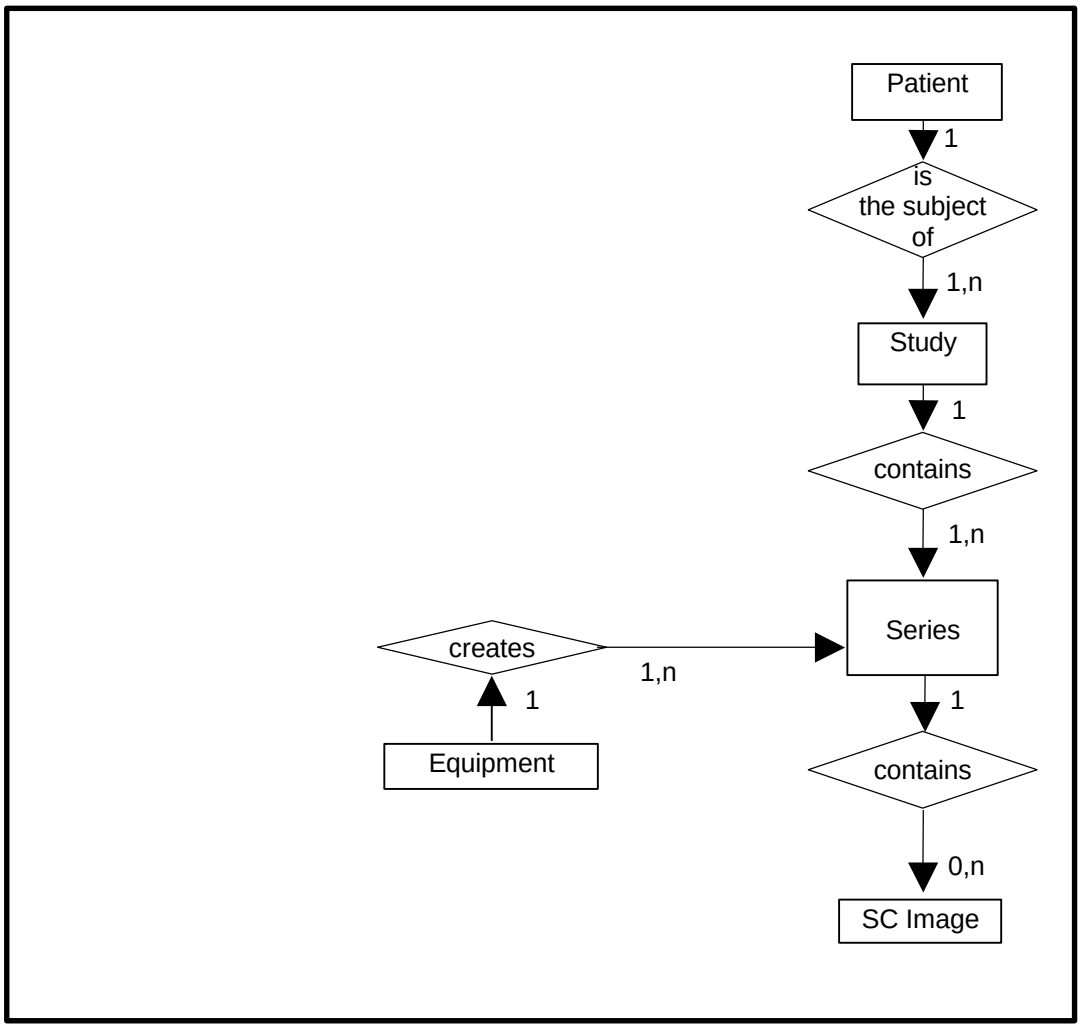
ILLUSTRATION 6.3.1
SC IMAGE ENTITY RELATIONSHIP DIAGRAM



6.3.1 Entity Descriptions

Please refer to DICOM Standard Part 3 (Information Object Definitions) for a description of each of the entities contained within the SC Information Object.

6.3.2 Vivid and EchoPAC v206 Mapping of DICOM Entities

TABLE 6.3.1
MAPPING OF DICOM ENTITIES TO VIVID V206 ENTITIES

DICOM	Vivid and EchoPAC v206 Entity
Patient	Patient
Study	Exam
Series	Exam
Equipment	Equipment
Image	Image

6.4 IOD MODULE TABLE

Within an entity of the DICOM SC IOD, attributes are grouped into related set of attributes. A set of related attributes is termed a module. A module facilitates the understanding of the semantics concerning the attributes and how the attributes are related with each other. A module grouping does not infer any encoding of information into datasets.
Table A.4.1 identifies the defined modules within the entities, which comprise the DICOM SC IOD. Modules are identified by Module Name.
See DICOM Part 3 for a complete definition of the entities, modules, and attributes.

6.5 INFORMATION MODULE DEFINITIONS

Please refer to DICOM Standard Part 3 (Information Object Definitions) for a description of each of the entities and modules contained within the SC Information Object.
The following modules are included to convey Enumerated Values, Defined Terms, and Optional Attributes supported. Type 1 & Type 2 Attributes are also included for completeness and to define what values they may take and where these values are obtained. It should be noted that they are the same ones as defined in the DICOM Standard Part 3 (Information Object Definitions).

6.5.1 SC Modules

This Section describes SC Equipment, and Image Modules. These Modules contain attributes that are specific to SC Image IOD.

6.5.1.1 SC Equipment Module

Section “SC Equipment” in Table A.4.2 describes the implemented attributes.

6.5.1.2 SC Image Module

Section “SC Image” in Table A.4.2 describes the implemented attributes.

7. SR INFORMATION OBJECT IMPLEMENTATION

Note: If "Use older SR version" is enabled (see 2.6 and 3.6) the corresponding DICOM Conformance Statement of the selected model and version should be referenced. The Conformance Statement can be found online through a link available in the references section of this document (section 1.6).

7.1 INTRODUCTION

This section specifies the use of the DICOM Comprehensive SR IOD to represent results produced by this implementation. Corresponding attributes are conveyed using the module construct. The contents of this section are:
7.2- IOD Implementation

7.3 - IOD Entity-Relationship Model

7.4 - IOD Module Table

7.5 - IOD Module Definition

In this section, supported means that tag is sent with value.

7.2 COMPREHENSIVE SR IOD IMPLEMENTATION

This section defines the implementation of Comprehensive SR information object.

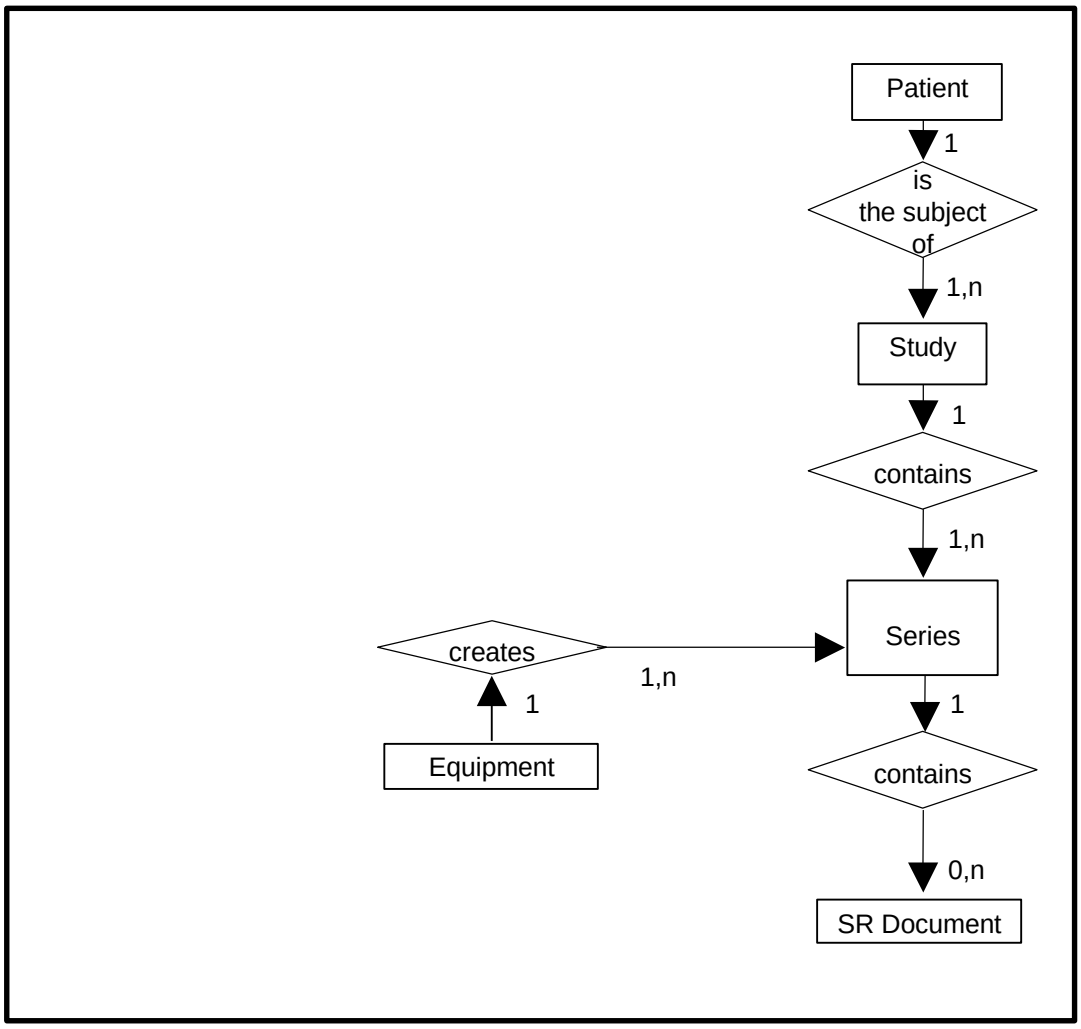
7.3 COMPREHENSIVE SR ENTITY-RELATIONSHIP MODEL

The Entity-Relationship diagram for the Comprehensive SR interoperability schema is shown in Illustration 7.3.1**.** In this figure, the following diagrammatic convention is established to represent the information organization:

- each entity is represented by a rectangular box
- each relationship is represented by a diamond shaped box.
- the fact that a relationship exists between two entities is depicted by lines connecting the corresponding entity boxes to the relationship boxes.

The relationships are fully defined with the maximum number of possible entities in the relationship shown. In other words, the relationship between Series and SR Documents can have up to n SR Documents per Series, but the Patient to Study relationship has 1 Patient for each Study (a Patient can have more than one Study on the system; however, each Study will contain all of the information pertaining to that Patient).

ILLUSTRATION 7.3.1
COMPREHENSIVE SR ENTITY RELATIONSHIP DIAGRAM



7.3.1 Entity Descriptions

Please refer to DICOM Standard Part 3 (Information Object Definitions) for a description of each of the entities contained within the Comprehensive SR Information Object.

7.3.2 Vivid and EchoPAC v206 Mapping of DICOM Entities

TABLE 7.3.1
MAPPING OF DICOM ENTITIES TO VIVID V206 ENTITIES

DICOM	Vivid and EchoPAC v206 Entity
Patient	Patient
Study	Exam
Series	Exam
Equipment	Equipment
SR Document	Results

7.4 IOD MODULE TABLE

Within an entity of the DICOM Comprehensive SR IOD, attributes are grouped into related set of attributes. A set of related attributes is termed a module. A module facilitates the understanding of the semantics concerning the attributes and how the attributes are related with each other. A module grouping does not infer any encoding of information into data sets.
Table A.6.1 identifies the defined modules within the entities, which comprise the DICOM Comprehensive SR IOD. Modules are identified by Module Name.
See DICOM Part 3 for a complete definition of the entities, modules, and attributes.

7.5 INFORMATION MODULE DEFINITIONS

Please refer to DICOM Standard Part 3 (Information Object Definitions) for a description of each of the entities and modules contained within the Comprehensive SR Information Object.
The modules described in Table A.6.2 are included to convey Enumerated Values, Defined Terms, and Optional Attributes supported. Type 1 & Type 2 Attributes are also included for completeness and to define what values they may take and where these values are obtained. It should be noted that they are the same ones as defined in the DICOM Standard Part 3 (Information Object Definitions).

7.5.1 SR Document Content Module

As previously mentioned, the SR Document Content Module is described in Table A.6.2.
Content templates are created according to the following rules:

- Template “Pediatric Cardiac Ultrasound Report” is created if there are measurements in “Pediatric” M&A categories.
- Template “Adult Echocardiography Procedure Report” is created if there are measurements in “Cardiac” and no measurements in “Pediatric” M&A categories.
- Template “Vascular Ultrasound Procedure Report” is created if there are measurements in “Vascular” or “Abdomen” M&A categories.
- If there are measurements from both “Cardiac/Pediatric” and “Vascular” category groups, both SR Documents will be created.

7.5.1.1 SR Document Content Descriptions

7.5.1.1.1 Content Template

Vivid and EchoPAC v206 supports the following root Templates for SR SOP Instances created by Vivid and EchoPAC v206.

TABLE 7.5.1
SR ROOT TEMPLATES

SOP Class	Template ID	Template Name	Use
Comprehensive SR	5200	“Adult Echocardiography Procedure Report”	Create

Comprehensive SR	5100	"Vascular Ultrasound Procedure Report"	Create
Comprehensive SR	5220	"Pediatric Cardiac Ultrasound Report"	Create

The mappings from the product's internal measurement names to DICOM SR encoding are in chapters 14 and 15.

7.6 STANDARD EXTENDED AND PRIVATE DATA ATTRIBUTES

Please see the definition of private modules in Table A.1.2.

7.7 STANDARD EXTENDED AND PRIVATE CONTEXT GROUPS

The product uses the standard extended context groups as described in chapters 14 and 15

7.8 STANDARD EXTENDED AND PRIVATE TEMPLATES

The product uses the standard extended templates as described in chapters 14 and 15

7.8.1 Standard Extended Templates

The product uses the standard extended templates as described in chapters 14 and 15

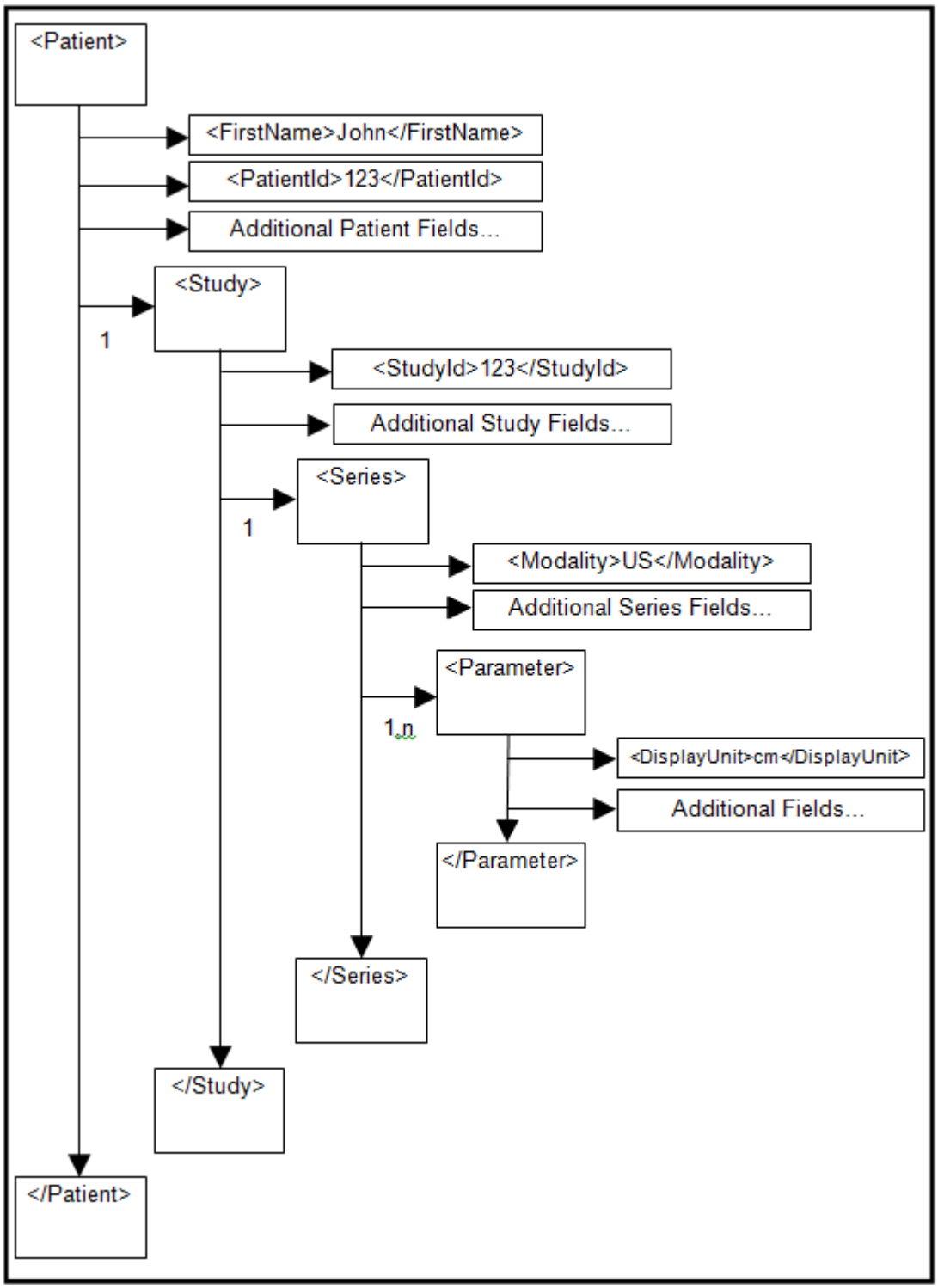
7.8.2 Private Templates

Not applicable.

7.8.3 Additional Private Element information

The Vivid and EchoPAC Software can be configured to export recorded measurements within an XML formatted payload located within a Private Data Element. The XML may contain additional measurements not part of the Public DICOM payload. The element is located within group and element number (6005,1030).
The structure of the XML object is intended to maintain the DICOM hierarchy of Patient->Study->Series->Object where possible to remain readable.
A simplified example of the XML data hierarchy is provided within Illustration 7.8.1.

ILLUSTRATION 7.8.1
SIMPLIFIED EXAMPLE OF XML PRIVATE ELEMENT



An example of a Measurement, or Parameter, formatted for XML is provided within Illustration 7.8.2.

ILLUSTRATION 7.8.2
MEASUREMENT XML EXAMPLE

```
<Parameter>
  <AverageType>A</AverageType>
  <Category>C</Category>
  <DisplayUnit>cm</DisplayUnit>
  <Edited>false</Edited>
  <ExcludedFromAvg>false</ExcludedFromAvg>
  <ExcludedFromCalc>false</ExcludedFromCalc>
  <MeasureId>Cardiac/2D/Ao/LA/LA/Ao</MeasureId>
  <ParameterId>2D/LA</ParameterId>
  <ParameterName>LA Diam</ParameterName>
  <ResultNo>-1</ResultNo>
  <ResultValue>1.001</ResultValue>
  <ScanMode>2D</ScanMode>
  <StudyId>Cardiac/2D/Ao/LA</StudyId>
  <ParameterType>M</ParameterType>
  <DisplayValue>100.1</DisplayValue>
</Parameter>
```

8. BASIC DIRECTORY INFORMATION OBJECT IMPLEMENTATION

8.1 INTRODUCTION

This section specifies the use of the DICOM Basic Directory IOD to represent the information included in directories produced by this implementation. Corresponding attributes are conveyed using the module construct. The contents of this section are:
8.2 - IOD Implementation

8.3 - IOD Entity-Relationship Model

8.4- IOD Module Table

8.5 - IOD Module Definition

8.2 BASIC DIRECTORY IOD IMPLEMENTATION

This section defines the implementation of Basic Directory information object.

8.3 BASIC DIRECTORY ENTITY-RELATIONSHIP MODEL

The Entity-Relationship diagram for the Basic Directory interoperability schema is shown in Illustration 8.3.1**.** In this figure, the following diagrammatic convention is established to represent the information organization:

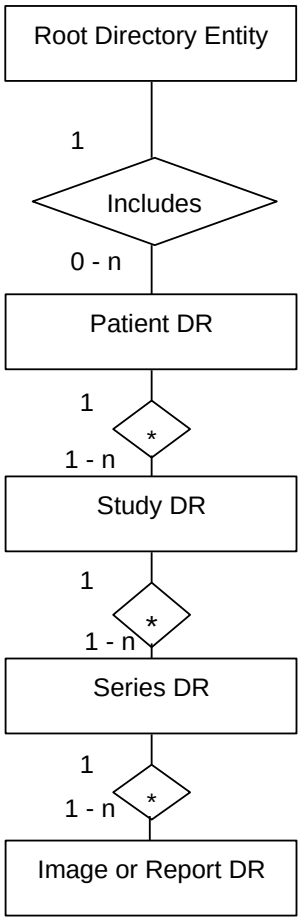
- each entity is represented by a rectangular box
- each relationship is represented by a diamond shaped box
- the fact that a relationship exists between two entities is depicted by lines connecting the corresponding entity boxes to the relationship boxes.

8.3.1 Vivid and EchoPAC v206 Mapping of DICOM entities

TABLE 8.3.1
MAPPING OF DICOM ENTITIES TO VIVID V206 ENTITIES

DICOM	Vivid and EchoPAC v206
Patient	Patient
Study	Exam
Series	Exam
Image or SR Document	Image or Results

ILLUSTRATION 8.3.1
BASIC DIRECTORY ENTITY RELATIONSHIP DIAGRAM



8.4 IOD MODULE TABLE

Within an entity of the Basic Directory IOD, attributes are grouped into related set of attributes. A set of related attributes is termed a module. A module facilitates the understanding of the semantics concerning the attributes and how the attributes are related with each other. A module grouping does not infer any encoding of information into datasets.
Table A.5.1 identifies the defined modules within the entities, which comprise the Basic Directory IOD. Modules are identified by Module Name.
See DICOM Part 3 for a complete definition of the entities, modules, and attributes.
The Directory Information Module is created when initializing the media. If it already exists, the existing information is not changed regarding patient, study, series or image/result data.
An existing Directory Information Module may have been obtained from application entities using removable media. These instances are external to this conformance claim and the origin of the SOP instances is outside the scope of this claim.

8.5 INFORMATION MODULE DEFINITIONS

Please refer to DICOM Standard Part 3 (Information Object Definitions) for a description of each of the entities and modules contained within the Basic Directory Information Object.
The following modules are included to convey Enumerated Values, Defined Terms, and Optional Attributes supported. Type 1 & Type 2 Attributes are also included for completeness and to define what values they may take and where these values are obtained. It should be noted that they are the same ones as defined in the DICOM Standard Part 3 (Information Object Definitions).

8.5.1 Common File Set identification Modules

Table A.5.2 section “File Set Identification Module” describes the implemented attributes.

8.5.2 Common Directory Information Modules

Table A.5.2 section “Directory Information Module” describes the implemented attributes.

8.5.3 Definition of Specific Directory Records

Please see a description of the implemented attributes in the following tables:
Table A.5.3
Attributes specific to record type PATIENT
Table A.5.4
Attributes specific to record type STUDY
Table A.5.5
Attributes specific to record type SERIES
Table A.5.6
Attributes specific to record type IMAGE
Table A.5.7
Attributes specific to record type SR DOCUMENT
Note that “Private Directory Record” and “Multi-Referenced File Directory Record” are not implemented.

8.6 PRIVATE DATA DICTIONARY

Please see the definition of private modules in Table A.1.2.

9. MODALITY WORKLIST INFORMATION MODEL DEFINITION

9.1 INTRODUCTION

This section specifies the use of the DICOM Modality Worklist Information Model used to organize data and against which a Modality Worklist Query will be performed. The Vivid acquisition systems support Modality Worklist, however both the EchoPAC Software Only and EchoPAC Plug-in do not provide Worklist functionality.
The contents of this section are:
9.2- Information Model Description

9.3- Information Model Entity-Relationship Model

Error! Reference source not found.- Information Model Module Table

Error! Reference source not found.- Information Model Keys

9.2 MODALITY WORKLIST INFORMATION MODEL DESCRIPTION

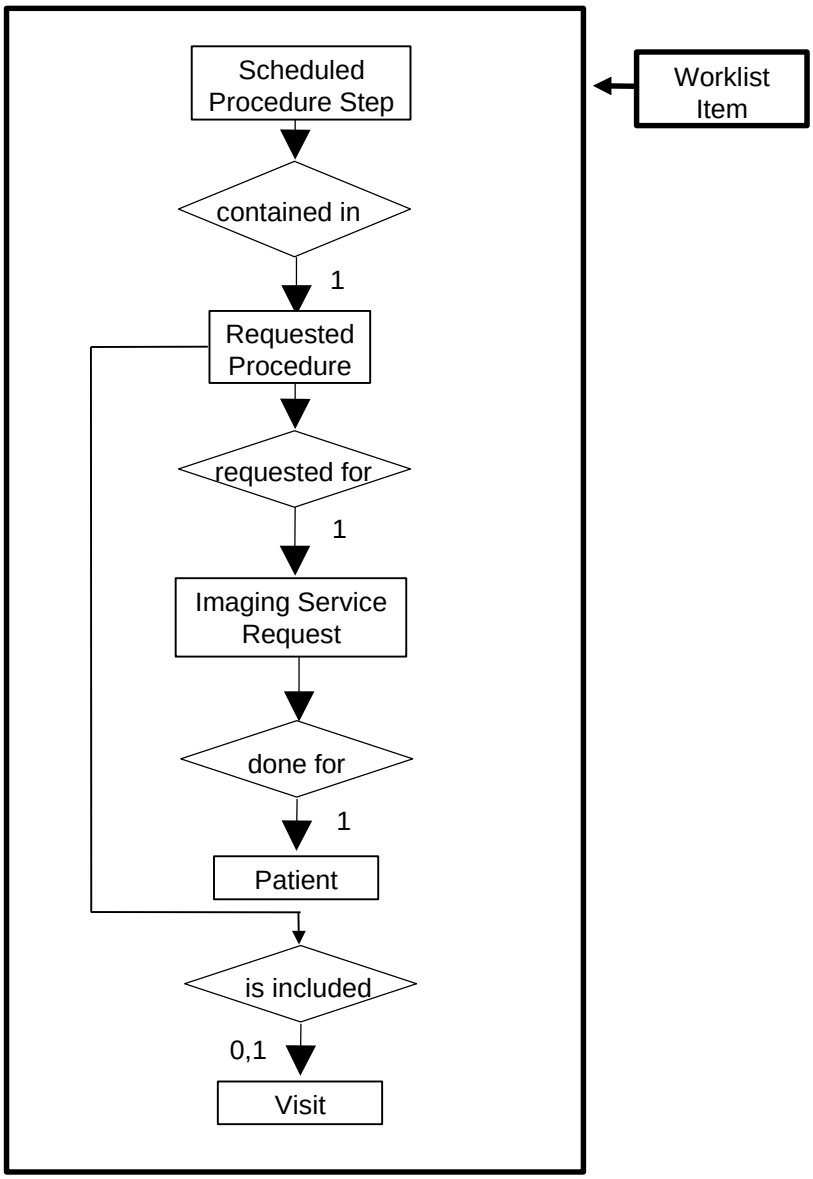
This section defines the implementation of Modality Worklist Information Model.

9.3 MODALITY WORKLIST INFORMATION MODEL ENTITY-RELATIONSHIP MODEL

The Entity-Relationship diagram for the Modality Worklist Information Model schema is shown in Illustration 9.3.1. It represents the information that composes a Worklist Item. In this figure, the following diagrammatic convention is established to represent the information organization:

- Each entity is represented by a rectangular box.
- Each relationship is represented by a diamond shaped box.
- The fact that a relationship exists between two entities is depicted by lines connecting the corresponding entity boxes to the relationship boxes.

ILLUSTRATION 9.3.1
MODALITY WORKLIST INFORMATION MODEL E/R DIAGRAM



9.3.1 Entity Descriptions

Please refer to DICOM Standard PS 3.3. (Information Object Definitions) and PS 3.4 (Service Class Specifications) for a description of each of the Entities contained within the Modality Worklist Information Model.

9.3.2 Scheduled Procedure Step

Schedule Procedure Step is implemented in a basic form to allow for the user to retrieve a subset of attributes.

9.3.2.1 Requested Procedure Entity Description

Requested Procedure Step is implemented in a basic form to allow for the user to retrieve a subset of attributes.

9.3.2.2 Imaging Service Request Entity Description

Image Service is implemented in a basic form to allow for the user to retrieve a subset of attributes.

9.3.2.3 Visit Entity Description

Visit Entity is implemented in a basic form to allow for the user to retrieve a subset of attributes.

9.3.2.4 Patient Entity Description

Patient Entity Description is implemented in a basic form to allow for the user to retrieve a subset of attributes.

9.3.3 Vivid v206 Mapping of DICOM entities

TABLE 9.3.1
MAPPING OF DICOM ENTITIES TO VIVID V206 ENTITIES

DICOM	Vivid v206 Entity
Scheduled Procedure Step	Worklist entry
Requested Procedure	Exam
Imaging Service Request	Exam
Visit	Not Applicable
Patient	Patient

9.4 SCU OF THE MODALITY WORKLIST INFORMATION MODEL – FIND SOP CLASS

As a Service Class User of the Modality Worklist Information Model – FIND SOP Class, the Vivid scanner uses the C-FIND-RQ message to query the SCP. It supports the Query Keys listed in Table 9.4.1. The term “Instance” is used in some of the Comments to denote Images and Results in examinations that are based on Worklist entries. Please note that tags that are not defined for SR documents will not be mapped (see Section 7).
The supported matching types listed in the Matching Type Column are:

- SINGLE_VALUE: SCU can request Single Value matching.
- UID: SCU can request UID matching.
- WILDCARD: SCU can request Wildcard matching.
- RANGE: SCU can request Range matching.
- SEQUENCE: SCU can request Sequence matching.
- RETURN_KEY: SCU can request attribute as a return value (universal matching).

Tags can be configured to be omitted from the query, in the Config screen. Wild Card Matching is only used for Patient's Name (0010,0010).
For the Query Value Source column, the following values are supported:

- FIXED: The query value cannot be modified by the user or by configuration.
- GENERATED: The query value is generated by the system (e.g., current date as the study date).
- CONFIGURATION: The query value is dependent on system configuration.
- USER: The query value is entered by the user.
- SCANNED: The query value is read from a barcode scanner or similar device.
- EMPTY: The query value is left empty to indicate it is a return key only.

For the Display on UI the following values are supported:

- D: The return value is displayed on the main UI by default.
- C: The return value is displayed on the main UI if configured.
- N: The return value is never displayed.

TABLE 9.4.1
SUPPORTED C-FIND QUERY PARAMETERS FOR MODALITY WORKLIST-SCU

Attribute Name	Tag	Matching Type	Query Value Sources	Value	Display on UI	Comments
SOP Common						
Specific Character Set	(0008,0005)	SINGLE_VALUE, RETURN_KEY	EMPTY, GENERATED	Empty	N	If the query contains only pure ASCII characters
				ISO_IR 100	N	If the query contains matching keys in other than the default

Attribute Name	Tag	Matching Type	Query Value Sources	Value	Display on UI	Comments
						character repertoire
Scheduled Procedure Step						
Schedule Procedure Step Sequence	(0040,0100)	RETURN_KEY	CONFIGURATION, USER, EMPTY		D	
>Modality	(0008,0060)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY		D	Only “US” and “SR” are supported
>Scheduled Station AE Title	(0040,0001)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY		N	
>Scheduled Procedure Step Start Date	(0040,0002)	RANGE, RETURN_KEY	USER, EMPTY		D	
>Scheduled Procedure Step Start Time	(0040,0003)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY		N	
>Scheduled Performing Physician’s Name	(0040,0006)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY		D	Maps to the attribute “Performing Physician’s Name” in the Instance
>Scheduled Procedure Step Description	(0040,0007)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY		D	
>Scheduled Protocol Code Sequence	(0040,0008)	RETURN_KEY	EMPTY		D	
>Scheduled Procedure Step ID	(0040,0009)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY		D	
>Scheduled Station Name	(0040,0010)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY		N	
>Scheduled Procedure Step Location	(0040,0011)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY		N	
Requested Procedure						
Referenced Study Sequence	(0008,1110)	RETURN_KEY	EMPTY		D	
>Referenced SOP Class UID	(0008,1150)	RETURN_KEY	EMPTY		D	
>Referenced SOP Instance UID	(0008,1155)	RETURN_KEY	EMPTY		D	
Study Instance UID	(0020,000D)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY		D	
Requested Procedure Description	(0032,1060)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY		D	Maps to the attribute “Study Description” in the Instance
Requested Procedure Code Sequence	(0032,1064)	RETURN_KEY	EMPTY		N	
Requested Procedure ID	(0040,1001)	SINGLE_VALUE, RETURN_KEY	USER, EMPTY		D	Vivid calls it Exam ID

Attribute Name	Tag	Matching Type	Query Value Sources	Value	Display on UI	Comments
Names of Intended Recipients of Results	(0040,1010)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY		D	Maps to the attribute "Physician(s) of Record".
Requested Procedure Comments	(0040,1400)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY		N	
Imaging Service Request						
Accession Number	(0008,0050)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, USER, EMPTY		D	
Referring Physician's Name	(0008,0090)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY		D	
Requesting Physician	(0032,1032)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY		N	
Requesting Service	(0032,1033)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY		N	
Imaging Service Request Comments	(0040,2400)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY		N	
Visit Identification						
Admission ID	(0038,0010)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY		D	
Visit Status						
Current Patient Location	(0038,0300)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY		N	
Visit Relationship						
Referenced Patient Sequence	(0008,1120)	RETURN_KEY	EMPTY			
>Referenced SOP Class UID	(0008,1150)	RETURN_KEY	EMPTY		N	
>Referenced SOP Instance UID	(0008,1155)	RETURN_KEY	EMPTY		N	
Patient Identification						
Patient's Name	(0010,0010)	SINGLE_VALUE, WILDCARD, RETURN_KEY	USER, EMPTY		D	
Patient ID	(0010,0020)	SINGLE_VALUE, RETURN_KEY	USER, EMPTY		D	
Issuer of Patient ID	(0010,0021)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY		D	
Issuer of Patient ID Qualifiers Sequence	(0010,0024)	RETURN_KEY	EMPTY		N	
>Universal Entity ID	(0040,0032)	RETURN_KEY			N	
>Universal Entity ID Type	(0040,0033)	RETURN_KEY			N	
>Identifier Type Code	(0040,0035)	RETURN_KEY			N	

Attribute Name	Tag	Matching Type	Query Value Sources	Value	Display on UI	Comments
Other Patient Ids	(0010,1000)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY		D	
Other Patient Ids Sequence	(0010,1002)	RETURN_KEY	EMPTY		D	
>Patient ID	(0010,0020)	RETURN_KEY			D	
>Issuer of Patient ID	(0010,0021)	RETURN_KEY			D	
>Issuer of Patient ID Qualifiers Sequence	(0010,0024)	RETURN_KEY	EMPTY		D	
>>Universal Entity ID	(0040,0032)	RETURN_KEY			N	
>>Universal Entity ID Type	(0040,0033)	RETURN_KEY			N	
>>Identifier Type Code	(0040,0035)	RETURN_KEY			N	
Patient Demographics						
Patients Birth Date	(0010,0030)	SINGLE_VALUE, RETURN_KEY	USER, EMPTY		D	
Patients Birth Time	(0010,0032)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY		N	
Patient's Sex	(0010,0040)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, USER, EMPTY		D	
Patient’s Size	(0010,1020)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY		D	
Patient's Weight	(0010,1030)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY		D	
Patient's Address	(0010,1040)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY		D	
Ethnic Group	(0010,2160)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY		N	
Patient Comments	(0010,4000)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY		D	
Patient Medical						
Medical Alerts	(0010,2000)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY		N	
Allergies	(0010,2110)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY		N	
Additional Patient History	(0010,21B0)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY		D	Appears as Ref. Reason in the UI
Pregnancy Status	(0010,21C0)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY		N	

9.5 SCP OF THE MODALITY WORKLIST INFORMATION MODEL – FIND SOP CLASS - N/A

Not supported.

10. MODALITY PERFORMED PROCEDURE STEP SOP CLASS DEFINITION

10.1 INTRODUCTION

This section of the DICOM Conformance Statement specifies the Modality Performed Procedure Step SOP Class, the optional attributes and service elements supported, the valid range of values for mandatory and optional attributes, and the status code behavior.

10.2 SCU OF THE MODALITY PERFORMED PROCEDURE STEP SOP CLASS

10.2.1 IOD Description

As a Service Class User of the Modality Performed Procedure Step SOP Class, the Vivid scanner and EchoPAC Software Only supports the following attributes in the N-CREATE-RQ and N-SET-RQ messages, if it creates the message.
In the values Source Column, the following values are supported:

- FIXED: the value is pre-defined and cannot be modified.
- GENERATED: the value is generated by the system.
- CONFIGURATION: the value is copied from system configuration.
- MWL: the value is copied from modality worklist.
- USER: the value is entered by the user.
- SCANNED: the value is read from a barcode scanner or similar device.
- EMPTY: the attribute is sent without value.

Attribute Name	Tag	Source	Value N- CREATE	Value N-SET	Comments
Performed Procedure Step Relationship					
Scheduled Step Attribute Sequence	(0040,0270)	GENERATED			
>Study Instance UID	(0020,000D)	GENERATED, MWL			MWL from (0020,000D)
>Referenced Study Sequence	(0008,1110)	EMPTY, MWL			MWL from (0008,1110)
>>Referenced SOP Class UID	(0008,1150)	MWL			
>>Referenced SOP Instance UID	(0008,1155)	MWL			
>Accession Number	(0008,0050)	EMPTY, USER, MWL			MWL from (0008,0050)

Attribute Name	Tag	Source	Value N- CREATE	Value N-SET	Comments
>Requested Procedure ID	(0040,1001)	EMPTY, MWL			MWL from (0040,1001)
>Requested Procedure Description	(0032,1060)	EMPTY, MWL			MWL from (0032,1060)
>Scheduled Procedure Step ID	(0040,0009)	EMPTY, MWL			MWL from (0040,0100) sub-attribute (0040,0009)
>Scheduled Procedure Step Description	(0040,0007)	EMPTY, MWL			MWL from (0040,0100) sub-attribute (0040,0007)
>Scheduled Protocol Code Sequence	(0040,0008)	EMPTY, MWL			MWL from (0040,0100) sub-attribute (0040,0008)
>>Code Value	(0008,0100)	MWL			
>>Coding Scheme Designator	(0008,0102)	MWL			
>>Code Meaning	(0008,0104)	MWL			
Patient's Name	(0010,0010)	USER, MWL			MWL from (0010,0010)
Patient ID	(0010,0020)	USER, MWL			MWL from (0010,0020)
Patient's Birth Date	(0010,0030)	USER, EMPTY, MWL			MWL from (0010,0030)
Patient's Sex	(0010,0040)	USER, MWL			MWL from (0010,0040)
Referenced Patient Sequence	(0008,1120)	EMPTY, MWL			MWL from (0008,1120)
>Referenced SOP Class UID	(0008,1150)	MWL			
>Referenced SOP Instance UID	(0008,1155)	MWL			
Admission Id	(0038,0010)	EMPTY, USER, MWL			MWL from (0038,0010)
Performed Procedure Step Information					
Performed Procedure Step ID	(0040,0253)	GENERATED	Integer value determined by the system		
Performed Station AE Title	(0040,0241)	CONFIGURATION			

Attribute Name	Tag	Source	Value N- CREATE	Value N-SET	Comments
Performed Station Name	(0040,0242)	Host name, CONFIGURATION			
Performed Location	(0040,0243)	CONFIGURATION			
Performed Procedure Step Start Date	(0040,0244)	GENERATED	Date of first image acquisition		
Performed Procedure Step Start Time	(0040,0245)	GENERATED	Time of first image acquisition		
Performed Procedure Step Status	(0040,0252)	GENERATED	IN PROGRESS	DISCONTINUED, COMPLETED	
Performed Procedure Step Description	(0040,0254)	EMPTY, USER, MWL			MWL from (0032,1060)
Performed Procedure Type Description	(0040,0255)	FIXED	EMPTY	EMPTY	
Procedure Code Sequence	(0008,1032)	EMPTY, MWL			MWL from (0032,1064)
Performed Procedure Step End Date	(0040,0250)	GENERATED	EMPTY	The date when the exam ended	
Performed Procedure Step End Time	(0040,0251)	GENERATED	EMPTY	The time when the exam ended	
Image Acquisition Results					
Modality	(0008,0060)	GENERATED, MWL	US, SR		MWL from (0008,0060)
Study ID	(0020,0010)	EMPTY, USER, MWL			MWL from (0040,1001)
Performed Protocol Code Sequence	(0040,0260)	EMPTY, MWL			MWL from (0040,0100) sub-attribute (0040,0008)
>Code Value	(0008,0100)	MWL			
>Coding Scheme Designator	(0008,0102)	MWL			
>Code Meaning	(0008,0104)	MWL			
Performed Series Sequence	(0040,0340)	EMPTY, GENERATED	EMPTY	GENERATED	
>Performing Physician's Name	(0008,1050)	FIXED		EMPTY	
>Protocol Name	(0018,1030)	FIXED		If stress protocol performed, Stress Protocol name, otherwise EMPTY.	

Attribute Name	Tag	Source	Value N- CREATE	Value N-SET	Comments
>Operator's Name	(0008,1070)	FIXED		EMPTY	
>Series Instance UID	(0020,000E)	GENERATED			
>Series Description	(0008,103E)	FIXED		EMPTY	
>Retrieve AE Title	(0008,0054)	FIXED		EMPTY	
>Referenced Image Sequence	(0008,1140)	EMPTY, GENERATED			List of files added to the Series, or Empty if no files.
>>Referenced SOP Class UID	(0008,1150)	GENERATED			
>>Referenced SOP Instance UID	(0008,1155)	GENERATED			
>Referenced Non-Image Composite SOP Instance Sequence	(0040,0220)	FIXED		EMPTY	

10.2.2 Operations

10.2.2.1 Service Class User Behavior

The Vivid scanner and EchoPAC Software Only send N-CREATE when first image in examination is acquired or when the exam is ended (for the case where there are no images or results).
The N-SET message is sent after the exam is ended, and it will include all acquired image- and result UIDs and the status of COMPLETED or DISCONTINUED.

10.2.2.2 Status Codes

No Service Class specific status values are defined for the N-ACTION Service. See PS 3.7 for general response status codes.
For this SOP class, all status codes with status Refused or Error are treated as failures and terminate the association and operation. All status codes with status Warning or Success are treated as successes.

10.3 SCP OF THE MODALITY PERFORMED PROCEDURE STEP SOP CLASS - N/A

Not supported.

11. STORAGE COMMITMENT PUSH MODEL SOP CLASS DEFINITION

11.1 INTRODUCTION

This section of the DICOM Conformance Statement specifies the Storage Commitment Push Model SOP Class, the optional attributes and service elements supported, the valid range of values for mandatory and optional attributes, and the status code behavior.

11.2 STORAGE COMMITMENT PUSH MODEL SOP CLASS DEFINITION

11.2.1 IOD Description

11.2.1.1 STORAGE COMMITMENT MODULE

TABLE 11.2.1
STORAGE COMMITMENT MODULE

Attribute Name	Tag	Attribute Description
Transaction UID	(0008,1195)	Uniquely generated by the equipment
Retrieve AE Title	(0008,0054)	Not used
Storage Media File-Set ID	(0088,0130)	Not used
Storage Media File-Set UID	(0088,0140)	Not used
Referenced SOP Sequence	(0008,1199)	Supported
>Referenced SOP Class UID	(0008,1150)	Supported
>Referenced SOP Instance UID	(0008,1155)	Supported
>Retrieve AE Title	(0008,0054)	Not used
>Storage Media File-Set ID	(0088,0130)	Not used
>Storage Media File-Set UID	(0088,0140)	Not used
Failed SOP Sequence	(0008,1198)	Supported
>Referenced SOP Class UID	(0008,1150)	Supported
>Referenced SOP Instance UID	(0008,1155)	Supported
>Failure Reason	(0008,1197)	Supported

11.2.2 DIMSE Service Group

DIMSE Service Element	Usage SCU/SCP
N-EVENT-REPORT	M/M
N-ACTION	M/M

11.2.3 Operations

11.2.3.1 Action Information

TABLE 11.2.2
STORAGE COMMITMENT REQUEST - ACTION INFORMATION

Action Type Name	Action Type ID	Attribute	Tag	Requirement Type SCU/SCP
Request Storage Commitment	1	Transaction UID	(0008,1195)	1/1
		Storage Media File-Set ID	(0088,0130)	Not used
		Storage Media File-Set UID	(0088,0140)	Not used
		Referenced SOP Sequence	(0008,1199)	1/1
		>Referenced SOP Class UID	(0008,1150)	1/1
		>Referenced SOP Instance UID	(0008,1155)	1/1
		>Storage Media File-Set ID	(0088,0130)	Not used
		>Storage Media File-Set UID	(0088,0140)	Not used

11.2.3.2 Service Class User Behavior

Vivid and EchoPAC Software Only v206 sends the N-ACTION primitive (Storage Commitment Request) after successful exam save to a DICOM Storage SCP.
Vivid and EchoPAC Software Only v206 may request storage commitment for all generated SOP Class UIDs:

Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1
Ultrasound Multi-frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
Comprehensive Structured Report	1.2.840.10008.5.1.4.1.1.88.33

The association for the N-ACTION is disconnected after processing the response. Thus, the N-EVENT-REPORT must be sent on a separate association.
The Referenced Study Component Sequence Attribute is not supported.

The Transaction UID is valid for two days. If no answer is received, the request will be removed without warning the user.
The optional Storage Media File-Set ID & UID Attributes in the N-ACTION are not supported.

11.2.3.3 Status Codes

No Service Class specific status values are defined for the N-ACTION Service. See PS 3.7 for general response status codes.
For this SOP class, all status codes with status Refused or Error are treated as failures and terminate the association and operation. All status codes with status Warning or Success are treated as successes.

11.2.4 Notifications

Vivid and EchoPAC Software Only v206 will only listen for an N-EVENT-REPORT from the SCP in a new association on the listen port for Verification and Storage Commitment.
Role Negotiation is supported and expected in the new association requested.

11.2.4.1 Event Information

TABLE 11.2.3
STORAGE COMMITMENT RESULT - EVENT INFORMATION

Event Type Name	Event Type ID	Attribute	Tag	Requirement Type SCU/SCP
Storage Commitment Request Successful	1	Transaction UID	(0008,1195)	-/1
		Retrieve AE Title	(0008,0054)	Not used
		Storage Media File-Set ID	(0088,0130)	Not used
		Storage Media File-Set UID	(0088,0140)	Not used
		Referenced SOP Sequence	(0008,1199)	-/1
		>Referenced SOP Class UID	(0008,1150)	-/1
		>Referenced SOP Instance UID	(0008,1155)	-/1
		>Retrieve AE Title	(0008,0054)	Not used
		>Storage Media File-Set ID	(0088,0130)	Not used
		>Storage Media File-Set UID	(0088,0140)	Not used
Storage Commitment Request Complete - Failures Exist	2	Transaction UID	(0008,1195)	-/1
		Retrieve AE Title	(0008,0054)	Not used
		Storage Media File-Set ID	(0088,0130)	Not used
		Storage Media File-Set UID	(0088,0140)	Not used

		Referenced SOP Sequence	(0008,1199)	-/1C
		>Referenced SOP Class UID	(0008,1150)	-/1
		>Referenced SOP Instance UID	(0008,1155)	-/1
		>Retrieve AE Title	(0008,0054)	Not used
		>Storage Media File-Set ID	(0088,0130)	Not used
		>Storage Media File-Set UID	(0088,0140)	Not used
		Failed SOP Sequence	(0008,1198)	-/1
		>Referenced SOP Class UID	(0008,1150)	-/1
		>Referenced SOP Instance UID	(0008,1155)	-/1
		>Failure Reason	(0008,1197)	-/1

11.2.4.2 Service Class User Behavior

If a successful answer is received, the request will be removed without warning the user.
If a non-successful answer is received, the request will be left in the holding queue.
If no answer is received, the request will be removed without warning the user after two days.

11.2.4.3 Status Codes

No Service Class specific status values are defined for the N-EVENT-REPORT Service. See PS 3.7 for general response status code.
For this SOP class, all status codes with status Refused or Error are treated as failures and terminate the association and operation. All status codes with status Warning or Success are treated as successes.

12. PRINT MANAGEMENT SOP CLASS DEFINITION

12.1 INTRODUCTION

This section of the DICOM Conformance Statement specifies the supported Print Management SOP and Meta SOP Classes, the optional attributes and service elements supported, the valid range of values for mandatory and optional attributes, and the status code behavior.

12.2 - Basic Print Management Meta SOP Classes

12.3 - Print Management SOP Class Definitions

12.4 - Print Management IODs

12.5 - IOD Module Definition

12.2 BASIC PRINT MANAGEMENT META SOP CLASSES

The Basic Print Management Meta SOP Classes correspond with the minimum functionality that an implementation of the Print Management Service Class shall support.

Vivid and EchoPAC Software Only v206 supports the Basic Grayscale Print Management Meta SOP Class and the Basic Color Print Management Meta SOP Class. These are defined in Table 12.2.1 and Table 12.2.2.

12.2.1 Basic Grayscale Print Management Meta SOP Class

The Basic Grayscale Print Management Meta SOP Class is defined by the following set of supported SOP Classes.

TABLE 12.2.1
BASIC GRAYSCALE PRINT MANAGEMENT META SOP CLASS

SOP Class Name	Usage SCU	Reference
Basic Film Session SOP Class	M	see 12.3.1
Basic Film Box SOP Class	M	see 12.3.2
Basic Grayscale Image Box SOP Class	M	see 12.3.3.1
Printer SOP Class	M	see 12.3.4

12.2.2 Basic Color Print Management Meta SOP Class

The Basic Color Print Management Meta SOP Class is defined by the following set of supported SOP Classes

TABLE 12.2.2
BASIC COLOR PRINT MANAGEMENT META SOP CLASS

SOP Class Name	Usage SCU	Reference
Basic Film Session SOP Class	M	see 12.3.1

Basic Film Box SOP Class	M	see 12.3.2
Basic Color Image Box SOP Class	M	see 12.3.3.2
Printer SOP Class	M	see 12.3.4

12.3 PRINT MANAGEMENT SOP CLASS DEFINITIONS

12.3.1 Basic Film Session SOP Class

The Basic Film Session IOD describes the presentation parameters, which are common for all the films of a film session. The DIMSE services that are applicable to the IOD are shown in Table 12.3.1.

TABLE 12.3.1
DIMSE SERVICE GROUP

DIMSE Service Element	Usage SCU	Reference
N-CREATE	M	see 12.3.1.1.1
N-SET	U	see 12.3.1.1.2
N-DELETE	U	see 12.3.1.1.3
N-ACTION	U	see 12.3.1.1.4

12.3.1.1 DIMSE Service Group

12.3.1.1.1 N-CREATE

The N-CREATE DIMSE Service is used by Vivid and EchoPAC v206 to request that the SCP (printer) create a Film Session SOP Instance. Table 12.4.2 defines the Basic Film Session Presentation Module attributes used in this request.

12.3.1.1.2 N-SET

Not used in this implementation.

12.3.1.1.3 N-DELETE

Not used in this implementation.

12.3.1.1.4 N-ACTION

Not used in this implementation

12.3.2 Basic Film Box SOP Class

The Basic Film Box IOD is an abstraction of the presentation of one film of the film session. The DIMSE services that are applicable to the IOD are shown in Table 12.3.2.

TABLE 12.3.2
DIMSE SERVICE GROUP

DIMSE Service Element	Usage SCU	Reference
N-CREATE	M	see 12.3.2.1.1
N-ACTION	M	see 12.3.2.1.2
N-DELETE	U	see 12.3.2.1.3
N-SET	U	see 12.3.2.1.4

12.3.2.1 DIMSE Service Group

12.3.2.1.1 N-CREATE

The N-CREATE DIMSE Service is used by Vivid and EchoPAC Software Only v206 to request that the SCP create a Film Box SOP Instance. Table 12.4.2 defines the Basic Film Box Presentation Module attributes used in this request.

12.3.2.1.2 N-ACTION

The N-ACTION DIMSE Service is used by Vivid v206 and EchoPAC Software Only to request the SCP (printer) to print the number of copies configured by the user to a film of the film session.

12.3.2.1.3 N-DELETE

The N-DELETE DIMSE Service is used by Vivid and EchoPAC Software Only v206 to request the SCP (printer) to delete the complete Film Box. The root Film Box Instance UID is sent to the SCP to accomplish this.

12.3.2.1.4 N-SET

Not used in this implementation.

12.3.3 Image Box SOP Class

12.3.3.1 Basic Grayscale Image Box SOP Class

The Basic Grayscale Image Box IOD is an abstraction of the presentation of an image and image related data in the image area of a film. The DIMSE services that are applicable to the IOD are shown in Table 12.3.3.

TABLE 12.3.3
DIMSE SERVICE GROUP

DIMSE Service Element	Usage SCU	Reference
N-SET	M	see 12.3.3.1.1

12.3.3.1.1 DIMSE Service Group (N-SET)

The N-SET DIMSE Service is used by Vivid and EchoPAC Software Only v206 to update the Basic Grayscale Image Box SOP Instance. Table 12.5.6 defines the Basic Image Box Presentation Module attributes used.

12.3.3.2 Basic Color Image Box SOP Class

The Basic Color Image Box IOD is an abstraction of the presentation of an image and image related data in the image area of a film. The DIMSE services that are applicable to the IOD are shown in Table 12.3.4.

TABLE 12.3.4
DIMSE SERVICE GROUP

DIMSE Service Element	Usage SCU	Reference
N-SET	M	see 12.3.3.2.1

12.3.3.2.1 DIMSE Service Group (N-SET)

The N-SET DIMSE Service is used by Vivid and EchoPAC Software Only v206 to update the Basic Color Image Box SOP Instance. Table 12.5.6 defines the Basic Image Box Presentation Module attributes used.

12.3.4 Printer SOP Class

The Printer IOD is an abstraction of the hard copy printer and is the basic Information Entity to monitor the status of the printer. The DIMSE services that are applicable to the IOD are shown in Table 12.3.5.

12.3.4.1 DIMSE Service Group

TABLE 12.3.5
DIMSE SERVICE GROUP

DIMSE Service Element	Usage SCU	Reference
N-EVENT-REPORT	M	see 12.3.4.1.1
N-GET	U	see 12.3.4.1.2

12.3.4.1.1 N-EVENT_REPORT

Vivid and EchoPAC Software Only v206 confirms the N-EVENT-REPORT initiated by the SCP (printer).

12.3.4.1.2 N-GET

Used by Vivid and EchoPAC Software Only v206 to request the SCP to get a Printer SOP Instance. Table 12.5.7 defines the Printer Module attributes.

12.4 PRINT MANAGEMENT IODS

Within an entity of a DICOM Print Management, attributes are grouped into a related set of attributes. A set of related attributes is termed a module. A module facilitates the understanding of the semantics concerning the attributes and how the attributes are related with each other. A module grouping does not infer any encoding of information into datasets.
Table 12.4.1, Table 12.4.2, Table 12.4.3 and Table 12.4.4 identify the defined modules within the entities which comprise the DICOM Print Management Service IODs. Modules are identified by Module Name.
See DICOM for a complete definition of the entities, modules and attributes.

12.4.1 Film Session IOD Module

TABLE 12.4.1
FILM SESSION IOD MODULES

Module Name	Reference	Module Description
SOP Common Module	12.5.2.1	Contains SOP Common information
Basic Film Session Presentation Module	12.5.2.1	Contains Film Session presentation information
Basic Film Session Relationship Module	12.5.2.2	References to related SOPs

12.4.2 Basic Film Box IOD Module Table

TABLE 12.4.2
BASIC FILM BOX IOD MODULES

Module Name	Reference
SOP Common Module	12.5.1.1
Basic Film Box Presentation Module	12.5.2.3
Basic Film Box Relationship Module	12.5.2.2

12.4.3 Basic Image Box IOD Module Table

TABLE 12.4.3
BASIC IMAGE BOX IOD MODULES

Module Name	Reference
SOP Common Module	12.5.1.1
Image Box Pixel Presentation Module	12.5.2.5

12.4.4 Printer IOD Module Table

TABLE 12.4.4
PRINTER IOD MODULES

Module Name	Reference
SOP Common Module	12.5.1.1
Printer Module	12.5.2.6

12.5 INFORMATION MODULE DEFINITIONS

Please refer to DICOM Standard Part 3 (Information Object Definitions) for a description of each of the entities and modules that comprise the Print Management.
The following modules are included to convey Enumerated Values, Defined Terms, and Optional Attributes supported.

12.5.1 General Modules

12.5.1.1 SOP Common Module

This section defines the attributes that are required for proper functioning and identification of the associated SOP Instances. They do not specify any semantics about the Real-World Object represented by the IOD.

TABLE 12.5.1
SOP COMMON MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
SOP Class UID	(0008,0016)	1	Varies with Module Instance and DIMSE Service being used. 1.2.840.100011.5.1.1.1 (Film Session) 1.2.840.100011.5.1.1.2 (Film Box) 1.2.840.100011.5.1.1.4 (Image Box)
SOP Instance UID	(0008,0018)	1	Provided by SCP (printer).
Specific Character Set	(0008,0005)	1C	Not used as expanded or replacement character sets not used.
Instance Creation Date	(0008,0012)	3	Not used.
Instance Creation Time	(0008,0013)	3	Not used.
Instance Creator UID	(0008,0014)	3	Not used.

12.5.2 Print Management Modules

For all user configurable tags with no default, no value will be sent if the tag is not configured.

12.5.2.1 Basic Film Session Presentation Module

This section defines the attributes that are common for all films of a film session. The attributes described in Table 12.5.2 apply when the N-CREATE DIMSE service is used.

TABLE 12.5.2
BASIC FILM SESSION PRESENTATION MODULE ATTRIBUTES

Attribute Name	Tag	USAGE (SCU)	Attribute Description
Number of Copies	(2000,0010)	U	Defined Terms used (user configurable): Default is 1. Max is 99.
Print Priority	(2000,0020)	U	Defined Terms used (user configurable): HIGH, MED, LOW. Default is HIGH.
Medium Type	(2000,0030)	U	Defined Terms used (user configurable): PAPER BLUE FILM CLEAR FILM Default is CLEAR FILM.
Film Destination	(2000,0040)	U	Defined Terms used (user configurable): MAGAZINE - default PROCESSOR
Film Session Label	(2000,0050)	U	User configurable. No default.
Memory Allocation	(2000,0060)	U	Not Used
Owner Id	(2100,0160)	U	Not Used

12.5.2.2 Basic Film Session Relationship Module

TABLE 12.5.3
BASIC FILM SESSION RELATIONSHIP MODULE ATTRIBUTES

Attribute Name	Tag	USAGE (SCU)	Attribute Description
Referenced Film Box Sequence	(2000,0500)	U	Not used
>Referenced SOP Class UID	(0008,1150)	U	
>Referenced SOP Instance UID	(0008,1155)	U	

12.5.2.3 Basic Film Box Presentation Module

The attributes described in Table 12.5.4 apply when the N-CREATE DIMSE service is used.

TABLE 12.5.4
BASIC FILM BOX PRESENTATION MODULE ATTRIBUTES

Attribute Name	Tag	USAGE (SCU)	Attribute Description
Image Display Format	(2010,0010)	M	Enumerated values used (user configurable): STANDARD\X,Y, where X and Y can take values from 1 to 5. Default is STANDARD\1,1.
Annotation Display Format ID	(2010,0030)	U	Not used.
Film Orientation	(2010,0040)	U	Defined Terms used (user configurable): PORTRAIT - default LANDSCAPE
Film Size ID	(2000,0050)	U	Defined Terms used (user configurable): 8INX10IN - default 10INX12IN 10INX14IN 11INX14IN 14INX14IN 14INX17IN 24CMX24CM 24CMX30CM
Magnification Type	(2010,0060)	U	Defined Terms Used (user configurable): REPLICATE - default BILINEAR CUBIC NONE
Smoothing Type	(2010,0080)	U	Free form text entry field (user configurable) and only sent if Magnification Type is CUBIC. No default
Border Density	(2010,0100)	U	Defined Terms Used (user configurable): BLACK WHITE Default is BLACK.

Empty Image Density	(2010,0110)	U	Defined Terms Used (user configurable): BLACK WHITE Default is WHITE.
Min Density	(2010,0120)	U	User configurable. No default. Max is 999.
Max Density	(2010,0130)	U	User configurable. No default. Max is 999.
Trim	(2010,0140)	U	Enumerated Values Used (user configurable): YES NO Default is NO.
Configuration Information	(2010,0150)	U	User configurable. No default.

12.5.2.4 Basic Film Box Relationship Module

This section defines the attributes that describe the common parameters, which apply for all images on a given sheet of film.

TABLE 12.5.5
BASIC FILM BOX RELATIONSHIP MODULE ATTRIBUTES

Attribute Name	Tag	USAGE (SCU)	Attribute Description
Referenced Film Session Sequence	(2010,0500)	M	
>Referenced SOP Class UID	(0008,1150)	M	1.2.840.10008.5.1.1.1
>Referenced SOP Instance UID	(0008,1155)	M	Provided by SCP (printer)
Referenced Image Box Sequence	(2010,0510)	U	Used for the subsequent handling of Image Boxes
>Referenced SOP Class UID	(0008,1150)	U	
>Referenced SOP Instance UID	(0008,1155)	U	
Referenced Basic Annotation Sequence	(2010,0520)	U	Not used
>Referenced SOP Class UID	(0008,1150)	U	
>Referenced SOP Instance UID	(0008,1155)	U	

12.5.2.5 Image Box Pixel Presentation Module

The attributes described in Table 12.5.6 apply when the DIMSE Service N-SET is used. The first attributes in the table are used for both grayscale and color printing. The attributes within the sequences are used for each type of printing respectively.

TABLE 12.5.6

IMAGE BOX PIXEL PRESENTATION MODULE ATTRIBUTES

Attribute Name	Tag	USAGE (SCU)	Attribute Description
Image Position	(2020,0010)	M	Based on the image display format.
Polarity	(2020,0020)	U	Defined term, NORMAL
Requested Image Size	(2020,0030)	U	Not sent
Basic Grayscale Image Sequence	(2020,0110)	M	
>Samples Per Pixel	(0028,0002)	M	Value = '1'
>Photometric Interpretation	(0028,0004)	M	Defined Term MONOCHROME2 used
>Rows	(0028,0010)	M	Value depends on scanning mode and configuration setup.
>Columns	(0028,0011)	M	Value depends on scanning mode and configuration setup.
>Pixel Aspect Ratio	(0028,0034)	MC	Not used
>Bits Allocated	(0028,0100)	M	Value always = 0008H
>Bits Stored	(0028,0101)	M	Value always = 0008H
>High Bit	(0028,0102)	M	Value always = 0007H
>Pixel Representation	(0028,0103)	M	Defined Value '0' - unsigned integer
>Pixel Data	(7FE0,0010)	M	
Basic Color Image Sequence	(2020,0111)	M	
>Samples Per Pixel	(0028,0002)	M	Value = '3'
>Photometric Interpretation	(0028,0004)	M	Defined Term RGB used
>Rows	(0028,0010)	M	Value depends on scanning mode and configuration setup.
>Columns	(0028,0011)	M	Value depends on scanning mode and configuration setup.
>Pixel Aspect Ratio	(0028,0034)	MC	Not used
>Bits Allocated	(0028,0100)	M	Value always = 0008H
>Bits Stored	(0028,0101)	M	Value always = 0008H
>High Bit	(0028,0102)	M	Value always = 0007H
>Pixel Representation	(0028,0103)	M	Defined Value '0' - unsigned integer
>Pixel Data	(7FE0,0010)	M	
>Planar Configuration	(0028, 0006)	M	0001H, color-by-plane, when Basic Color Image Sequence is set

12.5.2.6 Printer Module

This section defines the attributes that are used to monitor the status of the printer. The attributes described in Table 12.5.7 apply when the DIMSE Service N-GET is used.

TABLE 12.5.7
PRINTER MODULE ATTRIBUTES

Attribute Name	Tag	USAGE (SCU)	Attribute Description
Printer Status	(2110,0010)	U	Used to check the status of the printer before a print operation is started. If the status is different from NORMAL, the print operation is aborted, a message is displayed, and the print files reside in the print buffer.
Printer Status Info	(2110,0020)	U	If return status is "FAILURE" an error message is displayed, and the print files resides in the print buffer.
Printer Name	(2110,0030)	U	Requested, but not used
Manufacturer	(0008,0070)	U	Requested, but not used
Manufacturer Model Name	(0008,1090)	U	Requested, but not used
Device Serial Number	(0018,1000)	U	Requested, but not used
Software Versions	(0018,1020)	U	Requested, but not used
Date Last Calibration	(0018,1200)	U	Requested, but not used
Last Calibration	(0018,1201)	U	Requested, but not used

13. STUDY ROOT QUERY/RETRIEVE INFORMATION MODEL DEFINITION

13.1 INTRODUCTION

This section specifies the use of the DICOM Study Root Query/Retrieve Model used to organize data and against which a Query/Retrieve will be performed. The contents of this section are:

Error! Reference source not found. - Information Model Description

13.2 - Information Model Entity-Relationship Model

13.3 - Information Model Keys

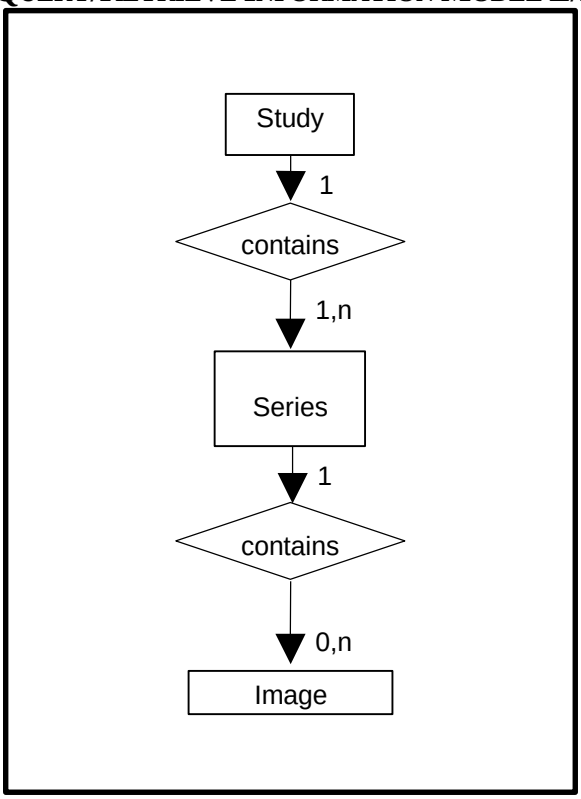
13.2 STUDY ROOT INFORMATION MODEL ENTITY-RELATIONSHIP MODEL

The Entity-Relationship diagram for the Study Root Information Model schema is shown in Illustration 13.2.1. In this figure, the following diagrammatic convention is established to represent the information organization:

- each entity is represented by a rectangular box
- each relationship is represented by a diamond shaped box.
- the fact that a relationship exists between two entities is depicted by lines connecting the corresponding entity boxes to the relationship boxes.

The relationships are fully defined with the maximum number of possible entities in the relationship shown. In other words, the relationship between Series and Image can have up to n Images per Series.

ILLUSTRATION 13.2.1
STUDY ROOT QUERY/RETRIEVE INFORMATION MODEL E/R DIAGRAM



13.2.1 Entity Descriptions

Please refer to DICOM Standard PS 3.4 (Service Class Specifications) for a description of each of the levels contained within the Study Root Query/Retrieve Information Model.

13.2.2 Vivid and EchoPAC Software Only v206 Mapping of DICOM entities

TABLE 13.2.1
MAPPING OF DICOM ENTITIES TO VIVID V206 ENTITIES

DICOM	Vivid and EchoPAC Software Only v206 Entity
Study	Exam
Series	Exam
Image	Image

13.3 SCU OF THE STUDY ROOT Q/R - INFORMATION MODEL – FIND SOP CLASS

As a Service Class User of the Study Root Q/R - Information Model - FIND SOP Class, the Vivid scanner and EchoPAC Software Only application use the C-FIND-RQ message and supports the Query Keys listed in Table 13.3.1 – Table 13.3.3.
The supported matching types listed in the Matching Type Column are:

- SINGLE_VALUE: SCU can request single value matching.
- UID: SCU can request UID matching.
- WILDCARD: SCU can request Wildcard matching.
- RANGE: SCU can request Range matching.
- SEQUENCE: SCU can request sequence matching.
- RETURN_KEY: SCU can request attribute as a return value (universal matching).

All non-required matching fields can be configured in Config screen to be either enabled, enabled with a constant value, or disabled. The constant value will be used as entered by user.

For the Query Value Source column, the following values are supported:

- FIXED: The query value cannot be modified by the user or by configuration.
- GENERATED: The query value is generated by the system (e.g., current date as the study date).
- CONFIGURATION: The query value is dependent on system configuration.
- USER: The query value is entered by the user.
- SCANNED: The query value is read from a barcode scanner or similar device.
- EMPTY: The query value is left empty to indicate it is a return key only.

Supported matching keys for STUDY level queries are described in Table 13.3.1. This query takes place when the DICOM Q/R dataflow is selected. The goal of the query is to bring up a list of Patients and Studies so that the user can select which to retrieve.

TABLE 13.3.1
SUPPORTED STUDY LEVEL C-FIND MATCHING KEYS FOR STUDY ROOT Q/R MODEL - SCU

Attribute Name	Tag	Matching Type	Query Value	Value	Display on UI	Comments
Specific Character Set	(0008,0005)	SINGLE_VALUE, RETURN_KEY	FIXED	ISO_IR 100		Set if extended characters are used in the query. ISO_IR 100 is supported in responses.
			EMPTY			Otherwise
Study Date	(0008,0020)	SINGLE_VALUE, RANGE, RETURN_KEY	USER, GENERATED, EMPTY			GENERATED means today's date. RANGE is specified in the "Exam before/after" UI fields.

Attribute Name	Tag	Matching Type	Query Value	Value	Display on UI	Comments
Study Time	(0008,0030)	SINGLE_VALUE, RANGE, RETURN_KEY	CONFIGURATION, EMPTY			Range indicator is '-'
Accession Number	(0008,0050)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, USER, EMPTY			
Query Retrieve Level	(0008,0052)	SINGLE_VALUE	FIXED	STUDY		
Modalities in Study	(0008,0061)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY			Modalities are separated by '\'.
Referring Physician's Name	(0008,0090)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY			
Study Description	(0008,1030)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY			
Procedure Code Sequence	(0008,1032)	RETURN_KEY	EMPTY			
Name of Physician(s) Reading Study	(0008,1060)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY			
Admitting Diagnoses Description	(0008,1080)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY			
Referenced Study Sequence	(0008,1110)	RETURN_KEY	EMPTY			
Referenced Patient Sequence	(0008,1120)	RETURN_KEY	EMPTY			
Patient's Name	(0010,0010)	SINGLE_VALUE, WILDCARD, RETURN_KEY	USER, EMPTY			
Patient ID	(0010,0020)	SINGLE_VALUE, RETURN_KEY	USER, EMPTY			
Patient's Birth Date	(0010,0030)	SINGLE_VALUE, RANGE, RETURN_KEY	USER, EMPTY			Filtering is supported.
Patient's Birth Time	(0010,0032)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY			
Patient's Sex	(0010,0040)	SINGLE_VALUE, RETURN_KEY	USER, EMPTY			Filtering is supported.
Other Patient IDs	(0010,1000)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY			
Other Patient Names	(0010,1001)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY			
Patient's Age	(0010,1010)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY			
Patient's Size	(0010,1020)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY			
Patient's Weight	(0010,1030)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY			

Attribute Name	Tag	Matching Type	Query Value	Value	Display on UI	Comments
Ethnic Group	(0010,2160)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY			
Occupation	(0010,2180)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY			
Additional Patient History	(0010,21B0)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY			
Patient Comments	(0010,4000)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY			
Study Instance UID	(0020,000D)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY			
Study ID	(0020,0010)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, USER, EMPTY			
Other Study Numbers	(0020,1070)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY			
Number of Patient Related Studies	(0020,1200)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY			
Number of Patient Related Series	(0020,1202)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY			
Number of Patient Related Instances	(0020,1204)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY			
Number of Study Related Series	(0020,1206)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY			
Number of Study Related Instances	(0020,1208)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY			
Interpretation Author	(4008,010C)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY			

Supported matching keys for SERIES level queries are described in Table 13.3.2. These queries take place after the STUDY level query, when the user has selected which Patient and Studies load; it is the first step of the “Retrieve” part of DICOM Query/Retrieve.

TABLE 13.3.2
SUPPORTED SERIES LEVEL C-FIND MATCHING KEYS FOR STUDY ROOT Q/R MODEL -SCU

Attribute Name	Tag	Matching Type	Query Value	Value	Display on UI	Comments
Specific Character Set	(0008,0005)	SINGLE_VALUE, RETURN_KEY	FIXED	ISO_IR 100		Set if extended characters are used in the query.
			EMPTY			Otherwise
			EMPTY			

Attribute Name	Tag	Matching Type	Query Value	Value	Display on UI	Comments
Series Date	(0008,0021)	SINGLE_VALUE, RANGE, RETURN_KEY	CONFIGURATION, EMPTY			Range indicator is character '-'
Series Time	(0008,0031)	SINGLE_VALUE, RANGE, RETURN_KEY	CONFIGURATION, EMPTY			Range indicator is character '-'
Query Retrieve Level	(0008,0052)	SINGLE_VALUE	FIXED	SERIES		
Modality	(0008,0060)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY			
Series Description	(0008,103E)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY			
Institutional Department Name	(0008,1040)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY			
Performing Physicians' Name	(0008,1050)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY			
Operator's Name	(0008,1070)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY			
Software Versions	(0018,1020)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY			
Protocol Name	(0018,1030)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY			
Study Instance UID	(0020,000D)	UID	GENERATED			Study Instance UID is taken from STUDY level Query response
Series Instance UID	(0020,000E)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY			
Series Number	(0020,0011)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY			
Number of Series Related Instances	(0020,1209)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY			
Performed Procedure Step Start Date	(0040,0244)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY			
Performed Procedure Step Start Time	(0040,0245)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY			
Request Attributes Sequence	(0040,0275)	RETURN_KEY	EMPTY			

Supported matching keys for IMAGE level queries are described in Table 13.3.3. Theses queries take place immediately after the SERIES level queries. The goal of the queries is

to get a list of all the images to load; it is the second step of the Retrieve part of DICOM Query/Retrieve. (The third and final step is C-MOVE.)

TABLE 13.3.3
SUPPORTED IMAGE LEVEL C-FIND MATCHING KEYS FOR STUDY ROOT Q/R MODEL -SCU

Attribute Name	Tag	Matching Type	Query Value	Value	Display on UI	Comments
Specific Character Set	(0008,0005)	SINGLE_VALUE, RETURN_KEY	FIXED	ISO_IR 100		Set if extended characters are used in the query.
			EMPTY			Otherwise
SOP Class UID	(0008,0016)	RETURN_KEY	EMPTY			
SOP Instance UID	(0008,0018)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY			
Query Retrieve Level	(0008,0052)	SINGLE_VALUE	FIXED	IMAGE		
Contrast/Bolus Agent	(0018,0010)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY			
Study Instance UID	(0020,000D)	UID	GENERATED			The value is taken from the STUDY level Query response
Series Instance UID	(0020,000E)	UID	GENERATED			The value is taken from the SERIES level Query response
Instance Number	(0020,0013)	SINGLE_VALUE, RETURN_KEY	CONFIGURATION, EMPTY			

13.4 SCP OF THE STUDY ROOT Q/R - INFORMATION MODEL – FIND SOP CLASS - N/A

Not supported.

13.5 SCU OF THE STUDY ROOT Q/R - INFORMATION MODEL – MOVE SOP CLASS

If no C-STORE requests are received within this configurable timeframe it repeats the C-MOVE-Request for the configured number of retries; and shows proper error to the user if no C-STORE requests received even after all retries.

13.6 SCP OF THE STUDY ROOT Q/R - INFORMATION MODEL – MOVE SOP CLASS - N/A

Not supported.

13.7 PRIVATE DATA DICTIONARY

No private data dictionary is defined.

14. ADULT AND PEDIATRIC ECHOCARDIOGRAPHY PROCEDURE REPORTS

This section describes the contents of the adult and pediatric echocardiography reports.

14.1 USAGE AND EXTENSIONS OF TID 5200 ECHOCARDIOGRAPHY PROCEDURE REPORT

	NL	Rel with Parent	VT	Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	EV (125200, DCM, "Adult Echocardiography Procedure Report")	1	M		Root node
2	>	HAS CONCEPT MOD	INCLUDE	DTID 1204 “Language of Content Item and Descendants”	1	U		
3	>	HAS OBS CONTEXT	INCLUDE	DTID 1001 “Observation Context **Concept**”	1	M		
4	>	CONTAINS	CONTAINER	DT (55111-9, LN, "Current Procedure Descriptions")	1	U		
5	>>	CONTAINS	CODE	DT (125203, DCM, "Acquisition Protocol")	1-n	M		BCID 12001 “Ultrasound Protocol Types”
6	>	CONTAINS	INCLUDE	DTID 5201 “Echocardiography Patient Characteristics”	1	U		
7	>	CONTAINS	CONTAINER	EV (111028, DCM, "Image Library")	1	U		
8	>>	CONTAINS	IMAGE	No purpose of reference	1-n	M		
9	>	CONTAINS	INCLUDE	DTID 5202 “Echo Section”	1	U		$SectionSubject = EV (T-32600, SRT, "Left Ventricle") $MeasType = DCID 12200 “Echocardiography Left Ventricle”
10	>	CONTAINS	INCLUDE	DTID 5202 “Echo Section”	1	U		$SectionSubject = EV (T-32500, SRT, "Right Ventricle") $MeasType = DCID 12204 “Echocardiography Right Ventricle”

	NL	Rel with Parent	VT	Name	VM	Req Type	Condition	Value Set Constraint
11	>	CONTAINS	INCLUDE	DTID 5202 “Echo Section”	1	U		$SectionSubject = EV (T-32300, SRT, "Left Atrium") $MeasType = DCID 12205 “Echocardiography Left Atrium”
12	>	CONTAINS	INCLUDE	DTID 5202 “Echo Section”	1	U		$SectionSubject = EV (T-32200, SRT, "Right Atrium") $MeasType = DCID 12206 “Echocardiography Right Atrium”
13	>	CONTAINS	INCLUDE	DTID 5202 “Echo Section”	1	U		$SectionSubject = EV (T-35400, SRT, "Aortic Valve") $MeasType = DCID 12211 “Echocardiography Aortic Valve”
14	>	CONTAINS	INCLUDE	DTID 5202 “Echo Section”	1	U		$SectionSubject = EV (T-35300, SRT, "Mitral Valve") $MeasType = DCID 12207 “Echocardiography Mitral Valve”
15	>	CONTAINS	INCLUDE	DTID 5202 “Echo Section”	1	U		$SectionSubject = EV (T-35200, SRT, "Pulmonic Valve") $MeasType = DCID 12209 “Echocardiography Pulmonic Valve”
16	>	CONTAINS	INCLUDE	DTID 5202 “Echo Section”	1	U		$SectionSubject = EV (T-35100, SRT, "Tricuspid Valve") $MeasType = DCID 12208 “Echocardiography Tricuspid Valve”
17	>	CONTAINS	INCLUDE	DTID 5202 “Echo Section”	1	U		$SectionSubject = EV (T-42000, SRT, "Aorta") $MeasType = DCID 12212 “Echocardiography Aorta”
18	>	CONTAINS	INCLUDE	DTID 5202 “Echo Section”	1	U		$SectionSubject = EV (T-44000, SRT, "Pulmonary artery")

	NL	Rel with Parent	VT	Name	VM	Req Type	Condition	Value Set Constraint
								$MeasType = DCID 12210 “Echocardiography Pulmonary Artery”
19	>	CONTAINS	INCLUDE	DTID 5202 “Echo Section”	1	U		$SectionSubject = EV (T-48600, SRT, "Vena Cava") $MeasType = DCID 12215 “Echocardiography Vena Cavae”
20	>	CONTAINS	INCLUDE	DTID 5202 “Echo Section”	1	U		$SectionSubject = EV (T-48581, SRT, "Pulmonary Venous Structure") $MeasType = DCID 12214 “Echocardiography Pulmonary Veins”
21	>	CONTAINS	INCLUDE	DTID 5202 “Echo Section”	1	U		$SectionSubject = EV (T-39050, SRT, "Pericardial cavity") $MeasType = DCID 12250 “Cardiac Ultrasound Common Linear Measurements”
22	>	CONTAINS	INCLUDE	DTID 5202 “Echo Section”	1	U		$SectionSubject = EV (P5-30031, SRT, "Cardiac Shunt Study") $MeasType = DCID 12217 “Echocardiography Cardiac Shunt”
23	>	CONTAINS	INCLUDE	DTID 5202 “Echo Section”	1	U		$SectionSubject = EV (D4-30000, SRT, "Congenital Anomaly of Cardiovascular System") $MeasType = DCID 12218 “Echocardiography Congenital”
24	>	CONTAINS	INCLUDE	DTID 5202 “Echo Section”	1	U		$SectionSubject = EV (T-42102, SRT, “Aortic Sinotubular Junction”)
25	>	CONTAINS	INCLUDE	DTID 5202 “Echo Section”	1	U		$SectionSubject = EV (T-42200, SRT, “Sinus of Valsalva”)

	NL	Rel with Parent	VT	Name	VM	Req Type	Condition	Value Set Constraint
26	>	CONTAINS	INCLUDE	DTID 5202 “Echo Section”	1	U		$SectionSubject = EV (T-43000, SRT, “Coronary Artery”)
27	>	CONTAINS	INCLUDE	DTID 5202 “Echo Section”	1	U		$SectionSubject = EV (D4-31012, SRT, “Patent Foramen Ovale”)
28	>	CONTAINS	INCLUDE	DTID 5202 “Echo Section”	1	U		$SectionSubject = EV (D4-32012, SRT, “Sinus of Valsalva”)
29	>	CONTAINS	INCLUDE	DTID 5202 “Echo Section”	1	U		$SectionSubject = EV (GEU-106-0056, 99GEMS, “Mitral Valve (prosthetics)”)
30	>	CONTAINS	INCLUDE	DTID 5202 “Echo Section”	1	U		$SectionSubject = EV (GEU-106-0057, 99GEMS, “Aortic Valve (prosthetics)”)
31	>	CONTAINS	INCLUDE	DTID 5202 “Echo Section”	1	U		$SectionSubject = EV (T-42300, SRT, “Aortic Arch”)
32	>	CONTAINS	INCLUDE	CTID 5202 “Echo Section”	1	U		$SectionSubject = EV (T-43110, SRT, “Anterior Descending Branch of Left Coronary Artery”)

14.2 USAGE AND EXTENSION OF TID 5220 PEDIATRIC, FETAL AND CONGENITAL CARDIAC ULTRASOUND REPORTS

	NL	Relation with Parent	Value Type	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	DCID 12245 “Cardiac Ultrasound Report Titles”	1	M		Root node
	>	HAS CONCEPT MODE	INCLUDE	DTID 1204 “Language of Content Item and Descendants”	1	M		