

# THE DICOM 2013 INTERNATIONAL CONFERENCE & SEMINAR

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## A Standardized Approach to Patient Positioning for Radiation Therapy Treatments using DICOM

Christof Schadt

Brainlab AG

Senior Software Specialist

Vice-Chair DICOM WG-07 “Radiotherapy”



- **Basic problem in radiotherapy:**

Where is the patient with respect to the treatment delivery device?

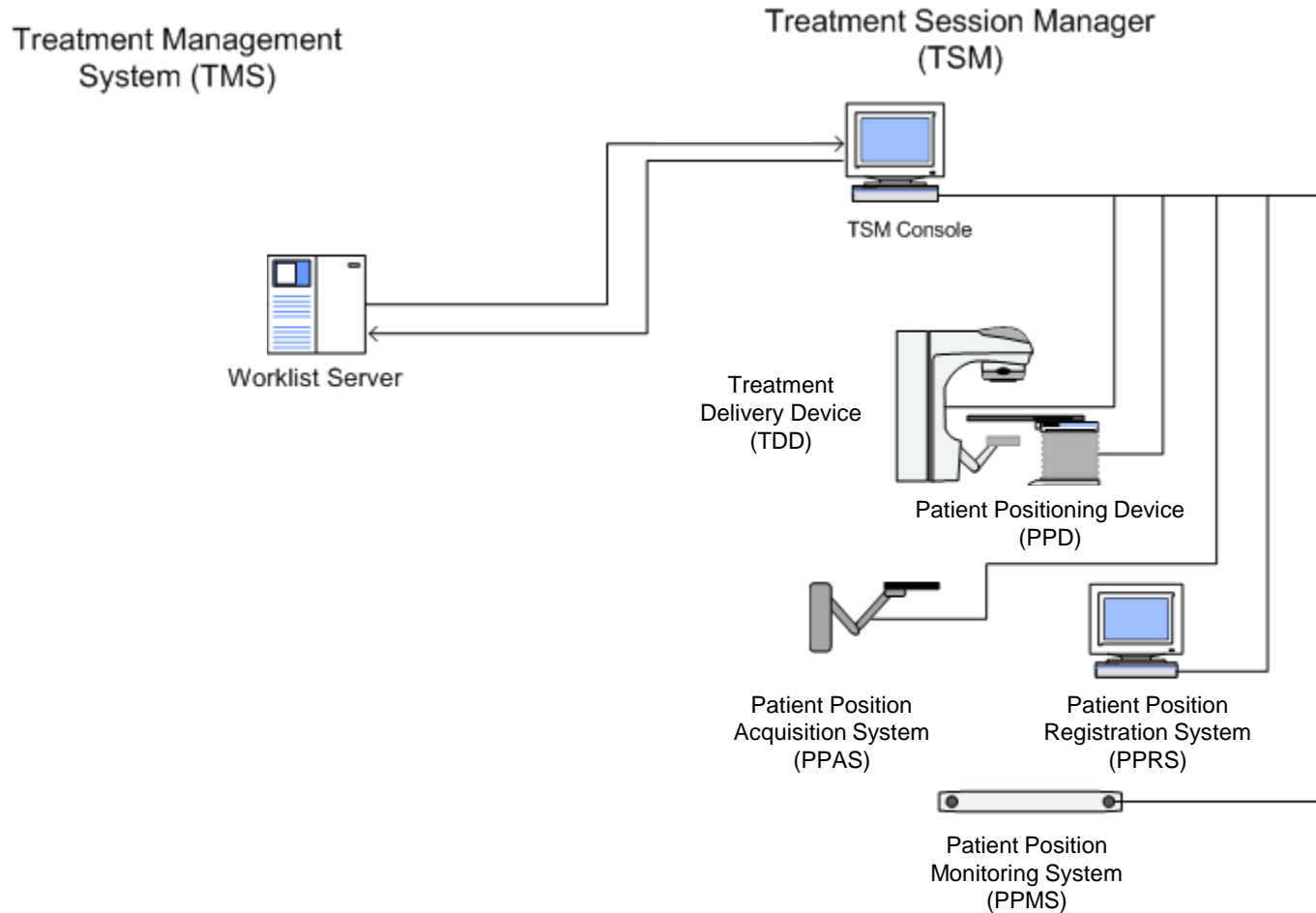
- **Basic solution:**

Use some kind of patient landmark and align this with a reference from the planning data

- **Get planning data**
- **Acquire current patient reference**
- **Register against ideal reference**
- **Apply difference to current position**
- **If required, repeat to verify**
- **Perform post-treatment review**

- **Peer-to-peer Communication**
- **Proprietary Protocols**
- **Weak references to DICOM RT Plans**
- **No way to report correction**
- **Lots of error-prone user interaction**
  - Assigning patients to procedures
  - Selecting treatment locations for verification

# Ideal Set-Up



## Definition of DICOM IODs based on

- **Supplement 96 „Unified Worklist and Procedure Step“**
  - **Supplement 147 „Second Generation Radiotherapy“**
- **Supplement 160 „Positioning and Workflow“**

## **Not only a multi-vendor environment, but also multi-technique:**

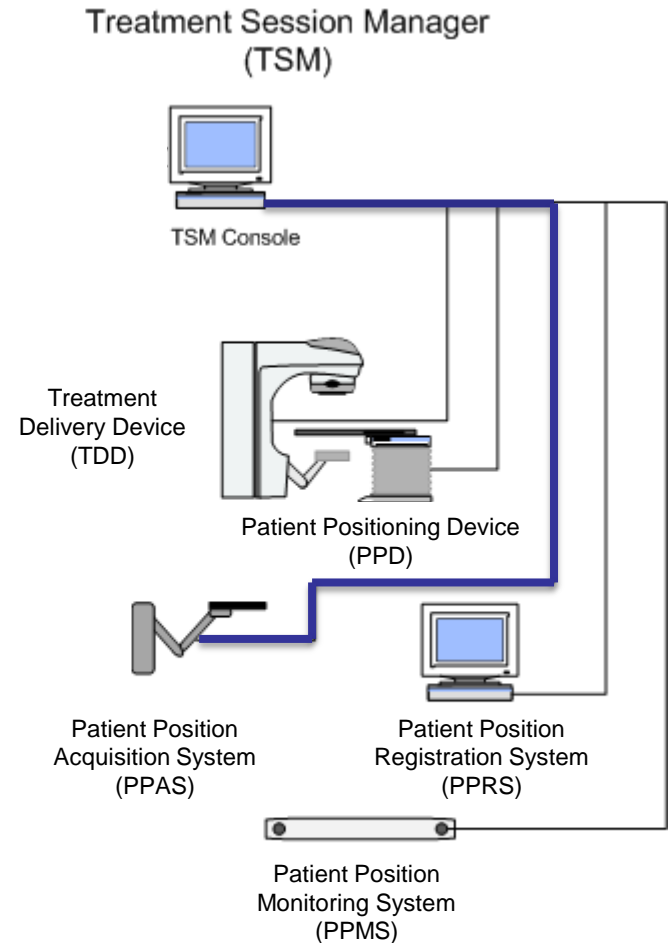
- kV/MV imaging (planar, volumetric)
- Ultrasound imaging
- Surface scanning (visible light, laser)
- Marker tracking (visible light, infra-red, radio-frequency, radioactive)

# Reference Acquisition

- Patient Position Acquisition Geometry IOD
- Patient Position Acquisition Instruction IOD

## Result:

- image objects (CT, US, ...)
- Surface Segmentation IOD
- Optical Surface Scanner IOD
- Fiducials IOD

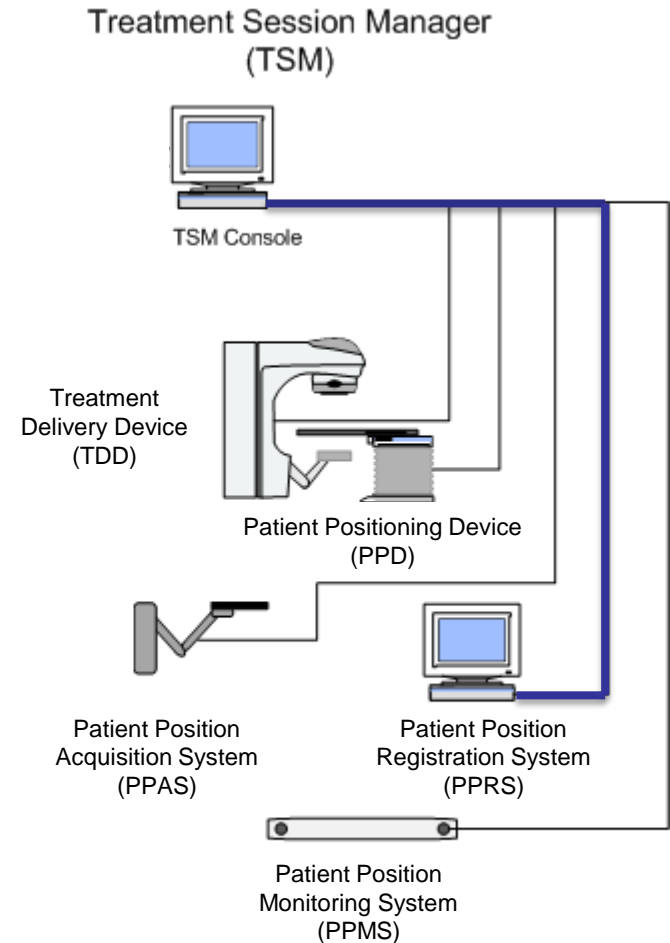




- Registration Instruction IOD

Result:

- Registration IOD

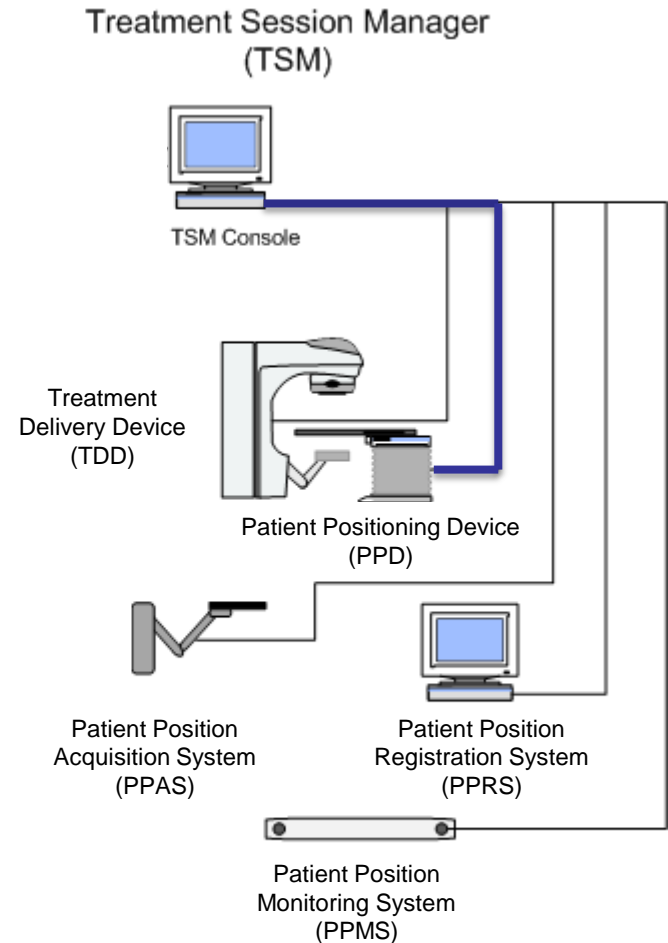


# Position Modification

- Patient Position Correction Instruction IOD
- Patient Position Modification Instruction IOD

## Result:

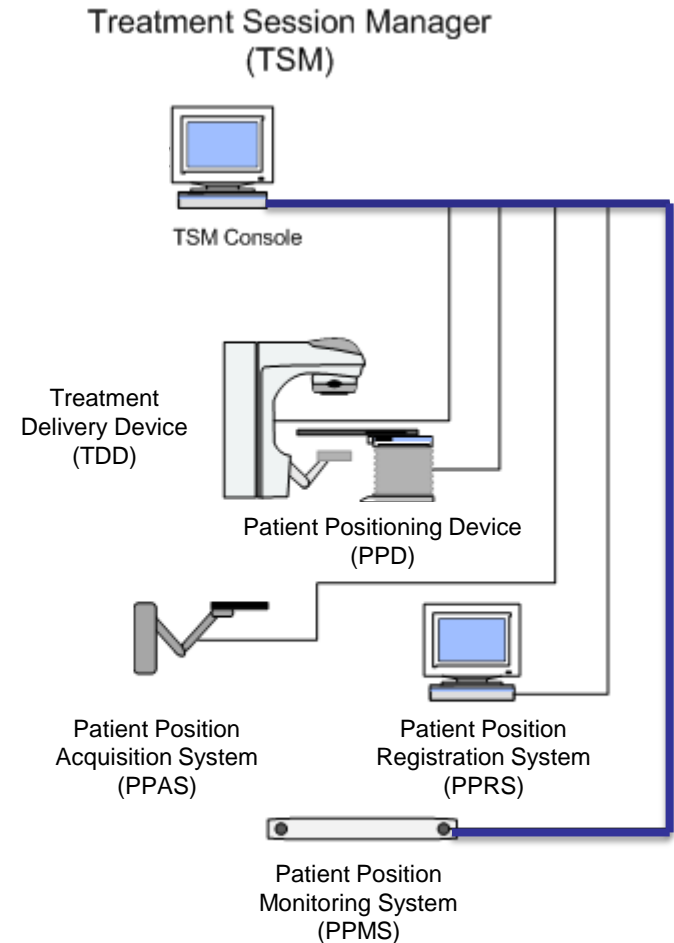
- Patient Position Modification Result IOD



- Patient Position Monitoring Instruction IOD

Result:

- Patient Position Monitoring Result IOD
- Waveform IOD



## Joint Enterprise by:

- **DICOM Working Group 07**  
**„Radiotherapy“ –**  
**Sub-Group „Positioning and Workflow“**
- **IHE Radiation Oncology Technical**  
**Committee –**  
**Sub-Group „Discrete Positioning and**  
**Delivery Workflow“**

# References



<http://dicom.nema.org/>



<http://www.IHE.net/>

- DICOM Supplement 96 “Unified Worklist and Procedure Step”
- DICOM Supplement 147 “2<sup>nd</sup> Generation Radiation Therapy”
- DICOM Supplement 160 “Positioning & Workflow”
- IHE-RO Supplement “Discrete Positioning and Delivery Workflow”

## **Christof Schadt**

- **christof.schadt@brainlab.com**
- **Brainlab AG**  
**Kapellenstrasse 12**  
**85622 Feldkirchen**  
**Germany**

***Thank you for your attention !***