Integrating the Healthcare Enterprise

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IHE Radiation Oncology
Technical Framework Supplement

10
Treatment Delivery – Record Content Brachy
(TDRC-Brachy)

15
(Version 2 – Revision 17)

<The IHE Documentation Specialist will change the title to just "Draft for Public Comment" upon publication for public comment; leave "as is" until then.>

20 Owner: WG07 Brachy

Date: June 15, 2023

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Foreword

This is a supplement to the IHE Radiation Oncology Technical Framework V 1.7. Each supplement undergoes a process of public comment and trial implementation before being incorporated into the volumes of the Technical Frameworks.

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<For Public Comment:> This supplement is published on <Month XX, 201x> for Public Comment. Comments are invited and may be submitted at http://www.ihe.net/<domain>/<domain>comments.cfm. In order to be considered in development of the Trial Implementation version of the supplement, comments must be received by <Month XX, 201X>.

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<For Trial Implementation:> This supplement is published on <Month XX, 201X> for Trial Implementation and may be available for testing at subsequent IHE Connectathons. The supplement may be amended based on the results of testing. Following successful testing it will be incorporated into the <Domain Name> Technical Framework. Comments are invited and may be submitted at http://www.ihe.net/<domain>/<domain>comments.cfm.

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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:

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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.

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General information about IHE can be found at: www.ihe.net.

Information about the IHE <Domain Name> domain can be found at: http://www.ihe.net/Domains/index.cfm.

Information about the organization of IHE Technical Frameworks and Supplements and the process used to create them can be found at: http://www.ihe.net/About/process.cfm and

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http://www.ihe.net/profiles/index.cfm.

The current version of the IHE <Domain name>Technical Framework can be found at: http://www.ihe.net/Technical_Framework/index.cfm.

<Comments may be submitted on IHE Technical Framework templates any time at *http://ihe.net/ihetemplates.cfm*. Please enter comments/issues as soon as they are found. Do not wait

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until a future review cycle is announced.

Table of Contents

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Introduction to this Supplement

This profile defines the content of the treatment record being transferred from the Treatment Delivery Device, Treatment Management System or other RT Brachy Treatment Record storage or producer to an interested consumer. This content can be available as soon as patient delivery is completed, and other computation and information gathering, and formatting can be performed to support the creation of the RT Brachy Treatment Record.

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 RT objects provided in their 1st generation.

History

Date	R.	Author	Change Summary
	1.0	Milena Donato	Initial Version
2015-07-08	1.1	Milena Donato	
2015-07-10	1.2	Ulrich Busch	(without change bars to keep document readable): - Cleaned up document - Synchronized with Supplement Template - Structures Chapter 7 along the systematics in development by IHE-RO TC. Finally, all sections will be combined in the Technical Framework and therefore the section numbering must follow the general scheme. Note: At this time, I have provided a Chapter 7 template to IHE for discussion and approval. Once this is done, a final version of the section numbering will be determined and may differ. Especially I intend to increase all 7.3.<n> IOD sections by 1 and reserve 7.3.1 for 2nd Gen Prescription IODs. However, the structure will not change substantially.
2015-07-10	1.2	Milena Donato	Introduced use case #3, #4, #5
2015-08-20	1.2	Milena Donato	Updates on use case #2 and #3. Integrated updates for use case #4 and #5 from Jan-Pieter Dieter Updated content information about Control Point Orientation (300A,0412) in chapter 7.4.4.2
2015-11-25	1.3	Milena Donato	Added Issue 5
2015-12-11	1.4	Milena Donato, Ulrich Busch	Updated section numbers along stabilized Chapter 4 section repository (see IHE_RO Wiki: http://www.ihe-ro.org/doku.php)
2016-01-13	1.4	Ulrich Busch	Version includes results of: WG-07 Brachy Subgroup Tcon 2016-01-13
2016-04-21	1.5	Yury Niatsetski	Version includes results of WG-07 Brachy Subgroup Tcons 2016-03-23 and 2016-04-20
2016-05-18	1.6	Yury Niatsetski	Includes results of WG-07 Brachy Subgroup Tcon 2016-05-18: accept agreed changes to the document.

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2016-06-01	1.7	Yury Niatsetski	Results of the WG-07 Brachy Subgroup T-con 2016-06-01: addressed question marks, remained unanswered, HDR profile.
2017-05-23	1.8	John de Ridder, Rob van der Laarse, Yury Niatsetski	Adaptation to CP1657
2017-06-29	1.9	Yury Niatsetski	Accept changes, based on the WG-07 Brachy decision (24-May-2017)
2018-01-03	1.10	Yury Niatsetski	Seeds profile update after Tcon 2018-01-03
2018-02-07	1.11	Yury Niatsetski	Seeds profile update after Tcon 2018-02-07. Changes accepted, new clean version created.
2018-03-07	1.12	Ulrich Busch	X.1 BWF Actors, Transactions, and Content Modules: Actor / Transaction list setup (besides TMS) X.<n>: Some General Sections clarified – see not colored sections 3.Y1 HDR Plan Storage [BWF-01]: Finalized Chapter 7 sections: Section number synchronized with actual numbering scheme of Technical Framework <mark>Yellow Color</mark>: Parts which need to be reworked / finalized.
2018-08-31	1.13	Yury Niatsetski	Replaced temporary attributes numbers with the official ones from the latest DICOM release
2018-11-21	1.14	Ulrich Busch	Results of TCon 2018-11-21 WG-07 Brachy Subgroup: Added Issue 6, 7, 8. Added section 7.4.11.6.2 RT Brachy Session Record Module for Seed treatment (not worked out yet – see 6. Added technique-specific lookup for RT Brachy Session Record Module in 7.3.6.3.1.2 IOD Definition
2019-03-27	1.15	Yury Niatsetski	Minor changes based on the feedback from Erik Roelofs + partial filling of the table 7.4.11.6.2 (as of March 27, 2019)
2019-05-13	1.16	Yury Niatsetski	Table 7.4.11.6.2 completed after the TCon of March 27, 2019. Changes accepted, also for the table 7.4.11.6.1.
2019-05-16	1.17	Roel Zinkstok	Includes results of TCon 2019-05-15/ Removed Treatment Management System and added Brachytherapy Treatment Record Consumer to list of actors (Table X.1-1). Added sections in Volume 2 for plan storage/retrieval transactions.
2019-07-09	2.0	Roel Zinkstok	Removes everything related to treatment record; converts to TDRC-Brachy, adopting the document structure of TDRC.
2019-07-25	2.1	Jim Percy	Continued transition to TDRC format
2019-12-9	2.2	Chris Pauer	Review with IHE-RO TC
2020-02-27	2.3	Yury Niatsetski	Reviewed version 2.2, accepted changes, removed addressed comments.
2021-04-07	2.5	Jim Percy	Updates after completion of TPPC-Brachy changes.
2021-10-08	2.6	Jim Percy	Updates from Working group meeting on Oct 8, 2021
2023-04-20	2.16	Jim Percy	Updates following review by IHE-RO Technical Committee in April 2023
2023-06-15	2.17	Jim Percy	Voted to public comment at TC meeting June 15, 2023

Open Issues and Questions

#	Open Issue Description
6	2018-11-21 WG-07 Brachy Subgroup: Added LDR Treatment Record Storage [BWF-11]. No specification is yet written for the Treatment Record Storage for Seeds. It was consensus that at least a manual recording would be useful. The main purpose is recording for archiving / charge capture. The record would be written by a TPS/TMS application. Added a module definition by 7.4.11.6.2 RT Brachy Session Record Module for Seed treatment. Currently rules are a copy form HRD. They have to be revised all over the place but kept for convenience. Rebecca Park will prepare a proposal for the meeting as a starting point.
8	2018-11-21 WG-07 Brachy Subgroup: The use of DICOM Unified Worklist suggested in some use cases will not be covered in this Profile. The use case section shall state, that the use case variations using worklist are included only for illustration of the clinical environment. The Technical Committee should look into eventually integrating Brachytherapy into TDW II, since the framework is basically the same. Alternatively, a separate TDW-style profiles could be written for Brachytherapy.

Closed Issues

#	Closed Issue Description/Resolution
3	Definition of the general workflow 2015-12-10; Various use case scenarios are described in X.4.2
1	Profile name: Brachytherapy Workflow Profile. DONE: Changed to TDRC-Brachy
2	Content definition (based on different techniques)
4	Definition of the list of transactions (see Appendices A and B, X.1 Actors, Transactions …)

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General Introduction

Update the following Appendices to the General Introduction as indicated below. Note that these are not appendices to Volume 1.

Appendix A - Actor Summary Definitions

145 *Add the following actors to the IHE Technical Frameworks General Introduction list of Actors:*

Actor	Definition
Brachytherapy Treatment Record Producer	A system capable of producing a **Brachytherapy** Treatment Record.
Brachytherapy Treatment Record Consumer	A system capable of consuming a **Brachytherapy** Treatment Record.

Appendix B - Transaction Summary Definitions

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Add the following transactions to the IHE Technical Frameworks General Introduction list of Transactions:

Transaction	Definition
TDRC-BRACHY-01: HDR/PDR Treatment Record Storage	A *Brachytherapy Treatment Record Producer* stores a treatment record to a *Brachytherapy Treatment Record Consumer.*

Glossary

Add the following glossary terms to the IHE Technical Frameworks General Introduction Glossary:

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Volume 1 – Profiles

X Brachy Treatment Delivery– Record Content (TDRC-Brachy) Profile

The Brachytherapy Treatment Delivery Record Content (TDRC-Brachy) Profile specifies the
content of the RT Brachy Treatment Record being transferred from the **Brachytherapy Treatment
Record Producer** to the **Brachytherapy Treatment Record Consumer**.

This profile will ensure that the treatment record transferred from the producer will contain all
necessary information. It will especially address the following:

> 1. This profile will make the therapists' workflow easier and faster, because it incorporates all
> information needed for treatment delivery record keeping.

> 2. This will enable Therapists to concentrate more on finalizing the details of patient treatment
> rather dealing with technical issues.

> 3. Fewer uncertainties will also reduce the time physicists and therapists need to gather and
> review treatment delivery information.

TDRC-Brachy contributes to patient safety, because it will standardize the content which is reviewed
to assess if delivery of treatment was accurate to the plan. The profile will not specify how to validate
the treatment delivery parameters, but will ensure that they are available, and well-formatted. The
applications involved are Treatment Management Systems, Treatment Delivery Systems and Quality
Assurance Devices.

This profile is a content-focused profile. For further information on the context, see Section X.6
TDRC-Brachy Cross Profile Considerations

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X.1 TDRC-Brachy Actors, Transactions, and Content Modules

In figure X.1-1 is showed how this content profile is used in the exchanging of DICOM treatment
180 records 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.

Brachytherapy Treatment Record Producer	TDRC-BRACHY-01 HDR/PDR Treatment Record Storage	Brachytherapy Treatment Record Consumer
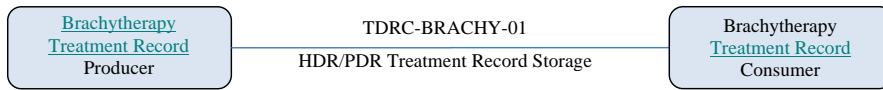
Figure X.1-1: TDRC-Brachy Actor Diagram

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Transactions Overview:

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

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

Actors	Content Modules	Optionality	Reference
Brachytherapy Treatment Record Producer	RT Brachy Treatment Record IOD	R	TDRC-Brachy-01
Brachytherapy Treatment Record Consumer	RT Brachy Treatment Record IOD	R	TDRC-Brachy-01

195 ## X.1.1 Actor Descriptions and Actor Profile Requirements

For Brachytherapy Treatment Record 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.

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"Actors shall display total times and dwell times at the reference date and time of the delivery and
not simple Control Pont Values."

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X.2 TDRC-Brachy Transaction Options

205   None

X.4 TDRC-Brachy Document Content Module

Not applicable.

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210 ## X.5 TDRC-Brachy Overview

X.5.1 Concepts

The Brachytherapy Treatment Record Content Consumer receives the RT Brachy Treatment Record from a Brachytherapy Treatment Record Content Producer, which holds the treatment record or prepares it for transmission

215 ## X.2 Use Cases

X.6 TDRC-Brachy Security Considerations

Not Applicable.

X.7 TDRC-Brachy Cross Profile Considerations

Not Applicable

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Appendices

220

Actor Definitions

Brachy Treatment Record Producer

225 A Treatment Planning System (TPS) or Treatment Control Console capable of producing a HDR/PDR treatment record.

Brachy Treatment Record Consumer

A system like a Treatment Planning System (TPS), Treatment Control Console or Treatment Management System (TMS) capable of consuming an HDR/PDR treatment record

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Transaction Summary Definitions

TDRC-BRACHY-01: Brachytherapy Treatment Record Storage

In the Treatment Record Storage, a ***Brachytherapy Treatment Record Producer*** stores a RT Brachy Treatment Record to a ***Brachytherapy Treatment Record Consumer.***

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Glossary

No new terms

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Volume 2 – Transactions

Add section 3.Y

240 ## 3.Y1 Brachy Treatment Record Storage [TDRC-Brachy 01]

3.Y1.1 Scope

In the Brachytherapy Treatment Record Storage transaction, a Producer of an RT Treatment Record that incorporates the brachytherapy technique identified in TDRC-Brachy-01: HDR/PDRTreatment Record Storage stores the plan to a Brachytherapy Treatment Record Consumer.

245   .

3.Y1.2 Actor Roles
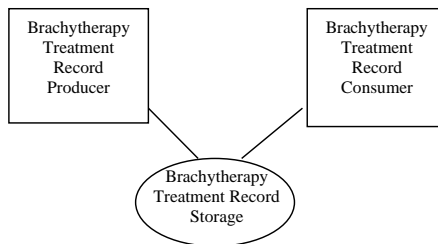
Actor:	Brachytherapy Treatment Record Producer
Role:	Creates a brachytherapy treatment record and stores it to a Brachytherapy Treatment Record Consumer.
Actor:	Brachytherapy Treatment Record Consumer
Role:	Accepts and stores the Brachytherapy Treatment Record from a Brachytherapy Treatment Record Producer

250 ### 3.Y1.3 Referenced Standards

DICOM 2023b Edition. PS 3.3: RT Modules, PS 3.4: Storage Service Class.

3.Y1.4 Interaction Diagram
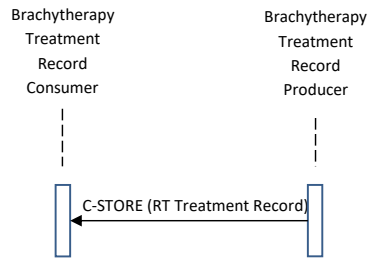
255

Volume 3 – Content Modules

5. Namespaces and Vocabularies

260 ## 6. Content Modules

No Content Modules defined.

7. DICOM Content Definition

7.1 Conventions

. Key to IHE-RO Column of requirements

265
- 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

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7.2 General Definitions

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7.3 IOD Definitions

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275 ### 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.

280 #### 7.3.6.3   RT Brachy Treatment Record

7.3.6.3.1 RT Brachy Treatment Record IOD

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7.3.6.3.1.1 Referenced Standards

DICOM 2023b Edition. PS 3.3

285 **7.3.6.3.1.2 IOD Definition**

IE	Module	Reference	Usage	IHE-RO Usage
Patient	Patient	C.7.1.1	M	M See 7.4.1.1.1
	Clinical Trial Subject	C.7.1.3	U	-
C.Study	General Study	C.7.2.1	M	M See 7.4.1.2.1
	Patient Study	C.7.2.2	U	-
	Clinical Trial Study	C.7.2.3	U	-
8Series	RT Series	C.8.8.1	M	M See 7.4.1.4.1
	Clinical Trial Series	C.7.3.2	U	-
Equipment	General Equipment	C.7.5.1	M	M See 7.4.1.5.1
Treatment Record	RT General Treatment Record	C.8.8.17	M	M See 7.4.11.2
	RT Patient Setup	C.8.8.12	U	-
	RT Treatment Machine Record	C.8.8.18	M	-
	Measured Dose Reference Record	C.8.8.19	U	- See 7.4.11.4
	Calculated Dose Reference Record	C.8.8.20	U	-
	RT Brachy Session Record	C.8.8.22	M	M Definitions see below 7.4.11.6
	RT Treatment Summary Record	C.8.8.23	U	-
	SOP Common	C.12.1	M	M See 7.4.1.6.1

7.4 Module Definitions

7.4.1 General Modules

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

290 ## 7.4.2 Workflow-Related Modules

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

7.4.11 Treatment Records

7.4.11.6 RT Brachy Treatment Record

7.4.11.6.1 Referenced Standards

295 DICOM 2023b Edition PS 3.3

7.4.11.6.2 RT Brachy Session Record Module Definition for HDR and PDR

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

300
- 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.

Table 7.4.11.6.2-1: Module Definition for HDR and PDR Treatment Record

Attribute Name	Tag	Type	IHE-RO	Attribute Description
Referenced Fraction Group Number	(300C,0022)	3	R+	Identifier of Fraction Group within referenced RT Plan.
Number of Fractions Planned	(300A,0078)	2	R+	Total number of treatments (Fractions) planned for current Fraction Group.
Brachy Treatment Technique	(300A,0200)	1	-*	No need to display. Type of brachytherapy treatment technique. Enumerated Values: **INTRALUMENARY** **INTRACAVITARY** **INTERSTITIAL** **CONTACT** **INTRAVASCULAR**
Brachy Treatment Type	(300A,0202)	1	R+	Type of brachytherapy treatment. **HDR** or **PDR** only

Attribute Name	Tag	Type	IHE-RO	Attribute Description
Recorded Source Sequence	(3008,0100)	1	-	Sequence of Sources to be used within Application Setups. One or more Items shall be included in this Sequence.
>Source Number	(300A,0212)	1	-*	Identification number of the Source. The value of Source Number (300A,0212) shall be unique within the Recorded Source Sequence (3008,0100) in which it is created.
>Source Type	(300A,0214)	1	-*	Type of Source. **POINT** **LINE** **CYLINDER** **SPHERE**
>Source Manufacturer	(300A,0216)	2	-*	Manufacturer of source.
>Source Serial Number	(3008,0105)	2	R+	
>Source Model ID	(300A,021B)	3	-*	User-supplied identifier for the radioactive source model that was used for the source in the treatment plan of which this session record is based to. See Section C.8.8.15.15.
>Source Description	(300A,021C)	3	-*	
>Source Isotope Name	(300A,0226)	1	-	
>Source Isotope Half Life	(300A,0228)	1	-*	Half-life of Isotope (days).
>Source Strength Units	(300A,0229)	1C	-	Measurement unit of Source Strength. Required if the source is not a gamma-emitting (photon) source. May be present otherwise. Enumerated Values: **AIR_KERMA_RATE** Air Kerma Rate if Source is Gamma emitting Isotope. **DOSE_RATE_WATER** Dose Rate in Water if Source is Beta emitting Isotope.
>Reference Air Kerma Rate	(300A,022A)	1	-	Air Kerma Rate in air of Isotope specified at Source Strength Reference Date (300A,022C)

Commented [PJ1]: TODO We might need a public comment open issue on these for RTRecord.

Commented [PJ2R1]: DICOM is in days

Attribute Name	Tag	Type	IHE-RO	Attribute Description
				and Source Strength Reference Time (300A,022E) (in μGy h^{-1} at 1 m). Value shall be zero for non-gamma sources.
>Source Strength	(300A,022B)	1C	-	Source Strength of Isotope at Source Strength Reference Date (300A,022C) and Source Strength Reference Time (300A,022E), in units specified in Source Strength Units (300A,0229). Required if the source is not a gamma-emitting (photon) source. See Section C.8.8.15.13.
>Source Strength Reference Date	(300A,022C)	1	-	Reference date for Reference Air Kerma Rate (300A,022A) or Source Strength (300A,022B) of Isotope.
>Source Strength Reference Time	(300A,022E)	1	-	Reference time for Air Kerma Rate (300A,022A) or Source Strength (300A,022B) of Isotope.
Treatment Session Application Setup Sequence	(3008,0110)	1	-*	Sequence of Application Setups for RT Treatment Record for current RT Plan. One or more Items shall be included in this Sequence.
>Current Fraction Number	(3008,0022)	2	R	Fraction number for this application setup.
>Application Setup Type	(300A,0232)	1	-*	Type of Application Setup. Defined Terms: **FLETCHER_SUIT** **DELCLOS** **BLOEDORN** **JOSLIN_FLYNN** **CHANDIGARH** **MANCHESTER** **HENSCHKE** **NASOPHARYNGEAL** **OESOPHAGEAL** **ENDOBRONCHIAL** **SYED_NEBLETT** **ENDORECTAL** **PERINEAL**

Attribute Name	Tag	Type	IHE-RO	Attribute Description
>Referenced Brachy Application Setup Number	(300C,000C)	3	-*	References application setup specified by Application Setup Number (300A,0234) in Application Setup Sequence (300A,0230) in RT Brachy Application Setups Module within referenced RT Plan.
>Application Setup Name	(300A,0236)	3	-*	User-defined name for Application Setup.
>Application Setup Manufacturer	(300A,0238)	3	-*	Manufacturer of Application Setup.
>Template Number	(300A,0240)	3	-*	Identification number of the Template.
>Template Type	(300A,0242)	3	-*	User-defined type for Template Device.
>Template Name	(300A,0244)	3	-*	User-defined name for Template Device.
>Application Setup Check	(3008,0116)	3	-*	Results of check-wire travel through all channels of current Application Setup. Enumerated Values: **PASSED** Passed check **FAILED** Failed check **UNKNOWN** Unknown status
>Referenced Verification Image Sequence	(300C,0040)	3	-*	Sequence of verification images obtained during delivery of current beam. One or more Items are permitted in this Sequence. See Note 1
>>*Include Table 10-11 "SOP Instance Reference Macro Attributes"*				
>Total Reference Air Kerma	(300A,0250)	1	-	Total Reference Air Kerma for current Application Setup, i.e., the sum of the products of the Air Kerma Rates of each Source in each Channel with its respective Channel Time (µGy at 1 m). Value shall be zero for non-gamma sources.
>Referenced Calculated Dose Reference Sequence	(3008,0090)	3	R*	Sequence of doses estimated for each treatment delivery. One or more Items are permitted in this Sequence.
>>Referenced Dose Reference Number	(300C,0051)	1	⊢	Uniquely identifies Dose Reference specified by Dose Reference Number (300A,0012) in

Commented [PJ3]: TODO WG This was * but it should be there along with the Dose value since this is required to be shown.

Commented [PJ4R3]: You would have to pull the description from the plan. Changing back to *

Attribute Name	Tag	Type	IHE-RO	Attribute Description
				Dose Reference Sequence (300A,0010) in RT Prescription Module of referenced RT Plan. Required if Referenced Calculated Dose Reference Number (3008,0092) is not present. It shall not be present otherwise.
>>Referenced Calculated Dose Reference Number	(3008,0092)	1C	-*	Uniquely identifies Calculated Dose Reference specified by Calculated Dose Reference Number (3008,0072) within Calculated Dose Reference Sequence (3008,0070). Required if Referenced Dose Reference Number (300C,0051) is not present. It shall not be present otherwise.
>>Calculated Dose Reference Dose Value	(3008,0076)	1	-	Calculated Dose (Gy).
>Current Fraction Number	(3008,0022)	2	R	
>Treatment Delivery Type	(300A,00CE)	2	R	Delivery Type of treatment. Defined Terms: **TREATMENT** normal patient treatment **CONTINUATION** continuation of interrupted treatment
>Treatment Termination Status	(3008,002A)	1	R	Conditions under which treatment was terminated. Enumerated Values: **NORMAL** treatment terminated normally **OPERATOR** operator terminated treatment **MACHINE** machine terminated treatment for other than NORMAL condition **UNKNOWN** status at termination unknown
>RT Treatment Termination Reason Code Sequence	(300A,0715)	3	R?	Identifies the reason why the current treatment session has terminated. Expected if the Treatment Termination Status (3008,002A) is not NORMAL. One or more items are permitted in this Sequence. See Note. The system must display the Code Meaning as a minimum.
>>*Include Table 8.8-1, "Code Sequence Macro Attributes"*				*DCID 9561 "Treatment Termination Reasons"*

Commented [PJ5]: TODO TC- is this OK with you.

Commented [PJ6]: Link to CID 9561 CID 9561 Treatment Termination Reason (nema.org)

Commented [JP7R6]: add more termination reasons for channel things ect.

Commented [JP8R6]:

Commented [JP9R6]: TODO WG Brachy needs a "Obstruction" code value. Jim Percy will draft CP.

Attribute Name	Tag	Type	IHE-RO	Attribute Description
>Machine-Specific Treatment Termination Code Sequence	(300A,0716)	3	?	Machine-specific termination codes.
>>Include Table 8.8-1, "Code Sequence Macro Attributes"				No baseline CID is defined
>Treatment Termination Description	(300A,0730)	3	R	A user-readable description for an abnormal termination.
>Treatment Verification Status	(3008,002C)	2	R+*	Conditions under which treatment was verified by a verification system. Shall be VERIFIED
>Recorded Brachy Accessory Device Sequence	(3008,0120)	3	-*	Sequence of Brachy Accessory Devices associated with current Application Setup. One or more Items are permitted in this Sequence.
>>Referenced Brachy Accessory Device Number	(3008,0122)	2		Identification number of the Brachy Accessory Device. The value of Brachy Accessory Device Number (300A,0262) shall be unique within the Application Setup in which it is created.
>>Brachy Accessory Device ID	(300A,0263)	2		User or machine supplied identifier for Brachy Accessory Device.
>>Brachy Accessory Device Type	(300A,0264)	1		Type of Brachy Accessory Device. Defined Terms: **SHIELD** **DILATATION** **MOLD** **PLAQUE** **FLAB**
>>Brachy Accessory Device Name	(300A,0266)	3		User-defined name for Brachy Accessory Device.
>Recorded Channel Sequence	(3008,0130)	1	-*	Sequence of Channels for current Application Setup. One or more Items shall be included in this Sequence.
>>Channel Number	(300A,0282)	1	-*	Identification number of the Channel. The value of Channel Number (300A,0282) shall be unique within the Application Setup in which it is created.

Attribute Name	Tag	Type	IHE-RO	Attribute Description
>>Referenced Channel Number	(0074,1406)	3	-*	The channel to be delivered, specified by the value of Channel Number (300A,0282) in referenced RT Plan.
>>Channel Length	(300A,0284)	2	-*	Length of Channel (mm). See RT Plan IOD.
>>Channel Effective Length	(300A,0271)	3	R+	Length of Channel (in mm) defined as the distance between the connector on the afterloader and the center of the distal-most possible position of the source. See Section C.8.8.15.16.
>>Channel Inner Length	(300A,0272)	2C	R+	The total physical inner length of channel (in mm). Specifies the distance between the connector on the afterloader and the end of the channel. Required if Channel Effective Length (300A,0271) is present. See Section C.8.8.15.16.1.
>>Afterloader Channel ID	(300A,0273)	3	R+	Identification of the Channel connection on the afterloader. See Section C.8.8.15.16.2.
>>Specified Channel Total Time	(3008,0132)	1	-	Total amount of time in seconds, scaled for the current source delivery strength and other delivery factors, specified to be delivered at the time of treatment between the first Control Point and the final Control Point for the current Channel. In the case of resuming a partially delivered treatment, the Specified Channel Total time will only include the remainder to be treated. See Section C.8.8.22.2.
>>Delivered Channel Total Time	(3008,0134)	1	-	Total amount of time in seconds actually delivered between Control Point 0 and final Control Point of the Brachy Control Point Delivered Sequence (3008,0160) for current Channel.
>>Source Movement Type	(300A,0288)	1	-*	Type of Source movement. Defined Terms: **STEPWISE** **FIXED** **OSCILLATING**

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Attribute Name	Tag	Type	IHE-RO	Attribute Description
				UNIDIRECTIONAL
>>Specified Number of Pulses	(3008,0136)	1C	-	Number of Pulses specified per fraction for current Channel. Required if Brachy Treatment Type (300A,0202) is PDR. See Section C.8.8.22.1.
>>Delivered Number of Pulses	(3008,0138)	1C	-	Number of Pulses actually delivered per fraction for current Channel. Required if Brachy Treatment Type (300A,0202) is PDR. See Section C.8.8.22.1.
>>Specified Pulse Repetition Interval	(3008,013A)	1C	-	Pulse repetition interval (sec) specified for current Channel. Required if Brachy Treatment Type (300A,0202) is PDR. See Section C.8.8.22.1
>>Delivered Pulse Repetition Interval	(3008,013C)	1C	-	Pulse repetition interval (sec) actually delivered for current Channel. Required if Brachy Treatment Type (300A,0202) is PDR. See Section C.8.8.22.1.
>>Referenced Measured Dose Reference Sequence	(3008,0080)	3	-*	Sequence of doses measured during treatment delivery, summed over entire session. One or more Items are permitted in this Sequence.
>>>Referenced Dose Reference Number	(300C,0051)	1C		Uniquely references Dose Reference specified by Dose Reference Number (300A,0012) in Dose Reference Sequence (300A,0010) in RT Prescription Module of referenced RT Plan. Required if Referenced Measured Dose Reference Number (3008,0082) is not present. It shall not be present otherwise.
>>>Referenced Measured Dose Reference Number	(3008,0082)	1C		References Measured Dose Reference specified by Measured Dose Reference Number (3008,0064) in Measured Dose Reference Sequence (3008,0010). Required if Referenced Dose Reference Number (300C,0051) is not present. It shall not be present otherwise.
>>>Measured Dose Value	(3008,0016)	1	-	Measured Dose.
>>Referenced Calculated Dose Reference Sequence	(3008,0090)	3	-*	

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Attribute Name	Tag	Type	IHE-RO	Attribute Description
>>>Referenced Dose Reference Number	(300C,0051)	1C	-*	Uniquely identifies Dose Reference specified by Dose Reference Number (300A,0012) in Dose Reference Sequence (300A,0010) in RT Prescription Module of referenced RT Plan. Required if Referenced Calculated Dose Reference Number (3008,0092) is not present. It shall not be present otherwise.
>>>Referenced Calculated Dose Reference Number	(3008,0092)	1C	-*	Uniquely identifies Calculated Dose Reference specified by Calculated Dose Reference Number (3008,0072) within Calculated Dose Reference Sequence (3008,0070). Required if Referenced Dose Reference Number (300C,0051) is not present. It shall not be present otherwise.
>>>Calculated Dose Reference Dose Value	(3008,0076)	1	-*	Calculated Dose (Gy).
>>Recorded Source Applicator Sequence	(3008,0140)	3	R+*	Only one entry in the sequence
>>>Referenced Source Applicator Number	(3008,0142)	2	R+*	Identification number of the Source Applicator. The value of Source Applicator Number (300A,0290) shall be unique within the Channel in which it is created.
>>>Source Applicator ID	(300A,0291)	2	R+	User or machine supplied identifier for Source Applicator.
>>>Source Applicator Type	(300A,0292)	1	-*	Type of Source Applicator. Defined Terms: **FLEXIBLE** **RIGID**
>>>Source Applicator Name	(300A,0294)	3	-*	User-defined name for Source Applicator.
>>>Source Applicator Length	(300A,0296)	1	-*	Length of Source Applicator (mm), defined as the distance between the connector of the applicator and the distal-most position of the source.
>>>Source Applicator Tip Length	(300A,0274)	2C	R*	Length of Source Applicator Tip (in mm), defined as the distance between the outer tip of the applicator and the center of the distal-most possible position of the source. Required if Channel Effective Length (300A,0271) is present. See Section C.8.8.15.16.

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Attribute Name	Tag	Type	IHE-RO	Attribute Description
>>>Source Applicator Manufacturer	(300A,0298)	3	-*	Manufacturer of Source Applicator.
>>>Source Applicator Step Size	(300A,02A0)	1C	-	Distance of path along channel (mm) between adjacent (potential) dwell positions. Required if Source Movement Type (300A,0288) is STEPWISE.
>>Transfer Tube Number	(300A,02A2)	2	-*	Identification number of the Transfer Tube. The value of Transfer Tube Number (300A,02A2) shall be unique within the Channel in which it is created.
>>Transfer Tube Length	(300A,02A4)	2C	-*	Length of Transfer Tube of current afterloading Channel (mm). Required if value Transfer Tube Number (300A,02A2) is not zero length.
>>Recorded Channel Shield Sequence	(3008,0150)	3	-*	Sequence of Channel Shields associated with current Channel. One or more Items are permitted in this Sequence. See RT Plan IOD for description of Channel Shields.
>>>Referenced Channel Shield Number	(3008,0152)	2	-*	Identification number of the Channel Shield. The value of Channel Shield Number (300A,02B2) shall be unique within the Channel in which it is created.
>>>Channel Shield ID	(300A,02B3)	2	-*	User or machine supplied identifier for Channel Shield.
>>>Channel Shield Name	(300A,02B4)	3	-*	User-defined name for Channel Shield.
>>Referenced Source Number	(300C,000E)	1	-*	Uniquely identifies the referenced Source within the Recorded Source Sequence (3008,0100) for current Application Setup.
>>Safe Position Exit Date	(3008,0162)	1C	-*	Date on which the source(s) exited the safe. Required if Recorded Channel Sequence (3008,0130) is present and Brachy Treatment Type (300A,0202) is not MANUAL or PDR.
>>Safe Position Exit Time	(3008,0164)	1C	-*	Time on which the source(s) exited the safe. Required if Recorded Channel Sequence (3008,0130) is present and Brachy Treatment Type (300A,0202) is not MANUAL or PDR.
>>Safe Position Return Date	(3008,0166)	1C	-*	Date on which the source(s) returned to the safe. Required if Recorded Channel Sequence (3008,0130) is present and Brachy Treatment Type (300A,0202) is not MANUAL or PDR.

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Attribute Name	Tag	Type	IHE-RO	Attribute Description
>>Safe Position Return Time	(3008,0168)	1C	-*	Time on which the source(s) returned to the safe. Required if Recorded Channel Sequence (3008,0130) is present and Brachy Treatment Type (300A,0202) is not MANUAL or PDR.
>>Number of Control Points	(300A,0110)	1	-*	Number of control points in Channel. For an N-segment Channel there will be 2N (stepwise movement) or N+1 (continuous movement) control points.
>>Brachy Control Point Delivered Sequence	(3008,0160)	1	-	Sequence of machine configurations describing this Channel. The number of Items in this Sequence shall equal the value of Number of Control Points (300A,0110). See RT Plan IOD and Section C.8.8.22.1 for description of Brachy Control Point Delivered Sequence.
>>>Referenced Control Point Index	(300C,00F0)	3	-	Index of current Control Point, starting at 0 for first Control Point.
>>>Treatment Control Point Date	(3008,0024)	1	-	Date when the delivery of radiation at this control point began. For the final control point this shall be the Date when the previous control point ended.
>>>Treatment Control Point Time	(3008,0025)	1	-	Time when the delivery of radiation at this control point began. For the final control point this shall be the Time when the previous control point ended. As described in section X.1.1, display the calculated dwell time spent at the treatment position defined by two control points at the same (3008, 0025) Control Point Relative Position. Also display the total dwell time for each channel (catheter).
>>>Control Point Relative Position	(300A,02D2)	1	-	Distance in mm between current Control Point Position and the center of the distal-most possible Source position in current Channel. See RT Plan IOD. Display only a single dwell position for the two matching control point locations that define a dwell location.

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Attribute Name	Tag	Type	IHE-RO	Attribute Description
>>>Override Sequence	(3008,0060)	3	-	Sequence of parameters that were overridden during the administration of the treatment immediately prior to the current control point. One or more Items are permitted in this Sequence.
>>>>Override Parameter Pointer	(3008,0062)	2	-	Contains the Data Element Tag of the Attribute that was overridden.
>>>>Operators' Name	(0008,1070)	2	-	Name of operator who authorized override.
>>>>Operator Identification Sequence	(0008,1072)	3	-	Identification of the operator who authorized override. Only a single Item is permitted in this Sequence.
>>>>>*Include Table 10-1 "Person Identification Macro Attributes Description"*				
>>>>Override Reason	(3008,0066)	3		User-defined description of reason for override of parameter specified by Override Parameter Pointer (3008,0062).
>>Pulse Specific Brachy Control Point Delivered Sequence	(3008,0171)	3	RC*	Brachy Control Point Delivered Sequence for each PDR treatment pulse. Number of Items in the Sequence shall be equal to the Delivered Number of Pulses (3008,0138). **Required if PDR**
>>>Pulse Number	(3008,0172)	1		Identification Number of this delivered Pulse. The pulse numbers for a treatment start at 1 and increase monotonically by 1. A given SOP Instance might only contain some of the pulses of the given treatment.
>>>Safe Position Exit Date	(3008,0162)	1		Date on which the source(s) exited the safe.
>>>Safe Position Exit Time	(3008,0164)	1		Time at which the source(s) exited the safe.
>>>Safe Position Return Date	(3008,0166)	1		Date on which the source(s) returned to the safe.
>>>Safe Position Return Time	(3008,0168)	1		Time at which the source(s) returned to the safe.
>>>Brachy Pulse Control Point Delivered Sequence	(3008,0173)	1		List of control points for this pulse. See Section C.8.8.22.1.

Attribute Name	Tag	Type	IHE-RO	Attribute Description
>>>>Referenced Control Point Index	(300C,00F0)	3		Index of current Control Point, starting at 0 for first Control Point in this Sequence.
>>>>Treatment Control Point Date	(3008,0024)	1		Date when the delivery of radiation at this control point began. For the final control point, this shall be the Date when the previous control point ended.
>>>>Treatment Control Point Time	(3008,0025)	1		Time when the delivery of radiation at this control point began. As described in section X.1.1, display the calculated dwell time spent at the treatment position defined by two control points at the same (3008, 0025) Control Point Relative Position. For the final control point, this shall be the Time when the previous control point ended. Also display the total dwell time for each channel (catheter).
>>>>Control Point Relative Position	(300A,02D2)	1		Distance in mm between current Control Point Position and the center of the distal-most possible Source position in current Channel. Display only a single dwell position for the two matching control point locations that define a dwell location. See Section C.8.8.15.9.
>>>>Override Sequence	(3008,0060)	3		Parameters which were overridden during the administration of the treatment immediately prior to the current control point. One or more Items are permitted in this Sequence.
>>>>>Override Parameter Pointer	(3008,0062)	2		Data Element Tag of the Attribute that was overridden.
>>>>>Operators' Name	(0008,1070)	2		Name of operator who authorized override.
>>>>>Operator Identification Sequence	(0008,1072)	3		Identification of the operator who authorized override. Only a single Item is permitted in this Sequence.
>>>>>>Include Table 10-1 "Person Identification Macro Attributes Description"				
>>>>>Override Reason	(3008,0066)	3		User-defined description of reason for override.

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Note

305 1. The Referenced Verification Image Sequence (300C,0040) may contain either images taken specifically for verification of the brachy application setup or reference images used in place of verification images, as might be done in HDR treatment planning.

310 2. Treatment Termination Code (3008,002B) was previously included in this Module but has been retired. See <<immediately previous PS3.3 DICOM revision>>. The RT Treatment Termination Reason Code Sequence (300A,0715) and Machine-Specific Treatment Termination Code Sequence (300A,0716) should be used for machine readable codes and Treatment Termination Description (300A,0730) for human readable text respectively.

315 # Appendices

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Volume 4 – National Extensions

4 National Extensions

Not applicable.

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