

DICOM Beyond 2000
Current Status of DICOM RT Extensions

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Presentation Overview

- **DICOM RT Object Implementation Issues**
- **Vendors Implementation & User's experience**
- **Benefits/Concluding Remarks**

General DICOM Implementation Issues

- **DICOM Conformance Statement (Part 2)**

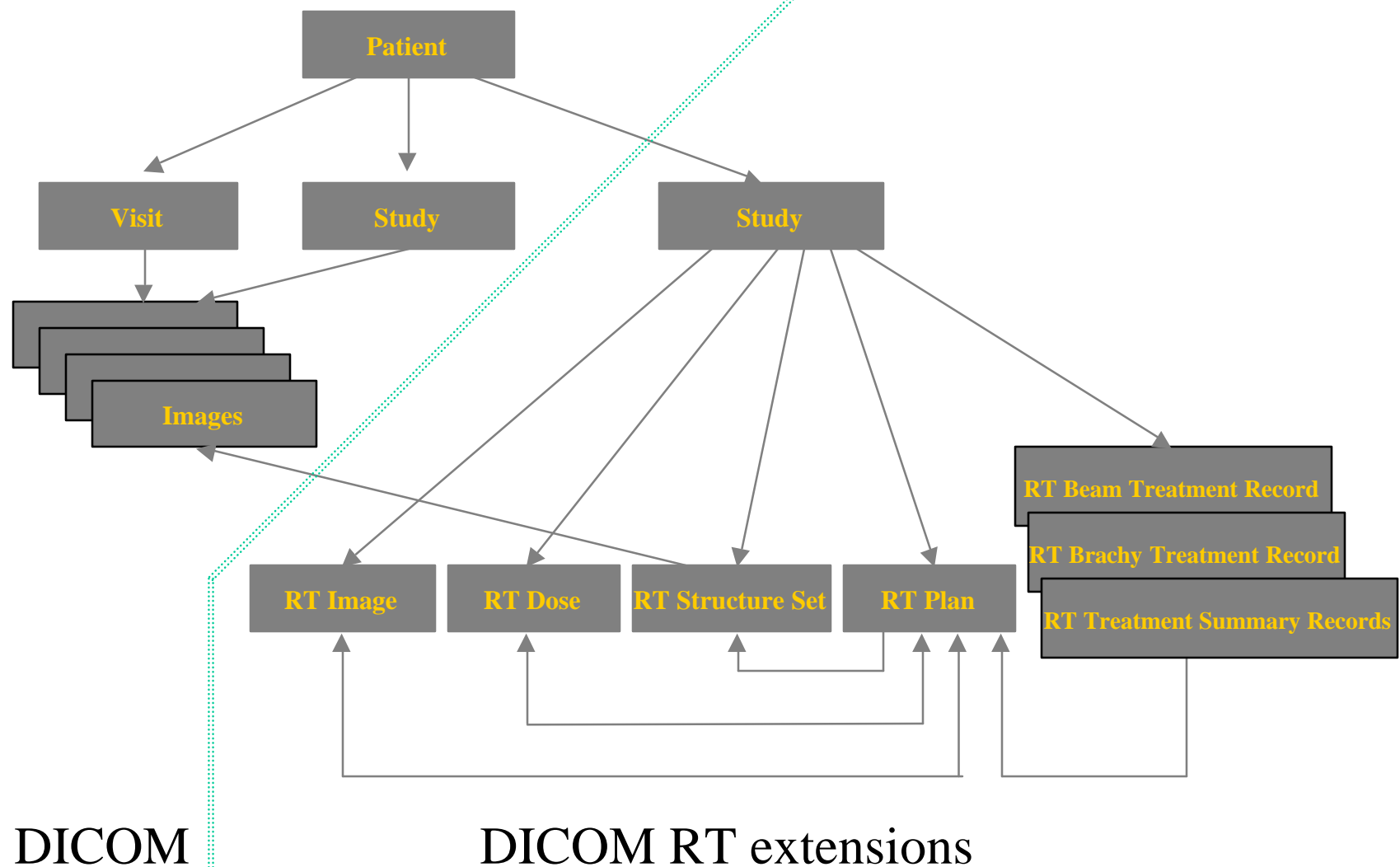
RT IODs more complex than Diagnostic IODs. For RT IODs DCS must contain Module/attribute lists

- **Modules/Attribute Options**

For RT IODs DCS must contain Module and their attribute lists. Inter vendor communication desirable

- **Testing: In house; Over Internet; Test Houses**

DICOM Information Model (with RT Extensions)



DICOM - RT Objects

- **RT Image** - DRR, Portal, Simulator (Conventional), Radiograph, Blank - defined on a conical geometry
- **RT Dose** - Dose Matrix, Dose Points (2D & 3D), Isodoses, DVH - calculated on a TPS
- **RT Structure Set** - Patient Structures and related data defined on eg CT/MR, Virtual Simulation, TPS or others
- **RT Plan** - External/Brachy Plan, Fractionation, Tolerance, Patient Setup, Beams, & Sources

- **RT Beam Treatment Record** - External beam session record with an optional summary indicating the cumulative state of a treatment course.
- **RT Brachy Treatment Record** - Brachy session record with an optional summary indicating the cumulative state of a treatment course.
- **RT Treatment Summary Record** - Treatment summary indicating the cumulative state of a treatment course.

Vendor Implementations of DICOM RT Image (SCP)

(Vendors used SC IOD in pre RT days)

Elekta (*iView*)

GE Medical Systems (*GEAdvantage Sim*)

Impac Medical Systems, Inc. (*ViewStation*)

MDS Nordion (*Helax-IMCON, Theraplan PLUS*)

Merge Technologies (*MergeARK*)

NOMOS (*CORVUS*)

Nucletron (*PLATO*)

Siemens Medical Systems (*LANTIS, BeamView, Imaging Platform*)

Varian Medical Systems (*VARiS/Vision G6*)

WIP

Future Release

Device Types:

EPI, VS, R&V, TPS

Vendor Implementations of DICOM RT Image (SCU)

(Vendors used SC IOD in pre RT days)

ADAC (Pinnacle)

GE Medical Systems (GE Advantage Sim)

Impac Medical Systems, Inc. (QwikSIM)

Marconi Medical Systems (AcQSim/AcQPlan)

MDS Nordion (Helax-TMS, Helax-IMCON & Theraplan PLUS)

Merge Technologies (MergeARK)

NOMOS (BAT)

Nucletron (PLATO)

Siemens Medical Systems (BeamView, *Imaging Platform*)

Varian Medical Systems (VARiS/Vision G6)

WIP

Future Release

Device Types:

EPI, VS, R&V, TPS

Vendor Implementations of DICOM RT Dose

SCP: *IMPAC Medical Systems, Inc.*

Marconi Medical Systems (AcQSim/AcQPlan)

MDS Nordion (DCM & Theraplan PLUS)

Merge Technologies (MergeARK)

NOMOS Corporation (BAT & *CORVUS*)

SCU: *IMPAC Medical Systems, Inc.*

Marconi Medical Systems (AcQSim/AcQPlan)

MDS Nordion (Helax-TMS, DCM & Theraplan PLUS)

Merge Technologies (MergeARK)

TomoTherapy Inc

Varian Medical Systems (VARiS/Vision)

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Vendor Implementations of DICOM RT Structure Set (SCP)

ADAC (Pinnacle)

CMS (FOCUS)

ELEKTA (iView)

GE Medical Systems (GE Advantage Sim)

Impac Medical Systems, Inc.

Marconi Medical Systems (AcQSim/AcQPlan)

MDS Nordion (Helax-TMS, DCM & Theraplan PLUS)

Merge Technologies (MergeARK)

NOMOS Corporation (CORVUS & BAT)

Nucletron (PLATO)

Siemens Medical Systems (Imaging Platform)

TomoTherapy Inc

Varian Medical Systems (VARiS/Vision G6)

Device Types: EPS, VS, R&V, TPS

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Vendor Implementations of DICOM RT Structure Set (SCU)

ADAC (Pinnacle)

GE Medical Systems (GE Advantage Sim)

IMPAC Medical Systems, Inc. (QwikSIM)

Marconi Medical Systems (AcQSim/AcQPlan)

MDS Nordion (Helax-TMS & Theraplan PLUS)

Merge Technologies (MergeARK)

NOMOS Corporation (CORVUS)

Nucletron (PLATO)

Siemens Medical Systems (Imaging Platform)

Varian Medical Systems (VARiS/Vision G6)

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Vendor Implementations of DICOM RT Plan (SCP)

ADAC (Pinnacle)

Elekta (PreciseDesktop, PrecisePlan & *iView*)

GE Medical Systems (GE Advantage Sim)

IMPAC Medical Systems, Inc. (Multi-ACCESS)

Marconi Medical Systems (AcQSim/AcQPlan)

MDS Nordion (Helax-TMS, Helax-VISIR, Helax IMCON, DCM & Theraplan PLUS)

Merge Technologies (MergeARK)

NOMOS Corporation(BAT)

Nucletron (PLATO)

Siemens Medical Systems (LANTIS, IMFAST, *Imaging Platform*)

Varian Medical Systems (VARiS/Vision)

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Vendor Implementations of DICOM RT Plan (SCU)

ADAC (Pinnacle)

CMS (FOCUS)

Elekta (PrecisePlan)

GE Medical Systems (GE Advantage Sim)

IMPAC Medical Systems, Inc. (QwikSIM)

Marconi Medical Systems (AcQSim/AcQPlan)

MDS Nordion (Helax-TMS, Helax-VISIR, Helax IMCON, DCM & Theraplan PLUS)

Merge Technologies (MergeARK)

NOMOS Corporation(CORVUS)

Nucletron (PLATO)

Siemens Medical Systems (IMFAST, *Imaging Platform*)

Varian Medical Systems (VARis/Vision)

WIP

Vendor Implementations of DICOM RT Beam, Brachy & Summary Treatment Records

- **Merge Technologies** (MergeARK):
SCU & SCP for RT Treatment Beam, Brachy & Summary Records
- **ELEKTA** (*PreciseDesktop*):
SCP for RT Treatment Beam & Summary Records
- **IMPAC Medical Systems, Inc.:**
RT Treatment Beam, Brachy & Summary Records
- **Varian Medical Systems:**
RT Treatment Record

WIP
Future Releases

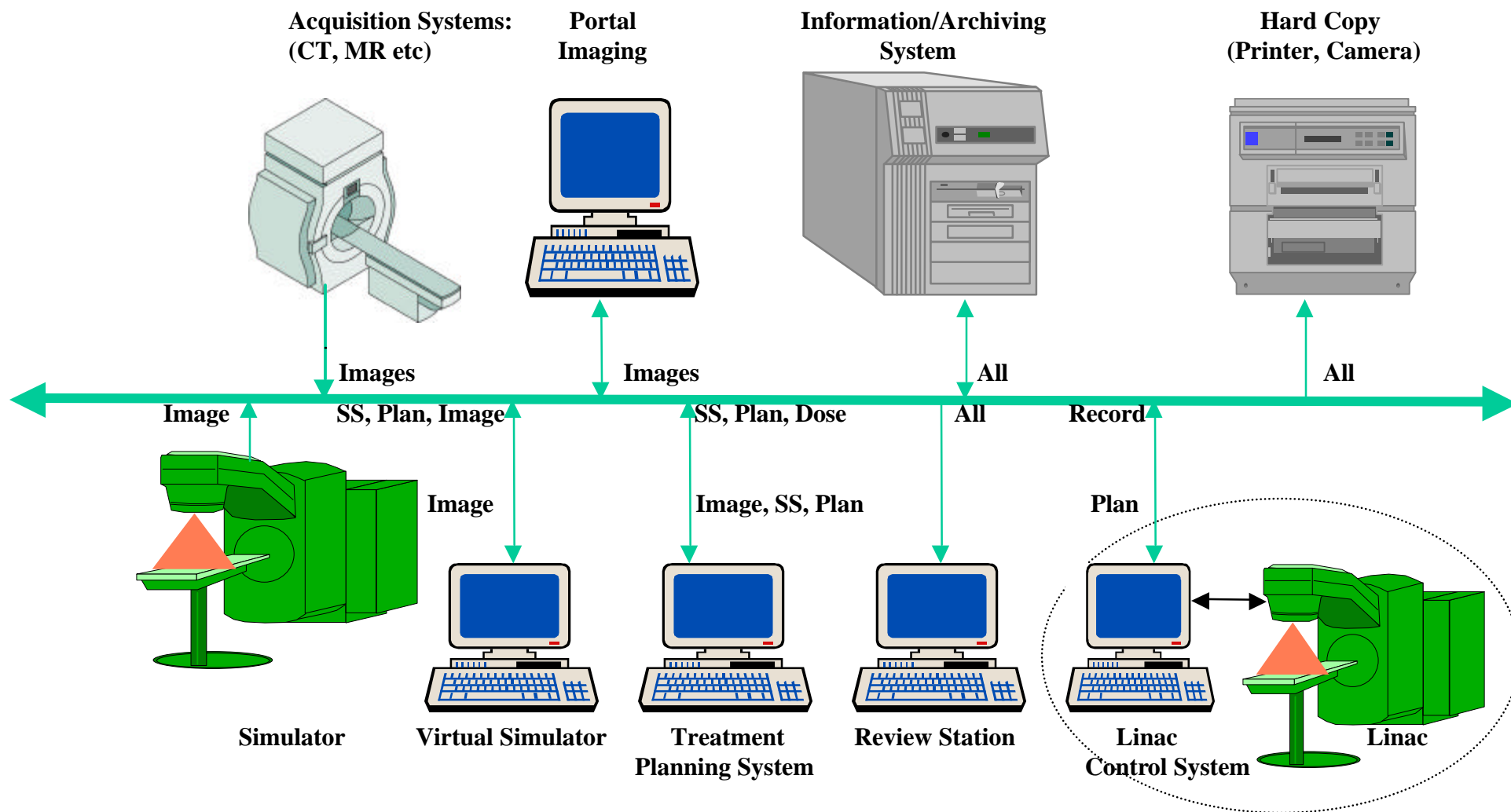
RT Plan communication between a Treatment System and different Treatment Planning Systems (An Example)

Treatment Planning Systems (RT Plan Export - SCU):	Communication status for importing RT Plan by the Elekta Precise Desktop Treatment System (RT Plan Import – SCP):
ADAC (Pinnacle)*	Being tested over the Internet and with clinical sites
CMS (FOCUS)*	Being tested over the Internet and with clinical sites
GE (Advantage)	Successfully imported the example data.
MDS Nordion (Helax-TMS)*	Successfully tested import of IMRT and Simple fields. In clinical use at Cookridge, Leeds (UK), & several other sites
Theratronics (TPP)	Received RT Plan data successfully – testing continues.
NOMOS (CORVUS)* (Only IMRT)	Successfully received example data and testing continues.
Nucletron (Plato)*	In clinical use at AZU Utrecht (Netherlands) & other sites.
Picker (AcQSim 4.0)	In clinical use with AcqPlan V4.1 at La Choux-de-fonds, Switzerland & other sites.
University Hospital Ghent, Belgium Own system (Gratis)*	In clinical use for IMRT (Step & Shoot)
PrecisePLAN	Testing in progress.
William Beaumont Hospital (In house system)*	Successfully tested and preparing to go clinical.
Univ of Washington, Seattle (In house system)*	Successfully tested and preparing to go clinical .
Prowess	Successfully received example data.
Thomas Jefferson Univ (In house system)	Initial testing successful

*** Include IMRT as well as Standard plans**

A DICOM Example (inc RT Objects)

(During an external beam patient treatment)



Benefits/Concluding Remarks

- **Safety & Large Data transfer (eg IMRT)**
- **Complex IODs eg RT Plan**
- **More DICOM RT IOD implementations planned ahead**
- **DICOM RT Extension - A success story**

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