap-up (½ day)
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- b. IHE-RO TC Tcons
i. Time is third Thursdays 10:30am-12:00pm ET.
ii. No teleconferences scheduled in Apr, Jul, Sep, Nov 2020
iii. Next Tcon is Jan 16th, 2020.

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c. Other meetings of interest

i. DICOM WG-07

1. Mar 9-13, 2020, UTSW, Dallas, TX
2. Jun 1-5, 2020, Elekta, St. Charles, MO
3. Aug 3-7, 2020, Brainlab, Chicago, IL
4. Oct 12-16, 2020, Elekta, Crawley, UK

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- ii. PTCOG May 4-9, 2020, Linkou, Taiwan
- iii. AAPM Jul 12-16, 2020, Vancouver, BC, Canada
- iv. ASTRO Oct 25-28, 2020, Miami Beach, FL
- v. RSNA Nov 29 – Dec 4, 2020, Chicago, IL

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XXVIII. Adjournment – the meeting was adjourned at 11:50am PST.

For more information specific to the IHE-RO Technical Committee, visit www.ihe-ro.org.

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