

# Board Report: IHE Radiation Oncology Domain 2023

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## Membership Rosters:

- [Planning Committee](#)
- [Technical Committee](#)

## Activity:

- Domain Scope: Radiation Oncology addresses information sharing, workflow, and patient care issues pertinent to radiation oncology.
- Technical Committee:
  - Some actors / transactions have been updated to allow re-use in new profiles. These changes should improve the development of several profiles. Transaction names were generalized and increased conformity to IHE guidelines was done.
  - The third revision in the Treatment Delivery Workflow profiles (TDW-III) is in active development
    - A shared workgroup with DICOM WG-7 will move to be fully under the auspices of the IHE-RO Technical Committee and renamed the **Treatment Session Management** subgroup. It will combine the efforts underway in motion management sub-groups with the current TDW enhancements. Suggestions to increase the use of FHIR in these developments is under consideration. Some work items regarding workflow IODs will still be done in cooperation with DICOM WG-7.
    - Work on TDOR is contingent on more commitment from vendors to prioritize implementations. At present, no implementation development is expected until 2024.
    - DRRO development has moved through Public Comment to the Trial Implementation phase. Much of the progress made in DRRO is the result of informal workshops allowing

vendors to test in-house implementations. This profile is expected to reach formal testing in 2024.

- The TDR-Brachy profile was moved to public comment in June, 2023. This has been a joint effort of the IHE-RO TC and DICOM WG-7, now in the IHE-RO TC scope.
  - The third version of the BRTO profile ( BRTO-III) is in the definition phase. Enhancements proposed include the inclusion of several Radiation Oncology 2<sup>nd</sup> Generation DICOM elements, including more advanced definition of Volumes of Interest. Significant work on handling mixed 1<sup>st</sup> and 2<sup>nd</sup> generation RT Structure Set definitions is in progress.
  - The XRTS development is now done in conjunction with the HL7 accelerators associated with mCode/CodeX, which is standardizing the communication structure of reporting from Radiation Oncology Information Systems (e.g. Aria, Mosaik, RayCare) with Hospital Information Systems (EPIC, Cerner, VA Vista). This effort has also benefited immensely from informal workshops and testing sessions organized primarily by IHE-RO.
  - Work on profiles associated with the delivery of Ion therapy continue development and are nearing public comment.
- IHE-RO Connectathons will continue in 2023 to be hybrid events. The formal Connectathon is scheduled for October 30 – Nov 3 in Munich, courtesy of Brainlab. A mirrored server from the main test server (at AAPM Headquarters in Alexandria VA.) will assist in timely interactions. Support from ESTRO / EFOMP physicists as Test Monitors will augment the AAPM-sponsored monitors.
- IHE-RO Planning Committee
    - Yi Rong (Mayo-Arizona) joined the leadership of the IHE-RO Planning Committee in 2023.
    - A submission to the AAPM Spring Clinical Meeting (March, 2024) has been made to the AAPM SCM program committee. If accepted, this session is intended to better publicize IHE-RO efforts and encourage broader participation from clinical medical physicists in IHE-RO efforts.
    - The program committee continues to evaluate the priorities of the IHE-RO Technical Committee on technical profile development. They are also looking at efforts to (a) encourage more development activity from additional vendors in IHE-RO, and (b) how to more effectively influence vendor development efforts to include IHE-RO profiles.

**Most Significant Profiles:**

| Title                                          | # vendor<br>Virtual<br>Cthon<br>2022 | # product<br>(Registry) | Description                                                | Significance                                                                                                                                                                                                   |
|------------------------------------------------|--------------------------------------|-------------------------|------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Treatment<br>Planning - Plan<br>Content (TPPC) | 3                                    | TBD                     | Treatment plan information<br>exchange for c-arm gantries. | Adopted by major vendors, being<br>used in recent RFPs from the VA for<br>peer review systems. TPPC is<br>improving data submissions to NRG<br>clinical protocol offices by better<br>categorizing beam types. |

|                                                                         |   |     |                                                                                                                                                                                                                          |                                                                                                                                                                                                     |
|-------------------------------------------------------------------------|---|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Multi-modality Image Registration for Radiation Oncology III (MMRO III) | 5 | TBD | Allows objective assessment that products can handle PET, CT, MR, and other imaging modalities to position a patient for treatment. Allows flexibility with primary image set with advances in MR-planned and guided RT. | Adopted by major vendors. Greater adoption expected when the DRRO profile is released. NRG Clinical trials group is waiting for DRRO to be implemented to include in multi-modality imaging trials. |
| Basic Radiotherapy Objects II (BRTO II)                                 | 6 | TBD | Defines minimum standards for information exchange in each step of treatment planning, from CT import, to contour creation and transfer, through radiation dose display.                                                 | Adopted by most vendors. BRTO is also being used for setting dose submission requirements for NRG clinical trials.                                                                                  |
| Treatment Delivery Workflow II (TDW II)                                 | 6 | TBD | Enforces seamless plan transfer from the Treatment Management System to the Delivery Device.                                                                                                                             | Still early for full clinical deployment. Following our 2021 Fall Connectathon, we are expecting this to be ready for promotion and commercial deployment.                                          |

#### **Significant Deployment Activity:**

- In general, the field is small, 3-4 major vendors, 10-12 smaller ones
- Several vendors have deployed software that supports the profiles above
- IHE-RO has recently participated in efforts with mCode/CodeX, providing a testing infrastructure for FHIR implementations.

#### **Demonstrations and Other Events:**

- All IHE-RO Planning and Technical Committee meetings in 2021 and early 2022 were held virtually. Hybrid meetings were held in the second half of 2022 including at the AAPM Annual Meeting (July, 2022), following the November, 2022 IHE-RO Connectathon (at AAPM HQ in Alexandria, VA), and at the AAPM Spring Clinical Meeting (April, 2023). The 2023 Connectathon will be held in Munich in late October / early November.
- TestTool development was moved in 2022 to DEMCON. The contract focuses primarily on maintenance and support of existing tools but provides for additional development (e.g. potential FHIR development for XRTS). With the rapid development of the XRTS (Radiation Oncology <-> Hospital EMR) and the DRRO (Deformable Registration in Radiation Oncology), informal virtual testing events for XRTS (two events with participation of the mCode / CodeX development consortium) and DRRO were held in 2022. As part of the XRTS effort, test servers for FHIR message exchange and test tools for both profiles have been developed.

#### **New Profiles:**

- TDOR - Treatment Delivery Offline Recording. It was recognized during TDW II development that a profile was needed to support the recording of data available at the delivery system outside (e.g. due to a network failure or device problem) of a successful TDW II workflow completion.
- DOSE - Abbreviated Dose. The DOSE supplement addresses content requirements for passing information between Radiation Oncology devices for the purpose of reporting dose - particularly for

modalities which may not require an RT plan.

- ROTH - Radiation Oncology Treatment History. Provide sufficient information to allow a treatment course to be continued at another site due to events (fire, weather, cybersecurity failure) preventing treatment to continue at the original site.

#### **Trends:**

- Increasing need for integration of OIS and HIS systems leading to a focused profile in this area and collaboration with similar efforts in organizations such as ASTRO, MITRE, and mCode/CodeX. Similarly, the development of test tools and testing scenarios for DRRO has included DICOM WG-7.
- Exchange of RT treatment information between clinics, not just within, is increasing and will be addressed by IHE-RO.
- A new generation of devices (e.g. seated imaging and positioning, proton imaging) from new vendors entering the market is driving new use cases (and revisiting of older profiles such as DPDW).
- In cooperation with DICOM WG-7, efforts for a Brachytherapy profile are well underway and should result in informal testing in 2022 and formal testing in 2023. A similar effort is ongoing for the support of ion therapy with WG-7 and PTCOG.

#### **Summary of Future Plans:**

- Integration with HIS and exchange of RT treatment plans and records between hospital systems. The XRTS profile development is focussed on exchange of end of treatment summary information. The goal is to be able to (informally) exercise the profile in 2022 and possibly formally at the 2023 November Connectathon.
- Continue to implement DICOM for RT prescription, proton radiotherapy, brachytherapy, motion management and other RT standards in DICOM.
- Address in profiles changes in the DICOM standard - e.g. CP 2006 (Unattached contours) and efforts from WG-7 to bridge from 1<sup>st</sup> generation to 2<sup>nd</sup> generation DICOM-RT concepts.
- IHE-RO efforts in improving patient safety were part of a session at the 2022 ASTRO Annual Meeting (October, 2022). An IHE-RO “get-together” was held for the AAPM Annual Meeting (July, 2022) to gather feedback on IHE-RO efforts and encourage more participation.
- Identify, in consultation with the planning committee, a set of deliverables for the technical committee (move to trial implementation or public comment or drafting of new profiles) to optimize effort for 2023. The results of a survey of ASTRO, ESTRO, and AAPM members for potential use cases is currently in review by the Planning and Technical Committees.

In order of importance from high to low. The IHE-RO needs to:

- 1) Get existing profiles into products and clinics
- 2) Continue creating clinically relevant profiles which incorporate new technologies
- 3) Improve visibility and demonstrate clinical impact of IHE-RO efforts
- 4) Widen participation to include smaller vendors who are not actively involved.

IHE-RO efforts are limited by the following:

- Resources – the IHE-RO effort is small, generally involving 8-12 vendors and organizations in the development of profiles and 3-7 vendor products in any specific profile.
- Clinical Resources - A small group of clinicians (Radiation Oncologists and Medical Physicists) support the IHE-RO Planning Committee and technical committee. More clinical engagement is required, along with definition of tasks and processes and closer integration of medical and technical expertise. The Planning Committee has significantly improved clinical participation in the past year and is working to encourage more active participants.
- Technical Resources - The IHE-RO Technical Committee has 10-15 active individuals (most of whom also participate in DICOM WG7). Each effort requires 4-5 weeks of meetings/year, requiring significant corporate and society backing. Due to travel restrictions imposed by clinics and vendors, participation is now limited to 1 F2F / year each for IHE-RO and DICOM (due to overlapping membership), alternating between Europe and the US, and one IHE-RO Connectathon.