# Digital Imaging and Communications in Medicine (DICOM)

## Sup 186 - Extensible SR Storage SOP Class

DICOM Standards Committee - Working Group 6 - Base Standard

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# Scope and Field of Application

This Supplement adds a new extensible IOD and SOP Class that allows new Content Item types to be used as they are added to the standard.

There is an increasing need for new Content Item types (such as SCOORD3D) and these are being added as needed to application-specific IODs and SOP Classes (such as the Colon CAD Supplement 126). There is a need for a generic IOD and SOP Class to allow new applications to make use of these in a general way, yet this conflicts with the requirement to be able to render all content.

It is also possible that new Relationship Types will be added, and the IOD also addresses these.

A specific conformance requirement is specified, that the user be warned if there is content of a type that the rendering software does not recognize or understand.

This is consistent with the approach used in other extensible formats like PDF, in which software tools like Acrobat Reader warn about unrecognized content when faced with newer versions.

# DICOM PS3.3 Information Object Definitions

## A Composite Information Object Definitions (Normative)

*Amend DICOM PS 3.3 - Information Object Definitions - Annex A - Composite Information Object Definitions (Normative), to add Extensible SR IOD Modules to A.1.4 Overview of the Composite IOD Module Content.*

*Amend DICOM PS 3.3 - Information Object Definitions - Annex A - Composite Information Object Definitions (Normative) as follows, to add a new Extensible SR IOD:*

### A.35.X Extensible SR IOD

### A.35.X.1 Extensible SR IOD Description

The Extensible SR IOD specifies support for all SR content item and relationship types currently defined and that may be added in the future.

It is designed specifically to support the possibility of future extensions, and the corresponding SOP Class defined in PS3.4 has specific behavior defined for a recipient in the presence of unrecognized or unsupported extensions.

### A.35.X.2 Extensible SR IOD Entity-Relationship Model

The E-R Model in Section A.1.2 applies to the Extensible SR IOD. The IEs at the level of the Image IE in Section A.1.2 are not components of the Extensible SR IOD. Table A.35.X-1 specifies the Modules of the Extensible SR IOD.

### A.35.X.3 Extensible SR IOD Module Table

**Table A.35.X-1. Extensible SR IOD Modules**

| IE | Module | Reference | Usage |
|---|---|---|---|
| Patient | Patient | C.7.1.1 | M |
| | Clinical Trial Subject | C.7.1.3 | U |
| Study | General Study | C.7.2.1 | M |
| | Patient Study | C.7.2.2 | U |
| | Clinical Trial Study | C.7.2.3 | U |
| Series | SR Document Series | C.17.1 | M |
| | Clinical Trial Series | C.7.3.2 | U |
| Frame of Reference | Synchronization | C.7.4.2 | U |
| Equipment | General Equipment | C.7.5.1 | M |
| | Enhanced General Equipment | C.7.5.2 | M |
| Document | SR Document General | C.17.2 | M |
| | SR Document Content | C.17.3 | M |
| | SOP Common | C.12.1 | M |

### A.35.X.3.1 Extensible SR IOD Content Constraints

### A.35.X.3.1.1 Value Type

Value Type (0040,A040) in the Content Sequence (0040,A730) of the SR Document Content Module is constrained to any of the Enumerated Values defined in Section C.17.3.

## A.35.X.3.1.2 Relationship Constraints

Relationships between content items in the content of this IOD may be conveyed either by-value or by-reference. Table A.35.X-2 specifies the relationship constraints of this IOD. See Table C.17.3-8 for Relationship Type definitions.

### Table A.35.X-2. Relationship Content Constraints for Extensible SR IOD

| Source Value Type | Relationship Type (Enumerated Values) | Target Value Type |
|---|---|---|
| CONTAINER | CONTAINS | any type. |
| any type | any type other than CONTAINS | any type. |

**Note**

The lack of explicit constraints between value types and relationship types is necessary to support extensibility in unanticipated ways (e.g., to support new coordinate value types that may be selected from new composite object value types), but that does not mean that all possible combinations will make sense or be usable (e.g., HAS OBS CONTEXT with source and target value types of IMAGE).

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

*Amend DICOM PS 3.3 - Information Object Definitions - Annex C.17.3 as follows, to make Value Type and Relationship Type enumerated values:*

## C.17.3 SR Document Content Module

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### Table C.17-5. Document Content Macro Attributes

| Attribute Name | Tag | Type | Attribute Description |
|---|---|---|---|
| Value Type | (0040,A040) | 1 | The type of the value encoded in this Content Item.<br><br>**~~Defined Terms~~Enumerated Values**:<br><br>**TEXT**<br>**NUM**<br>**CODE**<br>**DATE**<br>**TIME**<br>**DATETIME**<br>**UIDREF**<br>**PNAME**<br>**COMPOSITE**<br>**IMAGE**<br>**WAVEFORM**<br>**SCOORD**<br>**SCOORD3D**<br>**TCOORD**<br>**CONTAINER**<br><br>See Section C.17.3.2.1 for further explanation. |
| ... | .. | ... | ... |

### Table C.17-6. Document Relationship Macro Attributes

| Attribute Name | Tag | Type | Attribute Description |
|---|---|---|---|
| ... | ... | ... | ... |

| Attribute Name | Tag | Type | Attribute Description |
|---|---|---|---|
| >Relationship Type | (0040,A010) | 1 | The type of relationship between the (enclosing) Source Content Item and the Target Content Item.<br><br>IODs specify additional constraints on Relationships (including lists of Enumerated Values).<br><br>**~~Defined Terms~~<ins>Enumerated Values</ins>**<br><br>**CONTAINS**<br>**HAS PROPERTIES**<br>**HAS OBS**<br>**CONTEXT**<br>**HAS ACQ**<br>**CONTEXT**<br>**INFERRED FROM**<br>**SELECTED FROM**<br>**HAS CONCEPT**<br>**MOD**<br><br>See Section C.17.3.2.4 for further explanation. |
| ... | ... | ... | ... |

# DICOM PS3.4 Service Class Specifications

## B Storage Service Class (Normative)

*Amend DICOM PS 3.4 - Service Class Specifications - Annex B - Storage Service Class (Normative) as follows:*

## B.3.1.4 Related General SOP Classes (A-ASSOCIATE-RQ)

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**Table B.3-3. Standard and Related General SOP Classes**

| SOP Class Name | Related General SOP Class Name |
|---|---|
| ... | ... |
| Basic Text SR | Enhanced SR |
| | Comprehensive SR |
| | Comprehensive 3D SR |
| | **Extensible SR** |
| Enhanced SR | Comprehensive SR |
| | Comprehensive 3D SR |
| | **Extensible SR** |
| **Comprehensive SR** | **Extensible SR** |
| **Comprehensive 3D SR** | **Extensible SR** |
| Procedure Log | Enhanced SR |
| | Comprehensive SR |
| | Comprehensive 3D SR |
| | **Extensible SR** |
| X-Ray Radiation Dose SR | Enhanced SR |
| | Comprehensive SR |
| | Comprehensive 3D SR |
| | **Extensible SR** |
| Radiopharmaceutical Radiation Dose SR | Enhanced SR |
| | Comprehensive SR |
| | Comprehensive 3D SR |
| | **Extensible SR** |
| ... | ... |

## B.5 Standard SOP Classes

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

| SOP Class Name | SOP Class UID | IOD Specification (defined in PS3.3) |
|---|---|---|
| ... | ... | ... |
| **Extensible SR Storage** | **1.2.840.10008.5.1.4.1.1.88.35** | **Extensible SR IOD** |

| SOP Class Name | SOP Class UID | IOD Specification (defined in PS3.3) |
|---|---|---|
| ... | ... | ... |

## B.5.1.5 Structured Reporting Storage SOP Classes

The requirements of Annex O apply to the following SOP Classes:

• Basic Text SR

• Enhanced SR, and SOP Classes for which it is the Related General SOP Class

• **Extensible SR,** Comprehensive 3D SR, Comprehensive SR, and SOP Classes for which they are the Related General SOP Classes

• Mammography CAD SR

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# I Media Storage Service Class (Normative)

*Amend DICOM PS 3.4 - Service Class Specifications - Annex I - Media Storage Service Class (Normative) as follows:*

## I.4 Media Storage Standard SOP Classes

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

| SOP Class Name | SOP Class UID | IOD Specification (defined in PS3.3) |
|---|---|---|
| ... | ... | ... |
| **Extensible SR Storage** | **1.2.840.10008.5.1.4.1.1.88.35** | **Extensible SR IOD** |
| ... | ... | ... |

## I.4.1.2 Structured Reporting Storage SOP Classes

The requirements of Annex O apply to the following SOP Classes:

• Basic Text SR

• Enhanced SR

• Comprehensive SR

• Comprehensive 3D SR

• **Extensible SR**

• Mammography CAD SR

• ...

# O.2 Structured Reporting Storage SOP Class SCU and SCP Behavior

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### O.2.1 Behavior of an SCU

### O.2.1.2 <u>Extensible SR SOP Classes</u>

**<u>The concept of extensibility implies that a recipient may encounter Content Items, Value Types and Relationship Types that are unanticipated and unsupported and hence potentially unrenderable.</u>**

**<u>An implementation shall identify in its Conformance Statement which Content Items, Value Types and Relationship Types it creates.</u>**

### O.2.2 Behavior of an SCP

An SCP intending to display or otherwise render a Structured Report shall convey its full meaning in an unambiguous manner**<u>, except as described in Section O.2.2.2</u>** .

> **Note**
>
> "Full meaning" includes not just the Content Tree (i.e., the Items of the Content Sequence), but all Attributes of the Data Set that are necessary to properly interpret the Structured Report. This includes those Attributes that set the initial Observation Context for the Content Tree, i.e., the patient, procedure, and observer identifiers, and the Completion status and Verification status of the Structured Report.

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### O.2.2.2 <u>Extensible SR SOP Classes</u>

**<u>The concept of extensibility implies that a recipient may encounter Content Items, Value Types and Relationship Types that are unanticipated and unsupported and hence potentially unrenderable.</u>**

**<u>An implementation shall identify in its Conformance Statement which Content Items, Value Types and Relationship Types it supports.</u>**

**<u>Since it may not be possible to render the entire content in an unambiguous manner because of unrecognized content, an SCP intending to display or otherwise render an Extensible SR SOP Instance</u>**

• **<u>shall convey a warning in the rendering to indicate that unsupported content is present and that this may affect the meaning of the rendering</u>**

• **<u>shall identify in its Conformance Statement its behavior when encountering unsupported content</u>**

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## O.4 Conformance

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

### O.4.1 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:

• The Image or other composite object Storage SOP Classes that are also supported by the SCU and 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.

• The conditions under which a new SOP Instance UID is generated for an existing SR Document.

• If the implementation provides Query/Retrieve of Structured Reporting SOP Instances as an SCU, whether it supports the Optional Keys Concept Name Code Sequence or Content Template Sequence.

**Note**

**The description of the Value Types and Relationship Types that are supported by the SCU is particularly important for the Extensible SR SOP Class.**

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## O.4.2 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:

• 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.

• 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 may be referenced by instances of the Structured Reporting Storage SOP Class, and whether or not they will be displayed or otherwise rendered.

• 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 co-ordinates and referenced presentation states) are used to influence the display of the image or object.

• If the implementation supports Query/Retrieve of Structured Reporting SOP Instances as an SCP, whether it supports the Optional Keys Concept Name Code Sequence or Content Template Sequence.

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## O.4.2.2 **Extensible SR SOP Class**

**The following shall be documented in the Conformance Statement of any implementation claiming conformance to the Extensible SR SOP Class as an SCP:**

• **The behavior and warnings generated when encountering unsupported Content Items, Value Types and Relationship Types**

# DICOM PS3.6 Data Dictionary

## A Registry of DICOM Unique Identifiers (UIDs) (Normative)

*Amend DICOM PS 3.6 - Data Dictionary - Annex A - Registry of DICOM Unique Identifiers (UIDs) as follows:*

**Table A-1. UID Values**

| UID Value | UID NAME | UID TYPE | Part |
|---|---|---|---|
| ... | ... | ... | ... |
| **1.2.840.10008.5.1.4.1.1.88.35** | **Extensible SR Storage** | **SOP Class** | **PS 3.4** |
| ... | ... | ... | ... |