

# Treatment Delivery Device Integration

A universal expandable profile for automatic transfer and recording  
of radiotherapy treatments by computer controlled devices

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# Overview of the Use Case

- In modern radiotherapy, a wide array of delivery modalities exist, sold by many manufacturers. A given clinic may decide to a combination of these modalities best suits their patient's needs. Ideally, a clinic would operate with one patient management system controlling all delivery systems. This system would receive delivery parameters from a treatment planning system and pass those instructions onto the corresponding delivery system. The vendor of the PMS and the delivery systems need to work together to develop individual interfaces for a given combination.
- If a given OS or delivery system is meets requirement of this profile (ie. IHERO stamp of approval) then users is assured that it can interface properly with any other vendors OS or delivery sytem, given the other system is IHERO compliant as well.
- We must there fore define standard technical features of the interface, standard data, and standard data accuracy confirmation methods as part of this profile

# The Problem

- Radiotherapy process includes typically several data transfers that involve treatment planning, treatment management system / information system (a.k.a R&V system) and treatment delivery device
- Existing IHE-RO profiles specify only workflow for treatment delivery devices – data content is not specified
- Currently there are no official, standard interface requirements to ensure the interoperability of the treatment delivery device and treatment management system, and to make sure that the data is transferred and interpreted correctly between the systems
- Without standardization efforts, the potential error sources in data transfer between Treatment Management System and Treatment Delivery Device are numerous

# The Solution

- Advanced RT Object Integration Profile (based on DICOM RT) should be reused to include all necessary data for treatment delivery and should include a method for validation that the data was transferred and interpreted correctly.
- As much as possible the profile should be flexible and expandable so that different disparate equipment can share the same frame work (ie the same framework for liancs and for afterloaders with the device specific sub sections being part of an expanded sub section of the profile)



# The Benefit

- This profile ensures that the treatment plan generated in treatment planning system is interpreted correctly and safely by the treatment delivery device after any data transfers that have happened in IHE-RO compliant radiotherapy system/clinic before treatment session
- Radiotherapy clinics are able to choose treatment machines and treatment management systems based on the clinical features without sacrificing the ability to have a single treatment management system (R&V system) for all aspects of the patient's radiotherapy care.
- Eliminates treatments outside of the R&V framework

# Issues for Discussion

- **Are machines too unique to force a standardization**
  - Tomotherapy, Cyber knife etc
  - Would one for only L-arm linacs still be useful ?
- **Can this be built in an expandable way that enables its application to not-yet developed devices**
- **Should this include database lookup for scheduling/workflow**
  - Modality worklist for treatment machines

# Scoring Metric: Applicability / Reach

- **This profile can benefit all patients being treated with computer controlled devices in Radiation Oncology**
  - L-arm Linac
  - Tomotherapy
  - Gamma Knife
  - Remote Afterloader

# Scoring Metric: Safety

- **Eliminates radiotherapy treatments out of record and verify**
- **Allows a single radiotherapy EMR for all types of treatments**
- **Provides a mechanism for data verification at the time of treatment**



# Scoring Metric: Technical Ease of Implementation

- **Existing standards exists for many of the data elements**
  - DICOM-RT
- **Most systems already have methods for electronic data transfer**
  - If a standard is defined proprietary formats could be replaced by universal ones
- **Several interfaces exist already. Take the best features of those and call that the standard.**

# Scoring Metric: Industry Alignment