

DICOM

Second Generation Radiotherapy

Enhanced RT Image

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Chairman DICOM WG-07 Radiotherapy

RT Treatment Positioning uses major technologies:

- Projection Images (RT Image):
Scope of this Workitem
- 3D Imaging (CT, Conebeam CT)

Relation to DICOM 1st Generation RT

- Mostly same functional scope as in 1st Generation
- Now
 - using 2nd Gen concept
 - streamlining / strengthening patchy structure and representation in current 1st Gen object

Relation to DICOM 1st Generation RT

Generally same scope as in 1st Generation

(as follows)

Image Characteristics

- Projection Image
- May be:
 - Single-Frame
 - Multi-frame
 - MPEG

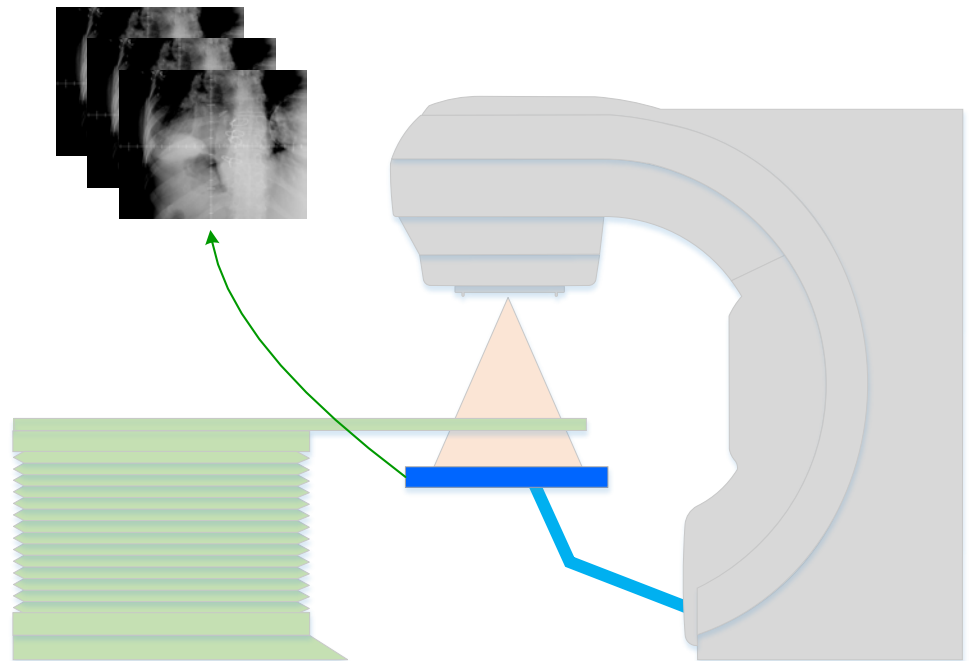
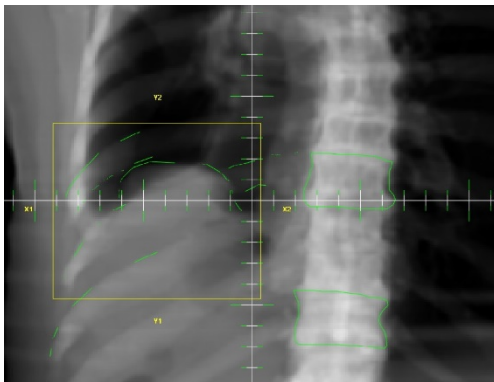


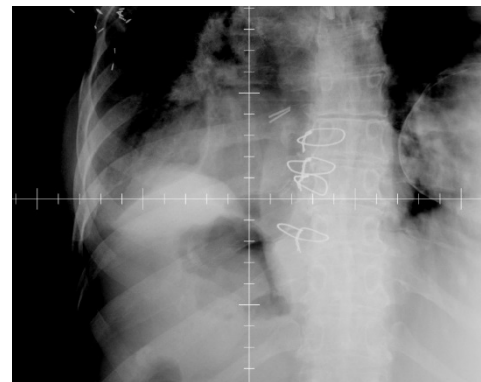
Image Object may represent

- Images acquired
(before / during / after therapeutic Radiation)
- Images artificially re-constructed from 3D Imaging prior to Treatment
(‘DRRs’, ‘Reference Images’, constructed in Treatment Planning phase).
- Used for verification:
Comparison against acquired Images

DRR



Acquired



Patient Position Detection and Correction

- Detect Patient Position prior to Treatment
- Relate actual Patient Position to Treatment Delivery Device (finally to: Source of therapeutic Radiation)
- Allow correction of Patient Position:
 - Get target point of beam in line with beam delivery device
 - Align orientation of patient in respect to treatment device
Not about axis orientation (HFS, HFP, FFS...), but:
Angular corrections

Monitor Patient Position

- Acquired during Therapeutic Radiation Delivery
- Along different frequencies / schedules
- Various Modes of Use
 - During-treatment observation
Ensure that position stays within certain limits
 - Post-Treatment Monitoring
To verify, that the position was within limits
Assess amount of motion

Geometric Content

- Precise, complete description of geometric relation
 - To Treatment device
 - To Patient positioning device

Beam-related Content

- State of Device where the Image relates to:
 - Value of Meterset / Time
 - Maybe related to device motion (e.g. gantry rotation):
Affects beam direction

Context

- RT Radiation, RT Radiation Record
- Fraction

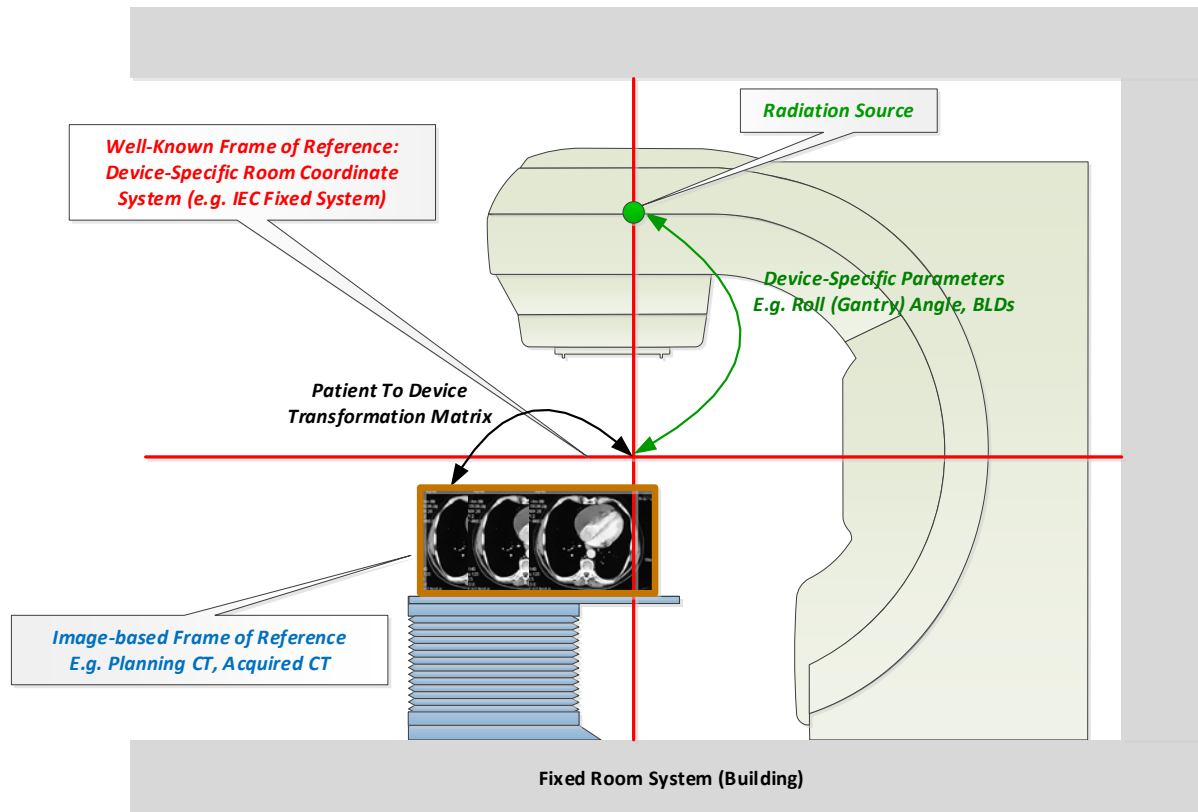
Adapt to 2nd Generation RT

- Referencing 2nd Gen IOD Instance
- Re-use of Patient Position Macro:
Annotation of Patient Positioning Device
- Re-use of other Beam-related Macros

Adapt to Enhanced Multi-Frame IOD Formalism

- Use of Multi-Frame Functional Groups

2nd Gen Use of application of Equipment FOR and Patient FOR



One IOD

(proposed Name: Enhanced RT Image)

Image-Entity-level Modules

(current viewpoint, preliminary)

- Image Pixel
- Multi-frame Functional Groups
- Multi-frame Functional Dimensions
- Synchronization Modules
- Enhanced RT Image

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