

**IHE-RO Technical Committee  
Face-to-Face  
February 5-8, 2018 at 8:30-5:30 ET  
February 9 8:30-12:00 ET  
Sun Nuclear  
Training Room  
3275 Suntree Blvd, Melbourne, FL 32940**

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

**IHERO Task Force 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 Society for Radiation 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 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:**

<b>Name</b>	<b>Affiliation</b>	<b>Email</b>	<b>2/5</b>	<b>2/6</b>	<b>2/7</b>	<b>2/8</b>	<b>2/9</b>
Chris Pauer	Sun Nuclear	<a href="mailto:chrispauer@sunnuclear.com">chrispauer@sunnuclear.com</a>	X	X	X	X	X
Scott Hadley	U. Mich.	<a href="mailto:swhadley@umich.edu">swhadley@umich.edu</a>	X	X	X	X	X
Walter Bosch	Wash. Univ.	<a href="mailto:wbosch@wustl.edu">wbosch@wustl.edu</a>	X	X	X	X	X
Jill Moton	AAPM	<a href="mailto:Jill@aapm.org">Jill@aapm.org</a>	X	X	X	X	
Rickard Holmberg	Raysearch Labs	<a href="mailto:rickard.holmberg@raysearchlabs.com">rickard.holmberg@raysearchlabs.com</a>	X	X	X	X	
Stefan Pall Boman	Raysearch Labs		T	T		X	X
Bob Pekarek	Accuray	<a href="mailto:bpekarek@accuray.com">bpekarek@accuray.com</a>	X	X	X	X	X
Thomas Schwere	Varian	<a href="mailto:Thomas.Schwere@varian.com">Thomas.Schwere@varian.com</a>	X	X	X	X	X
Sven Siekmann	Brainlab	<a href="mailto:Sven.Siekmann@brainlab.com">Sven.Siekmann@brainlab.com</a>	X	X	X	X	X
Jim Percy	Elekta	<a href="mailto:Jim.percy@elekta.com">Jim.percy@elekta.com</a>	X	X	X	X	X
Rishabh Kapoor	VCU/VHA	<a href="mailto:Rishabh.kapoor@va.gov">Rishabh.kapoor@va.gov</a>			X	X	
Tucker Meyers	Epic	<a href="mailto:tucker@epic.com">tucker@epic.com</a>			X	X	
Sanjay Bari	Elekta				X	X	
Ulrich Busch	Varian	<a href="mailto:Ulrich.busch@varian.com">Ulrich.busch@varian.com</a>	T				
Bruce Curran	AAPM / VCU	<a href="mailto:bhcurran@gmail.com">bhcurran@gmail.com</a>	T	T	T		T
Howie Richmond	MIM Software		T				
Harold Beunk	ICT			T	T		T
Gorkem Ekmekci	ICT				T		
Eric Vinson			T				
Amit Popat	Epic				T	T	
Koua Yang	Philips	<a href="mailto:Koua.yang@philips.com">Koua.yang@philips.com</a>					T

30 X = In person, T = Via teleconference

## Minutes:

- 35 I. Call to Order at 8:30 ET
- a. Potential Late Lunch Break 2/6 – SpaceX FH launch 1:30-4:30 pm ET
  - b. Review Agenda
  - c. Items added for discussion
  - d. Approval of Minutes was tabled: minutes from 1/22/18 teleconference have not yet been
- 40 distributed.
- II. Topic 1: Level Set
- a. Updates on IHE-RO activities
    - i. Planning
      - 45 1. Discussion of file sharing options for IHE-RO documents. The wiki works and has up-to-date content. Some find it difficult to post documents there. AAPM BBS (discussion streams with attachments) works, but is not optimal. Other options (e.g., Google docs) are not acceptable to some.
      - 50 2. Annual report for IHE
    - ii. Oversight, Steering Committees
    - iii. Domain Coordination Committee
  - b. AAPM
    - i. Preparation for IHE-RO TC meeting at AAPM Spring Clinical Meeting in Las Vegas.
  - c. DICOM WG-7 Update – Uli Busch updated the TC on DICOM WG-07 activities.
    - 55 i. WG-07 meeting, Jan 15-19, 2018, Dallas, TX
      - 1. CP1783 adds polyline representation for Spatial Fiducials
      - 2. CP1719 extends Referenced Image Purposes of Reference
      - 3. CP1720 adds RT Attributes To Confidentiality Profiles
      - 4. CP1721 clarifies Distances in Ion Beams
      - 60 5. CP1738 enhances Specification of Attribute usage for Normalized Services
      - 6. CP1762 fixes Omitted Attribute in Verification Control Points
    - ii. The Brachy sub-group has drafted a Profile on Brachy Plan Content. The draft is 80-90% complete. Assistance from the TC would be helpful in completing the draft. The latest draft (v1.10, 1/3/2017) is in the DICOM WG-07 FTP Ion Group Jan 2018 meeting folder.
    - 65 iii. The Ion sub-group has analyzed most of the ion therapy techniques (summarized in a spreadsheet). The group is drafting a TPPC-Ion Profile document that should be ready this year. The latest draft (v 0.8, July 2017) is in the IHE-RO Profiles folder on the DICOM FTP site. The sub-group is also addressing motion management issues and 2<sup>nd</sup> Generation RT objects for Ion Therapy. The TC should review the profile and be ready to assist in development.
    - 70 iv. 2<sup>nd</sup> Generation RT Objects
      - 75 1. Sup 147 has been approved for letter ballot. Final Text is expected in March-April 2018. Minor changes were incorporated at Jan 2018 meeting in labeling macros, derivation sequences for Conceptual Volumes, Segment characteristic precedence, and coding.
      - 2. Sup 175 is in reading with WG-06. Letter ballot is expected in June 2018. The TC should start work on for 2<sup>nd</sup> Generation Profiles for Sup 147, 175, 176 (also Sup 177).
      - 80 3. Sup 199 – Radiation Record draft is nearly complete.
      - 4. Enhanced RT Image (multi-frame) is in development.
      - 5. No comments relating to Prescription (RXRO) were received from Sup 147 Trial Implementation.

- 85 v. How to annotate the relationship between sub-plans that are split for various reasons.  
A CONCURRENT value for the Plan Relationship can be used for this purpose.

d. AdvaMed and Standards Efforts – Jim Percy reported on progress on the development of AdvaMed RT standards

- 90 i. RT2- Radiation Therapy Readiness check is complete.

ii. RT3-Machine Characterization Model Standard

- 95 1. Consistent XML notation has been developed, macros and modules defined.  
2. The primary Use Case is to describe models for the delivery system for treatment planning or treatment management systems.  
3. RT3 does not address dosimetric characterization of machines (beyond dose rate).  
4. The only required module is the equipment module. Detailed specifications are in device-specific (optional) modules. Interactions between combinations of device components are addressed in the technique module.  
100 5. Applications of this standard may be addressed in an IHE-RO Profile.

III. Topic 2: Plans for Week

IV. Topic 3: Profile Status – The TC reviewed actively developing profiles

105 a. Status Review as of Feb 5<sup>th</sup>

- i. BRTO-II – review for publication in Technical Framework

- ii. CDEB – additional review needed

- iii. DRRO – to be discussed this meeting

- iv. DPDW – update this meeting

- v. IPDW – update this meeting

- 110 vi. MMRO-III – review on Tuesday

- vii. RXRO – in draft, need to incorporate public comments from DICOM Sup147

- viii. QAW – to be discussed this meeting

- ix. QRRO – in holding

- x. HRO – draft

- 115 xi. ROIT – in draft, waiting for Sup 196

- xii. TDIC – has had Public Comment

- xiii. TPIC – no change, awaiting BRTO-II, Test Tools, vendor implementation

- xiv. TDPC – TI as of May 2016

- xv. TDRC – draft

- 120 xvi. TPPC – TI as of May 2016, some CPs to be discussed

- xvii. TPPC-Ion – draft in sub-group

- xviii. TPPC-brachy – draft in sub-group (change name?)

V. Topic 4: AAPM TG 275 – Scott Hadley reviewed a draft of the TG 275 report

- 125 a. The report “Strategies for Effective Physics Plan and Chart Review in Radiation Therapy” includes a Failure Mode and Effects Analysis for plan/chart review.

- b. The TC discussed failure modes, highlighted by Scott, with implications for IHE-RO Profiles.

- c. Several failure modes could be mitigated by integration of systems (avoiding manual transfer data).

- 130 d. Scott will distribute the draft report to TC members. Comments from TC members would be appreciated as soon as possible.

VI. Topic 5: Prescription Profile (RXRO)

- a. Current version is 0.9 (dated 3/24/2017).

- 135 b. RXRO Open Issues were reviewed by the TC.
- i. Instance Creation Date and Time in Radiotherapy Common Instance Module are redundant with same attributes in SOP Common. Instead, see a need for Content Date and Time, but those are not available in the current content definition.
  - 140 ii. The TC added definitions for glossary terms: *Intent*, *Prescription*, *Directive*.
  - iii. **ACTION 180211**: Sven to revise the document for further review by the TC.

VII. Topic 6: BRTO-II

- 145 a. Image Orientation (see Jan. T-con minutes). The TC discussed proposed text requiring that patient images be displayed such that the direction of gravity is indicated (e.g., at bottom of the screen). This would impose requirement on presentation in addition to content. It was decided *not* to include this requirement.
- b. Tissue Heterogeneity Correction (O+) – discussion of whether to continue requiring consumers to display this value. It was decided *not* to relax this requirement.
- 150 c. Inclusion of multiple setups
  - i. Patient Position (0018,5100) Shall be one of {HFS, HFP}. – Add “In case of multiple Patient Setups items, all shall have the same Patient Position.”
  - 155 ii. Table Top Vertical Setup Displacement (300A, 01D2), Table Top Longitudinal Setup Displacement (300A,01D4), and Table Top Lateral Setup Displacement (300A,01D6) attributes are O+\* with Attribute Note: If present, shall be consistent with Isocenter position.
  - iii. Add Note: All items in the Patient Setup Sequence shall use the same initial setup position.
- 160 d. **ACTION 180201** Jim Percy to refer the “multiple setup position” issue to WG-07 in the context of Sup 160.

[Adjourn for the day 2/5/18 5:25pm]

[Resume meeting 2/6/18 8:45am]

165 VIII. Topic 7: Connectathon – Next Steps

- 170 a. Walter Bosch presented results from the 2017 Connectathon
  - i. Test Tool results contained many uninterpretable results. Test tools crashing was common.
  - ii. Work with ICT to create content validator
  - 175 iii. Final test tool results had issues across the board.
  - iv. Can we have a successful exchange with a test partner who does not pass?
  - v. Report of issues was distributed to Connectathon participants.
  - vi. TPPC – Discuss Beam Dose Verification Control Point Sequence
  - 175 vii. Final report for 2017 connectathon will note that no actors fully met the requirements for passing.
  - viii. Question on how to report the findings, when failures are not shared.
  - ix. Not an unexpected result.
- 180 b. **ACTION 180202**: Walter Bosch to communicate results to IHE Testing & Tools Cmte
  - i. Statement: “After discussion with participants prior to the start of the Connectathon, it was decided that no formal testing would take place for this session.”
  - ii. This result was not completely unexpected. This Connectathon was ambitious. It was the first time the RO domain had done formal testing on these Profiles.
  - iii. Issues were found in the readiness of Profiles, Products, and Tools. Also, there were major changes to the TF.

- 185           iv. Does this mean we need a Domain Pre-Testing event? Consensus that formal and  
                  informal testing can be done concurrently.
- c. **DECISION**: Consensus that new Profiles under Pre-Testing before they are presented for  
Formal Testing at a Connectathon. Rules for submission of Content Validator Results to be  
discussed at April 2018 TC meeting.
- 190 d. Going forward, it is the intent of the TC to proceed
- i. Correction of Profile Text and incorporation into TF
- ii. Release of Content Validator Tool and vendor feedback.
- iii. Incorporate Content Checks real-time at Connectathon as pre-requisite for side-by-side  
              testing.
- 195           iv. ICT proposes to include a Q/R SCU in test tools for convenience in testing.
- e. Still need to decide Profiles to be tested in 2018

IX. Topic 8: RO Treatment History profile – Scope?

- a. Tentative name: Radiation Oncology Treatment History – ROTH Integration Profile
- 200 b. The intention is package planning and delivery history.
- i. Which is the real plan?
- ii. Everything from images to treatment record
- iii. KOS with references to instances?
- iv. Create an empty “query” template?
- 205 c. Use Cases include
- i. cross-enterprise transfer of patient planning/delivery history between clinics
- ii. clinical trials/registry data submission (with anonymization)
- d. Content Profile to communicate all instances *relevant* to a patient’s treatment.
- e. Export could be implemented at the level of a TMS (“one button” export). Could also be  
210 exported (manually) from an Archive.
- f. Media files are likely to be required for this Use Case. DICOM Value Length limits for  
Explicit VR transfer syntax used in Media Profiles may be an issue.
- g. Challenges include
- i. Data modeling for plans and treatment sessions and associated information objects.
- 215           ii. Dealing with partial fractions
- iii. How to interpret instances, e.g., doses, that are not fully delivered.
- h. How to represent the relationships between objects?
- i. Coding in KOS, architectural issues: multipls KOS instances; use of Treatment  
              Summary Record?,
- 220           ii. Profile could describe reference requirements that the ROTH Exporter has to support.  
              Define levels of support?
- i. Next steps
- i. **ACTION 180212**: Scott to solicit feedback from PC and clinical physics colleagues.
- ii. Work out data model(s) for treatment planning and delivery
- 225           iii. Evaluate use of KOS.

X. Topic 9: 4D Image Import

- a. CIS – Review or Plenary Work
- 230 b. Respiratory phase can be represented explicitly in Enhanced (multi-frame) CT. Conventional  
CT, however, has no explicit tags.
- c. Defacto “standard” uses Series Description to tag respiratory phase or percent inhale/exhale.  
This attribute is free text.
- d. How/where to represent respiratory phase or amplitude?
- i. Image Type (0008,0008) Value 5? (Value 3 = RESP\_GATED)
- 235           ii. Private tag?

- iii. Invoke Respiratory Phase Functional Group Macro in CT Image IOD?
- e. **ACTION 180203**: Jim Percy to draft email to DICOM WG-06 (cc: WG-07) requesting guidance on how/where to represent phase and/or amplitude in CT Image IOD.

240 XI. Topic 10: Deformable Registration

- a. Review CIS – DRRO use cases have been discussed. A very early draft has been started (based on MMRO Actors). Much work remains to be done.
- b. A champion is needed to move this Profile along.

245 XII. Topic 11: MMRO-III

- a. MMRO-III relaxes the requirement that Primary images Series be CT. Allowing MR images as Primary opens the possibility of non-transverse images. This may not be supported by all vendors.
- b. The MMRO-III Profile allows any modality and any Image Orientation (Patient) value for Primary image Series. I.e., any rectilinear (non-sheared) image. This appears not to be compatible with requirements for treatment planning images for several vendors.
  - i. Should use of non-CT Primary images be an *option* for MMRO-III?
  - ii. Should MMRO-III be revised to restrict Primary image Series to transverse?
  - iii. Should the use of non-transverse images for Primary image Series optional?
- c. **ACTION 180204**: Vendors to check image modality and orientation requirements for their systems for review by the end of the current TC meeting Feb 9<sup>th</sup>.
- d. *[Added 2/7/18 at 9:45am] Further discussion of MMRO-III*
  - i. *Clarification is needed to define the “Primary” FoR.*
  - ii. *Several vendors support non-axial, non-CT images as primary for registration, but require axial images for dosimetric planning.*
  - iii. *A decision is needed on whether to require (a) transverse or (b) cardinal (T/S/C) image planes for Primary Frame of Reference.*
  - iv. *Further discussion Feb 8<sup>th</sup> PM, Feb 9<sup>th</sup> AM.*

265 XIII. Topic 12: Treatment Delivery – Record Content

- a. Chris reviewed an updated version of this Profile with the TC.
- b. Ion attributes are currently incomplete.
- c. Note to add cross-profile Actor mappings for DPDW, IPDW, TDW-II
  - i. TDRC: Consumer → TDW-II / DPDW / IPDW: Object Storage
- d. Open Issues
  - i. Radiopharmaceutical Information Sequence used for PET-guided RT) – Chris to check with Michael Owens
  - ii. Radiology Image Dose – decision not to support this
  - iii. Should there be a note regarding the use of Treatment Record with zero MU delivered? This may be classified as a treatment variance. May be used for statistics. Continuing the fraction would be classified as a resumption.
- e. **ACTION 180205**: Chris to look for additional TDRC content edits from Aug 5, 2017.

280 XIV. Topic 14.5: TDPC

- a. This Profile was voted to Trial Implementation, May 2016

XV. Topic 14.9: TDIC

- a. This Profile was voted to Public Comment on 10/1/2016 (2<sup>nd</sup> round) Reviewed 8/17, no disposition.

285

- b. [Added Feb 8<sup>th</sup>] TDIC currently addresses the content of RT Image and Cone-Beam CT, but not Spatial Registration. The DICOM standard does not currently have type codes to represent 2D-2D registrations. Private codes are used in some applications. Thomas will attempt to draft a DICOM CP to add these codes.

290 XVI. Topic 6 (continued): BRTO-II

- a. Requirements for Tissue Heterogeneity Correction (3004,0014)
- i. VM is 1, 2, or 3.
  - ii. Current IHE-RO requirements “O+” (may be NULL) are inconsistent with DICOM requirement for Type 3 attributes.
  - iii. Change attribute requirement to “R+”, “Shall be present”.
- b. Transaction [RO-5] Dose Storage does not support DVH storage. [BRTO-II-3] DVH Dose Storage allows DVHs to be stored in an RT Dose instance *either* with or without a dose grid. This inconsistency was corrected by replacing the [RO-5] transactions with a modified version ([BRTO-II-5]) that does not prohibit inclusion of DVHs.
- c. [Added 2/7/18 at 9:45am] The corresponding retrieval transaction [RO-10] is to be replaced by a modified version ([BRTO-II-6]).
- d. Do we need to require RT Plan Relationship (300!,0055) for CONCURRENT plans? Could add requirement that the Referenced RT Plan Sequence (RC+\*) be present if there are related RT Plans. Conclusion: it is not necessary to require this Sequence in the BRTO-II (or TPPC) Profile. → Deleted.
- e. Change referenced standard to DICOM 2017e Edition in all chapter 7 tables of BRTO-II.
- f. The revised Profile is to remain in Trial Implementation for testing in the 2018 Connection. It is expected that it be voted to Final Text (publish to TF) after the Connectathon 2018.

310 [Adjourn for the day 2/6/18 5:30pm]  
[Resume meeting 2/7/18 8:30am]

XVII. Topic 15: ICT and Test Tool Updates

- a. Gorkem Ekmekci reviewed the status of the ICT Content Validator Tool and demonstrated its features.
- b. Possible future work includes
- i. Command-line invocation for integrated operation
  - ii. Addition of a Q/R mechanism
  - iii. Error navigation in DICOM Viewer
- c. Handling of Beam Dose Verification Control Point Sequence – IHE-RO requirements for this sequence and contents to be removed from Profiles
- d. Centralizing IHE-RO requirements facilitates maintenance of the tools.
- e. The Content Validator supersedes all previous test tools for content profiles.
- f. IHE-RO TC members are encouraged to download and run the Content Validator and provide feedback on performance and features.

XVIII. Topic 12.5: TDW-II

- a. Thomas presented several changes to the TDW-II Profile were discussed by the TC. It was decided not to draft a CP for these changes to the TDW-II Profile, but to include all in a revision of the Profile.
- i. Change to the TDW-II Profile to correct a collision in section numbering in the DICOM content (Chapter 7) material was discussed.
  - ii. C-FIND request Query key for Scheduled Workitem Code allows only a single item or nothing (not a list of values). It was proposed to use an empty key *to retrieve all Workitems* in the C-FIND request and filter the results.

- iii. The value of an identifier for the treatment session (accession number?) was discussed. A Procedure (“treatment session”) UID was discussed as a way to link multiple procedure steps. This is more significant for IPDW and DPDW Profile, since they involve multiple steps.
  - iv. Editorial change to replace Table 7.5.1.2.1-2: “Required Query Keys Returned within the Scheduled Processing Parameters Sequence” with a simplified table of Concept Name/Value Set Constraint for returned Processing Parameter Codes.
  - v. The TC discussed various Processing Parameter Codes and their relevance to treatment delivery instructions. A single Procedure Code, ‘121726’ (RT Treatment with Internal Verification), is used in TDW-II. Multiple codes are needed for imaging, verification, positioning, and delivery for IPDW.
- b. **ACTION 180206**: Thomas Schwere to revise TDW-II Profile (v. 13) with changes.

XIX. Topic 14: IPDW

- a. Processing Parameter Codes for IPDW
  - i. Use of “Templates” for Procedure Codes and associated parameter sets was discussed. Templates are likely to be vendor- and device-specific.
  - ii. The alternative is to wait for completion of work on DICOM Sup 160 to specify parameters for detailed Procedure Codes.

XX. Topic 18: Hospital Information System Transfer of RO data

- a. Tucker Meyers reported on activities of Epic in developing interfaces with Oncology Information Systems. Priorities are mostly outbound.
- b. Rishabh Kapoor reported on the results of a survey of HIS information categories (10/24/2017).
  - i. Priorities for HIS → OIS:
    - 1. Pregnancy
    - 2. Pacemaker
    - 3. Contrast allergy
    - 4. Pathology report
    - 5. Radiology report
    - 6. Chemotherapy information
    - 7. Patient Consent for RT
    - 8. Patient Clinical Appointments for RO
  - ii. Priorities for OIS → HIS
    - 1. Prescription (may be HIS → OIS)
    - 2. Radiation Dosimetry Treatment Summary
    - 3. Physician’s Treatment Completion Notes
- c. The TC reviewed a draft Profile for OIS-EHR exchange.
  - i. Issues include (a) information to be communicated, (b) information source, (c) timing/frequency of update, (d) concurrency of updates, and (e) priority in case of conflict.
  - ii. OIS information for HIS:
    - 1. Intent
    - 2. Prescription: site, method of delivery, dose/fraction, number of fractions, total dose
    - 3. Dose delivered
    - 4. Fractions delivered
  - iii. Actors
    - 1. RO Treatment Intent Producer

2. RO Treatment Intent Consumer
3. RO Prescription Producer
4. RO Prescription Consumer
5. RO Treatment Session Results Producer
6. RO Treatment Session Results Consumer

iv. Content

1. Intent (EHR  $\leftrightarrow$  OIS)
  - a. Intent UID
  - b. Treatment Site
  - c. Site Code, (e.g., ICD-10, ICD-O)
  - d. Diagnosis (e.g., ICD-10)
  - e. Staging (text?)
  - f. Therapeutic goals (text): Curative, Palliative, ...
  - g. General methods: XRT, SBRT, Photon-IMRT, Protons, ...
  - h. Protocol: (clinical, clinical/trial, registry, etc.)
2. Prescription (OIS  $\rightarrow$  EHR)
  - a. Rx UID
  - b. Intent UID
  - c. Treatment Site
  - d. Treatment Technique Code, i.e., method of delivery, e.g, Photon-IMRT, etc.
  - e. Dose/fraction
  - f. Number of fractions
  - g. Total dose
  - h. Frequency of delivery: daily, BID, alternate days, etc.  
(Dose units – define in Profile)
3. Session Results (OIS  $\rightarrow$  EHR)
  - a. Rx UID
  - b. Plan Label
  - c. Plan UID
  - d. Session number
  - e. Fraction number (n of total), e.g., “9 of 32”
  - f. Treatment Site
  - g. Nominal fractional dose delivered
  - h. Cumulative nominal dose
  - i. Delivery completion status
  - j. Resource UID (delivery device)
  - ~~k. Plan technique~~
  - ~~l. IGRT method~~
  - (Dose units – define in Profile)

v. General Workflow

1. Intent comes first.
2. Prescription references Intent
3. Session Results reference Prescription

*[Adjourn for the day 2/7/18 5:30pm]*

*[Resume meeting 2/8/18 at 8:30am]*

## vi. Next steps

1. Mapping to data sources (DICOM, ...)
2. What is required, optional?
3. Workflow

**Intent Message Content**

<b>Data Item</b>	<b>Description</b>	<b>VM</b>	<b>DICOM Mapping</b>	<b>Issues</b>
Intent UID	ID for Intent Instance	1	RT Physician Intent SOP Instance UID?	DICOM mapping?
Physician Narrative	Free text note	0-1	RT Physician Intent Narrative	
Concurrent therapy	Free text description of surgery, chemotherapy, immunotherapy for this patient	0-1	<GAP>	May be included in Physician Narrative
Treatment Site	Free text describing treatment site	1	Treatment Site	
Site Code	Coded description of the treatment site. May use ICD-* codes.	0-N	Treatment Site Code Sequence	>1 code needed?
Diagnosis Code	Coded description of the condition to be treated by this Intent. May use ICD-10 codes.	0-N	RT Diagnosis Code Sequence	>1 code needed?
Staging	Free text describing disease stage. T/N/M	1	<GAP>	DICOM mapping? This is not well standardized
Staging Code	Coded description of the disease stage. Use SNOMED, etc. codes	0-1	<GAP>	DICOM mapping?
Therapeutic Goals	Intent type: CURATIVE, PALLIATIVE, PROPHYLACTIC, UNSPECIFIED	1	RT Treatment Intent Type	
General Methods	Free text describing the category of treatment technique to be used. Categories include (a) Tele vs. Brachy, (b) Radiation type: Photon, Electron, Ion or Brachy Source Type etc. ...	0-1	Radiotherapy Treatment Type, Teletherapy Radiation Type, Brachytherapy Source Type	
Treatment Technique Code	Coded description of the radiotherapy technique to be used	0-1	RT Treatment Technique Code Sequence	
Protocol	Free text identifying the clinical, clinical-trial, or registry protocols	0-N	RT Protocol Code Sequence	

## Prescription Message Content

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Data Item	Description	VM	DICOM Mapping	Issues
Prescription UID	ID for Radiotherapy Prescription	1	RT Physician Intent SOP Instance UID?	DICOM mapping?
Intent UID	ID for Intent Instance	1	RT Physician Intent SOP Instance UID?	DICOM mapping?
Treatment Site	Free text describing treatment site	1	Treatment Site	
Prescription Sequence	Sequence containing Prescriptions to deliver therapeutic radiation	1-n	RT Prescription Sequence	
>Prescription Label	User defined label for prescription		RT Prescription Label	
>Prescription Index	Index of Prescription		RT Prescription Index	
>Treatment Technique Code	Coded description of the radiotherapy technique to be used	1	RT Treatment Technique Code Sequence	
>Dose Per Fraction	Nominal dose to highest-dose target volume for prescription	1	<GAP>	DICOM mapping?
>Number of Fractions	Number of fractions to be delivered for this prescription	1	<GAP>	DICOM mapping?
>Frequency of Delivery	Free text describing the frequency of delivery for this prescription	1	<GAP>	DICOM mapping? Should this be coded?
Total Dose	Nominal composite dose to be delivered for all items in the Prescription Sequence.	1	<GAP>	DICOM mapping?

## Session Results Message Content

Data Item	Description	VM	DICOM/Source Mapping	Issues
Session UID	Treatment Session UID	1	TMS	DICOM mapping?
Session Start DateTime	Date and Time of Treatment Session Start	1	TMS	
Session End DateTime	Date and Time of Treatment Session End	1	TMS	
Appointment ID	Appointment Identifier for this Treatment Session	1	TMS	DICOM mapping?
Delivered Plan Sequence	Plans delivered during this Treatment Session	1-n		

>Plan Label	RT Plan Label for delivered plan	1	RT Plan Label	Emergency treatments?
>Plan UID	UID for delivered RT Plan instance	1	Referenced RT Plan Sequence	Emergency treatments?
>Fraction Number	Ordinal fraction number for delivery of this plan	1	TMS	
>Total Fractions	Total number of fractions for delivery of this plan		TMS	
>Treatment Site	Treatment Site for this plan	1	Treatment Site	
>Nominal Fraction Dose Delivered	Nominal Fraction Dose (Gy) delivered for this plan	1	TMS, RT Treatment Session Record	
>Cumulative Nominal Dose	Cumulative Nominal Dose (Gy) delivered for this plan	1	TMS	
>Delivery Completion Status	Completion status for delivery of this plan	1	TMS	
>Prescription UID	ID for Radiotherapy Prescription	0-1	RT Physician Intent SOP Instance UID?	DICOM mapping?
>Resource Label	Label for RT Delivery Resource used for this plan delivery session	1	<GAP>	
>Resource UID	UID for RT Delivery Resource used for this plan delivery session	1	<GAP>	
>Department Name	Name of Department in which this plan delivery session took place	1	Institution Name in RT Treatment Session Record	DICOM mapping?

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vii. What is a Treatment Session?

- a. Is a Session related directly to a Plan? ... to a Prescription? ... to a Patient?
- b. Definition: "Visit" for therapy; Patient enters treatment room, is treated, leaves treatment room
- c. Primary Use Case is tracking progress toward completion of therapy.
- d. Not spatially precise. It is *not* meaningful to add cumulative nominal plan doses.

460

viii. EHR → OIS Parameter Exchange

1. Clinical information

- a. Pacemaker
- b. Pregnancy
- c. Contrast allergy
- d. Radiology reports – MDM message
- e. Pathology reports – MDM message
- f. Chemotherapy regimen, dose (to date), history, current course
- g. Patient consent
- h. Patient's clinical appointments for Rad Onc

2. Place a, b, c, g in a message

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**RT Consent and Counter-indications Message**

<b>Data Item</b>	<b>Description</b>	<b>VM</b>	<b>DICOM/Source Mapping</b>	<b>Issues</b>
DateTime of Last Update	DateTime of last update	1		
Implanted Device Sequence	Sequence of parameters describing implanted medical device(s)	0-n		
>Device Code	Code identifying implanted device type	1		
>Device Manufacturer	Implanted device manufacturer	0-1		
>Device Model	Implanted device model	0-1		
>Device Serial number	Implanted device serial number			
>Device Implant Date	Date of implant	0-1		
Pregnancy Status	Yes, Maybe, No, Unknown	1		
Last Menstrual Date		0-1		
Medical Alerts		0-n	Medical Alerts (0010,2000)	
Contrast Allergies		0-n	Allergies (0010,2110)	
Special Needs		0-n	Special Needs (0038,0050)	
Patient Consent for Radiation Oncology		0-1		
>Date Consent Signed		1		
>Consent Expiration Date		1		
>Consented Procedure Code		1		
>Consent Encapsulated Document		0-1		
>Consent Digital Signature				

### Chemotherapy Dose Summary Message

Data Item	Description	VM	DICOM/Source Mapping	Issues
DateTime of Last Update	DateTime of last update	1		
Chemotherapy Regimen		1-n		
>Regimen Status	PLANNED, IN_PROGRESS, COMPLETED, TERMINATED_INCOMPLETE	1		
>Chemotherapy Agent Code		1		
>Chemotherapy Agent Dose		1		
>Chemotherapy Dose Schedule		1		
>Chemotherapy Start Date		1		
>Chemotherapy End Date		0-1		

Radiology Report Message – Review IHE-Radiology Profiles

Patient Information Update

485

Pathology Report Message – Review IHE-Pathology and Laboratory Medicine Profiles

**ACTION 180207:** Rishabh Kapoor to ask Jeff West to examine existing IHE Technical Frameworks for applicable Profiles for Hospital Information System Transfer of RO data.

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**ACTION 180208:** Scott Hadley to review IHE-RO TC minutes for Hospital Information System Transfer of RO data with PC and Dose Elements group, with request to get more complex examples covering multi-plan treatments.

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XXI. Topic 20: TPPC Update

a. Sven Siekman reviewed changes to the TPPC Profile that came from recent DICOM WG-07 meetings and the IHE-RO 2017 Connectathon:

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i. Clarification: Fluence Mode ID of type “FFF” and Fluence Mode (3002,0051) “NON\_STANDARD” is used for the SRS machine model configuration in IHE-RO Connectathon testing, but the requirement to use FFF been removed from the TPPC Profile.

ii. Beam Delivery Duration Limit (300A,00C5) – requirement (R+) has been removed from the TPPC Profile. It remains a DICOM Type 3 Attribute.

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iii. Source to Wedge Tray Distance (300A,00DA) – Clarification of the condition for the presence of this attribute: Shall be present if Wedge Type (00A,00D3) is STANDARD.

iv. Effective Wedge Angle (300A,00DE) – Clarification of the the condition for the presence of this attribute: Shall be present if Wedge Type (300A,00D3) is DYNAMIC or MOTORIZED

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v. Remove Verification Control Point – The DICOM Standard has been updated in CP 1658 to remove Verification Control Point Sequence from Fraction Group Sequence and add it to the Referenced Dose Reference Sequence in the Beam Sequence.

- b. These issues have been corrected in version 1.3 of the TPPC Profile. Sven will post the updated version to the ihe-ro.org wiki.

515

XXII. Topic 16: QA Workflow

- a. Chris Pauer reviewed base issues for the QA Workflow Use Case
- b. Lack of integration of stand-alone systems
- c. Pain points
  - i. Standalone systems
  - ii. Lack of Integration
  - iii. Manual work
  - iv. correct order of work steps
- d. Planning Analysis Performer is similar to the BRTO Dose Displayer.
  - i. There is no workflow support for BRTO Profiles – need Q/R.
  - ii. QA analysis needs Beam Dose.
- e. RO Treatment History
  - i. The Analysis Performer acts like human agencies in ROTH
- f. Automated transport of data from clinical treatment planning to QA workflow.
- g. Plan Approval can be the trigger for Plan QA workflow.

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XXIII. Topic 20.3: Connectathon 2018

- a. Anticipated Profiles & Actors:
  - i. BRTO-II
    - 1. Contourer: 5
    - 2. Dose Planner: 3
    - 3. Dose Display: 4.1
  - ii. MMRO-III
    - 1. Registrator: 5
    - 2. Reg Contourer: 4
    - 3. Reg Display: 4+
    - 4. Reg Dose Display: 3
  - iii. TPPC
    - 1. Producers: 3
    - 2. Consumers: 3.1
  - iv. TDW-II
    - 1. TMS: 2
    - 2. TDS: ?
  - v. TDW (informal)
    - 1. TMS: 2
    - 2. TDS: 1+

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*[Adjourn for the day 2/8/18 5:35pm]  
[Resume meeting 2/9/18 at 8:30am]*

XXIV. Topic : Update on Query / Retrieve

- a. Koua Yang presented an updated draft of the QRRO Profile
  - i. This Profile provides Instance-level query capabilities for RT Structure Set, RT Plan, RT Dose
  - ii. The Profile uses a Hierarchical Query Model.
  - iii. The TC discussed C-FIND SCU, SCP Matching and Return Keys for RT Plan

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- 565           iv. The IHE-RAD TF (Table 4.14-1 in RAD TF-2) shows Matching and Return Query  
Keys for Images
1. SCU Matching: R+ unless attributes are Optional
  2. SCP Matching: R+
  3. SCU Return: R+ (may be R+\* if no need to display)
  4. SCP Return: R+
- 570           b. Koua will work with Stefan to fill in the requirements table for RT Plan query keys.
- XXV.   Topic 14: IPDW (continued)
- a. Fully specifying details of patient positioning parameters requires completion of DICOM Sup 160.
  - 575       b. A template-based approach (without parametric details) can be used in the first version of this Profile to specify workflow at the procedural level. Parametric details can be added later.
  - c. **DECISION:** Consensus of the TC to proceed with development of IPDW Profile using a template-based approach using existing 1<sup>st</sup> Gen RT DICOM information objects.
- 580   XXVI.   Topic 11: MMRO-III (continued)
- a. Further discussion of requirements for Primary image Series in MMRO-III. What type of images are supported by products seeking to act as MMRO-III Registrator?
  - b. Provisional consensus of the TC
    - 585       i. Define “Primary” as CT or MR. Implication for Frame of Reference of Spatial Registration Instance.
    - ii. Image Orientation (Patient) for Primary image must be Transverse – other IOP values may be supported, but will not be tested.
    - iii. Patient Positions supported: HFS, HFP, FFS, FFP – other Positions may be supported, but will not be tested.
    - 590       iv. Primary and Secondary images are recti-linear (non-sheared, non-skewed).
    - v. Modality of Secondary Images may be CT, MR, PET.
    - vi. Image Orientation (Patient) of Secondary Images: Cardinal planes +/- 30 degrees rotation
  - 595       c. **ACTION 180209:** Sven Siekmann to incorporate clarifications into MMRO-III v. 1.8 and distribute for approval at the next TC T-con.
- XXVII.   Topic 20.3: Connectathon 2018
- a. Proposal to require informal testing of new Profiles to evaluate Test Tools, completeness of Profile Text, and product readiness, before attempting formal testing.
  - 600       b. TDIC, TPIC – consensus that these Profiles are not ready for informal pre-testing.
  - c. Consider allowing Content Validated instances from same vendor with private filtered out (DICOM Cleaner?) a test source?
  - 605       d. **ACTION 180210:** Walter to apply to IHE Testing & Tools Committee for 2018 Connectathon formal testing of revised BRTO-II, MMRO-III, TPPC Profiles and TDW-II (pending sufficient participants).
- XXVIII.   Topic 4: AAPM TG 275 (continued)
- a. Summary of feedback
    - 610       i. TG should avoid vendor names and specific failure modes.
    - ii. Many references to errors arising from manual entry of data – may want to highlight this issue as a source of error. Strongly urge that users not attempt manual transfer of plan data.
    - iii. Strongly urge users to update/replace outdated software and systems.

615 iv. Further feedback should be sent to Scott.

XXIX. Topic : Review Minutes

XXX. Topic : Review Action Items

620 XXXI. Topic : Future Meetings / Next Agenda

a. IHE-RO TC Meetings

i. After AAPM Spring Clinical Meeting – April 10-13, 2018, Las Vegas, NV

1. Start 2:00pm on Tuesday, finish 12:00pm on Friday.

2. Tuesday afternoon agenda for engagement with attendees of AAPM meeting.

625 3. Topics to include HIS transfer, Q/R, RXRO

ii. Post-AAPM – Aug 1, 2018 at 2pm through Aug 4, 2017 at noon, Nashville, TN

iii. Fall Connectathon – September 17-22, 2018, AAPM HQ

b. IHE-RO TC Tcons

i. Third Tuesdays at 11am ET

630 c. Other meetings of interest

i. DICOM WG-07

1. March 12-16, 2018, MITA, Washington, DC

2. May 14-18, 2018, (tentative) Brainlab, Munich or RaySearch, Stockholm

3. October 24-27, 2018, post ASTRO

635 4. November 12-16, 2018 (tentative) – adjacent to WG-06

5. December 3-7, 2018, (tentative) Melbourne, FL (Chris to check with Sun)

ii. PTCOG May 21-26, 2018, Cincinnati, OH

iii. AAPM Ann Mtg. Jul 30, 2018 – Aug 2, 2018, Nashville, TN

iv. AAPM Spring Clinical Mtg . Apr 7-10, Las Vegas, NV

640 v. ASTRO Oct 21-24, 2018

vi. RSNA Chicago, IL

XXXII. Meeting Adjourned at 11:50pm 2/9/18

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## AGENDA TOPICS

Monday February 5:

655 ○ 8:30 – 9:00 Settling and Setup

○ 9:00 – 12:30 Morning

▪ Call to Order

• Review Agenda

• Other broad topics to add.

660 • Minutes from last meetings

▪ Topic 1: Level Set

• Updates on IHE-RO activities

○ Planning

○ Oversight, Steering Committees

665 ○ Domain Coordination Committee

- AAPM
      - DICOM WG-7 Update
      - AdvaMed and Standards Efforts
        - RT2- Radiation Therapy Readiness check
        - RT3-Beam Model Standard
        - RT4-(potential) Standard for Machine, Patient QA
    - Topic 2: Plans for Week
      - Plenary Sessions vs. Solo Work
    - Topic 3: Profile Status
      - Technical Framework
      - Public Comment
      - In Process
      - Priorities
      - Any effect for this agenda?
  - 12:30 – 1:30 Lunch
  - 1:30 – 5:30 Afternoon
    - Topic 4: AAPM TG 275
    - Topic 5: Prescription Profile (RXRO)
    - Topic 6: BRTO-II
      - Image Orientation (see Jan. minutes)
      - Inclusion of multiple setups
- Tuesday February 6
  - 8:30-12:30
    - Topic 7: Connectathon – Next Steps
    - Topic 8: RO History profile – Scope?
    - Topic 9: 4D Image Import
      - CIS – Review or Plenary Work
  - 12:30 – 1:30 Break
  - 1:30 – 5:30
    - Topic 10: Deformable Registration
      - Review CIS
      - Next steps?
    - Topic 11: MMRO-III
      - See Dec Minutes
    - Topic 12: Treatment Delivery – Record Content
    - Topic 13: DPDW
    - Topic 14: IPDW
- Wednesday February 7
  - 8:30 – 12:30 Morning Session
    - Topic 15: ICT and Test Tool Updates
    - Topic 16: QA Workflow
    - Topic 17: ROIT
  - 12:30 – 1:30 Break
  - 1:30 – 5:30
    - Topic 18: Hospital Information System Transfer of RO data
- Thursday February 8
  - 8:30 – 12:30 Morning Session
    - Topic 18 cont.: HIS data transfer Continued.
  - 12:30 – 1:30 Break
  - 1:30 – 5:30

- Topic 19: Brachy Profile
- Topic 20: TPPC
  - Remove Verification Control Point

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- Friday February 9
  - 8:30 – 12:00 Morning Session
    - Topic : Update on Query / Retrieve
    - Topic : Review Minutes
    - Topic : Review Action Items
    - Topic : Future Meetings / Next Agenda

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For more information specific to the IHE-RO Technical Committee, visit [www.ihe-ro.org](http://www.ihe-ro.org).