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Digital Imaging and Communications in Medicine (DICOM)

Supplement 111: Segmentation Storage SOP Class

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Table of Contents

75   **Foreword**

The domain of this Supplement is segmentation instances created during acquisition, post-processing, interpretation and treatment. A growing number of applications perform segmentations and work with the resulting segments for which there is no widely used representation within DICOM. The Supplement provides a way to encode segmentation data. It is
80   intended for composite data objects of any modality or clinical specialty.

This IOD can be used to encode tissue segmentation, functional segmentation, and artifact identification for quantification or visualization.

The supplement supports the following features:

1. The IOD is encoded as a multi-frame image.

85   2. Each frame represents a 2D plane or a slice of a single segmentation category.

3. More than one segmentation category is supported per IOD instance. If more than one segmentation category is defined, each is encoded in a separate set of frames (i.e. multiple segmentation categories are not packed into pixels)

4. Segmentations are either binary or fractional. Fractional segmentations may be used to
90   represent probability or occupancy percentages.

5. The spatial sampling and the extent do not need to be identical to the referenced images.

6. When a Frame of Reference exists, position and orientation are defined within that patient coordinate system.

This document is a Supplement to the DICOM Standard. It is an extension to the following parts
95   of the DICOM Standard:

PS 3.2	-	Conformance
PS 3.3	-	Information Object Definitions
PS 3.4	-	Service Class Specifications
PS 3.6	-	Data Dictionary
PS 3.15	-	Security and System Management Profiles
PS 3.16	-	Content Mapping Resource
PS 3.17	-	Explanatory Information

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Changes to NEMA Standards Publication PS 3.2-2006

Digital Imaging and Communications in Medicine (DICOM)

Part 2: Conformance

Item: Add SOP Class to Table A.1-2

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Table A.1-2
UID VALUES

UID Value	UID NAME	Category
…		
1.2.840.10008.5.1.4.1.1.66.4	**Segmentation SOP Class**	**Transfer**
…		

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Changes to NEMA Standards Publication PS 3.3-2006

Digital Imaging and Communications in Medicine (DICOM)

125   **Part 3: Information Object Definitions**

Item: Add in Section 10.3, Table 10-3

10.3   IMAGE SOP INSTANCE REFERENCE MACRO

Table 10-3
IMAGE SOP INSTANCE REFERENCE MACRO ATTRIBUTES

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Attribute Name	Tag	Type	Attribute Description
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.
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**, and Referenced Segment Number (0062,000B) is not present.**
Referenced Segment Number	**(0062,000B)**	**1C**	**Identifies the Segment Number to which the reference applies. Required if the Referenced SOP Instance is a Segmentation and the reference does not apply to all segments and Referenced Frame Number (0008,1160) is not present.**

Item: Add in Section A.1.4, rows and column to Table A.1-1

A.1.4   Overview of the Composite IOD Module Content

IODs Modules	Seg.
Patient	**M**
Specimen Identification	**U**
Clinical Trial Subject	**U**
General Study	**M**
Patient Study	**U**
Clinical Trial Study	**U**
General Series	**M**
Segmentation Series	**M**
Clinical Trial Series	**U**
Frame Of Reference	**C**
General Equipment	**M**
Enhanced General Equipment	**M**
General Image	**M**
Image Pixel	**M**
Segmentation Image	**M**
Multi-frame Functional Groups	**M**
Multi-frame Dimension	**M**
Common Instance Reference	**C**
SOP Common	**M**

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Item: Add in the following new section in Annex A

A.51   SEGMENTATION INFORMATION OBJECT DEFINITION

A.51.1 Segmentation IOD Description

The Segmentation Information Object Definition (IOD) specifies a multi-frame image representing
140   a classification of pixels in one or more referenced images. Segmentations are either binary or

fractional. If the referenced images have a defined frame of reference, the segmentation instance shall have the same frame of reference and is not required to have the same spatial sampling or extent as the referenced images. If the referenced image does not have a defined frame of reference, the segmentation instance shall have the same spatial sampling and extent as the referenced image.

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The Segmentation IOD does not include the full set of acquisition parameters of the referenced images, e.g. cardiac phase. An application rendering or processing the segmentation may need to access the referenced images for such information.

A.51.2 Segmentation IOD Entity-Relationship Model

150   The E-R Model in Section A.1.2 depicts those components of the DICOM Information Model that directly reference the Segmentation IOD. The Segmentation is a kind of Image.

A.51.3 Segmentation IOD Module Table

Table A.51-1
SEGMENTATION IOD MODULES

IE	Module	Reference	Usage
Patient	Patient	C.7.1.1	M
	Specimen Identification	C.7.1.2	U
	Clinical Trial Subject	C.7.1.3	U
Study	General Study	C.7.2.1	M
	Patient Study	C.7.2.2	U
	Clinical Trial Study	C.7.2.3	U
Series	General Series	C.7.3.1	M
	Segmentation Series	C.8.20.1	M
	Clinical Trial Series	C.7.3.2	U
Frame of Reference	Frame of Reference	C.7.4.1	C – Required if Derivation Image Functional Group (C.7.16.2.6) is not present.
Equipment	General Equipment	C.7.5.1	M
	Enhanced General Equipment	C.7.5.2	M
Segmentation	General Image	C.7.6.1	M
	Image Pixel	C.7.6.3	M
	Segmentation Image	C.8.20.2	M
	Multi-frame Functional Groups	C.7.6.16	M
	Multi-frame Dimension	C.7.6.7.17	M
	Common Instance Reference	C.12.2	C – Required if Derivation Image Functional Group (C.7.16.2.6) is present.

SOP Common	C.12.1	M

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A.51.4 Segmentation IOD Content Constraints

The VOI LUT module shall not be present.

The Modality LUT module shall not be present.

The Overlay Module shall not be present.

160   Pixel Padding Value (0028,0120) shall not be present.

A.51.5 Segmentation Functional Groups

Table A.51-2 specifies the use of the Functional Group macros used in the Multi-frame Functional Group Module for the Segmentation IOD.

Table A.51-2
165   **SEGMENTATION FUNCTIONAL GROUP MACROS**

Function Group Macro	Section	Usage
Pixel Measures	C.7.6.16.2.1	C – Required if Derivation Image Functional Group (C.7.6.16.2.6) is not present. May be present otherwise. See A.51.5.1
Plane Position	C.7.6.16.2.3	C – Required if Derivation Image Functional Group (C.7.6.16.2.6) is not present. May be present otherwise. See A.51.5.1
Plane Orientation	C.7.6.16.2.4	C – Required if Derivation Image Functional Group (C.7.6.16.2.6) is not present. May be present otherwise. See A.51.5.1
Derivation Image	C.7.6.16.2.6	C – Required if any of Pixel Measures (C.7.6.16.2.1) or Plane Position (C.7.6.16.2.3) or Plane Orientation (C.7.6.16.2.4) Functional Groups are not present. May be present otherwise. See A.51.5.1
Frame Content Macro	C.7.6.16.2.2	M
Segmentation	C.8.20.3.1	M

A.51.5.1   Segmentation Functional Groups Description

When a Frame of Reference UID is present the segment shall be specified within that coordinate system, using the Pixel Measures, Plane Position and Plane Orientation Functional Groups.
170   Since this defines the spatial relationship of the segment, the size of the segmentation frames need not be the same size, or resolution, as the image data used to generate the segment data.

If the Frame of Reference UID is not present, each pixel of the segmentation shall correspond to a pixel in a referenced image, using the Derivation Image Functional Group. Hence, the rows and columns of each referenced image will match the segmentation image.

175   The value of Purpose of Reference Sequence (0040,A170) in the Derivation Image Functional Group Macro shall be (121322, DCM, "Source Image for Image Processing Operation"). The value of Derivation Code Sequence (0008,9215) shall be (113076, DCM, "Segmentation").

Item: Add in the following new text in C.7.3.1.1.1

180 **C.7.3.1.1.1   Modality**

Defined Terms for the Modality (0008,0060) are:

   …

SEG   = Segmentation

Item: Add in the following new sections in C.8

C.8.20 Segmentation

185 This section describes the specific modules for the Segmentation IOD.

C.8.20.1 Segmentation Series Module

Table C.8.20-1 defines the general Attributes of the Segmentation Series Module.

Table C.8.20-1
SEGMENTATION SERIES MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Modality	(0008,0060)	1	Modality Type Enumerated Value: SEG
Series Number	(0020,0011)	1	A number that identifies this Series
Referenced Performed Procedure Step Sequence	(0008,1111)	1C	Uniquely identifies the Performed Procedure Step SOP Instance to which the Series is related (e.g. a Modality or General-Purpose Performed Procedure Step SOP). Only a single Item is permitted in this sequence. Required if the SOP Instance was created in a workflow managed with the Modality Performed Procedure Step SOP Class or General Purpose Performed Procedure Step SOP Class.
>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.

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C.8.20.2 Segmentation Image Module

Table C.8.20-2 defines the general Attributes of the Segmentation Image Module.

Table C.8.20-2
SEGMENTATION IMAGE MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Image Type	(0008,0008)	1	Value 1 shall be DERIVED. Value 2 shall be PRIMARY. No other values shall be present.
Include Content Identification Macro Table 10-12			
Samples Per Pixel	(0028,0002)	1	Enumerated Values: 1

Photometric Interpretation	(0028,0004)	1	Enumerated Values: MONOCHROME2
Pixel Representation	(0028,0103)	1	Enumerated Values: 0
Bits Allocated	(0028,0100)	1	If Segmentation Type (0062,0001) is BINARY, shall be 1. Otherwise it shall be 8. See Section C.8.20.2.1.
Bits Stored	(0028,0101)	1	If Segmentation Type (0062,0001) is BINARY, shall be 1. Otherwise it shall be 8. See Section C.8.20.2.1.
High Bit	(0028,0102)	1	If Segmentation Type (0062,0001) is BINARY, shall be 0. Otherwise it shall be 7. See Section C.8.20.2.1.

Lossy Image Compression	(0028,2110)	1	Specifies whether an Image has undergone lossy compression.
			Enumerated Values:
			    00 = Image has NOT been subjected to lossy compression.
			    01 = Image has been subjected to lossy compression.
			See Section C.8.20.2.2

Lossy Image Compression Ratio	(0028,2112)	1C	Describes the approximate lossy compression ratio(s) that have been applied to this image.
			See C.7.6.1.1.5 for further explanation.
			May be multivalued if successive lossy compression steps have been applied.
			    Notes: 1. For example, a compression ratio of 30:1 would be described in this Attribute with a single value of 30.
			    2. For historical reasons, the lossy compression ratio may also be described in Derivation Description (0008,2111).
			Required if present in the source images or this IOD instance has been compressed.

Lossy Image Compression Method	(0028,2114)	1C	A label for the lossy compression method(s) that have been applied to this image. See C.7.6.1.1.5 for further explanation. May be multivalued if successive lossy compression steps have been applied; the value order shall correspond to the values of Lossy Image Compression Ratio (0028,2112). Note: For historical reasons, the lossy compression method may also be described in Derivation Description (0008,2111). Required if present in the source images or this IOD instance has been compressed. See section C.8.20.2.2.
Segmentation Type	(0062,0001)	1	The type of encoding used to indicate the presence of the segmented property at a pixel/voxel location. Enumerated Values are: BINARY FRACTIONAL See section C.8.20.2.3.
Segmentation Fractional Type	(0062,0010)	1C	For fractional segmentation encoding, the meaning of the fractional value. Enumerated Values are: PROBABILITY OCCUPANCY Required if Segmentation Type (0062,0001) is FRACTIONAL. See section C.8.20.2.3.
Maximum Fractional Value	(0062,000E)	1C	Specifies the value that represents 100%. There shall be no values in Pixel Data (7FE0,0010) greater than this value. Required if Segmentation Type (0062,0001) is FRACTIONAL.
Segment Sequence	(0062,0002)	1	Describes the segments that are contained within the data. One or more items shall be present.
>Segment Number	(0062,0004)	1	Identification number of the segment. The value of Segment Number (0062,0004) shall be unique within the Segmentation instance in which it is created. See C.8.20.2.4.

>Segment Label	(0062,0005)	1	User-defined label identifying this segment. This may be the same as the Code Meaning (0008,0104) of the Segmented Property Type Code Sequence (0062,000F).
>Segment Description	(0062,0006)	3	User-defined description for this segment.
>Segment Algorithm Type	(0062,0008)	1	Type of algorithm used to generate the segment. Enumerated Values are: AUTOMATIC: calculated segment SEMIAUTOMATIC: calculated segment with user assistance MANUAL: user-entered segment
>Segment Algorithm Name	(0062,0009)	1C	Name of algorithm used to generate the segment. Required if Segment Algorithm Type (0062,0008) is not MANUAL.
>Include 'General Anatomy Mandatory Macro' Table 10-5			
>Segmented Property Category Code Sequence	(0062,0003)	1	Sequence defining the general category of this segment. This sequence shall contain a single item.
>>Include 'Code Sequence Macro' Table 8.8-1		Baseline Context ID is 7150.	
>Segmented Property Type Code Sequence	(0062,000F)	1	Sequence defining the specific property type of this segment. This sequence shall contain a single item.
>>Include 'Code Sequence Macro' Table 8.8-1		Baseline Context ID is 7151.	
>Recommended Display Grayscale Value	(0062,000C)	3	A default single gray unsigned value in which it is recommended that the maximum pixel value in this segment be rendered on a monochrome display. The units are specified in P-Values from a minimum of 0000H (black) up to a maximum of FFFFH (white). Note: The maximum P-Value for this Attribute may be different from the maximum P-Value from the output of the Presentation LUT, which may be less than 16 bits in depth.
>Recommended Display CIELab Value	(0062,000D)	3	A default triplet value in which it is recommended that segment be rendered on a color display. The units are specified in PCS-Values, and the value is encoded as CIELab. See C.10.7.1.1.

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C.8.20.2.1   Bits Allocated and Bits Stored

As a consequence of the enumerated Bits Allocated and Bits Stored attribute values, single bit pixels shall be packed 8 to a byte as defined by the encoding rules in PS 3.5.

C.8.20.2.2   Lossy Image Compression and Lossy Image Compression Method

If Lossy Image Compression (0028,2110) in any of the source images is "01", the value shall be "01" for the Segmentation instance.

The process of segmentation itself is defined not to be lossy compression, even though it involves loss. If the Segmentation instance is encoded using a lossy compression transfer syntax, then the value shall be set to "01".

Notes: It is not advisable to lossy compress a Segmentation SOP Instance. In particular, a binary segmentation should not be lossy compressed.

C.8.20.2.3   Segmentation Type and Segmentation Fractional Type

BINARY indicates the segmented property is present with a value of 1 and absent with a value of 0.

FRACTIONAL segmentation is defined as a value from zero to the Maximum Fractional Value (0062,000E). A FRACTIONAL segmentation shall be further specified via the Segmentation Fractional Type (0062,0010) attribute, with the following values:

PROBABILISTIC   Defines the probability, as a percentage, that the segmented property occupies the spatial area defined by the voxel.

OCCUPANCY   Defines the percentage of the voxel area occupied by the segmented property.

C.8.20.2.4   Segment Number

Segment Number (0062,0004) shall be unique within each instance, start at a value of 1, and increase monotonically by 1.

C.8.20.3   Segmentation Functional Group Macros

The following sections contain Functional Group macros specific to the Segmentation IOD.

Note: The attribute descriptions in the Functional Group Macros are written as if they were applicable to a single frame (i.e., the macro is part of the Per-frame Functional Groups Sequence). If an attribute is applicable to all frames (i.e. the macro is part of the Shared Functional Groups Sequence) the phrase "this frame" in the attribute description shall be interpreted to mean "for all frames".

C.8.20.3.1   Segmentation Macro

Table C.8.20-3 specifies the attributes of the Segmentation Functional Group macro.

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Table C.8.20-3
SEGMENTATION MACRO ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Segment Identification Sequence	(0062,000A)	1	Identifies the characteristics of this frame. Only a single Item shall be permitted in this sequence.
>Referenced Segment Number	(0062,000B)	1	Uniquely identifies the segment described in the Segment Sequence (0062,0002) by reference to the Segment Number (0062,0004). Referenced Segment Number (0062,000B) shall not be multi-valued.

Item: Add in the following text in section in C.18

C.18.4 Image Reference Macro

235   Table C.18.4-1 specifies the Attributes that convey a reference to a DICOM image.

Table C.18.4-1
IMAGE REFERENCE MACRO ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Include 'Composite Object Reference Macro' Table C.18.3-1			
>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**, and Referenced Segment Number (0062,000B) is not present**.
>Referenced Segment Number	**(0062,000B)**	**1C**	**Identifies the segments to which the reference applies identified by Segment Number (0062,0004). Required if the Referenced SOP Instance is a Segmentation and the reference does not apply to all segments and Referenced Frame Number (0008,1160) is not present.**
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Changes to NEMA Standards Publication PS 3.4-2006

Digital Imaging and Communications in Medicine (DICOM)

Part 4: Service Class Specifications

Item: Add the following to Table B.5-1

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B.5 STANDARD SOP CLASSES

Table B.5-1
STANDARD SOP CLASSES

SOP Class Name	SOP Class UID	IOD Specification (defined in PS 3.3)
Segmentation Storage	**1.2.840.10008.5.1.4.1.1.66.4**	**Segmentation**

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Item: Add the following to Table I.4-1

I.4 MEDIA STORAGE STANDARD SOP CLASSES

Table I.4-1
Media Storage Standard SOP Classes

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SOP Class Name	SOP Class UID	IOD Specification
Segmentation Storage	**1.2.840.10008.5.1.4.1.1.66.4**	**Segmentation**

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Changes to NEMA Standards Publication PS 3.6-2006

Digital Imaging and Communications in Medicine (DICOM)

Part 6: Data Dictionary

Item: Add or the following Data Elements to Part 6 Section 6:

270   **6   Registry of DICOM data elements**

Tag	Name	VR	VM
(0062,0001)	Segmentation Type	CS	1
(0062,0002)	Segment Sequence	SQ	1
(0062,0003)	Segmented Property Category Code Sequence	SQ	1
(0062,0004)	Segment Number	US	1
(0062,0005)	Segment Label	LO	1
(0062,0006)	Segment Description	ST	1
(0062,0008)	Segment Algorithm Type	CS	1
(0062,0009)	Segment Algorithm Name	LO	1
(0062,000A)	Segment Identification Sequence	SQ	1
(0062,000B)	Referenced Segment Number	US	1-n
(0062,000C)	Recommended Display Grayscale Value	US	1
(0062,000D)	Recommended Display CIELab Value	US	3
(0062,000E)	Maximum Fractional Value	US	1
(0062,000F)	Segmented Property Type Code Sequence	SQ	1
(0062,0010)	Segmentation Fractional Type	CS	1

Item: Add the following UID to Part 6 Annex A:

Annex A   Registry of DICOM unique identifiers (UID)
(Normative)

275   **Table A-1**
UID VALUES

UID Value	UID NAME	UID TYPE	Part
1.2.840.10008.5.1.4.1.1.66.4	Segmentation Storage	SOP Class	PS 3.4

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285

Changes to NEMA Standards Publication PS 3.15-2006

Digital Imaging and Communications in Medicine (DICOM)

Part 15: Security and Systems Management Profiles

Item: Add to Section C2 and C3

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C.2 CREATOR RSA DIGITAL SIGNATURE PROFILE

…

    a.   the SOP Class and Instance UIDs

    b.   the SOP Creation Date and Time, if present

295   c.   the Study and Series Instance UIDs

    d.   any attributes of the General Equipment module that are present

    e.   any attributes of the Overlay Plane, Curve or Graphic Annotation modules that are present

    f.   any attributes of the General Image and Image Pixel modules that are present

300   g.   any attributes of the SR Document General and SR Document Content modules that are present

    h.   any attributes of the Waveform and Waveform Annotation modules that are present

    i.   any attributes of the Multi-frame Functional Groups module that are present

    j.   any attributes of the Enhanced MR Image module that are present

305   k.   any attributes of the MR Spectroscopy modules that are present

    l.   any attributes of the Raw Data module that are present

    m.   any attributes of the Enhanced CT Image module that are present

    n.   any attributes of the Enhanced XA/XRF Image module that are present

    o.   <u>any attributes of the Segmentation Image module that are present</u>

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C.3 AUTHORIZATION RSA DIGITAL SIGNATURE PROFILE

…

    a.   the SOP Class and Instance UIDs

315   b.   the Study and Series Instance UIDs

    c.   any attributes whose Values are verifiable by the technician or physician (e.g., their Values are displayed to the technician or physician)

    d.   any attributes of the Overlay Plane, Curve or Graphic Annotation modules that are present

320   e.   any attributes of the General Image and Image Pixel modules that are present

    f.   any attributes of the SR Document General and SR Document Content modules that are present

    g.   any attributes of the Waveform and Waveform Annotation modules that are present

    h.   any attributes of the Multi-frame Functional Groups module that are present

325   i.   any attributes of the Enhanced MR Image module that are present

    j.   any attributes of the MR Spectroscopy modules that are present

    k.   any attributes of the Raw Data module that are present

    l.   any attributes of the Enhanced CT Image module that are present

    m.   any attributes of the Enhanced XA/XRF Image module that are present

330   **n.   any attributes of the Segmentation Image module that are present**

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Changes to NEMA Standards Publication PS 3.16-2006

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

Part 16: DICOM Content Mapping Resource

Item: Add to Annex B

CID 29 Acquisition Modality

345 This Context Group includes codes that may be used to identify an image or waveform acquisition modality, as used in Attribute Modality (0008,0060) of a Composite SOP Instance Series Module (see PS3.3). It generally corresponds to a class of diagnostic equipment, or to a specific acquisition function or technique in a device.

Context ID 29
350 **Acquisition Modality**
Type: Extensible Version: 20040921

Coding Scheme Designator	Code Value	Code Meaning
…		
DCM	**SEG**	**Segmentation**

CONTEXT GROUP 7150 – Segmentation Property Categories

CID 7150
355 **Segmentation Property Categories**

Type: Extensible Version: 20060822

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
SRT	T-D0050	Tissue
SRT	T-D000A	Anatomical Structure
SRT	A-00004	Physical object
SRT	M-01000	Morphologically Altered Structure
SRT	R-42019	Function

CONTEXT GROUP 7151 – Segmentation Property Types

360 **CID 7151**
Segmentation Property Types

Type: Extensible Version: 20060822

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
INCLUDE CID 8 Angiographic Interventional Devices		
INCLUDE CID 3010 Cardiovascular Anatomic Locations		
INCLUDE CID 3827 Vessel Segments		
INCLUDE CID 3829 Pulmonary Arteries		
INCLUDE CID 4031 Common Anatomic Regions		
INCLUDE CID 6040 Non-Lesion Object Type		
INCLUDE CID 6138 Chest Non-Lesion Object Type		
INCLUDE CID 7152 Cardiac Structure Segmentation Types		
INCLUDE CID 7153 Brain Tissue Segmentation Types		
INCLUDE CID 7154 Abdominal Organ Segmentation Types		
INCLUDE CID 7155 Thoracic Tissue Segmentation Types		
INCLUDE CID 7156 Vascular Tissue Segmentation Types		

| INCLUDE CID 7157 Device Segmentation Types |
| INCLUDE CID 7158 Artifact Segmentation Types |
| INCLUDE CID 7159 Lesion Segmentation Types |
| INCLUDE CID 7160 Pelvic Organ Segmentation Types |
| INCLUDE CID 7161 Physiology Segmentation Types |

Note: This set is expected to be extended as various applications further define segmentation properties.

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CONTEXT GROUP 7152 –Cardiac Structure Segmentation Types

CID 7152
Cardiac Structure Segmentation Types

370 **Type: Extensible   Version: 20060822**

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
SRT	T-32000	Heart
SRT	T-42000	Aorta
SRT	T-32600	Left Ventricle
SRT	T-32500	Right Ventricle

CONTEXT GROUP 7153 – Brain Tissue Segmentation Types

CID 7153
375 **Brain Tissue Segmentation Types**

Type: Extensible   Version: 20060822

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
SRT	T-A2030	White Matter
SRT	T-A2020	Grey Matter
SRT	T-A1000	Cerebrospinal Fluid
SRT	T-A1110	Meninges
SRT	T-11100	Skull

CONTEXT GROUP 7154 – Abdominal Organ Segmentation Types

380 **CID 7154**
Abdominal Organ Segmentation Types

Type: Extensible   Version: 20060822

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
SRT	T-62000	Liver
SRT	T-C3000	Spleen
SRT	T-71000	Kidney
SRT	T-B3000	Adrenal gland
SRT	T-42000	Aorta
SRT	T-48710	Inferior vena cava

385   **CONTEXT GROUP 7155 – Thoracic Tissue Segmentation Types**

CID 7155
Thoracic Tissue Segmentation Types

Type: Extensible   Version: 20060822

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
SRT	T-28000	Lung
SRT	T-D3400	Diaphragm
SRT	T-26000	Bronchi
SRT	T-40000	Blood Vessel
SRT	T-D3300	Mediastinum
SRT	T-D016E	Bone

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CONTEXT GROUP 7156 – Vascular Tissue Segmentation Types

CID 7156
Vascular Tissue Segmentation Types

Type: Extensible   Version: 20060822

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
SRT	T-40230	Lumen
SRT	T-1A170	Intima
SRT	T-40210	Media
SRT	T-1A190	Adventitia
SRT	M-35001	Thrombus
SRT	M-520F8	Vascular sclerosis

395

CONTEXT GROUP 7157 – Device Segmentation Types

CID 7157
Device Segmentation Types

400   **Type: Extensible   Version: 20060822**

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
SRT	A-25500	Stent
SRT	A-12030	Bone Screw
SRT	A-12024	Bone Pin
SRT	A-11100	Pacemaker
SRT	A-11206	Defibrillator
SRT	A-11FCD	Left ventricular assist device
SRT	A-04034	Radioactive implant
SRT	A-04200	Dental Prosthesis
SRT	A-04036	Inlay Dental Restoration

CONTEXT GROUP 7158 – Artifact Segmentation Types

CID 7158
405   **Artifact Segmentation Types**

Type: Extensible   Version: 20060822

Coding Scheme	Code Value	Code Meaning (0008,0104)

Designator (0008,0102)	(0008,0100)	
SRT	A-00916	Clothing
SRT	A-17350	Table

CONTEXT GROUP 7159 – Lesion Segmentation Types

410

CID 7159
Lesion Segmentation Types

Type: Extensible   Version: 20060822

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
SRT	M-8FFFF	Neoplasm
SRT	M-03010	Nodule
SRT	M-3340A	Cyst
SRT	M-54000	Necrosis
SRT	M-40000	Inflammation
SRT	M-41610	Abscess

415   ## CONTEXT GROUP 7160 – Pelvic Organ Segmentation Types

CID 7160
Pelvic Organ Segmentation Types

Type: Extensible   Version: 20060822

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
SRT	T-94000	Testis
SRT	T-83000	Uterus
SRT	T-87000	Ovary
SRT	T-83200	Cervix
SRT	T-92000	Prostate
SRT	T-93000	Seminal Vesicle
SRT	T-59600	Rectum
SRT	T-74000	Bladder
SRT	T-13001	Muscle
SRT	T-40000	Blood Vessel
SRT	T-D016E	Bone

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CONTEXT GROUP 7161 – Physiology Segmentation Types

CID 7161
Physiology Segmentation Types

Type: Extensible   Version: 20060822

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
SRT	R-0039F	Perfusion

425

425 **Item: Add Annex D**

Annex D   DICOM Controlled Terminology Definitions (Normative)

This Annex specifies the meanings of codes defined in DICOM, either explicitly or by reference to another part of DICOM or an external reference document or standard.

DICOM Code Definitions (Coding Scheme Designator "DCM" Coding Scheme Version
430 **"01")**

Code Value	Code Meaning	Definition	Notes
…			
SEG	Segmentation	Segmentation	

435

440

Changes to NEMA Standards Publication PS 3.17-2006

Digital Imaging and Communications in Medicine (DICOM)

Part 17: Explanatory Information

445

445 | **Item: Add Annex HH** |

ANNEX HH: SEGMENTATION ENCODING EXAMPLE (Informative)

Figure HH-1 depicts an example of how the data is organized within an instance of the Segmentation IOD. Each item in the Segment Sequence provides the attributes of a segment. The source image used in all segmentations is referenced in the Shared Functional Groups Sequence. Each item of the Per-frame Functional Groups Sequence maps a frame to a segment. The Pixel Data classifies the corresponding pixels/voxels of the source Image.
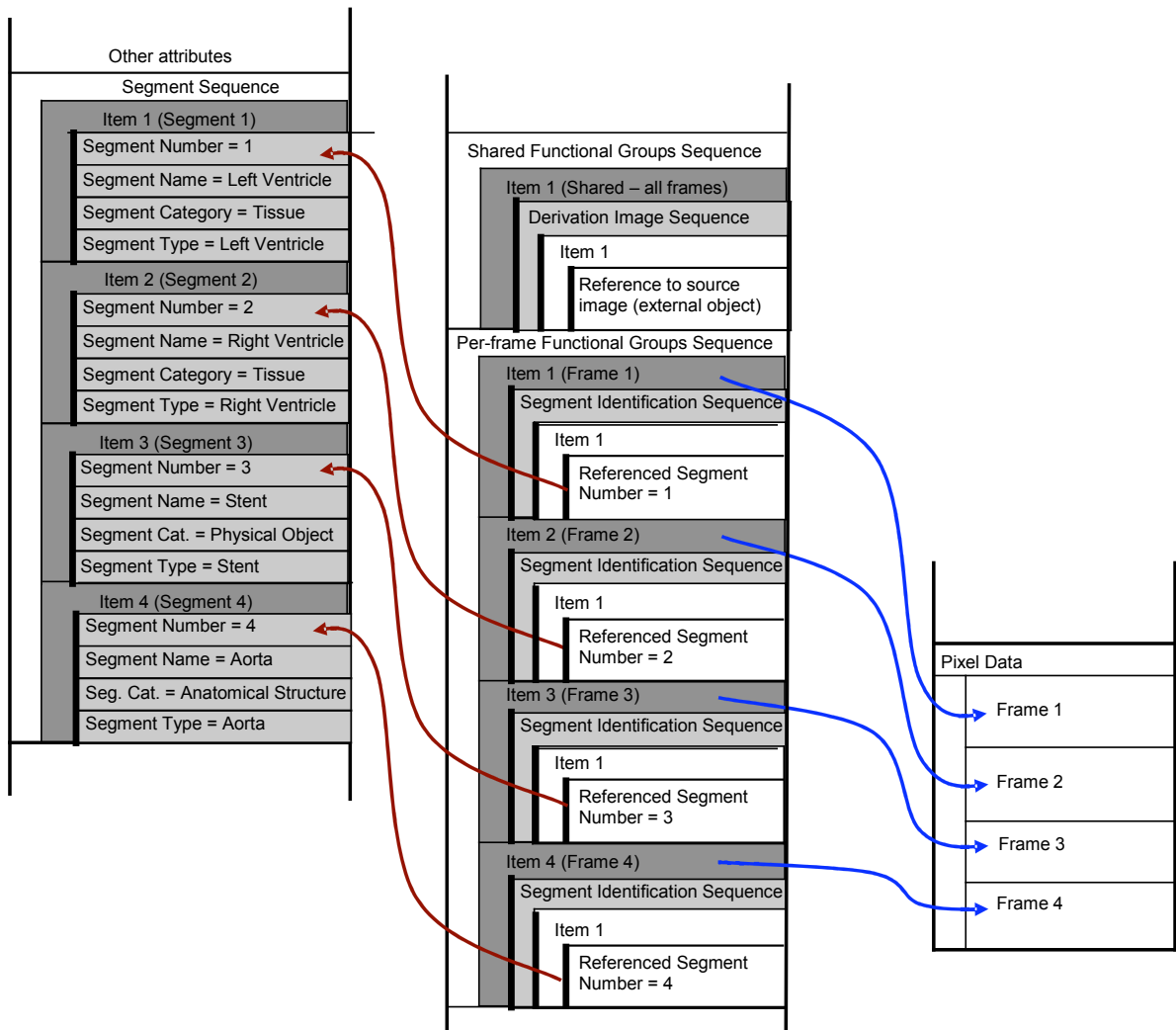
450

Figure HH-1 Segment Sequence Structure and References