Integrating the Healthcare Enterprise

IHE Radiation Oncology
Technical Framework Supplement

Treatment Planning – Plan Content Brachy (TPPC-Brachy)

For review and comment only.

DO NOT implement this public comment version.

Revision 1.0 – Draft for Public Comment

Date: November 10, 2023

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Please verify you have the most recent version of this document. See here for Trial Implementation and Final Text versions and here for Public Comment versions.

Foreword

This is a supplement to the IHE Radiation Oncology Technical Framework. Each supplement undergoes a process of public comment and trial implementation before being incorporated into the volumes of the Technical Frameworks.

This supplement is published on November 10, 2023 for Public Comment. Comments are invited and can be submitted at https://www.ihe.net/Radiation_Oncology_Public_Comments. In order to be considered in development of the Trial Implementation version of the supplement, comments must be received by December 11, 2023.

This supplement describes changes to the existing technical framework documents.

"Boxed" instructions like the sample below indicate to the Volume Editor how to integrate the relevant section(s) into the relevant Technical Framework volume.

Amend Section X.X by the following:

Where the amendment adds text, make the added text **bold underline**. Where the amendment removes text, make the removed text ~~**bold strikethrough**~~. When entire new sections are added, introduce with editor's instructions to "add new text" or similar, which for readability are not bolded or underlined.

General information about IHE can be found at IHE.net.

Information about the IHE Radiation Oncology domain can be found at IHE Domains.

Information about the organization of IHE Technical Frameworks and Supplements and the process used to create them can be found at Profiles and IHE Process.

The current version of the Radiation Oncology Technical Framework can be found at Radiation Oncology Technical Framework.

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Introduction to this Supplement

This content profile is motivated by medical physicists working with brachytherapy planning systems, who face an increasing demand from patient-care, data-quality and research perspectives to increase the usefulness, exchangeability and availability of clinical data across the various treatment planning systems.

The main role of this profile is to address a solution for such interoperability using the DICOM objects provided in its 1st generation.

The aim is to streamline the implementation of the DICOM objects in order to identify a common understanding and key reading of the standard. This supplement provides the guidelines to handle techniques that exist in brachytherapy that benefit from digital data storage. The involved actors are either producers or consumers of a DICOM RT Plan for brachytherapy.

History of Changes

Date	Rev.	Author	Change Summary
November 2023	1.0	RO Technical Committee	Initial Public Comment Publication

Open Issues

#	Comment/Issue
1	For temporary LDR treatment plans, can we restrict to just 2 control points (CP's) per channel like Permanent LDR?

Closed Issues

None

IHE Technical Frameworks General Introduction

The IHE Technical Frameworks General Introduction is shared by all of the IHE domain technical frameworks. Each technical framework volume contains links to this document where appropriate.

9 Copyright Licenses

IHE technical documents refer to, and make use of, a number of standards developed and published by several standards development organizations. Please refer to the IHE Technical Frameworks General Introduction, Section 9 - Copyright Licenses for copyright license information for frequently referenced base standards. Information pertaining to the use of IHE International copyrighted materials is also available there.

10 Trademark

IHE® and the IHE logo are trademarks of the Healthcare Information Management Systems Society in the United States and trademarks of IHE Europe in the European Community. Please refer to the IHE Technical Frameworks General Introduction, Section 10 - Trademark for information on their use.

IHE Technical Frameworks General Introduction Appendices

The IHE Technical Framework General Introduction Appendices are components shared by all of the IHE domain technical frameworks. Each technical framework volume contains links to these documents where appropriate.

Appendix A – Actors

*Add the following **new or modified** actors to the IHE Technical Frameworks General Introduction Appendix A:*

New (or modified) Actor Name	Description
HDR/PDR Structure Set Producer	A system capable of producing an HDR/PDR Structure Set
HDR/PDR Structure Set Consumer	A system capable of consuming an HDR/PDR Structure Set
LDR Structure Set Producer	A system capable of producing an LDR Structure Set
LDR Structure Set Consumer	A system capable of consuming an LDR Structure Set
HDR Treatment Plan Producer	A system capable of producing an HDR treatment plan.
HDR Treatment Plan Consumer	A system capable of consuming an HDR treatment plan
PDR Plan Producer	A system capable of producing a PDR treatment plan.
PDR Plan Consumer	A system capable of consuming a PDR treatment plan
LDR Permanent Plan Producer	A system capable of producing a permanent LDR treatment plan.
LDR Permanent Plan Consumer	A system capable of consuming a permanent LDR treatment plan
LDR Temporary Plan Producer	A system capable of producing a temporary LDR treatment plan.
LDR Temporary Plan Consumer	A system capable of consuming a temporary LDR treatment plan
RT Ultrasound Producer	A system capable of producing an RT Ultrasound image.
RT Ultrasound Consumer	A system capable of consuming an RT Ultrasound image

Appendix B – Transactions

*Add the following **new or modified** transactions to the IHE Technical Frameworks General Introduction Appendix B:*

New (or modified) Transaction Name and Number	Definition
Store HDR Plan [TPPC-BRACHY-01]	An HDR Plan Producer stores a treatment plan to a HDR Plan Consumer.
Store PDR Plan [TPPC-BRACHY-02]	A PDR Plan Producer stores a treatment plan to a PDR Plan Consumer.
Store LDR Permanent Plan [TPPC-BRACHY-03]	An LDR Permanent Plan Producer stores a treatment plan to an LDR Permanent Plan Consumer.
Store LDR Temporary Plan [TPPC-BRACHY-04]	An LDR Temporary Plan Producer stores a treatment plan to an LDR Temporary Plan Consumer.
Store HDR/PDR Structure Set [TPPC-BRACHY-05]	An HDR/PDR Structure Set Producer stores a structure set to an HDR/PDR Structure Set Consumer.
Store LDR Structure Set [TPPC-BRACHY-06]	An LDR Structure Set Producer stores a structure set to an LDR Structure Set Consumer.
Store RT Ultrasound [TPPC-BRACHY-07]	An RT Ultrasound Producer stores an Ultrasound image series to an RT Ultrasound Consumer.

Appendix D – Glossary

*Add the following **new or modified** glossary terms to the IHE Technical Frameworks General Introduction Appendix D:*

New (or modified) Glossary Term	Definition	Synonyms	Acronym/ Abbreviation
Applicator	Device, consisting out of one or more catheters, holding the radioactive source(s) during brachytherapy		
High dose rate	Radiation delivered internally to the patient via a short half-life, high output, continuously irradiating isotope that is left in the patient for the entire time of treatment.		HDR
Low dose rate	Radiation delivered internally to the patient via a long half-life, low output radioisotope		LDR
Pulse dose rate	Radiation delivered internally to the patient via a short half-life, high output, irradiating isotope that is moved in and out of the patient on a planned time schedule (pulsing)		PDR

Volume 1 – Profiles

X Brachy Treatment Planning – Plan Content Integration (TPPC-Brachy) Profile

This integration profile involves the exchange of RT Plan information:

- Between treatment planning systems
- Between treatment planning systems and treatment management systems and / or treatment delivery systems.

The transactions revolve around the brachytherapy treatment specific workflows (e.g., specifying the process of transferring the treatment planning data to a treatment management system). On the basis of the planned technique for the treatment, the content of the DICOM object has an additional content specifications defined in chapter 7 in order to address the interoperability between different vendors.

The workflow description will make use of this content description defined in Section 7.

This profile addresses the techniques that exist in Brachytherapy. The actors are either producers or consumers of a DICOM RT Plan.

X.1 TPPC-BRACHY Actors, Transactions, and Content Modules

This section defines the actors, transactions, and/or content modules in this profile. General definitions of actors are given in the Technical Frameworks General Introduction Appendix A. IHE Transactions can be found in the Technical Frameworks General Introduction Appendix B. Both appendices are located at https://profiles.ihe.net/GeneralIntro/index.html.

Figure X.1-1 shows how the TPPC-BRACHY Content Profile is used in the exchange of DICOM plans between actors that are identified as producers and actors that are identified as consumers.

The DICOM objects that are exchanged between producers and consumers have to implement the requirements listed in this profile in order to be IHE compliant.

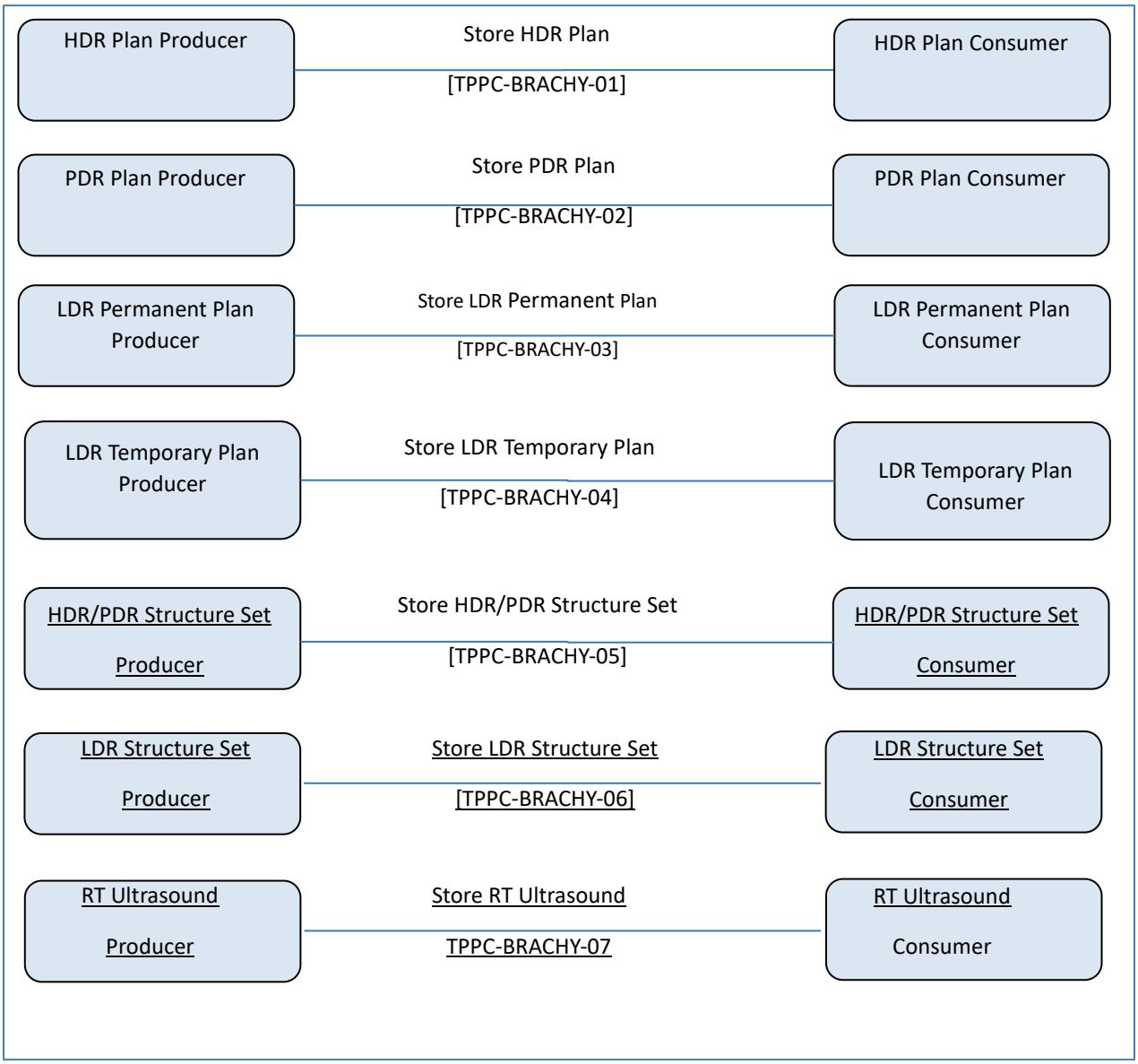


Figure X.1-1: TPPC-Brachy Actor Diagram

Table X.1-1 lists the transactions for each actor directly involved in the TPPC-Brachy Profile. To claim compliance with this profile, an actor shall support all required transactions (labeled "R") and may support the optional transactions (labeled "O").

Table X.1-1: TPPC-Brachy Profile - Actors and Transactions

Actors	Transactions	Initiator or Responder	Optionality	Reference (Section in TF-2)
Treatment Management System (TMS) (See Note Below)	Store HDR Plan [TPPC-Brachy-01]	Responder	O	RO TF-2: 3.Y1
	Store PDR Plan [TPPC-Brachy-02]	Responder	O	RO TF-2: 3.Y2
	Store LDR Permanent Plan [TPPC-Brachy-03]	Responder	O	RO TF-2: 3.Y3
	Store LDR Temporary Plan [TPPC-Brachy-04]	Responder	O	RO TF-2: 3.Y4
	Store HDR/PDR Structure Set [TPPC-Brachy-05]	Responder	O	RO TF-2: 3.Y5
	Store LDR Structure Set [TPPC-Brachy-06]	Responder	O	RO TF-2: 3.Y6
HDR Plan Producer	Store HDR Plan [TPPC-Brachy-01]	Initiator	R	RO TF-2: 3.Y1
PDR Plan Producer	Store PDR Plan [TPPC-Brachy-02]	Initiator	R	RO TF-2: 3.Y2
LDR Permanent Plan Producer	Store LDR Permanent Plan [TPPC-Brachy-03]	Initiator	R	RO TF-2: 3.Y3
LDR Temporary Plan Producer	Store LDR Temporary Plan [TPPC-Brachy-04]	Initiator	R	RO TF-2: 3.Y4
HDR Plan Consumer	Store HDR Plan [TPPC-Brachy-01]	Responder	R	RO TF-2: 3.Y1
PDR Plan Consumer	Store PDR Plan [TPPC-Brachy-02]	Responder	R	RO TF-2: 3.Y2
LDR Permanent Plan Consumer	Store LDR Permanent Plan [TPPC-Brachy-03]	Responder	R	RO TF-2: 3.Y3
LDR Temporary Plan Consumer	Store LDR Temporary Plan [TPPC-Brachy-04]	Responder	R	RO TF-2: 3.Y4
HDR/PDR Structure Set Producer	Store HDR/PDR Structure Set [TPPC-Brachy-05]	Initiator	R	RO TF-2: 3.Y5
LDR Structure Set Producer	Store LDR Structure Set [TPPC-Brachy-06]	Initiator	R	RO TF-2: 3.Y6
HDR/PDR Structure Set Consumer	Store HDR/PDR Structure Set [TPPC-Brachy-05]	Responder	R	RO TF-2: 3.Y5
LDR Structure Set Consumer	Store LDR Structure Set [TPPC-Brachy-06]	Responder	R	RO TF-2: 3.Y6
RT Ultrasound Producer	Store RT Ultrasound [TPPC-Brachy-07]	Initiator	R	RO TF-2: 3.Y7
RT Ultrasound Consumer	Store RT Ultrasound [TPPC-Brachy-07]	Responder	R	RO TF-2: 3.Y7

Note: The TMS Integration Statement will indicate which transactions it is capable of supporting. In general, these will be grouped according to the overall functionality of the TMS Actor. For example, a general TMS would likely support all transactions, while a Brachy only TMS may only support the brachy structure sets and brachy plans. In addition, for cases where there are insufficient actors for complete testing of the TMS, the TMS can pass the Connectathon by claiming those transactions it successfully completed.

X.1.1 Actor Descriptions and Actor Profile Requirements

For all Brachytherapy Content Producers and Consumers, the display requirements for dwell time and total dose contributions are not sufficiently met by just presenting the DICOM data. It must be converted as described in the notes in this section. An actor does not adhere to the profile unless the system provides the output in the prescribed format.

Actors shall display total times and dwell times at the reference date and time of the plan (including time zone used) and not Cumulative Time Weights.

X.2 TPPC-Brachy Actor Options

None

X.3 TPPC-Brachy Required Actor Groupings

None

X.4 TPPC-Brachy Overview

X.4.1 Concepts

This profile enhances the content of the DICOM plan objects as regard the brachytherapy scope. This is fulfilled by providing specialized actors for each technique and role (producer or consumer).

Typically, a Treatment Planning System (TPS) is expected to implement one or more of the “producer” actors.

A TPS that is intended to be able to perform a re-planning based on the output of another TPS is expected to adhere to one or more of the “consumers” actors.

The transactions included in this profile provide the guidelines that indicate how the DICOM object shall be filled focusing in the content description rather than in the workflow description.

The most important attributes that have to be properly included in the DICOM object in order to avoid ambiguities and safety implications on interpreting the object have been identified in the transactions.

X.5 TPPC-Brachy Security Considerations

None

X.6 TPPC-Brachy Cross Profile Considerations

None

Appendices to Volume 1

None

Volume 2 – Transactions

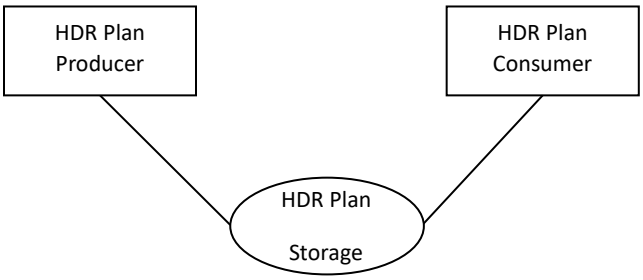
Add the following Sections (3.Y1 through 3.Y7)

3.Y1 Store HDR Plan [TPPC-Brachy-01]

3.Y1.1 Scope

In the Store HDR Plan transaction, a Producer of an RT Plan that incorporates the brachytherapy technique identified in Store HDR Plan [TPPC-Brachy-01]Store HDR Plan stores the plan to an HDR Plan Consumer. In this example, we diagram a DICOM C-Store, but other forms of transmission are acceptable for this content profile.

3.Y1.2 Actor Roles



Actor:	HDR Plan Producer
Role:	Creates a HDR plan for a treatment that shall be delivered using a treatment delivery system and stores it to an HDR Plan Consumer.
Actor:	HDR Plan Consumer
Role:	Accepts and stores the RT Plan from the HDR Plan Producer

3.Y1.3 Referenced Standards

DICOM 2021c Edition. PS 3.3: RT Modules, PS 3.4: Storage Service Class.

3.Y1.4 Messages

3.Y1.4.1 Message Name

3.Y1.4.1.1 Trigger Events

The HDR Plan Producer transfers the plan to a storage or HDR Plan Consumer once the plan is created and the dose calculation is finished.

3.Y1.4.1.2 Message Semantics

The HDR Plan Producer may create a new series containing the plan or may use an existing series, where previous plan(s) are contained.

The study where the series of the plan is contained shall be the same study as the one containing the structure set referenced in the plan.

The requirements for the content of the RT Plan are specified in section 7.3.2.1.3 RT Plan IOD for Brachytherapy respectively.

3.Y1.4.1.3 Expected Actions

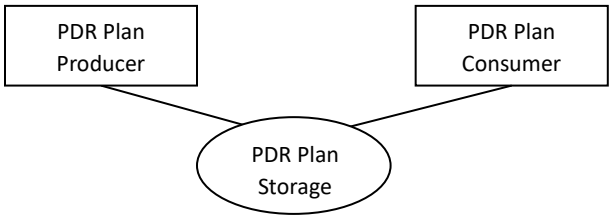
The HDR Plan Consumer stores the RT Plan.

3.Y2 Store PDR Plan [TPPC-Brachy-02]

3.Y2.1 Scope

In the Store PDR Plan transaction, a Producer of an RT Plan that incorporates the brachytherapy technique identified in Store PDR Plan [TPPC-Brachy-02] Store PDR Plan stores the plan to an HDR Plan Consumer. In this example, we diagram a DICOM C-Store, but other forms of transmission are acceptable for this content profile.

3.Y2.2 Actor Roles



Actor:	PDR Plan Producer
Role:	Creates an PDR plan for a treatment that shall be delivered using a treatment delivery system and stores it to a PDR Plan Consumer.
Actor:	PDR Plan Consumer
Role:	Accepts and stores the RT Plan from the PDR Plan Producer

3.Y2.3 Referenced Standards

DICOM 2021c Edition. PS 3.3: RT Modules, PS 3.4: Storage Service Class.

3.Y2.4 Messages

3.Y2.4.1 PDR Plan Storage

3.Y2.4.1.1 Trigger Events

The PDR Plan Producer transfers the plan to a storage or PDR Plan Consumer once the plan is created and the dose calculation is finished.

3.Y2.4.1.2 Message Semantics

The PDR Plan Producer may create a new series containing the plan or may use an existing series, where previous plan(s) are contained.

The study where the series of the plan is contained shall be the same study as the one containing the structure set referenced in the plan.

The requirements for the content of the RT Plan are specified in section 7.3.2.1.3.

3.Y2.4.1.3 Expected Actions

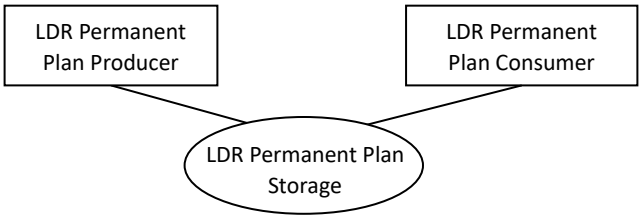
The PDR Plan Consumer stores the RT Plan and its RT Structure Set.

3.Y3 Store LDR Permanent Plan [TPPC-Brachy-03]

3.Y3.1 Scope

In the Store LDR Permanent Plan transaction, a Producer of an RT Plan that incorporates the brachytherapy technique identified in Store LDR Permanent Plan [TPPC-Brachy-03] Store LDR Permanent Plan stores the plan to an LDR Permanent Plan Consumer. In this example, we diagram a DICOM C-Store, but other forms of transmission are acceptable for this content profile.

3.Y3.2 Actor Roles



Actor:	LDR Permanent Plan Producer
Role:	Creates an LDR Permanent plan for a treatment that shall be delivered using a treatment delivery system and stores it to an LDR Permanent Plan consumer
Actor:	LDR Permanent Plan Consumer
Role:	Accepts and stores the RT Plan from the LDR Permanent Plan Producer

3.Y3.3 Referenced Standards

DICOM 2021c Edition. PS 3.3: RT Modules, PS 3.4: Storage Service Class.

3.Y3.4 Messages

3.Y3.4.1 LDR Permanent Plan Storage

3.Y3.4.1.1 Trigger Events

The LDR Permanent Plan Producer transfers the plan to a storage or LDR Permanent Plan Consumer once the plan is created and the dose calculation is finished.

3.Y3.4.1.2 Message Semantics

The LDR Permanent Plan Producer may create a new series containing the plan or may use an existing series, where previous plan(s) are contained.

The study where the series of the plan is contained shall be the same study as the one containing the structure set referenced in the plan.

The requirements for the content of the RT Plan are specified in section 7.3.2.1.3.

3.Y3.4.1.3 Expected Actions

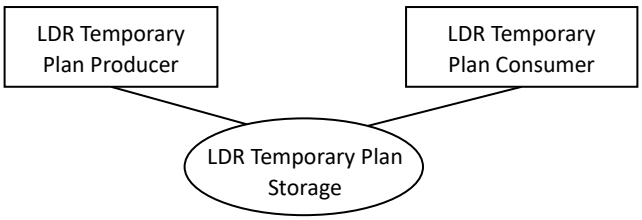
The LDR Permanent Plan Consumer stores the RT Plan.

3.Y4 Store LDR Temporary Plan [TPPC-Brachy-04]

3.Y4.1 Scope

In the Store LDR Temporary Plan transaction, a Producer of an RT Plan that incorporates the brachytherapy technique identified in Store LDR Temporary Plan [TPPC-Brachy-04] Store LDR Temporary Plan stores the plan to an LDR Temporary Plan Consumer. In this example, we diagram a DICOM C-Store, but other forms of transmission are acceptable for this content profile.

3.Y4.2 Actor Roles



Actor:	LDR Temporary Plan Producer
Role:	Creates an LDR Temporary plan for a treatment that shall be delivered using a treatment delivery system and stores it to an LDR Temporary Plan Consumer

Actor:	LDR Temporary Plan Consumer
Role:	Accepts and stores the RT Plan from the LDR Temporary Plan Producer

3.Y4.3 Referenced Standards

DICOM 2021c Edition. PS 3.3: RT Modules, PS 3.4: Storage Service Class.

3.Y4.4 Messages

3.Y4.4.1 LDR Temporary Plan Storage

3.Y4.4.1.1 Trigger Events

The LDR Temporary Plan Producer transfers the plan to a storage or LDR Temporary Plan Consumer once the plan is created and the dose calculation is finished.

3.Y4.4.1.2 Message Semantics

The LDR Temporary Plan Producer may create a new series containing the plan or may use an existing series, where previous plan(s) are contained.

The study where the series of the plan is contained shall be the same study as the one containing the structure set referenced in the plan.

The requirements for the content of the RT Plan are specified in section 7.3.2.1.3.

3.Y4.4.1.3 Expected Actions

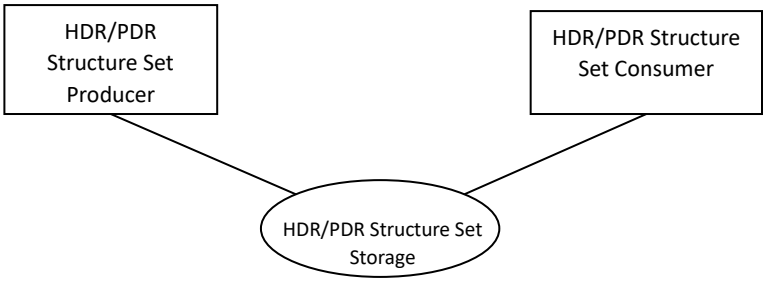
The LDR Temporary Plan Consumer stores the RT Plan.

3.Y5 Store HDR/PDR Structure Set [TPPC-Brachy-05]

3.Y5.1 Scope

In the Store HDR/PDR Structure Set transaction for Brachy, a producer of a Structure Set that incorporates the contours identified as necessary for an HDR or PDR treatment plan, stores the structure set to an HDR/PDR Structure Set Consumer.

3.Y5.2 Actor Roles



Actor:	HDR/PDR Structure Set Producer
Role:	Creates an HDR/PDR Structure Set and stores it to an HDR/PDR Structure Set Consumer
Actor:	HDR/PDR Structure Set Consumer
Role:	Accepts and stores the HDR/PDR Structure Set from the HDR/PDR Structure Set Producer

3.Y5.3 Referenced Standards

DICOM 2021c Edition. PS 3.3: RT Modules, PS 3.4: Storage Service Class.

3.Y5.4 Messages

3.Y5.4.1 HDR/PDR Structure Set Storage

3.Y5.4.1.1 Trigger Events

The HDR/PDR Structure Set Producer transfers the structure set to an HDR/PDR Structure Set Consumer once the HDR or PDR plan is created.

3.Y5.4.1.2 Message Semantics

The HDR/PDR Structure Set Producer may create a new series containing the structure set or may use an existing series, where previous structure set(s) are contained.

The requirements for the content of the RT Structure Set and RT Plan are specified in section 7.3.4.1.3 RT Structure Set for Brachytherapy.

3.Y5.4.1.3 Expected Actions

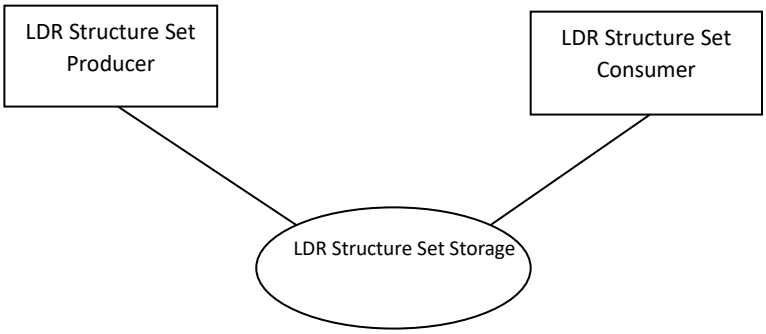
The HDR/PDR Structure Set Consumer stores the RT Structure Set.

3.Y6 Store LDR Structure Set [TPPC-Brachy-06]

3.Y6.1 Scope

In the Store LDR Structure Set transaction for Brachy, a producer of a Structure Set that incorporates the contours identified as necessary for an LDR Permanent or LDR Temporary treatment plan, stores the structure set to an LDR Structure Set Consumer.

3.Y6.2 Actor Roles



Actor:	LDR Structure Set Producer
Role:	Creates an LDR Structure Set and stores it to an LDR Structure Set Consumer
Actor:	LDR Structure Set Consumer
Role:	Accepts and stores the LDR Structure Set from the LDR Structure Set Producer

3.Y6.3 Referenced Standards

DICOM 2021c Edition. PS 3.3: RT Modules, PS 3.4: Storage Service Class.

3.Y6.4 Messages

3.Y6.4.1 LDR Structure Set Storage

3.Y6.4.1.1 Trigger Events

The LDR Structure Set Producer transfers the structure set to an LDR Structure Set Consumer once the LDR plan is created.

3.Y6.4.1.2 Message Semantics

The LDR Structure Set Producer may create a new series containing the structure set or may use an existing series, where previous structure set(s) are contained.

The requirements for the content of the RT Structure Set and RT Plan are specified in section 7.3.4.1.3 RT Structure Set for Brachytherapy.

3.Y6.4.1.3 Expected Actions

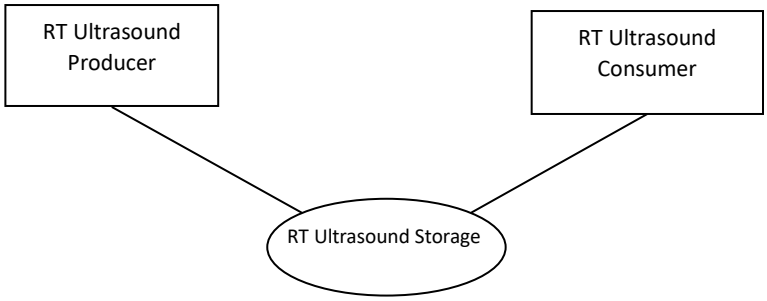
The LDR Structure Set Consumer stores the RT Structure Set.

3.Y7 LDR Store RT Ultrasound [TPPC-Brachy-07]

3.Y7.1 Scope

In the Store RT Ultrasound transaction for Brachy, a Producer of an RT Ultrasound set of images that incorporates the image plane details identified as necessary for an RT Ultrasound plan, stores the RT Ultrasound image series to an RT Ultrasound Consumer.

3.Y7.2 Actor Roles



Actor:	RT Ultrasound Producer
Role:	Creates an RT Ultrasound series of images and stores it to an RT Ultrasound Consumer
Actor:	RT Ultrasound Consumer
Role:	Accepts and stores an RT Ultrasound series from an RT Ultrasound Producer

3.Y7.3 Referenced Standards

DICOM 2021c Edition. PS 3.3: RT Modules, PS 3.4: Storage Service Class.

3.Y7.4 Messages

3.Y7.4.1 LDR Structure Set Storage

3.Y7.4.1.1 Trigger Events

The RT Ultrasound Producer transfers the RT Ultrasound images series to an RT Ultrasound Consumer once the image set is created

3.Y7.4.1.2 Message Semantics

The RT Ultrasound Producer will create a new series containing the images.

The requirements for the content of the RT Ultrasound images are specified in section 7.4.6.3 RT Ultrasound Image for Brachytherapy.

3.Y7.4.1.3 Expected Actions

The RT Ultrasound Consumer stores the RT Ultrasound images.

Appendices to Volume 2

None

Volume 3 – Content Modules

5 IHE Namespaces, Concept Domains and Vocabularies

Add to Section 5 IHE Namespaces, Concept Domains and Vocabularies

5.1 IHE Radiation Oncology Namespaces

The RO registry of OIDs is located at: no registry

Additions to the Radiation Oncology OID Registry are:

codeSystem	codeSystemName	Description
NA		

5.2 IHE Radiation Oncology Concept Domains

For a listing of the <Domain Name> Concept Domains see *<enter location of the domains Concept Domains or NA if none>*

conceptDomain	conceptDomainName	Description
NA		

5.3 IHE Radiation Oncology Format Codes and Vocabularies

5.3.1 IHE Format Codes

*List in the table below any **new** format codes to be added to the IHE Format Codes wiki page at http://wiki.ihe.net/index.php/IHE_Format_Codes. For public comment, the additions must be listed in the table below. The domain technical committee must ensure any new codes are also added to the wiki page prior to publication for trial implementation.*

Profile	Format Code	Media Type	Template ID
NA			

5.3.2 IHEActCode Vocabulary

*List in the table below, any **new** additions to the IHEActCode Vocabulary wiki page at http://wiki.ihe.net/index.php/IHEActCode_Vocabulary. For public comment, the additions must be listed in the table below. The domain technical committee must ensure any new codes are also added to the wiki page prior to publication for trial implementation.*

Code	Description
NA	

5.3.3 IHERoleCode Vocabulary

*List in the table below any **new** additions to the IHERoleCode Vocabulary wiki page at http://wiki.ihe.net/index.php/IHERoleCode_Vocabulary. For public comment, the additions must be listed in the table below. The domain technical committee must ensure any new codes are also added to the wiki page prior to publication for trial implementation.*

Code	Description
NA	

6 Radiation Oncology HL7 V3 CDA Content Modules

No HL7 V3 CDA Content Modules defined.

7 Radiation Oncology DICOM Content Definitions

DICOM Content Definitions constrain the use of instances of specific DICOM IODs (also referred to as DICOM objects). This typically means placing requirements on the creators of those instances, although requirements may also be placed on the receivers and users.

The most common such requirements are to:

- Make a module that is optional (U) in a DICOM IOD be required or conditional,
- Make an attribute that is optional (Type 3) in a DICOM Module be required or conditional,
- Require that an attribute that is optional (Type 3) in a DICOM Module be absent
- Constrain the content of an attribute to be empty
- Constrain the content of an attribute to be populated in a certain way, such as:
  - Constraining the value to be taken from a specific table
  - Constraining the value to be copied from a specific source
  - Constraining the value to encode certain information
- Require that an attribute be displayed/accessible to the operator

Reiterating DICOM requirements is kept to a minimum sufficient to provide context for the IHE requirements. Implementers are still required to be familiar with, and conform to, the underlying DICOM specification.

Content Definitions may be referenced from a Profile independent of transactions to constrain content without specifying the transport. Content Definitions may also be referenced from within a transaction specification to constrain the content without duplicating the same constraint text across multiple related transactions.

For attributes that are optional, the creator is permitted but not required to include them, and the receiver is permitted but not required to ignore them.

7.1 Conventions

Key to IHE-RO Column of requirements

- R+ = The requirement is an IHE extension of the DICOM requirements and needs to be displayed (note: when consumed!, not produced)
- R* = The attribute is required to be there but not required to be displayed
- R+* = The Requirement is an IHE extension of the DICOM requirements, but it is NOT required to be displayed
- O+ = The attribute is optional but if there, it must be displayed.

- -* = The DICOM usage applies but the value does not need to be displayed

7.3.2 Plan IODs

7.3.2.1.3 RT Plan for Brachytherapy

7.3.2.1.3.1 Referenced Standards

DICOM 2021c Edition. PS 3.3

7.3.2.1.3.2 IOD Definition

IE	Module	Reference	Usage	IHE-RO Usage
Patient	Patient	C.7.1.1	M	R See RO TF-3: 7.4.1.1.1 (Base Content)
	Clinical Trial Subject	C.7.1.3	U	U
Study	General Study	C.7.2.1	M	R See RO TF-3: 7.4.1.2.1 (Base Content)
	Patient Study	C.7.2.2	U	U
	Clinical Trial Study	C.7.2.3	U	U
Series	RT Series	C.8.8.1	M	R See RO TF-3: 7.4.1.4.1 (Base Content)
	Clinical Trial Series	C.7.3.2	U	U
Frame of Reference	Frame of Reference	C.7.4.1	U	R See RO TF-3: 7.4.1.7.1 (Base Content)
Equipment	General Equipment	C.7.5.1	M	R See RO TF-3: 7.4.1.5.1 (Base Content)
Plan	RT General Plan	C.8.8.9	M	R See RO TF-3: 7.4.3.1.1
	RT Prescription	C.8.8.10	U	R See RO TF-3: 7.4.3.2.1
	RT Tolerance Tables	C.8.8.11	U	
	RT Patient Setup	C.8.8.12	U	-
	RT Fraction Scheme	C.8.8.13	U	R See RO TF-3: 7.4.3.3.3
	RT Beams	C.8.8.14	C - Required if RT Fraction Scheme Module exists and Number of Beams (300A,0080) is greater than zero for one or more fraction groups	Shall not be present
	RT Brachy Application Setups	C.8.8.15	C - Required if RT Fraction Scheme Module exists and Number of Brachy Application Setups (300A,00A0) is greater than zero for one or more fraction groups	R See relevant section for the type of plan being generated: • HDR and PDR Section 7.4.4.6.1 • LDR Permanent Section 7.4.4.6.2 • LDR Temporary Section 7.4.4.6.3
	Approval	C.8.8.16	U	R

IE	Module	Reference	Usage	IHE-RO Usage
	SOP Common	C.12.1	M	R See RO TF-3: 7.4.1.6.1

7.3.3 Image IODs

7.3.3.3 US Image

IE	Module	Reference	Usage	IHE-RO Usage
Patient	Patient	C.7.1.1	M	-
	Clinical Trial Subject	C.7.1.3	U	-
Study	General Study	C.7.2.1	M	-
	Patient Study	C.7.2.2	U	-
	Clinical Trial Study	C.7.2.3	U	-
Series	General Series	C.7.3.1	M	-
	Clinical Trial Series	C.7.3.2	U	-
Frame of Reference	Frame of Reference	C.7.4.1	U	R
	Synchronization	C.7.4.2	U	-
Equipment	General Equipment	C.7.5.1	M	-
Image	General Image	C.7.6.1	M	-
	Image Plane Module	C.7.6.2	Not used in regular US image	R Added module for IHE RO planning use. See Section 7.4.6.3.4
	General Reference	C.12.4	U	-
	Image Pixel	C.7.6.3	M	-
	Contrast/Bolus	C.7.6.4	C - Required if contrast media was used in this image	-
	Palette Color Lookup Table	C.7.9	C - Required if Photometric Interpretation (0028,0004) has a value of PALETTE COLOR	R* Shall not be used
	Device	C.7.6.12	U	-

IE	Module	Reference	Usage	IHE-RO Usage
	Specimen	C.7.6.22	U	-
	US Region Calibration	C.8.5.5	U	R Shall not be present
	US Image	C.8.5.6	M	-
	Overlay Plane	C.9.2	U	-
	VOI LUT	C.11.2	U	-
	ICC Profile	C.11.15	U	-
	SOP Common	C.12.1	M	-
	Common Instance Reference	C.12.2	U	-

565 ### 7.3.4 RT Structure Set IOD

7.3.4.1.3 RT Structure Set for Brachytherapy

In the IHE-RO Usage column, the specific content required by Brachytherapy, is indicated; otherwise the Base Content is referenced. .

IE	Module	Reference	Usage	IHE-RO Usage
Patient	Patient	C.7.1.1	M	R See RO TF-3: 7.4.1.1.1 (Base Content)
	Clinical Trial Subject	C.7.1.3	U	U
Study	General Study	C.7.2.1	M	R See RO TF-3: 7.4.1.2.1 (Base Content)
	Patient Study	C.7.2.2	U	U
	Clinical Trial Study	C.7.2.3	U	U
Series	RT Series	C.8.8.1	M	R See RO TF-3: 7.4.1.4.1 (Base Content)
	Clinical Trial Series	C.7.3.2	U	U

IE	Module	Reference	Usage	IHE-RO Usage
Frame of Reference	Frame of Reference	C.7.4.1	U	R See RO TF-3: 7.4.1.7.1 (Base Content)
Equipment	General Equipment	C.7.5.1	M	R See RO TF-3: 7.4.1.5.1 (Base Content)
Structure Set	Structure Set	C.8.8.5	M	R See Section 7.4.8.3.3
	ROI Contour	C.8.8.6	M	R See Section 7.4.8.2.3
	RT ROI Observation	C.8.8.8	M	R See relevant section for the type of plan being generated • HDR/PDR Section 7.4.8.1.3 • LDR Section 7.4.8.1.4
	Approval	C.8.8.16	U	U
	SOP Common	C.12.1	M	R
	Common Instance Reference	C.12.2	U	C – Required if reference information is available

7.3.5 Dose IODs

This section is present only to convey the envisioned section numbering.

7.3.6 Treatment Record IODs

7.3.6.1 Technique Specific RT Treatment Record

This section is present only to convey the envisioned section numbering.

7.3.6.2 RT Treatment Record for General Use

This section is present only to convey the envisioned section numbering.

7.3.6.3 RT Brachy Treatment Records

7.3.6.3.1 RT Brachy Treatment Record

580 ###### 7.3.6.3.1.1 Referenced Standards

DICOM 2021c Edition. PS 3.3

7.3.6.3.1.2 IOD Definition

7.4 Module Definitions

7.4.1 General Modules

585 #### 7.4.1.3 General Series Module

7.4.1.3.4 General Series Module Brachy Content

Attribute Name	Tag	DICOM usage	IHE-RO usage	Attribute Description
Series Instance UID	(0020,000E)	1	-	
Series Date	(0008,0021)	3	R*	Shall be present
Series Time	(0008,0031)	3	R*	Shall be present
Operators' Name	(0008,1070)	3	R*	Shall be present

7.4.1.5 Equipment Module

590 ##### 7.4.1.5.1 General Equipment Module Content

7.4.1.5.1.3 General Equipment Module Brachy Content

Attribute Name	Tag	IHE-RO usage	Attribute Description
Manufacturer	(0008,0070)	R+*	IHE requires that this element be present, and should contain the manufacturer of the equipment creating the image, structure set, plan, or dose. If the equipment is storing and forwarding information, the value of this element shall be preserved. If a new plan is created from a previous plan, the manufacturer of the equipment producing the new plan shall insert their identifier in this

Attribute Name	Tag	IHE-RO usage	Attribute Description
			element. If a new structure set is created from a previous structure set, the manufacturer of the equipment producing the new structure set shall insert their identifier in this element.
Manufacturer's Model Name	(0008,1090)	R+*	If an application resamples or adds data and re-exports a series of CT or US images, or modifies an instance then this element must be present, and must contain the model name of the equipment doing the resampling or additions
Software Versions	(0018,1020)	R+*	Must be present. If images are edited, this is the Software Versions of the system that made the changes.

7.4.1.6SOP Common Module

7.4.1.6.2 SOP Common Module Brachy Content

7.4.1.6.2.1 Referenced Standards

DICOM 2021c Edition PS 3.3

7.4.1.6.2.2 Module Definition

Key to IHE-RO Column of requirements

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- R* = The attribute is required to be there but not required to be displayed
- R+* = The Requirement is an IHE extension of the DICOM requirements, but it is NOT required to be displayed
- O+ = The attribute is optional but if there, it must be displayed.
- -* = The DICOM usage applies but the value does not need to be displayed

Attribute Name	Tag	Type	IHE-RO usage	Attribute Description
Instance Creation Date	(0008,0012)		R+	Shall be present. If an image has been modified for planning purposes, the Date shall be when the modifying system created the instance.

Attribute Name	Tag	Type	IHE-RO usage	Attribute Description
Instance Creation Time	(0008,0013		R+	Shall be present. If an image has been modified for planning purposes, the Time shall be when the modifying system created the instance.
SOP Instance UID	(0008,0018)	1	R*	If an image has been modified for planning purposes, the UID shall be updated and contain the root of the manufacturer of the updated image.

7.4.3.3.3 RT Fraction Scheme Module for Brachy

Key to IHE-RO Column of requirements

- R+ = The requirement is an IHE extension of the DICOM requirements and needs to be displayed (note: when consumed!, not produced)
- R* = The attribute is required to be there but not required to be displayed
- R+* = The Requirement is an IHE extension of the DICOM requirements, but it is NOT required to be displayed
- O+ = The attribute is optional but if there, it must be displayed.
- -* = The DICOM usage applies but the value does not need to be displayed

Attribute	Tag	Presence	Specific Rules
Fraction Group Sequence	(300A,0070)	R+*	Shall have only a single item in the sequence.
> Referenced Dose Reference Sequence	(300C,0050)		
>> Referenced Dose Reference Number	(300C,0051)		
>Number of Fractions Planned	(300A,0078)	R+	
> Number of Beams	(300A,0080)	R+*	Shall be 0.
> Number of Brachy Application Setups	(300A,000A)	R+*	Shall be equal to the number of items under "Application Setup Sequence" (300A,0230)
> Referenced Brachy Application Setup Sequence	(300C,000C)	-	
>> Brachy Application Setup Dose Specification Point	(300A,00A2)	-	

Attribute	Tag	Presence	Specific Rules
>> Brachy Application Setup Dose	(300A,00A4)	R+*	If the plan contains multiple Application Setups, the sum of the Brachy Application Setup Doses represents the dose per fraction for the plan.
>>Referenced Dose Reference UID	(300A,0083)	R+*	Identifies the Dose Reference specified by Dose Reference UID (300A,0013) in the Dose Reference Sequence (300A,0010) in the RT Prescription Module which specifies the primary target for the current Application Setup. If present shall have a value that is present in the Dose Reference Sequence.

7.4.4 Plan-Related Modules in Planning

7.4.4.6 RT Brachy Application Setups

7.4.4.6.1 RT Application Setup Module for HDR Plan and PDR Plan

Key to IHE-RO Column of requirements

- R+ = The requirement is an IHE extension of the DICOM requirements and needs to be displayed (note: when consumed!, not produced)
- R* = The attribute is required to be there but not required to be displayed
- R+* = The Requirement is an IHE extension of the DICOM requirements, but it is NOT required to be displayed
- O+ = The attribute is optional but if there, it must be displayed.
- -* = The DICOM usage applies but the value does not need to be displayed

Attribute	Tag	HDR and PDR Technique		
			Presence	Specific Rules
Brachy Treatment Technique	(300A,0200)	1	R+*	Shall not be PERMANENT
Brachy Treatment Type	(300A,0202)	1	R+	Shall be HDR or PDR
Treatment Machine Sequence	(300A,0206)	1		
>Treatment Machine Name	(300A,00B2)	2	R+	Shall have a value.
>Manufacturer	(0008,0070)	3	R+*	Shall have a value.
>Institution Name	(0008,0080)	3	-	
>Institution Address	(0008,0081)	3	-	
>Institutional Department Name	(0008,1040)	3	-	

Attribute	Tag	HDR and PDR Technique		
			Presence	Specific Rules
>Manufacturer's Model Name	(0008,1090)	3	R+	Shall have a value.
>Device Serial Number	(0018,1000)	3	-	
Source Sequence	(300A,0210)	1		
>Source Number	(300A,0212)	1	-*	
>Source Serial Number	(3008,0105)	3	-	
>Source Model ID	(300A,021B)	3	-	
>Source Description	(300A,021C)	3	R+	Use this for the full model ID as it is not limited by the Source Model ID that is limited to 16 characters.
>Source Type	(300A,0214)	1	-*	
>Source Manufacturer	(300A,0216)	3	-	
>Active Source Diameter	(300A,0218)	3	-	
>Active Source Length	(300A,021A)	3	-	
>Material ID	(300A,00E1)	3	-	
>Source Encapsulation Nominal Thickness	(300A,0222)	3	-	
>Source Encapsulation Nominal Transmission	(300A,0224)	3	-	
>Source Isotope Name	(300A,0226)	1	R+	Representation of the Source shall be in the form used by SNOMED: <Element>-<number of nucleons> e.g., Iridium-192
>Source Isotope Half Life	(300A,0228)	1	-*	
>Source Strength Units	(300A,0229)	1C	R+	Shall have a value without constraint for gamma-emitting source. Measurement unit of Source Strength. Enumerated Values: AIR_KERMA_RATE Air Kerma Rate DOSE_RATE_WATER Dose Rate in Water
>Reference Air Kerma Rate	(300A,022A)	1	R+	Required if source is calibrated in Air-Kerma-Rate. If not, value shall be 0
>Source Strength	(300A,022B)	1C	R+	Source strength used to calculate the dwell times. Required if source is calibrated in Dose Rate in water. If not, attribute shall not be present.
>Source Strength Reference Date	(300A,022C)	1	-	
>Source Strength Reference Time	(300A,022E)	1	-	
Application Setup Sequence	(300A,0230)	1	R+*	Number of items shall be 1.

Attribute	Tag	HDR and PDR Technique		
			Presence	Specific Rules
>Application Setup Type	(300A,0232)	1	-*	
>Application Setup Number	(300A,0234)	1	-*	
>Application Setup Name	(300A,0236)	3	-	
>Application Setup Manufacturer	(300A,0238)	3	-	
>Template Number	(300A,0240)	3	-	
>Template Type	(300A,0242)	3	-	
>Template Name	(300A,0244)	3	-	
>Referenced Reference Image Sequence	(300C,0042)	3	-	
>Total Reference Air Kerma	(300A,0250)	1	-	
>Brachy Accessory Device Sequence	(300A,0260)	3	-	
>>Brachy Accessory Device Number	(300A,0262)	2	-	
>>Brachy Accessory Device ID	(300A,0263)	2	-	
>>Brachy Accessory Device Type	(300A,0264)	1		
>>Brachy Accessory Device Name	(300A,0266)	3	-	
>>Material ID	(300A,00E1)	3	-	
>>Brachy Accessory Device Nominal Thickness	(300A,026A)	3	-	
>>Brachy Accessory Device Nominal Transmission	(300A,026C)	3	-	
>Channel Sequence	(300A,0280)	1	-*	
>>Referenced ROI Number	(3006,0084)	2	R+*	Shall be present in order to reproduce the channel of the applicator. RT ROI Interpreted Type (3006,00A4) for the referenced ROI shall be BRACHY_CHANNEL
>>Channel Effective Length	(300A,0271)	3	R+	Shall be present to correctly specify the distance between connector on the afterloader and the center of the distal-most possible position of the source.
>>Channel Inner Length	(300A,0272)	2C	R+	Shall be present to correctly specify the distance between connector on afterloader and the end of the channel.

Attribute	Tag	HDR and PDR Technique		
			Presence	Specific Rules
>>Afterloader Channel ID	(300A,0273)	2C	R+	Shall be present to correctly identify the channel connection on the afterloader.
>>Channel Number	(300A,0282)	1	-*	
>>Channel Length	(300A,0284)	2	-	
>>Channel Total Time	(300A,0286)	1	-	
>>Source Movement Type	(300A,0288)	1	-*	
>>Number of Pulses	(300A,028A)	1C	-	
>>Pulse Repetition Interval	(300A,028C)	1C	-	
>>Source Applicator Number	(300A,0290)	3	R+	Shall be present for enabling (300A,0291) for channel mapping
>>Source Applicator ID	(300A,0291)	2C	R+	Shall be present in the plan for correct channel mapping
>>Source Applicator Type	(300A,0292)	1C	-*	Required if Source Applicator number is present FLEXIBLE or RIGID
>>Source Applicator Name	(300A,0294)	3	-	
>>Source Applicator Length	(300A,0296)	1C	-	
>>>Source Applicator Tip Length	(300A,0274)	2C	R+	Shall be present to specify the distance between the outer tip of the applicator and the center of the distal-most possible position of the source.
>>Source Applicator Manufacturer	(300A,0298)	3	-	
>>Material ID	(300A,00E1)	3	-	
>>Source Applicator Wall Nominal Thickness	(300A,029C)	3	-	
>>Source Applicator Wall Nominal Transmission	(300A,029E)	3	-	
>>Source Applicator Step Size	(300A,02A0)	1C	-	
>>Applicator Shape Referenced ROI Number	(300A,02A1)	3	O+*	If present, the RT ROI Interpreted Type (3006,00A4) for the referenced ROI shall be BRACHY_SRC_APP

Attribute	Tag	HDR and PDR Technique		
			Presence	Specific Rules
>>Referenced ROI Number	(3006,0084)	2C	R+*	Shall be present in order to reproduce the channel of the applicator. RT ROI Interpreted Type (3006,00A4) for the referenced ROI shall be BRACHY_CHANNEL
>>Transfer Tube Number	(300A,02A2)	2	-*	
>>Transfer Tube Length	(300A,02A4)	2C	-*	
>>Channel Shield Sequence	(300A,02B0)	3	-	
>>>Channel Shield Number	(300A,02B2)	1		
>>>Channel Shield ID	(300A,02B3)	2	-	
>>>Channel Shield Name	(300A,02B4)	3	-	
>>>Material ID	(300A,00E1)	3	-	
>>>Channel Shield Nominal Thickness	(300A,02B8)	3	-	
>>>Channel Shield Nominal Transmission	(300A,02BA)	3	-	
>>>Referenced ROI Number	(3006,0084)	2	-	
>>Referenced Source Number	(300C,000E)	1		
>>Number of Control Points	(300A,0110)	1		
>>Final Cumulative Time Weight	(300A,02C8)	1C	R+	As described in section X.1.1, display the final dwell time value
>>Brachy Control Point Sequence	(300A,02D0)	1	-	
>>>Control Point Index	(300A,0112)	1	-	
>>>Cumulative Time Weight	(300A,02D6)	2	R+	As described in section X.1.1, display the dwell time spent at each location
>>>Control Point Relative Position	(300A,02D2)	1	-	
>>>Control Point 3D Position	(300A,02D4)	3	R+*	If present it has to be consistent with the related information in the structure. The structure is defined by the Referenced ROI Number (3006,0084).
>>>Control Point Orientation	(300A,0412)	3	R+*	Shall be consistent with the related information in the structure. The structure is defined by the Referenced ROI Number (3006,0084)
>>>Brachy Referenced Dose Reference Sequence	(300C,0055)	3	R+	Mandatory for the last Control Point, see DICOM PS 3.3 C.8.8.15.11. See Note 1 for display requirement.
>>>>Referenced Dose Reference Number	(300C,0051)	1	-	

Attribute	Tag	HDR and PDR Technique		
			Presence	Specific Rules
>>>>Cumulative Dose Reference Coefficient	(300A,010C)	1	-	

Note 1: As a minimum, the dose contribution from each Channel and all Channels to all Dose References shall be displayed.

7.4.4.6.2 RT Application Setup Module for LDR Permanent Plan

Key to IHE-RO Column of requirements

- R+ = The requirement is an IHE extension of the DICOM requirements and needs to be displayed (note: when consumed!, not produced)
- R* = The attribute is required to be there but not required to be displayed
- R+* = The Requirement is an IHE extension of the DICOM requirements, but it is NOT required to be displayed
- O+ = The attribute is optional but if there, it must be displayed.
- -* = The DICOM usage applies but the value does not need to be displayed.

Attribute	Tag	LDR Permanent Technique		
			Presence	Specific Rules
Brachy Treatment Technique	(300A,0200)	1	R+*	Shall be PERMANENT
Brachy Treatment Type	(300A,0202)	1	R+*	Shall be LDR
Treatment Machine Sequence	(300A,0206)	1	-	
Source Sequence	(300A,0210)	1		
>Source Number	(300A,0212)	1	-*	
>Source Serial Number	(3008,0105)	3	-	
>Source Model ID	(300A,021B)	3	-	
>Source Description	(300A,021C)	3	R+	Use this for the full Model ID
>Source Type	(300A,0214)	1	-*	
>Source Manufacturer	(300A,0216)	3	-	
>Active Source Diameter	(300A,0218)	3	-	
>Active Source Length	(300A,021A)	3	-	
>Material ID	(300A,00E1)	3	-	
>Source Encapsulation Nominal Thickness	(300A,0222)	3	-	
>Source Encapsulation Nominal Transmission	(300A,0224)	3	-	

Attribute	Tag	LDR Permanent Technique		
			Presence	Specific Rules
>Source Isotope Name	(300A,0226)	1	R+	Representation of the Source shall be in the SNOMED format : <Element>-<number of nucleons> e.g., Iridium-192
>Source Isotope Half Life	(300A,0228)	1	-*	
>Source Strength Units	(300A,0229)	1C	R+	Shall have a value without constraint for gamma-emitting source. Measurement unit of Source Strength. Enumerated Values: AIR_KERMA_RATE Air Kerma Rate DOSE_RATE_WATER Dose Rate in Water
>Reference Air Kerma Rate	(300A,022A)	1	R+	Required if source is calibrated in Air-Kerma-Rate. If not, value shall be 0
>Source Strength	(300A,022B)	1C	R+	Source strength used to calculate the dwell times. Required if source is calibrated in Dose Rate in water. If not, attribute shall not be present.
>Source Strength Reference Date	(300A,022C)	1	-	
>Source Strength Reference Time	(300A,022E)	1	-	
Application Setup Sequence	(300A,0230)	1	R+*	Number of items shall be 1.
>Application Setup Type	(300A,0232)	1	-*	
>Application Setup Number	(300A,0234)	1	-*	
>Application Setup Name	(300A,0236)	3	-	
>Application Setup Manufacturer	(300A,0238)	3	-	
>Template Number	(300A,0240)	3	-	
>Template Type	(300A,0242)	3	-	
>Template Name	(300A,0244)	3	-	
>Referenced Reference Image Sequence	(300C,0042)	3	-	
>Total Reference Air Kerma	(300A,0250)	1	-	
>Brachy Accessory Device Sequence	(300A,0260)	3	-	
>Channel Sequence	(300A,0280)	1	-*	
>>Referenced ROI Number	(3006,0084)	2C	-*	
>>Channel Effective Length	(3006,0271)	3	-	
>>Channel Inner Length	(300A,0272)	2C	-*	
>>Afterloader Channel ID	(300A,0273)	2C	-*	
>>Channel Number	(300A,0282)	1	-*	
>>Channel Length	(300A,0284)	2	-	
>>Channel Total Time	(300A,0286)	1	-*	

Attribute	Tag	LDR Permanent Technique		
			Presence	Specific Rules
>>Source Movement Type	(300A,0288)	1	R+*	Shall be FIXED
>>Number of Pulses	(300A,028A)	1C	-	
>>Pulse Repetition Interval	(300A,028C)	1C	-	
>>Source Applicator Number	(300A,0290)	3	-	
>>Source Applicator ID	(300A,0291)	2C	-	
>>Source Applicator Type	(300A,0292)	1C	-	
>>Source Applicator Name	(300A,0294)	3	-	
>>Source Applicator Length	(300A,0296)	1C	-	
>>Source Applicator Manufacturer	(300A,0298)	3	-	
>>Material ID	(300A,00E1)	3	-	
>>Source Applicator Wall Nominal Thickness	(300A,029C)	3	-	
>>Source Applicator Wall Nominal Transmission	(300A,029E)	3	-	
>>Source Applicator Step Size	(300A,02A0)	1C	-	
>>Applicator Shape Referenced ROI Number	(300A,02A1)	3	-	
>>Referenced ROI Number	(3006,0084)	2C	-	
>>Transfer Tube Number	(300A,02A2)	2	-*	
>>Transfer Tube Length	(300A,02A4)	2C	-*	
>>Channel Shield Sequence	(300A,02B0)	3	-	
>>Referenced Source Number	(300C,000E)	1	-*	
>>Number of Control Points	(300A,0110)	1	R+*	Value shall be 2
>>Final Cumulative Time Weight	(300A,02C8)	1C	-	As described in section X.1.1, display the final time value.
>>Brachy Control Point Sequence	(300A,02D0)	1	-*	
>>>Control Point Index	(300A,0112)	1	-*	
>>>Cumulative Time Weight	(300A,02D6)	2	-	As described in section X.1.1display the total time spent at each location.
>>>Control Point Relative Position	(300A,02D2)	1	-	
>>>Control Point 3D Position	(300A,02D4)	3	R+*	Shall be present.
>>>Control Point Orientation	(300A,0412)	3	R+*	Shall be present.
>>>Brachy Referenced Dose Reference Sequence	(300C,0055)	3	R+	Mandatory for the last Control Point, see DICOM PS 3.3 C.8.8.15.11. See Note 1 for display requirement.
>>>>Referenced Dose Reference Number	(300C,0051)	1	-	

Attribute	Tag	LDR Permanent Technique		
			Presence	Specific Rules
>>>>Cumulative Dose Reference Coefficient	(300A,010C)	1	-	

Note 1: As a minimum, the dose contribution from all Channels to all Dose References shall be displayed.

645 **7.4.4.6.3 RT Application Setup Module for LDR Temporary Plan**

Attribute	Tag	LDR Temporary Technique		
			Presence	Specific Rules
Brachy Treatment Technique	(300A,0200)	1		Shall not be PERMANENT
Brachy Treatment Type	(300A,0202)	1		Shall be LDR
Treatment Machine Sequence	(300A,0206)	1	-	
>Treatment Machine Name	(300A,00B2)	2	-	
>Manufacturer	(0008,0070)	3	-	
>Institution Name	(0008,0080)	3	-	
>Institution Address	(0008,0081)	3	-	
>Institutional Department Name	(0008,1040)	3	-	
>Manufacturer's Model Name	(0008,1090)	3	-	
>Device Serial Number	(0018,1000)	3	-	
Source Sequence	(300A,0210)	1		
>Source Number	(300A,0212)	1		
>Source Serial Number	(3008,0105)	3	-	
>Source Model ID	(300A,021B)	3	-	
>Source Description	(300A,021C)	3	R+	Use this for the full Model ID
>Source Type	(300A,0214)	1	-*	
>Source Manufacturer	(300A,0216)	3	-	
>Active Source Diameter	(300A,0218)	3	-	
>Active Source Length	(300A,021A)	3	-	
>Material ID	(300A,00E1)	3	-	
>Source Encapsulation Nominal Thickness	(300A,0222)	3	-	
>Source Encapsulation Nominal Transmission	(300A,0224)	3	-	
>Source Isotope Name	(300A,0226)	1	R+	Representation of the Source shall be in the SNOMED form: <Element>-<number of nucleons> e.g., Iridium-192
>Source Isotope Half Life	(300A,0228)	1	-*	

Attribute	Tag	LDR Temporary Technique		
			Presence	Specific Rules
>Source Strength Units	(300A,0229)	1C	R+	Shall have a value without constraint for gamma-emitting source. Measurement unit of Source Strength. Enumberated Values: AIR_KERMA_RATE Air Kerma Rate DOSE_RATE_WATER Dose Rate in Water
>Reference Air Kerma Rate	(300A,022A)	1	R+	Required if source is calibrated in Air-Kerma-Rate. If not, value shall be 0.
>Source Strength	(300A,022B)	1C	R+	Source strength used to calculate the dwell times. Required if source is calibrated in Dose Rate in water. If not, attribute shall not be present.
>Source Strength Reference Date	(300A,022C)	1	-	
>Source Strength Reference Time	(300A,022E)	1	-	
Application Setup Sequence	(300A,0230)	1	R+*	Number of items shall be 1.
>Application Setup Type	(300A,0232)	1	-*	
>Application Setup Number	(300A,0234)	1	-*	
>Application Setup Name	(300A,0236)	3	-	
>Application Setup Manufacturer	(300A,0238)	3	-	
>Template Number	(300A,0240)	3	-	
>Template Type	(300A,0242)	3	-	
>Template Name	(300A,0244)	3	-	
>Referenced Reference Image Sequence	(300C,0042)	3	-	
>Total Reference Air Kerma	(300A,0250)	1	-	
>Brachy Accessory Device Sequence	(300A,0260)	3	-	
>Channel Sequence	(300A,0280)	1	-*	
>>Referenced ROI Number	(3006,0084)	2C	-	
>>Channel Effective Length	(300A,0271)	3	-	
>>Channel Inner Length	(300A,0272)	2C	-	
>>Afterloader Channel ID	(300A,0273)	2C	-	
>>Channel Number	(300A,0282)	1	-*	
>>Channel Length	(300A,0284)	2	-	
>>Channel Total Time	(300A,0286)	1	-	Calculated Treatment Time
>>Source Movement Type	(300A,0288)	1	-*	
>>Referenced Source Number	(300C,000E)	1	-	
>>Number of Control Points	(300A,0110)	1	R*	See Open Issue #1

Attribute	Tag	LDR Temporary Technique		
			Presence	Specific Rules
>>Final Cumulative Time Weight	(300A,02C8)	1C	R+	As described in section X.1.1, display the final dwell time value.
>>Brachy Control Point Sequence	(300A,02D0)	1	-	
>>>Control Point Index	(300A,0112)	1	-*	
>>>Cumulative Time Weight	(300A,02D6)	2	R+	As described in section X.1.1display the dwell time spent at each location.
>>>Control Point Relative Position	(300A,02D2)	1	R*	
>>>Control Point 3D Position	(300A,02D4)	3	R+*	Shall be present.
>>>Control Point Orientation	(300A,0412)	3	R+*	
>>>Brachy Referenced Dose Reference Sequence	(300C,0055)	3	R+	Mandatory for the last Control Point, see DICOM PS 3.3 C.8.8.15.11. See Note 1 for display requirement.
>>>>Referenced Dose Reference Number	(300C,0051)	1	-	
>>>>Cumulative Dose Reference Coefficient	(300A,010C)	1	-	

Note 1: As a minimum, the dose contribution from each Channel and all Channels to all Dose References shall be displayed.

7.4.5 Plan-Related Modules in Delivery

7.4.5.1 RT Beams

This section is present only to convey the envisioned section numbering.

7.4.5.2 RT Tolerance Table

This section is present only to convey the envisioned section numbering.

7.4.5.3 RT Patient Setup Module

7.4.5.3.1 RT Patient Setup Module for Treatment Delivery

This section is present only to convey the envisioned section numbering.

7.4.6 Image-related Modules in Planning

7.4.6.3 RT Ultrasound Image for Brachytherapy

7.4.6.3.1 Referenced Standard

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7.4.6.3.2 Image Module Brachy Content

Attribute Name	Tag	Type	IHE-RO Usage	Attribute Description
Content Date	(0008,0023)	2C	R	Shall be present if Image Module is present in US images.
Content Time	(0008,0033)	2C	R	Shall be present if Image Module is present in US images.
…				
Photometric Interpretation	(0028,0004)	1	R*	Shall be MONOCHROME2
Bits Allocated	(0028,0100)	1	R*	Shall be 8
Bits Stored	(0028,0101)	1	R*	Shall be 8
High Bit	(0028,0102)	1	R+	Shall be 7

7.4.7 Image-related Modules in Delivery

This section is present only to convey the envisioned section numbering.

7.4.8 Segment Modules

7.4.8.1 ROI Observations Module

7.4.8.1.1 ROI Observations Base Content

This section is present only to convey the envisioned section numbering.

7.4.8.1.2 ROI Observations Base TBD

This section is present only to convey the envisioned section numbering.

7.4.8.1.3 ROI Observations In HDR/PDR Brachy

675 Multiple RT Plans may reference the same RT Structure Set instance. For brachytherapy this means that the RT Structure Set can contain brachytherapy channel contours from multiple plans.

Base content applies except where noted below.

Attribute	Tag	Type	Presence	Attribute Note
RT ROI Observations Sequence	(3006,0080)			
>RT ROI Interpreted Type	(3006,00A4)		R+*	If referenced ROI has associated contours of type CLOSED_PLANAR, the content consumer must accept at minimum the following values: EXTERNAL PTV CTV GTV TREATED_VOLUME IRRAD_VOLUME BOLUS AVOIDANCE ORGAN CONTRAST_AGENT CAVITY BRACHY_SRC_APP BRACHY_CHNL_SHLD If referenced ROI has associated contours of type POINT, the content consumer must accept at minimum the following values: MARKER REGISTRATION ISOCENTER If referenced ROI has associated contours of type OPEN_NONPLANAR, the content consumer must accept at minimum the following values: BRACHY_CHANNEL See Note 1.
>>ROI Physical Property	(3006,00B2)		R+*	Only the following shall be supported: REL_MASS_DENSITY REL_ELEC_DENSITY

680 Note 1. The ROI with value 'BRACHY_CHANNEL' as the RT ROI Interpreted Type (3006,00A4) shall contain a single item in the Contour Sequence (3006,0040) and the Number of Contour Points (3006,0046) shall be two or greater. The

points in the Contour Data (3006,0050) shall start from the distal end of the channel (the point furthest from the after-loader). See also Figure C.8.8.15-1 in DICOM standard part 3.

7.4.8.1.4 ROI Observations for LDR Permanent Brachy

No special Brachy requirements. Sources are not to be modeled as structures. Base requirements apply.

7.4.8.1.4 ROI Observations for LDR Temporary Brachy

No special Brachy requirements. Sources are not to be modeled as structures. Base requirements apply.

7.4.8.2 ROI Contour Module

7.4.8.2.1 ROI Contour Base Content

This section is present only to convey the envisioned section numbering.

7.4.8.2.2 ROI Contour Offslice

This section is present only to convey the envisioned section numbering.

7.4.8.2.3 ROI Contour In HDR/PDR Brachy

The Base content of tags apply unless superseded by the definitions below.

Attribute	Tag	Type	Attribute Note
ROI Contour Sequence	(3006,0039)		
>> Contour Geometric Type	(3006,0042)	R+*	OPEN_PLANAR shall not be used.

7.4.8.2.4 ROI Contour in LDR Brachytherapy

Base Applies; no special Brachy requirements.

7.4.8.3 RT Structure Set Module

7.4.8.3.3 RT Structure Set Module Brachy Content

The Base content of attributes apply unless superseded by the definitions below.

Attribute	Tag	Type	Attribute Note
>>>>Referenced SOP Class UID	(0008,1155)	R+*	Must be present with a value of '1.2.840.10008.5.1.4.1.1.2', (CT) or '1.2.840.10008.5.1.4.1.1.4' (MR) or '1.2.840.10008.5.1.4.1.1.6.1' (Ultrasound)

7.4.6.2 Image Plane Module

7.4.6.2.1 Image Plane Brachy Content

7.4.13.3.2.1 Referenced Standard

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7.4.6.2.2 Module Content

The Base content of tags apply unless superseded by the definitions below.

Attribute Name	Tag	Type	IHE-RO Usage	Attribute Description
Image Orientation (Patient)	(0020,0037)	1	R+*	This element shall NOT be restricted to TRANSVERSE patient orientation only. The IOP (patient) shall create a cuboid dose pattern. That is, the frame shall be square or rectangular, the normal to the IOP shall point in the same direction and be in alignment. All frames shall have the same X and Y pixel sizes and a uniform Grid Frame Offset Vector (3004,000C)

7.4.13.3 RT Dose Module

7.4.13.3.1 RT Dose Module Base Content

7.4.13.3.2 RT Dose Module Brachy Content

RT Dose Module Base Content applies unless otherwise noted below.

Attribute Name	Tag	Type	IHE-RO Usage	Attribute Description
Bits Allocated	(0028,0100)	1C	R+*	Shall be present and equal to 32
Dose Type	(3004,0004)	1	R+	Shall be **PHYSICAL**

Appendices to Volume 3

None

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4 National Extensions

Not applicable.