

Digital Imaging and Communications in Medicine (DICOM)

Supplement 135: SR Diagnostic Imaging Report Transformation Guide

Prepared by:

DICOM Standards Committee, Working Group 20 and HL7 Imaging Integration Working Group

1300 N. 17th Street

Rosslyn, Virginia 22209 USA

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References

- 45 [1] DICOM PS 3.3-2007: Information Object Definitions, NEMA Rosslyn 2007
- [2] DICOM PS 3.16-2007: Content Mapping Resource, NEMA Rosslyn 2007
- [3] Clinical Document Architecture (CDA) Release 2, HL7 Version 3 Normative Edition 2006. Health Level Seven, Ann Arbor
- [4] DICOM PS 3.5-2007: Data Structures and Encoding, NEMA Rosslyn 2007
- [5] Version 3 Guide, HL7 Version 3 Normative Edition 2006. Health Level Seven, Ann Arbor

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Document History

Version	Date	Comments
01	October 29, 2007	First Progress Report Discussion at WG6.
02	January 6, 2008	Rework of open issues section and minimal context requirements. DICOM Supplement Template used for formatting of text. Update of DICOM SR sample document to include Procedure Code Sequence.
03	February 3, 2008	Rework of minimal context requirements and open issues. Removal of mapping of spatial coordinates.
04	February 10, 2008	Open issue #4 and #5 added. Mapping of Patient's Religious Preference (0010,21F0) and LanguageCommunication attributes deleted.

Open Issues

- 1) CDA documents are based on HL7 Version 3 data types. The Instance Identifier (II) data type does not provide use codes that allow for distinction of multiple patient identifiers within a set of identifiers. In addition to the Patient ID (0010,0020) attribute, DICOM also specifies the Other Patient IDs (0010,1000) attribute for use of multiple patient identifiers. Those additional patient identifiers may be mapped if an appropriate infrastructure (e.g. Master Person Index) is available to distinguish the identifiers based on the Instance Identifier root values that are issued by different domain authorities.
- 2) The Study Instance UID (General Study Module) and Requested Procedure ID of the Referenced Request Sequence (SR Document General Module) are mapped to serviceEvent.id. Shall additional requested procedure attributes be mapped to a CDA section?
- 3) Mapping of DICOM SR procedure codes. DICOM WG6 decision, January 2008: Procedure codes shall be mapped from the Procedure Code Sequence of the General Study Module. Value multiplicity in Row 6 of Template 1005 (Procedure Context) will be corrected to "1-n" to allow for inclusion of multiple procedure codes. If multiple procedure codes are allowed which individual procedure code shall be mapped as part of the procedure context information to a) service event at document level; b) act or procedure at section level? This document constrains the number of permitted items within the General Study Module Procedure Code Sequence to "One Item may be included in this Sequence" and the value multiplicity of Procedure Code within Template 1005 to "1".
- 4) Mapping of procedure context data will be clarified in DICOM CP 849. That may impact the mapping of procedure context data, e.g. attributes contained within the Referenced Request Sequence (0040,A370).
- 5) Mapping of Organization.name (Table 41) for Person Observer. Institution Name (0008,0080) can be obtained from several places. Decision on most reliable source is pending.

Closed Issues

- 1) WG6 decision January 2008: HL7 Version 3 vocabulary does not specify an appropriate boundary code to express that the boundary of a multi-frame image is delineated by the referenced frames and their frame numbers. The DICOM code 113036 "Group of Frames for Display" (Definition: "A list of frames or single-frame or entire multi-frame instances that together constitute a set for some purpose, such as might be displayed together in the same viewport, as distinct from another set that might be displayed in a separate viewport.") is used.
- 2) WG6 decision January 2008: Spatial Coordinates of the original DICOM SR document are not mapped because different coordinate systems may be used for the images referenced in the CDA document.

1 Scope

Constrained DICOM SR documents based on DICOM SR template 2000 are mapped to HL7 CDA Release2 Diagnostic Imaging Reports. Template 2000 specifies the “Basic Diagnostic Imaging Report” (PS 3.16-2007), a basic DICOM SR report template for general diagnostic imaging interpretation reports.

The following constraints apply to DICOM SR Basic Diagnostic Imaging Reports that are mapped to CDA Release 2:

- Subject Context, Patient (TID 1007): The constrained DICOM SR Basic Diagnostic Imaging Report is restricted to cover one and only one patient subject.
- Subject Context, Specimen (TID 1009): Specimen data is not included. DICOM WG26 specifies a new specimen information object definition which will replace the current DICOM specimen attributes (DICOM Supplement 122 is work in progress).
- Only Image and Structured Report DICOM Composite Objects can be referenced. Other non-image DICOM Composite Objects such as Waveforms are excluded from the mapping.
- The mapping of DICOM SR clinical trial header data (Clinical Trial Subject Module, Clinical Trial Study Module, Clinical Trial Series Module) is out of scope for this version of the implementation guide.
- The mapping of de-identified SR documents (e.g. for clinical trials and educational purposes) is not addressed in this version of the implementation guide. CDA Release 2 does not address de-identification explicitly (e.g. by definition of flags).
- The mapping of DICOM Patient Study Module attributes in the document header is out of scope. Pertinent clinical information may be present in the SR content tree and will be mapped to the CDA document body.
- The transcoding of encrypted DICOM SR to the CDA Release 2 is not addressed in this version of the implementation guide.
- Since the use of digital signatures for transcoded DICOM SR documents is not primarily a mapping question, this topic is not addressed in the implementation guide.
- For automated transformation of DICOM SR diagnostic imaging report it is recommended to transform only SR documents where the DICOM Completion Flag (0040,A491) value equals “COMPLETE” to make sure that only SR documents get exported that contain all significant observations (the completeness of the content will be attested or verified by an authorized user). The value of the completion flag can be ignored if an authorized user confirms that the SR document contains all significant observations. The Completion Flag (0040,A491) cannot be mapped to the CDA since the CDA Release 2 does not specify such flags.
- Spatial coordinates contained in the content tree of the original DICOM SR document are not mapped because different coordinate systems may be used for the images referenced in the CDA document.
- The number of permitted items within the General Study Module Procedure Code Sequence is constrained to “One Item may be included in this Sequence” and the value multiplicity of Procedure Code within Template 1005 is constrained to “1”.



2 Use Cases

The basic use case for the mapping and transformation from DICOM SR to HL7 CDA is to facilitate the exchange of imaging based observations between imaging information systems and clinical information systems. The DICOM SR “Basic Diagnostic Imaging Report” will typically base its observations and conclusions on imaging data and related clinical information.

130 Scenarios:

- a. Mapping of the complete constrained DICOM SR “Basic Diagnostic Imaging Report” to an HL7 CDA Release 2 Diagnostic Imaging Report. The receiver optionally selects relevant parts of the transformed document for inclusion into a clinical HL7 CDA document (e.g. a clinical progress note or a summary report that cites the results of a variety of subspecialties involved in the treatment process of the patient)
- b. Mapping of a subset of the original DICOM SR “Basic Diagnostic Imaging Report” which includes measurement data and the relevant context information (the minimal context that is required will be outlined in section 3.2.2). This subset comprises the relevant information provided by the responsible physician of the imaging institution to external parties (e.g. for ultrasound SR documents where only a subset of the measurement data will be communicated)

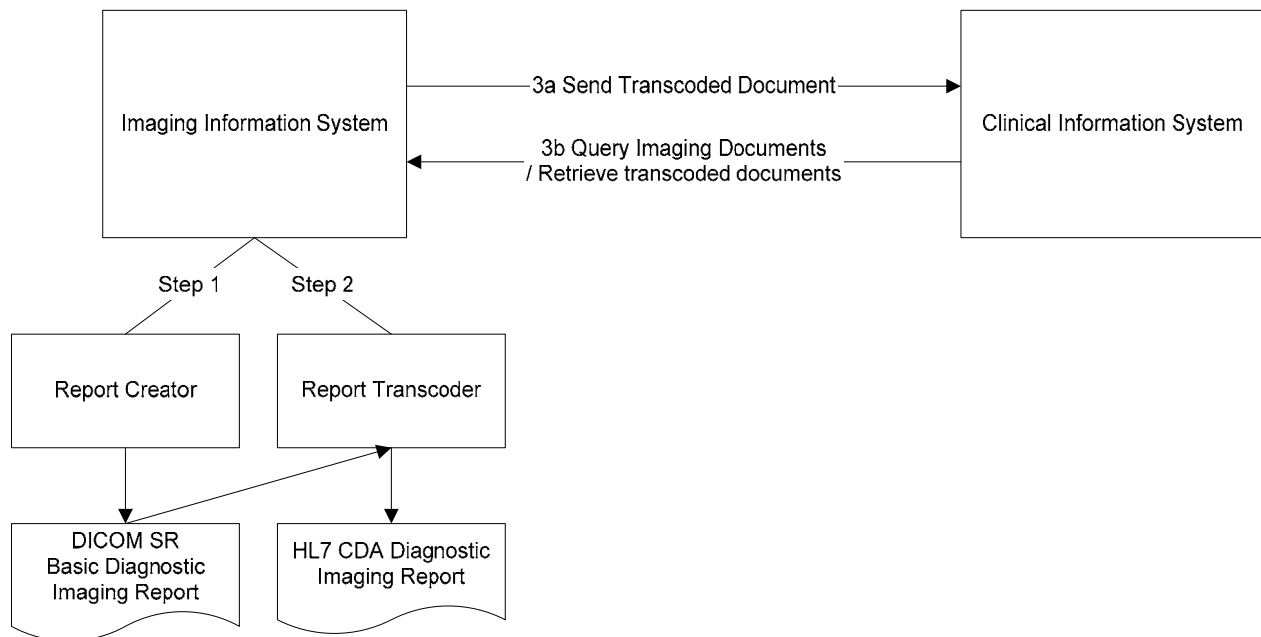


Figure 1
REPORT CREATION AND TRANSFORMATION

3 Structure of DICOM SR Documents

DICOM SR documents consist of document header and document body. The header metadata attribute values are grouped into modules such as “Patient”, “General Study” [1].

150 The SR Content Module contains the attributes for the root content item which includes the coded report title. The content tree (structured content) of the document body is contained in the content sequence of that module. “Container” content items are part of the content sequence. They are structural elements of the SR document body structure. Content items are DICOM SR document nodes within the content tree which are connected through “by-value” and “by-reference” relationships.

155

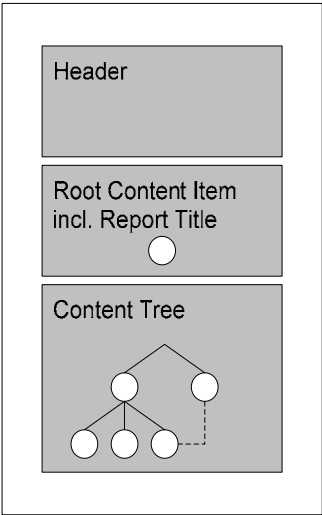


Figure 2
SR DOCUMENT STRUCTURE

160 **3.1 HEADER**

Header specified in DICOM PS 3.3 [1]

Table 1
DICOM SR Modules

IE	Module	Reference	Usage
Patient	Patient	C.7.1.1	M
	Specimen Identification	C.7.1.2	C - Required if the Observation Subject is a Specimen
	Clinical Trial Subject	C.7.1.3	U
Study	General Study	C.7.2.1	M
	Patient Study	C.7.2.2	U
	Clinical Trial Study	C.7.2.3	U
Series	SR Document Series	C.17.1	M

	Clinical Trial Series	C.7.3.2	U
Equipment	General Equipment	C.7.5.1	M
Document	SR Document General	C.17.2	M
	SR Document Content	C.17.3	M
	SOP Common	C.12.1	M

165

DICOM SR Header Modules:

Refer to section 6.1 for details

Patient Module

- 170 The patient module specifies the Attributes of the Patient that describe and identify the Patient who is the subject of a diagnostic Study. This Module contains Attributes of the patient that are needed for diagnostic interpretation of the Image and are common for all studies performed on the patient.

Specimen Identification Module

The DICOM Specimen Identification Module specifies the Attributes that identify a Specimen.

- 175 Redefinition of the DICOM specimen information object (DICOM Supplement 122) is work in progress. Mapping will be provided by future versions of the implementation guide.

Clinical Trial Subject Module

The Clinical Trial Subject Module contains attributes that identify a Patient as a clinical trial Subject.

General Study Module

- 180 The General Study Module specifies the Attributes that describe and identify the Study performed upon the Patient.

Patient Study Module

The Patient Study Module defines the attributes that provide information about the Patient at the time the Study was performed.

- 185 **Clinical Trial Study Module**

The Clinical Trial Study Module contains attributes that identify a Study in the context of a clinical trial.

SR Document Series Module

The SR Document Series Module defines the Attributes of the SR Document Series. A Series of SR Documents may contain any number of SR Documents.

- 190 **Clinical Trial Series Module**

The Clinical Trial Series Module contains attributes that identify a Series in the context of a clinical trial.

General Equipment Module

The General Equipment Module specifies the Attributes that identify and describe the piece of equipment that produced a Series of Composite Instances.

195 **SR Document General Module**

The SR Document General Module defines the general Attributes of an SR Document Instance. These Attributes identify the SR Document and provide context for the entire document.

SOP Common Module

200 The SOP Common Module defines the Attributes which are required for proper functioning and identification of the associated SOP Instances.

SR Document Content Module

The Attributes in this Module convey the content of an SR Document. It specifies the root content item and the content tree (refer to Figure 2 SR Document Structure).

205 **3.2 DOCUMENT BODY**

3.2.1 DICOM SR “Basic Diagnostic Imaging Report” Template Structure and Constraints

Template 2000 is the top-level template of DICOM SR Basic Diagnostic Imaging Reports (DICOM PS3.16 [2]). It includes sub-templates as shown in Figure 3. The root content item (coded report title) and the content sequence details (structure and contents) are specified by those templates.

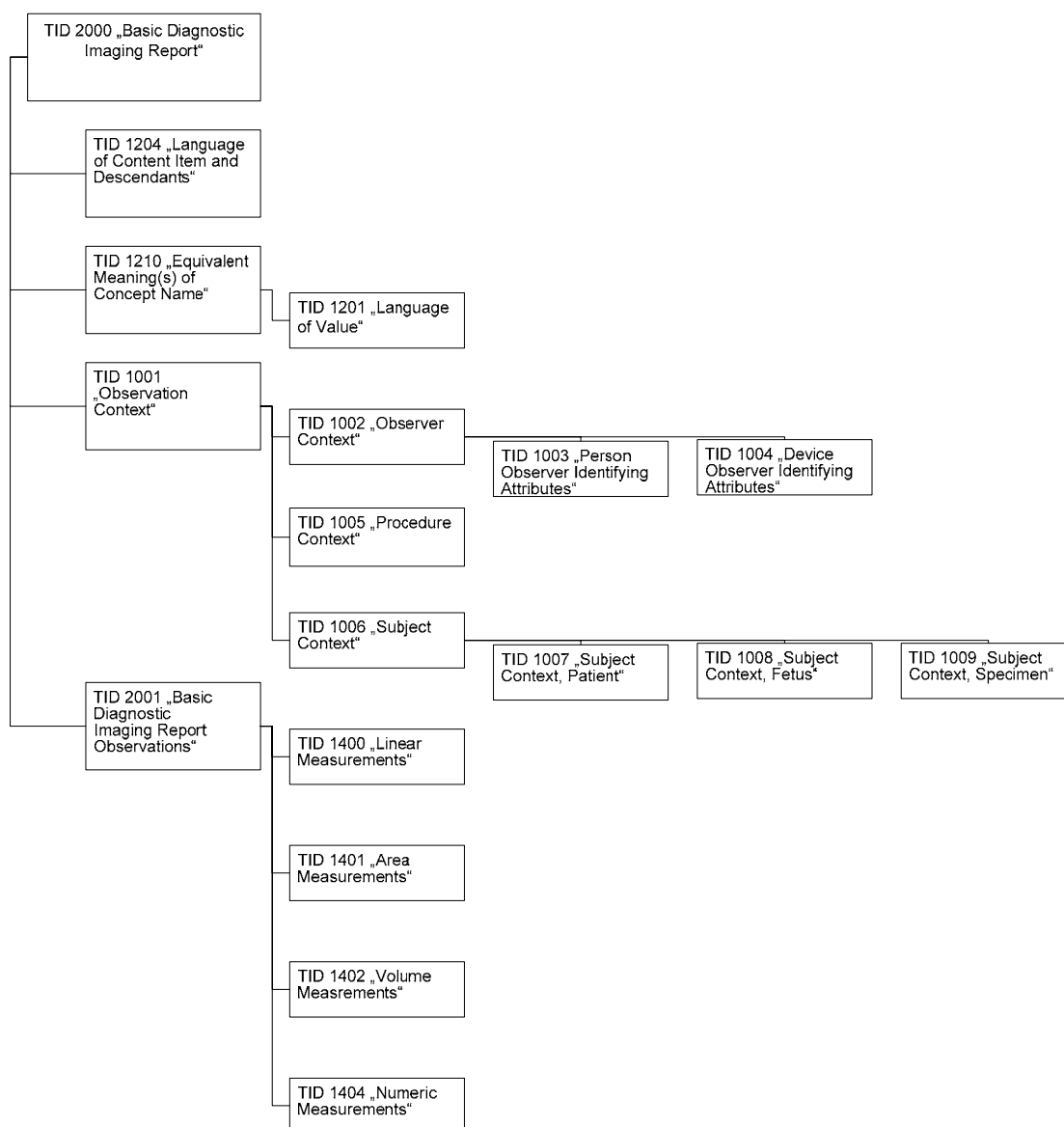


Figure 3
TEMPLATE STRUCTURE

Constraints on SR Subject Context Templates:

- 215 - Subject Context, Patient (TID 1007): The constrained DICOM SR Basic Diagnostic Imaging Report is restricted to cover one and only one patient subject.
- Subject Context, Specimen (TID 1009): Specimen data is not included. DICOM WG26 specifies a new specimen information object definition which will replace the current DICOM specimen attributes (DICOM Supplement 122 is work in progress).

3.2.2 Minimal Context Information for Mapping Content Sequence Subset Data

For mapping a subset of the original DICOM SR “Basic Diagnostic Imaging Report” data to HL7 CDA Diagnostic Imaging Reports, the minimal context information that is required for the document header and

body needs to be determined. The goal is to allow for a flexible exchange of relevant observations of the original document.

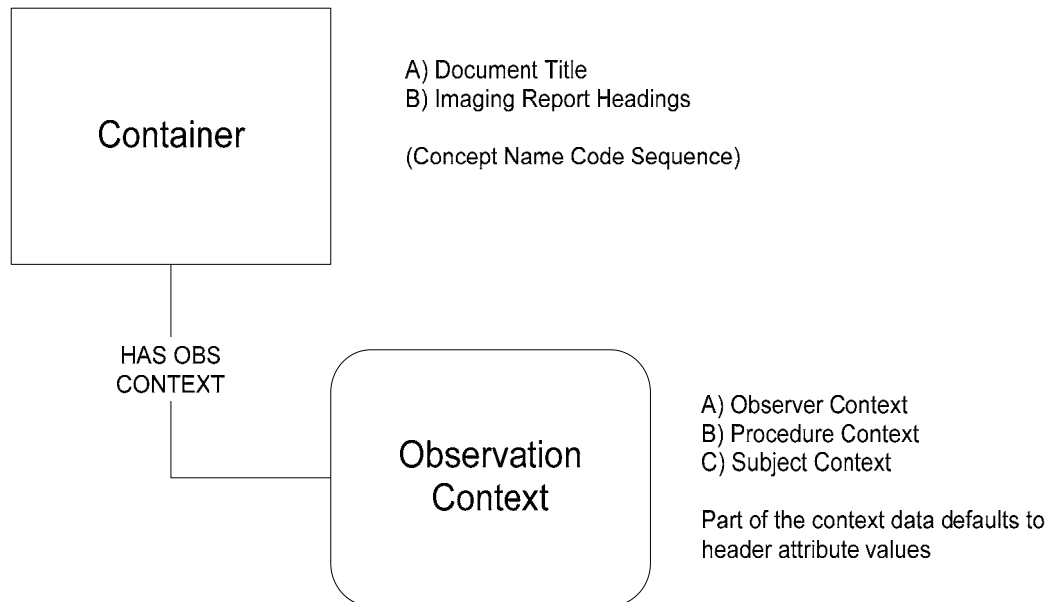


Figure 4
CONTEXT INFORMATION PATTERN USED IN DICOM SR TEMPLATE 2000

The observation context data used in Template 2000 is related to the Container Content Item at the document or section level. *Each observation at that level inherits the observation context.* The observation context defined at document level may be overwritten at document section level.

The observation context consists of:

- Observer Context (the person or device observer and the organization to which they belong)
- Procedure Context (the imaging services, image-guided interventions and reporting procedures that are performed)
- Subject Context (the patient or fetus subject on whom the observation is made)

Observation Context Requirements

Observer Context (Person/Device Observer)

- 1) DICOM Verifying Observer / CDA Legal Authenticator

Mapping Targets:

SR Header (SR Document General Module)	SR Template	CDA Attribute
Verifying Observer Name (0040,A075) of Verifying Observer Sequence (0040,A073)	n.a.	/ClinicalDocument/legalAuthenticator/AssignedEntity/Person/name
Verifying Organization (0040,A027) of Verifying Observer Sequence (0040,A073)	n.a.	/ClinicalDocument/legalAuthenticator/AssignedEntity/Organization/name
Verification DateTime (0040,A030) of Verifying Observer Sequence (0040,A073)	n.a.	/ClinicalDocument/legalAuthenticator/time
Verifying Observer Identification Code Sequence (0040,A088) of Verifying Observer Sequence (0040,A073)	n.a.	/ClinicalDocument/legalAuthenticator/AssignedEntity/id and /ClinicalDocument/legalAuthenticator/AssignedEntity/code

Conditions/Optionality:

- 250 DICOM PS3.3 [1]: If the Verification Flag (0040,A493) value (Type 1) of the original SR document equals "VERIFIED", the Verifying Observer Sequence (Type 1C) contains the Verifying Observer Name, Verifying Organization, Verification DateTime and the Verifying Observer Identification Code Sequence (Type 2).

Requirement:

- 255 The above SR header attributes shall be mapped as specified in table 7 to 10. The transformed CDA document is considered verified if legally authenticated.

2) DICOM Author Observer / CDA Author

Mapping Targets:

- 260 The Person and Device Observer context data at document level may be overridden at section level. Person and Device Observer attributes are mapped to author participation, associated roles and entities related to the CDA ClinicalDocument or Section act class.

a) Person Observer

SR Header (SR Document General Module)	SR Template	CDA Attribute
Content Date (0008,0023), Content Time (0008,0033)	n.a.	/author/time
Person Name (0040,A123) of Author Observer Sequence (0040,A078)	Person Observer Name (TID 1003)	/author/AssignedAuthor/Person/name

265 b) Device Observer

SR Header (SR Document General Module)	SR Template	CDA Attribute
Content Date (0008,0023), Content Time (0008,0033)	n.a.	/author/time
n.a.	Device Observer UID (TID 1004)	/author/AssignedAuthor/id

Conditions/Optionality:

- 270 - DICOM PS3.3 [1]: The Author Observer Sequence (0040,A078) is optional (Type 3). Within that sequence the nested Person Identification Code Sequence (0040,1101) is required (Type 2C) if the Observer Type value equals "PSN" (Person). The Device UID (0018,1002) of Type 1C is required if the Observer Type value equals "DEV" (Device). Person Name (0040,A123) of Type 1C within the Author Observer Sequence (0040,A078) is required if Observer Type value equals PSN (Person). Content Date (0008,0023) and Content Time (0008,0033) of the SR Document General Module are Type 1 attributes.
- 275 - DICOM PS3.16 [2]: Person Observer Name is mandatory (Requirement Type M) for person observers (Template 1003). The Device Observer UID is mandatory (Requirement Type M) for device observers (TID 1004).

Requirements:

- 280 - CDA author Participation: author.time shall be mandatory for diagnostic imaging CDA reports.
- The above SR header attributes shall be mapped as specified in table 39 (Content Date and Content Time), 42 (Person Observer Name) and 43 (Device Observer UID).

Procedure Context

285

1) DICOM Requested Procedure / CDA Service Event

Mapping Targets:

SR Header (General Study Module)	SR Template	CDA Attribute
Study Instance UID ((0020,000D)	n.a.	/ServiceEvent/id

SR Header (SR Document General Module)	SR Template	CDA Attribute
Requested Procedure ID (0040,1001) of the Referenced Request Sequence (0040,A370)	n.a.	/ServiceEvent/id

290 Conditions/Optionality:

DICOM PS3.3 [1]: The Referenced Request Sequence (Type 1C) is required if the original DICOM SR document fulfills at least one Requested Procedure.

Requirement:

- 295 - The Study Instance UID ((0020,000D) of the General Study Module and Requested Procedure ID (0040,1001) of the Referenced Request Sequence (0040,A370) shall be mapped to the CDA ServiceEvent.id set of instance identifiers as specified in table 37.

300 Note: The Study Instance UID of the DICOM General Study Module is also available in the CDA DICOM Object Catalog as the Study.id value.

2) DICOM Order and Requested Procedure / CDA Order

Mapping Targets:

SR Header	SR Template	CDA Attribute
Placer Order Number/Imaging Service Request (0040,2016)	Procedure HL7 Placer Number of Evidence (TID 1005)	/Order/id
Filler Order Number/Imaging Service Request (0040,2017)	Procedure HL7 Filler Number of Evidence (TID 1005)	/Order/id
Accession Number (0008,0050)	Procedure Accession Number (TID 1005)	/Order/id

305 Conditions/Optionality:

DICOM PS3.3 [1]: The Referenced Request Sequence (Type 1C) is required if the original DICOM SR document fulfills at least one Requested Procedure and therefor an order.

- 310 DICOM PS3.16 [2]: Template 1005 "Procedure Context" specifies "Procedure HL7 Placer Number of Evidence" (defaults to Placer Order Number/Imaging Service Request (0040,2016)), "Procedure HL7 Filler Number of Evidence" (defaults to Filler Order Number/Imaging Service Request (0040,2017)) and "Procedure Accession Number" (defaults to Accession Number (0008,0050)) as optional attributes (Requirement Type User Option).

Requirement:

- 315 - At least one of the following numbers of the Referenced Request Sequence (0040,A370) shall be mapped to the CDA Order.id set of instance identifiers if the original DICOM SR document fulfills at least one Requested Procedure: Placer Order Number/Imaging Service Request (0040,2016), Filler Order Number/Imaging Service Request (0040,2017), Accession Number (0008,0050).

320

3) DICOM Procedure / CDA Act or CDA Procedure

Procedure codes at document level may be overridden at section level. Procedure code is mapped to ServiceEvent code at document level respectively Act xor Procedure code at section level.

325 Mapping Targets:

a) Document Level

SR Header (General Study Module)	SR Template	CDA Attribute
Procedure Code Sequence (0008,1032)	Procedure Code (TID 1005)	/ServiceEvent/code

b) Section Level

SR Header (General Study Module)	SR Template	CDA Attribute
Procedure Code Sequence (0008,1032)	Procedure Code (TID 1005)	/Act/code xor /Procedure/code

330 Conditions/Optionality:

DICOM PS3.3 [1]: The Procedure Code Sequence (0008,1032) of the General Study Module is optional (Type 3).

DICOM PS3.16 [2]: The Procedure Code value of the Procedure Context (Template 1005) is optional (Requirement Type User Option).

335

Requirement:

- The number of permitted items within the General Study Module Procedure Code Sequence shall be constrained to "One Item may be included in this Sequence" and the value multiplicity of Procedure Code within Template 1005 shall be constrained to "1".

340 - The Procedure Code value of the Procedure Code Sequence (0008,1032) within the General Study Module or the Procedure Code value of the Procedure Context (Template 1005) shall be mapped to the CDA clinical statement entry class attribute Act.code or Procedure.code as specified in table 38. The choice between the act and procedure entry class shall be determined based on Procedure Code value of the Procedure Code Sequence (0008,1032) or the Procedure Code value of the Procedure Context (Template 1005).

345

- The optional CDA clinical statement entry class attribute Procedure.code shall be required for documents that are transformed to the CDA Release 2.

- Subject Context (Patient/Fetus)

350

1) DICOM Patient Subject / CDA Record Target

Mapping Targets (if Observation Subject Class value of TID 1006 Subject Context equals "Patient"):

SR Header (Patient Module)	SR Template	CDA Attribute
Patient ID (0010,0020)	Subject ID (Template 1007)	/recordTarget/PatientRole/id
Patient's Name (0010,0010)	Subject Name (Template 1007)	/recordTarget/PatientRole/Patient/name
Patient's Sex (0010,0040)	Subject Sex ID (Template 1007)	/recordTarget/PatientRole/Patient/ administrativeGenderCode
Patient's Birth Date (0010,0030)	Subject Birth Date (Template 1007)	/recordTarget/PatientRole/Patient/ birthTime

Conditions/Optionality:

355 DICOM PS3.3 and PS3.16 [1],[2]:

- Subject ID (Template 1007) is mandatory if the subject is a patient (Requirement Type Mandatory Conditional). It defaults to the value of the Patient ID (0010,0020) attribute (Type 2) in Patient Module.

- Subject Name (Template 1007) is mandatory if the subject is a patient (Requirement Type Mandatory Conditional). Defaults to value of Patient's Name (0010,0010) attribute (Type 2) in Patient Module.

360 - Subject Sex ID (Template 1007) is optional (Requirement Type User Option). Defaults to value the Patient's Sex (0010,0040) attribute (Type 2) in Patient Module.

- Subject Birth Date (Template 1007) is optional (Requirement Type User Option). Defaults to value of the Patient's Birth Date (0010,0030) (Type 2) in Patient Module.

365 Requirements:

- The Subject ID (Template 1007) attribute shall be mapped to the CDA PatientRole.id attribute as specified in table 33.

- The optional CDA PatientRole.id attribute shall be mandatory for documents that are transformed to the CDA Release 2.

370 - The Subject Name (Template 1007) attribute shall be mapped to the CDA Patient.name attribute as specified in table 34.

- The optional CDA Patient.name attribute shall be required for documents that are transformed to the CDA Release 2.

- The Subject Sex (Template 1007) attribute shall be mapped to the CDA Patient.
375 administrativeGenderCode attribute as specified in table 34.

- The optional CDA Subject Sex attribute shall be required for documents that are transformed to CDA Release 2.

- The optional CDA administrativeGenderCode attribute shall be required for documents that are transformed to the CDA Release 2.

380 - The Subject Birth Date (Template 1007) attribute shall be mapped to the CDA Patient.birthtime attribute as specified in table 34.

- The optional CDA Subject Birth Date attribute shall be required for documents that are transformed to the CDA Release 2.

385 - The optional CDA Patient.birthtime attribute shall be required for documents that are transformed to the CDA Release 2.

Note: For reports on mother and their fetus(es), information on mother is mapped to recordTarget, PatientRole and Patient. Information on fetus is mapped to subject, relatedSubject and SubjectPerson at CDA section level. Both, context information on the mother and fetus shall be included in the document if observations on fetus(es) are contained in the document.

390

2) DICOM Fetus Subject / CDA Related Subject

Mapping Targets (if Observation Subject Class value of TID 1006 Subject Context equals "Fetus"):

SR Header	SR Template	CDA Attribute
n.a.	Subject ID xor Fetus ID (Template 1008)	/subject/relatedSubject/SubjectPerson/name

Conditions/Optionality:

395 DICOM PS3.16 [2]: - Subject ID or Fetus ID (Template 1008) are mandatory (Requirement Type Mandatory Conditional) if the subject is a fetus.

Requirements:

400 - The Subject ID or Fetus ID (TID 1008) shall be mapped to the CDA SubjectPerson.name as specified in table 36.

- The value domain CDA PersonalRelationshipRoleType shall be extended by the "Fetus" code (DICOM PS3.16 [2]: CID 271) that shall be used as the value for the CDA RelatedSubect.code attribute as specified in table 35.

405 - The optional CDA RelatedSubect.code attribute shall be mandatory if the subject is a fetus for documents that are transformed to the CDA Release 2.

Document Context Requirements

1) SR Document / CDA Clinical Document

410 Mapping Targets:

SR Header (SR Document General Module)	SR Template	CDA Attribute
n.a.	Basic Diagnostic Imaging Report Document Titles (TID 2000)	/ClinicalDocument/code
Content Date (0008,0023) and Content Time ((0008,0033)	n.a.	/ClinicalDocument/effectiveTime

Conditions/Optionality:

The DICOM Diagnostic Imaging Report Document Title is mandatory (Requirement Type Mandatory) in Template 2000 [2]. Content Date (0008,0023) and Content Time (0008,0033) within the SR Document
415 General Module are Type 1 attributes.

Requirements:

- CDA ClinicalDocument.classCode: "DOCCLIN" (Clinical Document) shall be assigned as the attribute
420 value as specified in table 3.

- CDA ClinicalDocument moodCode: "EVN" (Event) shall be assigned as the attribute value as specified in table 3.

- The required CDA ClinicalDocument id attribute shall be mandatory for documents that are transformed to the CDA Release 2. An UID with a maximum length of 64 bytes shall be assigned to the root portion of the HL7 V3 Instance Identifier (II) data type. There shall be no extension to the root portion of the Instance Identifier.
425

- The required CDA ClinicalDocument code attribute shall be mandatory for documents that are transformed to the CDA Release 2. The SR document root content item concept name code is mapped to the ClinicalDocument code as specified in table 3.

430 - The required CDA ClinicalDocument effectiveTime attribute shall be mandatory for documents that are transformed to the CDA Release 2. The DICOM attribute values of Content Date (0008,0023) and Content Time ((0008,0033) of the original SR document shall be mapped as specified in table 3.

2) Parent Document of the transformed CDA Document (Original DICOM SR document)

435 Mapping Targets:

SR Header (SOP Common Module)	SR Template	CDA Attribute
SOP Instance UID (0008,0018)	n.a.	/relatedDocument/ParentDocument/id
n.a.	Basic Diagnostic Imaging Report Document Titles (TID 2000)	/relatedDocument/ParentDocument/code

Requirements:

- CDA relatedDocument.typeCode: "XFRM" (Transformation) shall be assigned as the attribute value.

440 - The multiplicity of the CDA relatedDocument act relationship shall be constrained to cardinality 1..1 (single original DICOM SR document is transformed to the CDA). This act relationship shall be mandatory for SR documents that are transformed to the CDA.

- CDA ParentDocument.classCode: "DOCCLIN" (Clinical Document) shall be assigned as the attribute value.

- CDA ParentDocument.moodCode: "EVN" (Event) shall be assigned as the attribute value.

445 - The required CDA ParentDocument.id shall be mandatory for documents that are transformed to the CDA Release 2. The mandatory DICOM SOP Instance UID (0008,0018) of the original DICOM SR document SOP Common Module shall be assigned to the root portion of the HL7 V3 Instance Identifier (II) data type (ParentDocument.id) as specified in table 21.

450 -The optional CDA ParentDocument.code shall be mandatory (cardinality: 1..1) for documents that are transformed to the CDA Release 2. The mandatory report title of the original SR Basic Diagnostic Imaging Report document (Template 2000, [2]) shall be mapped to the CDA ParentDocument.code as specified in table 21.

3) CDA Document Body

455 Requirements:

- The NonXMLBody act class shall not be used for documents that are transformed to the CDA Release 2 (bodyChoice has been removed from the constrained RMIM for CDA Diagnostic Imaging Reports since StructuredBody is the only act class that links the document header to the CDA document body).

- CDA StructuredBody.classCode: "DOCBODY" (Document Body) shall be assigned as the attribute value.

460 - CDA StructuredBody.moodCode: "EVN" shall be assigned as the attribute value.

4) SR Document Section (Container) / CDA Section

Requirements:

465 - CDA Section.classCode: "DOCSECT" (Document Section) shall be assigned as the attribute value.

- CDA Section.moodCode: "EVN" shall be assigned as the attribute value.

- The required CDA Section.text contains the attested document content (refer to 6.1.2 Section (Level 2) for a description on how to populate section text).

470 **DICOM Composite Object References Context Requirements**

The attributes of DICOM composite object references are specified in Annex B: HL7 V3 DICOM CMETs (Common Message Element Types). These CDA mapping patterns shall be used to reference DICOM images and DICOM structured reports. Information on relevant images referenced within the CDA target document's body and the original DICOM SR document shall be included in the CDA DICOM object catalog section.

475

4 Structure of HL7 CDA Release2 Documents

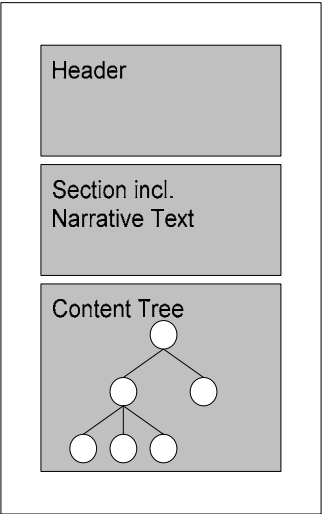


Figure 5
CDA RELEASE 2 [3] DOCUMENT STRUCTURE

The CDA Header contains the document metadata. The structured document body may comprise multiple sections with narrative text and clinical statement entries which form the content tree of the document.

5 Mapping and Validation

5.1 DICOM SR SAMPLE DOCUMENT REPRESENTATION

The SR sample document encoding includes information on the tag and nesting level (Column 1: DICOM tag and nested artifacts such as sequences and sequence items), the DICOM attribute value representation (Column 2: VR as specified in [4]), the sample attribute values (Column 3: Value) and the DICOM attribute names (Column 4: Attribute). Annex A of the document contains the complete encoding of the DICOM SR sample document and the XML representation of the transcoded CDA document.

Table 2
Encoding of DICOM SR documents

Tag & Nesting Level	VR	Value	Attribute
...
(0010,0010)	PN	Doe^John	Patient's Name
(0010,0020)	LO	0000680029	Patient ID
(0010,0030)	DA	19641128	Patient's Birth Date
(0010,0040)	CS	M	Patient's Sex

(0020,000d)	UI	1.2.840.113619.2.62.994044785528.114289542805	Study Instance UID
(0020,000e)	UI	1.2.840.113619.2.62.994044785528.20060823223142485052	Series Instance UID
(0020,0010)	SH	10523475	Study ID
(0020,0011)	IS	560	Series Number
(0020,0013)	IS	07851	Instance Number
(0040,a040)	CS	CONTAINER	Value Type
(0040,a043)	SQ		Concept Name Code Sequence
>BEGIN ITEM 1			
>(0008,0100)	SH	18782-3	Code Value
>(0008,0102)	SH	LN	Coding Scheme Designator
>(0008,0104)	LO	X-Ray Report	Code Meaning
>END ITEM 1			
...

495

5.2 EQUIVALENT HL7 CDA “DIAGNOSTIC IMAGING REPORT” SAMPLE DOCUMENT REPRESENTATION

The HL7 development framework (HDF) uses a model driven methodology and the derivation of specifications and interim work products from a common set of reference models [5]. The basis for Refined Message Information Models is the HL7 Reference Information Model (RIM). The CDA RMIM contains act classes, entities, roles and participations derived from the core RIM artifacts. The structured part of the CDA RMIM (Clinical Statement) specifies generic act entry classes such as act and observation. The code attribute of the entry classes is used to convey the semantic information while generic class names are used for the different act entries. Similarly the type code of the entry relationships denotes the semantics of the relationship between act entries.

The HL7 CDA XML representation builds on the HL7 V3 XML Implementation Technology Specification – Data Types and XML Implementable Technology Specification for V3 Structures. XML structures are derived from Hierarchical Message Descriptions (HMD).

5.3 HL7 V3 TARGET STRUCTURE VALIDATION

The header of the transcoded DICOM SR document may be validated using the XML schema that is based on the constrained CDA RMIM contained in section 6.1 of this document.

6 HL7 CDA Release2 Diagnostic Imaging Report Target Structure

The header of the transcoded diagnostic imaging report contains the participations and act relationships that are related to the central ClinicalDocument act class. The clinical document contains the structured body of the CDA document that consists of one or multiple sections. Each document section contains an optional section code and narrative text. Sections are associated with optional entry act classes and their related participations. Entry act classes are connected by act relationships that denote the type of relationship between individual act entries.

520 DICOM UIDs are mapped to HL7 V3 Instance Identifier (II) data type root. Non UID DICOM identifiers and numbers are mapped to the HL7 V3 Instance Identifier (II) data type extension portion. In this case the root value of the assigning authority (custodian organization) shall be used.

6.1 CONSTRAINED HL7 CDA RELEASE2 DIAGNOSTIC IMAGING REPORT RMIM

525 The constrained CDA RMIM for Diagnostic Imaging Reports transcoded from DICOM SR Basic Diagnostic Imaging Reports shows the relevant artifacts of the target CDA document (refer to CDA Diagnostic Imaging Report RMIM).

The XML schema generated from the constrained RMIM may be used to validate the header contents of the CDA Diagnostic Imaging Report.

530 6.1.1 Header (Level 1)

General Remarks on the mapping of DICOM header module attributes:

SR Document General Module

- 535 - Custodian: The Type 3 DICOM Custodial Organization Sequence ((0040,A07C) attribute values of the original SR document are not necessarily the basis for mapping to the CDA Custodian Participation, related roles and entities, since the custodian values of the transformed CDA document shall be set according to institution policies.
- Mapping of the DICOM SR Document General Participant Sequence (0040,A07A) [1] : Participations of type "SOURCE" (Equipment that contributed to the content) are not mapped to the CDA Release 2.
- 540 The DICOM Template 2000 [2] does not specify default values for the device observer that are based on the participant sequence.
- Attributes of the Predecessor Documents Sequence (0040,A360) and Identical Documents Sequence (0040.A525) are not mapped since they are relevant only in the context of the original DICOM SR document.
- 545 - Attributes of the Current Requested Procedure Evidence Sequence (0040,A375), Pertinent Other Evidence Sequence (0040,A385) and Equivalent Document Sequence (0040,A090) are not mapped since they are relevant only in the context of the original DICOM SR document.

SOP Common Module

- 550 - Timezone Offset From UTC (0008,0201) [1] shall be considered for attributes of the original DICOM SR document that are based on the DA or TM data type [4].
- The Specific Character Set (0008,0005) is required (Type 1C) if the Basic Graphic Set is expanded or replaced [1]. This is the basis for mapping DICOM character sets to CDA Unicode (<?xml version="1.0" encoding="UTF-8"?>)

555

Note: Ambiguities exist for mapping individual characters to unicode (e.g. for Japanese characters). Resolution of those issues is beyond the scope of this document.

Header Mapping Tables

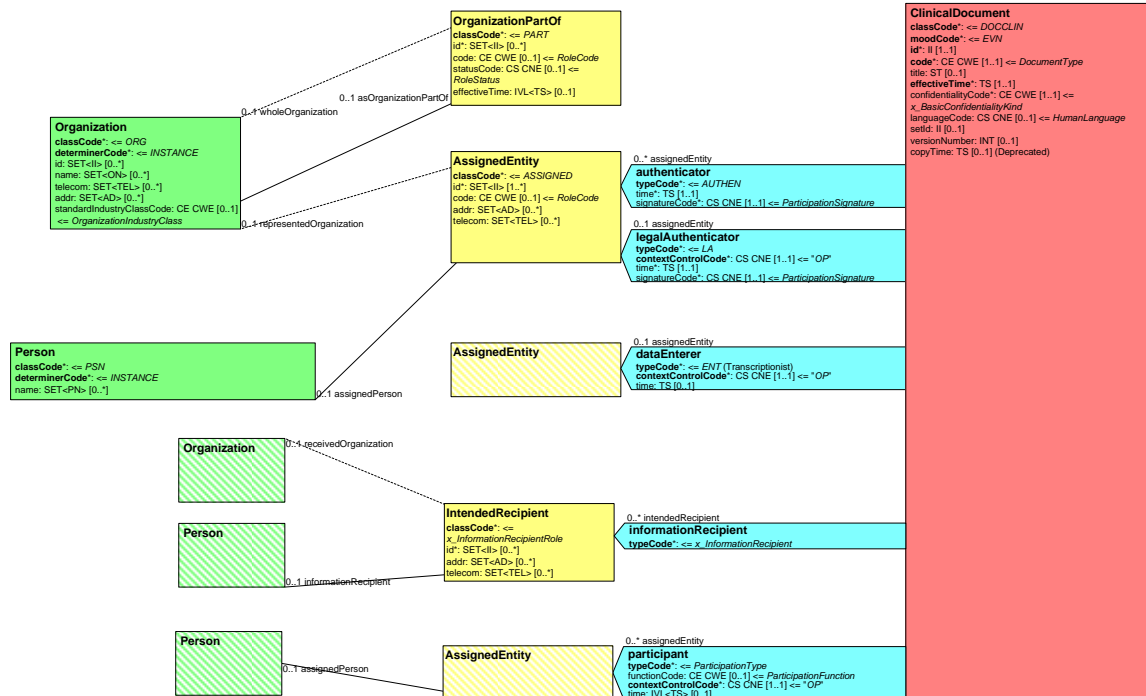


Figure 6
CLINICAL DOCUMENT HEADER PARTICIPATIONS

Clinical Document

Table 3
CLINICAL DOCUMENT

Attribute	Data Type	Multiplicity	Value
classCode	CS	1..1	DOCCLIN
moodCode	CS	1..1	EVN
id	II	1..1	<i>Insert requirement... (as specified for document minimal context)</i>
code	CE	1..1	Concept name code sequence (0040,A043) of the root content item <Code Value (0008,0100) as code property, 1.2.840.10008.2.16.4 as codeSystem property, DCM as codeSystemName property, Code Meaning (0008,0104) as displayName property.
title	ST	0..1	Code Meaning (0008,0104) of DCM, "Equivalent Meaning of Concept Name" (Template 1210)
effectiveTime	TS	1..1	Content Date (0008,0023), Content Time (0008,0033) of the SR Document General Module
confidentialityCode	CE	1..1	Defaults to "N" (Normal confidentiality rules). Other values may be used in accordance with local policies.
languageCode	CS	0..1	Code Sequence (0040,A043) of "Language of Content Item and Descendants" code content item (TID 1204): <code value as

			code property, coding scheme designator as codeSystemName property, code meaning as displayName property> (as defined by the IETF (Internet Engineering Task Force) RFC 3066)
setID	II	0..1	Assign new setID
versionNumber	INT	0..1	Assign new versionNumber
copyTime	TS	0..1	Deprecated

For the mapping of parent document attributes (i.e. the transformed original DICOM SR document) refer to table 21.

570 Authenticator Participation

The attributes of the SR Document General Module Participant Sequence (0040,A07A) [1] are mapped to the authenticator participation, associated role and entity as specied in table 4 to 6 if the participation type value equals "ATTEST" (Attestor).

575

Table 4
AUTHENTICATOR PARTICIPATION

Attribute	Data Type	Multiplicity	Value
typeCode	CS	1..1	AUTHEN
time	TS	1..1	Participation Datetime (0040,A082) of Participant Sequence (0040,A07A) if Participation Type (0040,A080) equals "ATTEST" (Attestor).
signatureCode	CS	1..1	S (Signature has been affixed) if DICOM attestor attribute values are set in the original document.

**Table 5
ASSIGNED ENTITY**

Attribute	Data Type	Multiplicity	Value
classCode	CS	1..1	ASSIGNED
id	SET<II>	1..*	Person Identification Code Sequence (0040,1101): code value as identifier
code	CE	0..1	Person Identification Code Sequence (0040,1101): <code value as code property, 1.2.840.10008.2.16.4 as codeSystem property, DCM as codeSystemName property, code meaning as displayName property>
addr	SET<AD>	0..*	Not mapped, no such DICOM attribute for attestor specified.
telecom	SET<TEL>	0..*	Not mapped, no such DICOM attribute for attestor specified.

580

DICOM does not specify any attributes for organization that can be mapped to organization entity.

**Table 6
PERSON**

Attribute	Data Type	Multiplicity	Value
classCode	CS	1..1	PSN
determinerCode	CS	1..1	INSTANCE
name	SET<PN>	0..*	Person Name (0040,A123) of Participant Sequence (0040,A07A) if Participation Type (0040,A080) equals "ATTEST" (Attestor).

585 Legal Authenticator Participation

The SR Document General Module attributes related to document verification [1] are mapped to the legal authenticator participation, associated role and entities as specified in table 7 to 10.

590 The Verification Flag (0040,A493) cannot be mapped to the CDA since the CDA Release 2 does not specify such flags. If however legalAuthenticator attribute values are set, that implies that the document is verified. If not, the document is unverified. Recommendation: Each transformed DICOM SR document that is sent to information systems should be verified after it has been transcoded. Only verified documents should be exported.

**Table 7
LEGAL AUTHENTICATOR PARTICIPATION**

Attribute	Data Type	Multiplicity	Value
typeCode	CS	1..1	LA
contextControlCode	CS	1..1	OP

595

time	TS	1..1	Verification DateTime (0040,A030)
signatureCode	CS	1..1	S (Signature has been affixed) if Verification Flag (0040,A493) Value equals "VERIFIED".

Table 8
ASSIGNED ENTITY

Attribute	Data Type	Multiplicity	Value
classCode	CS	1..1	ASSIGNED
id	SET<II>	1..*	Verifying Observer Identification Code Sequence (0040,A088) : code value as identifier
code	CE	0..1	Verifying Observer Identification Code Sequence (0040,A088) : <code value as code property, 1.2.840.10008.2.16.4 as codeSystem property, DCM as codeSystemName property, code meaning as displayName property>
addr	SET<AD>	0..*	Not mapped, no such DICOM attribute for verifying observer specified.
telecom	SET<TEL>	0..*	Not mapped, no such DICOM attribute for verifying observer specified.

600

Table 9
ORGANIZATION

Attribute	Data Type	Multiplicity	Value
classCode	CS	1..1	ORG
determinerCode	CS	1..1	INSTANCE
id	SET<II>	0..*	Not mapped, no such DICOM attribute for verifying observer specified
name	SET<ON>	0..*	Verifying Organization (0040,A027)
telecom	SET<TEL>	0..*	Not mapped, no such DICOM attribute for verifying observer specified.
addr	SET<AD>	0..*	Not mapped, no such DICOM attribute for verifying observer specified.
standardIndustryClassCode	CE	0..1	Not mapped, no such DICOM attribute for verifying observer specified.

605

Table 10
PERSON

Attribute	Data Type	Multiplicity	Value
classCode	CS	1..1	PSN
determinerCode	CS	1..1	INSTANCE
name	SET<PN>	0..*	Verifying Observer Name (0040,A075)

610 Information Recipient Participation

The referring physician is considered the primary information recipient for both, inpatient as well as outpatient delivery of imaging services by default.

Information on the attending physician may be encoded by using the encompassing encounter | encounter participation (refer to table 26 to 28). This participation may also be used for encoding information of the
615 referrer if the primary information recipient is different from the referring physician.

The PRCP (Primary Information Recipient) code shall be used as a fixed value for type code as specified in table 11.

Table 11
INFORMATION RECIPIENT PARTICIPATION

Attribute	Data Type	Multiplicity	Value
typeCode	CS	1..1	PRCP

620

Attribute values of the original SR document General Study Module, Referring Physician Identification Sequence (0008,0096) are mapped as specified in table 12 to 14.

Table 12
ASSIGNED ENTITY ROLE

Attribute	Data Type	Multiplicity	Value
classCode	CS	1..1	ASSIGNED
id	SET<II>	0..*	Person Identification Code Sequence (0040,1101) of Referring Physician Identification Sequence (008,0096): code value as identifier
addr	SET<AD>	0..*	Person's Address (0040,1102) of Referring Physician Identification Sequence (008,0096): DICOM ST (Short Text) String Data Type
telecom	SET<TEL>	0..*	Person's Telephone Numbers (0040,1103) of Referring Physician Identification Sequence (008,0096): DICOM LO (Long String) String Data Type

625

Table 13
ORGANIZATION

Attribute	Data Type	Multiplicity	Value
classCode	CS	1..1	ORG
determinerCode	CS	1..1	INSTANCE
id	SET<II>	0..*	Institution Code Sequence (0008,0082) of Referring Physician Identification Sequence (008,0096): code value as identifier (will not be used if Institution Name is present)

name	SET<ON>	0..*	Institution Name (0008,0080) of Referring Physician Identification Sequence (008,0096) (will not be used if Institution Code Sequence is present and code value is mapped to id).
telecom	SET<TEL>	0..*	Not mapped, no such DICOM attribute for referring physician specified.
addr	SET<AD>	0..*	Institution Address (0008,0081) of Referring Physician Identification Sequence (008,0096)
standardIndustryClassCode	CE	0..1	Not mapped, no such DICOM attribute for referring physician specified.

630

**Table 14
PERSON**

Attribute	Data Type	Multiplicity	Value
classCode	CS	1..1	PSN
determinerCode	CS	1..1	INSTANCE
name	SET<PN>	0..*	Referring Physician's Name (0008,0090)

635 Data Enterer Participation

The attributes of the SR Document General Module Participant Sequence (0040,A07A) [1] are mapped to the dataEnterer participation, associated role and entity as specied in table 15 to 17 if the participation type value equals "ENT" (Data Enterer).

**Table 15
DATA ENTERER PARTICIPATION**

640

Attribute	Data Type	Multiplicity	Value
typeCode	CS	1..1	ENT
contextControlCode	CS	1..1	OP
time	TS	0..1	Participation Datetime (0040,A082) of Participant Sequence (0040,A07A) if Participation Type (0040,A080) equals "ENT" (Data Enterer).

**Table 16
ASSIGNED ENTITY**

Attribute	Data Type	Multiplicity	Value
classCode	CS	1..1	ASSIGNED
id	SET<II>	1..*	Person Identification Code Sequence (0040,1101): code value as identifier
code	CE	0..1	Person Identification Code Sequence (0040,1101): <code value as code property, 1.2.840.10008.2.16.4 as codeSystem property, DCM as codeSystemName property,

			code meaning as displayName property>
addr	SET<AD>	0..*	Not mapped, no such DICOM attribute for data enterer specified.
telecom	SET<TEL>	0..*	Not mapped, no such DICOM attribute for data enterer specified.

645 DICOM does not specify any attributes for organization that can be mapped to organization entity.

Table 17
PERSON

Attribute	Data Type	Multiplicity	Value
classCode	CS	1..1	PSN
determinerCode	CS	1..1	INSTANCE
name	SET<PN>	0..*	Person Name (0040,A123) of Participant Sequence (0040,A07A) if Participation Type (0040,A080) equals "ENT" (Data Enterer).

participant (Referrer) Participation

650 Attribute values of the original SR document General Study Module, Referring Physician Identification Sequence (0008,0096) are mapped as specified in table 18 to 20.

Table 18
REFERRING PHYSICIAN ENCOUNTER PARTICIPATION

Attribute	Data Type	Multiplicity	Value
typeCode	CS	1..1	REF
time	IVL<TS>	0..1	No DICOM attribute to map.

655

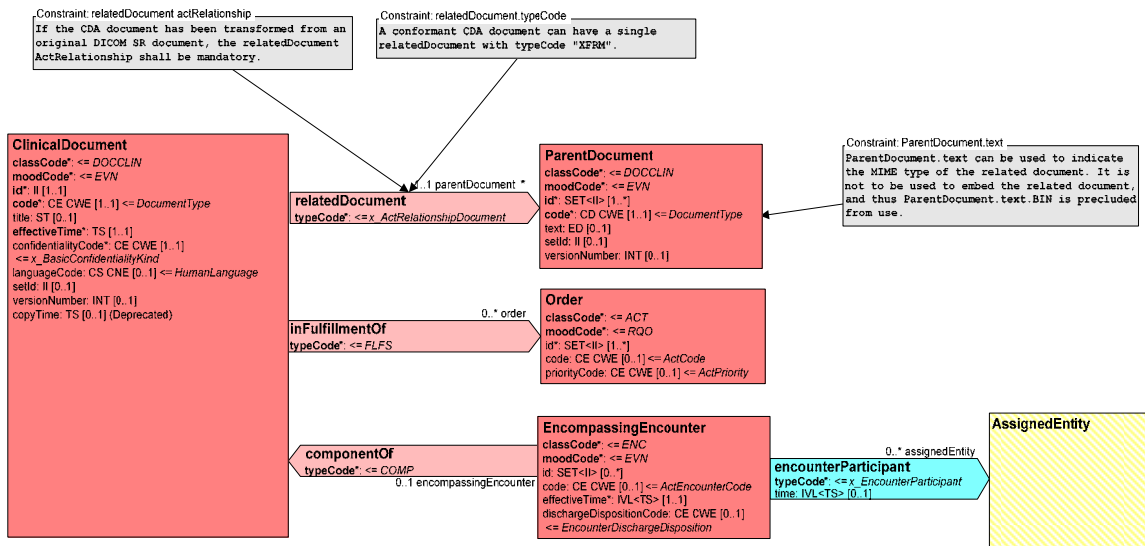
Table 19
Assigned Entity

Attribute	Data Type	Multiplicity	Value
classCode	CS	1..1	ASSIGNED
id	SET<II>	1..*	Referring Physician Identification Sequence (0008,0096): code value as identifier
code	CE	0..1	Referring Physician Identification Sequence (0008,0096): <code value as code property, 1.2.840.10008.2.16.4 as codeSystem property, DCM as codeSystemName property, code meaning as displayName property>
addr	SET<AD>	0..*	Person's Address (0040,1102) of Referring Physician Identification Sequence (008,0096): DICOM ST (Short Text) String Data Type
telecom	SET<TEL>	0..*	Person's Telephone Numbers (0040,1103) of Referring Physician Identification Sequence (008,0096): DICOM LO (Long String) String Data Type

**Table 20
PERSON**

Attribute	Data Type	Multiplicity	Value
classCode	CS	1..1	PSN
determinerCode	CS	1..1	INSTANCE
name	SET<PN>	0..*	Referring Physician's Name (0008,0090)

660



665

**Figure 7
CLINICAL DOCUMENT HEADER ACT RELATIONSHIPS**

Parent Document

RelatedDocument act relationship: Set typeCode to fixed value "XFRM" (for transformed parent DICOM SR document). The multiplicity of the act relationship is constrained to cardinality 1..1 (for a single original DICOM SR document that has been transformed to the CDA).

670

Related Parent Document

The SOP Instance UID (0008,0016) attribute value of the SOP Common Module is mapped to required CDA attribute ParentDocument.id.

675

**Table 21
PARENT DOCUMENT**

Attribute	Data Type	Multiplicity	Value
classCode	CS	1..1	DOCCLIN
moodCode	CS	1..1	EVN
id	SET<II>	1..*	SOP Instance UID of original DICOM SR Composite Object.
code	CD	1..1	DICOM SR Report Title: Concept Name Code Sequence (0040,A043) of Root Content Item.
text	ED	0..1	Not mapped.
setID	II	0..1	Not mapped, no such attribute specified for original DICOM SR document.
versionNumber	INT	0..1	Not mapped, no such attribute specified for original DICOM SR document.

Order Fulfillment

At least one of the following numbers of the SR Document header [1] shall be mapped to the CDA Order.id set of instance identifiers if the original DICOM SR document fulfills an order: Placer Order Number/Imaging Service Request (0040,2016), Filler Order Number/Imaging Service Request (0040,2017), Accession Number (0008,0050).

**Table 22
ORDER**

Attribute	Data Type	Multiplicity	Value
classCode	CS	1..1	ACT
moodCode	CS	1..1	RQO
id	SET<II>	1..*	Placer Order Number/Imaging Service Request (0040,2016), Filler Order Number/Imaging Service Request (0040,2017), Accession Number (0008,0050).
code	CE	0..1	Requested Procedure Code Sequence (0032,1064)
priorityCode	CE	0..1	Not mapped, no such attribute specified for original DICOM SR document.

Service Event

For the diagram related to the serviceEvent mapping refer to section 6.1.4.2 Procedure Context.

DICOM General Study Attributes Mapping:

- Physician(s) Reading Study attributes are mapped to the service event act class performer participation, associated roles and entities (refer to table 23 to 25).
- Physician(s) of Record attributes are mapped to the encompassing encounter act | encounter participation (typeCode = "ATND" for Attender), associated roles and entities (refer to table 26 to 28 and the information recipient section for the relationship to the primary information recipient).

695 **Service Event Performer Participation**

Attribute values of original SR document General Study Module, Physician(s) Reading Study (0008,1060) and Physician(s) Reading Study Identification Sequence (0008,1062) are mapped as specified in table 23 to 25.

700 **Table 23**
PHYSICIAN(S) READING STUDY PERFORMER PARTICIPATION

Attribute	Data Type	Multiplicity	Value
typeCode	CS	1..1	PRF
functionCode	CE	0..1	Not mapped, no such DICOM attribute for performer specified.
time	IVL<TS>	0..1	Not mapped, no such DICOM attribute for performer specified.

Table 24
ASSIGNED ENTITY

Attribute	Data Type	Multiplicity	Value
classCode	CS	1..1	ASSIGNED
id	SET<II>	1..*	Person Identification Code Sequence (0040,1101)) within Physician(s) Reading Study Identification Sequence (0008,1062) : code value as identifier
code	CE	0..1	Person Identification Code Sequence (0040,1101) within Physician(s) Reading Study Identification Sequence (0008,1062): <code value as code property, 1.2.840.10008.2.16.4 as codeSystem property, DCM as codeSystemName property, code meaning as displayName property>
addr	SET<AD>	0..*	Not mapped, no such DICOM attribute for performer specified.
telecom	SET<TEL>	0..*	Not mapped, no such DICOM attribute for data performer specified.

705 **Table 25**
PERSON

Attribute	Data Type	Multiplicity	Value
classCode	CS	1..1	PSN
determinerCode	CS	1..1	INSTANCE
name	SET<PN>	0..*	Name of Physician(s) Reading Study (0008,1060)

Encompassing Encounter

710 EncompassingEncounter.effectiveTime is a required attribute. There is no DICOM SR attribute specified that can be mapped, i.e. Visit Date and Time are not available. If the value cannot be obtained from some other source, the null flavor "UNK" (unknown) shall be assigned as EncompassingEncounter.effectiveTime value .

Attender Participation

- 715 Attribute values of the Physician(s) of Record Identification Sequence (0008,1049) within the General Study module [1] are mapped to the encompassing encounter act | encounter participation (typeCode = "ATND" for Attender), associated roles and entities.

Table 26
PHYSICIAN(S) OF RECORD ATTENDER PARTICIPATION

Attribute	Data Type	Multiplicity	Value
typeCode	CS	1..1	ATND
time	IVL<TS>	0..1	No DICOM attribute to map.

720

Table 27
Assigned Entity

Attribute	Data Type	Multiplicity	Value
classCode	CS	1..1	ASSIGNED
id	SET<II>	1..*	Physician(s) of Record Identification Sequence (0008,1049): code value as identifier
code	CE	0..1	Physician(s) of Record Identification Sequence (0008,1049): <code value as code property, 1.2.840.10008.2.16.4 as codeSystem property, DCM as codeSystemName property, code meaning as displayName property>
addr	SET<AD>	0..*	Not mapped, no such DICOM attribute for person observer specified.
telecom	SET<TEL>	0..*	Not mapped, no such DICOM attribute for person observer specified.

725

Table 28
PERSON

Attribute	Data Type	Multiplicity	Value
classCode	CS	1..1	PSN
determinerCode	CS	1..1	INSTANCE
name	SET<PN>	0..*	Physician(s) of Record (0008,1048)

6.1.2 Section (Level 2)

730 General Mapping of Document Sections

DICOM SR Container Content Items are mapped to CDA Clinical Document Sections.

Table 29
CDA Section Attributes

Attribute	Data Type	Multiplicity	Value
classCode	CS	1..1	DOCSECT
moodCode	CS	1..1	EVN
id	II	0..1	<i>Section Identifier</i>
code	CE	0..1	Concept Name Code Sequence (0040,A043) of the DICOM SR Container Content Item: <code value as code property, coding scheme oid as codeSystem property, coding scheme designator as codeSystemName property, code meaning as displayName property>
title	ST	0..1	If section title is intended to be rendered: Code meaning of Concept Name Code Sequence (0040,A043) of the DICOM SR Container Content Item.
text	ED	0..1	If section text is intended to be rendered: Narrative text
confidentialityCode	CE	0..1	If used the value defaults to "N" (Normal confidentiality rules). Other values may be used in accordance with local policies.
languageCode	CS	0..1	Not mapped, no DICOM attribute available.

735 CDA Section Text

Section.text contains the narrative text (attested content) of the document. Section.text is populated from the contents of DICOM SR content items. The narrative text of the transcoded CDA document, in that sense, is an extract of the structured body of the original DICOM SR Basic Diagnostic Imaging Report. The extraction of selected parts of the DICOM SR structured body to the narrative section text is part of the application logic and is therefore beyond the scope of this implementation guide.

Structured CDA entries may be referenced within the narrative section text of the CDA document (refer to the CDA Release 2 Standard, Section 4.3.5.1 <content>). Parts of the structured body of the CDA document that are part of the attested content of the document shall be included in the narrative section text. To that end the associated CDA entries are extended by originalText elements and a reference value that can be derived from the entry act class code displayName.

```

<observation classCode="OBS" moodCode="EVN">

  <code code="121112" codeSystem="1.2.840.10008.2.16.4" codeSystemName="DCM" displayName="Source of Measurement">

    <originalText>

      <reference value="#SrceOfMeas2"/>

    </originalText>

  </code>

</observation>

```

CDA Sample Document Excerpt 1 Original text and reference value

755

Within section text a new paragraph may be used for CDA entries that are inserted as part of the attested content. The caption value may be derived from the code displayName value. The attribute value of reference value shall be used for the content ID attribute.

```

<paragraph>
760  <caption>Source of Measurement</caption>

      <content ID=" SrceOfMeas2"/>

      ...

</paragraph>

```

CDA Sample Document Excerpt 2

Section text paragraph

For CDA entries (structured part) WADO references are included in observation text as reference value.

```

<observation classCode="DGIMG" moodCode="EVN">
...
770  <text xsi:type="ED" mediaType="application/DICOM">

      <!--reference to CR DICOM image (PA view) -->

      <reference value=
775  "http://www.example.org/wado?requestType=WADO&studyUID=1.2.840.113619.2.62.994044785528.114289542805&serie
      sUID=1.2.840.113619.2.62.994044785528.20060823223142485051&objectUID=1.2.840.113619.2.62.994044785528.20060823
      .200608232232322.3&contentType=application/DICOM"

      />

      </text>

      ...

</observation>

```

CDA Sample Document Excerpt 3

Observation text WADO reference

Within section text the same WADO reference may be included as the linkHtml href attribute value and the element value can be derived from the DICOM Study Description attribute value.

```

785  <linkHtml
      href="http://www.example.org/wado?requestType=WADO&studyUID=1.2.840.113619.2.62.994044785528.114289542805&serie
      ;seriesUID=1.2.840.113619.2.62.994044785528.20060823223142485051&objectUID=1.2.840.113619.2.62.994044785528.200
      60823.200608232232322.3&contentType=application/DICOM">Chest_PA

</linkHtml>

```

CDA Sample Document Excerpt 4

Section text WADO reference

Section.title and Section.text values shall be populated as shown in Table 29 above if the section is intended to be rendered. Sections that are not intended to be rendered such as the DICOM Objects Catalog shall not contain title and/or text values.

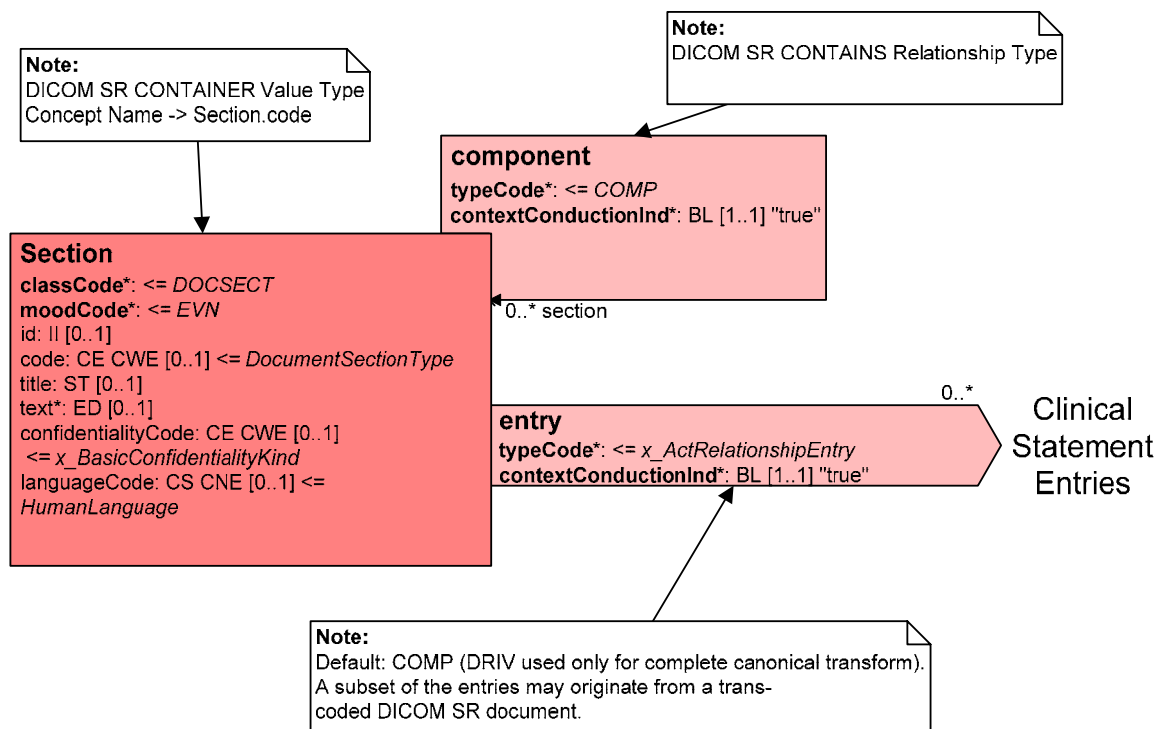


Figure 8
NESTED SECTIONS

800

DICOM SR Basic Diagnostic Imaging Reports include nested container content items. The root content item (value type “CONTAINER”) includes document sections (content items of value type “CONTAINER”) by applying relationships between those content items (relationship type “CONTAINS”).

805 The ClinicalDocument act class is associated with the StructuredBody act class by an act relationship (typeCode “COMP”). The structured body of the CDA contains sections that may be nested (recursive act relationship, typeCode = “COMP”). Nested DICOM SR sections within the document body are not used for SR Basic Diagnostic Imaging Reports (Template 2000). For other SR document types nested sections are mapped as shown in Figure 8 (recursive component act relationship).

810 **DICOM Object Catalog Section**

The DICOM Object Catalog Section provides a single location for the identifying information of the study/series/instance hierarchical context of DICOM composite objects that are referenced for a specific purpose (Refer to Annex B: Dicom Section (COCT_RM830110UV) for details. In the context of the CDA, entry act class and actRelationships names shall be used as specified for the CDA mapping).

815

6.1.3 Structured Body (Level 3)
Coded Observations

DICOM Template 2000 specifies that Imaging Report Elements of Value Type Code are contained in sections (row 6 and 8). The Imaging Report Elements are inferred from Basic Diagnostic Imaging Report Observations (Row 9) that consist of image references and measurements (linear, area, volume and numeric). Coded DICOM Imaging Report Elements in this context are mapped to CDA coded observations that are section components and are related to the SopInstance or QuantityMeasurement act classes by the SPRT (Support) act relationship (Figure 9).

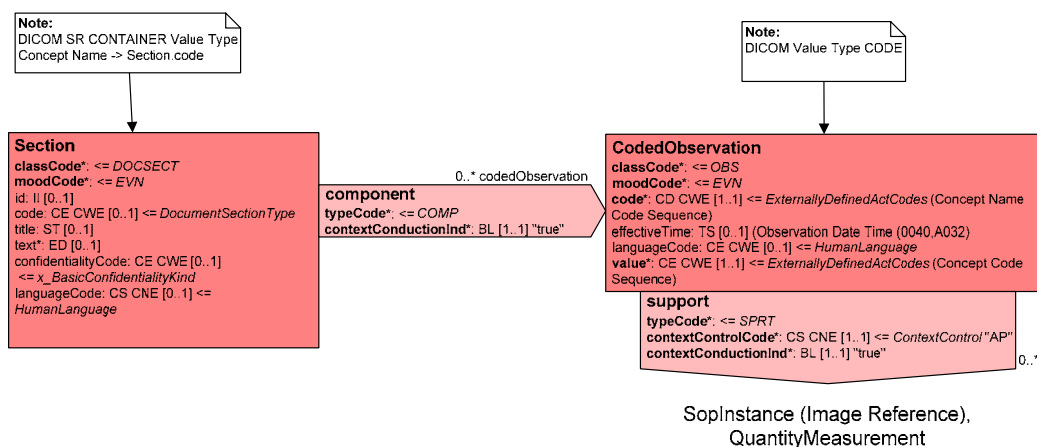


Figure 9
CODED OBSERVATION WITHIN SECTION

Table 30 shows the mapping of attribute values for DICOM Imaging Report Elements to CDA coded observation. The component act relationship between Section and CodedObservation is encoded as a section entry in CDA; CodedObservation as an observation CDA entry and the support act relationship as entryRelationship.

Table 30
CODED OBSERVATION (DICOM IMAGING REPORT ELEMENT, VALUE TYPE CODE)

Attribute	Data Type	Multiplicity	Value
classCode	CS	1..1	OBS
moodCode	CS	1..1	EVN
code	CE	1..1	Concept Name Code Sequence (0040,A043) of CODE Content Item:): <code value as code property, coding scheme designator as codeSystemName property, code meaning as displayName property>
effectiveTime	TS	0..1	Observation DateTime (0040,A032)
languageCode	CE	0..1	Not used at entry level.
value	CE	1..1	Concept Code Sequence (0040,A168) of CODE Content Item:): <code value as code property, coding scheme designator as codeSystemName property, code meaning as displayName property>

Text Observations

DICOM Template 2000 specifies that Imaging Report Elements of Value Type Text are contained in sections (row 6 and 10). The Imaging Report Elements are inferred from Basic Diagnostic Imaging Report Observations (Row 11) that consist of image references and measurements (linear, area, volume and numeric). Coded DICOM Imaging Report Elements in this context are mapped to CDA text observations that are section components and are related to the SopInstance or QuantityMeasurement act classes by the SPRT (Support) act relationship (Figure. 10).

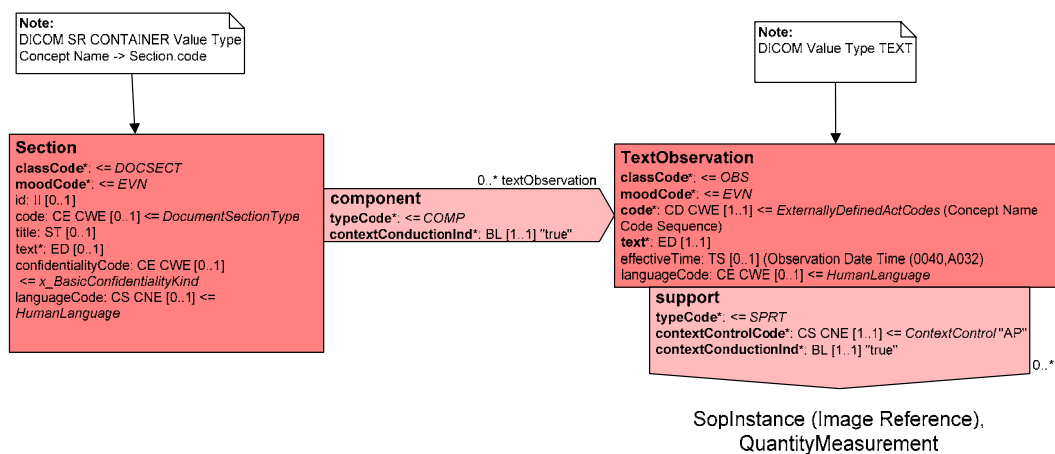


Figure 10
Text Observation within Section

Table 31 shows the mapping of attribute values for DICOM Imaging Report Elements to CDA text observation. The component act relationship between Section and TextObservation is encoded as a section entry in CDA; TextObservation as an observation CDA entry and the support act relationship as entryRelationship.

Table 31
TEXT OBSERVATION

Attribute	Data Type	Multiplicity	Value
classCode	CS	1..1	OBS
moodCode	CS	1..1	EVN
code	CE	1..1	Concept Name Code Sequence (0040,A043) of TEXT Content Item:): <code value as code property, coding scheme designator as codeSystemName property, code meaning as displayName property>
effectiveTime	TS	0..1	Observation DateTime (0040,A032)
languageCode	CE	0..1	Not used at entry level.
value	ED	1..1	Text Value (0040,A160) of TEXT Content Item

Image References and Measurements within Section

Image references and measurements (linear, area, volume and numeric) may also be inserted directly within sections (Template 2000, row 6 and 12). In this case CDA sections are related to SopInstance and/or QuantityMeasurement act classes via component (COMP) act relationships.

Quantity Measurement + DICOM Composite Object References

- 860 For the modeling of DICOM Composite Object References refer to Annex B:
A_DicomCompositeObjectReference minimal (COCT_RM830120UV). In the context of the CDA, entry act class and actRelationships names shall be used as specified for the CDA mapping. SOP Instance Constraints: Only Image and SR DICOM Composite Objects shall be referenced. Other non-image DICOM Composite Objects such as Waveforms and DICOM SR documents are excluded from the mapping.
- 865 The mapping of observations (i.e. quantity measurements based on image data) is specified below (structured contents of linear, area, volume and numeric measurements). CMET COCT_RM830120 „ReferencedDicomComposite Object“ (refer to Annex B) is reused for the mapping. Instead of starting directly with the SopInstance Act Class, the COCT_RM830120 pattern is applied in the context of Quantity Measurements (refer to Figure 11 for details).
- 870 **Quantity Measurement Act Class (Observation)**

Table 32
QUANTITY MEASUREMENT

Attribute	Data Type	Multiplicity	Value
classCode	CS	1..1	OBS
moodCode	CS	1..1	EVN
code	CE	1..1	Concept Name Code Sequence (0040,A043) of Numeric Measurement (NUM)
effectiveTime	TS	0..1	Observation DateTime (0040,A032)
languageCode	CE	0..1	Not used at entry level.
value	PQ	1..1	The Numeric Value (0040,A30A) DICOM decimal string (DS data type) is mapped to the value component of the PQ data type (real number). The contents of the Measurement Units Code Sequence (0040,08EA) macro are mapped to the unit component of the PQ data type (UCUM codes are used for the CS data type): unit of measure code value as code property

Subject Act Relationship (QuantityMeasurement to SopInstance)

- 875 Equivalent DICOM relationship types of the CDA SUBJ actRelationship in this context are: INFERRED FROM and R-INFERRED. CDA Release 2 does not specify reference relationships. However act class clones that carry a unique identifier only and omit other attribut values of the original act class may be used to that purpose.

- 880 The relation of quantity measurements to procedures and acts is specified in section 6.1.4.2 Procedure Context.

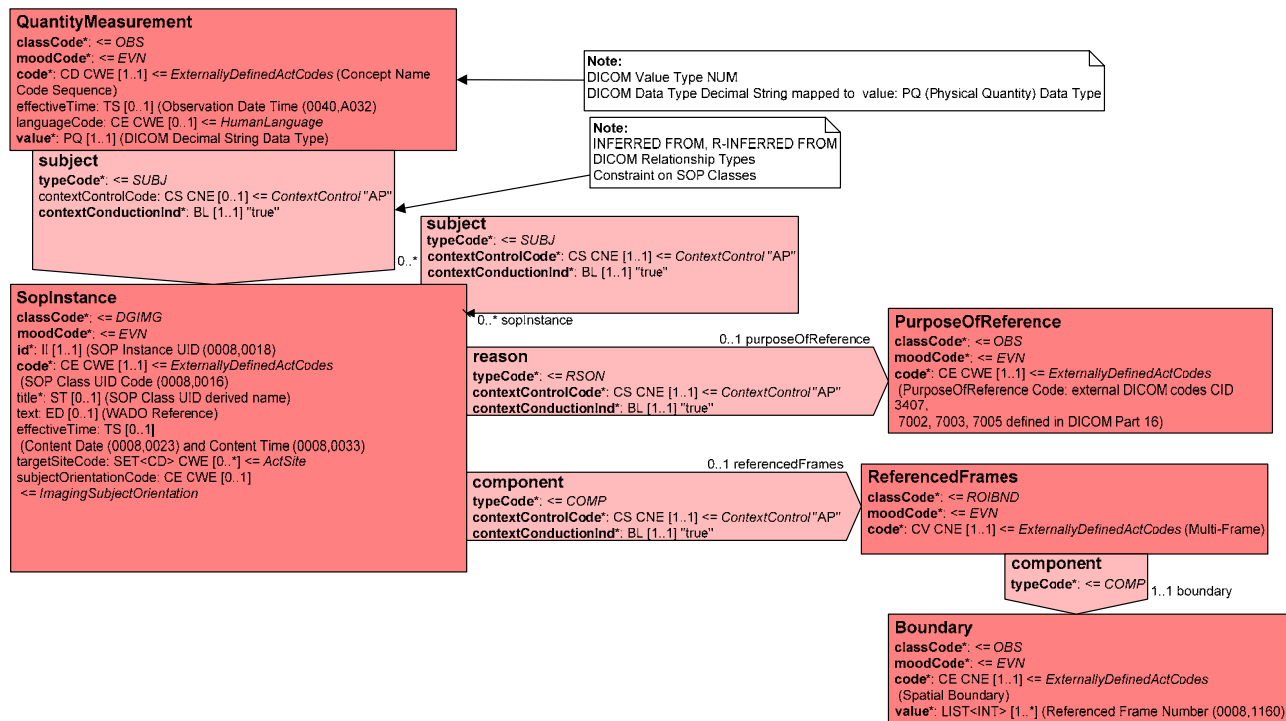


Figure 11
QUANTITY MEASUREMENT AND DICOM COMPOSITE OBJECT REFERENCE

The act relationships shown in figure 11 are encoded as entryRelationships in CDA; the act classes are represented as observations.

DICOM SR numeric measurements (value type NUM) are mapped to the QuantityMeasurement act class.

- 890 The QuantityMeasurement act class is associated with one or more SopInstance act classes. SopInstance is associated to one PurposeOfReference act class through the reason entry relationship.

Multi-frame Image References

- The DICOM Image Reference Macro (used for SR content items of value type IMAGE) allows for referencing individual frames of a multi-frame image if the reference does not apply to all frames. The individual referenced frames (DICOM attribute "Referenced Frame Number" (0008,1160)) are mapped to the value attribute (list of integers) of the boundary act class. For mapping quantity measurements (applies to SR template 1400, 1401, 1402 and 1404) that are related to frames of a multi-frame image, one ReferencedFrames act class is associated with SopInstance through an entryRelationship of type code component (Figure 11). The DICOM code 121190 "ReferencedFrames" is assigned to the ReferencedFrames.code attribute. The ReferencedFrames act class is related to one Boundary act class through an entryRelationship of type code component. In the context of mapping DICOM template 2000 the Boundary.value attribute contains the referenced frame number of the frame that is the basis for measurements or coded purpose of reference terms.

6.1.4 DICOM SR Observation Context

905 The observation context comprises the observer context data (the human observer or device that made the observation), the procedure context data (related to data acquisition and interpretation) and the subject context data (for patient, specimen and fetus being subject to the reported procedure). Sections 6.1.4.1, 6.1.4.2 and 6.1.4.3 specify the mapping.

6.1.4.1 Subject Context

910 *Subject Context, Patient*

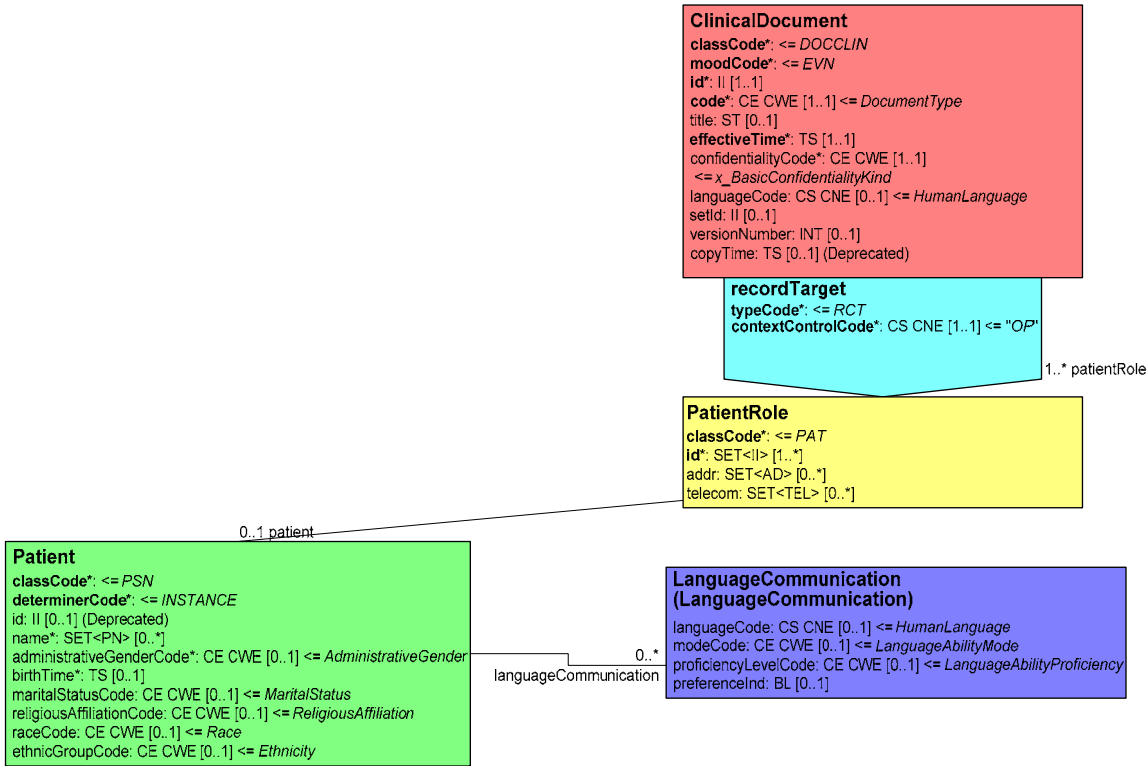


Figure 12
PATIENT CONTEXT

915 DICOM template 2000 [2] constrains the multiplicity of the patient subject to one per document. The patient context shall be mapped if the Subject Class Code (Template 1006, [2]) equals "Patient". Attributes of the Patient Module [1] and the Patient Subject Context (Template 1007, [2]) are mapped to the recordTarget participation, associated roles and entities.

Table 33
PATIENT ROLE

Attribute	Data Type	Multiplicity	Value
classCode	CS	1..1	PAT
id	SET<II>	1..*	"Subject ID": Defaults to value of Patient ID (0010,0020) in Patient Module. Other Patient IDs (0010,1000): may be mapped if appropriate infrastructure (master person index) and policies for domain identifier assignment are in place. The SET <II> data type does not provide use codes to distinguish multiple patient identifiers.
addr	SET<AD>	0..*	Patient's Address (0010,1040) in Patient Demographic Module.
telecom	SET<TEL>	0..*	Patient's Telephone Numbers (0010,2154)) in Patient Demographic Module.

Table 34
Patient Entity

Attribute	Data Type	Multiplicity	Value
classCode	CS	1..1	PSN
determinerCode	CS	1..1	INSTANCE
name	SET<PN>	0..*	"Subject Name": Defaults to value of Patient's Name (0010,0010) in Patient Module. Other Patient Names (0010,1001) may be mapped to if appropriate infrastructure (master person index) and policies for domain identifier assignment are in place. No specific use codes are provided by DICOM.
administrativeGenderCode	CE	0..1	"Subject Sex": Defaults to value equivalent to Patient's Sex (0010,0040) in Patient Module.
birthTime	TS	0..1	"Subject Birth Date": Defaults to value of Patient's Birth Date (0010,0030) in Patient Module.
maritalStatusCode	CE	0..1	Not mapped, no DICOM attribute specified.
religiousAffiliationCode	CE	0..1	Not mapped.
raceCode	CE	0..1	Not mapped..
ethnicGroupCode	CE	0..1	Ethnic Group (0010,2160) of Patient Module if present.

Subject Context, Fetus

Document Level

930 The header attributes shall contain values for mother as specified in Table 33 to 34. Refer to figure 12 for an overview on the recordTarget participation. The mother of the fetus is considered the patient and is therefore the recordTarget. Patient.name (Patient Entity, Table 34) or "Subject Name": Defaults to value of Patient's Name (0010,0010) in Patient Module, which shall be identical to TID 1008 PNAME ("Mother of fetus").

Section Level

935 The fetus subject is specified at section level.

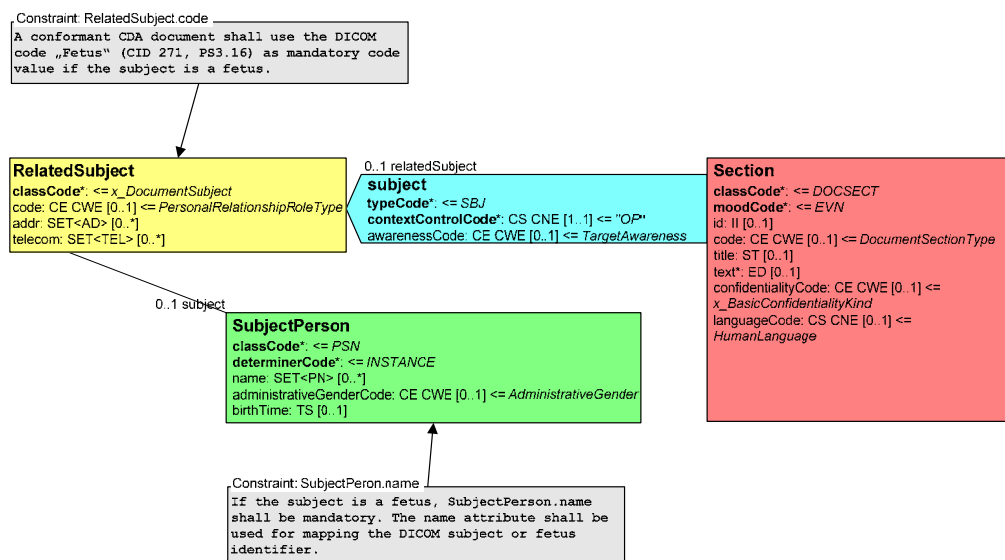


Figure 13
SUBJECT CONTEXT, FETUS

940

Table 35
RELATED SUBJECT, FETUS

Attribute	Data Type	Multiplicity	Value
classCode	CS	1..1	PRS (Personal Relationship)
code	CE	1..1	“Fetus” code (CID 271) extends value domain PersonalRelationshipRoleType <121026> as code property, 1.2.840.10008.2.16.4 as codeSystem property, DCM as codeSystemName property, “Fetus” as displayName property>
administrativeGenderCode	CE	0..1	Not mapped, no such DICOM attribute for fetus subject available
birthTime	TS	0..0	Not applicable (birthTime for fetus does not exist by definition).

945

Table 36
SUBJECT PERSON, FETUS

Attribute	Data Type	Multiplicity	Value
classCode	CS	1..1	PSN
determinerCode	CS	1..1	INSTANCE
name	SET<PN>	1..1	Subject ID or Fetus ID
telecom	SET<TEL>	0..*	Not mapped, no such DICOM attribute for fetus subject specified

CDA Release 2 does not specify a subject ID for mapping of Fetus Subject UID. Also the DICOM SR NUM content item that conveys the number of fetuses cannot be mapped from DICOM SR to the CDA Release 2 because the CDA Release 2 does not specify such an attribute. The fetus subject is always mapped in combination with the mother record target artifacts.

6.1.4.2 Procedure Context
CDA Header

Service Event Attribute Values default to DICOM SR „General Study“ Module Header Attribute Values.

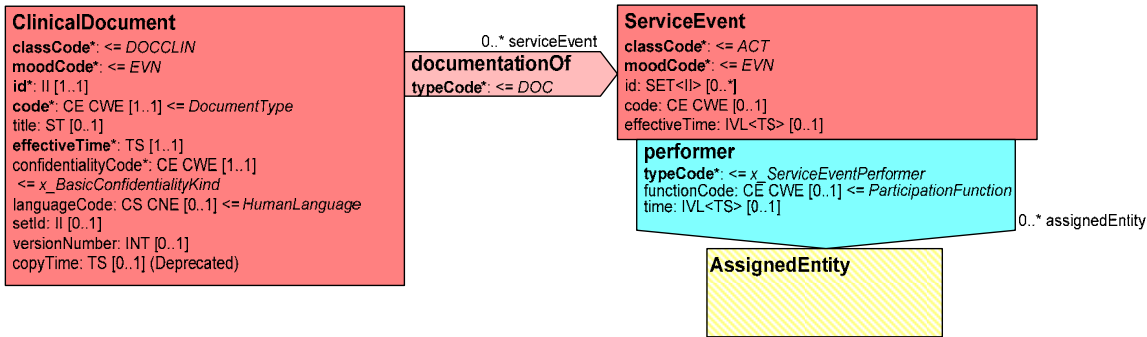


Figure 14
CDA Header Procedure Context (Service Event)

Table 37
SERVICE EVENT

Attribute	Data Type	Multiplicity	Value
classCode	CS	1..1	ACT
moodCode	CS	1..1	EVN
id	SET<II>	0..*	Study Instance UID (0020,000D) of the General Study Module, Requested Procedure ID (0040,1001) of the Referenced Request Sequence (0040,A370) of the SR Document General Module
code	CE	1..1	Procedure Code Sequence (0008,1032) or Procedure Code (Template 1005)
effectiveTime	IVL<TS>	0..1	Single TS is used instead of interval: Study Date (0008,0020) and Study Time (0008,0030)

For the mapping of Physician(s) reading study to the performer participation refer to Service Event Performer Participation (Table 23 to 25).

CDA Entries (Clinical Statement, Structured Body)

The ServiceEvent Procedure Context of the document header may be overridden in the CDA structured body if there is a need to refer to multiple imaging procedures or acts. The selection of the “Procedure” or “Act” entry from the clinical statement choice box depends on the nature of the imaging service that has been performed. The “Procedure” entry shall be used for image-guided interventions and minimal invasive imaging services, whereas the “Act” entry shall be used for diagnostic imaging services (based on Procedure Code Sequence (0008,1032) or Procedure Code (Template 1005) values). The set of attributes is identical for the “Procedure” and “Act” Context.

970

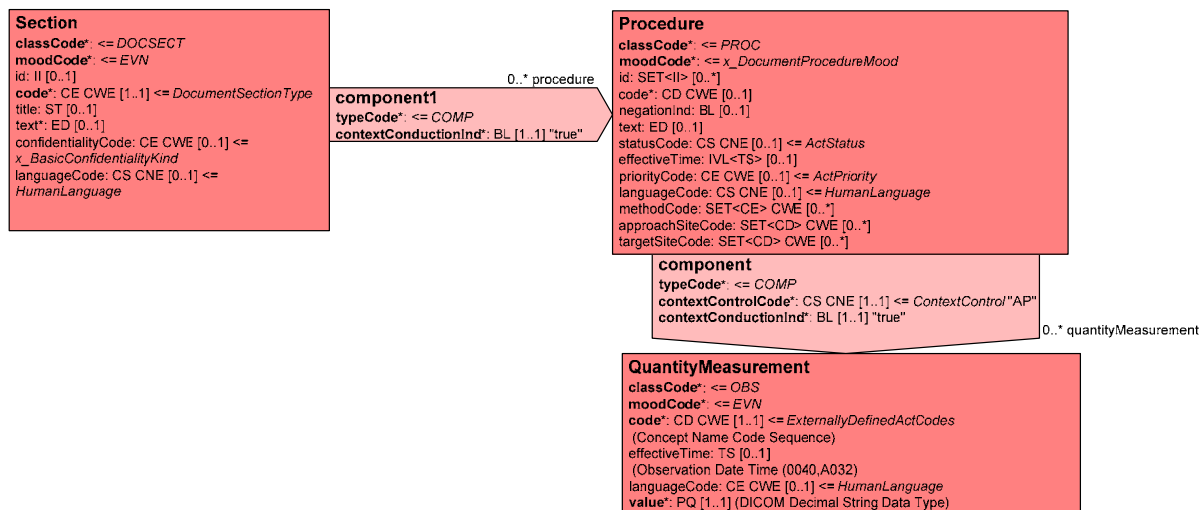


Figure 15

PROCEDURE CONTEXT FOR IMAGE-GUIDED INTERVENTIONS

975

Figures 15 and 16 show the procedure context for image-guided interventions and diagnostic imaging services and its relationship to CDA document sections plus quantity measurements. The component act relationship between Section and Procedure/Act is encoded as a section entry in CDA; QuantityMeasurement as an observation CDA entry and the component act relationship between Procedure/Act and QuantityMeasurement as entryRelationship.

980

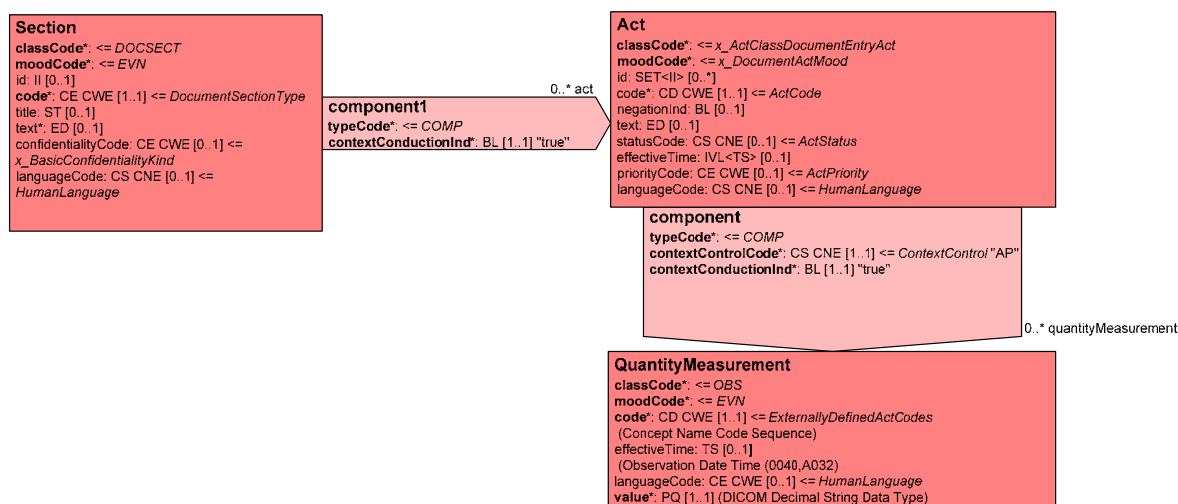


Figure 16

PROCEDURE CONTEXT FOR DIAGNOSTIC IMAGING SERVICES

Table 38
COMMON SET OF ATTRIBUTES FOR PROCEDURE AND ACT CONTEXT

Attribute	Data Type	Multiplicity	Value
classCode	CS	1..1	ACT
moodCode	CS	1..1	EVN
id	SET<II>	0..*	Not mapped, refer to Study Instance UID (0020,000D) of General Study Module mapped to ServiceEvent.id that is applied via context conduction
code	CE	1..1	Procedure Code Sequence (0008,1032) or Procedure Code (Template 1005)
text	ED	0..1	Study Description (0008,1030)
effectiveTime	IVL<TS>	0..1	Single TS is used instead of interval: Study Date (0008,0020) and Study Time (0008,0030)

6.1.4.3 Observer Context

990 The Observer Context (TID 1002, DICOM PS 3.16) maps to the author participation and associated roles and entities at document or section level. DICOM specifies a Person Observer (TID 1003, [2]) and a Device Observer (TID 1004, [2]). Depending on the DICOM SR Observer Type, attribute values are mapped to the Person or AuthoringDevice Entity in the AuthorChoice Box.

995 The Person and Device Observer Context used at document level (Figure 17) may be overridden at section level (Figure 18).

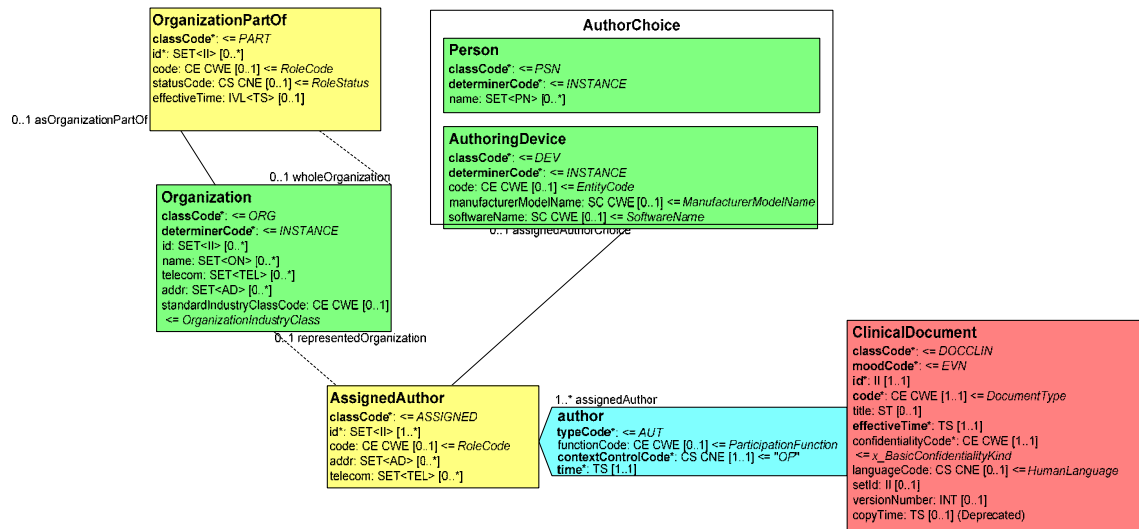


Figure 17
DOCUMENT OBSERVER CONTEXT

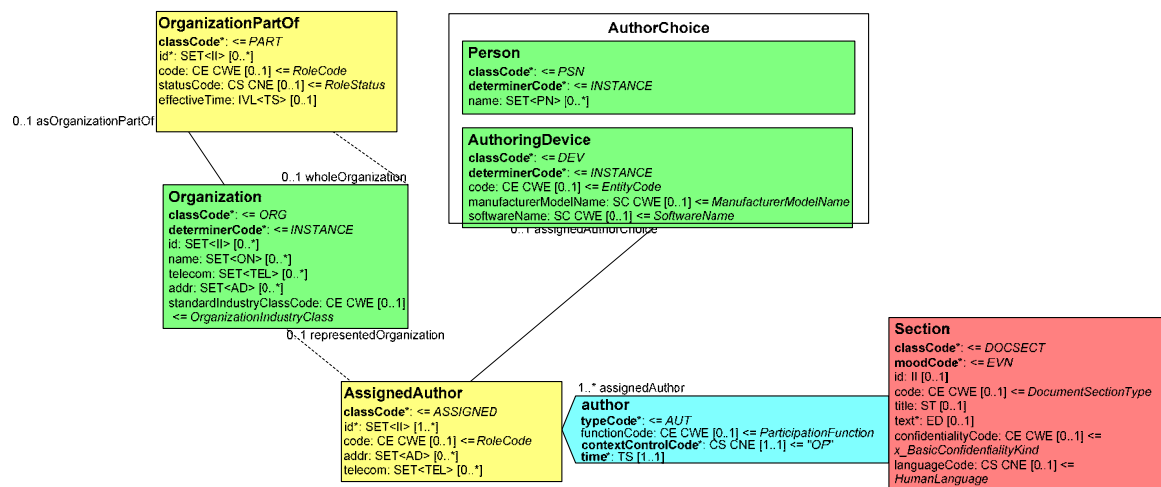


Figure 18
SECTION OBSERVER CONTEXT

Table 39
AUTHOR PARTICIPATION (FOR BOTH PERSON AND DEVICE OBSERVER)

Attribute	Data Type	Multiplicity	Value
typeCode	CS	1..1	AUT
functionCode	CE	0..1	Attribute value cannot be mapped, no such DICOM attribute specified
contextControlCode	CS	1..1	"OP"
time	TS	1..1	Content Date (0008,0023), Content Time (0008,0033) of the SR Document General Module

6.1.4.3.1 Person Observer

Attribute values of Template 1003 "Person Observer Identifying Attributes" [2] and the SR Document General Module are mapped to the CDA author participation, associated role and entities as specified in table 39 and 40 to 42. The DICOM attribute values of Person Observer's Role in this procedure and Person Observer's Role in the Organization cannot be mapped to CDA Release 2 since it does not specify equivalent attributes.

Table 40
ASSIGNED AUTHOR, PERSON OBSERVER CONTEXT

Attribute	Data Type	Multiplicity	Value
classCode	CS	1..1	ASSIGNED
id	SET<II>	1..*	Person Identification Code Sequence (0040,1101) of Author Observer Sequence (0040,A078) in SR Document General Module.
addr	SET<AD>	0..*	Not mapped, no such DICOM attribute for person observer specified.
telecom	SET<TEL>	0..*	Not mapped, no such DICOM attribute for person observer

specified.

Table 41
ORGANIZATION, PERSON OBSERVER CONTEXT

Attribute	Data Type	Multiplicity	Value
classCode	CS	1..1	ORG
determinerCode	CS	1..1	INSTANCE
id	SET<II>	0..*	Institution Code Sequence (0008,0082) of Author Observer Sequence (0040,A078) in SR Document General Module
name	SET<ON>	0..*	Person Observer's Organization Name (TID 1003), .
telecom	SET<TEL>	0..*	Not mapped, no such DICOM attribute for person observer specified.
addr	SET<AD>	0..*	Not mapped, no such DICOM attribute for person observer specified.
standardIndustryClassCode	CE	0..1	Not mapped, no such DICOM attribute for person observer specified.

1020

Table 42
PERSON, PERSON OBSERVER CONTEXT

Attribute	Data Type	Multiplicity	Value
classCode	CS	1..1	PSN
determinerCode	CS	1..1	INSTANCE
name	SET<PN>	0..*	Defaults to Person Name (0040,A123) of Author Observer Sequence (0040,A078) in SR Document General Module; otherwise Person Observer Name as specified in TID 1003 is used.

6.1.4.3.2 Device Observer

1025 Attribute values of Template 1004 "Device Observer Identifying Attributes" [2] and the SR Document General Module are mapped to the CDA author participation, associated role and entities as specified in table 39 and 43 to 45. DICOM does not specify attributes that would be mapped to the MaintainedEntity role and associated Person entity.

1030

Table 43
ASSIGNED AUTHOR, DEVICE OBSERVER CONTEXT

Attribute	Data Type	Multiplicity	Value
classCode	CS	1..1	ASSIGNED
id	SET<II>	1..*	Device Observer UID as specified in TID 1004
addr	SET<AD>	0..*	Device Observer Physical Location during observation UID as

telecom	SET<TEL>	0..*	specified by TID 1004 is used. Not mapped, no such DICOM attribute for device observer specified.
---------	----------	------	--

The DICOM attribute Device Observer Serial Number specified in TID 1004 cannot be mapped to CDA Release 2 because there is no equivalent attribute specified.

1035

Table 44
AUTHORING DEVICE, DEVICE OBSERVER CONTEXT

Attribute	Data Type	Multiplicity	Value
classCode	CS	1..1	DEV
determinerCode	CS	1..1	INSTANCE
code	CE	0..1	Defaults to Station Name (0008,1010) of Author Observer Sequence (0040,A078) in SR Document General Module.
manufacturerModelName	SC	0..1	Defaults to Device Observer Model Name (0008,1090) of Author Observer Sequence (0040,A078) in SR Document General Module; otherwise to Device Observer Model Name as specified by TID 1004 is used.
softwareName	SC	0..1	Not mapped, no such DICOM attribute for device observer specified.

Table 45
ORGANIZATION, DEVICE OBSERVER CONTEXT

Attribute	Data Type	Multiplicity	Value
classCode	CS	1..1	ORG
determinerCode	CS	1..1	INSTANCE
id	SET<II>	0..*	Not mapped, no such DICOM attribute for device observer specified.
name	SET<ON>	0..*	Manufacturer (0008,0070) of Author Observer Sequence (0040,A078) in SR Document General Module
telecom	SET<TEL>	0..*	Not mapped, no such DICOM attribute for device observer specified.
addr	SET<AD>	0..*	Not mapped, no such DICOM attribute for device observer specified.
standardIndustryClassCode	CE	0..1	Not mapped, no such DICOM attribute for device observer specified.

1040 **Annex A: Sample Documents**
1.1 DICOM SR “BASIC DIAGNOSTIC IMAGING REPORT” (TID 2000)

Sample document encoding (refer to section 5.1 for description)

Tag & Nesting Level	VR	Value	Attribute
(0008,0012)	DA	20060827	Instance Creation Date
(0008,0013)	TM	224157	Instance Creation Time
(0008,0014)	UI	1.2.276.0.7230010.3.0.3.5.4	Instance Creator UID
(0008,0016)	UI	1.2.840.10008.5.1.4.1.1.88.22	SOP Class UID
(0008,0018)	UI	1.2.840.113619.2.62.994044785528.2 0060823.200608232232322.9	SOP Instance UID
(0008,0020)	DA	20060823	Study Date
(0008,0023)	DA	20060823	Content Date
(0008,0030)	TM	222400	Study Time
(0008,0033)	TM	224352	Content Time
(0008,0050)	SH	10523475	Accession Number
(0008,0060)	CS	SR	Modality
(0008,0070)	LO	DicomWg20	Manufacturer
(0008,0090)	PN	Smith^John^^MD	Referring Physician's Name
(0008,1032)	SQ		Procedure Code Sequence
>BEGIN ITEM 1			
>(0008,0100)	SH	11123	Code Value
>(0008,0102)	SH	99WUHID	Coding Scheme Designator
>(0008,0104)	LO	X-Ray Study	Code Meaning
>END ITEM 1			
(0008,1111)	SQ		Referenced Study Component Sequence
(0010,0010)	PN	Doe^John	Patient's Name
(0010,0020)	LO	0000680029	Patient ID
(0010,0030)	DA	19641128	Patient's Birth Date
(0010,0040)	CS	M	Patient's Sex
(0020,000d)	UI	1.2.840.113619.2.62.994044785528.1 14289542805	Study Instance UID
(0020,000e)	UI	1.2.840.113619.2.62.994044785528.2 0060823223142485052	Series Instance UID
(0020,0010)	SH	10523475	Study ID
(0020,0011)	IS	560	Series Number
(0020,0013)	IS	07851	Instance Number
(0040,a040)	CS	CONTAINER	Value Type

(0040,a043)	SQ		Concept Name Code Sequence
>BEGIN ITEM 1			
>(0008,0100)	SH	18782-3	Code Value
>(0008,0102)	SH	LN	Coding Scheme Designator
>(0008,0104)	LO	X-Ray Report	Code Meaning
>END ITEM 1			
(0040,a050)	CS	SEPARATE	Continuity Of Content
(0040,a073)	SQ		Verifying Observer Sequence
>BEGIN ITEM 1			
>(0040,a027)	LO	World University Hospital	Verifying Organization
>(0040,a030)	DT	20060827141500	Verification DateTime
>(0040,a075)	PN	Blitz^Richard^^MD	Verifying Observer Name
>(0040,a088)	SQ		Verifying Observer Identification Code Sequence
>>BEGIN ITEM 1			
>>(0008,0100)	SH	08150000	Code Value
>>(0008,0102)	SH	99WUHID	Coding Scheme Designator
>>(0008,0104)	LO	Verifying Observer ID	Code Meaning
>>END ITEM 1			
>END ITEM 1			
(0040,a370)	SQ		Referenced Request Sequence
>BEGIN ITEM 1			
>(0008,0050)	SH	10523475	Accession Number
>(0008,1110)	SQ		Referenced Study Sequence
>>BEGIN ITEM 1			
>>(0008,1150)	UI	1.2.840.10008.5.1.4.1.1.1	Referenced SOP Class UID
>>(0008,1155)	UI	1.2.840.113619.2.62.994044785528.20060823.200608232232322.3	Referenced SOP Instance UID
>>END ITEM 1			
>(0020,000d)	UI	1.2.840.113619.2.62.994044785528.114289542805	Study Instance UID
>(0032,1060)	LO	CHEST TWO VIEWS, PA AND LATERAL	Requested Procedure Description
>(0032,1064)	SQ		Requested Procedure Code Sequence
>>BEGIN ITEM 1			

>>(0008,0100)	SH	11123	Code Value
>>(0008,0102)	SH	99WUHID	Coding Scheme Designator
>>(0008,0104)	LO	X-Ray Study	Code Meaning
>>END ITEM 1			
>(0040,1001)	SH	123453	Requested Procedure ID
>(0040,1002)	LO	Suspected lung tumor	Reason for the Requested Procedure
>(0040,2016)	LO	123451	Placer Order Number/Imaging Service Request
>(0040,2017)	LO	123452	Filler Order Number/Imaging Service Request
>END ITEM 1			
(0040,a372)	SQ		Performed Procedure Code Sequence
>BEGIN ITEM 1			
>(0008,0100)	SH	11123	Code Value
>(0008,0102)	SH	99WUHID	Coding Scheme Designator
>(0008,0104)	LO	X-Ray Study	Code Meaning
>END ITEM 1			
(0040,a375)	SQ		Current Requested Procedure Evidence Sequence
>BEGIN ITEM 1			
>(0008,1115)	SQ		Referenced Series Sequence
>>BEGIN ITEM 1			
>>(0008,1199)	SQ		Referenced SOP Sequence
>>>BEGIN ITEM 1			
>>>(0008,1150)	UI	1.2.840.10008.5.1.4.1.1.1	Referenced SOP Class UID
>>>(0008,1155)	UI	1.2.840.113619.2.62.994044785528.20060823.200608232232322.3	Referenced SOP Instance UID
>>>END ITEM 1			
>>>BEGIN ITEM 2			
>>>(0008,1150)	UI	1.2.840.10008.5.1.4.1.1.1	Referenced SOP Class UID
>>>(0008,1155)	UI	1.2.840.113619.2.62.994044785528.20060823.200608232231422.3	Referenced SOP Instance UID
>>>END ITEM 2			
>>(0020,000e)	UI	1.2.840.113619.2.62.994044785528.20060823223142485051	Series Instance UID

>>END ITEM 1			
>(0020,000d)	UI	1.2.840.113619.2.62.994044785528.1 14289542805	Study Instance UID
>END ITEM 1			
(0040,a491)	CS	COMPLETE	Completion Flag
(0040,a493)	CS	VERIFIED	Verification Flag
(0040,a730)	SQ		Content Sequence
>BEGIN ITEM 1			
>(0040,a010)	CS	HAS CONCEPT MOD	Relationship Type
>(0040,a040)	CS	CODE	Value Type
>(0040,a043)	SQ		Concept Name Code Sequence
>>BEGIN ITEM 1			
>>(0008,0100)	SH	121049	Code Value
>>(0008,0102)	SH	DCM	Coding Scheme Designator
>>(0008,0104)	LO	Language of Content Item and Descendants	Code Meaning
>>END ITEM 1			
>(0040,a168)	SQ		Concept Code Sequence
>>BEGIN ITEM 1			
>>(0008,0100)	SH	en-US	Code Value
>>(0008,0102)	SH	ISO639_1	Coding Scheme Designator
>>(0008,0104)	LO	English (U.S.)	Code Meaning
>>END ITEM 1			
>END ITEM 1			
>BEGIN ITEM 2			
>(0040,a010)	CS	HAS CONCEPT MOD	Relationship Type
>(0040,a040)	CS	TEXT	Value Type
>(0040,a043)	SQ		Concept Name Code Sequence
>>BEGIN ITEM 1			
>>(0008,0100)	SH	121050	Code Value
>>(0008,0102)	SH	DCM	Coding Scheme Designator
>>(0008,0104)	LO	Equivalent Meaning of Concept Name	Code Meaning
>>END ITEM 1			
>(0040,a160)	UT	Chest X-Ray, PA and LAT View	Text Value
>END ITEM 2			
>BEGIN ITEM 3			
>(0040,a010)	CS	HAS OBS CONTEXT	Relationship Type

>(0040,a040)	CS	CODE	Value Type
>(0040,a043)	SQ		Concept Name Code Sequence
>>BEGIN ITEM 1			
>>(0008,0100)	SH	121005	Code Value
>>(0008,0102)	SH	DCM	Coding Scheme Designator
>>(0008,0104)	LO	Observer Type	Code Meaning
>>END ITEM 1			
>(0040,a168)	SQ		Concept Code Sequence
>>BEGIN ITEM 1			
>>(0008,0100)	SH	121006	Code Value
>>(0008,0102)	SH	DCM	Coding Scheme Designator
>>(0008,0104)	LO	Person	Code Meaning
>>END ITEM 1			
>END ITEM 3			
>BEGIN ITEM 4			
>(0040,a010)	CS	HAS OBS CONTEXT	Relationship Type
>(0040,a040)	CS	PNAME	Value Type
>(0040,a043)	SQ		Concept Name Code Sequence
>>BEGIN ITEM 1			
>>(0008,0100)	SH	121008	Code Value
>>(0008,0102)	SH	DCM	Coding Scheme Designator
>>(0008,0104)	LO	Person Observer Name	Code Meaning
>>END ITEM 1			
>(0040,a123)	PN	Blitz^Richard^^MD	Person Name
>END ITEM 4			
>BEGIN ITEM 5			
>(0040,a010)	CS	CONTAINS	Relationship Type
>(0040,a040)	CS	CONTAINER	Value Type
>(0040,a043)	SQ		Concept Name Code Sequence
>>BEGIN ITEM 1			
>>(0008,0100)	SH	121060	Code Value
>>(0008,0102)	SH	DCM	Coding Scheme Designator
>>(0008,0104)	LO	History	Code Meaning
>>END ITEM 1			
>(0040,a050)	CS	SEPARATE	Continuity Of Content
>(0040,a730)	SQ		Content Sequence

>>BEGIN ITEM 1			
>>(0040,a010)	CS	CONTAINS	Relationship Type
>>(0040,a040)	CS	TEXT	Value Type
>>(0040,a043)	SQ		Concept Name Code Sequence
>>>BEGIN ITEM 1			
>>>(0008,0100)	SH	121060	Code Value
>>>(0008,0102)	SH	DCM	Coding Scheme Designator
>>>(0008,0104)	LO	History	Code Meaning
>>>END ITEM 1			
>>(0040,a160)	UT	Sore throat.	Text Value
>>END ITEM 1			
>END ITEM 5			
>BEGIN ITEM 6			
>(0040,a010)	CS	CONTAINS	Relationship Type
>(0040,a040)	CS	CONTAINER	Value Type
>(0040,a043)	SQ		Concept Name Code Sequence
>>BEGIN ITEM 1			
>>(0008,0100)	SH	121070	Code Value
>>(0008,0102)	SH	DCM	Coding Scheme Designator
>>(0008,0104)	LO	Findings	Code Meaning
>>END ITEM 1			
>(0040,a050)	CS	SEPARATE	Continuity Of Content
>(0040,a730)	SQ		Content Sequence
>>BEGIN ITEM 1			
>>(0040,a010)	CS	CONTAINS	Relationship Type
>>(0040,a040)	CS	TEXT	Value Type
>>(0040,a043)	SQ		Concept Name Code Sequence
>>>BEGIN ITEM 1			
>>>(0008,0100)	SH	121071	Code Value
>>>(0008,0102)	SH	DCM	Coding Scheme Designator
>>>(0008,0104)	LO	Finding	Code Meaning
>>>END ITEM 1			

>>(0040,a160)	UT	The cardiomediatinum is within normal limits. The trachea is midline. The previously described opacity at the medial right lung base has cleared. There are no new infiltrates. There is a new round density at the left hilus, superiorly (diameter about 45mm). A CT scan is recommended for further evaluation. The pleural spaces are clear. The visualized musculoskeletal structures and the upper abdomen are stable and unremarkable.	Text Value
>>(0040,a730)	SQ		Content Sequence
>>>BEGIN ITEM 1			
>>>(0040,a010)	CS	INFERRED FROM	Relationship Type
>>>(0040,a032)	DT	20060823223912	Observation DateTime
>>>(0040,a040)	CS	NUM	Value Type
>>>(0040,a043)	SQ		Concept Name Code Sequence
>>>>BEGIN ITEM 1			
>>>>(0008,0100)	SH	M-02550	Code Value
>>>>(0008,0102)	SH	SNM3	Coding Scheme Designator
>>>>(0008,0104)	LO	Diameter	Code Meaning
>>>>END ITEM 1			
>>>(0040,a300)	SQ		Measured Value Sequence
>>>>BEGIN ITEM 1			
>>>>(0040,08ea)	SQ		Measurement Units Code Sequence
>>>>>BEGIN ITEM 1			
>>>>>(0008,0100)	SH	mm	Code Value
>>>>>(0008,0102)	SH	UCUM	Coding Scheme Designator
>>>>>(0008,0103)	SH	1.5	Coding Scheme Version
>>>>>(0008,0104)	LO	mm	Code Meaning
>>>>>END ITEM 1			
>>>>(0040,a30a)	DS	45	Numeric Value
>>>>END ITEM 1			
>>>(0040,a730)	SQ		Content Sequence
>>>>BEGIN ITEM 1			
>>>>(0008,1199)	SQ		Referenced SOP Sequence
>>>>>BEGIN ITEM 1			
>>>>>(0008,1150)	UI	1.2.840.10008.5.1.4.1.1.1	Referenced SOP Class UID
>>>>>(0008,1155)	UI	1.2.840.113619.2.62.994044785528.20060823.200608232232322.3	Referenced SOP Instance UID

>>>>END ITEM 1			
>>>>(0040,a010)	CS	INFERRED FROM	Relationship Type
>>>>(0040,a040)	CS	IMAGE	Value Type
>>>>(0040,a043)	SQ		Concept Name Code Sequence
>>>>BEGIN ITEM 1			
>>>>(0008,0100)	SH	121112	Code Value
>>>>(0008,0102)	SH	DCM	Coding Scheme Designator
>>>>(0008,0104)	LO	Source of Measurement	Code Meaning
>>>>END ITEM 1			
>>>>END ITEM 1			
>>>END ITEM 1			
>>END ITEM 1			
>END ITEM 6			
>BEGIN ITEM 7			
>(0040,a010)	CS	CONTAINS	Relationship Type
>(0040,a040)	CS	CONTAINER	Value Type
>(0040,a043)	SQ		Concept Name Code Sequence
>>BEGIN ITEM 1			
>>(0008,0100)	SH	121072	Code Value
>>(0008,0102)	SH	DCM	Coding Scheme Designator
>>(0008,0104)	LO	Impressions	Code Meaning
>>END ITEM 1			
>(0040,a050)	CS	SEPARATE	Continuity Of Content
>(0040,a730)	SQ		Content Sequence
>>BEGIN ITEM 1			
>>(0040,a010)	CS	CONTAINS	Relationship Type
>>(0040,a040)	CS	TEXT	Value Type
>>(0040,a043)	SQ		Concept Name Code Sequence
>>>BEGIN ITEM 1			
>>>(0008,0100)	SH	121073	Code Value
>>>(0008,0102)	SH	DCM	Coding Scheme Designator
>>>(0008,0104)	LO	Impression	Code Meaning
>>>END ITEM 1			
>>(0040,a160)	UT	No acute cardiopulmonary process. Round density in left superior hilus, further evaluation with CT is recommended as underlying	Text Value

		malignancy is not excluded.	
>>END ITEM 1			
>END ITEM 7			

1.2 TRANSCODED HL7 CDA RELEASE2 “DIAGNOSTIC IMAGING REPORT”

1045

```
<?xml version="1.0" encoding="UTF-8"?>
```

```
<?xml-stylesheet type="text/xsl" href="CDA.xsl"?>
```

```
<ClinicalDocument xmlns="urn:hl7-org:v3" xmlns:voc="urn:hl7-org:v3/voc" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="urn:hl7-org:v3 CDA.xsd">
```

1050 <typeId root="2.16.840.1.113883.1.3" extension="POCD_HD000040"/>

```
    <templateId root="2.16.840.1.113883.10" extension="CDAR2_II_BIMGRPTS_R1"/>
```

```
    <id root="1.2.840.113619.2.62.994044785528.12" extension="20060828170821659"/>
```

```
    <code code="18782-3" codeSystem="2.16.840.1.113883.6.1" codeSystemName="LOINC" displayName="X-Ray Report"/>
```

1055 <title>Chest X-Ray, PA and LAT View</title>

```
    <!-- from TID 1210 -->
```

```
    <effectiveTime value="20060828170821"/>
```

```
    <!-- fictive, can be different from SR study date and SR content date, SR instance creation date -->
```

```
    <confidentialityCode code="N" codeSystem="2.16.840.1.113883.5.25"/>
```

1060 <languageCode code="en-US"/>

```
    <!-- RFC 3066; ISO639_1-->
```

```
    <recordTarget>
```

```
        <patientRole>
```

```
            <id root="1.2.840.113619.2.62.994044785528.10" extension="0000680029"/>
```

1065 <!-- (0010,0020) {root}.10 = patient ID list -->

```
        <patient>
```

```
            <name>
```

```
                <given>John</given>
```

```
                <!-- (0010,0010) -->
```

1070 <family>Doe</family>

```
            </name>
```

```

        <administrativeGenderCode codeSystem="2.16.840.1.113883.5.1" code="M"/>
        <!-- (0010,0040) -->
        <birthTime value="19641128"/>
1075    <!-- (0010,0030) -->
        </patient>
        </patientRole>
    </recordTarget>
    <author>
1080    <time value="20060823224352"/>
        <!-- Content Date + Content Time-->
        <assignedAuthor>
            <id extension="121008" root="2.16.840.1.113883.19.5"/>
            <assignedPerson>
1085    <name>
                <given>Richard</given>
                <!-- (0040,A078) > (0040,A123) -->
                <family>Blitz</family>
                <suffix>MD</suffix>
1090    </name>
            </assignedPerson>
        </assignedAuthor>
    </author>
    <custodian>
1095    <!-- custodian values have been added based on organizational policy (in this case they are not mapped from the SR
sample document)-->
        <assignedCustodian>
            <representedCustodianOrganization>
                <id root="2.16.840.1.113883.19.5"/>
1100    <name>World University Hospital</name>
            </representedCustodianOrganization>
        </assignedCustodian>
    </custodian>
    <!-- legal authenticator present in sample, document is VERIFIED -->

```

```

1105     <legalAuthenticator>
          <time value="20060827141500"/>
          <!-- verification date time (0040,A030)-->
          <signatureCode code="S"/>
          <assignedEntity>
1110     <id extension="08150000" root="1.2.840.113619.2.62.994044785528.33"/>
          <assignedPerson>
            <name>
              <given>Richard</given>
              <family>Blitz</family>
1115     <suffix>MD</suffix>
            </name>
          </assignedPerson>
        </assignedEntity>
      </legalAuthenticator>
1120 <!-- Mapped from Referring physicians name (0008,0090) SR sample document -->
      <participant typeCode="REF">
        <associatedEntity classCode="PROV">
          <id nullFlavor="UNK"/>
          <associatedPerson>
1125     <name>
              <given>John</given>
              <family>Smith</family>
              <suffix>MD</suffix>
            </name>
          </associatedPerson>
1130     </associatedEntity>
        </participant>
        <inFulfillmentOf>
          <order>
1135     <id extension="10523475" root="1.2.840.113619.2.62.994044785528.27"/>
          <!-- {root}.27 of accession number added based on organizational policy (not present in SR sample document
because root is not specified by DICOM)-->

```

1140

<id extension="123452" root="1.2.840.113619.2.62.994044785528.28"/>

<!-- {root}.28 of filler order number added based on organizational policy (not present in SR sample document because root is not specified by DICOM)-->

<id extension="123451" root="1.2.840.113619.2.62.994044785528.29"/>

<!-- {root}.29 of placer order number added based on organizational policy (not present in SR sample document because root is not specified by DICOM)-->

</order>

</inFulfillmentOf>

<documentationOf>

<serviceEvent classCode="ACT">

<id root="1.2.840.113619.2.62.994044785528.114289542805"/>

<!-- study instance UID -->

1150

<id extension="123453" root="1.2.840.113619.2.62.994044785528.26"/>

<!-- {root}.26 of requested procedure ID added based on organizational policy (not present in SR sample document because root is not specified by DICOM)-->

<effectiveTime value="20060823222400"/>

<!-- (0008,0020) Study Date + (0008,0030) Study Time -->

1155

</serviceEvent>

</documentationOf>

<!-- transformation of a DICOM SR -->

<relatedDocument typeCode="XFRM">

<parentDocument>

1160

<id root="1.2.840.113619.2.62.994044785528.20060823.200608232232322.9"/>

<!-- SOP Instance UID (0008,0018) of SR sample document-->

</parentDocument>

</relatedDocument>

<component>

1165

<structuredBody>

<component>

<!--

DICOM Object Catalog Section

1170

-->

```

        <section classCode="DOCSECT" moodCode="EVN">

            <code code="121181" codeSystem="1.2.840.10008.2.16.4" codeSystemName="DCM"
displayName="DICOM Object Catalog"/>

1175         <entry>

            <!--

            *****

            Study

            *****

1180         -->

            <act classCode="ACT" moodCode="EVN">

                <id root="1.2.840.113619.2.62.994044785528.114289542805"/>

                <code code="113014" codeSystem="1.2.840.10008.2.16.4" codeSystemName="DCM"
displayName="Study"/>

1185            <!--

            *****

            Series

            *****

            -->

1190            <entryRelationship typeCode="COMP">

                <act classCode="ACT" moodCode="EVN">

                    <id root="1.2.840.113619.2.62.994044785528.20060823223142485051"/>

                    <code code="113015" codeSystem="1.2.840.10008.2.16.4" codeSystemName="DCM"
displayName="Series">

1195                        <qualifier>

                            <name code="121139" codeSystem="1.2.840.10008.2.16.4"
codeSystemName="DCM" displayName="Modality"> </name>

                            <value code="CR" codeSystem="1.2.840.10008.2.16.4" codeSystemName="DCM"
displayName="Computed Radiography"> </value>

1200                        </qualifier>

                            </code>

                            <!--

                            *****

                            SopInstance UID

1205                            *****

                            -->

```

```

<!-- 2 References (chest PA and LAT) -->

<entryRelationship typeCode="COMP">

  <observation classCode="DGIMG" moodCode="EVN">

1210      <id root="1.2.840.113619.2.62.994044785528.20060823.200608232232322.3"/>

          <code code="1.2.840.10008.5.1.4.1.1.1" codeSystem="1.2.840.10008.2.6.1"
codeSystemName="DCMUID" displayName="Computed Radiography Image Storage">

            </code>

            <text xsi:type="ED" mediaType="application/DICOM">

1215      <reference
value="http://www.example.org/wado?requestType=WADO&studyUID=1.2.840.113619.2.62.994044785528.114289542
805&seriesUID=1.2.840.113619.2.62.994044785528.20060823223142485051&objectUID=1.2.840.113619.2.62.99
4044785528.20060823.200608232232322.3&contentType=application/DICOM"/>

          <!--reference to image 1 (PA) -->

1220      </text>

          <effectiveTime value="20060823223232"/>

        </observation>

      </entryRelationship>

      <entryRelationship typeCode="COMP">

1225      <observation classCode="DGIMG" moodCode="EVN">

          <id root="1.2.840.113619.2.62.994044785528.20060823.200608232231422.3"/>

          <code code="1.2.840.10008.5.1.4.1.1.1" codeSystem="1.2.840.10008.2.6.1"
codeSystemName="DCMUID" displayName="Computed Radiography Image Storage">

            </code>

1230      <text xsi:type="ED" mediaType="application/DICOM">

          <reference
value="http://www.example.org/wado?requestType=WADO&studyUID=1.2.840.113619.2.62.994044785528.114289542
805&seriesUID=1.2.840.113619.2.62.994044785528.20060823223142485051&objectUID=1.2.840.113619.2.62.99
4044785528.20060823.200608232231422.3&contentType=application/DICOM"/>

1235      <!--reference to image 2 (LAT) -->

          </text>

          <effectiveTime value="20060823223142"/>

        </observation>

      </entryRelationship>

1240      </act>

    </entryRelationship>

  </act>

</entry>

```



```

1245      </section>

      <!--

      *****

      End of DICOM Object Catalog Section

      *****

      -->

1250      </component>

      <component>

      <!--

      *****

      Reason for study Section

1255      *****

      The original DICOM SR document that is mapped does not contain a "Indications for Procedure" section. The attribute value
      "Reason for the Requested Procedure" (0040,1002) within the Referenced Request Sequence (0040,A370) of the SR header
      has been mapped under the assumption that the header attribute value has been displayed to and included by the legal
      authenticator.

1260      -->

      <section>

          <code code="121109" codeSystem="1.2.840.10008.2.16.4" codeSystemName="DCM"
      displayName="Indications for Procedure"/>

          <title>Indications for Procedure</title>

1265      <text>Suspected lung tumor</text>

      </section>

      <!--

      *****

      Reason for study Section

1270      *****

      -->

      </component>

      <component>

      <!--

1275      *****

      History Section

      *****

      -->

```

```
<section>
1280     <code code="121060" codeSystem="1.2.840.10008.2.16.4" codeSystemName="DCM"
displayName="History"/>
        <title>History</title>
        <text>
            <paragraph>
1285                <caption>History</caption>
                <content ID="Fndng1">Sore throat.</content>
            </paragraph>
        </text>
        <entry>
1290            <!-- History report element (TEXT) -->
            <observation classCode="OBS" moodCode="EVN">
                <code code="121060" codeSystem="1.2.840.10008.2.16.4" codeSystemName="DCM"
displayName="History">
                    <originalText>
1295                        <reference value="#Fndng1"/>
                    </originalText>
                    </code>
                    <value xsi:type="ED" mediaType="text/plain">Sore throat.</value>
                </observation>
1300            </entry>
        </section>
        <!--
*****
End of History Section
1305 *****
-->
        </component>
        <component>
            <!--
1310 *****
Findings Section
*****
```

-->

<section>

1315 <code code="121070" codeSystem="1.2.840.10008.2.16.4" codeSystemName="DCM"
displayName="Findings"/>

<title>Findings</title>

<text>

<paragraph>

1320 <caption>Finding</caption>

<content ID="Fndng2">The cardiomediatinum is within normal limits. The trachea is midline. The previously described opacity at the medial right lung base has cleared. There are no new infiltrates. There is a new round density at the left hilus, superiorly (diameter about 45mm). A CT scan is recommended for further evaluation. The pleural spaces are clear. The visualized musculoskeletal structures and the upper abdomen are stable and unremarkable.</content>

1325 </paragraph>

<paragraph>

<caption>Diameter</caption>

<content ID="Diam2">45mm</content>

</paragraph>

1330 <paragraph>

<caption>Source of Measurement</caption>

<content ID="SrceOfMeas2">

<linkHtml

1335 href="http://www.example.org/wado?requestType=WADO&studyUID=1.2.840.113619.2.62.994044785528.1142895428
05&seriesUID=1.2.840.113619.2.62.994044785528.20060823223142485051&objectUID=1.2.840.113619.2.62.994
044785528.20060823.2006082322322.3&contentType=application/DICOM">Chest_PA

</linkHtml>

</content>

</paragraph>

1340 </text>

<entry>

<observation classCode="OBS" moodCode="EVN">

<code code="121071" codeSystem="1.2.840.10008.2.16.4" codeSystemName="DCM"
displayName="Finding">

1345 <originalText>

<reference value="#Fndng2"/>

</originalText>

</code>

<value xsi:type="ED" mediaType="text/plain">

1350 The cardiomedastinum is within normal limits. The trachea is midline. The previously described opacity at the medial right lung base has cleared. There are no new infiltrates. There is a new round density at the left hilus, superiorly (diameter about 45mm). A CT scan is recommended for further evaluation. The pleural spaces are clear. The visualized musculoskeletal structures and the upper abdomen are stable and unremarkable.

1355 </value>

1355 <!-- inferred from measurement -->

 <entryRelationship typeCode="SPRT">

 <observation classCode="OBS" moodCode="EVN">

 <code code="M-02550" codeSystem="2.16.840.1.113883.6.96" codeSystemName="SNM3" displayName="Diameter">

1360 <originalText>

 <reference value="#Diam2"/>

 </originalText>

 </code>

 <!-- no DICOM attribute <statusCode code="completed"/> -->

1365 <effectiveTime value="20060823223912"/>

 <value xsi:type="PQ" value="45" unit="mm">

 <translation code="mm" codeSystem="2.16.840.1.113883.6.8" codeSystemName="UCUM" codeSystemVersion="1.5"/>

 </value>

1370 <!-- inferred from image -->

 <entryRelationship typeCode="SUBJ">

 <observation classCode="DGIMG" moodCode="EVN">

 <!-- (0008,1155) Referenced SOP Instance UID-->

 <id root="1.2.840.113619.2.62.994044785528.20060823.200608232232322.3"/>

1375 <!-- (0008,1150) Referenced SOP Class UID -->

 <code code="1.2.840.10008.5.1.4.1.1.1" codeSystem="1.2.840.10008.2.6.1" codeSystemName="DCMUID" displayName="Computed Radiography Image Storage">

 </code>

 <text xsi:type="ED" mediaType="application/DICOM">

1380 <!--reference to CR DICOM image (PA view) -->

 <reference value="http://www.example.org/wado?requestType=WADO&studyUID=1.2.840.113619.2.62.994044785528.114289542805&seriesUID=1.2.840.113619.2.62.994044785528.20060823223142485051&objectUID=1.2.840.113619.2.62.994044785528.20060823.200608232232322.3&contentType=application/DICOM"/>

1385 </text>

 <effectiveTime value="20060823223232"/>

```

                                <!-- Purpose of Reference -->
                                <entryRelationship typeCode="RSON">
                                    <observation classCode="OBS" moodCode="EVN">
1390                                <code code="121112" codeSystem="1.2.840.10008.2.16.4"
                                codeSystemName="DCM" displayName="Source of Measurement">
                                    <originalText>
                                        <reference value="#SrceOfMeas2"/>
                                    </originalText>
1395                                </code>
                                    </observation>
                                </entryRelationship>
                                    </observation>
                                </entryRelationship>
1400                                </observation>
                                    </entryRelationship>
                                        </observation>
                                            </entry>
                                                </section>
1405                                <!--
                                *****
                                End of Findings Section
                                *****
                                -->
1410                                </component>
                                    <component>
                                        <!--
                                *****
                                Impressions Section
1415                                *****
                                -->
                                    <section>
                                        <code code="121072" codeSystem="1.2.840.10008.2.16.4" codeSystemName="DCM"
                                displayName="Impressions"/>
1420                                <title>Impressions</title>

```

```

        <text>
          <paragraph>
            <caption>Impression</caption>
            <content ID="Fndng3">No acute cardiopulmonary process. Round density in left superior hilus,
1425 further evaluation with CT is recommended as underlying malignancy is not excluded.</content>
          </paragraph>
        </text>
      <entry>
        <!-- Impression report element (TEXT) -->
1430      <observation classCode="OBS" moodCode="EVN">
          <code code="121073" codeSystem="1.2.840.10008.2.16.4" codeSystemName="DCM"
displayName="Impression">
            <originalText>
              <reference value="#Fndng3"/>
1435            </originalText>
          </code>
          <value xsi:type="ED" mediaType="text/plain">No acute cardiopulmonary process. Round density in
left superior hilus, further evaluation with CT is recommended as underlying malignancy is not excluded.
        </value>
1440      </observation>
    </entry>
  </section>
  <!--
*****

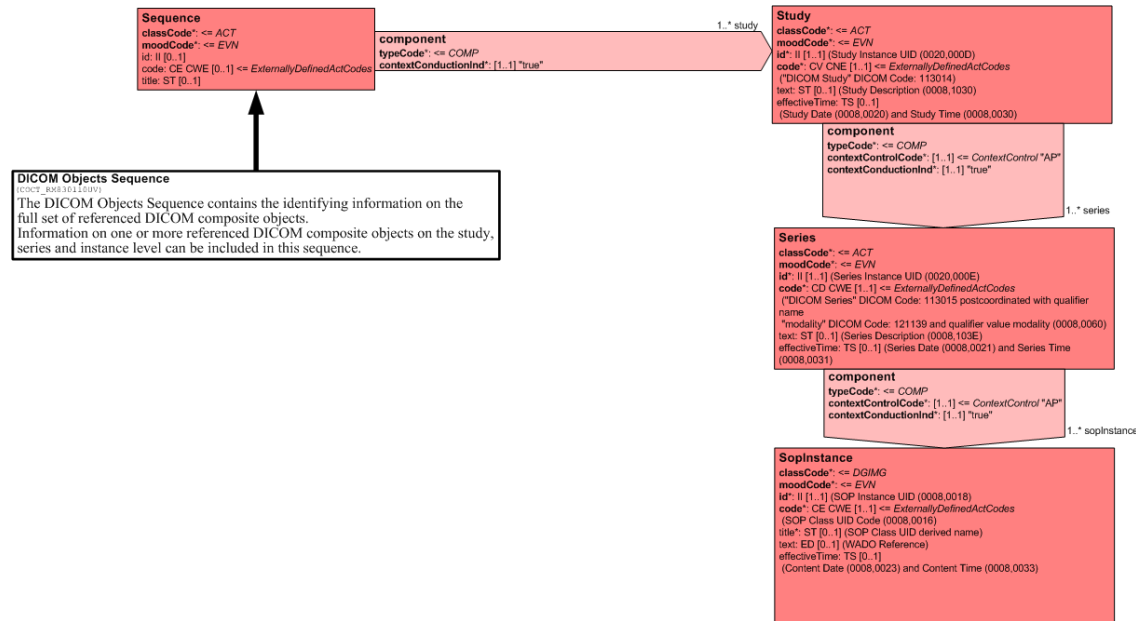
1445      End of Impressions Section
*****

  -->
    </component>
  </structuredBody>
1450 </component>
</ClinicalDocument>

```

Annex B: HL7 V3 DICOM CMETs

1.1 A_DICOMSEQUENCE MINIMAL (COCT_RM830110UV)



- 1455 The A_DicomSequence minimal CMET is used to reference DICOM composite objects within HL7 Version 3 messages. It provides a single location for the identifying information of the study/series/instance hierarchical context of DICOM composite objects that are referenced for a specific purpose. Additional information on this context (e.g. Study Description) may optionally be added. Mappings from DICOM object attributes to the various Act attributes are provided. The CMETs for the HL7 V3 message sequence and the CDA Release 2 section are structurally identical. For the CDA section pattern different clone names are used according to the specified entry names of CDA Release 2.
- 1460

Note: The A_DicomSequence minimal CMET may be used in combination with COCT_RM830120 to provide additional structured information on individual references to DICOM composite objects.

COCT_RM830120 is used to put the references into the context of other acts and observations (e.g. relate referenced DICOM images to lab observations).

1465

The following description of the act classes and act relationships contains the attribute mappings of HL7 V3 attributes to DICOM (Digital Imaging and Communications in Medicine) tags. The group and element number of the mapped DICOM tags are listed in parenthesis. The CDA mappings specify the use of the CMET act classes and act relationships for a CDA Release 2 document section which contains section entries.

1470

1 Sequence

The DICOM Objects Sequence contains the identifying information on DICOM composite objects referenced in a HL7 V3 message for a specific purpose. The sequence can be used for any HL7 V3 message which includes references to composite DICOM objects, such as images and structured reports. Information on one or more referenced DICOM composite objects on the study, series and instance level can be included in a sequence.

1475

Table 1 Sequence Act

Attribute	Data Type	Multiplicity	Value
classCode	CS	1..1	ACT
moodCode	CS	1..1	EVN
id	II	0..1	<i>Sequence Identifier</i>
code	CE	1..1	Externally defined DICOM codes, e.g. <121181 as code property, 1.2.840.10008.2.16.4 as codeSystem property, DCM as codeSystemName property, e.g. "DICOM Object Catalog" as displayName property>
title	ST	0..1	<e.g. "DICOM Object Catalog">

1480 **1.1 CDA Mapping (Class Name and Attributes used for CDA Documents)**

Section (replaces Sequence)

1485 The CDA DICOM Objects Section contains the identifying information on DICOM composite objects referenced in a CDA Release2 document for a specific purpose. The CDA DICOM Objects Section can be used within any CDA Release 2 document which includes references to composite DICOM objects in the structured part of the CDA document, such as images and structured reports. Information on one or more referenced DICOM composite objects on the study, series and instance level can be included in this section.

Table 2 Section Act

Attribute	Data Type	Multiplicity	Value
classCode	CS	1..1	ACT
moodCode	CS	1..1	EVN
id	II	0..1	<i>Section Identifier</i>
code	CE	1..1	Externally defined DICOM codes, e.g. <121181 as code property, 1.2.840.10008.2.16.4 as codeSystem property, DCM as codeSystemName property, e.g. "DICOM Object Catalog" as displayName property>
title	ST	0..1	<e.g. "DICOM Object Catalog">

DICOM Supplement 101:

1490 Specifies the semantics of the section e.g. "DICOM Object Catalog" (DICOM Code Value: 121181) which contains information on the full set of DICOM composite objects referenced in the CDA document: "It is recommended that this list be transcoded to CDA Entries in a Section with Section.Title "DICOM Object Catalog" and a Section.Code of 121181 from the DICOM Controlled Terminology (see PS3.16)."

2 ActRelationship COMPONENT (Sequence to Study)

1495 This actRelationship “COMPONENT” is used to link Sequence with one or more associated study acts.

2.1 CDA Mapping (ActRelationship Name and Attributes used for CDA Documents)

- ActRelationship Clone name: entry (replaces COMPONENT)
- ActRelationship.typeCode: x_ActRelationshipEntry (Constraint: Fixed value = COMP)
- ContextConductionInd: “true”

1500 3 Study

The Study act class contains the DICOM study information that defines the characteristics of a referenced medical study performed on a patient. A study is a collection of one or more series of medical images, presentation states, SR documents, overlays and/or curves that are logically related for the purpose of diagnosing a patient. Each study is associated with exactly one patient. A study may include composite
1505 instances that are created by a single modality, multiple modalities or by multiple devices of the same modality. The study information is modality independent.

Table 3 DICOM Study Reference in an HL7 v3 Act

Attribute	Data Type	Multiplicity	Value
classCode	CS	1..1	ACT
moodCode	CS	1..1	EVN
id	II	1..1	<Study Instance UID (0020,000D) as root property with no extension property>: Unique identifier for the Study
code	CV	1..1	<113014 as code property, 1.2.840.10008.2.16.4 as codeSystem property, DCM as codeSystemName property, “DICOM Study” as displayName property>
text	ST	0..1	<Study Description (0008,1030)> Institution-generated description or classification of the Study (component) performed.
effectiveTime	TS	0..1	<Study Date (0008,0020): Date the Study started; and Study Time (0008,0030): Time the Study started.>

3.1 CDA Mapping (Class Name and Attributes used for CDA Documents)

- 1510
- Act clone name of the CDA entry is “Act” instead of “Study”. The attributes and attribute values of this CDA entry “Act” are identical to those listed in table 3.

4 ActRelationship COMPONENT (Study to Series)

This actRelationship “COMPONENT” is used to link one study act with one or more associated series acts.

4.1 CDA Mapping (ActRelationship Name and Attributes used for CDA Documents)

- 1515
- ActRelationship Clone name: entryRelationship (replaces COMPONENT)
 - ActRelationship.typeCode: x_ActRelationshipEntry (Constraint: Fixed value = COMP)

- ActRelationship.contextControlCode: “AP” (Additive Propagating)
- ContextConductionInd: “true”

5 Series

1520 The Series act class contains the DICOM series information for referenced DICOM composite objects. The series information defines the attributes that are used to group composite instances into distinct logical sets. Each series is associated with exactly one study.

Table 4 DICOM Series Reference in an HL7 v3 Act

Attribute	Data Type	Multiplicity	Value
classCode	CS	1..1	ACT
moodCode	CS	1..1	EVN
id	II	1..1	<Series Instance UID (0020,000E) as root property with no extension property>): Unique identifier of the Series.
code	CD	0..1	<113015 as code property, 1.2.840.10008.2.16.4 as codeSystem property, DCM as codeSystemName property, “DICOM Series” as displayName property, Modality as qualifier property (see text and Table 5)>
text	ST	0..1	<Series Description (0008,103E)> User provided description of the Series
effectiveTime	TS	0..1	<Series Date (0008,0021) : Date the Series started. and Series Time (0008,0031): Time the Series started.>

1525 The code for the Act representing a Series uses a qualifier property to indicate the modality. The qualifier property is a list of coded name/value pairs. For this use, only a single list entry is used, as described in Table 5.

Table 5 Modality Qualifier for the Series Act.Code

Property	Data Type	Value
name	CV	<121139 as code property, 1.2.840.10008.2.16.4 as codeSystem property, DCM as codeSystemName property, “Modality” as displayName property>
value	CD	<Modality (0008,0060) as code property, 1.2.840.10008.2.16.4 as codeSystem property, DCM as codeSystemName property, Modality code meaning (from PS3.16) as displayName property>

5.1 CDA Mapping (Class Name and Attributes used for CDA Documents)

- Act Clone Name: Act
- 1530
- Act clone name of the CDA entry is “Act” instead of “Series”. The attributes and attribute values of this CDA entry “Act” are identical to those listed in table 4 and 5.

6 ActRelationship COMPONENT (Series to SopInstance)

1535 This actRelationship "COMPONENT" is used to link one series act with one or more associated SopInstance acts.

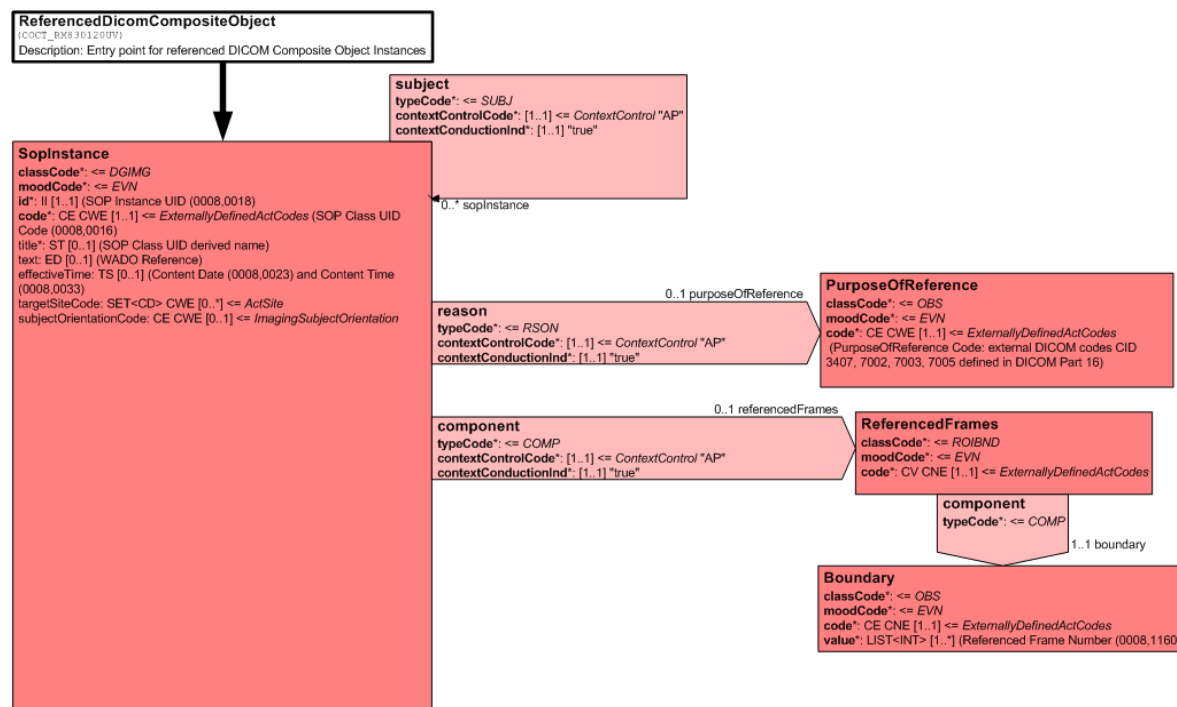
6.1 CDA Mapping (*ActRelationship Name and Attributes used for CDA Documents*)

- ActRelationship Clone name: entryRelationship (replaces COMPONENT)
- ActRelationship.typeCode: x_ActRelationshipEntry (Constraint: Fixed value = COMP)
- ActRelationship.contextControlCode: "AP" (Additive Propagating)
- 1540 • ContextConductionInd: "true"

7 SopInstance

Please refer to COCT_RM830120UV for the description of the SopInstance act class.

1.2 A_DICOMCOMPOSITEOBJECTREFERENCE MINIMAL (COCT_RM830120UV)



1545

The A_DicomCompositeObjectReference minimal CMET is used to reference DICOM composite objects within HL7 Version 3 messages in the context of acts and observations. It provides detailed information on the referenced DICOM composite object such as images, presentation states and DICOM structured documents. Mappings from DICOM object attributes to the various Act attributes are provided. The CMETs for the HL7 V3 message DICOM composite object references and the corresponding CDA Release 2 section entries are structurally identical. For the CDA section entries different clone names are used according to the specified entry names in the CDA Release2.

1550

Note: The A_DicomCompositeObjectReference minimal CMET COCT_RM830120 may be used in combination with COCT_RM830110 which provides a single location for lookup of referenced DICOM composite objects of an HL7 V3 message (identifying information on the DICOM study/series/instance hierarchy can be found there).

1555

The following description of the act classes and act relationships contains the attribute mappings of HL7 V3 attributes to DICOM (Digital Imaging and Communications in Medicine) tags. The group and element number of the mapped DICOM tags are listed in parenthesis. The CDA mappings specify the use of the CMET act classes and act relationships as CDA Release 2 document section entries.

1560

1 SopInstance

The SopInstance act class contains the DICOM Service Object Pair (SOP) Instance information for referenced DICOM composite objects. The SopInstance act class is used to reference both, image and non-image DICOM instances. The text attribute contains the DICOM WADO (Web Access to Persistent DICOM Objects, DICOM Standard PS 3.18) reference.

1565

Table 1 DICOM Composite Object Reference in an HL7 v3 Act

Attribute	Data Type	Multiplicity	Value
classCode	CS	1..1	DGIMG
moodCode	CS	1..1	EVN
id	II	1..1	<SOP Instance UID (0008,0018) as root property with no extension property> Uniquely identifies the SOP Instance.
code	CE	1..1	<SOP Class UID (0008,0016) as code property, 1.2.840.10008.2.6.1 as codeSystem property, DCMUID as codeSystemName property, SOP Class UID Name (from PS3.6) as displayName property>: Unique Identifier for the SOP Class as Code Property
title	ST	0..1	SOP Class UID derived name
text	ED	0..1	<application/DICOM as mediaType property, WADO reference (see Table X.3-6) as reference property>
effectiveTime	TS	0..1	<Content Date (0008,0023): The date the content creation (e.g. image pixel data, document) started; and Content Time (0008,0033): The time the content creation (e.g. image pixel data, document) started.>

The DGIMG classCode is used to reference all DICOM Composite Instances, not just diagnostic images.

1570 WADO is a service that enables the Web Client System to retrieve DICOM Persistent Objects managed by a Web Enabled DICOM Server, through the HTTP/HTTPs protocol. The WADO reference uses an URI with query parameters (Table 7). Access to the content of a data object is enabled by specifying a "link" pointing to a specific DICOM Persistent Object by means of its URL/URI and specifying its DICOM object Instance UID and the transfer syntax to be employed.

Table 2 WADO Reference in HL7 DGIMG Observation.Text

WADO Component	Source
<scheme>://<authority>/<path>	Configuration setting, used by the conversion process, identifying the WADO server
?requestType=WADO	Fixed
&studyUID=<uid>	Study Instance UID for referenced instance
&seriesUID=<uid>	Series Instance UID for referenced instance
&objectUID=<uid>	SOP Instance UID for referenced instance
&contentType=application/DICOM	Fixed

1575

1.1 CDA Mapping (Class Name and Attributes used for CDA Documents)

- Act clone name of the CDA entry is "Observation" instead of "SopInstance". The attributes and attribute values of this CDA entry "Observation" are identical to those listed in table 1 and 2,

1580 except for the optional title attribute (Value: SOP Class UID derived name) which is not mapped
because it is not supported by CDA Act Entries.

2 ActRelationship SUBJECT (SopInstance recursive actRelationship)

1585 This optional recursive “SUBJECT” actRelationship is used to link a referenced DICOM Presentation State
to one or more associated referenced DICOM images (SopInstance act class is used in both cases) it is
applied to.

2.1 CDA Mapping (ActRelationship Name and Attributes used for CDA Documents)

- ActRelationship Clone name: entryRelationship (replaces SUBJECT)
- ActRelationship.typeCode: x_ActRelationshipEntry (Constraint: Fixed value = SUBJ)
- ActRelationship.contextControlCode: “AP” (Additive Propagating)
- 1590 • ContextConductionInd: “true”

3 ActRelationship REASON (SopInstance to PurposeOfReference)

1595 This optional “REASON” actRelationship is used to relate a referenced DICOM composite object
(SopInstance ActClass) with the PurposeOfReference ActClass which includes the coded purpose(s) of
reference.

3.1 CDA Mapping (ActRelationship Name and Attributes used for CDA Documents)

- ActRelationship Clone name: entryRelationship (replaces REASON)
- ActRelationship.typeCode: x_ActRelationshipEntry (Constraint: Fixed value = RSON)
- ActRelationship.contextControlCode: “AP” (Additive Propagating)
- 1600 • ContextConductionInd: “true”

4 PurposeOfReference

1605 Describes the purpose the DICOM composite object reference is made for. Appropriate codes such as
externally defined DICOM codes may be used to specify the semantics of the purpose of reference. When
absent, implies that the reason for the reference is unknown.

Codes specified in DICOM Part 16 "Content Mapping Resource" (DICOM PS 3.16) shall be used to
designate the coded purpose of reference. Candidate codes are contained in the DICOM Context Groups
3407, 7002, 7003 and 7005. The attribute mapping for the code attributes are listed in table 3.

Table 3 DICOM Coded Purpose of Reference in an HL7 v3 Act

Attribute	Data Type	Multiplicity	Value
classCode	CS	1..1	OBS

moodCode	CS	1..1	EVN
code	CE	1..1	<Code Value (0008,0100) as code property, 1.2.840.10008.2.16.4 as codeSystem property, Coding Scheme Designator (0008,0102) as codeSystemName property, Code Meaning (0008,0104) as displayName property>

1610

4.1 CDA Mapping (Class Name and Attributes used for CDA Documents)

- Act Clone Name: Observation
- Act clone name of the CDA entry is "Observation" instead of "PurposeOfReference"
- The attributes and attribute values of this "Observation" CDA entry are identical to those listed in table 3

1615

5 ActRelationship COMPONENT (SopInstance to ReferencedFrames)

This optional "COMPONENT" actRelationship is used to link a referenced DICOM composite object to one or more frames of a DICOM multi-frame image SOP instance.

5.1 CDA Mapping (ActRelationship Name and Attributes used for CDA Documents)

- ActRelationship Clone name: entryRelationship (replaces COMPONENT)
- ActRelationship.typeCode: x_ActRelationshipEntry (Constraint: Fixed value = COMP)
- ActRelationship.contextControlCode: "AP" (Additive Propagating)
- ContextConductionInd: "true"

1625

6 ReferencedFrames

This act class shall be used if the referenced DICOM SOP instance is a multi-frame image and the reference does not apply to all frames. The list of integer values for the referenced frames of a DICOM multi-frame image SOP instance is contained in the Boundary ActClass.

Table 4 DICOM Referenced Frames in an HL7 v3 Act

Attribute	Data Type	Multiplicity	Value
classCode	CS	1..1	ROIBND
moodCode	CS	1..1	EVN
code	CV	1..1	<(0008,0100): <121190> as code property, 1.2.840.10008.2.16.4 as codeSystem property, DCM as codeSystemName property, Code Meaning (0008,0104): "Referenced Frames" as displayName property>.

1630



6.1 CDA Mapping (Class Name and Attributes used for CDA Documents)

- Act Clone Name: Observation
- Act clone name of the CDA entry is "Observation" instead of "ReferencedFrames"

1635

7 ActRelationship Component (ReferencedFrames to Boundary)

This "COMPONENT" actRelationship is used to link the ReferencedFrames ActClass to the Boundary ActClass which contains the list of integer values for the referenced frames of a DICOM multi-frame image SOP instance.

1640 7.1 CDA Mapping (ActRelationship Name and Attributes used for CDA Documents)

- ActRelationship Clone name: entryRelationship (replaces COMPONENT)
- ActRelationship.typeCode: x_ActRelationshipEntry (Constraint: Fixed value = COMP)

8 Boundary

1645 The act class contains a list of integer values for the referenced frames of a DICOM multi-frame image SOP instance. It identifies the frame numbers within the Referenced SOP Instance to which the reference applies. The first frame shall be denoted as frame number 1. This act class shall be used if the referenced DICOM SOP instance is a multi-frame image and the reference does not apply to all frames.

Table 5 Boundary ActClass

Attribute	Data Type	Multiplicity	Value
classCode	CS	1..1	OBS
moodCode	CS	1..1	EVN
code	CE	1..1	<113036> as code property, 1.2.840.10008.2.16.4 as codeSystem property, DCM as codeSystemName property, "Group of Frames for Display" as displayName property.
value	LIST<INT>	1..*	<Referenced Frame Number (0008,1160)> Identifies the frame numbers within the Referenced SOP Instance to which the reference applies. The first frame shall be denoted as frame number 1. Values shall be provided if the Referenced SOP Instance is a multi-frame image and the reference does not apply to all frames.

1650

8.1 CDA Mapping (Class Name and Attributes used for CDA Documents)

Act Clone Name: ObservationAct clone name of the CDA entry is "Observation" instead of "Boundary"