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## **Digital Imaging and Communications in Medicine (DICOM)**

### *Supplement 23: Structured Reporting Storage SOP Classes*

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#### **DICOM Standards Committee**

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## Foreword

This Supplement to the DICOM Standard introduces the SR SOP Classes for transmission and storage of documents that describe or refer to any number of images or waveforms or to the specific features that they contain. The SR SOP Classes fully support conventional free text reports and provide the capability to record structured information that enhances the precision, clarity and value of clinical documents. The SR SOP Classes allow users to link text and other data to particular images and/or waveforms and to store the coordinates of findings so that users can see exactly what is being described in a report. In addition, users can label, index and retrieve clinically-relevant information using codes. SR SOP Classes can be used in a variety of clinical contexts. For example:

- in CT or MRI to convey the interpretation text, to record the DICOM identifiers of selected images and to denote the spatial coordinates of significant findings;
- in ultrasound to transmit measurements; and
- in cardiac catheterization laboratories to record a procedure log that time-stamps and describes significant measurements and interventions and link together all of the related images, waveforms, interpretation reports and related information into a convenient unit-record.

This draft Supplement to the DICOM Standard was developed according to DICOM Committee Procedures. The Supplement was developed in liaison with other Standards Organizations including HL7, CEN/TC 251 in Europe and MEDIS-DC, JAMI, and JIRA in Japan, with review by other organizations.

The DICOM standard is structured as a multi-part document using the guidelines established in the following document:

- ISO/IEC Directives, 1989 Part 3 - Drafting and Presentation of International Standards.

This document is a Supplement to the DICOM Standard. It is an extension to PS 3.3, 3.4, 3.5 and 3.6 of the published DICOM Standard which consists of the following parts:

- |         |   |   |
|---------|---|---|
| PS 3.1  | - | Introduction and Overview                                 |
| PS 3.2  | - | Conformance   |
| PS 3.3  | - | Information Object Definitions                            |
| PS 3.4  | - | Service Class Specifications                              |
| PS 3.5  | - | Data Structures and Encoding                              |
| PS 3.6  | - | Data Dictionary   |
| PS 3.7  | - | Message Exchange  |
| PS 3.8  | - | Network Communication Support for Message Exchange        |
| PS 3.9  | - | Point-to-Point Communication Support for Message Exchange |
| PS 3.10 | - | Media Storage and File Format                             |
| PS 3.11 | - | Media Storage Application Profiles                        |
| PS 3.12 | - | Media Formats and Physical Media                          |
| PS 3.13 | - | Print Management - Point-to-point Communication Support   |
| PS 3.14 | - | Grayscale Standard Display Function                       |

These Parts are independent but related documents.

## Scope and Field of Application

4 This Supplement to the DICOM Standard specifies the SR IODs and the corresponding SR Storage SOP Classes. The Structured Reporting Entity Relationship Model enables query and retrieval of SR SOP Instances as Instance level entities in the DICOM Query/Retrieve Model.

Since this document proposes changes to existing Parts of DICOM the reader should have a working understanding of the Standard.

This proposed Supplement includes a number of Addenda to existing Parts of DICOM:

- 8
1. PS 3.3
  2. PS 3.4
  3. PS 3.5
  4. PS 3.6



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## Part 3, Body Addendum

*Add or revise the following to PS 3.3 Definitions*

### **3.13 CODES AND CONTROLLED TERMINOLOGY DEFINITIONS:**

The following definitions are used ~~in the specification of Interpretation Data Interchange:~~

16

~~**3.13.1 Baseline Context ID:** Identifier of the Baseline Context Group.~~

**3.13.2 Baseline Context Group:** Context Group that specifies the suggested Value Set for a Code Sequence Attribute.

20

**3.13.3 Baseline Template:** Template that specifies a suggested set of Properties and corresponding Value Sets.

~~**3.13.4 Baseline Template ID:** Identifier of the Baseline Template.~~

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**3.13.n Defined Context Group:** Context Group that specifies the Value Set for a Code Sequence Attribute that shall be supported but which may be extended.

**3.13.n Defined Template:** Template that specifies the set of Properties and corresponding Value Sets that shall be used but which may be extended.

28

**3.13.n Enumerated Context Group:** Context Group that specifies the Value Set for a Code Sequence Attribute that shall be used and which shall not be extended.

**3.13.n Enumerated Template:** Template that specifies the set of Properties and corresponding Value Sets that shall be used and which shall not be extended.

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*Add the following to PS 3.3 Body*

**9 TEMPLATE IDENTIFICATION MACRO**

36 Table 9-1 specifies the set of Attributes that identify Templates. These Attributes comprise the Template Macro. Attribute Descriptions in Table 9-1 refer to similar attributes of the Code Sequence Macro in Section 8.8 of this Part.

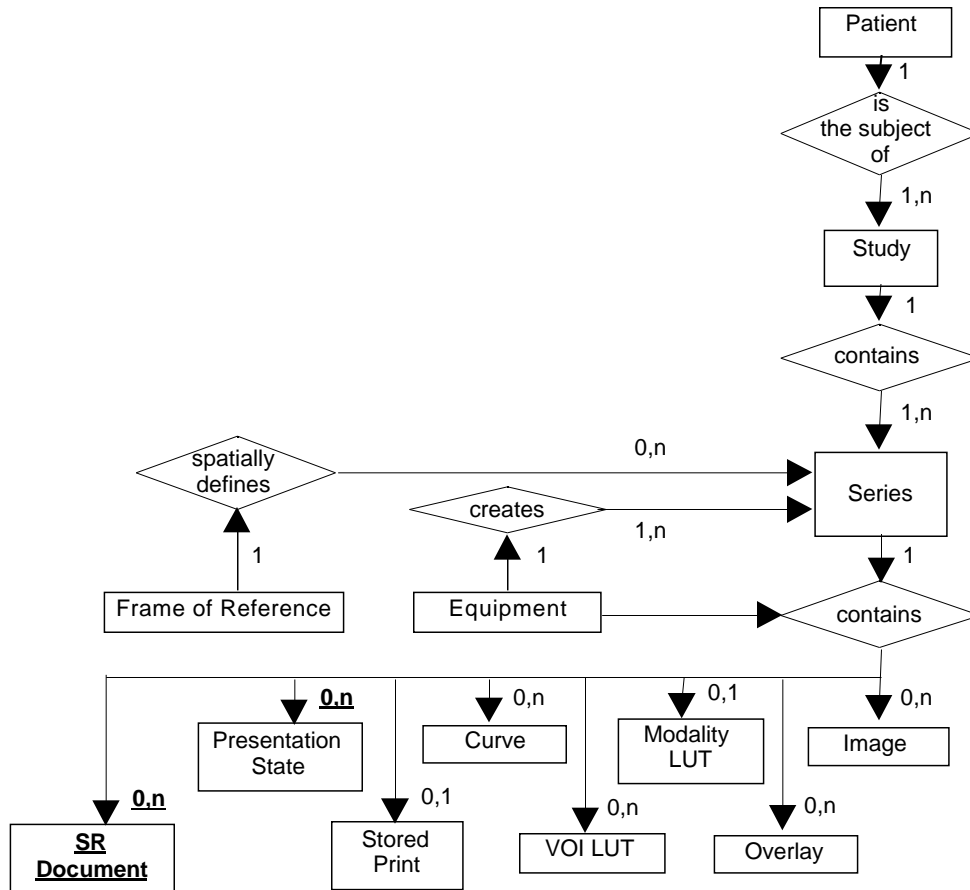
**Table 9-1  
Template Identification Macro Attributes Description**

<b>Attribute Name</b>	<b>Tag</b>	<b>Type</b>	<b>Attribute Description</b>
Template Identifier	(0040,DB00)	1	Template identifier.
Mapping Resource	(0008,0105)	1	Mapping Resource that defines the template. See Section 8.4.
Template Version	(0040,DB06)	1C	Version of the Template. See Section 8.5. Required if the Template Identifier (0040,DB00) and Mapping Resource (0008,0105) are not sufficient to identify the template unambiguously.
Template Local Version	(0040,DB07)	1C	Local version number assigned to a template that contains private extensions. See Section 8.7. Required if the value of Template Extension Flag (0040,DB0B) is "Y".
Template Extension Flag	(0040,DB0B)	1C	Indicates that the template is a private extension of the template denoted by Template Identifier (0040,DB00), Mapping Resource (0008,0105) and Template Version (0040,DB06). See Section 8.7 of this Part.  Enumerated Values: Y, N  "Y" shall mean the template is a private extension of the template designated by Template Identifier (0040,DB00), Mapping Resource (0008,0105) and Template Version (0040,DB06).  Required if the template is a private extension of the template designated by Template Identifier (0040,DB00), Mapping Resource (0008,0105) and Template Version (0040,DB06).
Template Extension Organization UID	(0040,DB0C)	2C	Identifies the organization that created and/or maintains an extension to a template, if defined. See Section 8.2.  Required if the value of Template Extension Flag (0040,DB0B) is "Y".
Template Extension Creator UID	(0040,DB0D)	2C	Identifies the person who created and/or maintains an extension to a template. See Section 8.7.  Required if the value of Template Extension Flag (0040,DB0B) is "Y".



### Part 3, Annex A Addendum

Update the E-R model in A.1.2 to include SR Document



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Update the Composite Module Table to include SR IODs and Modules

IODs Modules	Basic Text SR	Enhanced SR	Comprehensive SR
Patient	<u>M</u>	<u>M</u>	<u>M</u>
Patient Summary			
Specimen Identification	<u>C</u>	<u>C</u>	<u>C</u>
General Study	<u>M</u>	<u>M</u>	<u>M</u>
Patient Study	<u>U</u>	<u>U</u>	<u>U</u>
Study Content			
General Series			

CR Series			
NM/PET Patient Orientation			
PET Series			
PET Isotope			
PET Multi-gated Acquisition			
RT Series			
DX Series			
Mammo Series			
Intra-oral Series			
Presentation Series			
<b>SR Document Series</b>	<b><u>M</u></b>	<b><u>M</u></b>	<b><u>M</u></b>
Frame Of Reference			
U S Frame of Ref.			
General Equipment	<b><u>M</u></b>	<b><u>M</u></b>	<b><u>M</u></b>
SC Equipment			
General Image			
Image Plane			
Image Pixel			
NM Image Pixel			
PaletteColor Lookup Table			
Contrast/ Bolus			
Cine			
Multi-frame			
NM Multi-frame			
Frame Pointers			
Mask			
Display Shutter			
Bitmap Display Shutter			
Device			
Therapy			
CR Image			
CT Image			

MR Image			
NM Image			
NM Isotope			
NM Detector			
NM TOMO Acquisition			
NM Multi-Gated Acquisition			
NM Phase			
NM Reconstruction			
US Region Calibration			
US Image			
SC Image			
PET Image			
X-Ray Image			
X-Ray Acquisition			
X-Ray Collimator			
X-Ray Table			
XRF Positioner			
X-Ray Tomo Acquisition			
X-Ray Acquisition Dose			
X-Ray Generation			
X-Ray Filtration			
X-Ray Grid			
XA Positioner			
DX Anatomy Imaged			
DX Image			
DX Detector			
DX Positioning			
Mammo Image			
Intra-oral Image			
VL Image			
Slide Coordinates			

RT Image			
RT Dose			
RT DVH			
Structure Set			
ROI Contour			
RT Dose ROI			
RT ROI Observations			
RT General Treatment Record			
RT Treatment Machine Record			
Measured Dose Reference Record			
Calculated Dose Reference Record			
RT Beams Session Record			
RT Brachy Session Record			
RT Treatment Summary Record			
RT General Plan			
RT Prescription			
RT Tolerance Tables			
RT Patient Setup			
RT Fraction Scheme			
RT Beams			
RT Brachy Application Setups			
Approval			
<b><u>SR Document General</u></b>	<b><u>M</u></b>	<b><u>M</u></b>	<b><u>M</u></b>
<b><u>SR Document Content</u></b>	<b><u>M</u></b>	<b><u>M</u></b>	<b><u>M</u></b>
Overlay Identification			
Overlay Plane			
Multi-frame Overlay			

Curve Identification			
Curve			
PET Curve			
Audio			
Displayed Area			
Overlay/Curve Activation			
Graphic Annotation			
Spatial Transformation			
Graphic Layer			
Modality LUT			
VOI LUT			
Softcopy VOI LUT			
Softcopy Presentation LUT			
Image Histogram			
LUT Identification			
Presentation State			
Acquisition Context			
SOP Common	<u>M</u>	<u>M</u>	<u>M</u>

48 Add the following to PS 3.3 Annex A

**A.X STRUCTURED REPORT DOCUMENT INFORMATION OBJECT DEFINITIONS**

**A.X.1 Basic Text SR Information Object Definition**

52 **A.X.1.1 Basic Text SR Information Object Description**

The Basic Text Structured Report (SR) IOD specifies a class of documents, the content of which is restricted to hierarchical textual information with references to DICOM Composite SOP Instances.

**A.X.1.2 Basic Text SR IOD Entity-Relationship Model**

56 The E-R Model in Section A.1.2 of this Part applies to the Basic Text SR IOD. The Frame of Reference IE, and the IEs at the level of the Image IE in Section A.1.2 are not components of the Basic Text SR IOD. Table A.X.1-1 specifies the Modules of the Basic Text SR IOD.

**A.X.1.3 Basic Text SR IOD Module Table**

60 Table A.X.3-1 specifies the Modules of the Basic Text SR IOD.

**Table A.X.1-1  
BASIC TEXT SR IOD 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
Study	General Study	C.7.2.1	M
	Patient Study	C.7.2.2	U
Series	SR Document Series	C.Z.1	M
Equipment	General Equipment	C.7.5.1	M
Document	SR Document General	C.Z.2	M
	SR Document Content	C.Z.3	M
	SOP Common	C.12.1	M

64 **A.X.1.3.1 Basic Text SR IOD Content Constraints**

**A.X.1.3.1.1 Value Type**

Value Type (0040,A170) in the Content Sequence (0040,A730) of the SR Document Content Module is constrained to the following Enumerated Values:

- 68       TEXT  
CODE  
DATETIME  
DATE  
72       TIME  
UIDREF  
PNAME  
COMPOSITE  
76       IMAGE  
WAVEFORM  
CONTAINER

80 **A.X.1.3.1.2 Relationship Constraints**

Relationships between Content Items in the content of this IOD shall be conveyed in the by-value mode.

Note: Relationships by-reference are forbidden. Therefore, Referenced Content Item Identifier (0040,DB73) is not present in any of the Content Items within the Document Content Module.

Table A.X.1-2 specifies the relationship constraints of this IOD.

**Table A.X.1-2  
RELATIONSHIP CONTENT CONSTRAINTS FOR BASIC TEXT SR IOD**

Source Value Type	Relationship Type (Enumerated Values)	Target Value Type
CONTAINER	CONTAINS	TEXT, CODE, DATETIME, DATE, TIME, UIDREF, PNAME, COMPOSITE <sup>1</sup> , IMAGE <sup>1</sup> , WAVEFORM <sup>1</sup> , CONTAINER
CONTAINER	HAS OBS CONTEXT	TEXT, CODE, DATETIME, DATE, TIME, UIDREF, PNAME
CONTAINER, IMAGE <sup>1</sup> , WAVEFORM <sup>1</sup> , COMPOSITE <sup>1</sup>	HAS ACQ CONTEXT	TEXT, CODE, DATETIME, DATE, TIME, UIDREF, PNAME
TEXT	HAS PROPERTIES	TEXT, CODE, DATETIME, DATE, TIME, UIDREF, PNAME, IMAGE <sup>1</sup> , WAVEFORM <sup>1</sup> , COMPOSITE <sup>1</sup>
TEXT	INFERRED FROM	TEXT, CODE, DATETIME, DATE, TIME, UIDREF, PNAME, IMAGE <sup>1</sup> , WAVEFORM <sup>1</sup> , COMPOSITE <sup>1</sup>

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Note: 1. Which SOP Classes the IMAGE, WAVEFORM or COMPOSITE Value Type may refer to, are documented in the Conformance Statement for an application (see PS 3.2 and PS 3.4).

92 **A.X.2 Enhanced SR Information Object Definition**

**A.X.2.1 Enhanced SR Information Object Description**

96 The Enhanced Structured Report (SR) IOD specifies a class of documents, the content of which is restricted to hierarchical textual information which may be enhanced by numeric measurement values, references to DICOM Composite SOP Instances and spatial or temporal regions of interest within such Composite Instances.

**A.X.2.2 Enhanced SR IOD Entity-Relationship Model**

100 The E-R Model in Section A.1.2 of this Part applies to the Enhanced SR IOD. The Frame of Reference IE, and the IEs at the level of the Image IE in Section A.1.2 are not components of the SR Text IOD. Table A.X.2-1 specifies the Modules of the Enhanced SR IOD.

**A.X.2.3 Enhanced SR IOD Module Table**

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**Table A.X.2-1  
ENHANCED SR IOD 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
Study	General Study	C.7.2.1	M
	Patient Study	C.7.2.2	U
Series	SR Document Series	C.Z.1	M
Equipment	General Equipment	C.7.5.1	M

Document	SR Document General	C.Z.2	M
	SR Document Content	C.Z.3	M
	SOP Common	C.12.1	M

**A.X.2.3.1 Enhanced SR IOD Content Constraints**

**A.X.2.3.1.1 Value Type**

108 Value Type (0040,A170) in the Content Sequence (0040,A730) of the SR Document Content Module is constrained to the following Enumerated Values:

- TEXT
- CODE
- 112 NUM
- DATETIME
- DATE
- TIME
- 116 UIDREF
- PNAME
- SCOORD
- TCOORD
- 120 COMPOSITE
- IMAGE
- WAVEFORM
- CONTAINER

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**A.X.2.3.1.2 Relationship Constraints**

Relationships between Content Items in the content of this IOD shall be conveyed in the by-value mode.

128 Note: Relationships by-reference are forbidden. Therefore, Referenced Content Item Identifier (0040,DB73) is not present in any of the Content Items within the Document Content Module.



Table A.X.2-2 specifies the relationship constraints of this IOD.

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**Table A.X.2-2  
RELATIONSHIP CONTENT CONSTRAINTS FOR ENHANCED SR IOD**

Source Value Type	Relationship Type (Enumerated Values)	Target Value Type
CONTAINER	CONTAINS	TEXT, CODE, NUM, DATETIME, DATE, TIME, UIDREF, PNAME, SCOORD, TCOORD, COMPOSITE <sup>1</sup> , IMAGE <sup>1</sup> , WAVEFORM <sup>1</sup> , CONTAINER
CONTAINER	HAS OBS CONTEXT	TEXT, CODE, NUM, DATETIME, DATE, TIME, UIDREF, PNAME
CONTAINER, IMAGE <sup>1</sup> , WAVEFORM <sup>1</sup> , COMPOSITE <sup>1</sup>	HAS ACQ CONTEXT	TEXT, CODE, NUM, DATETIME, DATE, TIME, UIDREF, PNAME
TEXT	HAS PROPERTIES	TEXT, CODE, NUM, DATETIME, DATE, TIME, UIDREF, PNAME, IMAGE <sup>1</sup> , WAVEFORM <sup>1</sup> , COMPOSITE <sup>1</sup> , SCOORD, TCOORD
TEXT	INFERRED FROM	TEXT, CODE, NUM, DATETIME, DATE, TIME, UIDREF, PNAME, IMAGE <sup>1</sup> , WAVEFORM <sup>1</sup> , COMPOSITE <sup>1</sup> , SCOORD, TCOORD
SCOORD	SELECTED FROM	IMAGE <sup>1</sup>
TCOORD	SELECTED FROM	IMAGE <sup>1</sup> , WAVEFORM <sup>1</sup>

Note: 1. Which SOP Classes the IMAGE, WAVEFORM or DICOM Value Type may refer to, are documented in the Conformance Statement for an application (see PS 3.2 and PS 3.4).

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### A.X.3 Comprehensive SR Information Object Definition

#### A.X.3.1 Comprehensive SR Information Object Description

140 The Comprehensive SR IOD specifies a class of documents, the content of which may include textual and coded information, numeric measurement values, references to the DICOM Composite Instances and spatial or temporal regions of interest within such Composite Instances.

In particular, relationships by reference are allowed between Content Items.

#### A.X.3.2 Comprehensive SR IOD Entity-Relationship Model

144 The E-R Model in Section A.1.2 of this Part applies to the Comprehensive SR IOD. The Frame of Reference IE, and the IEs at the level of the Image IE in Section A.1.2 are not components of the Comprehensive SR IOD. Table A.X.3-1 specifies the Modules of the Comprehensive SR IOD.

#### A.X.3.3 Comprehensive SR IOD Module Table

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**Table A.X.3-1  
COMPREHENSIVE SR IOD 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
Study	General Study	C.7.2.1	M

	Patient Study	C.7.2.2	U
Series	SR Document Series	C.Z.1	M
Equipment	General Equipment	C.7.5.1	M
Document	SR Document General	C.Z.2	M
	SR Document Content	C.Z.3	M
	SOP Common	C.12.1	M

**A.X.3.3.1 Comprehensive SR IOD Content Constraints**

152 **A.X.3.3.1.1 Value Type**

Value Type (0040,A170) in the Content Sequence (0040,A730) of the SR Document Content Module is constrained to the following Enumerated Values:

- 156 TEXT
- CODE
- NUM
- DATETIME
- DATE
- 160 TIME
- UIDREF
- PNAME
- SCOORD
- 164 TCOORD
- COMPOSITE
- IMAGE
- WAVEFORM
- 168 CONTAINER

**A.X.3.3.1.2 Relationship Constraints**

172 Relationships between content items in the content of this IOD may be conveyed either by-value or by-reference. Table A.X.3-2 specifies the relationship constraints of this IOD.

**Table A.X.3-2  
RELATIONSHIP CONTENT CONSTRAINTS FOR COMPREHENSIVE SR IOD**

Source Value Type	Relationship Type (Enumerated Values)	Target Value Type
CONTAINER	CONTAINS	TEXT, CODE, NUM, DATETIME, DATE, TIME, UIDREF, PNAME, SCOORD, TCOORD, COMPOSITE <sup>1</sup> , IMAGE <sup>1</sup> , WAVEFORM <sup>1</sup> , CONTAINER.
TEXT, CODE, NUM, CONTAINER	HAS OBS CONTEXT	TEXT, CODE, NUM, DATETIME, DATE, TIME, UIDREF, PNAME
CONTAINER, IMAGE <sup>1</sup> , WAVEFORM <sup>1</sup> , COMPOSITE <sup>1</sup>	HAS ACQ CONTEXT	TEXT, CODE, NUM, DATETIME, DATE, TIME, UIDREF, PNAME, CONTAINER (See below).
TEXT, CODE, NUM	HAS PROPERTIES	TEXT, CODE, NUM, DATETIME, DATE, TIME, UIDREF, PNAME, IMAGE <sup>1</sup> , WAVEFORM <sup>1</sup> , COMPOSITE <sup>1</sup> , SCOORD, TCOORD, CONTAINER (See below).
TEXT, CODE, NUM	INFERRED FROM	TEXT, CODE, NUM, DATETIME, DATE, TIME, UIDREF, PNAME, IMAGE <sup>1</sup> , WAVEFORM <sup>1</sup> , COMPOSITE <sup>1</sup> , SCOORD, TCOORD, CONTAINER (See below).
SCOORD	SELECTED FROM	IMAGE <sup>1</sup>
TCOORD	SELECTED FROM	IMAGE <sup>1</sup> , WAVEFORM <sup>1</sup>

176 Note: 1. Which SOP Classes the IMAGE, WAVEFORM or DICOM Value Type may refer to, are documented in the Conformance Statement for an application (see PS 3.2 and PS 3.4).

180 Content Items with a Value Type of CONTAINER shall only be the target of relationships other than CONTAINS, if this relationship is conveyed by-reference.

Relationships by-reference to ancestor Content Items are forbidden in this IOD to prevent loops.

### Part 3, Annex C Addendum

Add the following Modality type to Section C.7.3.1.1.1

184 **C.7.3.1 GENERAL SERIES MODULE (MODALITY TYPES)**

SR = SR Document

Add the SR Document Series Module

**C.Z.1 SR DOCUMENT SERIES MODULE**

188 Table C.Z-1 defines the Attributes of the SR Document Series. A Series of SR Documents may contain any number of SR Documents.

Note: Series of SR Documents are separate from Series of Images or other Composite SOP Instances. SR Documents do not reside in a Series of Images or other Composite SOP Instances.

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**Table C.Z-1  
SR DOCUMENT SERIES MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
Modality	(0008,0060)	1	Modality type. Enumerated Value: SR = SR Document
Series Instance UID	(0020,000E)	1	Unique identifier of the Series. Note: No SR-specific semantics are specified.
Series Number	(0020,0011)	1	A number that identifies the Series. Note: No SR-specific semantics are specified.
Referenced Study Component Sequence	(0008,1111)	2	Uniquely identifies the Performed Procedure Step SOP Instance for which the Series is created. The Sequence shall have one item. Notes: 1. The Study Component referred to by this Attribute is the Performed Procedure Step during which this Document was generated. 2. This Sequence may be sent zero length if the Performed Procedure Step is unknown. 3. This Attribute is not used to convey the Modality Performed Procedure Steps associated with the Composite SOP Instances examined as evidence in the current interpretation procedure. Instead, the evidence is conveyed in Complete Composite Object Evidence Sequence (0040,A375).
>Referenced SOP Class UID	(0008,1150)	1C	Uniquely identifies the referenced SOP Class. Required if Referenced Study Component Sequence (0008,1111) is present.
> Referenced SOP Instance UID	(0008,1155)	1C	Uniquely identifies the referenced SOP Instance. Required if Referenced Study Component Sequence (0008,1111) is present.

196 Add the SR DOCUMENT GENERAL MODULE

**C.Z.2 SR DOCUMENT GENERAL MODULE**

Table C.Z-2 defines the general Attributes of an SR Document Instance. These Attributes identify the SR Document and provide context for the entire document.

200

**Table C.Z-2  
SR DOCUMENT GENERAL MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
Instance Number	(0020,0013)	1	A number that identifies the SR Document.
Completion Flag	(0040,A491)	1	The estimated degree of completeness of this SR Document with respect to externally defined criteria in a manner specified in the Conformance Statement.  Note: It may be desirable to make these criteria adaptable to local policies or user decisions.  Enumerated Values: PARTIAL = Partial content. COMPLETE = Complete content.
Verification Flag	(0040,A493)	1	Indicates whether this SR Document is Verified. Enumerated Values: UNVERIFIED = Not attested to. VERIFIED = Attested to by the Documenting Observer (0040,A075) who is accountable for its content.  Note: The intent of this specification is that the "prevailing final version" of an SR Document is the version having the most recent Verification DateTime (0040,A030), Completion Flag (0040,A491) of COMPLETE and Verification Flag (0040,A493) of VERIFIED.
Content Date	(0008,0023)	1	The date the document content creation started.
Content Time	(0008,0033)	1	The time the document content creation started.
Verification DateTime	(0040,A030)	1C	Date and Time of verification by the Documenting Observer (0040,A075). Required if Verification Flag (0040,A493) is VERIFIED.
Documenting Observer	(0040,A075)	1C	The person authorized by the Documenting Organization (0040,A027) to verify documents of this type and who accepts responsibility for the content of this document. Required if Verification Flag (0040,A493) is VERIFIED.

Documenting Organization	(0040,A027)	1C	Organization to which the Documenting Observer (0040,A075) is accountable for this document in the current interpretation procedure. Required if Verification Flag (0040,A493) is VERIFIED.
Predecessor Documents Sequence	(0040,A360)	1C	Shall refer to SR SOP Instances whose content has been wholly or partially included in this document with or without modification (e.g. previous versions or partial documents). One or more items may be present. Required if this document includes content from other documents.
<i>&gt;Include 'SOP Instance Reference Macro' Table C.Z-3</i>			
Identical Documents	(0040,A525)	1C	Duplicates of this document, stored with different SOP Instance UIDs. Required if this document is stored with different SOP Instance UIDs in one or more other Studies.
<i>&gt;Include 'SOP Instance Reference Macro' Table C.Z-3</i>			
Referenced Request Sequence	(0040,A370)	1C	Shall refer to Requested Procedures that are related to this Document. One or more items shall be present. Required if Requested Procedures exist.
>Study Instance UID	(0020,000D)	1	Unique identifier for the Study.
>Referenced Study Sequence	(0008,1110)	2	Uniquely identifies the Study SOP Instance. This Sequence shall have only one Item.
>>Referenced SOP Class UID	(0008,1150)	1	Uniquely identifies the SOP Class
>>Referenced SOP Instance UID	(0008,1155)	1	Uniquely identifies the SOP Instance.
>Accession Number	(0008,0050)	2	A departmental IS generated number which identifies the order for the Study.
>Placer Order Number/Imaging Service Request	(0040,2016)	2	The order number assigned to the Imaging Service Request by the party placing the order.
>Filler Order Number/Imaging Service Request	(0040,2017)	2	The order number assigned to the Imaging Service Request by the party filling the order.
>Requested Procedure ID	(0040,1001)	2	Identifier of the related Requested Procedure
>Requested Procedure Description	(0032,1060)	2	Institution-generated administrative description or classification of Requested Procedure.
>Requested Procedure Code Sequence	(0032,1064)	2	A sequence that conveys the requested procedure. Zero or one item may be included in this Sequence.
<i>&gt;&gt;Include 'Code Sequence Macro' Table 8.8-1</i>		<i>No Baseline Context ID Number is specified.</i>	

Performed Procedure Code Sequence	(0040,A372)	2	A Sequence that conveys the codes of the performed procedures pertaining to this SOP Instance. Zero or more Items may be included in this Sequence.
>Include 'Code Sequence Macro' Table 8.8-1		No Baseline Context ID Number is specified.	
Complete Composite Object Evidence Sequence	(0040,A375)	1C	Full set of Composite Objects referred to by Content Items and examined as evidence in this document  Required if Composite Objects were evaluated as evidence.  Note: The intent of this specification is that all evidence considered will be declared here, even if it is not explicitly referenced in the content tree.
>Include 'SOP Instance Reference Macro' Table C.Z-3			
Pertinent Prior Evidence Sequence	(0040,A385)	1C	Composite Objects that may be pertinent prior evidence for this document.  Required if Composite Objects were evaluated as prior evidence.
>Include 'SOP Instance Reference Macro' Table C.Z-3			

### C.Z.2.1 SOP Instance Reference Macro

204 Table C.Z-3 specifies the Attributes that reference a SOP Instance.

**Table C.Z-3**  
**SOP INSTANCE REFERENCE MACRO ATTRIBUTES**

Study Instance UID	(0020,000D)	1	Unique identifier for the Study.
Referenced Series Sequence	(0008,1115)	1	Sequence of Repeating Items where each Item includes the Attributes of one or more Series containing the referenced Composite Object(s).
>Series Instance UID	(0020,000E)	1	Unique identifier of a Series that is part of this Study.
>Retrieve AE Title	(0008,0054)	3	Title of the DICOM Application Entity where the Composite Object(s) may be retrieved on the network.
>Storage Media File-Set ID	(0088,0130)	3	The user or implementation specific human readable identifier that identifies the Storage Media on which the Composite Object (s) reside.
>Storage Media File-Set UID	(0088,0140)	3	Uniquely identifies the Storage Media on which the Composite Object (s) reside.
>Referenced SOP Sequence	(0008,1199)	1	References to a Composite Object SOP Class/SOP Instance pairs that are part of the Study defined by Study Instance UID and the Series defined by Series Instance UID (0020,000E).
>>Referenced SOP Class UID	(0008,1150)	1	Uniquely identifies the referenced SOP Class.
>>Referenced SOP Instance UID	(0008,1155)	1	Uniquely identifies the referenced SOP Instance.

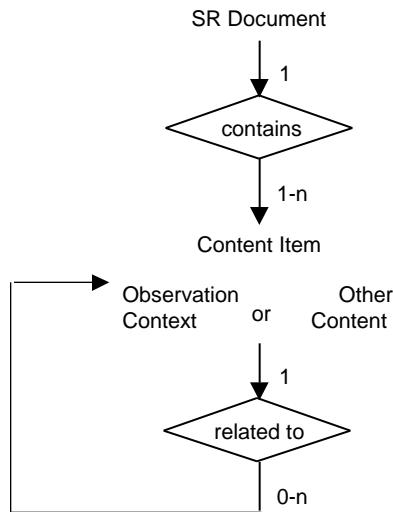
208 *Add the SR Document Content Module*

### C.Z.3 SR DOCUMENT CONTENT MODULE

This section specifies the Attributes contained in the SR Document Content Module. The Attributes in this Module convey the content of an SR Document.

212 The Module consists of a single root Content Item that is the root of the SR Document tree. The root  
Content Item is of type CONTAINER, and its Content Sequence conveys either directly, or indirectly  
through further nested Content Sequences, all of the other Content Items in the document. This root  
Content Item shall have a heading in Concept Name Code Sequence (0040,A043) that conveys the  
216 document type.

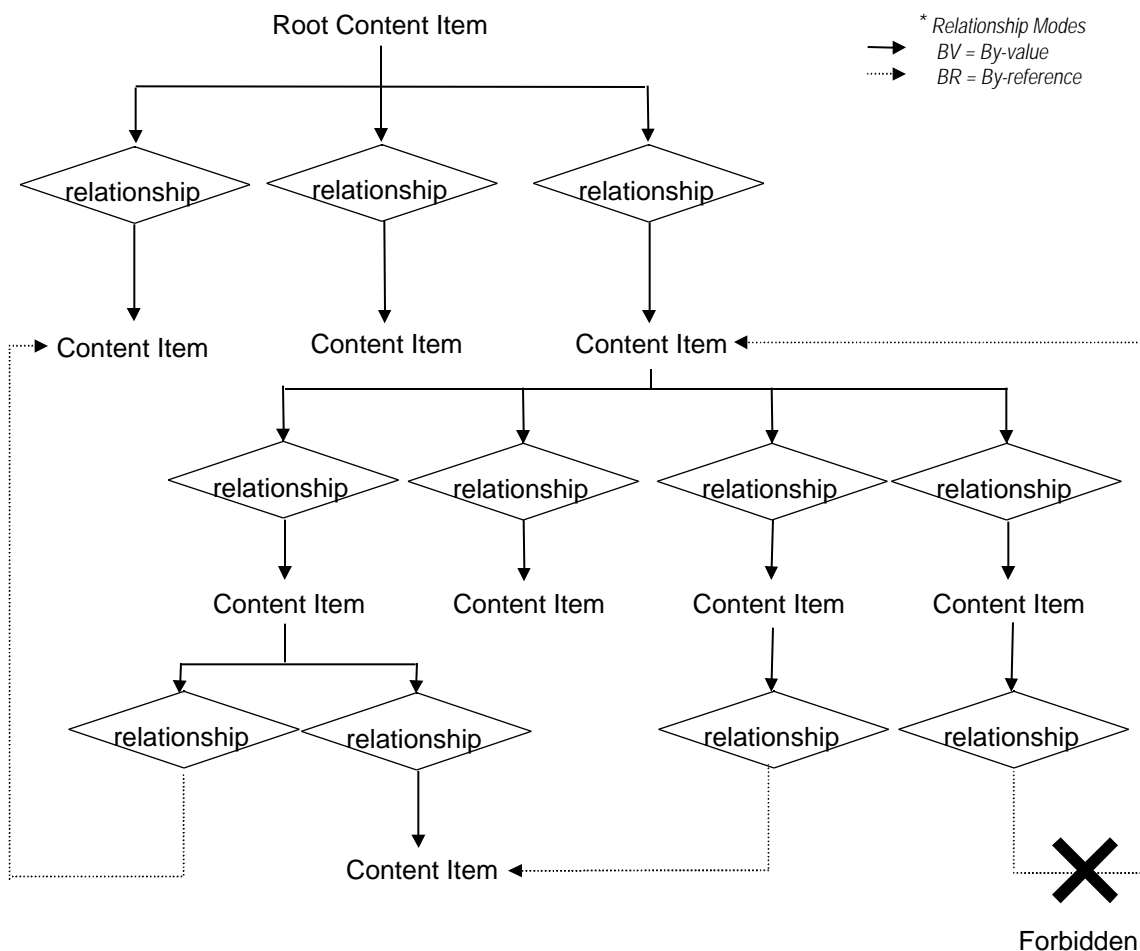
Figure C.Z.3-1 depicts the relationship of SR Documents to Content Items and the relationships of  
Content Items to other Content Items and to Observation Context.



220

**Figure C.Z.3-1**  
**SR Information Model**





224 Note: Whether or not relationships by-reference are allowed to ancestor Content Items, is specified in the IOD.

**Figure C.Z.3-2 – Example of an SR Content Tree (Informative)**

Each Content Item contains:

- 228 - a name/value pair, consisting of
  - a single Concept Name Code Sequence (0040,A043) that is the name of a name/value pair or a heading,
  - a value (text, codes, etc.),
- 232 - references to images, waveforms or other composite objects, with or without coordinates,
- relationships to other Items, either
  - by-value through nested Content Sequences, or
  - by-reference.

236

The value of the name/value pair is encoded with the following types (the choice of which may be constrained by the IOD in which this Module is contained):

- plain text
- 240 - numeric values
- codes
- dates and times
- dates
- 244 - times
- person names
- DICOM Unique Identifier references
- references to DICOM Images,
- 248 - references to DICOM Waveforms
- references to other DICOM Composite Instances
- spatial coordinates
- temporal coordinates
- 252 - containers of other items.

A container value type may include a heading encoded in the Concept Name Code Sequence (0040,A043). This heading describes the content of the container Content Item and may map to a document section heading in a printed or displayed document. The value of a container Content Item is the collection of Content Items that it contains.

Content Items are identified by their position in the Content Item tree. They have an implicit order as defined by the order of the Sequence Items. See the definition of Referenced Content Item Identifier (0040,DB73).

Table C.Z.3-1 describes the type of relationship between the Source Content Item and the Target Content Item.

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**Table C.Z.3-1**  
**RELATIONSHIP TYPE DEFINITIONS**

Relationship Type	Description	Definition and Example
CONTAINS	Contains	Source Item contains Target Content Item. E.g.: CONTAINER "History" {CONTAINS: TEXT: "mother had breast cancer"; CONTAINS IMAGE 36}
HAS OBS CONTEXT	Has Observation Context	Target Content Items shall convey any specialization of Observation Context needed for unambiguous documentation of the Source Content Item. E.g: CONTAINER: "Report" {HAS OBS CONTEXT: PNAME: "Recording Observer" ="Smith^John^Dr^"}
HAS PROPERTIES	Has Properties	Description of properties of the Source Content Item. E.g: CODE "Mass" {HAS PROPERTIES: CODE "anatomic location", HAS PROPERTIES: CODE "diameter", HAS PROPERTIES: CODE "margin", ...}.
HAS ACQ CONTEXT	Has Acquisition Context	The Target Content Item describes the conditions present during data acquisition of the Source Content Item. E.g: IMAGE 36 {HAS ACQ CONTEXT: CODE "contrast agent", HAS ACQ CONTEXT: CODE "position of imaging subject", ...}.
INFERRED FROM	Inferred From	Source Content Item conveys a measurement or other inference made from the Target Content Items. Denotes the supporting evidence for a measurement or judgment. E.g: CODE "Malignancy" {INFERRED FROM: CODE "Mass", INFERRED FROM: CODE "Lymphadenopathy",...}. Example: NUM: "BPD = 5mm" {INFERRED FROM: SCOOD}.
SELECTED FROM	Selected From	Source Content Item conveys spatial or temporal coordinates selected from the Target Content Item(s). E.g: SCOOD: "CLOSED 1,1 5,10" {SELECTED FROM: IMAGE 36}. E.g: TCOORD: "SEGMENT 60-200mS" {SELECTED FROM: WAVEFORM}.

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**Table C.Z.3-2**  
**SR DOCUMENT CONTENT MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
<i>Include Document Relationship Macro Table C.Z.3-3.</i>			
<i>Include Document Content Macro Table C.Z.3-4. with a Value Type (0040,A170) of CONTAINER</i>			

272

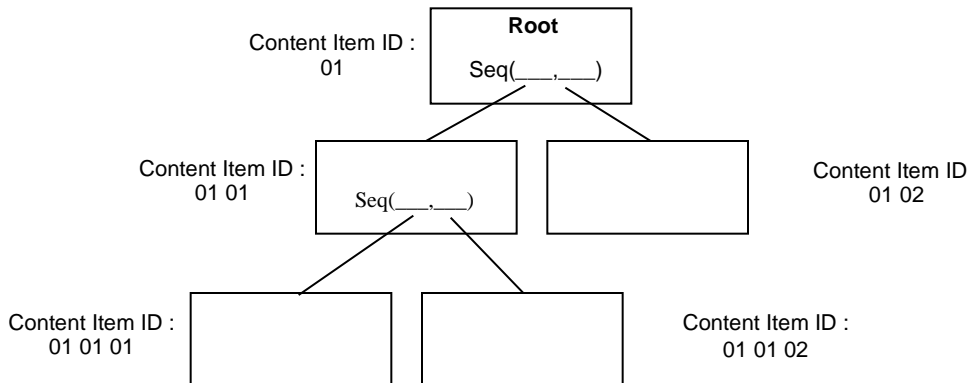
**Table C.Z.3-3**  
**DOCUMENT RELATIONSHIP MACRO ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
Observation DateTime	(0040,A196)	1C	<p>The date and time on which this Content Item was completed.</p> <p>Required if the date and time are different from the Content Date (0008,0023) and Content Time (0008,0033) or the Observation DateTime (0040,A196) defined in higher items.</p> <p>Note: When Content Items are copied into successor reports, the Content Date (0008,0023) and Content Time (0008,0033) of the new report are likely to be different than the date and time of the original observation. Therefore this attribute may need to be included in any copied Content Items to satisfy the condition.</p>
Content Template Sequence	(0040,A504)	1C	<p>Template that describes the content of this Content Item.</p> <p>One Item shall be present.</p> <p>Required if a template was used to define the content of this Item.</p>
<i>&gt;Include 'Template Identification Macro' Table 9-1</i>		<i>No Baseline Template ID is defined.</i>	

Content Sequence	(0040,A730)	1C	<p>A potentially recursively nested Sequence of Items that conveys content that is the Target of Relationships with the enclosing Source Content Item.</p> <p>One or more Items may be present.</p> <p>Required if the enclosing Content Item has relationships.</p> <p>Notes: 1. If this Attribute is not present then the enclosing Item is a leaf.  2. The order of Items within this Sequence is semantically significant for presentation.</p>
>Relationship Type	(0040,A732)	1	<p>The type of relationship between the (enclosing) Source Content Item and the Target Content Item.</p> <p>IODs specify additional constraints on Relationships (including lists of Enumerated Values).</p> <p>Defined Terms:</p> <p>CONTAINS  HAS PROPERTIES  HAS OBS CONTEXT  HAS ACQ CONTEXT  INFERRED FROM  SELECTED FROM</p>
<p>&gt;Include Document Relationship Macro Table C.Z.3-2a if Referenced Content Item Identifier is absent.</p>			<p>&gt;Include Document Content Macro Table C.Z.3-2b if Referenced Content Item Identifier is absent.</p>

<p>&gt;Referenced Content Item Identifier</p>	<p>(0040,DB73)</p>	<p>1C</p>	<p>An ordered set of one or more integers that uniquely identifies the target Content Item of the relationship.</p> <p>The root Content Item is referenced by a single value of 1.</p> <p>Each subsequent Integer represents an ordinal position of a Content Item in the Content Sequence (0040,A730) in which it belongs. The Reference Content Item Identifier is the set of these ordinal positions along the by-value relationship path. The number of values in this Multi-Value Attribute is exactly the number of relationships traversed in the SR content tree plus one.</p> <p>Note: 1. See example in note below table. 2. Content Items are ordered in a Content Sequence starting from 1 as defined in VR of SQ (See PS 3.5).</p> <p>Required if the Document Relationship Macro and Document Content Macro are not included.</p> <p>Shall not be present if Relationship Type (0040,A732) is CONTAINS.</p>
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276 Note: This example illustrates an SR content tree and identifiers associated with each Content Item:



**Table C.Z.3-4  
DOCUMENT CONTENT MACRO ATTRIBUTES**

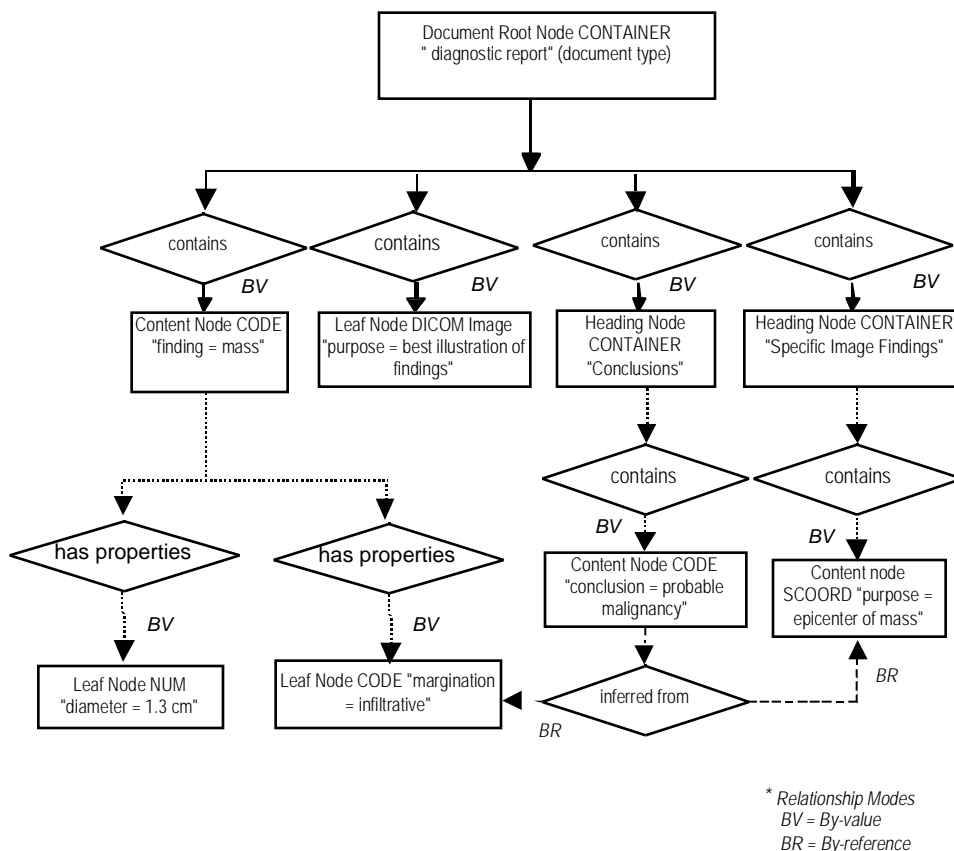
<b>Attribute Name</b>	<b>Tag</b>	<b>Type</b>	<b>Attribute Description</b>
Value Type	(0040,A170)	1	The type of the value encoded in this Content Item. Defined Terms: TEXT NUM CODE DATETIME DATE TIME UIDREF PNAME COMPOSITE IMAGE WAVEFORM SCOORD TCOORD CONTAINER
Concept Name Code Sequence	(0040,A043)	1C	Code describing the concept represented by this Content Item. This sequence shall contain exactly one Item. Also conveys the value of headings in documents.  Required if Value Type (0040,A170) is TEXT or NUM or CODE or DATETIME or DATE or TIME or UIDREF or PNAME.  Also required if Value Type (0040,A170) is CONTAINER and a heading is present, or this is the root Content Item.
>Include 'Code Sequence Macro' Table 8.8-1		Defined Context IDs are: 99 "Purpose of Reference" 178 "Spatial Extent of Finding"	
Text Value	(0040,A160)	1C	This is the value of the Content Item. Required if Value Type (0040,A170) is TEXT.
DateTime	(0040,A120)	1C	This is the value of the Content Item. Required if Value Type (0040,A170) is DATETIME.
Date	(0040,A121)	1C	This is the value of the Content Item. Required if Value Type (0040,A170) is DATE.
Time	(0040,A122)	1C	This is the value of the Content Item. Required if Value Type (0040,A170) is TIME.

Person Name	(0040,A123)	1C	This is the value of the Content Item. Required if Value Type (0040,A170) is PNAME.
UID	(0040,A124)	1C	This is the value of the Content Item. Required if Value Type (0040,A170) is UIDREF.
<i>Include 'Numeric Measurement Macro' Table C.X.1-1 if and only if Value Type (0040,A170) is NUM.</i>			
<i>Include 'Code Macro' Table C.X.2-1 if and only if Value Type (0040,A170) is CODE.</i>			
<i>Include 'Composite Object Reference Macro' Table C.X.3-1 if and only if Value Type (0040,A170) is COMPOSITE.</i>			
<i>Include 'Image Reference Macro' Table C.X.4-1 if and only if Value Type (0040,A170) is IMAGE.</i>			
<i>Include 'Waveform Reference Macro' Table C.X.5-1 if and only if Value Type (0040,A170) is WAVEFORM.</i>			
<i>Include 'Spatial Coordinates Macro' Table C.X.6-1 if and only if Value Type (0040,A170) is SCOORD.</i>			
<i>Include 'Image Coordinates Macro' Table C.X.7-1 if and only if Value Type (0040,A170) is TCOORD.</i>			

284

### C.Z.4 SR Content Tree Example (Informative)

Figure C.Z.4-1 depicts the content of an example diagnostic interpretation.



288

- Notes:
1. For nodes of type CONTAINER, the contents of the Concept Name Code Sequence are shown in quotes.
  2. For nodes of Value Type CODE, the contents are shown as "Concept Name Code Sequence = Concept Code Sequence".



292

**Figure C.Z.4-1 (Informative)**  
**SR Content Tree for an Example Diagnostic Interpretation**

**C.Z.5 OBSERVATION CONTEXT ENCODING**

296 Observation Context describes who or what is performing the interpretation, whether the examination of  
evidence is direct or quoted, what procedure generated the evidence that is being interpreted, and who or  
what is the subject of the evidence that is being interpreted.

300 Initial Observation Context is defined outside the SR Document Content tree by other modules in the SR  
IOD (i.e., Patient Module, Specimen Identification, General Study, Patient Study, SR Document Series,  
General Equipment and SR Document General modules). Observation Context defined by attributes in  
these modules applies to all Content Items in the SR Document Content tree and need not be explicitly  
304 coded in the tree. The initial Observation Context from outside the tree can be explicitly replaced rather  
than inherited if it is ambiguous.

If a Content Item in the SR Document Content tree has Observation Context above and beyond the  
context already encoded elsewhere in the IOD, the context information applying to that Content Item shall  
be encoded as a child node of the Content Item in the tree using the HAS OBSERVATION CONTEXT  
308 relationship. That is, Observation Context is a property of its parent Content Item.

The context information specified in the Observation Context child node (i.e. target of the HAS OBS  
CONTEXT relationship) adds to the Observation Context of its parent node Content item, and is inherited  
by all the descendant nodes of that parent node. Observation Context is encoded in the same manner as  
312 any other Content Item. See the example in Figure C.Z.5-1. A Content Item inherits the accumulated  
Observation Context of its parent. Observation Context is never replaced as the tree of Content Items is  
traversed top down from the root, only extended, and shall not be ambiguous or contradictory.

316 The IOD may specify restrictions on Content Items and Relationship Types that also constrain the  
flexibility with which Observation Context may be described.

The IOD may specify Templates that offer or restrict patterns and content in Observation Content.

Note: Template IDs 24 "Direct Observation Context", 25 "Quoted Document Observation Context" and 26  
"Quoted Verbal Observation Context" are defined.

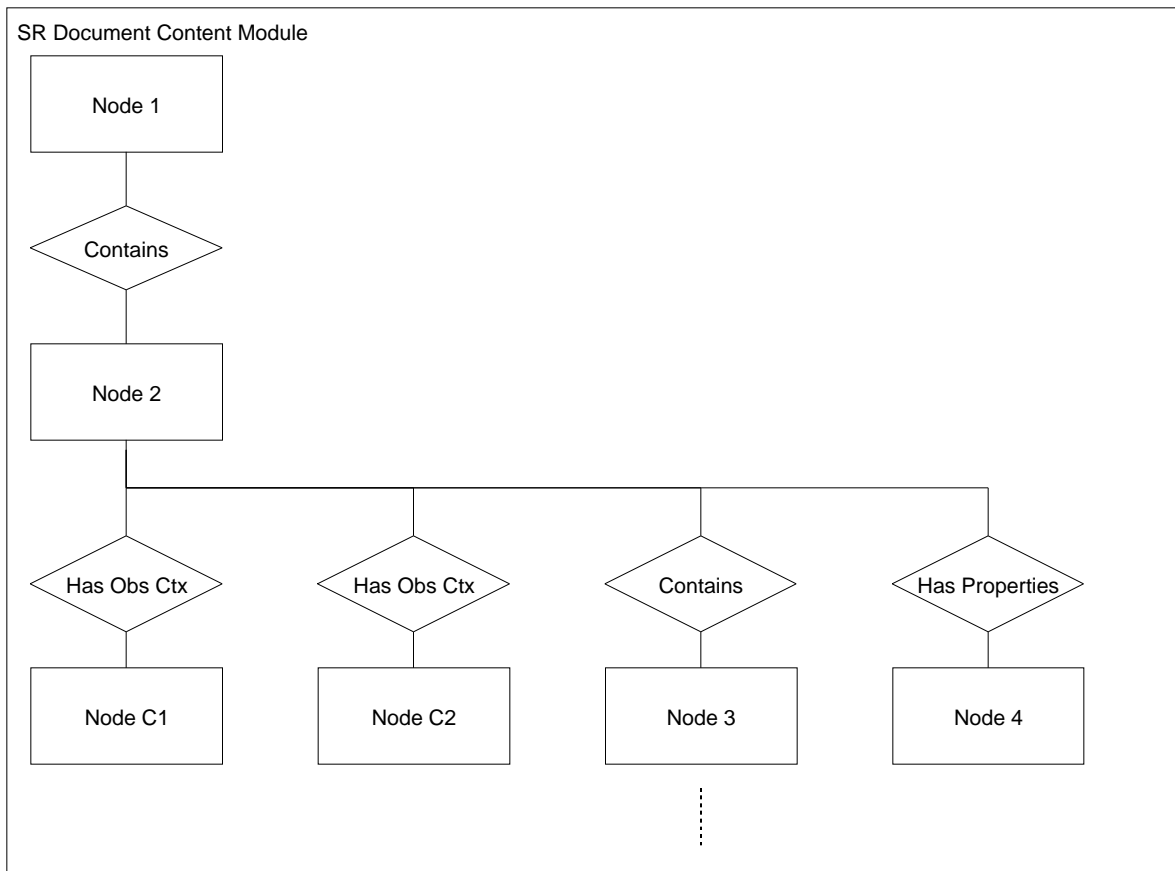
320

Patient Module  
 Patient Name  
 Patient ID  
 Patient Sex  
 Patient Date Of Birth

General Study Module  
 Study Instance UID  
 Accession Number

SR Document Series Module  
 Modality

SR Document General Module  
 Referenced Request Sequence  
 >Requested Procedure ID  
 >Requested Procedure Description



324

- Notes:
1. Node 2 inherits any Observation Context of Node 1, which is then extended by the additional Observation Context defined in Nodes C1 and C2 (that is C1 and C2 are properties of 2).
  2. Node 3 and its descendents inherit the Observation Context of Node 2, which includes C1 and C2.
  3. Node 4 inherits the Observation Context of Node 2, which includes C1 and C2.

328

**Figure C.Z.5-1 (Informative)  
Definition and Inheritance of Observation Context**

**C.X CONTENT MACROS**

**C.X.1 Numeric Measurement Macro**

332 Table C.X.1-1 specifies the Attributes that convey a NUM (numeric measurement) value.

**Table C.X.1-1  
NUMERIC MEASUREMENT MACRO ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
Measured Value Sequence	(0040,A300)	1	This is the value of the Content Item. Shall consist of a Sequence of Items conveying the measured value(s), which represent integers or real numbers and units of measurement. One or more Items may be present.
>Numeric Value	(0040,A30A)	1	Numeric measurement value or values.
>Measurement Units Code Sequence	(0040,08EA)	1	Units of measurement. No more than one Item may be present. Note: The units are not required to be the same for all the Items of the Measured Value Sequence.
>>Include 'Code Sequence Macro' Table 8.8-1			Defined Context ID is 82.

336

**C.X.2 Code Macro**

Table C.X.2-1 specifies the Attributes that convey a CODE value.

**Table C.X.2-1  
CODE MACRO ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
Concept Code Sequence	(0040,A168)	1	This is the value of the Content Item. This sequence shall contain one Item.
>Include 'Code Sequence Macro' Table 8.8-1			No Baseline Context ID Number is specified.

340

**C.X.3 Composite Object Reference Macro**

Table C.X.3-1 specifies the Attributes that convey a reference to a DICOM Composite Object that is not a DICOM Image or Waveform (such as a DICOM presentation state or structured report).

344 Notes: 1. If softcopy presentation state is referenced by this macro, then it will contain references to the images to which it applies.  
2. Other SR Documents may be referenced by this macro, but there is no facility to reference individual content items within those reports.

348

**Table C.X.3-1  
COMPOSITE OBJECT REFERENCE MACRO ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
Referenced SOP Sequence	(0008,1199)	1	References to Composite Object SOP Class/SOP Instance pairs .

>Referenced SOP Class UID	(0008,1150)	1	Uniquely identifies the referenced SOP Class. Shall be the same for all Images referenced by this presentation state.
>Referenced SOP Instance UID	(0008,1155)	1	Uniquely identifies the referenced SOP Instance.

352 **C.X.4 Image Reference Macro**

Table C.X.4-1 specifies the Attributes that convey a reference to a DICOM image.

**Table C.X.4-1  
IMAGE REFERENCE MACRO ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
<i>Include 'Composite Object Reference Macro' Table C.X.3-1</i>			
>Referenced Frame Number	(0008,1160)	1C	Identifies the frame numbers within the referenced SOP Instance to which the reference applies. The first frame shall be denoted as frame number 1.  Note: This Attribute may be multi-valued.  Required if the referenced SOP Instance is a multi-frame image and the reference does not apply to all frames.

356

**C.X.5 Waveform Reference Macro**

Table C.X.5-1 specifies the Attributes that convey a reference to a DICOM waveform.

**Table C.X.5-1  
WAVEFORM REFERENCE MACRO ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
<i>Include 'Composite Object Reference Macro' Table C.X.3-1</i>			
>Referenced Waveform Channels	(0040,A0B0)	1C	List of channels in Waveform to which the reference applies. See C.X.5.1.1  Required if the Referenced SOP Instance is a Waveform that contains multiple Channels and not all Channels in the Waveform are referenced.

360

**C.X.5.1 Waveform Reference Macro Attribute Descriptions**

**C.X.5.1.1 Referenced Waveform Channels**

364 Referenced Waveform Channels (0040,A0B0) is a multi-value attribute which lists the channels  
referenced. Each channel is specified as a pair of values (M,C), where the first value is the sequence item  
number of the Waveform Sequence (5400,0100) attribute in the referenced object (i.e. the Multiplex  
Group Number), and the second value is the sequence item number of the Channel Definition Sequence  
368 (003A,0200) attribute (i.e., the Channel Number) within the multiplex group.

If the specified channel number is 0, the annotation applies to all channels in the multiplex group.

372 Note: As an example, an annotation which applies to the entire first multiplex group and channels 2 and 3 of the third multiplex group would have Referenced Waveform Channels (0040,A0B0) value 0001 0000 0003 0002 0003 0003.

### C.X.6 Spatial Coordinates Macro

376 Table C.X.6-1 specifies the Attributes that convey SCOORD Content Items located within a referenced object that is a DICOM Image.

**Table C.X.6-1  
SPATIAL COORDINATES MACRO ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
Graphic Data	(0070,0022)	1	An ordered set of (column,row) pairs that denote positions in an image specified with sub-pixel resolution such that the origin at the TLHC of the TLHC pixel is 0.0\0.0, the BRHC of the TLHC pixel is 1.0\1.0, and the BRHC of the BRHC pixel is Columns\Rows. The values must be within the range 0\0 to Columns\Rows. The values Columns (0028,0011) and Rows (0028,0010) are those contained in the referenced image(s). See C.X.6.1.2 for further definition.
Graphic Type	(0070,0023)	1	See C.X.6.1.1 for Enumerated Values.

#### 380 C.X.6.1 Spatial Coordinates Macro Attribute Descriptions

##### C.X.6.1.1 Graphic Type

When annotation applies to an image, this attribute defines the type of geometry of the annotated region of interest. The following Enumerated Values are specified for image spatial coordinate geometries:

- 384 POINT = a single pixel denoted by a single (column,row) pair  
MULTIPOINT = multiple pixels each denoted by an (column,row) pair  
POLYLINE = a closed polygon with vertices denoted by (column,row) pairs  
388 CIRCLE = a circle defined by two (column,row) pairs. The first point is the central pixel. The second point is a pixel on the perimeter of the circle.  
ELLIPSE = an ellipse defined by four pixel (column,row) pairs, the first two points specifying the endpoints of the major axis and the second two points specifying the endpoints of the minor axis of an ellipse

392

##### C.X.6.1.2 Graphic Data

396 Graphic Data may be used to associate an anatomic or spatial Concept with a defined subset of one or more images. Graphic Data may be explicitly defined as a single point (i.e. to denote the epicenter of an anatomic site or lesion) or more than one point (i.e. representing a set of points or an open or closed polygon).

Note: Spatial coordinates may be used to associate observational data with a set of Image features. Spatial coordinates also may be used to convey coordinates that are input data for a measurement.

400

### C.X.7 Temporal Coordinates Macro

Table C.X.7-1 specifies the Attributes that convey TCOORD content items located within a referenced object (such as a DICOM IMAGE or WAVEFORM).

404

**Table C.X.7-1**  
**TEMPORAL COORDINATES MACRO ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
Temporal Range Type	(0040,A130)	1	See C.X.7.1.1 for Enumerated Values.
Referenced Sample Positions	(0040,A132)	1C	List of samples within a multiplex group specifying temporal points of the referenced data. Position of first sample is 1.  Required if the Referenced SOP Instance is a Waveform and Referenced Time Offsets (0040,A138) and Referenced Datetime (0040,A13A) are not present.  May be used only if Referenced Channels (0040,A0B0) refers to channels within a single multiplex group.
Referenced Time Offsets	(0040,A138)	1C	Specifies temporal points for reference by number of seconds after start of data.  Required if Referenced Sample Positions (0040,A132) and Referenced Datetime (0040,A13A) is not present.
Referenced Datetime	(0040,A13A)	1C	Specifies temporal points for reference by absolute time.  Required if Referenced Sample Positions (0040,A132) and Referenced Time Offsets (0040,A138) is not present.

#### C.X.7.1 Temporal Range Type

408 This Attribute defines the type of temporal extent of the region of interest. A temporal point (or instant of time) may be defined by a waveform sample offset (for a single waveform multiplex group only), time offset, or absolute time.

The following Enumerated Values are specified for Temporal Range Type:

- 412 POINT = a single temporal point  
 MULTIPOINT = multiple temporal points  
 SEGMENT = a range between two temporal points  
 MULTISEGMENT = multiple segments, each denoted by two temporal points  
 416 BEGIN = a range beginning at one temporal point, and extending beyond the end of the acquired data  
 END = a range beginning before the start of the acquired data, and extending to (and including) the identified temporal point

420

## DICOM DIRECTORY

**Update Table B.15.3-3: DICOM Directory Record Types**

424 **B.15.3 Update of DICOM Directory Record Types**

Table B.15.3-3 (continued)

Attribute Name	Tag	Type	Attribute Description
>Directory Record Type	(0004,1430)	1C	<p>Defines a specialized type of Directory Record by reference to its position in the Media Storage Directory Information Model (see Section B.15.4). Required if the Directory Record Sequence (0004,1220) is not zero length.</p> <p>Enumerated Values (see Section B.15.5):            PATIENT      STUDY      SERIES            IMAGE        OVERLAY     MODALITY LUT            VOI LUT      CURVE        TOPIC            VISIT        RESULTS      INTERPRETATION            STUDY COMPONENT      STORED PRINT            RT DOSE      RT STRUCTURE SET            RT PLAN      RT TREAT RECORD            PRESENTATION  <b>SR DOCUMENT</b></p> <p>PRIVATE = Privately defined record hierarchy position. Type shall be defined by Private Record UID (0004,1432). MRDR = Special Directory Record which allows indirect reference to a File by multiple Directory Records. Instead of directly referencing a File by its Referenced File ID (0004,1500), a Directory Record of any of the Types define above (except MRDR) may reference a Multi-Referenced File Directory Record which in turn will reference the File by its File ID.</p>

Add SR Document Directory Record (in bold) to Table B.15.4-2

428 **B.15.4 Update of DICOM Directory Record Relationships**

Table B.15.4-2 - RELATIONSHIP BETWEEN DIRECTORY RECORDS

Directory Record Type	Section	Directory Record Types which may be included in the next lower-level directory Entity
(Root Directory Entity)		PATIENT, TOPIC, PRIVATE
PATIENT	F.5.1	STUDY, PRIVATE
STUDY	F.5.2	SERIES, VISIT, RESULTS, STUDY COMPONENT PRIVATE
SERIES	F.5.3	IMAGE, OVERLAY, MODALITY LUT, VOI LUT, CURVE, STORED PRINT, RT DOSE, RT STRUCTURE SET, RT PLAN, RT TREAT RECORD, PRESENTATION, <b>SR DOCUMENT</b> , PRIVATE

IMAGE	F.5.4	PRIVATE
OVERLAY	F.5.5	PRIVATE
MODALITY LUT	F.5.6	PRIVATE
VOI LUT	F.5.7	PRIVATE
CURVE	F.5.8	PRIVATE
STORED PRINT	F.5.18	PRIVATE
RT DOSE	F.5.19	PRIVATE
RT STRUCTURE SET	F.5.20	PRIVATE
RT PLAN	F.5.21	PRIVATE
RT TREAT RECORD	F.5.22	PRIVATE
PRESENTATION	F.5.23	PRIVATE
<b><u>SR DOCUMENT</u></b>	F.5.24	PRIVATE
TOPIC	F.5.9	STUDY, SERIES, IMAGE, OVERLAY, MODALITY LUT, VOI LUT, CURVE, STORED PRINT, RT DOSE, RT STRUCTURE SET, RT PLAN, RT TREAT RECORD, PRESENTATION, PRIVATE
VISIT	F.5.10	PRIVATE
RESULTS	F.5.11	INTERPRETATION, PRIVATE
INTERPRETATION	F.5.12	PRIVATE
STUDY COMPONENT	F.5.13	PRIVATE
PRIVATE	F.6.1	PRIVATE, (any of the above as privately defined)
MRDR	F.6.2	(Not applicable)

432 Add SR Document Directory Record

#### F.5.24 Update of SR Document Directory Record Definition

436 The Directory Record is based on the specification of Section B.15.3. It is identified by a Directory Record Type of Value "SR DOCUMENT". Table F.5-24 lists the set of keys with their associated Types for such a Directory Record Type. The description of these keys may be found in the Modules related to the Observation IE of Structured Report IOD. This Directory Record shall be used to reference an SR Document. This type of Directory Record may reference a Lower-Level Directory Entity which includes one or more Directory Records as defined in Table B.15.4-2.

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**Table F.5-24  
SR DOCUMENT KEYS**

Key	Tag	Type	Type
Specific Character Set	(0008,0005)	1C	Required if an extended or replacement character set is used in one of the keys.
Instance Number	(0020,0013)	1	
Completion Flag	(0040,A491)	1	
Verification Flag	(0040,A493)	1	



Content Date	(0008,0023)	1	
Content Time	(0008,0033)	1	
Verification DateTime	(0040,A030)	1C	Date and Time of verification by the Documenting Observer (0040,A075). Required if Verification Flag (0040,A493) is VERIFIED.
Concept Name Code Sequence	(0040,A043)	1	Code describing the concept represented by the root Content Item. This sequence shall contain exactly one Item.
Any Attribute of the Document IE Modules		3	

Note: Because (0004,1511) Referenced SOP Instance UID in File may be used as a "pseudo" Directory Record Key (See Table B.15.3-3), it is not duplicated in this list of keys.

## Part 4 Addendum

*Add Structured Report Storage SOP Classes to Table B.5-1*

### B.5 STANDARD SOP CLASSES

SOP Class Name	SOP Class UID	IOD (See PS 3.3)
Basic Text SR	1.2.840.10008.5.1.4.1.1.88.11	Basic Text SR
Enhanced SR	1.2.840.10008.5.1.4.1.1.88.22	Enhanced SR
Comprehensive SR	1.2.840.10008.5.1.4.1.1.88.33	Comprehensive SR

448

#### B.5.1 Specialization for Standard SOP Classes

##### B.5.1.4 Grayscale Softcopy Presentation State Storage SOP Class

See Annex N.

##### B.5.1.5 Structured Reporting Storage SOP Classes

See Annex O.

452

*Add Structured Report Storage Media Storage SOP Classes to Table I.4-1*

### I.4 MEDIA STANDARD STORAGE SOP CLASSES

SOP Class Name	SOP Class UID	IOD (See PS 3.3)
Basic Text SR	1.2.840.10008.5.1.4.1.1.88.11	Basic Text SR
Enhanced SR	1.2.840.10008.5.1.4.1.1.88.22	Enhanced SR
Comprehensive SR	1.2.840.10008.5.1.4.1.1.88.33	Comprehensive SR

456

#### I.4.1 Specialization for Standard SOP Classes

##### I.4.1.1 Grayscale Softcopy Presentation State Storage SOP Class

See Annex N.

460

##### I.4.1.2 Structured Reporting Storage SOP Classes

See Annex O.

464 Add Annex O Structured Report Storage SOP Classes

## **Annex O    STRUCTURED REPORTING STORAGE SOP CLASSES (Normative)**

### **O.1    OVERVIEW**

468    The Structured Reporting Storage SOP Classes extend the functionality of the Storage Service class (defined in Annex B) to extend the SCP behavior and conformance requirements.

### **O.2    BEHAVIOR OF AN SCP**

472    An SCP intending to display or otherwise render a Structured Report shall convey its full meaning in an unambiguous manner.

For a device, that is both an SCU and an SCP of these Storage SOP Classes, in addition to the behavior for the Storage Service Class specified in B.2.2, the following additional requirements are specified for Structured Reporting Storage SOP Classes:

476        — an SCP of this SOP Class shall support Level 2 Conformance as defined in Section B.4.1.

Note:    This requirement means that all Type 1, Type 2, and Type 3 Attributes defined in the Information Object Definition associated with the SOP Class will be stored and may be accessed.

480

### **O.3    CONFORMANCE**

484    In addition to the Conformance Statement requirements for the Storage Service Class specified in B.4.3, the following additional requirements are specified for Structured Reporting Storage SOP Classes:

#### **O.3.1    Conformance Statement for an SCU**

The following shall be documented in the Conformance Statement of any implementation claiming conformance to the Structured Reporting Storage SOP Classes as an SCU:

- 488        — the Image or other composite object Storage SOP Classes that are also supported by the SCU and which may be referenced by instances of Structured Reporting Storage SOP Class.
- the range of Value Types and Relationship Types that are supported by the SCU.

#### **O.3.2    Conformance Statement for an SCP**

The following shall be documented in the Conformance Statement of any implementation claiming conformance to the Structured Reporting Storage SOP Class as an SCP:

- 496        — For an SCP of a Structured Reporting Storage SOP Class that is displaying or otherwise rendering the structured report contained in a SOP Instance of the Class, the general form in which the structured report related attributes are rendered.
- 500        — For an SCP of a Structured Reporting Storage SOP Class, the Image or other composite object Storage SOP Classes that are also supported by the SCP and which may be referenced by instances of the Structured Reporting Storage SOP Class, and whether or not they will be displayed or otherwise rendered.

504

- For an SCP of a Structured Reporting Storage SOP Class that is displaying or otherwise rendering an image or other composite object referred to by a SOP Instance of the Class, the manner in which the structured report related attributes (such as spatial coordinates and referenced presentation states) are used to influence the display of the image or object.

## Part 5 Addendum

### 508 7.5 NESTING OF DATA SETS

The VR identified "SQ" shall be used for Data Elements with a Value consisting of a Sequence of zero or more Items, where each Item contains a set of Data Elements. SQ provides a flexible encoding scheme that may be used for simple structures of repeating sets of Data Elements, or the encoding of more  
512 complex Information Object Definitions often called folders. SQ Data Elements can also be used recursively to contain multi-level nested structures.

**Items present in an SQ Data Element shall be an ordered set where each Item may be referenced by its ordinal position. Each Item shall be implicitly assigned an ordinal position starting with the value 1 for the first Item in the Sequence, and incremented by 1 with each subsequent Item. The last Item in the Sequence shall have an ordinal position equal to the number of Items in the Sequence.**

516

**Notes:** 1. This clause implies that item ordering is preserved during transfer and storage.  
2. An IOD or Module Definition may choose not to use this ordering property of a Data Element with VR of SQ. This is simply done by not specifying any specific semantics to the ordering of Items or by not specifying usage of the referencing of Items by ordinal position.

520

524 The definition of the Data Elements encapsulated in each Item is provided by the specification of the Data Element (or associated Attribute) of Value Representation SQ. Items in a sequence of Items may or may not contain the same set of Data Elements. Data Elements with a VR of SQ may contain multiple Items but shall always have a Value Multiplicity of one (ie. a single Sequence).

528 There are three special SQ related Data Elements that are not ruled by the VR encoding rules conveyed by the Transfer Syntax. They shall be encoded as Implicit VR. These special Data Elements are Item (FFFE,E000), Item Delimitation Item (FFFE,E00D), and Sequence Delimitation Item (FFFE,E0DD). However, the Data Set within the Value Field of the Data Element Item (FFFE,E000) shall be encoded  
532 according to the rules conveyed by the Transfer Syntax.

## Part 6 Addendum

### 6. REGISTRY OF DICOM DATA ELEMENTS

536 Add the following Data Elements to PS 3.6, Section 6.

Tag	Name	VR	VM
(0040,A027)	Documenting Organization	LO	1
(0040,A030)	Verification DateTime	DA	1
(0040,A075)	Documenting Observer	PN	1
(0040,A0B0)	Referenced Waveform Channels	US	2-2n
(0040,A120)	DateTime	DT	1
(0040,A124)	UID	UI	1
(0040,A130)	Temporal Range Type	CS	1
(0040,A132)	Referenced Sample Offsets	UL	1-n
(0040,A138)	Referenced Time Offset	DS	1-n
(0040,A13A)	Referenced DateTime	DT	1-n
(0040,A196)	Observation DateTime	DT	1
(0040,A300)	Measured Value Sequence	SQ	1
(0040,A30A)	Numeric Value	DS	1-n
(0040,A360)	Predecessor Documents Sequence	SQ	1
(0040,A370)	Referenced Request Sequence	SQ	1
(0040,A372)	Performed Procedure Code Sequence	SQ	1
(0040,A375)	Complete Composite Object Evidence Sequence	SQ	1
(0040,A385)	Pertinent Prior Evidence Sequence	SQ	1
(0040,A491)	Completion Flag	CS	1
(0040,A493)	Verification Flag	CS	1
(0040,A504)	Content Template Sequence	SQ	1
(0040,A525)	Identical Documents	SQ	1
(0040,A730)	Content Sequence	SQ	1
(0040,A732)	Relationship Type	CS	1
(0040,DB00)	Template Identifier	CS	1
(0040,DB06)	Template Version	DT	1
(0040,DB07)	Template Local Version	DT	1
(0040,DB0B)	Template Extension Flag	CS	1
(0040,DB0C)	Template Extension Organization UID	UI	1
(0040,DB0D)	Template Extension Creator UID	UI	1
(0040,DB73)	Referenced Content Item Identifier	US	1-n

## ANNEX A (NORMATIVE): REGISTRY OF DICOM UNIQUE IDENTIFIERS (UID)

540 Add the following UIDs to Part 6 Annex A:

UID Value	UID NAME	UID TYPE	Part
1.2.840.10008.5.1.4.1.1.88.11	Basic Text SR	SOP Class	3.4
1.2.840.10008.5.1.4.1.1.88.22	Enhanced SR	SOP Class	3.4
1.2.840.10008.5.1.4.1.1.88.33	Comprehensive SR	SOP Class	3.4