

Integrating the Healthcare Enterprise



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**IHE Radiology (RAD)
Technical Framework**

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**Volume 3
IHE RAD TF-3
Cross-Transaction Specifications
and Content Specifications**

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Please verify you have the most recent version of this document, which is published [here](#).

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1 Introduction

This document, Volume 3 of the IHE Radiology (RAD) Technical Framework, defines content modules used in the Radiology profiles.

90 1.1 Introduction to IHE

Integrating the Healthcare Enterprise (IHE) is an international initiative to promote the use of standards to achieve interoperability among health information technology (HIT) systems and effective use of electronic health records (EHRs). IHE provides a forum for care providers, HIT experts and other stakeholders in several clinical and operational domains to reach consensus on standards-based solutions to critical interoperability issues.

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The primary output of IHE is system implementation guides, called IHE Profiles. IHE publishes each profile through a well-defined process of public review and trial implementation and gathers profiles that have reached final text status into an IHE Technical Framework, of which this volume is a part.

100 For more general information regarding IHE, refer to www.ihe.net. It is strongly recommended that, prior to reading this volume, the reader familiarizes themselves with the concepts defined in the [IHE Technical Frameworks General Introduction](#).

1.2 Intended Audience

The intended audience of IHE Technical Frameworks Volume 3 is:

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- IT departments of healthcare institutions
- Technical staff of vendors participating in the IHE initiative
- Experts involved in standards development

1.3 Overview of Technical Framework Volume 3

Volume 3 is comprised of several distinct sections:

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- Section 1 provides background and reference material.
- Section 2 presents the conventions used in this volume to define the content modules.
- Section 3 provides an overview of Content Modules and the terminology used.
- Section 4 lists the namespaces and identifiers defined or referenced and the vocabularies defined or referenced herein.

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- Section 5 specifies IHE Radiology options on other domain's profiles.
- Section 6 contains IHE Radiology content specifications

The appendices in Volume 3 provide clarification of technical details of the IHE data model and transactions. Code and message samples may also be stored on the IHE Google Drive. In this case, explicit links to the applicable Google Drive folder will be provided in the transaction text.

120 Due to the length of the document, some domains may divide Volume 3 into smaller volumes labeled 3a, 3b, etc. In this case, the Volume 3 appendices are gathered in Volume 3x.

For a brief overview of additional Technical Framework Volumes (TF-1, TF-2, TF-4), please see the IHE Technical Frameworks General Introduction, [Section 5 - Structure of the IHE Technical Frameworks](#).

125 **1.4 Comment Process**

IHE International welcomes comments on this document and the IHE initiative. Comments on the IHE initiative can be submitted by sending an email to the co-chairs and secretary of the Radiology domain committees at radiology@ihe.net. Comments on this document can be submitted at https://www.ihe.net/Radiology_Public_Comments.

130 **1.5 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.

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1.6 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.

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1.7 Disclaimer Regarding Patent Rights

Attention is called to the possibility that implementation of the specifications in this document may require use of subject matter covered by patent rights. By publication of this document, no position is taken with respect to the existence or validity of any patent rights in connection therewith. IHE International is not responsible for identifying Necessary Patent Claims for which a license may be required, for conducting inquiries into the legal validity or scope of Patents Claims or determining whether any licensing terms or conditions provided in connection with submission of a Letter of Assurance, if any, or in any licensing agreements are reasonable or non-discriminatory. Users of the specifications in this document are expressly advised that determination of the validity of any patent rights, and the risk of infringement of such rights, is entirely their own responsibility. Further information about the IHE International patent disclosure process including links to forms for making disclosures is available at

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http://www.ihe.net/Patent_Disclosure_Process. Please address questions about the patent disclosure process to the secretary of the IHE International Board: secretary@ihe.net.

155 1.8 History of Document Changes

This section provides a brief summary of changes and additions to this version of the IHE Radiology Technical Framework.

Date	Document Revision	Change Summary
2020-09-18	19.0	Integrate Scheduled Workflow.b as a Final Text profile. Integrate the DBT Extensions Supplement into Final Text. Incorporate Change Proposals from 2019 CP Ballots. Refer to the IHE RAD CP Tracking Sheet for details. Update TF Volumes to move all transaction definitions to Volume 2 and align Volume 3 with the current template, where feasible.
2022-03-10	20.0	Integrate Management of Radiology Report Templates (MRRT) as a Final Text profile. Incorporate Change Proposals from 2020-2021 CP Ballots. Refer to the IHE RAD CP Tracking Sheet for details.
2023-06	21.0	Integrate Radiation Exposure Monitoring for Nuclear Medicine (REM-NM) as a Final Text profile Incorporate Change Proposals from CP Ballot 2023A and CP-RAD-460. Refer to the IHE RAD CP Tracking Sheet and IHE Radiology's Incorporated CPs for details.
2024-06	22.0	Integrate Web-based Image Capture (WIC) as a Final Text Profile. Incorporate CP-RAD-524. Refer to IHE Radiology's Incorporated CPs for details.

2 Conventions

160 This document has adopted the following conventions for representing the framework concepts and specifying how the standards upon which the IHE Technical Framework is based shall be applied.

2.1 Content Module Modeling and Profiling Conventions

165 In order to maintain consistent documentation, modeling methods for IHE content modules and profiling conventions, for frequently used standards, are maintained as [Appendix E](#) to the *IHE Technical Frameworks General Introduction*. Methods described include the standards conventions DICOM, HL7 v2.x, HL7 Clinical Document Architecture (CDA) Documents, etc. These conventions are critical to understanding this volume and should be reviewed prior to reading this text.

170 2.2 Additional Standards Profiling Conventions

This section defines profiling conventions for standards which are not described in the [IHE Technical Frameworks General Introduction](#).

No additional conventions.

3 Content Modules Overview and Terminology

175 In the future, an appendix to the IHE Technical Frameworks General Introduction will provide and an overview of Content Modules. In the interim, information may be available on the IHE wiki at <http://wiki.ihe.net/index.php?title=Profiles>.

4 IHE Namespaces, Concept Domains and Vocabularies

180 4.1 IHE Namespaces

The IHE registry of root OIDs is located at

http://wiki.ihe.net/index.php/OID_Registration#IHE_Domain_Namespaces

Additions to the IHE Radiology OID Registry are:

Table 4.1-1: OIDs for IHE Radiology Profiles

Profile	code	codingScheme	Description	Reference
The Clinical Decision Support – Order Appropriateness Tracking TI Supplement adds codes to this table.				
The Cross-Enterprise Remote Reading Workflow Definition TI Supplement adds codes to this table.				

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4.2 IHE Radiology Concept Domains

Reserved for future use.

conceptDomain	conceptDomainName	Description
<oid or uid>	<code system name>	<short description or pointer to more detailed description>
<oid or uid>	<code system name>	<short description or pointer to more detailed description>
<oid or uid>	<code system name>	<short description or pointer to more detailed description>

190 **4.3 IHE Radiology Format Codes, Vocabularies, and Value Sets**

4.3.1 IHE Radiology Format Codes

Table 4.3.1-1: Format Codes for IHE Radiology Profiles

Profile	Format Code	Coding Scheme	Description	Reference
Cross-Enterprise Document Sharing for Imaging (XDS-I.b) and Cross-Community Access for Imaging (XCA-I)	1.2.840.10008.5.1.4.1.1.88.59	1.2.840.10008.2.6.1	Key Object Selection Document	RAD TF-2: Table 4.68.4.1.2.3-1
	urn:ihe:rad:TEXT	1.3.6.1.4.1.19376.1.2.3	CDA Wrapped Text Report	RAD TF-2: Table 4.68.4.1.2.3-1
	urn:ihe:rad:PDF	1.3.6.1.4.1.19376.1.2.3	PDF Report	RAD TF-2: Table 4.68.4.1.2.3-1
	urn:ihe:rad:CDA:ImagingReportStructuredHeadings:2013	1.3.6.1.4.1.19376.1.2.3	CDA Imaging Report with Structured Headings	RAD TF-2: Table 4.68.4.1.2.3-1

4.3.2 IHE Radiology Vocabularies

195 **4.3.2.1 Codes for the SOLE Profile**

This vocabulary is currently in Section 7.1 of the [Standardized Operational Log of Events \(SOLE\) Trial Implementation Supplement](#).

4.3.3 IHE Radiology Value Sets

Reserved for future use.

200 **4.3.3.1 Value Set Name/Concept Domain Name <oid>**

Reserved for future use.

5 Transaction Options on Other Domain Profiles

205 This section lists all the IHE Radiology options on transactions of other domains' integration profiles. Transactions from other domains that are reused in Radiology integration profiles are not listed here, but rather referenced within those profiles. References to the other domains' technical frameworks we are creating options on are listed here as well.

5.1 Radiology Audit Trail Option in ITI ATNA

210 The Radiology Audit Trail Option defines the specific requirements of the IHE Radiology transactions for implementations supporting the Secure Node or Secure Application Actor in the IHE ITI Audit Trail and Node Authentication (ATNA) Profile. See [ITI TF-1: 9.2.2](#).

215 This option deals largely with the details of the Record Audit Event [ITI-20] transaction in the IHE ITI Technical Framework. The option details the required audit events for each of the IHE Radiology transactions, based on the different trigger events. See [ITI TF-2: 3.20](#) for the full definition of this transaction.

Note: No new triggers have been added beyond those previously defined in the Radiology Basic Security Integration Profile. No new coded values have been added to extend the IHE Audit Message dictionary.

5.1.1 Trigger Events and Message semantics

220 An Audit Log is a record of actions performed on data by users. Actions are queries, views, additions, deletions and changes. The IHE actor shall be able to create an Audit Record when an IHE transaction-related event occurs or when a non-IHE transaction (e.g., application functionality outside the IHE scope) event occurs.

225 IHE specifies that events defined in Table 5.1-1 shall be reportable by means of the IHE Audit Trail. The deprecated SEC Provisional Audit Message name is only included here for reference, as well as the new IHE Audit Message EventId (code meaning) along with the specialized EventTypeCode (code meaning) as needed.

230 Table 5.1-1 lists all the trigger events for the generation of Audit Records. This is the table of trigger events specified in [ITI TF-2: 3.20.4.1.1.1](#), with the exceptions noted below, and is included here to further define the specific Audit Message contents.

The following trigger events from ATNA are not applicable to the Radiology actors and transactions so they are not included in Table 5.1-1.

- Health-service-event
- Medication
- 235 • Patient-care-assignment
- Patient-care-episode
- Patient-care-protocol

The “Actor-config” trigger event is an extension of the ATNA triggers to provide continued support for Basic Security.

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Table 5.1-1: Audit Record Trigger Events

Trigger Event	Description	IHE Audit Message Audit EventID (EventCodeType(s))	Provisional Audit Message – Deprecated
Actor-config	Generated for any configuration change related to the actor. Applies to all actors.	Security Alert (Software Configuration)	ActorConfig
Actor-start-stop	Startup and shutdown of any actor. Applies to all actors. Is distinct from hardware powerup and shutdown.	Application Activity (Application Start, Application Stop)	ActorStartStop
Audit-Log-Used	The audit trail repository has been accessed or modified by something other than the arrival of audit trail messages.	Audit Log Used	AuditLogUsed
Begin-storing-instances	Begin storing SOP Instances for a study. This may be a mix of instances. Involved actors: Acquisition Modality, Evidence Creator.	Begin Transferring DICOM Instances	BeginStoringInstances
Images Availability Query	Image availability query is received.	Query	DICOMQuery
Instances-deleted	SOP Instances are deleted from a specific study.	DICOM Study Deleted	DICOMInstancesDeleted
Instances-Stored	Instances for a particular study have been stored on this system.	DICOM Instances Transferred	InstancesStored
Mobile-machine-event	Mobile machine joins or leaves secure domain.	Network Entry (Attach, Detach)	NetworkEntry
Node-Authentication-failure	A secure node authentication failure has occurred during TLS negotiation, e.g., invalid certificate.	Security Alert (Node Authentication)	SecurityAlert
Order-record-event	Order record created, accessed, modified or deleted. Involved actors: Order Placer, Order Filler.	Order Record	OrderRecord
Patient-record-event	Patient record created, modified, or accessed. Involved actors: ADT Patient Registration.	Patient Record	PatientRecord
PHI-export	Any export of PHI on media, either removable physical media such as CD-ROM or electronic transfer of files such as email. Any printing activity, paper or film, local or remote that prints PHI. Applies to all actors.	Export	Export
PHI-import	Any import of PHI on media, either removable physical media such as CD-ROM or electronic transfers of files such as email. Applies to all actors.	Import	Import

Trigger Event	Description	IHE Audit Message Audit EventID (EventCodeType(s))	Provisional Audit Message – Deprecated
Procedure-record-event	Procedure record created, modified, accessed or deleted. Involved actors: Department System Scheduled/Order Filler.	Procedure Record	ProcedureRecord
Query Information	A query has been received, either as part of an IHE transaction, or as part other products functions. For example: 1. Modality Worklist Query	Query	DICOMQuery
Security Administration	Administrative actions create, modify, delete, query, and display the following: (from ITI TF-2: Table 3.20.4.1.1.1-1 – not all numbered items included here.) 10. User authentication, authentication failure, authentication revocation, or signoff. Security administration events should always be audited.	User Authentication (Login, Logout)	UserAuthenticated
Study-Object-Event	Study is created, modified, or accessed. This reports on addition of new instances to existing studies as well as creation of new studies.	DICOM Instances Accessed	DICOMInstancesUsed
Study-used	SOP Instances from a specific study are created, modified or accessed. One event covers all instances used for the particular study.	DICOM Instances Accessed	DICOMInstancesUsed

Table 5.1-2 lists all the Radiology transactions which cause the corresponding Trigger Events found in Table 5.1-1. The last column specifies whether the sender or receiver side of the transaction is required to audit this transaction.

- 245 Note: There are a number of trigger events in Table 5.1-1 that are not related to an IHE transaction in Table 5.1-2. Trigger events like “Actor-config” or “Actor-start-stop” are application activities. The audit of these events is required when these types of triggers occur within your application.
- Note: No status notifications are audited (PPS messages, Status Updates), since both the sender and receiver have an established trust relationship and they contain minimal amount of PHI.
- 250 Note: The Acquisition Modality and the Evidence Creator shall be able to report the Instances-deleted event when they delete instances after Storage Commitment.
- Note: The receiver node of the query request, not the initiator of the request, shall be able to report any of the Query transactions. The audit message records the query request not the query results.

Table 5.1-2: IHE Radiology transactions and resulting ATNA trigger events

IHE Radiology Transaction	ATNA Trigger Event(s)	Actor(s) that shall be able to record audit event
Patient Registration [RAD-1]	Patient-record-event	ADT Order Placer, DSS/OF - when PHI is presented
Placer Order Management [RAD-2]	Order-record-event	Order Placer DSS/OF - when PHI is presented
Filler Order Management [RAD-3]	Order-record-event	DSS/OF
Procedure Scheduled [RAD-4]	Procedure-record-event	DSS/OF
Query Modality Worklist [RAD-5]	Query Information	DSS/OF
Modality Procedure Step In Progress [RAD-6]	None	
Modality Procedure Step Completed [RAD-7]	None	
Modality Images Stored [RAD-8]	Begin-storing-instances	Acquisition Modality
	Instances-Stored	Image Manager/Image Archive
Modality Presentation State Stored [RAD-9]	Begin-storing-instances	Acquisition Modality
	Instances-Stored	Image Manager/Image Archive
Storage Commitment [RAD-10]	None	
Images Availability Query [RAD-11]	Images Availability Query	Image Manager/Image Archive
Patient Update [RAD-12]	Patient-record-event	ADT Order Placer, DSS/OF - when PHI is presented
Procedure Update [RAD-13]	Procedure-record-event	DSS/OF
Query Images [RAD-14]	Query Information	Image Manager/Image Archive
Query Presentation States [RAD-15]	Query Information	Image Manager/Image Archive
Retrieve Images [RAD-16]	Instances-Stored	Image Manager/Image Archive, Imaging Document Source
	Study-used	Image Display, Imaging Document Consumer
Retrieve Presentation States [RAD-17]	Instances-Stored	Image Manager/Image Archive
	Study-used	Image Display
Creator Images Stored [RAD-18]	Begin-storing-instances	Evidence Creator
	Instances-Stored	Image Manager/Image Archive
Creator Presentation State Stored [RAD-19]	Begin-storing-instances	Evidence Creator
	Instances-Stored	Image Manager/Image Archive
Creator Procedure Step In Progress [RAD-20]	None	
Creator Procedure Step Completed [RAD-21]	None	
Print Request with Presentation LUT [RAD-23]	PHI-export	Print Composer
Report Submission [RAD-24]	Begin-storing-instances	Report Creator
	Instances-Stored	Report Manager
Report Issuing [RAD-25]	Begin-storing-instances	Report Manager
	Instances-Stored	Report Repository

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IHE Radiology Transaction	ATNA Trigger Event(s)	Actor(s) that shall be able to record audit event
Query Reports [RAD-26]	Query Information	Report Repository/External Report Repository
Retrieve Reports [RAD-27]	Instances-Stored	Report Repository/External Report Repository
	Study-used	Report Reader
Structured Report Export [RAD-28]	Instances-Stored	Report Manager
Key Image Note Stored [RAD-29]	Begin-storing-instances	Evidence Creator, Acquisition Modality
	Instances-Stored	Image Manager/Image Archive
Query Key Image Notes [RAD-30]	Query Information	Image Manager/Image Archive
Retrieve Key Image Notes [RAD-31]	Instances-Stored	Image Manager/Image Archive
	Study-used	Image Display
Authenticate Node [ITI-19]	Node-Authentication-failure	Any Secure Node
Maintain Time [ITI-1]	None	
Record Audit Event [ITI-20]	None	
Charge Posted [RAD-35]	PHI-export	DSS/OF
Account Management [RAD-36]	PHI-export	ADT
Query Post-Processing Worklist [RAD-37]	Query Information	Post-Processing Manager
Workitem Claimed [RAD-38]	None	
Workitem PPS In-Progress [RAD-39]	None	
Workitem PPS Completed [RAD-40]	None	
Workitem Completed [RAD-41]	None	
Performed Work Status Update [RAD-42]	None	
Evidence Document Stored [RAD-43]	Begin-storing-instances	Acquisition Modality/Evidence Creator
	Instances-Stored	Image Manager/Image Archive
Query Evidence Documents [RAD-44]	Query Information	Image Manager/Image Archive
Retrieve Evidence Documents [RAD-45]	Instances-Stored	Image Manager/Image Archive
	Study-used	Image Display
Query Reporting Worklist [RAD-46]	Query Information	Report Manager
Distribute Imaging Information on Media [RAD-47]	PHI-export	Portable Media Creator
	PHI-import	Portable Media Importer
	Study-used	Image Display, Report Reader, Print Composer
Appointment Notification [RAD-48]	None	
Instance Availability Notification [RAD-49]	None	
Store Instances [RAD-50]	Begin-storing-instances	Export Selector
	Instances-Stored	Export Manager
Store Export Selection [RAD-51]	Begin-storing-instances	Export Selector
	Instances-Stored	Export Manager
Store Additional Teaching File Information	Begin-storing-instances	Export Selector

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IHE Radiology Transaction	ATNA Trigger Event(s)	Actor(s) that shall be able to record audit event
[RAD-52]	Instances-Stored	Export Manager
Export Instances [RAD-53]	Begin-storing-instances	Export Manager – when PHI is exported
	Instances-Stored	Receiver – when PHI is exported
WADO Retrieve [RAD-55]	Instances-Stored	Imaging Document Source
	Study-used	Imaging Document Consumer
Import Procedure Step In Progress [RAD-59]	None	
Import Procedure Step Completed [RAD-60]	None	
Imported Objects Stored [RAD-61]	Begin-storing-instances	Sender Importer shall audit
	Instances-Stored	Receiver (IM/IA) shall audit
Store Dose Information [RAD-62]	Begin-storing-instances	Acquisition Modality
	Instances-Stored	Image Manager/Image Archive, Dose Information Reporter, Dose Information Consumer
Submit Dose Information [RAD-63]	Begin-storing-instances	Dose Information Reporter – when PHI is exported
	Instances-Stored	Dose Registry – when PHI is exported
Query Dose Information [RAD-64]	Query Information	Image Manager/Image Archive
Retrieve Dose Information [RAD-65]	Instances-Stored	Image Manager/Image Archive
	Study-used	Dose Information Reporter, Dose Information Consumer, Acquisition Modality
Rejection Note Stored [RAD-66]	Instances-deleted	Sender: Acquisition Modality, Evidence Creator, Change Requester. Note: The actor rejecting/correcting images must assume that the Image Archive may hide the images (similar to logical deletion).
	Instances-deleted	Receiver: Image Archive. Note: Although an Archive may be configured to provide rejected images, this may be changed any time by users. Thus, it is valuable to log this.
Patient Demographics Query [ITI-21]	Query Information	Patient Demographics Supplier shall audit
Provide and Register Imaging Document Set – MTOM/XOP [RAD-68]	PHI-export	Imaging Document Source
Retrieve Imaging Document Set [RAD-69]	Instances-Stored	Imaging Document Source
	Study-used	Imaging Document Consumer
Replacement Instances Stored [RAD-74]	Begin-storing-instances Instances-Stored	Sender: Change Requester
	Instances-Stored	Receiver: Image Manager/Archive.
Cross Gateway Retrieve Imaging Document Set [RAD-75]	Instances-Stored	Responding Imaging Gateway
	Study-used	Initiating Imaging Gateway

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IHE Radiology Transaction	ATNA Trigger Event(s)	Actor(s) that shall be able to record audit event
Retrieve Imaging Report Template [RAD-103]	None	
Store Imaging Report Template [RAD-104]	None	
Query Imaging Report Template [RAD-105]	None	
Store Instances over the Web [RAD-108]	Begin-storing-instances	Sender: Image Capturer, Lightweight Modality, Evidence Creator
	Instances-Stored	Receiver: Image Manager, Image Manager/Archive
Store Radiopharmaceutical Activity Information [RAD-110]	Begin-storing-instances	Radiopharmaceutical Activity Supplier
	Instances-Stored	Image Manager/Image Archive, Dose Information Reporter, Dose Information Consumer, Acquisition Modality

255 **6 IHE Radiology Content Specifications**

6.1 XDR-I Imaging Document Set

This section is currently in the [Cross-Enterprise Reliable Interchange of Images](#) (XDR-I) Trial Implementation Supplement.

6.2 Medical Health Documents - Imaging (deprecated)

260 This section was previously reserved for the MHD-I content specification. The MHD-I Profile is now deprecated and is replaced by Web-based Access to Imaging (WIA).

6.3 SOLE Event Definitions

This section is currently in the [Standardized Operational Log of Events](#) (SOLE) Trial Implementation Supplement.

265 **6.4 Clinical Decisions Support (CDS) Information**

This section is currently in Section 6.4.1 of the [Clinical Decision Support – Order Appropriateness Tracking](#) (CDS-OAT) Trial Implementation Supplement.

6.5 Imaging Analysis Result Content

This section is currently in the [AI Results](#) (AIR) Trial Implementation Supplement.

270 **6.6 MRRT Report Template Structure**

The format for report templates for the Management of Radiology Report Templates (MRRT) Profile is expressed in HTML5 with extensions. Some of the extensions, such as custom data attributes, are supported by HTML5, while others, such as coded content in XML format, are not. Whenever possible, existing HTML5 tags are used to express template content. All HTML5 tags shall be closed so the report template can be validated as XML. Except for two XML blocks at the end of the report template, the document can be validated using widely available HTML5 tools. Internal and external CSS style sheets may be used to render these templates. Inline styles are not permitted.

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280 Although the format for report templates is expressed in HTML5, the Report Creator is not required to use an HTML5 rendering engine. HTML is simply a convenient method to express the concepts in the template. The Report Creator is required to expose the appropriate behavior, for example allow the user to select an item from a selection list.

285 Examples of template content are provided in the figures below. In addition, an example template and external style sheet are available in Google Drive: [IHE Documents > TF Implementation Material > Rad > examples](#).

Each template shall support the constraints described below. The template:

1. Shall begin with exactly one [1..1] HTML5 DOCTYPE declaration: `<!DOCTYPE html>`
2. Shall contain exactly one [1..1] `html` element.

a. The `html` element shall contain exactly one [1..1] `head` element.

- 290
- i. Identifiers in the `head` element shall use an underscore (“_”) as separator.
 - ii. The `head` element shall contain exactly one [1..1] `title` element containing the name of the template. The value of the `title` element shall be the same as the `dcterms.title` element shown in Table 6.6.1-1.
 - 295
 - iii. The `head` element shall contain exactly one [1..1] `meta` element declaring the character set used: `<meta charset="UTF-8">`.
 - iv. The `head` element shall contain one or more [1..*] `meta` elements encoding Dublin core attributes for the template, as shown in Figure 6.6-1 and Table 6.6.1-1.
 - 300
 1. The `name` property of the `meta` element will be used to specify the template attribute.
 2. For Dublin Core template attributes, the “`dcterms`” namespace shall be used.
 - 305
 3. The `content` property of the `meta` element will be used to specify the value of the template attribute.

```
310 <head>
    <title>CT Brain</title>
    <meta charset="UTF-8">
    <!--Dublin Core metadata elements here-->
    <meta name="dcterms.title" content="CT Brain">
    <meta name="dcterms.identifier" content="1.2.3.4.5">
    <meta name="dcterms.type" content="IMAGE_REPORT_TEMPLATE">
    <meta name="dcterms.language" content="en">
    <meta name="dcterms.publisher" content="Radiological Society of North
315 America (RSNA)">
    <meta name="dcterms.rights" content="May be used freely, subject to
license agreement">
    <meta name="dcterms.license"
320 content="http://www.radreport.org/license.pdf">
    <meta name="dcterms.date" content="2012-03-28">
    <meta name="dcterms.creator" content="Flanders AE, et al.">
    <meta name="dcterms.contributor" content="Bozkurt S [coder]">
    <meta name="dcterms.contributor" content="Kahn CE Jr [editor]">
    <meta name="dcterms.contributor" content="American Society of
325 Neuroradiology (ASNR)">
    <link rel="stylesheet" type="text/css" href="IHE_Template_Style.css" />
</head>
```

Figure 6.6-1: Example of Dublin Core coded content in the `<head>` element

- 330 v. The `head` element shall contain exactly one [1..1] `script` element containing coded content.
1. The `script` element shall be assigned a `type` attribute of `"text/xml"`.
 2. The `script` element shall contain exactly one [1..1] `template_attributes` element.
 - 335 a. The `template_attributes` element may contain zero or more of the non-Dublin Core metadata elements specified in Table 6.6.1-2, such as `status` and `top-level-flag`.
 - b. The `template_attributes` element may contain zero or one [0..1] `coding_schemes` element
 - 340 i. The `coding_schemes` shall contain one or more [1..*] `coding_scheme` elements.
 1. Each `coding_scheme` shall contain exactly one `name` attribute and one `designator` attribute.
 - 345 c. The `template_attributes` element may contain zero or more [0..*] `term` elements containing additional coded content applicable to the entire template that cannot be represented in Dublin Core attributes.
 - 350 i. `term` elements may be assigned a `type` attribute indicating the template attribute for which the term tuple is the value. See the example shown in Figure 6.6-2.
 - ii. Each `term` element shall contain exactly one `code` element.
 - 355 1. Each `code` element shall contain exactly one `meaning` attribute, one `scheme` attribute and one `value` attribute. See Table 6.6.6.1-2.

```
360 <head>
    <!--title and Dublin Core meta elements here-->
    <script type="text/xml">
        <template_attributes>
            <!--non-Dublin Core metadata attributes and term elements here-->
            <top-level-flag>true</top-level-flag>
365     <status>ACTIVE</status>
        <coding_schemes>
```

```
370         <coding_scheme name="RADLEX"
designator="2.16.840.1.113883.6.256" />
        </coding_schemes>
        <term type="modality">
          <code meaning="computed tomography" value="RID10321"
scheme="RADLEX" />
        </term>
375     <term type="body part">
      <code meaning="brain" value="RID6434" scheme="RADLEX" />
    </term>
    <coded_content>
      <!--Other coded content here-->
    </coded_content>
380  </template_attributes>
  </script>
</head>
```

Figure 6.6-2: Example of non-Dublin-Core template attributes in the <script> element

- 385 d. The `template_attributes` element shall contain exactly one [1..1] `coded_content` element, such as that shown in Figure 6.6-3. The `coded_content` element contains coded content linked to specific elements in the body of the template.

Coded content shall be expressed as described in Section 6.6.6.1.

```
390 <head>
  <!-- title and Dublin Core meta elements here -->
  <script type="text/xml">
    <template_attributes>
395     <coded_content>
      <coding_schemes>
        <coding_scheme name="RADLEX"
designator="2.16.840.1.113883.6.256" />
      </coding_schemes>
400     <entry ORIGTXT="T003">
      <term>
        <code meaning="Ankle" value="RID28545" scheme="RADLEX" />
      </term>
      <term>
405     <code meaning="Right" value="RID5825" scheme="RADLEX" />
      </term>
    </entry>
    <!--additional entry elements here-->
  </coded_content>
  </template_attributes>
410 </script>
</head>
```

Figure 6.6-3: Coded Content Example

- 415
- vi. The `head` element may contain style information formatted according to HTML5 standards, using the `style` element for internal CSS style elements and the `link` element for CSS files.
 - vii. The `head` element shall comply with all other HTML5 constraints.
- b. The `html` element shall contain exactly one [1..1] `body` element.
- 420
- i. Identifiers in the `body` element shall use a hyphen (“-“) as separator to maintain compatibility with HTML5 features, such as custom coded content.
 - ii. The `body` element shall contain at least one [1..*] `section` element whose opening tag specifies the attributes described in Table 6.6.2-1.
- 425
- 1. Each `section` element shall contain exactly one [1..1] `header` element.
 - a. The opening tag of the `header` element shall contain exactly one [1..1] `class` attribute indicating the section level. The value of the attribute shall be the string “level” followed by an integer indicating the nesting level (e.g., “level1”).
 - b. The header element may contain the title text for the section.
 - 2. Each `section` element shall contain at least one [1..*] HTML paragraph (`p`) element containing the section content.
- 430

435 6.6.1 Template Attributes

The following Dublin Core metadata attributes may be associated with each report template in the `head` element.

The “Opt” (Optionality) column applies to the Report Template Creator. For each report template:

- 440
- The Report Template Creator shall include values for metadata elements with optionality of “R”. The Report Template Creator may include values for metadata elements with optionality of “O”.
 - The Report Template Manager shall store the values for all metadata attributes, both those marked with optionality “R” and those marked with “O”.

445

Table 6.6.1-1: Dublin Core Metadata Elements for Report Templates

Dublin Core Template Metadata Elements	Description	Vocabulary Constraint	Opt
dcterms.title	A human readable name for the template. There is enforced correspondence with the title element in the head.	This value shall be the same as the value of the title element of the head element. See Section 6.6, 2.a.ii.	R
dcterms.identifier	A unique alphanumeric identifier (OID) included in any report instance generated using the template.	This value shall be an Object identifier (OID) as specified in ITI TF-2: Appendix B . A new value shall be assigned when elements outside of the head element are modified. It is permitted to retain the value when the head element is updated.	R
dcterms.type	Indicates the type of XML document.	Shall be "IMAGE_REPORT_TEMPLATE"	R
dcterms.publisher	The organizations who have published the template (e.g., RSNA, the local site).		R
dcterms.rights	Licensing considerations for the template.		R
dcterms.license	A reference to a license that may govern the use of the template.		R
dcterms.date	The date of unspecified purpose that could be the most recent modification of the template.		R
dcterms.creator	An individual or group who primarily created this template.		R
dcterms.contributor	An individual or group who contributed to the template.		O
dcterms.relation	The identifier of a template which deprecates this template (i.e., a new version of this template).		O

Dublin Core Template Metadata Elements	Description	Vocabulary Constraint	Opt
dcterms.language	The language in which the template is written.	ISO 639 two-letter language code: although template encoding is UTF-8 as specified in the <head> section, some special characters in different languages will need to use the unicode representation.	O

The following additional metadata attributes may be associated with each report template in the `template_attributes` element:

Table 6.6.1-2: Other Metadata Elements for Report Templates

Template Metadata Elements	Description	Vocabulary Constraint	Opt
top-level-flag	Binary attribute that indicates when the template should not be a subsection of another template.	xsd:boolean	O
status	Marks templates that should no longer be used for creating reports.	Shall be one of: DRAFT, ACTIVE, RETIRED	O
user-list	The users to which this template may apply, separated by commas.		O
provider-group-list	The provider groups to which this template may apply, separated by commas.		O

450

Report Creators may use these metadata elements to guide application behavior.

6.6.2 Section Attributes

Table 6.6.2-1 shows the attributes that may be associated with each section. These attributes are specified as custom data attributes in the HTML start tag for the section. Figure 6.6.2-1 shows an example.

455

Table 6.6.2-1: Attributes of Report Template Sections

HTML5 Attribute	Description	Vocabulary Constraint	Opt
data-section-name	A human readable name for the section.		R
data-section-required	A flag indicating whether this section must appear in the report (can be deleted).	xsd:boolean	O
id	Linking identifier for coded content that corresponds to this item.		O

```

460 <body>
      <section
        id="T002"
        data-section-name="Procedure:"
      >
        <header class="level1">Procedure:</header>
465 <p>
          <!--Section content here-->
        </p>
      </section>
    </body>

```

Figure 6.6.2-1: Example of <section> element

470 **6.6.3 Report Template Fields**

Many current reporting systems support the concept of fields, typically rendered as delimited by square brackets. Fields can serve many purposes, including:

- 475 • Emphasize a part of the report that frequently should be modified by the provider (e.g., left/right information). Default text may be provided, even where there is an expectation that it will be replaced or modified.
- Enable rapid navigation among parts of the report that are frequently modified (e.g., using rewind and fast-forward buttons to move between fields).
- Serve as a visual cue for more complex user interface behavior (e.g., verbal triggers, pick lists, and other field types).
- 480 • Represent a field that must be accepted or edited before the report can be finalized.

Fields shall be described only using the HTML `select` or `input` elements and attributes as shown in Table 6.6.3-1 and in the subsections that follow.

Table 6.6.3-1: Attributes of Report Template Fields

Field Type	HTML5 Element	HTML5 Attribute	HTML5 Attribute Value
TEXT	input	type	text
TEXTAREA	textarea	-	-
NUMBER	input	type	number
SELECTION_LIST	select	multiple	single, multiple
DATE	input	type	date
TIME	input	type	time
CHECKBOX	input	type	checkbox
RADIO BUTTON	input	type	radio

485 **6.6.3.1 Field Attributes**

Table 6.6.3.1-1 shows the attributes associated with fields of any type. These are specified as attributes of the HTML element for the field.

Table 6.6.3.1-1: Attributes of Report Template Fields

HTML5 Attribute	Description	Vocabulary Constraint	Opt
name	A human readable alphanumeric identifier for this field.		R
data-field-type	The nature of the information intended to be captured by this field.	TEXT, TEXTAREA, NUMBER, SELECTION_LIST, DATE, TIME, CHECKBOX, RADIO BUTTON, MERGE. See Sections 6.6.3.3 – 6.6.3.8.	R
data-field-merge-flag	Indicates whether content from an outside source can be accepted as the value of this field. If this attribute is absent, the assumed value is 'false'.	xsd:boolean	O
data-field-verbal-trigger	A word or phrase to enable rapid navigation to the field with a voice command. If no verbal trigger is specified, the Field name serves as the default verbal trigger.		O
value	The value of the field if the user does not modify it. This value is shown when the report template is initially displayed.		O

HTML5 Attribute	Description	Vocabulary Constraint	Opt
<code>data-field-completion-action</code>	Indicates an action that may be taken if the field is not populated by the user of the Report Creator.	NONE ALERT PROHIBIT	O
<code>title</code>	Guidance to the user on how to populate this field. If present, the system shall be capable of communicating the title to the user.	No limit on title length; if present, it may be a word, sentence or many paragraphs.	O
<code>id</code>	Linking identifier for coded content that corresponds to this item.		O

490 A given field may have multiple attributes. Example:

name: Spleen size

data-field-type: text

value: normal

495 title: measure maximum dimension in coronal plane, and use cutoffs as follows: <13 cm = normal, 13-15 cm = mild, 15-20 = moderate, >20 = marked

Note: The field could alternately be rendered with a data-field type of “selection_list” rather than “text”, with possible values specified as per Section 8.1.3.5.

The values of the `data-field-completion-action` attribute shall be interpreted as follows:

- 500 • NONE: The user may modify the field in any way, including deletion, without restriction. If no value for the `data-field-completion-action` field is specified, NONE is the default.
- ALERT: If a field with this attribute value is blank or missing, the user is alerted at report completion time. These fields may be deleted by the user, but such a deletion also will cause an alert at completion time.
- 505 • PROHIBIT: A value must be supplied for a field with this attribute value prior to report completion. Deletion is not allowed. If the field is blank, the report completion is prohibited.

6.6.3.2 Linkage Between Template Text and Template Fields

510 To signify that a field is semantically linked to specific template text, the text should be marked by a `label` element whose `for` attribute matches the `id` attribute of the associated field. If the text is modified, the `label` content associate with this field may be invalid. Figure 6.6.3.2-1 shows an example.

515

```

<label for="T010">The unenhanced liver attenuation is</label>
<input id="T010"
  name="unenhanced_liver"
  data-field-type="NUMERIC"
  type="number"
  title="Liver attenuation"
  data-field-completion-action="ALERT"
  value="0"
  max="1000"
  min="-1000"
  />
    
```

520

525

Figure 6.6.3.2-1: Example of Linkage Between Template Text and Template Field

Section 6.6.6.3 discusses possible application behavior when semantically linked text is modified by the user.

6.6.3.3 Text or TextArea Field Attributes

530

Text fields may contain narrative text that is editable by the user. A text field helps organize report text into blocks for rapid navigation. Text fields are currently in wide use by radiology speech recognition systems. Single line text fields shall be expressed using the HTML5 `input` element with `type` attribute = `text`. Multi-line text fields shall be expressed using the HTML5 `textarea` element with optional attributes `rows` and `cols`.

535

6.6.3.4 Numeric Field Attributes

Numeric fields contain a numeric value with associated optional range and optional units. Numeric fields shall be expressed using the HTML5 `input` element with `type` attribute = `number`. Table 6.6.3.4-1 shows the additional attributes associated with numeric fields.

Table 6.6.3.4-1: Attributes of Numeric Fields

HTML5 Attribute	Description	Vocabulary Constraint	Opt
<code>min</code>	The minimum value this field will accept, checked by the Report Creator.		O
<code>max</code>	The maximum value this field will accept, checked by the Report Creator.		O
<code>data-field-units</code>	The unit of measure for the number, such as "HU".	Unified Code for Units of Measure (UCUM)	O
<code>step</code>	Use <code>step=1</code> for integers, or specify a step value smaller than 1 for real numbers. (e.g., 0.1, or 0.01, depending on desired precision).		O

540

6.6.3.5 Selection List Field Attributes

Selection list fields can take on a value selected by the user from a list of items. Each item on the list may be associated with text that should be displayed in the report if that item is selected. Selection lists may have a default value, which is displayed in the field when the template is applied. A user choice among the list items may be required or optional. A single selection may be required, or multiple selected elements may be allowed. Only the attributes and coded content associated with the item(s) selected by the user are associated with the report instance that is generated.

Selection list fields shall be expressed using the HTML5 `select` element. Table 6.6.3.5-1 shows the additional attributes associated with selection list fields.

Table 6.6.3.5-1: Attributes of Selection List Fields

HTML5 Attribute	Description	Vocabulary Constraint	Opt
<code>multiple</code>	<p><code>single</code>: Only one choice can be selected from the list of items, typically implemented as a menu or as radio buttons.</p> <p><code>multiple</code>: More than one choice can be selected from the list of items, typically implemented as multiple check boxes or as a multi-select menu.</p> <p>Default if unspecified is <code>single</code>.</p>	<p><code>single</code></p> <p><code>multiple</code></p>	O

6.6.3.5.1 Selection Items

Each selection item shall be expressed using the HTML5 `option` element within a `select` element. Table 6.6.3.5.1-1 shows the attributes associated with Selection Items.

Table 6.6.3.5.1-1: Attributes of Selection Items

HTML5 Tag	Description	Vocabulary Constraint	Opt
<code>name</code>	A human readable alphanumeric identifier of this item.		R
<code>value</code>	The text that should be displayed and incorporated into the report when this item is selected.	The value of this attribute must equal the content between the open and close tags.	R
<code>data-template-UID</code>	The unique identifier of a template, as specified in its <code>dc:identifier</code> that should be		O

HTML5 Tag	Description	Vocabulary Constraint	Opt
	substituted at an arbitrary point in the document. [use <code>span</code> or <code>div</code> element to specify location].		
<code>data-replacement-element-id</code>	The id of the element to be replaced with the selected content. [use <code>span</code> or <code>div</code> element with corresponding <code>id</code> tag].		C, required if <code>data-template-UID</code> is present
<code>label</code>	A comment or instruction on the meaning of this item.		O
<code>data-verbal-trigger</code>	A word or phrase that, when dictated, causes this item to be selected by the Report Creator.		O
<code>selected</code>	Binary variable indicating whether this item should be used as the default value for this field.		O
<code>id</code>	Linking identifier for coded content that corresponds to this item.		O

560 If `data-template-UID` is specified, the template with that UID replaces the report text delimited by the element whose `id` corresponds to `data-replacement-element-id`. This function enables user selection of a menu item to trigger insertion of another template at an arbitrary point.

6.6.3.6 Date Field Attributes

Date fields accept calendar date information. Date fields shall be expressed using the HTML5 input element with `type attribute = date`.

565 6.6.3.7 Time Field Attributes

Time fields accept clock time information. Time fields shall be expressed using the HTML5 input element with `type attribute = time`.

6.6.3.8 Merge Field Attributes

570 Merge fields accept information from other sources, such as patient information from an HL7 order, measurements from an ultrasound device, or a region of interest (ROI) calculation from an imaging workstation. These fields can substantially increase the efficiency of the user and the accuracy of the report by reducing the need to re-dictate or re-enter these data. Table 6.6.3.8-1 shows the additional attributes associated with merge fields.

Table 6.6.3.8-1: Attributes of Merge Fields

HTML5 Attribute	Description	Vocabulary Constraint	Opt
data-merge-identifier	An opaque string label for an implementation specific value that is obtained by the Report Creator.		C, required for Merge fields only

575

The MRRT Profile does not define how data from other sources are incorporated into merge fields. Transforming the merge data to fit into the report is an undefined task for the Report Creator. Those functions depend on the capabilities of the Report Creator, and may or may not be present. Report Creators may Merge data into any field type, including text, numeric, and selection list fields.

580

6.6.3.9 Checkbox Field Attributes

Checkbox fields present the user with a control that can be toggled on/off. The Checkbox is associated with text that should be displayed in the report if that item is checked. The text value may or may not be the same as the name used to label the field, e.g., the name of the field could be “Tumor deposits” and the text value is “Yes”.

585

Checkbox fields shall be expressed using the HTML5 `input` element with `type` attribute = `checkbox`. Table 6.6.3.9-1 shows the attributes associated with Checkbox fields.

Table 6.6.3.9-1: Attributes of Checkbox Fields

HTML5 Attribute	Description	Vocabulary Constraint	Opt
checked	Indicate whether this item is selected. This is used to set the default state.	checked or empty	O

590

6.6.3.10 Radio Button Field Attributes

Radio Button fields present the user with a control where only one of the radio buttons within the same named group can be checked (“on”). The Radio buttons are associated with text that should be displayed in the report if that item is checked. The text value is not required to be the same as the name used to label the field.

595

Radio Button fields shall be expressed using the HTML5 `input` element with `type` attribute = `radio`. Table 6.6.3.9-1 shows the attributes associated with Radio Button fields.

Table 6.6.3.10-1: Attributes of Radio Button Fields

HTML5 Attribute	Description	Vocabulary Constraint	Opt
checked	Indicate whether this item is selected. This is used to set the default state.	checked	O
name	Specify the name of the group of radio buttons in which only one of them can be checked.		R
value	Specify the value submitted by the corresponding radio button when it is checked.		R

6.6.4 Incorporating Templates into Other Templates

600 Templates may be incorporated into other templates, sometimes called “nested” or “modular” templates. The HTML5 `embed` element shall be used to indicate the location where a template should be included. The `src` attribute of the `embed` element shall contain a string concatenating the unique identifier for the template to be included, and “.html”. The `type` attribute of the `embed` element shall be “text/html”. Figure 6.6.4-1 shows an example of how content from

605 Template2 could be embedded in Template1; Template1 will contain the HTML shown in the figure at the point where Template2 should be included:

```
<embed src="1.2.3.4.6.html" type="text/html" />
```

Figure 6.6.4-1: Example of Incorporating Content from Template2

610 When content from Template2 is embedded in Template1, identifiers shall be prefixed to avoid namespace conflicts.

6.6.5 Permitted HTML5 Formatting Tags

Table 6.6.5-1 shows the HTML5 tags that may be used to format and markup a template. Other formatting tags are permitted but will be ignored.

615

Table 6.6.5-1: Permitted HTML5 Formatting Tags

HTML5 Tag	Description
<a>	Hyperlink to a web resource specified by the <code>href</code> attribute
 	Line break
<div>	Container that can be used to group elements
	Emphasized text, often in italics
	Image
	List item

HTML5 Tag	Description
	Ordered list
<p>	Paragraph
<q>	Short quotation
	Groups inline text and other elements
	Important text, often bold
<sub>	Subscripted text
<sup>	Superscripted text
<table>	Defines a table
<td>	Table cell
<th>	Header cell in a table
<tr>	Table row
<u>	Stylistically different text, often underlined
	Unordered list

6.6.6 Coded Content

620 Report components may be associated with coded content, such as terms from a controlled vocabulary that explicitly represent the semantics of the text. These references may be used to link text in the report template or the report instance with the associated machine-readable semantic content. These references enable applications to manage the relationship between report text and associated coded content during user editing.

6.6.6.1 Simple Format for Coded Content

625 The `template_attributes` element within the `script` element of each template contains a block of `coded_content`:

1. The `coded_content` may contain zero or one [0..1] `coding_schemes` element.
 - a. The `coding_schemes` shall contain one or more [1..*] `coding_scheme` elements.
 - i. Each `coding_scheme` shall contain exactly one `name` attribute and one `designator` attribute.

630

Table 6.6.6.1-1: Attributes of a <coding_scheme> Element

Attribute	Description	Vocabulary Constraint	Opt
name	The name of the coding scheme.	A valid coding scheme designator. A reference list for well-known coding scheme designator is	R

Attribute	Description	Vocabulary Constraint	Opt
		available in DICOM PS3.16 Chapter 8 .	
designator	The unique value that identifies the coding scheme designator.	An Object identifier (OID) as specified in ITI TF-2: Appendix B .	R

2. The `coded_content` element may contain zero or more `[0..*]` `entry` elements.
- a. The opening tag of each `entry` element shall contain an `ORIGTXT` attribute whose value matches the `id` attribute of an element in the `body` to which the coded content in the `entry` applies.
 - b. Each `entry` shall contain at least one `[1..*]` `term` element, encoded in XML
 - i. Each `term` element shall contain exactly one `code`.
 1. Each `code` element shall contain exactly one `meaning` attribute, one `scheme` attribute and one `value` attribute.
 - ii. `term` elements may be assigned a `type` attribute indicating the template attribute for which the term tuple is the value.

Table 6.6.6.1-2: Elements of a <code> Element

Element	Description	Vocabulary Constraint	Opt
meaning	Human readable text provided for the convenience of readers.		R
value	A computer readable and computer searchable identifier that is unambiguous within the coding scheme denoted by the <code>scheme</code> .		R
scheme	Reference to a defined <code>coding_scheme</code> element within the template which uniquely identifies the resource where the <code>value</code> is linked to its <code>meaning</code> .	Defined values specified in the <code>name</code> attribute of the defined <code>coding_scheme</code> element. The values defined are case sensitive.	R

Figure 6.6.6.1-1 shows a simple example in which the identifier `T002` is used to link a section in the `body` to a RadLex term specified in the `coded_content` block. By repeating the `term` block, a list of terms could be used to specify the coded content.

```
650 <head>
    <!--other head items here-->
    <script>
      <template_attributes>
        <!--other attributes applicable to the entire template here-->
        <coded_content>
          <coding_schemes>
655     <coding_scheme name="RADLEX"
designator="2.16.840.1.113883.6.256" />
          </coding_schemes>
          <entry ORIGTXT="T002">
660     <term>
        <code meaning="Procedure" value="RID1559" scheme="RADLEX"
/>
          </term>
        </entry>
        <!--additional entries here-->
665     </coded_content>
      </template_attributes>
    </script>
  </head>
  <body>
670    <section
      id="T002"
      class="level1"
      data-section-name="Procedure:">
      <header class="level1">Procedure:</header>
675    <p>
      <!--Section content here-->
    </p>
    </section>
    <!--remainder of template body here-->
680  </body>
```

Figure 6.6.6.1-1: Simple Coded Content Example

6.6.6.2 Complex Coded Content

Unfortunately, an unstructured list of terms is sometimes insufficient to express even simple concepts. Listed below are examples of coded content too complex to express in an unstructured list:

685

1. Concept: “Pain in the left upper quadrant and the right lower quadrant” Term list: (PAIN, RLQ, LUQ). Does the pain apply to both RLQ and RUQ, or just one?
2. Concept: “Numbness and pain the left face and right shoulder”. Term list: (LEFT, FACE, RIGHT, SHOULDER, PAIN, NUMBNESS). Which body parts are specified, and which symptom belongs with which part?
3. Concept: “A mass projects from the medial aspect of a calcified left kidney”. Term list: (MASS, PROJECTS, MEDIAL, CALCIFIED, LEFT, KIDNEY). Is the kidney or the mass calcified?

690

695 The [MRRT White Paper](#) proposes a simple recursive structure, called a Term Set, to express more complex coded content. However, the use of HL7 CDA encoding or other standard methods may also provide sufficiently rich expressions that could be passed along from a report template to a report instance. The MRRT Profile does not address expressions of coded content other than lists of terms.

6.6.6.3 Managing Coded Content during Template Editing

700 Report creation tools typically provide a text editor metaphor, allowing the user to select, delete, edit, or add text at an insertion point. When text linked to coded content is edited by the user, the coded entries underlying the text may no longer be valid. In the worst case, the user might edit the text to negate the sentence. How these dependencies are managed will be left to each system implementation. Possible actions include doing nothing, warning the user, or deleting associated
705 coded content.

6.6.7 Merging Data into Report Templates

It may be desirable to merge data into a template field from another source. There are many possible sources from which this merge data might be derived:

- The HL7 order for this study
- 710 • Other information in the radiology information system (RIS)
- The DICOM image header for this study
- A DICOM structured report for this study
- Previous reports for this same patient
- The electronic medical record for this same patient

715 The [MRRT White Paper](#) proposes a Merge Retrieval Method that retrieves these data from a Merge Source. However, a simpler and more prevalent method for the retrieval of merge data is described in the MRRT Profile. A single opaque identifier, which is an attribute of each Merge field, may be used by an application to retrieve data to merge into the template. How an application manages the correspondence between this identifier and specific merge capabilities is
720 left to each system implementation.

6.6.8 Relationships among Template

It may be useful for applications to maintain relationships among templates. However, the MRRT Profile specifies that `dc:relation` attribute shall be used only to represent the “deprecated by” relationship.

725 Other relationships, such as creating a “CT Abdomen” template, with children “CT Abdomen with IV contrast” and “CT Abdomen without, then with, IV contrast”, with children inheriting some attributes and features of the parent template are beyond the scope of the MRRT Profile.

Appendices to Volume 3

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Appendix A – Example Analysis Result Encodings

This appendix is currently in the [AI Results](#) (AIR) Trial Implementation Supplement.