

# DICOM Correction Proposal

STATUS	Assigned
Date of Last Update	20165/01/08
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Correction Number	CP-1550
Log Summary: Refactor SOP Class specs for Non-Patient IODs	
Name of Standard PS3.3 PS3.4	
<p>Rationale for Correction:</p> <p>The SOP Class specifications for Implant Templates were incorrectly included in the Part 4 Annex B Storage Service Class. Per section B.1.1, that Service Class is restricted to IODs using the Patient/ Study/ Series/ Instance model.</p> <p>This CP refactors the Implant Templates requirements, together with the Hanging Protocol and Color Palette SOP Classes, into a new Part 4 Annex for Non-Patient Object Storage Service. This can be the future single location for documenting other non-patient-related SOP Classes, such as Modality Acquisition Protocols. A consolidated specification will also simplify the definition of DICOM Web Services for accessing these objects.</p> <p>Alternate names considered were “Stand-Alone” and “Detached” objects, but those terms have historical connotations in DICOM that make them inappropriate. <b>A technically correct name would be “Non-Patient-Related Object Storage Service”, but that seems too long.</b></p> <p>Note that the Query/Retrieve services for these objects are not consolidated into a single service definition.</p>	
Correction Wording:	

***Update PS 3.3 to consolidate non-patient information models***

## 7.7 Extension of the DICOM Model of the Real World for Hanging Protocols

**See Section 7.xx.**

**Note:**

**The specifications of this section have been consolidated into the Real World Model for Non-Patient-Related Information.**

~~The DICOM Model of the Real World is extended for Hanging Protocols...~~

## 7.8 Extension of the DICOM Model of the Real World for Color Palettes

**See Section 7.xx.**

**Note:**

**The specifications of this section have been consolidated into the Real World Model for Non-Patient-Related Information.**

~~The DICOM Model of the Real World is extended for Color Palettes ...~~

## 7.10 Extension of DICOM Model of the Real World for Implant Templates

See Section 7.xx.

**Note:**

The specifications of this section have been consolidated into the Real World Model for Non-Patient-Related Information.

~~For the purpose of Implant Template SOP Classes ...~~

*Add the following new Section to PS3.3*

## 7.xx DICOM Model of the Real World for Non-Patient-Related Information

The DICOM Model of the Real World is extended for a variety of non-patient-related information with the specification of entities that are generally separate from the rest of the DICOM Real World Information Model. These information entities are not associated with a specific patient. While there may be entity relationships, there is no hierarchy applied to these entities.

### 7.xx.1 Hanging Protocol Information Entity

A Hanging Protocol Information Entity specifies the viewing preferences of a specific user or group, for a specific type of study (Modality, Anatomy, Laterality combination, and optionally Procedure, and/or Reason). A Hanging Protocol definition includes descriptors that identify the Hanging Protocol, the creator, the type of study it addresses, the type of image sets to display, the intended display environment, and the intended layout for the screen(s).

The Hanging Protocol IE does not have any relationships with other Information Entities. See Figure 7.xx-1.



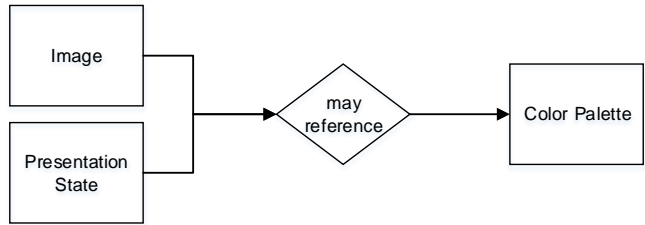
**Figure 7.xx-1. DICOM Model of the Real World - Hanging Protocol**

### 7.xx.2 Color Palette Information Entity

A Color Palette Information Entity specifies a color palette suitable for application to an image with a single channel of information (grayscale) to render it in color, i.e., pseudo-coloring.

The Color Palette IE may be referenced by Image or Presentation State Information Entities. See Figure 7.xx-2.

The Color Palette IOD instantiates the Color Palette IE only.



**Figure 7.xx-2. DICOM Model of the Real World - Color Palette**

### 7.xx.3 Implant Related Information Entities

#### 7.xx.3.1 Implant Template Information Entity

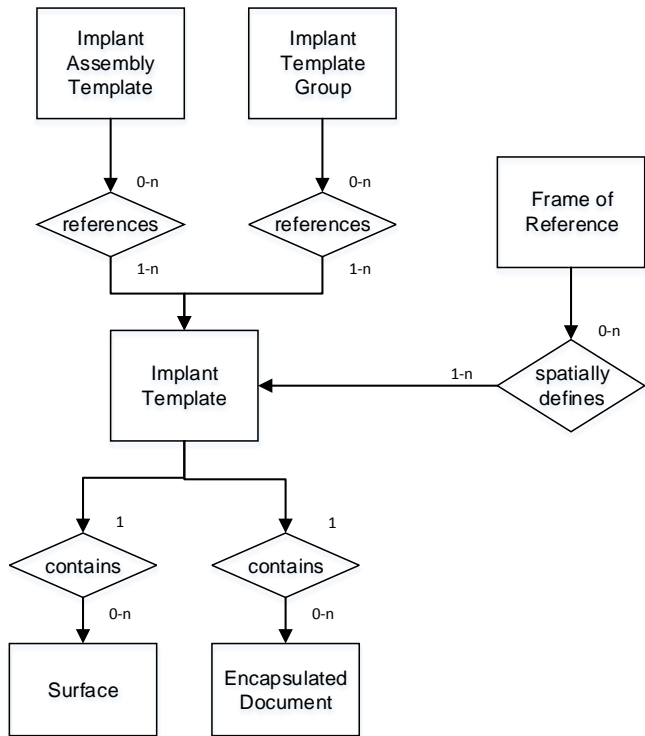
An Implant Template Information Entity specifies a 2D- and/or 3D-template representing a physical implant. The IE specifies mechanisms for implant assembly, i.e., the rigid connection of two or more implants.

The Implant Template IE may be related to a Surface IE (see Section A.1.2.18) or to an Encapsulated Document IE (see Section A.1.2.16) for the specification of the 2D- or 3D-template.

The Implant Template IE may be related to a Frame of Reference IE (see Section A.1.2.5) to support registration of the template with patient anatomical landmarks in a separate frame of reference.

The Implant Template IE may be related to an Implant Assembly Template IE for the specification of multi-part assemblies. The Implant Template IE may be related to an Implant Template Group IE for shared specification of a set of templates.

See Figure 7.xx-3.



**Figure 7.xx-3. DICOM Model of the Real World - Implant Templates**

### 7.xx.3.2 Implant Assembly Template Information Entity

An Implant Assembly Template Information Entity specifies how to combine several implants to fulfill a certain purpose.

The Implant Assembly Template IE may be related to Implant Template IEs.

### 7.xx.3.3 Implant Template Group Information Entity

An Implant Template Group Information Entity specifies a set of Implant Templates for shared specification and management. It facilitates browsing through a set of similar implants by providing similar matching coordinates and ordering the referenced templates by dimensional size or similar attributes

The Implant Assembly Template IE is related to Implant Template IEs.

**Update PS 3.4 to clarify non-network SOP Classes**

## 6.7 Service Class Specification

A Service Class Specification defines a group of one or more SOP Classes related to a specific function that is to be accomplished by communicating Application Entities. A Service Class Specification also defines rules that allow implementations to state some pre-defined level of conformance to one or more SOP Classes. Applications may conform to network SOP Classes as either a Service Class User (SCU) or Service Class Provider (SCP), **and to media exchange SOP Classes as a File Set Creator (FSC), File Set Reader (FSR), or File Set Updater (FSU).**

Service Class Specifications are defined in this Part of the DICOM Standard.

Note

**Such Network** interaction between peer Application Entities work on a 'client/server model.' The SCU acts as the 'client,' while the SCP acts as the 'server'. The SCU/SCP roles are determined during Association establishment.

**Update PS 3.4 Storage SOP Classes to move incorrectly specified non-patient related classes:**

## B.5 Standard SOP Classes

The SOP Classes in the Storage Service Class identify the Composite IODs to be stored. Table B.5-1 identifies Standard SOP Classes.

**Table B.5-1. Standard SOP Classes**

SOP Class Name	SOP Class UID	IOD Specification (defined in PS3.3)
...		
RT Beams Delivery Instruction Storage	1.2.840.10008.5.1.4.34.7	RT Beams Delivery Instruction IOD
<del>Generic Implant Template Storage</del>	<del>1.2.840.10008.5.1.4.43.1</del>	<del>Generic Implant Template IOD</del>
<del>Implant Assembly Template Storage</del>	<del>1.2.840.10008.5.1.4.44.1</del>	<del>Implant Assembly Template IOD</del>
<del>Implant Template Group Storage</del>	<del>1.2.840.10008.5.1.4.45.1</del>	<del>Implant Template Group IOD</del>

**Note**

The Generic Implant Template Storage, Implant Assembly Template Storage, and Implant Template Group Storage SOP Classes were formerly specified in this table, incorrectly since they do not use the Patient / Study / Series / Instance information model. Those have been consolidated into the Non-Patient Object Storage Service Class (see Section XX).

...

### B.5.1.10 Implant Template Storage SOP Classes

See Section XX.

**Note:**

The requirements of this section have been consolidated into the Non-Patient Object Storage Service Class (see Section XX.5.3).

~~A device that is a Generic Implant Template Storage, Implant Assembly Template Storage, or Implant Template...~~

~~Referential integrity between sets of related SOP instances shall be maintained.~~

**Update PS 3.4 Media Conformance, and remove redundant listing of SOP Classes:**

## I.4 Media Storage Standard SOP Classes

The SOP Classes in the Media Storage Service Class identify the Composite ~~and Normalized~~ IODs to be stored. The following Standard SOP Classes are **defined**:

- all SOP Classes specified for the DIMSE C-STORE based Storage Service Class identified in Table B.4-1
- all SOP Classes specified for the DIMSE C-STORE based Non-Patient Object Storage Service Class identified in Table XX.4-1
- the media directory SOP Class identified in Table I.4-1

**Table I.4-1. Media Storage Standard SOP Classes**

SOP Class Name	SOP Class UID	IOD Specification (defined in PS3.3)
Media Storage Directory Storage	1.2.840.10008.1.3.10	Basic Directory IOD
<del>Computed Radiography Image Storage</del>	<del>1.2.840.10008.5.1.4.1.1.1</del>	<del>Computed Radiography Image IOD</del>
...	...	...
<del>Implant Template Group Storage</del>	<del>1.2.840.10008.5.1.4.45.1</del>	<del>Implant Template Group IOD</del>

Note

1. Except for the Media Storage Directory SOP Classes, the above listed Media Storage Standard SOP Classes are assigned the same UID Value as the corresponding network communication SOP Classes. This was done to simplify UID assignment. Although these SOP Classes are based on different Operations, the context of their usage should unambiguously distinguish a Media Storage SOP Class from a Network communication SOP Class.
2. The storage of Normalized Print SOP Instances on media was previously defined in DICOM. They have been retired. See PS 3.4-1998.
3. The storage of Detached and Standalone SOP Instances on media was previously defined in DICOM. They have been retired. See PS 3.4-2004

*Replace the current Annexes for Hanging Protocols and Color Palette with the following references*

## **T Hanging Protocol Storage Service Class**

See Section XX.

Note:

The requirements of this section have been consolidated into the Non-Patient Object Storage Service Class.

## **W Color Palette Storage Service Class**

See Section XX.

Note:

The requirements of this section have been consolidated into the Non-Patient Object Storage Service Class.

*Add the following new Annex*

## **XX Non-Patient Object Storage Service Class**

### **XX.1 Overview**

#### **XX.1.1 Scope**

The Non-Patient Object Storage Service Class defines an application-level class-of-service that allows one DICOM AE to send a SOP Instance of a non-patient-related information object to another DICOM AE.

#### **XX.1.2 Service Definition**

The Non-Patient Object Storage Service Class includes several SOP Classes, each using an IOD defined in PS3.3 (see Section XX.3). The Non-Patient Object Storage Service Class uses the C-STORE DIMSE Service specified in PS3.7. A successful completion of the C-STORE has the following semantics:

- Both the SCU and the SCP support the type of information to be stored.
- The transferred information is stored in some medium.
- For some time frame, the stored information may be accessed.

Note

1. Support for the Non-Patient Object Storage SOP Class does not imply support for any related Query/Retrieve Service Classes.

2. The duration of the storage is also implementation dependent, but is described in the Conformance Statement of the SCP.
3. The Non-Patient Object Storage SOP Class is intended to be used in a variety of environments: e.g., for workstations to transfer SOP Instances to other workstations or archives, for archives to transfer SOP Instances to workstations, etc.

## XX.2 Association Negotiation

The Association negotiation rules as defined in PS3.7 apply to the SOP Classes of this Service Class. No SOP Class specific application information (extended negotiation) is used.

## XX.3 SOP Classes

The application-level services addressed by the Non-Patient Object Storage Service Class definition are specified in the SOP Classes specified in Table XX.3-1.

**Table XX.3-1. Standard SOP Classes**

SOP Class Name	SOP Class UID	IOD Specification (defined in PS3.3)
Hanging Protocol Storage	1.2.840.10008.5.1.4.38.1	Hanging Protocol IOD
Color Palette Storage	1.2.840.10008.5.1.4.39.1	Color Palette Storage IOD
Generic Implant Template Storage	1.2.840.10008.5.1.4.43.1	Generic Implant Template IOD
Implant Assembly Template Storage	1.2.840.10008.5.1.4.44.1	Implant Assembly Template IOD
Implant Template Group Storage	1.2.840.10008.5.1.4.45.1	Implant Template Group IOD

## XX.4 Behavior

This Section defines the SCU and SCP behavior for the Non-Patient Object Storage Service. The C-STORE DIMSE-C Service shall be the mechanism used to transfer SOP Instances between peer DICOM AEs as described in PS3.7.

In addition to the behaviors specified in this section, there may be SOP Class specific behavior requirements, as described in Section XX.6.

### XX.4.1 Service Class User

A DICOM AE that claims conformance to any of the Non-Patient Object Storage SOP Classes as an SCU shall be capable of sending a SOP Instance that meets the requirements of the related IOD. The Service shall be invoked by the SCU through the use of the DIMSE C-STORE request used in conjunction with the SOP Class.

The SCU shall recognize the status of the C-STORE service and take appropriate action based on the success or failure of the service. The Non-Patient Object Storage Service places no further requirements on what the SCU shall do other than that it shall distinguish between successful and failed C-STORE responses. This behavior shall be documented as part of the Conformance Statement.

### XX.4.2 Service Class Provider

A DICOM AE that claims conformance to any of the Non-Patient Object Storage SOP Classes as an SCP shall receive and store a SOP Instance through the use of the DIMSE C-STORE service used in conjunction with the specific SOP Class.

The SCP shall store and provide access to all Type 1, Type 2, and Type 3 Attributes defined in the IOD, as well as any Standard Extended Attributes (including Private Attributes) included in the SOP Instance.

The SCP may, but is not required to validate that the Attributes of the SOP Instance meet the requirements of the associated IOD.

The SCP shall not modify the values of any Attributes in the SOP Instance without assigning a new SOP Instance UID, except that the SCP may modify values of, or add, Type 3 and Private Attributes that do not change the semantics or interpretation of the SOP Instance.

Note

E.g., an SCP may add values to Alternate Content Description Sequence (0070,0087), to provide an additional description in another language.

The SCP shall return, via the C-STORE response primitive, the Response Status Code applicable to the associated request. By performing this service successfully, the SCP indicates that the SOP Instance has been successfully stored. Table XX.4-1 shows the response status values. General status code values and fields related to status code values are defined in PS3.7.

**Table XX.4-1. C-STORE Response Status Values**

Service Status	Further Meaning	Status Codes	Related Fields
Failure	Refused: Out of Resources	A700	(0000,0902)
	Error: Data Set Does Not Match SOP Class	A900	(0000,0901) (0000,0902)
	Error: Cannot Understand	C000	(0000,0901) (0000,0902)
Success		0000	None

Note

Status Codes are returned in DIMSE response messages (see PS3.7). The code values stated in column "Status Codes" are returned in Status Command Element (0000,0900).

## XX.5 Conformance Statement Requirements

An implementation may conform to any of the Non-Patient Object Storage SOP Classes as an SCU, SCP or both. The Conformance Statement shall be in the format defined in PS3.2.

### XX.5.1 SCU Conformance Requirements

An implementation that conforms to a SOP Class of the Non-Patient Object Storage Service as an SCU shall state in its Conformance Statement:

- Whether the implementation is a SOP Instance creator for the SOP Class.

Note

There may be SOP Class specific Conformance Statement requirements for creators of SOP Instances. See Section XX.6.

- The behavior of the SCU in the case of a successful C-STORE response status.
- The behavior of the SCU in each case of a failure C-STORE response status.

### XX.5.2 SCP Conformance Requirements

An implementation that conforms to a SOP Class of the Non-Patient Object Storage Service as an SCP shall state in its Conformance Statement:



- The behavior of the SCP in the case of a successful C-STORE operation, including the access method for a stored SOP Instance, and the duration of the storage.
- The meaning of each case of a failure C-STORE response status, as well as appropriate recovery action.
- Whether the implementation is a Display Application for the SOP Class.

Note

There may be SOP Class specific Conformance Statement requirements for applications that use the SOP Instances for display or further processing. See Section XX.6.

## **XX.6 Application Behavior for Standard SOP Classes**

This section specifies SOP Class specific behaviors for conformant applications.

### **XX.6.1 Hanging Protocol SOP Class**

#### **XX.6.1.1 Instance Creator**

An implementation that conforms to the Hanging Protocol Storage SOP Class as an SCU and is an instance creator shall state in its Conformance Statement:

- The manner in which the values of the Hanging Protocol IOD Attributes are derived from displayed images, layouts, operator intervention or defaults.
- Any Private Attributes that are used as the value of Selector Attribute (0072,0026) in the Image Set Selector Sequence, Filter Operations Sequence or Sorting Operations Sequence.
- The optional Attributes that may be included in a Hanging Protocol SOP Instance.

#### **XX.6.1.2 Display Application**

An implementation that conforms to the Hanging Protocol Storage SOP Class as an SCP and interprets the contents of instances of the SOP Class to control the display of images, shall apply all mandatory Hanging Protocol and presentation intent Attributes to the sets of displayed images. Such an implementation shall state in its Conformance Statement:

- The range of display environments that the application will support (e.g., number of screens, size of screens, overlapping image boxes).
- The optional Attributes of the Hanging Protocol IOD that it is capable of interpreting and those that are not supported.
- Description of application behavior when the value of Partial Data Display Handling (0072,0208) is ADAPT\_LAYOUT or zero length.
- Description of application behavior when the display environment of the Hanging Protocol Instance differs from the display environment of the application, with respect to preserving layout versus spatial resolution.
- The Image Storage SOP Classes for which the Hanging Protocol Storage SOP Class is supported for display control.

### **XX.6.2 Color Palette Storage SOP Class**

An implementation that conforms to the Color Palette Storage SOP Class as an SCP and interprets the contents of instances of the SOP Class to affect the display of images, shall apply all mandatory Color Palette and presentation intent Attributes to the applicable displayed images.

### **XX.6.3 Template Storage SOP Classes**

*This text is copied from current Standard, but probably needs clarification*

An implementation that is a Generic Implant Template Storage, Implant Assembly Template Storage, or Implant Template Group Storage SOP Class SCU may modify information in a SOP Instance that it has previously sent or received. When this SOP Instance is modified and sent to an SCP, it shall be assigned a new SOP Instance UID if there is addition, removal or update of any Attribute within:

- Generic Implant Template Description Module
- Generic Implant Template 2D Drawings Module
- Generic Implant Template 3D Models Module
- Generic Implant Template Mating Features Module
- Generic Implant Template Planning Landmarks Module
- Implant Assembly Template Module
- Implant Template Group Module
- Surface Mesh Module

Referential integrity between sets of related SOP instances shall be maintained.