BK Medical

Systems bkSpecto, bk3000, bk5000 and bkActiv

Network Services

The system implements the necessary DICOM services to download worklists from a scheduling system, acquiring 2D and 3D ultrasound images and related measurement reports and archiving them to a PACS. Furthermore, it can request a confirmation for safekeeping from the PACS and notify the scheduling system of the status of the scheduled exam. As an alternative to archiving the acquisition results to a PACS, they can also be sent to a DICOM printer or exported to external media (USB, CD/DVD).

Networking SOP Classes	User of Service (SCU)	Provider of Service (SCP)
Transfer		
Verification	Yes	Yes
Ultrasound Image Storage	Yes	Yes
Ultrasound Multiframe Image Storage	Yes	Yes
Comprehensive SR	Yes	Yes
Enhanced US Volume Storage	Yes	Yes
Multi-frame True Color Secondary Capture Image Storage	Yes	Yes
Comprehensive 3D SR Storage	Yes	Yes
Storage Commitment Push Model	Yes	No
Query/Retrieve		
Patient Root Q/R - FIND	Yes	No
Patient Root Q/R - MOVE	Yes	No
Study Root Q/R - MOVE	Yes	No
Workflow Management		
Modality Worklist	Yes	No
Modality Performed Procedure Step	Yes	No
Print Management		
Basic Grayscale Print Management	Yes	No
Basic Color Print Management	Yes	No

Supported Structured Report Templates

Concept Name	Template ID
B-K Medical Structured Report	TID BK1000

Comprehensive 3D SR	TID 1500

DICOM is the registered trademark of the National Electrical Manufacturers Association for its standards publications relating to digital communications of medical information.

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Issued by:

BK Medical ApS

Mileparken 34

DK-2730 Herlev

Denmark

Tel.: +45 44 528 100

Fax: +45 44 528 199

E-mail: info@bkmedical.com

Contents

1 Introduction

This section provides general information about the purpose, scope and contents of this Conformance Statement.

This document describes the conformance to the DICOM Standard for releases of bk3000/bk5000, bkActiv and bkSpecto after April 2022.

The BK Medical ultrasound system is a device that:

- Generates ultrasound images that:
  - Can be sent using DICOM standard protocols and definitions to network archive servers;
  - Can be printed on a remote DICOM printer;
  - Can be exported to external media.
- Generates ultrasound multi-frame images (video clips) that:
  - Can be sent using DICOM standard protocols and definitions to network archive servers;
  - Can be exported to external media.
- Generates 3D volumes that:
  - Can be sent using DICOM standard protocols and definitions to network archive servers;
  - Can be exported to external media.
- Generates Ultrasound Comprehensive Structured Reports Reports and Comprehensive 3D Structured Reports that:
  - Can be sent using DICOM standard protocols and definitions to network archive servers;
  - Can be exported to external media.
- Can retrieve Modality Worklist from a Radiology Information System (RIS) or a Hospital Information System (HIS).
- Can notify Remote Modality Performed Procedure Step server on the procedures performed.
- Can query/retrieve single- and multi-frame ultrasound images, and 3D volumes with a set of key attributes.

- Can request Storage Commitment of the files sent to network archive servers and process Storage Commitment responses.
- Can establish secure connections to RIS, MPPS, network archive servers and DICOM printers (if these systems also support encryption).

1.1 Scope and Field of Application

The scope of this DICOM Conformance Statement is to facilitate data exchange with the BK Medical equipment. This document specifies the compliance to the DICOM standard. It contains a short description of the applications involved and provides technical information about the data exchange capabilities of the equipment. The main elements describing these capabilities are: the supported DICOM Service-Object Pair (SOP) Classes, Application Profiles, Roles, Information Object Definitions (IOD) and Transfer Syntaxes.

The field of application is the integration of the BK Medical equipment into an environment of medical devices.

This Conformance Statement should be read in conjunction with the DICOM standard and its addenda.

1.2 Intended Audience

This Conformance Statement is intended for:

- (Potential) customers;
- System integrators of medical equipment;
- Marketing staff interested in system functionality;
- Software designers implementing DICOM interfaces.

It is assumed that the reader is familiar with the DICOM standard.

1.3 Used Definitions, Terms, Symbols and Abbreviations

DICOM definitions, terms and abbreviations are used throughout this Conformance Statement. For a description of these, see DICOM PS 3.3 and PS 3.4.

The following abbreviations are used in this document:

AE	Application Entity
AP	Application Profile
BCID	Baseline Context Group Identifier
BKCMR	BK Content Mapping Resource

DCID	Defined Context Group Identifier
DCMR	DICOM Content Mapping Resource
DICOM	Digital Imaging and Communications in Medicine
DIMSE	DICOM Message Service Element
DIMSE-C	DICOM Message Service Element-Composite
DIMSE-N	DICOM Message Service Element-Normalized
EV	Enumerated Value
GUI	Graphical User Interface
HIS	Hospital Information System
IE	Information Entity
IFF	If and only if
IOD	Information Object Definition
ISO	International Standards Organization
MPPS	Modality Performed Procedure Step
NEMA	National Electrical Manufacturers Association
PACS	Picture Archiving and Communication System
PDU	Protocol Data Unit
Q/R	Query/Retrieve
RIS	Radiology Information System
RWA	Real-World Activity
SC	Service Class
SCP	Service Class Provider
SCU	Service Class User
SNOMED	Systematized Nomenclature of Medicine
SOP	Service-Object Pair
SR	Structured Report
TCP/IP	Transmission Control Protocol/Internet Protocol
TID	Template ID
UCUM	Unified Code for Units of Measure
UID	Unique Identifier
US	Ultrasound
VR	Value Representation

The following abbreviations represent specific attributes:

CM	Code Meaning (0008, 0104)
CSD	Coding Scheme Designator (0008, 0102)

CSV	Coding Scheme Version (0008,0103)
CV	Code Value (0008, 0100)

1.4 References

DICOM The Digital Imaging and Communications in Medicine (DICOM) standard:

DICOM PS 3.X (X refers to the part 1 - 22)

National Electrical Manufacturers Association (NEMA)

1300 North 17th Street, Suite 900, Arlington, Virginia 22209, United States of America

Can also be downloaded from https://www.dicomstandard.org/

1.5 Important Note to the Reader

This Conformance Statement by itself does not guarantee compatibility of BK Medical equipment with non-BK Medical equipment. The user should be aware of the following issues:

- Interoperability;
- Validation;
- New (or old) versions of the DICOM standard.

1.5.1 Interoperability

Interoperability refers to the ability of application functions, distributed over two or more systems, to work together successfully. The integration of medical devices into a networked environment may require application functions that are not specified within the scope of DICOM. Consequently, using only the information provided by this Conformance Statement does not guarantee interoperability of BK Medical equipment with non-BK Medical equipment.

Furthermore, the system is capable of exporting relatively new DICOM objects like Enhanced US Volume and Comprehensive 3D Structured Report. These objects may not be supported by current versions of remote communication partners.

It is the user's responsibility to thoroughly analyze the application requirements and to specify a solution that integrates BK Medical equipment with non-BK Medical equipment.

1.5.2 Validation

BK Medical equipment has been tested to assure that the actual implementation of the DICOM interface corresponds with this Conformance Statement.

Where BK Medical equipment is linked to non-BK Medical equipment, the first step is to compare the relevant Conformance Statements. If the Conformance Statements indicate that successful information exchange should be possible, additional validation tests will be

necessary to ensure the functionality, performance, accuracy and stability of single and multi-frame images, structured reports, 3D volumes and their related data.

It is the user's responsibility to specify the appropriate tests and to carry out the additional validation tests.

1.5.3 New Versions of the DICOM Standard

The DICOM Standard will evolve in future to meet the user's growing requirements and to incorporate new features and technologies. BK Medical plans to adapt its equipment to future versions of the DICOM Standard. In order to do so, BK Medical reserves the right to make changes to its products or to discontinue their delivery.

2 Networking

2.1 Implementation Model

BK Medical's Ultrasound Systems with DICOM option activated have the following DICOM functionality:

- Verify communication to a remote AE.
- Retrieve a worklist for ultrasound modality from a Radiology Information System (RIS) or a Hospital Information System (HIS).
- Send information on the procedures performed to a Remote Modality Performed Procedure Step server.
- Transfer ultrasound images to a remote storage system.
- Transfer video clips as ultrasound multi-frame images to a remote storage system.
- Transfer ultrasound comprehensive structured reports to a remote storage system.
- Transfer 3D volumes as enhanced US volumes to a remote storage system.
- Transfer comprehensive 3D structured reports to a remote storage system.
- Transfer 3D volume preview thumbnails as multi-frame true color secondary capture image to a remote storage system.
- Request Storage Commitment of ultrasound images, video clips, reports, 3D volumes and their thumbnails sent to a remote storage system.
- Process Storage Commitment responses.
- Query information about ultrasound images, video clips, reports, 3D volumes and their thumbnails from a remote storage system.
- Retrieve ultrasound images, video clips, reports, 3D volumes and their thumbnails from a remote storage system.
- Print ultrasound images on a remote DICOM printer.

2.1.1 Application Data Flow Diagram

The Implementation Model for the AEs is depicted in the Figure 2.1-1 Application Data Flow.

Figure 2.1-1 Application Data Flow

The AEs are implemented as a Windows®-based application.

2.2 Functional Definition of AEs

2.2.1 Functional Definition of Verification AE

The Verification AE is associated with the local real-world activity “Verify DICOM Connection”.

The BK Medical Ultrasound System is able to verify DICOM communication with a remote system, i.e., PACS and Storage Commitment servers, RIS or HIS, MPPS, a remote DICOM printer. This is done upon operator’s request via DICOM Status dialog. This function is used for network diagnostic purposes.

2.2.2 Functional Definition of Workflow AE

The Workflow AE is associated with the local real-world activities "Procedure Info" and "Retrieve RIS/HIS Worklist".

The BK Medical Ultrasound System is able to retrieve the ultrasound modality Worklist from a RIS/HIS. This is done both manually upon operator’s request and automatically each time the Worklist tab is opened. From the received list, a selection of one Worklist item can be made, i.e. the examination to be performed. The data received from the RIS/HIS consists of patient demographic data and procedure step information.

The Workflow AE is able to notify a remote Modality Performed Procedure Step (MPPS) system on the status of the procedure steps performed. The remote MPPS system can be configured in the DICOM menu. The Workflow AE initiates an association with the configured remote MPPS SCP to notify about start, completion or discontinuation of a procedure step.

2.2.3 Functional Definition of Storage AE

The Storage AE is associated with the local real-world activities “Send Images/Reports”, “Request Storage Commitment”, “Receive Storage Commitment Response” and “Receive Images”. “Storage” can be initiated either manually (upon operator’s request) or automatically (the automatic transfer options can be set in the DICOM/PACS menu).

The BK Medical Ultrasound System is able to send ultrasound images, video clips, 3D volumes and their thumbnails and 2D/3D structured reports to a remote AE, which can be set in the DICOM/PACS menu.

Image data to be transferred are instances of the Ultrasound Image Storage, Ultrasound Multi-frame Image Storage and Enhanced US Volume Storage SOP classes. The structured reports to be transferred are instances of the Comprehensive SR and Comprehensive 3D SR SOP classes. 3D volume thumbnails to be transferred are instances of Multi-frame True Color Secondary Capture Image Storage SOP Class.

Graphics, both within the ultrasound image/video clips/3D volume/3D volume thumbnail and surrounding the ultrasound image/video clip/3D volume, are transferred as burned-in graphics in case of the automatic transfer, so it is the operator’s responsibility to put in or leave out the desired graphics. If the transfer is initiated manually, the operator can use an option to de-identify patient data.

The BK Medical Ultrasound system is capable of requesting storage commitment for the documents transferred to the Storage SCP and processing the storage commitment response. The user can enable or disable Storage Commitment in the DICOM/PACS menu. If Storage Commitment is enabled, the user can choose to configure a separate server as a Storage Commitment SCP or can configure the Storage SCP to act also as a Storage Commitment SCP.

The Storage AE considers the transfer of all images and reports created in the course of a performed procedure step as a single "transaction". If the usage of Storage Commitment is configured, the successful reception of a Storage Commitment confirmation is considered part of this transaction. If any part (image transfer, storage commitment) fails in this transaction, the whole transaction is considered as failed. The system will then retry the whole transaction periodically, including the re-transmission of all images.

Furthermore, the Storage AE is capable of receiving images and reports sent from remote systems – usually in response to the retrieve request issued by the Query/Retrieve AE. It only accepts those SOP Classes that the system generates, i.e. ultrasound images, movies and volumes and structured reports.

2.2.4 Functional Definition of Print AE

The Print AE is associated with the local real-world activity "Print Image Request".

The BK Medical Ultrasound System is able to print ultrasound images on a remote AE (a grayscale or color printer). The images are sent to the printer upon an image capture during the ongoing exam.

2.2.5 Functional Definition of Query and Retrieve AE

The Query and Retrieve AE is associated with the local real-world activities "Q/R Query" and "Q/R Retrieve".

The BK Medical Ultrasound System is able to query and retrieve Patient Root Information Model. It issues a set of key attributes to query at the level of patient, study, series or composite object instance. It supplies itself as a move destination for retrieval and handling of the incoming C-STORE sub-operations. It may cancel the ongoing C-FIND or C-MOVE command at any time upon user request.

2.3 Sequencing of Real-World Activities

Under normal scheduled workflow conditions the sequencing constraints apply:

1. Query Worklist
2. Receive Worklist of Modality Scheduled Procedure Steps
3. Select Worklist Item
4. Start acquisition and create MPPS
5. Acquire images/video clips/3D volumes (volume + 3D Structured Report + Preview image)

6. Print images (if Print AE is configured)
7. Complete acquisition, generate 2D Structured Reports and finalize MPPS
8. Store acquired images/video clips/3D volumes/generated 2D SR
9. Request Storage Commitment for all the stored documents (if Storage AE is configured)

2.4 Supported SOP Classes Overview

The system provides Standard Conformance to the following DICOM SOP Classes as an SCU:

Table 2.4-1 Supported SOP Classes by the Application as SCU

SOP Class Name	SOP Class UID
Verification	1.2.840.10008.1.1
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1
Enhanced US Volume Storage	1.2.840.10008.5.1.4.1.1.6.2
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4
Storage Commitment Push Model	1.2.840.10008.1.20.1
Modality Worklist Information Model – FIND	1.2.840.10008.5.1.4.31
Basic Grayscale Print Management Meta	1.2.840.10008.5.1.1.9
Basic Color Print Management Meta	1.2.840.10008.5.1.1.18
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3
Comprehensive Structured Report Storage	1.2.840.10008.5.1.4.1.1.88.33
Comprehensive 3D Structured Report Storage	1.2.840.10008.5.1.4.1.1.88.34
Patient Root Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.1.1
Patient Root Query/Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.1.2
Study Root Query/Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.2.2

The system provides Standard Conformance to the following DICOM SOP Classes as an SCP:

Table 2.4-2 Supported SOP Classes by the Application as SCP

SOP Class Name	SOP Class UID
Verification	1.2.840.10008.1.1
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1
Enhanced US Volume Storage	1.2.840.10008.5.1.4.1.1.6.2
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4
Comprehensive Structured Report Storage	1.2.840.10008.5.1.4.1.1.88.33
Comprehensive 3D Structured Report Storage	1.2.840.10008.5.1.4.1.1.88.34

2.5 AE Specifications

2.5.1 Verification Application Entity Specification

2.5.1.1 SOP Classes

Verification AE provides Standard Conformance to the following SOP Classes:

Table 2.5-1 SOP Classes for Verification AE

SOP Class Name	SOP Class UID	SCU	SCP
Verification	1.2.840.10008.1.1	Yes	No[1]

2.5.1.2 Association Policies

2.5.1.2.1 General

The DICOM standard application context name for DICOM is always proposed:

Table 2.5-2 DICOM Application Context for Verification AE

Application Context Name	1.2.840.10008.3.1.1.1

The maximum Protocol Data Unit (PDU) size for PDUs sent to the BK Medical Ultrasound System is fixed at 32Kb (64Kb for verification). The minimum PDU size accepted for sending from the scanner is 512 bytes. In case the receiving SCP claims PDUs smaller than 512 bytes, then 512 bytes are used.

2.5.1.2.2 Number of Associations

The Verification AE initiates one Association at a time.

Table 2.5-3 Number of Associations Initiated for Verification AE

Maximum number of simultaneous Associations	1

2.5.1.2.3 Asynchronous Nature

The Verification AE does not support asynchronous mode.

2.5.1.2.4 Implementation Identifying Information

The implementation information for Verification AE is:

Table 2.5-4 DICOM Implementation Class and Version for Verification AE

Implementation Class UID	1.2.208.154.1

[1] The Verification AE does not accept connections, but the Storage AE does. Handling of inbound verification requests is described in chapter 2.5.3.4.3.1.5.

Implementation Version Name	BKM DICOM 3.3

2.5.1.3 Association Initiation Policy

2.5.1.3.1 Activity – Verify Communication with a Remote AE

2.5.1.3.1.1 Description and Sequencing of Activities

The Associated Real-World Activity "Verification Request" is an attempt to verify communication with a remote AE. This occurs when the operator clicks either on the "Test" button in the DICOM Configuration dialog or on the "Test Device" button in the DICOM Status dialog.

2.5.1.3.1.2 Proposed Presentation Contexts

BK Medical Ultrasound System is capable of proposing the Presentation Contexts shown in the table below:

Table 2.5-5 Proposed Presentation Contexts for Verification Request

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	**UID**	**Name List**	**UID List**		
Verification	1.2.840.10008.1.1	Implicit VR Little Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCU / SCP	None

2.5.1.3.1.3 SOP Specific Conformance for Verification SOP Class

The Verification AE provides standard conformance. Extended negotiation is not supported.

Verification Service Class is a feature used for network diagnostic purposes. Verification of communication to a remote AE is performed by issuing a C-ECHO request and processing a response to this request. Association is released upon receipt of each C-ECHO response . The status received in the C-ECHO response is displayed to a user in the "Verifying connection" field of the DICOM Test dialog. In the event that the remote AE does not respond for some reason, the operation will time out and the association will be as well released.

The handling of association rejections by the remote AE is defined in the table below.

Table 2.5-6 Association Rejection Reasons

Result	Source	Reason/Diag	Explanation
1 – rejected-permanent	a	3 – called AE title not recognized	The reason is displayed in the "Verifying connection" field of the DICOM Test dialog

1 – rejected-permanent	A	7 – calling AE title not recognized	The reason is displayed in the “Verifying connection” field of the DICOM Test dialog
*	*	Any other reason	“Association failed” is displayed in the “Verifying connection” field of the DICOM Test dialog

2.5.2 Workflow Application Entity Specification

2.5.2.1 SOP Classes

Workflow AE provides Standard Conformance to the following SOP Classes:

Table 2.5-7 SOP Classes for Workflow AE

SOP Class Name	SOP Class UID	SCU	SCP
Modality Worklist Information Model – FIND	1.2.840.10008.5.1.4.31	Yes	No
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	Yes	No

2.5.2.2 Association Policies

2.5.2.2.1 General

The DICOM standard application context name for DICOM is always proposed:

Table 2.5-8 DICOM Application Context for Workflow AE

Application Context Name	1.2.840.10008.3.1.1.1

The maximum Protocol Data Unit (PDU) size for PDUs sent to the BK Medical Ultrasound System is fixed at 32Kb (64Kb for verification). The minimum PDU size accepted for sending from the scanner is 512 bytes. In case the receiving SCP claims PDUs smaller than 512 bytes, then 512 bytes are used.

2.5.2.2.2 Number of Associations

The Workflow AE initiates one Association at a time.

Table 2.5-9 Number of Associations Initiated for Workflow AE

Maximum number of simultaneous Associations	1

2.5.2.2.3 Asynchronous Nature

The Workflow AE does not support asynchronous communication (multiple outstanding transactions over a single association).

2.5.2.2.4 Implementation Identifying Information

The implementation identifying information for Workflow AE is:

Table 2.5-10 DICOM Implementation Class and Version for Workflow AE

Implementation Class UID	1.2.208.154.1
Implementation Version Name	BKM DICOM 3.3

2.5.2.3 Association Initiation Policy

2.5.2.3.1 Activity - Retrieve HIS/RIS Worklist

2.5.2.3.1.1 Description and Sequencing of Activities

This activity can be triggered either automatically when the Worklist tab is opened or at the operator's request (when the "Refresh List" button is clicked). An association is set up to the pre-configured remote system, the Modality Worklist SCP (e.g. RIS). After receiving the Worklist, the association is released. In the event that the remote system does not respond for some reason, the operation will time out after the number of seconds set by DqrScpTimeoutSeconds parameter and the association will be released.

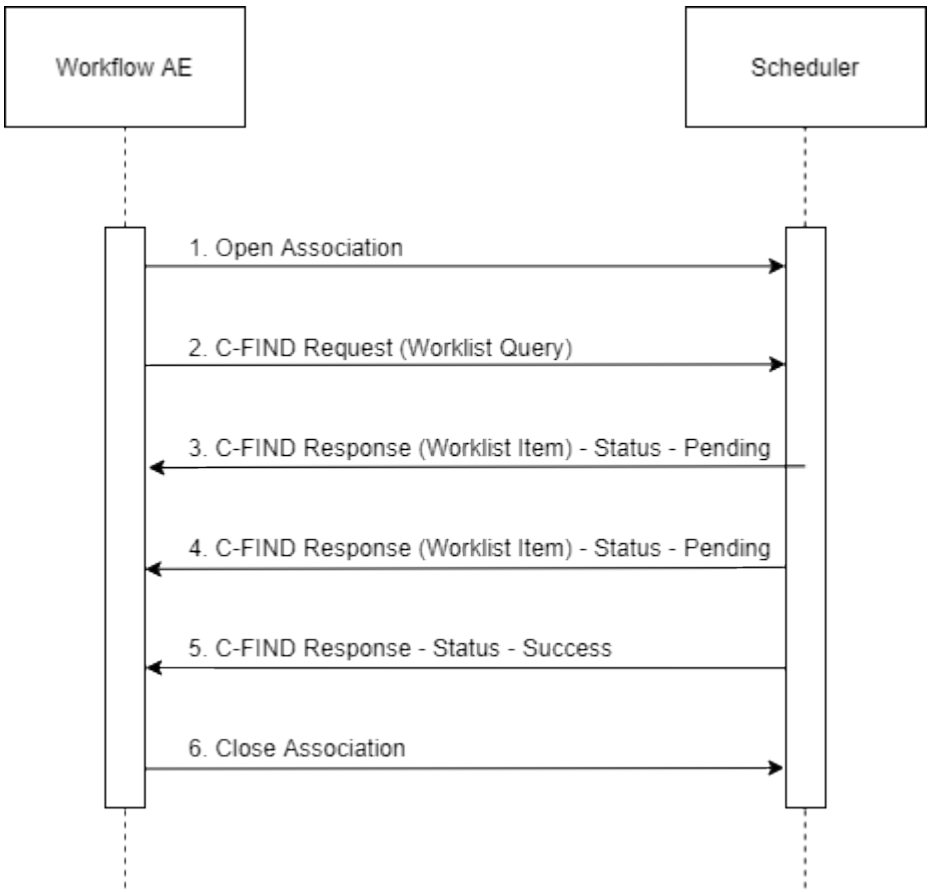

Figure 2.5-1 Sequencing of Activity – Retrieve HIS/RIS Worklist

A possible sequence of interactions between the Workflow AE and a remote scheduling system (HIS/RIS) is shown in the figure above.

1. The Workflow AE opens an association to the scheduler.
2. The Workflow AE sends a C-FIND Request to the scheduler conveying the matching criteria obtained from configuration and user input.
3. The scheduler returns a C-FIND response for a first worklist item matching the criteria.
4. The scheduler returns a C-FIND response for a second worklist item matching the criteria.
5. The scheduler returns a final C-FIND response with a status of Success indicating that no futher worklist matches exist.
6. The Workflow AE releases the association and displays the matching results to the user.

2.5.2.3.1.2 Proposed Presentation Contexts

BK Medical Ultrasound System is capable of proposing the Presentation Contexts shown in the table below:

Table 2.5-11 Proposed Presentation Contexts for Retrieve HIS/RIS Worklist

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Modality Worklist Information Model – FIND	1.2.840.10008.5.1.4.31	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		

2.5.2.3.1.3 SOP Specific Conformance for Modality Worklist SOP Class

The Workflow AE provides standard conformance. Extended negotiation is not supported.

An overview of all requested Matching and Return keys with additional attribute information is given in Table 2.5-12Table 2.5-12. The matching type (Single Value, Wild Card Matching or Range Matching) is also specified.

The user can chose between four date/time queries and one patient query.

The four date/time queries are: Today Only, +/- 12 hours, +/- 24 Hours and +/- 3 Days. Please note that the worklist is requested using only date range filter in the request identifier, and then the time filter is applied to the received matches on the SCU side.

The patient query is made from Patient Name, Patient ID, Accession Number and Requested Procedure ID. The user can enter data in one of these fields to query for patients.

The system will expect the extended character set in the worklist Response Identifiers (returned by the SCP) to match the configured character set on the scanner and sent with the Request Identifier. The character set used on the scanner depends on the selected language. See the chapter 6 for a list of languages and extended character sets.

If an attribute is present conditionally/optionally or if the attribute may contain a zero length value, this is indicated.

The scanner will use predefined DICOM Character Sets depending upon the selected language. See table in the section 6.

The user will be warned if the Character Set of the worklist does not match the Character Set of the scanner.

The search filter mentioned is set in the worklist setup for the modality. The queries mentioned are selected in the patient dialog where the worklist is displayed.

Table 2.5-12 Modality Worklist Information Model - FIND SOP Class - C-FIND Request Identifier

Description	Tag	Match	Return	Note
SOP Common				
Specific Character Set	(0008,0005)		1C	Depending on configuration
Scheduled Procedure Step				
Scheduled Procedure Step Sequence	(0040,0100)	R	1	Sequence Matching is applied
> Scheduled Station AE Title	(0040,0001)	R	1	Single Value Matching is applied; the applied value is the configured AE Title. Only used if search filter is “This System Only”
> Scheduled Procedure Step Start Date	(0040,0002)	R	1	Range Value Matching is applied when using date/time queries.
> Scheduled Procedure Step Start Time	(0040,0003)	R	1	
> Modality	(0008,0060)	R	1	Single Value Matching is applied; the applied value is US. Only used if search filter is “Ultrasound Only”
> Scheduled Procedure Step Description	(0040,0007)	O	1C	Return key
> Scheduled Procedure Step Location	(0040,0011)	O	2	Return key
> Scheduled Protocol Code Sequence	(0040,0008)	O	1C	Return key
> Scheduled Procedure Step ID	(0040,0009)	O	1	Return key
> Scheduled Procedure Step Status	(0040,0020)	O	1	Return key
Requested Procedure				
Requested Procedure ID	(0040,1001)	R	1	Return key. Single Value/Wild Card Matching is applied when data has been entered by the user and “Patient” query has been selected.
Requested Procedure Description	(0032,1060)	R	1C	Return Key
Requested Procedure Code Sequence	(0032,1064)	R	1C	Sequence Matching is applied
> Code Value	(0008,0100)	R	1C	Return Key
> Coding Scheme Designator	(0008,0102)	R	1C	Return Key
> Code Meaning	(0008,0104)	R	1	Return key

Study Instance UID	(0020,000D)	R	1	Return key
Study Date	(0008,0020)	O	3	Return key
Study Time	(0008,0030)	O	3	Return key
Referenced Study Sequence	(0008,1110)	R	2	Sequence Matching is applied
> Referenced SOP Class UID	(0008,1150)	R	1	Return Key
> Referenced SOP Instance UID	(0008,1155)	R	1	Return Key
Requested Procedure Priority	(0040,1003)	O	2	Return key
Names of Intended Recipients of Results	(0040,1010)	O	3	Return key
Imaging Service Request				
Accession Number	(0008,0050)	R	1	Return key. Single Value Matching is applied when data has been entered by the user and "Patient" query has been selected.
Referring Physician's Name	(0008,0090)	R	2	Return key
Requesting Physician	(0032,1032)	O	2	Return key
Visit Identification				
Admission ID	(0038,0010)	O	2	Return key
Visit Admission				
Admitting Diagnoses Description	(0008,1080)	O	2	Return key
Patient Identification				
Patient's Name	(0010,0010)	R	1	Return key. Single Value/Wild Card Matching is applied when data has been entered by the user and "Patient" query has been selected.
Patient ID	(0010,0020)	R	1	Return key. Single Value Matching is applied when data has been entered by the user and "Patient" query has been selected.
Issuer of Patient ID	(0010,0021)	O	3	Return key
Patient Medical				
Last Menstrual Date	(0010,21D0)	O	3	Return key
Patient Demographic				
Patient's Birth Date	(0010,0030)	R	2	Return key

Patient's Sex	(0010,0040)	R	2	Return key
Patient's Weight	(0010,1030)	R	2	Return key
Patient's Size	(0010,1020)	R	3	Return key
Patient's Address	(0010,1040)	O	3	Return key
Current Patient Location	(0038,0300)	O	3	Return key

The following are the status codes that are more specifically processed when messages are received from the Modality Worklist SCP equipment:

Table 2.5-13 Modality Worklist C-FIND Response Status Handling Behavior

Service Status	Further Meaning	Status Code	Application behavior when receiving Status Code
Failure	Out of resources	A700	Association is closed. No patient data received. An error message is displayed to the user and written to the log file.
	Identifier does not match SOP Class	A900	Association is closed. No patient data received. An error message is displayed to the user and written to the log file.
	Unable to process	Cxxx	Association is closed. No patient data received. An error message is displayed to the user and written to the log file.
Success	Matching is complete	0000	Worklist is considered as „fully received", association is released with A-RELEASE.
Pending	Matching is continuing – Current Match is supplied and any Optional Keys were supported in the same manner as Required Keys.	FF00	The process of receiving matches continues.
	Matching is continuing – Warning that one or more Optional Keys were not supported for existence for this identifier.	FF01	The process of receiving matches continues without any warnings or errors.
	Unknown	None of above	Association is closed. No patient data received.

If RIS/HIS Worklist server is unreachable, the user will be presented a cached list of patients and their scheduled procedures and a message stating that "Worklist is Offline". The operator

can retry to obtain the latest MWL information by clicking on the “Refresh List” button or can enter the patient and examination information manually.

2.5.2.3.2 Activity – Procedure Info

2.5.2.3.2.1 Description and Sequencing of Activities

After patient- and examination data has been entered by the user – either by selecting a worklist entry from the GUI or by entering the data manually, the user confirms to start the exam. This event triggers the creation of an MPPS SOP Instance and the establishment of an association to send the associated MPPS-N-CREATE message with a status of “IN PROGRESS”.

Subsequently, the user can either end or cancel the performed procedure with or without images or other SOP Instances having been acquired. The termination of the procedure step triggers the final MPPS-N-SET message with a status of COMPLETED or DISCONTINUED. After every message transfer the association is released. Each of the MPPS-messages (N-CREATE/N-SET) is sent over an individual association.

The following figure shows a possible sequencing of interactions between the Workflow AE and a scheduling system (e.g. HIS/RIS). Prior to this sequence of interactions, the user has either obtained the order data via modality worklist or entered it manually.

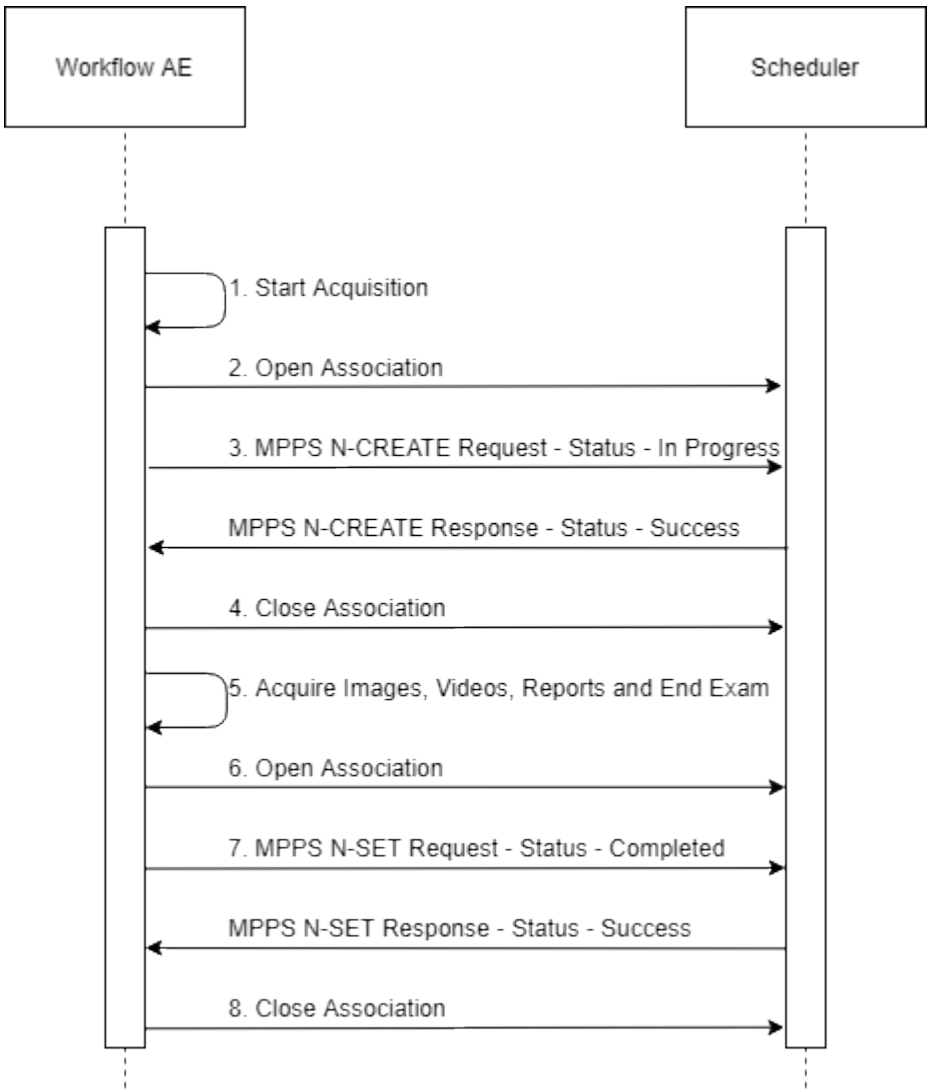

Figure 2.5-2 Sequencing of Activity – Procedure Info

1. The user starts the acquisition of a new exam for the given patient/study/SPS.
2. The Workflow AE opens an association with the scheduler.
3. The Workflow AE sends an MPPS N-CREATE request with the status of "IN PROGRESS" to create a remote MPPS instance with all necessary attributes. The scheduler acknowledges the creation with an N-CREATE response (status success).
4. The Workflow AE closes the association to the scheduler.
5. The user acquires one or more images, videos and reports. After acquisition is completed, the user ends the exam.
6. The Workflow AE opens an association with the scheduler.
7. The Workflow AE sends an MPPS N-SET request with the status of "COMPLETED" to update the previously created remote MPPS instance with all necessary attributes. The scheduler acknowledges the creation with an N-SET response (status success).
8. The Workflow AE closes the association to the scheduler.

2.5.2.3.2.2 Proposed Presentation Contexts

BK Medical Ultrasound System is capable of proposing the Presentation Contexts shown in the table below:

Table 2.5-14 Proposed Presentation Contexts for Procedure Info

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

2.5.2.3.2.3 SOP Specific Conformance for MPPS SOP Class

The Workflow AE provides standard conformance. Extended negotiation is not supported.

The N-CREATE Service Element is used to create the MPPS instance. This message is sent by the modality when an exam is started.

The N-SET Service Element is used to indicate the end of the MPPS. This message is sent with PerformedProcedureStepStatus (0040,0252) set to either COMPLETED in case of the end of the examination or DISCONTINUED in case when the exam has been cancelled. The N-SET request is sent regardless whether the N-CREATE was successfully sent and received a successful response.

This section specifies in detail the applied attributes in the N-CREATE and N-SET Service Elements of this supported SOP Class.

Table 2.5-15: Performed Procedure Step Relationship Module attributes

Attribute Name	Tag	Req.Type N-CREATE	Req.Type N-SET	Note
Scheduled Step Attributes Sequence	(0040,0270)	1	Not allowed	From MWL
>Study Instance UID	(0020,000D)	1	Not allowed	From MWL
>Referenced Study Sequence	(0008,1110)	2	Not allowed	From MWL / equipment generated
>>Referenced SOP Class UID	(0008,1150)	1	Not allowed	From MWL
>>Referenced SOP Instance UID	(0008,1155)	1	Not allowed	From MWL
>Accession Number	(0008,0050)	2	Not allowed	From MWL
>Requested Procedure ID	(0040,1001)	2	Not allowed	From MWL
>Requested Procedure Code Sequence	(0032,1064)	3	Not allowed	From MWL

>Requested Procedure Description	(0032,1060)	2	Not allowed	From MWL
>Scheduled Procedure Step ID	(0040,0009)	2	Not allowed	From MWL
>Scheduled Procedure Step Description	(0040,0007)	2	Not allowed	From MWL / Entered by User
>Scheduled Protocol Code Sequence	(0040,0008)	2	Not allowed	From MWL / Entered by User
Patient's Name	(0010,0010)	2	Not allowed	From MWL / Entered by User
Patient ID	(0010,0020)	2	Not allowed	From MWL / Entered by User
Issuer of Patient ID	(0010,0021)	3	Not allowed	From MWL
Patient's Birth Date	0010,0030)	2	Not allowed	From MWL / Entered by User
Patient's Sex	(0010,0040)	2	Not allowed	From MWL / Entered by User
Referenced Patient Sequence	(0008,1120)	2	Not allowed	From MWL / Entered by User
Protocol Name	(0018,1030)	Not allowed	1	Updated at the end of Examination
Admission ID	(0038,0010)	3	Not allowed	From MWL

Table 2.5-16: Performed Procedure Step Information Module attributes

Attribute Name	Tag	Req.Type N-CREATE	Req.Type N-SET	Note
Performed Procedure Step ID	(0040,0253)	1	Not allowed	From MWL / Entered by User
Performed Station AE Title	(0040,0241)	1	Not allowed	From configuration
Performed Station Name	(0040,0242)	2	Not allowed	From MWL
Performed Location	(0040,0243)	2	Not allowed	From MWL
Performed Procedure Step Start Date	(0040,0244)	1	Not allowed	Automatically assigned by begin of acquisition
Performed Procedure Step Start Time	(0040,0245)	1	Not allowed	Automatically assigned by begin of acquisition
Performed Procedure Step Status	(0040,0252)	1	3	This value can be: IN PROGRESS, COMPLETED or DISCONTINUED. Depending on user interaction (Start, End/Cancel Exam)

Performed Procedure Step Description	(0040,0254)	2	3	From MWL
Performed Procedures Type Description	(0040,0255)	2	3	From MWL
Procedure Code Sequence	(0008,1032)	2	3	From MWL
>Code Value	(0008,0100)	1C	3	From MWL
>Coding Scheme Designator	(0008,0102)	1C	1C	From MWL
>Coding Scheme Version	(0008,0103)	1C	1C	From MWL
>Code Meaning	(0008,0104)	3	3	From MWL
Performed Procedure Step End Date	(0040,0250)	3	2	Updated on End of Acquisition
Performed Procedure Step End Time	(0040,0251)	3	2	Updated on End of Acquisition

The following table specifies the attributes which describe the acquisition of Images during the Performance of the MPPS.

Table 2.5-17: Image Acquisition Results Module attributes

Attribute Name	Tag	Req.Type N-CREATE	Req.Type N-SET	Note
Modality	(0008,0060)	1	Not allowed	Type of Equipment = US. Retrieved from MWL / set by the scanner
Study ID	(0020,0010)	2	Not allowed	Retrieved from MWL / auto generated ("currentdate_currenttime")
Performed Protocol Code Sequence	(0040,0260)	2	3	Present in N-Create with zero-length, not present in N-Set
Performed Series Sequence	(0040,0340)	2	1	Updated at the study end by MPPS
>Protocol Name	(0018,1030)	1	1	Updated at the study end by MPPS
>Operators' Name	(0008,1070)	2	2	Updated at the study end by MPPS
>Series Instance UID	(0020,000E)	1	1	Updated at the study end by MPPS
>Series Description	(0008,103E)	2	2	Updated at the study end by MPPS
>Retrieve AE Title	(0008,0054)	2	2	Updated at the study end by MPPS
>Referenced Image Sequence	(0008,1140)	2	2	Updated at the study end by MPPS

>>Referenced SOP Class UID	(0008,1150)	1	1	Updated at the study end by MPPS
>>Referenced SOP Instance UID	(0008,1155)	1	1	Updated at the study end by MPPS
>Referenced Non Image composite SOP Instance Sequence	(0040,0220)	2	2	Updated at the study end by MPPS
>>Referenced SOP Class UID	(0008,1150)	1	1	Updated at the study end by MPPS
>>Referenced SOP Instance UID	(0008,1155)	1	1	Updated at the study end by MPPS

Table 2.5.2.3-4: MPPS N-CREATE / N-SET Response Status Handling Behavior

Service Status	Further Meaning	Status Codes	Application behavior when receiving Status Code
Success	Success	0000	The SCP has completed the operation successfully.
Warning	Attribute List Error	0107H	The association is terminated. The status is updated as failure.
Warning	Attribute Value out of Range	0116H	The association is terminated. The status is updated as failure.
Failure	Invalid attribute value	0106	An error is logged and displayed to a user as a transient notification.
	Processing failure	0110	An error is logged and displayed to a user as a transient notification.
	Missing attribute	0120	An error is logged and displayed to a user as a transient notification.
	Missing attribute value	0121	An error is logged and displayed to a user as a transient notification.
	Duplicate invocation	0210	An error is logged and displayed to a user as a transient notification.
	Mistyped argument	0212	An error is logged and displayed to a user as a transient notification.
	Resource limitation	0213	An error is logged and displayed to a user as a transient notification.
	Unknown	None of above	Association is terminated; the status is updated as failure.

2.5.3 Storage Application Entity Specification

2.5.3.1 Description and Sequencing of Activities

Since the association initiation and association acceptance of different activities are cojoined in the process of archival, they are described in their combination here.

The archival process is comprised of sending the acquired images, videos and reports, requesting for a Storage Commitment acknowledgement and receiving the confirmation over a separate association initiated by the image archive.

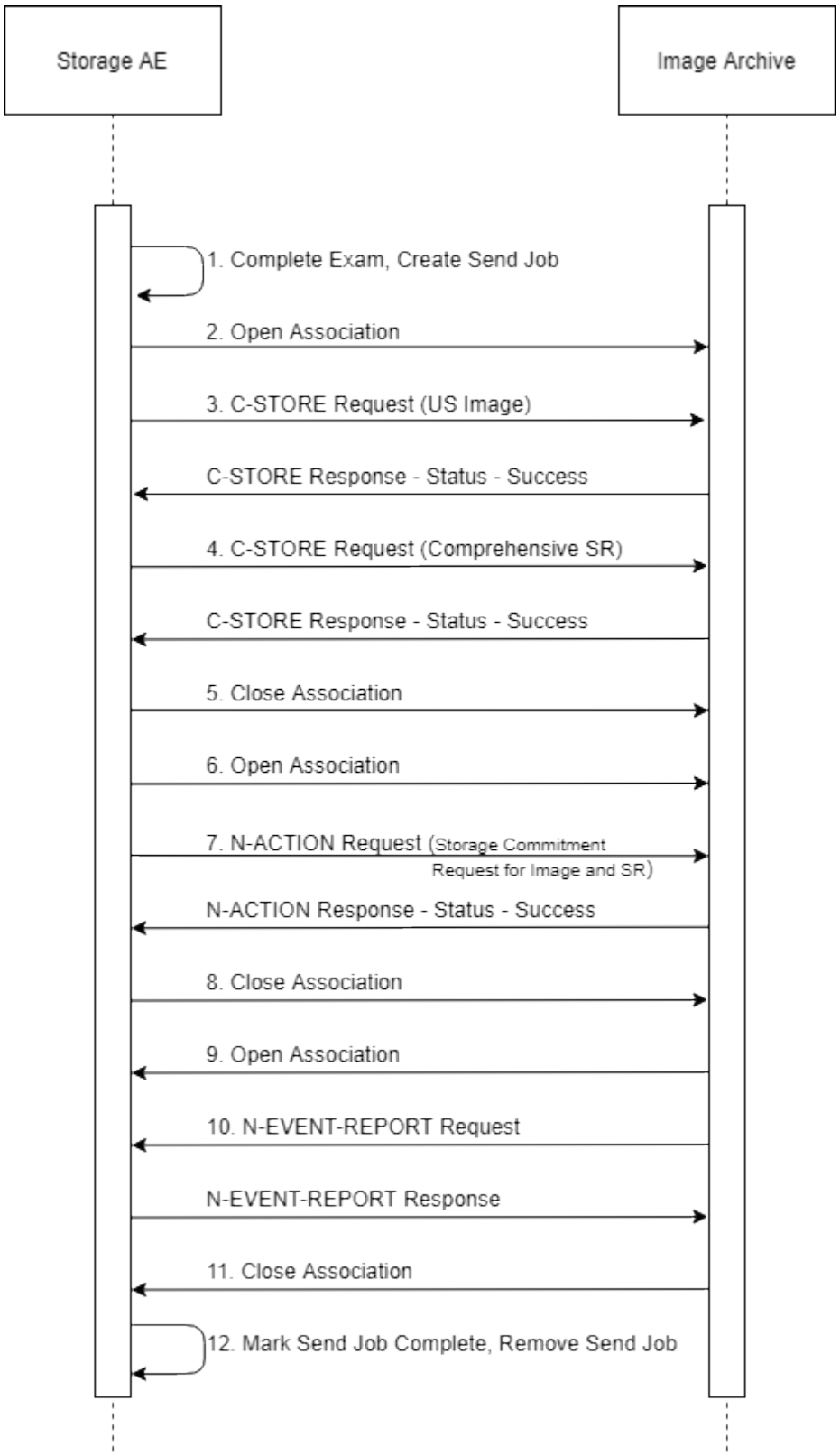

Figure 2.5-3 Sequencing of Activity – Storage

The diagram above shows a possible sequence of interactions between the system and a remote image archive.

1. After completion of the exam, the images, reports and videos are stored as a send-job on the system.
2. The Storage AE opens an association to the remote image archive.
3. The Storage AE sends a C-STORE request for an Ultrasound Image to the remote image archive, the image archive confirms the successful transfer with a C-STORE response (status success).
4. The Storage AE sends a C-STORE request for a Comprehensive SR to the remote image archive, the image archive confirms the successful transfer with a C-STORE response (status success).
5. After all acquired SOP Instances have been transferred, the Storage AE closes the association with the image archive.
6. The Storage AE opens a new association to the image archive.
7. The Storage AE sends an N-ACTION request for the Storage Commitment, referencing the previously sent SOP Instances of the send job. The image archive replies with an N-ACTION response (status success).
8. The Storage AE closes the association with the image archive.
9. The image archive opens an association with the Storage AE.
10. The image archive sends a Storage Commitment N-EVENT-REPORT request notifying the Storage AE of successful archival of the SOP Instances.
11. The image archive closes the association with the Storage AE.
12. The Storage AE marks the send job as successfully completed. The send job is removed from the send job queue.

2.5.3.2 SOP Classes

Storage AE provides Standard Conformance to the following SOP Classes:

Table 2.5-18 SOP Classes for Storage AE

SOP Class Name	SOP Class UID	SCU	SCP
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	Yes	Yes
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	Yes	Yes
Enhanced US Volume Storage	1.2.840.10008.5.1.4.1.1.6.2	Yes	Yes
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	Yes	Yes
Comprehensive Structured Report Storage	1.2.840.10008.5.1.4.1.1.88.33	Yes	Yes
Comprehensive 3D SR	1.2.840.10008.5.1.4.1.1.88.34	Yes	Yes

Storage Commitment Push Model	1.2.840.10008.1.20.1	Yes	No

2.5.3.3 Association Policies

2.5.3.3.1 General

The DICOM standard application context name for DICOM is always proposed:

Table 2.5-19 DICOM Application Context for Storage AE

Application Context Name	1.2.840.10008.3.1.1.1

The maximum Protocol Data Unit (PDU) size for PDUs sent to the BK Medical Ultrasound System is fixed at 32Kb (64Kb for verification). The minimum PDU size accepted for sending from the scanner is 512 bytes. In case the receiving SCP claims PDUs smaller than 512 bytes, then 512 bytes are used.

2.5.3.3.2 Number of Associations

The Storage AE initiates one Association at a time.

Table 2.5-20 Number of Associations Initiated for Storage AE

Maximum number of simultaneous Associations	1

The Storage AE accepts associations to receive solicited (in response to a Retrieve operation) or unsolicited transfers of images and/or reports. Furthermore, the Storage AE accepts association to receive the Storage Commitment N-EVENT-Report notifications for the Storage Commitment Push Model SOP Class.

Table 2.5-21 Number of Associations Accepted for Storage AE

Maximum number of simultaneous Associations	unlimited

2.5.3.3.3 Asynchronous Nature

The Storage AE does not support asynchronous mode.

2.5.3.3.4 Implementation Identifying Information

The implementation information for Storage AE is:

Table 2.5-22 DICOM Implementation Class and Version for Storage AE

Implementation Class UID	1.2.208.154.1
Implementation Version Name	BKM DICOM 3.3

2.5.3.4 Association Initiation Policies

2.5.3.4.1 Activity – Send Images/Reports

2.5.3.4.1.1 Description of Activity

The BK Medical Ultrasound System operator sends a request for storage of images, video clips, 3D volumes, 3D volume thumbnails and structured reports to a remote system. The images, video clips, 3D volumes, 3D volume thumbnails and structured reports are transferred to the remote system.

The activity to transfer images and/or reports can be triggered in several ways:

a) In the course of performing a procedure step and acquiring SOP Instances:

• Immediately after the acquisition of a new SOP Instance is completed;

• After the user confirmed the completion of the procedure step.

These automatic transfers target the remote Storage SCP which has been configured to be the “Default PACS”.

Which of these two approaches is taken is dependent on the system configuration.

b) By user interaction

The user may select one or more SOP Instances from multiple exams and trigger their transfer to a remote Storage SCP AE.

c) In periodically retrying failed transfers

In the event of failure to transfer the documents to the Remote device, the modality tries to re-send them every 30 seconds, till the configured Max retry attempts are reached. Once the maximum retry limit is reached, the modality stops retrying and indicates the failed transfer with a red icon. To initiate another attempt to re-send the documents (when the maximum retry limit is reached) a user needs to add a new document to the queue or restart the application.

The DICOM communication behavior is independent from the particular case of the above mentioned and solely depends on the destination node configuration (i.e. whether or not Storage Commitment is supported).

The remote system is configured in the DICOM system settings. There can be multiple remote systems configured to send documents to.

After the transfer, the association is released. In the event that the remote system does not respond for some reason, the operations will time out after 30 seconds (by default) and the association will be released.

In the event of failure to transfer the documents to the Remote device, the modality tries to re-send them every 30 seconds, till the configured Max retry attempts are reached. Once the maximum retry limit is reached, the modality stops retrying and indicates the failed transfer with a red icon. To initiate another attempt to re-send the documents (when the maximum retry limit is reached) a user needs to add a new document to the queue or restart the application.

Since some of the SOP Instances created by the system refer to relatively modern Information Object Definitions, it is configurable whether:

- Enhanced US Volume, Comprehensive 3D SR and Multi-Frame True Color Secondary Capture objects are transferred
- Only Enhanced US Volume is transferred
- None of the 3D-related SOP Instances are transferred

This is to avoid complete transfer jobs to fail for the incapability of the receiver to handle the modern 3D objects.

2.5.3.4.1.2 Proposed Presentation Contexts

Table 2.5-23 Transfer Syntax

Name List	UID List
DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2
DICOM Explicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2.1
JPEG Baseline (Process 1): Default Transfer Syntax for Lossy JPEG 8 Bit Image Compression	1.2.840.10008.1.2.4.50
JPEG Lossless (Processes 14): Default Transfer Syntax for Lossless JPEG Image Compression	1.2.840.10008.1.2.4.70

Table 2.5-24 Proposed Presentation Contexts for Image Storage

Abstract Syntax		Transfer Syntax	Role	Extended Negotiation
Name	UID			
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	1.2.840.10008.1.2 (default), 1.2.840.10008.1.2.1 See Table 2.5-23	SCU	None

Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	1.2.840.10008.1.2.4.70 (default), 1.2.840.10008.1.2.4.50, 1.2.840.10008.1.2, 1.2.840.10008.1.2.1 See Table 2.5-23	SCU	None
Enhanced US Volume Storage	1.2.840.10008.5.1.4.1.1.6.2	1.2.840.10008.1.2.1 (default), 1.2.840.10008.1.2 See Table 2.5-23	SCU	None
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	1.2.840.10008.1.2.1 (default), 1.2.840.10008.1.2 See Table 2.5-23	SCU	None
Comprehensive Structured Report Storage	1.2.840.10008.5.1.4.1.1.88.33	1.2.840.10008.1.2.1 (default), 1.2.840.10008.1.2 See Table 2.5-23	SCU	None
Comprehensive 3D Structured Report Storage	1.2.840.10008.5.1.4.1.1.88.34	1.2.840.10008.1.2.1 (default), 1.2.840.10008.1.2 See Table 2.5-23	SCU	None

Note: Transfer Syntax can only be changed by trained service personnel.

2.5.3.4.1.3 SOP-Specific Conformance to Storage SOP Classes

The Storage AE provides standard conformance. Extended negotiation is not supported.

A detailed overview of the applied US Image IOD is given in appendix 8.1.

A detailed overview of the applied US Multi-Frame Image IOD is given in appendix 8.2.

A detailed overview of the applied Enhanced US Volume IOD is given in appendix 8.3.

A detailed overview of the applied Multi-frame True Color Secondary Capture Image IOD is given in appendix 8.4.

A detailed overview of the applied Comprehensive Structured Report IOD is given in appendix 8.6.

A detailed overview of the applied Comprehensive 3D Structured Report IOD is given in appendix 8.7.

In the following cases, the images, video clips, 3D volumes and their thumbnails and reports will be resent until the transmission succeeded (or Max retry count is reached if this happens earlier) or a user cancels the job:

- If the Storage AE is unable to open an association with the selected destination AE.
- If the Abstract Syntax for an image is not supported by the destination AE.

- If none of the Transfer Syntaxes proposed for an SOP Class are not supported by the destination AE.
- If a failed or refused response to the C-STORE operation is received.

The following are the status codes that are more specifically processed when receiving messages from the Storage SCP equipment:

Table 2.5-25 Storage Status Codes

Service Status	Further Meaning	Status Codes	Application behavior when receiving Status Codes
Success	Success	0000	The documents have been sent to SCP successfully.
Failure	Data Set does not match SOP Class	A900	The error is logged and displayed to a user as a transient notification.
	Unable to process	C000	The error is logged and displayed to a user as a transient notification.
Warning		Bxxx	The operation is considered successful.
	All other status codes	*	Association is terminated; Transfer will be retried until successful attempt (or until Max retry count is reached) or until aborted by a user.

Table 2.5-26 Storage Communication Failure Behavior

Exception	Behavior
Timeout	Error message to a user. Association is terminated; transfer will be retried until aborted by a user.
Association aborted by SCP or network layers	Error message to a user. Transfer will be retried until aborted by a user.

2.5.3.4.2 Activity – Request Storage Commitment

2.5.3.4.2.1 Description of Activity

The Storage AE requests the Storage Commitment for the Storage SOP Classes previously transferred via the Storage Service Class, if the destination AE is configured as Storage Commitment Server (SCP). This occurs automatically after each image transfer without any user interaction.

The remote system is configured in the DICOM system settings. The Storage commitment acknowledgement is always expected on a separate association initiated by the remote Storage Commitment SCP AE. The Storage AE waits on a configurable listener port for incoming associations for the Storage Commitment SCP reporting a Storage Commitment status.

2.5.3.4.2.2 Proposed Presentation Contexts

The Storage AE will propose Presentation Contexts as shown in the following table:

Table 2.5-27 Proposed Presentation Contexts for Storage Commitment

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	**UID**	**Name List**	**UID List**		
Storage Commitment Push Model	1.2.840.10008.1.20.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

2.5.3.4.2.3 SOP Specific Conformance for Storage Commitment SOP Class

The Storage AE provides standard conformance. Extended negotiation is not supported.

The Storage AE will send an N-ACTION request to the Storage Commitment through the PACS and close the existing association.

The following table describes the attributes used for the Storage Commitment N-ACTION-Request.

Table 2.5-28 Storage Commitment Attribute Module

Attribute Name	Tag	Usage	Note
Transaction UID	(0008,1195)	M	Uniquely generated by the equipment
Referenced SOP Sequence	(0008,1199)	M	Supported
>Referenced SOP Class UID	(0008,1150)	M	Supported
>Referenced SOP Instance UID	(0008,1155)	M	Supported

The Storage Commitment SCP shall open a new association with the Storage AE, send an N-Event-Report (Storage Commitment Response), process the response to N-Event-Report and then release the association.

The duration of applicability of the Transaction UID is configurable. If the report is not received within the configured time, that specific Storage Commitment will be considered as a failure and the transaction UID is considered as invalid. Then the Storage AE will attempt to resend objects to the PACS and send the Storage Commitment requests with a new Transaction UID.

The Storage AE does not send the optional image attributes with the Storage Commitment request. The Storage Commitment Status for the various jobs will be stored in the Patient database. The successful / pending / failed Storage commitment status will be updated in the DICOM Status dialog.

The following table shows the reaction towards the N-ACTION Responses issued by the SCP.

Table 2.5-29 Storage Commitment N-ACTION Status Codes

Service Status	Further Meaning	Status Codes	Application behavior when receiving Status Codes
Success	Success	0000	
Failure	Processing Failure	0110	The error is logged and displayed to a user as a transient notification.
	Unknown	None of above	Association is terminated. The status will be updated as pending till the time out. Once the time out occurs the status will be updated as failure.

2.5.3.4.3 Association Acceptance Policies

The Storage AE receives associations to receive Storage Commitment Responses and Storage Requests. Storage Requests may occur in response to Retrieve Requests issued by the Query/Retrieve AE.

2.5.3.4.3.1 Activity: Receive Storage Commitment Response

2.5.3.4.3.1.1 Description and Sequencing of Activities

The Storage AE permanently listens for incoming connections in order to receive responses to a Storage Commitment Request.

The Storage AE accepts any Association Request issued to the configured port.

2.5.3.4.3.1.2 Accepted Presentation Contexts

The Storage AE accepts the following Presentation Contexts for the reception of a Storage Commitment N-EVENT-Report response.

Table 2.5-30: Transfer Syntax

Name List	UID List
DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2

Table 2.5-31: Accepted Presentation Contexts for Storage Commitment

Abstract Syntax		Transfer Syntax	Role	Extended Negotiation
Name	UID			
Storage Commitment Push Model	1.2.840.10008.1.20.1	1.2.840.10008.1.2	SCU	None
Verification	1.2.840.10008.1.1	1.2.840.10008.1.2	SCP	None

The Storage AE will only accept the SCU role (which must be proposed via SCP/SCU Role Selection Negotiation) within a Presentation Context for the Storage Commitment Push Model SOP Class.

2.5.3.4.3.1.3 SOP Specific Conformance for the Storage Commitment SOP Class

Upon reception of an N-EVENT-Report Response, the Storage AE verifies:

- Whether the Transaction UID in the N-EVENT-REPORT Response matches a currently open Storage Commitment Transaction;
- Whether the list of SOP Class- and SOP Instance UID matches the corresponding list sent with the N-ACTION-Request for the given Transaction UID;
- Whether all SOP Instances in the transactions are listed in the Referenced SOP Sequence of the N-EVENT- REPORT Respone.

If all this is given, the send job is marked as successful. Otherwise the send job is marked as failed and will be retried until cancelled by user interaction.

The behavior of the Storage AE when receiving Event Types within the N-EVENT-REPORT is summarized in the **Table 2.5-33: Storage Commitment N-EVENT-REPORT Status Codes**.

2.5.3.4.3.1.4 Storage Commitment N-EVENT-REPORT Behavior

The following table describes the attributes expected in the Storage Commitment N-EVENT-REPORT-Request issued by the remote Storage Commitment SCP and their usage in the system.

Table 2.5-32: Storage Commitment Attribute Module

Attribute Name	Tag	Usage	Note
Transaction UID	(0008,1195)	M	References Transaction UID in corresponding N-ACTION Request
Retrieve AE Title	(0008,0054)	U	Not used
Storage Media File Set ID	(0088,0130)	U	Not used
Storage Media File Set UID	(0088,0140)	U	Not used
Referenced SOP Sequence	(0008,1199)	M	Supported
>Referenced SOP Class UID	(0008,1150)	M	Supported
>Referenced SOP Instance UID	(0008,1155)	M	Supported
>Retrieve AE Title	(0008,0054)	U	Not used
>Storage Media File Set ID	(0088,0130)	U	Not used
>Storage Media File – Set UID	(0088,0140)	U	Not used
Failed SOP Sequence	(0008,1198)	M	Supported N-EVENT-REPORT Request
>References SOP Class UID	(0008,1150)	M	Supported
>Referenced SOP Instance UID	(0008,1155)	M	Supported
>Failure Reason	(0008,1197)	M	Supported

Upon receiving a Storage Commitment N-EVENT-REPORT-Request, the Transaction referenced by the Transaction UID in the N-EVENT-REPORT-Request will be terminated.

Table 2.5-33: Storage Commitment N-EVENT-REPORT Status Codes

Service Status	Further Meaning	Status Codes	Application behavior when receiving Status Codes
Success		0000	The N-EVENT-REPORT Response has been successfully processed.
Failure	Processing Failure	0110	The Transaction UID has expired (i.e. N-EVENT-REPORT was not sent within the configured period of validity of the Transaction UID) Or The Transaction ID is unknown (i.e. has never been sent with an N-ACTION-Request) Or The Referenced-/Failed SOP Instance List containes one or more SOP Instances which have not been sent with the N-ACTION-Request for this Transaction UID

2.5.3.4.3.1.5 SOP Specific Conformance for the Verification SOP Class

The Storage AE provides standard conformance to the Verification SOP Class as an SCP. If the C-ECHO request was successfully received, a 0000 (Success) status code will be returned in the C-ECHO response. Otherwise, a C000 (Error - Cannot Understand) status code will be returned in the C-ECHO response.

2.5.3.4.3.2 Activity: Receive Images

The Storage AE responds to Storage Requests which be sent by the configured PACS in response to Retrieve Requests.

2.5.3.4.3.2.1 Description and Sequencing of Activities

As instances are received they are copied to the local file system and a record inserted into the local database. If the received instance is a duplicate of a previously received instance (i.e. an image with the same SOP Instance UID is already present in the system), the old file and database record will be overwritten with the new one.

The images are written to the file system of the scanner and - if requested via the activity Q/R Retrieve - displayed to the user. Received SOP Instances are kept for a configurable timespan. After the timespan has elapsed, the SOP Instances are deleted.

2.5.3.4.3.2.2Accepted Presentation Contexts

The Storage AE accepts the following Presentation Context upon receiving an Association Request for Storage.

Table 2.5-34 Transfer Syntax

Name List	UID List
DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2
DICOM Explicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2.1
JPEG Baseline (Process 1): Default Transfer Syntax for Lossy JPEG 8 Bit Image Compression	1.2.840.10008.1.2.4.50
JPEG Lossless (Processes 14): Default Transfer Syntax for Lossless JPEG Image Compression	1.2.840.10008.1.2.4.70

Table 2.5-35 Accepted Presentation Contexts for Image Storage

Abstract Syntax		Transfer Syntax	Role	Extended Negotiation
Name	UID			
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	1.2.840.10008.1.2 (default), 1.2.840.10008.1.2.1 See Table 2.5-34	SCP	None
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	1.2.840.10008.1.2.4.70 (default), 1.2.840.10008.1.2.4.50, 1.2.840.10008.1.2, 1.2.840.10008.1.2.1 See Table 2.5-34	SCP	None
Enhanced US Volume Storage	1.2.840.10008.5.1.4.1.1.6.2	1.2.840.10008.1.2.1 (default), 1.2.840.10008.1.2 See Table 2.5-34	SCP	None
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	1.2.840.10008.1.2.1 (default), 1.2.840.10008.1.2 See Table 2.5-34	SCP	None
Comprehensive Structured Report Storage	1.2.840.10008.5.1.4.1.1.88.33	1.2.840.10008.1.2.1 (default), 1.2.840.10008.1.2 See Table 2.5-34	SCP	None
Comprehensive 3D Structured Report Storage	1.2.840.10008.5.1.4.1.1.88.34	1.2.840.10008.1.2.1 (default), 1.2.840.10008.1.2 See Table Table 2.5-34	SCP	None

Note: Transfer Syntax can only be changed by trained service personnel.

2.5.3.4.3.2.3 Extended Negotiation

No extended negotiation is performed, though the Storage AE:

- Is a Level-2 Storage SCP (Full – does not discard any data elements);
- Does not support digital signatures;
- Does not coerce any data elements.

2.5.3.4.3.2.4 SOP Specific Conformance for the Storage SOP Class

The Storage AE provides standard conformance to the Storage Service Service Class as an SCP.

2.5.3.4.3.2.5 Presentation Context Acceptance Criterion

The Storage AE will always accept any Presentation Context for the supported SOP Classes with the supported Transfer Syntax. If more than one Presentation Context is proposed for the same Abstract Syntax, the Storage AE will accept it, if at least one of the proposed Transfer Syntaxes is supported.

2.5.3.4.3.2.6 Transfer Syntax Selection Policies

The Transfer Syntax selection policy follows the order in which the Transfer Syntaxes for each Abstract Syntax are given in Table 2.5-35.

2.5.3.4.3.2.7 Response Status

The Storage AE will behave as described in the table below when generating a C-STORE Response message.

Service Status	Further Meaning	Status Codes	Application behavior when receiving Status Codes
Success		0000	The SOP Instance was successfully received and referenced in the local database.
Error	Dataset does not match SOP Class	A900	The Abstract Syntax of the SOP Instance sent mismatched the Abstract Syntax of the Presentation Context used for the Transfer.
*	All other Status Codes		

2.5.4 Print Application Entity Specification

2.5.4.1 SOP Classes

Print AE provides Standard Conformance to the following SOP Classes:

Table 2.5-36 SOP Classes for Print AE

SOP Class Name	SOP Class UID	SCU	SCP
Basic Grayscale Print Management Meta	1.2.840.10008.5.1.1.9	Yes	No
Basic Color Print Management Meta	1.2.840.10008.5.1.1.18	Yes	No

2.5.4.2 Association Policies

2.5.4.2.1 General

The DICOM standard application context name for DICOM is always proposed:

Table 2.5-37 DICOM Application Context for Print AE

Application Context Name	1.2.840.10008.3.1.1.1

The maximum Protocol Data Unit (PDU) size for PDUs sent to the BK Medical Ultrasound System is fixed at 32Kb (64Kb for verification). The minimum PDU size accepted for sending from the scanner is 512 bytes. In case the receiving SCP claims PDUs smaller than 512 bytes, then 512 bytes are used.

2.5.4.2.2 Number of Associations

The Print AE initiates one Association at a time.

Table 2.5-38 Number of Associations Initiated for Print AE

Maximum number of simultaneous Associations	1

2.5.4.2.3 Asynchronous Nature

The Print AE does not support asynchronous (multiple outstanding transactions over a single Association).

Maximum number of outstanding asynchronous operations	1

2.5.4.2.4 Implementation Identifying Information

The implementation information for Print AE is:

Table 2.5-39 DICOM Implementation Class and Version for Print AE

Implementation Class UID	1.2.208.154.1

Implementation Version Name	BKM DICOM 3.3

2.5.4.3 Association Initiation Policy

2.5.4.3.1 Activity – Print Image Request

2.5.4.3.1.1 Description and Sequencing of Activies

An association is initiated with the named DICOM printer when the operator requests the image(s) to be printed. This occurs during image acquisition if the printer is configured to be the default destination for “archiving” acquired images. After the printing is finished, the association is released. In the event that the printer does not respond for some reason, the operations will time out after the configured time and the association will be released.

Failed print jobs will be retried in a configurable interval until the user cancels the job by manual interaction.

The N-CREATE Service Element is used for the Basic Film Session and Basic Film Box. The N-SET Service Element is used for Basic Grayscale Image Box and Basic Color Image Box. The N-ACTION Service Element is used for Basic Film Box to print the image. The N-EVENT-REPORT Service Element is used to receive the changes of printer status in an asynchronus way.

The color/monochrome configuration must be correctly set for the printer. A color printer that is set up as a monochrome printer (or vice versa) will not produce any output. A printer that supports both color and monochrome must be installed as a color printer.

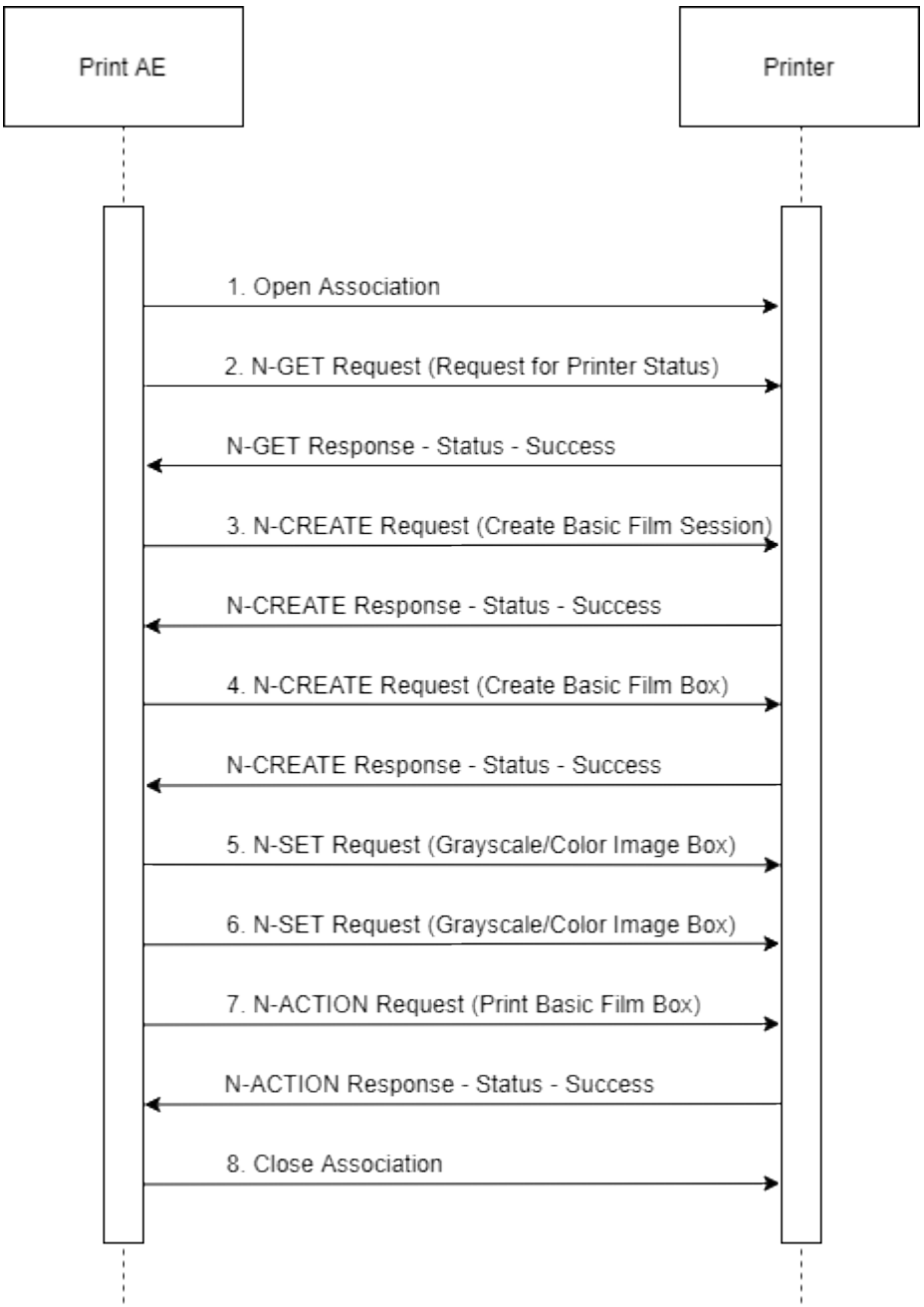

Figure 2.5-4 Sequencing of Activities – Print Image Request

The diagram above shows a possible sequence of interactions between the Print AE and a remote DICOM printer.

1. The Print AE opens an association to the printer.
2. The Print AE requests for the printer status by sending a N-GET request on the Printer SOP Class to the printer. The printer responds to the N-GET with the status “Success”.
3. The Print AE sends an N-CREATE request on the Basic Film Session SOP Class to the printer. The printer confirms the creation of the film session by sending an N-CREATE response with the status “Success”.

4. The Print AE sends an N-CREATE request on the Basic Film Box SOP Class to the printer using the pre-configured film layout to define the number of image boxes on the hardcopy. The printer confirms the creation of the film session by sending an N-CREATE response with the status “Success”.
5. The Print AE send an N-SET request on the Grayscale/Color Image Box SOP Class to the printer to assign the first image to the hardcopy.
6. The Print AE send another N-SET request on the Grayscale/Color Image Box SOP Class to the printer to assign the second image to the hardcopy.
7. The Print AE sends an N-ACTION on the Basic Film Box SOP Class to instruct the printer to print the film box. The printer confirms the generation of the hardcopy with an N-ACTION response with the status “Success”.
8. The Print AE closes the association with the printer.

2.5.4.3.1.2 Proposed Presentation Contexts

BK Medical Ultrasound System is capable of proposing the Presentation Contexts shown in the table below:

Table 2.5-12.5-40: Proposed Presentation Contexts for Grayscale Print Management

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	**UID**	**Name List**	**UID List**		
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	Implicit VR Little Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCU	None
Basic Color Print Management Meta SOP Class	1.2.840.10008.5.1.1.18	Implicit VR Little Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCU	None

2.5.4.3.1.3 Common SOP Specific Conformance for all Print SOP Classes

The common SOP Specific behavior of all Print Management related SOP Classes is described in the table below.

Table 2.5-41 General Print Communication Failure Behavior

Exception	Behavior
Timeout	Error message to a user. Association is terminated; print job will be retried until aborted by a user.
Association aborted by SCP or network layers	Error message to a user. Print job will be retried until aborted by a user.

2.5.4.3.1.4 SOP Specific Conformance for the Printer SOP Class

The Printer SOP Class is used to verify the readiness of the remote Print SCP for a print job. The Print AE supports the following DIMSE operations for the Printer SOP Class:

- N-GET
- N-EVENT-REPORT

2.5.4.3.1.4.1 Printer Status N-GET Operation

The Print AE uses Printer SOP Class N-GET operations prior to sending a print job to verify that the printer is ready to receive the current pending print job.

In the case that the remote Printer responds to the N-GET message with a status of 0x000 = Success, the print job will be created.

2.5.4.3.1.4.2 Printer Status N-EVENT-REPORT Operation

The Print AE receives N-EVENT-REPORT notifications issued by the remote Print SCP and replies to them with a status of 0x0000 = Success to “consume” these messages. It does not evaluate the status or other contents of these messages.

2.5.4.3.1.5 SOP Specific Conformance for Basic Film Session SOP Class

2.5.4.3.1.5.1 Basic Film Session N-CREATE Operation

The Print AE supports the N-CREATE operation for the Basic Film Session SOP Class to create one Film session for each locally generated print job.

Table 2.5-42: Basic Film Session Presentation Module

Attribute Name	Tag	VR	Value	Presence of Value	Source
Number of Copies	(2000,0010)	IS	1	ALWAYS	Fixed
Print Priority	(2000,0020)	CS	HIGH	ALWAYS	Fixed
Medium Type	(2000,0030)	CS	PAPER, CLEAR FILM, BLUE FILM	ALWAYS	Configuration
Film Destination	(2000,0040)	CS	PROCESSOR	ALWAYS	Fixed

Film Session Label	(2000,0050)	LO	"Session <day>-<month>-<year> <hours>:<minutes>"	ALWAYS	Auto

The behavior of the Print AE in handling N-CREATE Status codes for the Basic Film Session is summarized in the table below.

Table 2.5-43 N-CREATE Basic Film Session N-CREATE Status Handling Behavior

Service Status	Further Meaning	Status Codes	Application behavior when receiving Status Codes
Success	Film session successfully created	0000	Film session request is considered successful
Warning	Memory allocation not supported	B600	Film session request is considered successful
	All others		Association is released; Creation will be retried until aborted by user.

2.5.4.3.1.6 SOP Specific Conformance for Basic Film Box SOP Class

The Print AE supports the the following operations for the Basic Film Box SOP Class:

- N-CREATE
- N-ACTION

2.5.4.3.1.6.1 Basic Film Box N-CREATE Operation

This following table describes the applied attributes in the N-CREATE Service Element of the Basic Film Box SOP Class.

Table 2.5-44: Basic Film Box Presentation Module

Attribute Name	Tag	VR	Value	Presence of Value	Source
Image Display Format	(2010,0010)	ST	STANDARD\C,R (C,R = 1,1 / 1,2 / 2,2 / 2,3 / 3,3 / 3,4 / 3,5 / 4,4 / 4,5 / 4,6 / 5,5 / 5,6 / <Custom>)	ALWAYS	Configuration
Referenced Film Session Sequence	(2010,0500)	SQ		ALWAYS	

> Referenced SOP Class UID	(0008,1150)	UI	Appl. value: 1.2.840.10008.5.1.1.1 (Basic Film Session SOP Class)	ALWAYS	Basic Film Session N-CREATE-RQ
> Referenced SOP Instance UID	(0008,1155)	UI	Appl. value: The SOP Instance UID of the parent film session	ALWAYS	Basic Film Session N-CREATE-RQ
Film Orientation	(2010,0040)	CD	PORTRAIT / LANDSCAPE	ALWAYS	Configuration
Film Size ID	(2010,0050)	CS	See defined terms below	ALWAYS	Configuration
Magnification Type	(2010,0060)	CS	CUBIC	ALWAYS	Fixed

Film Size ID

The defined terms are:

8INX10IN 10INX12IN

10INX14IN 11INX14IN

14INX14IN 14INX17IN

24CMX24CM 24CMX30CM

and custom size (both CM and IN)

The following table describes the behavior of the Print AE when receiving status codes for the Basic Film Box N-CREATE Request

Table 2.5-45 Printer Basic Film Box N-CREATE Status Codes

Service Status	Further Meaning	Status Codes	Application behavior when receiving Status Codes
Success	Film accepted for printing	0000	Print job continues
Warning	Requested Min/Max Density out of range	B605	Print job continues
	All others		Association is released. Info popup is displayed to the user. Print job will be retried until aborted by user.

2.5.4.3.1.6.2 Basic Film Box N-ACTION Operation

An N-ACTION Request is issued to instruct the Print SCP to print the contents of the Film Box. The Action Reply argument in an N-ACTION response is not evaluated.

The behavior of Hardcopy AE when encountering status codes in a N-ACTION response is summarized in the Table below:

Table 2.5-46 Printer Basic Film Box N-ACTION Status Codes

Service Status	Further Meaning	Status Codes	Application behavior when receiving Status Codes
Success	Film accepted for printing	0000	Print job continues
Warning	*	Bxxx	Print job continues
	All others		Association is released. Info popup is displayed to the user. Print job will be retried until aborted by user.

2.5.4.3.1.7 SOP Specific Conformance for the Basic Color/Grayscale Image Box SOP Class

The Print AE supports the N-SET Operation for the Basic Grayscale Image Box SOP Class.

2.5.4.3.1.7.1 Basic Color/Grayscale Image Box N-SET Operation

This section specifies in detail the applied attributes in the N-SET Service Element of this supported SOP Class.

Table 2.5-47: Basic Color/Grayscale Image Box Presentation Module

Attribute Name	Tag	VR	Value	Presence of Value	Source
Image Position	(2020,0010)	US	Sequentially numbered	ALWAYS	Auto
Polarity	(2020,0020)	CS	NORMAL	ALWAYS	Fixed
Basic Color Image Sequence resp. Basic Grayscale Image Sequence	(2020,0111) Resp. (2020,0110)	SQ		ALWAYS	
> Samples Per Pixel	(0028,0002)	US	3 (Color) 1 (Grayscale)	ALWAYS	Image
> Photometric Interpretation	(0028,0004)	CS	RGB (Color) MONOCHROME2 (Grayscale)	ALWAYS	Image
> Rows	(0028,0010)	US	Image height	ALWAYS	Image
> Columns	(0028,0011)	US	Image width	ALWAYS	Image
> Pixel Aspect Ratio	(0028,0034)	U	"1\1"	ALWAYS	Image
> Bits Allocated	(0028,0100)	M	0008H (Color)	ALWAYS	Image

			0010H (Grayscale)		
> Bits Stored	(0028,0101)	M	0008H (Color) 000CH (Grayscale)	ALWAYS	Image
> High Bit	(0028,0102)	M	0007H (Color) 000BH (Grayscale)	ALWAYS	Image
> Pixel Representation	(0028,0103)	M	0000H (= unsigned integer)	ALWAYS	Image
> Pixel Data	(7FE0,0010)	M		ALWAYS	Image

The following table describes the behavior of the Print AE when receiving status codes for the N-SET Request.

Table 2.5-48 N-SET Basic Grayscale/Color Image Box Status Codes

Service Status	Further Meaning	Status Codes	Application behavior when receiving Status Codes
Success	Image successfully stored in image box	0000	Print job continues
Warning	*	Bxxx	Print job continues
Warning	Attribute List Error	0107	Print job continues
Warning	Attribute Value out of Range	0116	Print job continues
	All others		Association is released. Info popup displayed to the user. Creation will be retried until aborted by user.

2.5.4.4 Association Acceptance Policy

The Print AE does not accept associations.

2.5.5 Query and Retrieve Application Entity Specification

2.5.5.1 SOP Classes

Query and Retrieve AE provides Standard Conformance to the following SOP Classes:

Table 2.5-49 SOP Classes for Query and Retrieve AE

SOP Class Name	SOP Class UID	SCU	SCP
Patient Root Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.1.1	Yes	No
Patient Root Query/Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.1.2	Yes	No
Study Root Query/Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.2.2	Yes	No

2.5.5.2 Association Policies

2.5.5.2.1 General

The DICOM standard application context name for DICOM is always proposed:

Table 2.5-50 DICOM Application Context for Query and Retrieve AE

Application Context Name	1.2.840.10008.3.1.1.1

The maximum Protocol Data Unit (PDU) size for PDUs sent to the BK Medical Ultrasound System is fixed at 32Kb (64Kb for verification). The minimum PDU size accepted for sending from the scanner is 512 bytes. In case the receiving SCP claims PDUs smaller than 512 bytes, then 512 bytes are used.

2.5.5.2.2 Number of Associations

The Query and Retrieve AE initiates one Association at a time.

Table 2.5-51 Number of Associations Initiated for Query and Retrieve AE

Maximum number of simultaneous Associations	1

2.5.5.2.3 Asynchronous Nature

The Query and Retrieve AE does not support asynchronous mode.

2.5.5.2.4 Implementation Identifying Information

The implementation information for Query and Retrieve AE is:

Table 2.5-52 DICOM Implementation Class and Version for Query and Retrieve AE

Implementation Class UID	1.2.208.154.1
Implementation Version Name	BKM DICOM 3.3

2.5.5.3 Association Initiation Policy

2.5.5.3.1 Activity – Q/R Query

2.5.5.3.1.1 Description of Activity

This function is triggered at the operator's request after entering query values for a given set of key attributes at different level of patient and study. At first, a PATIENT-Level C-FIND is sent to obtain a list of patients matching the PATIENT-Level keys entered by the user. Subsequently, for each matching result on PATIENT-Level, a STUDY-Level query is sent to filter out patients which have no studies from the results being displayed to the user.

Upon the user selecting a patient, the list of studies for this patient is re-queried, and for each matching study, a list of SERIES is requested to filter for Studies which contain Ultrasound-series.

An association is set up to the pre-configured default PACS. After the queries are complete, the association is released.

2.5.5.3.1.2 Proposed Presentation Contexts

BK Medical Ultrasound System is capable of proposing the Presentation Contexts shown in the table below:

Table 2.5-53 Proposed Presentation Contexts for Q/R Query

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	**UID**	**Name List**	**UID List**		
Patient Root Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.1.1	Implicit VR Little Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCU	None

2.5.5.3.1.3 SOP Specific Conformance for Patient Root Q/R Information Model - FIND

The Query and Retrieve AE provides baseline behavior of the C-FIND SCU. Extended negotiation is not supported.

The user can enter data for one or more of the query key attributes. Note that some of the key attributes may not be visible for some vendors even if they are supported in the software.

The system will expect the Specific Character Set in the return key attributes to match the Specific Character Set on the scanner and sent in the Request Identifier. See the section 6 for a list of languages and supported character sets.

The following attributes are supported as matching/return keys for the C-FIND request. The values of key attributes are set in the search dialog where a list of key attributes is displayed.

Types of attributes used in Q/R Information Models (Column "Type"):

U: Unique Key Attribute

R: Required Key Attribute

O: Optional Key Attribute

Unique, required and options keys may be contained in the identifier of a C-FIND request.

Types of matching performed on key attributes (Column “Match”):

S: Single Value Matching

L: List of UID Matching

U: Universal Matching

W: Wild Card Matching

R: Range Matching

Q: Sequence Matching

Table 2.5-54: Key Attributes for Patient Root Q/R Information Model - C-FIND

Description	Tag	Type	Match	Note
Patient Level				
Patient’s Name	(0010,0010)	R	W, U	
Patient ID	(0010,0020)	U	W, U	
Patient’s Birth Date	(0010,0030)	O	R, S, U	
Patient’s Sex	(0010,0040)	O	U	
Number of Patient Related Studies	(0020,1200)	O	U	
Study Level				
Patient ID	(0010,0020)	U	S, U, W	
Study Instance UID	(0020,000D)	U	U	
Study Date	(0008,0020)	R	R, S, U	
Study Time	(0008,0030)	R	U	
Accession Number	(0008,0050)	R	S, U, W	
Study ID	(0020,0010)	U	U	
Refering Physician’s Name	(0008,0090)	U	U	
Study Description	(0008,1030)	O	U	
Number of Study Related Series	(0020,1206)	O	U	
Number of Study Related Instances	(0020,1208)	O	U	
Series Level				
Patient ID	(0010,0020)	U	S	
Study Instance UID	(0020,000D)	U	S	
Series Instance UID	(0020,000E)	U	U	
Modality	(0008,0060)	R	S, U	
Series Number	(0020,0011)	R	U	
Composite Object Instance Level				

Patient ID	(0010,0020)	U	S	
Study Instance UID	(0020,000D)	U	S	
Series Instance UID	(0020,000E)	U	S	
SOP Class UID	(0008,0016)	U	U	
SOP Instance UID	(0008,0018)	U	U	
Instance Number	(0020,0013)	R	U	

The following are the specific status codes which might be returned in a C-FIND response.

Table 2.5-55 Patient Root Q/R Information Model - FIND Status Codes

Service Status	Further Meaning	Status Codes	Application behavior when receiving Status Codes
Failure	Refused: Out of Resources	A700	Association is terminated. Info popup displayed to the user. No matches displayed.
	Identifier does not match SOP Class	A900	Association is terminated. Info popup displayed to the user. No matches displayed.
	Unable to process	Cxxx	Association is terminated. Info popup displayed to the user. No matches displayed.
Cancel	Matching terminated due to Cancel request	FE00	Association is terminated. Info popup displayed to the user. No matches displayed.
Success	Matching is complete – No final identifier is supplied	0000	Matching is completed. Subsequent C-FIND-Request is sent, or if the above mentioned procedure is complete, the matches are displayed to the user.
Pending	Matches are continuing – Current Match is supplied and any Optional Keys were supported in the same manner as Required Keys.	FF00	The process of receiving matches continues.
	Matches are continuing – Warnings that one or more Option Keys were not supported for exis-tence and/or matching for this identifier.	FF01	The process of receiving matches continues without any warnings or errors.

If the response of a query to the Patient Root Q/R Information Model returns no matching records, the user will see an empty list of patients and examinations. The operator can modify the query key values and then retry the search.

2.5.5.3.2 Activity - Q/R Retrieve

2.5.5.3.2.1 Description of Activity

This function is triggered when a queried study is selected for viewing by the operator. All the ultrasound and structured report series belonging to the selected study will be retrieved.

Prior to issuing the C-MOVE-Requests, the studies and series for the selected patient are re-queried through the Q/R Query activity to obtain the latest acquisition results.

Both Study Root MOVE and Patient Root Move are supported. It might be configured to try Study Root MOVE first before Patient Root MOVE. Otherwise, Patient Root MOVE is always executed.

An association is set up to the pre-configured default PACS. After C-MOVE command is complete, the association is released. The subsequent C-STORE sub-operation shall occur on a different association where the local AE serves as an SCP of the storage service class.

2.5.5.3.2.2 Proposed Presentation Contexts

The Query and Retrieve AE will include the following presentation contexts:

Table 2.5-56 Proposed Presentation Contexts for Q/R Retrieve

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	**UID**	**Name List**	**UID List**		
Patient Root Query/Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.1.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Study Root Query/Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.2.2	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None

2.5.5.3.2.3 SOP Specific Conformance for Patient Root or Study Root Q/R Information Model - MOVE

The Query and Retrieve AE provides baseline behavior of the C-MOVE SCU for Patient Root and Study Root Q/R Information Model. Extended negotiation is not supported.

The Patient Root C-MOVE is the default method. It can be configured to first try Study Root C-MOVE, and if it is not supported by Q/R SCP, it falls back to Patient Root C-MOVE. When the C-MOVE request is issued, C-STORE sub-operations invoked on the Q/R-SCP side are handled by the Storage AE. If Patient Root C-MOVE is used, the Query and Retrieve AE is listening on a configurable local port (default value is 7878) for incoming C-STORE association. The destination AE title of C-MOVE is set to be the same as the local AE title.

The scanner will use predefined DICOM Character Sets depending on the selected language. See table in the section 6.

If the level of retrieval is STUDY, the move destination is the local AE title, and the default listening port for C-STORE sub-operation is 104. If the level of retrieval is IMAGE, the move

destination is the local AE title, and the default listening port for C-STORE sub-operation is 7878. When configuring AE titles and listening ports for move destination, attention should be taken to populate both of the above two entries.

Table 2.5-57: Key Attributes for Patient Root / Study Root Q/R Information Model - C-MOVE

Description	Tag	Note
Patient ID	(0010,0020)	Single value of Unique Key Attribute; Not present in Study Root Q/R Information Model
Study Instance UID	(0020,000D)	Single value of Unique Key Attribute
Series Instance UID	(0020,000E)	Single value of Unique Key Attribute. Not present if retrieval level is STUDY
SOP Instance UID	(0008,0018)	List of UIDs. Not present if retrieval level is STUDY

The following are the specific status codes which might be returned in a C-MOVE response.

Table 2.5-58 Patient Root or Study Root Q/R Information Model – MOVE Status Codes

Service Status	Further Meaning	Status Codes	Application behavior when receiving Status Codes
Failure	Refused: Out of Resources – Unable to calculate number of matches	A701	Process terminated. No data received.
	Refused: Out of Resources – Unable to perform sub-operations	A702	Process terminated. No data received.
	Refused: Move Destination unknown	A801	Process terminated. No data received.
	Identifier does not match SOP Class	A900	Process terminated. No data received.
	Unable to process	Cxxx	Process terminated. No data received.
Cancel	Sub-operation terminated due to Cancel Indication	FE00	Process terminated. Stopped receiving remaining data.
Warning	Sub-operation Complete – One or more Failures	B000	Complete process.
Success	Sub-operation Complete – No Failures	0000	Complete process.
Pending	Sub-operations are continuing	FF00	Continue process.

If the response to the C-MOVE somehow fails or no matching composite object instances returned, the user will see an empty list of thumbnails.

3 Communication Profiles

3.1 TCP/IP Stack

The Application provides DICOM 3.0 TCP/IP Network Communication Support as defined in DICOM PS 3.8.

The TCP/IP stack is inherited from the underlying Microsoft Windows®-based operating system.

3.1.1 Physical Media Support

The system is indifferent to the physical medium; it inherits the medium from the Windows® Operating System.

4 Extensions / Specializations / Privatizations

No extended or specialized SOP Classes are supported by the system.

For private attributes and codes, see the chapter about IOD Contents (8).

5 Configuration

The system is configured in the DICOM Setup menu. Only an operator with the correct level of knowledge should change the configuration. The Configuration menu is intended to be used during installation, by a service engineer only.

5.1 AE Title/Presentation Address Mapping

The Local AE Title is configurable. A service engineer must configure it after the product installation.

5.2 Configurable Parameters

5.2.1 Local AE

The following fields are configurable:

- Local AE Title.

The following fields can be configured through Windows Network Setup dialog:

- Local IP Address;
- Local IP Net mask.

5.2.2 Remote AE

The following fields are configurable for every remote DICOM AE:

- Connection Name;
- Remote AE Title;
- Remote IP Address or hostname;
- Responding TCP/IP Port;
- Encrypted connection (if Remote AE supports it).

5.2.3 Storage

The default transfer syntax for Ultrasound Images is Implicit VR Little Endian. The transfer syntax can be changed to Explicit VR Little Endian by BK Medical trained service personnel.

The default transfer syntax for Ultrasound Multi-frame Images (video clips) is JPEG Lossless Non-Hierarchical First-Order Prediction (Process 14). The transfer syntax can be changed to Implicit VR Little Endian/Explicit VR Little Endian/JPEG Baseline(Process 1) by BK Medical trained service personnel.

The default transfer syntax for Enhanced US Volumes, Multi-frame True Color Secondary Capture Images (volume's preview), Comprehensive Structured Reports and Comprehensive

3D Structured Reports is Explicit VR Little Endian. The transfer syntax can be changed to Implicit VR Little Endian by BK Medical trained service personnel.

5.2.4 Storage Commitment

The Storage Commitment support for the Modality is configurable. By default Storage Commitment support is disabled. The Storage Commitment support can be enabled, and either the remote PACS server can be configured as Storage Commitment SCP or a new Storage Commitment SCP can be configured. For the Storage commitment SCU, a listener port can be configured. Only BK Medical trained service personnel can do these changes.

5.2.5 Printing

The color/monochrome configuration must be correctly set for the printer. A color printer that is set up as a monochrome printer (or vice versa) will not produce any output. A printer that supports both color and monochrome must be installed as a color printer.

5.2.6 Query/Retrieve

The port number for the C-MOVE destination AE to listen for incoming C-STORE sub-operations is configurable by service engineer. The default port number is 7878 for Patient Root, and the AE title for the C-MOVE destination AE is set the same as the local AE title.

Patient Root Q/R Information Model is the default to use for C-MOVE. It can be configured to try Study Root first by service engineer. But be aware that in this case the listening port specified above is obsolete as the local AE port now takes precedence.

6 Support of Character Sets

The system supports the following character sets depending on the language selected on the scanner:

Language	DICOM Character Set
DEFAULT[2]	ISO_IR 100
ENGLISH	ISO_IR 6
RUSSIAN	ISO_IR 144

7 Security and Confidentiality Profiles

7.1 Security Profiles

It is assumed that the product is used within a secured environment.

It is assumed that a secured environment includes at a minimum:

1. Firewall or router protections to ensure that only approved external hosts have network access to the product.
2. Firewall or router protections to ensure that the product only has network access to the approved external hosts and services.
3. Any communication with external hosts and services outside the locally secured environment use appropriate secure network channels (e.g. such as a Virtual Private Network).

In order to maintain data confidentiality, data integrity, origin- and target authentication this product optionally supports BCP 195 TLS Secure Transport Connection Profile. See section 8.2.

7.1.1 Secure Use Profiles

Not applicable.

7.1.2 Secure Transport Connection Profiles

This application is conformant to BCP 195 TLS Secure Transport Connection Profile.

[2] Default refers to the following languages: Danish, English, French, German, Italian, Spanish, Swedish.

Supported protocols: TLS 1.2 or newer, but may fall back to the previous protocol versions up to TLS 1.0.

Supported cipher suites:

- TLS_DHE_RSA_WITH_AES_128_GCM_SHA256 (TLS 1.2 or newer)
- TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256 (TLS 1.2 or newer)
- TLS_DHE_RSA_WITH_AES_256_GCM_SHA384 (TLS 1.2 or newer)
- TLS_ECDHE_RSA_WITH_AES_256_GCM_SHA384 (TLS 1.2 or newer)
- TLS_RSA_WITH_AES_128_CBC_SHA (providing backward compatibility with older implementations)
- TLS_RSA_WITH_3DES_EDE_CBC_SHA (providing backward compatibility with older implementations)

Application provides a configuration parameter (it is called “Encrypt Connection” in the application GUI) for each Remote AE for which it initiates connections. This configuration parameter indicates whether or not the Remote AE is designated as handling TLS connections or non-TLS connections. This parameter can be as well set via configuration files.

If TLS-connection is enabled, either a client-side certificate or a server certificate (or even both) has to be specified - this can be done via the application GUI or via configuration files. Client-side certificates must correspond to the server-side certificates in order to successfully establish a secured connection.

Certificates generation and distribution is the responsibility of the Hospital or any other institution using this product.

Certificates can be imported through the application GUI. The application GUI provides an option to view details of the imported certificates.

Supported archive file format: PKCS #12 (.pfx and .crt extensions)

Supported public key certificate: X.509

Key management is implemented through certificates import/export into Microsoft Certificate Manager tool via Windows API.

When an integrity check fails, the connection is dropped per the TLS protocol, causing both the sender and the receiver to issue an A-P-ABORT indication to the upper layers.

7.1.3 Digital Signature Profile

Not applicable.

7.1.4 Media Storage Security Profiles

Not applicable.

7.1.5 Network Address Management Profiles

Not applicable.

7.1.6 Time Synchronization Profiles

Not applicable.

7.1.7 Application Configuration Management Profiles

Not applicable.

7.1.8 Audit Trail Profiles

Not applicable.

7.2 Confidentiality Profiles

This application is conformant to the Basic Application Level Confidentiality Profile.

Option to de-identify patient's data is available upon the export of documents to USB/CD/DVD and Network Drive.

8 Appendix: Overview of the Applied Information Object Definitions

Definitions

Usage Specification	M = Mandatory	C = Conditional	U = User Option
Matching Key	U = Unique	R = Required	O = Optional
Type/Return Key	1 = Mandatory	2 = Mandatory, may be empty	3 = Optional
	1C = Conditional	2C = Conditional	
Device usage	A = Always	AE = Always maybe empty	N = Not used
	No entry = standard behaviour		

8.1 Overview of the Applied Ultrasound Image IOD

Table 8.1-1: Applied Modules in the US Image IOD

Information Entity	Module	Usage	Details
Patient	Patient	M	See Table 8.5-1 Patient Module
Study	General Study	M	See Table 8.5-2 General Study Module
	Patient Study	U	See Table 8.5-3 Patient Study Module
Series	General Series	M	See Table 8.5-4 General Series Module
Equipment	General Equipment	M	See Table 8.5-9 General Equipment Module
Image	General Image	M	See Table 8.5-11 General Image Module
	Image Pixel	M	See Table 8.5-12 Image Pixel Module
	Contrast/Bolus	C	See Table 8.5-13 Contrast/Bolus Module
	US Region Calibration	U	See Table 8.5-17 US Region Calibration Module
	US Image	M	See Table 8.5-18 US Image Module
	US Image Private Tags	M	See Table 8.5-19 US Image Module Private Tags
	SOP Common	M	See Table 8.5-24 SOP Common Module

8.2 Overview of the Applied Ultrasound Multi-frame Image IOD

Table 8.2-1: Applied Modules in the US Multi-frame Image IOD

Information Entity	Module	Usage	Details
Patient	Patient	M	See Table 8.5-1 Patient Module
Study	General Study	M	See Table 8.5-2 General Study Module
	Patient Study	U	See Table 8.5-3 Patient Study Module
Series	General Series	M	See Table 8.5-4 General Series Module
Equipment	General Equipment	M	See Table 8.5-9 General Equipment Module
Image	General Image	M	See Table 8.5-11 General Image Module
	Image Pixel	M	See Table 8.5-12 Image Pixel Module
	Contrast/Bolus	C	See Table 8.5-13 Contrast/Bolus Module
	Cine	M	See Table 8.5-14 Cine Module
	Multi-frame	M	See Table 8.5-15 Multi-frame Module
	Frame Pointers	U	See Table 8.5-16 Frame Pointers Module
	US Image	M	See Table 8.5-18 US Image Module
	US Image Private Tags	M	See Table 8.5-19 US Image Module Private Tags
	SOP Common	M	See Table 8.5-24 SOP Common Module

8.3 Overview of the Applied Enhanced Ultrasound Volume IOD

Table 8.3-1 Applied Modules in the Enhanced US Volume IOD

Information Entity	Module	Usage	Details
Patient	Patient	M	See Table 8.5-1 Patient Module
Study	General Study	M	See Table 8.5-2 General Study Module
Series	General Series	M	See Table 8.5-4 General Series Module
	Enhanced US Series	M	See Table 8.5-5 Enhanced US Series Module

Frame of Reference	Frame of Reference	M	See Table 8.5-6 Frame of Reference Module
	US Frame of Reference	M	See Table 8.5-7 US Frame of Reference Module
	Synchronization	M	See Table 8.5-8 Synchronization Module
Equipment	General Equipment	M	See Table 8.5-9 General Equipment Module
	Enhanced General Equipment	M	See Table 8.5-10 Enhanced General Equipment Module
Image	General Image	M	See Table 8.5-11 General Image Module
	Image Pixel	M	See Table 8.5-12 Image Pixel Module
	Multi-frame Functional Groups	M	See Table 8.5-20 Multi-frame Functional Groups Module
	Multi-frame Dimension	M	See Table 8.5-21 Multi-frame Dimension Module
	Acquisition Context	M	See Table 8.5-22 Acquisition Context Module
	Enhanced US Image	M	See Table 8.5-23 Enhanced US Image Module
	SOP Common	M	See Table 8.5-24 SOP Common Module

The Functional Groups included in Enhanced US Volume SOP Instances are listed in the table below.

Table 8.3-2 Functional Groups

Functional Group	Usage	Details
Frame Content	Per Frame	See Table 8.5-27 Enhanced US Volume Functional Groups
Pixel Measures	Shared	
Frame VOI LUT	Shared	
Plane Position (Volume)	Per Frame	
Plane Orientation (Volume)	Per Frame	
Image Data Type	Shared	
US Image Description	Per Frame	

8.4 Overview of the Applied Multi-frame True Color Secondary Capture Image IOD

Table 8.4-1 Applied Modules in the Multi-frame True Color Secondary Capture Image IOD

Information Entity	Module	Usage	Details
Patient	Patient	M	See Table 8.5-1 Patient Module
Study	General Study	M	See Table 8.5-2 General Study Module
Series	General Series	M	See Table 8.5-4 General Series Module
Equipment	General Equipment	M	See Table 8.5-9 General Equipment Module
	SC Equipment	M	See Table 8.5-25 SC Equipment Module
Image	General Image	M	See Table 8.5-11 General Image Module
	General Reference	U	See Table 8.5-26 General Reference Module
	Image Pixel	M	See Table 8.5-12 Image Pixel Module
	Multi-frame Functional Groups	M	See Table 8.5-20 Multi-frame Functional Groups Module
	SOP Common	M	See Table 8.5-24 SOP Common Module

8.5 IOD Module Tables

The details of these applied modules are given in the tables below. The list of possible values is given, if applicable. If an attribute may be present conditionally/optionally or may contain a zero length value, this is also indicated.

Table 8.5-1 Patient Module

Attribute Name	Tag	Type	Note
Patient's Name	(0010,0010)	2	Received from RIS or entered by user
Patient ID	(0010,0020)	2	Received from RIS or entered by user
Issuer Of Patient ID	(0010,0021)	3	Received from RIS
Patient's Birth Date	(0010,0030)	2	Received from RIS or entered by user
Patient's Sex	(0010,0040)	2	Received from RIS or entered by user

Table 8.5-2 General Study Module

Attribute Name	Tag	Type	Note
Study Instance UID	(0020,000D)	1	Generated at creation of the Study or received from RIS
Study ID	(0020,0010)	2	Auto-generated from Study Date and Study Time or received from RIS
Study Date	(0008,0020)	2	Received from RIS or auto-generated
Study Time	(0008,0030)	2	Received from RIS or auto-generated
Accession Number	(0008,0050)	2	Received from RIS or entered by user
Referring Physician's Name	(0008,0090)	2	Received from RIS or entered by user
Name of Physician(s) Reading Study	(0008,1060)	3	Entered by user
Study Description	(0008,1030)	3AE	Received from RIS (copied from Requested Procedure Step Description) or entered by user
Procedure Code Sequence	(0008,1032)	3	From MWL

Table 8.5-3 Patient Study Module

Attribute Name	Tag	Type	Note
Admitting Diagnoses Description	(0008,1080)	3AE	Present if received from RIS or entered by user or empty
Patient's Size	(0010,1020)	3	Length or size of the Patient, in meters. Not present if neither received from RIS nor entered by user
Patient's Weight	(0010,1030)	3	Weight of the Patient, in kilograms. Not present if neither received from RIS nor entered by user
Admission ID	(0038,0010)	3	Identifier of the visit as assigned by the healthcare provider. Present if received from RIS.

Table 8.5-4 General Series Module

Attribute Name	Tag	Type	Note
Modality	(0008,0060)	1	US or OT
Series Instance UID	(0020,000E)	1	Generated at creation of the Series
Series Number	(0020,0011)	2	Auto generated
Series Date	(0008,0021)	3	Date of the Series creation

Series Time	(0008,0031)	3	Time of the Series creation
Series Description	(0008,103E)	3	“Exam type/Preset”
Laterality	(0020,0060)	2C	Empty
Operator’s Name	(0008,1070)	3	Entered by user
Protocol Name	(0018,1030)	3	“Exam type/Preset”
Request Attributes Sequence	(0040,0275)	3AE	Present only if MWL is available
>Requested Procedure ID	(0040,1001)	1C	From MWL
>Requested Procedure Description	(0032,1060)	3	From MWL
>Reason for the Requested Procedure	(0040,1002)	3	From MWL
>Reason for Requested Procedure Code Sequence	(0040,100A)	3	From MWL
>>Code Value	(0008,0100)	1C	From MWL
>>Coding Scheme Designator	(0008,0102)	1C	From MWL
>>Coding Scheme Version	(0008,0103)	1C	From MWL
>>Code Meaning	0008,0104	1	From MWL
>Scheduled Procedure Step ID	(0040,0009)	1C	From MWL
>Scheduled Procedure Step Description	(0040,0007)	3	From MWL
>Scheduled Protocol Code Sequence	(0040,0008)	3	From MWL
>>Code Value	(0008,0100)	1C	From MWL
>>Coding Scheme Designator	(0008,0102)	1C	From MWL
>>Coding Scheme Version	(0008,0103)	1C	From MWL
>>Code Meaning	(0008,0104)	1	From MWL
Referenced Performed Procedure Step Sequence	(0008,1111)	3	Uniquely identifies the Performed Procedure Step SOP Instance for which the Series has been created
>Referenced SOP Class UID	(0008,1150)	1	1.2.840.10008.3.1.2.3.3
>Referenced SOP Intance UID	(0008,1155)	1	Equal to SOP Instance of the associated MPPS
Performed Procedure Step ID	(0040,0253)	3	Auto generated – only if MPPS is active
Performed Procedure Step Start Date	(0040,0244)	3	Auto generated– only if MPPS is active

Performed Procedure Step Start Time	(0040,0245)	3	Auto generated– only if MPPS is active
Performed Procedure Step Description	(0040,0254)	3	Entered by user – active only if MPPS is available.

Table 8.5-5 Enhanced US Series Module

Attribute Name	Tag	Type	Note
Modality	(0008,0060)	1	"US"

Table 8.5-6 Frame of Reference Module

Attribute Name	Tag	Type	Note
Frame of Reference UID	(0020,0052)	1	Auto generated
Position Reference Indicator	(0020,1040)	2	String value; Can be empty

Table 8.5-7 US Frame of Reference Module

Attribute Name	Tag	Type	Note
Ultrasound Acquisition Geometry	(0020,9307)	1	"APEX" or "PATIENT"
Apex Position	(0020,9308)	1C	Position of the apex (or phase center) of the acquisition geometry, encoded as xA, yA, and zA in mm units in the Volume. Example: 0\0\0
Volume to Transducer Mapping Matrix	(0020,9309)	1	4x4 rigid transformation matrix that maps the Volume homogeneous coordinate system (XV, YV, ZV) to the Transducer Frame of Reference homogeneous coordinate system (XX,YX, ZX). Example: 1\0\0\0\0\1\0\0\0\0\1\0\0\0\0\1
Volume Frame of Reference UID	(0020,9312)	1	Auto generated

Table 8.5-8 Synchronization Module

Attribute Name	Tag	Type	Note
Synchronization Trigger	(0018,106A)	1	Value can be: "SOURCE", "EXTERNAL", "PASSTHRU", "NO TRIGGER".

Acquisition Time Synchronized	(0018,1800)	1	“Y” or “N”
Synchronization Frame of Reference UID	(0020,0200)	1	1.2.840.10008.15.1.1

Table 8.5-9 General Equipment Module

Attribute Name	Tag	Type	Note
Manufacturer	(0008,0070)	2	“BK Medical”
Manufacturer’s Model Name	(0008,1090)	3A	The value depends on the model.
Institution Name	(0008,0080)	3AE	Institution where the equipment that produced the composite instance is located. Set up in the system settings.
Institution Address	(0008,0081)	3	Mailing address of the institution where the equipment that produced the composite instances is located. Set up in the system settings.
Station Name	(0008,1010)	3	User defined name identifying the machine that produced the composite instances. Set up in the system settings.
Institutional Department Name	(0008,1040)	3	Department in the institution where the equipment that produced the composite instances is located. Set up in the system settings.
Device Serial Number	(0018,1000)	3	The serial number of the scanner
Device UID	(0018,1002)	3	Unique identifier of the scanner
Software Versions	(0018,1020)	3A	Software version of the current software

Table 8.5-10 Enhanced General Equipment Module

Attribute Name	Tag	Type	Note
Manufacturer	(0008,0070)	2A	“BK Medical”
Manufacturer’s Model Name	(0008,1090)	3A	The value depends on the model.
Device Serial Number	(0018,1000)	3A	The serial number of the scanner
Software Version(s)	(0018,1020)	3A	Software version of the current software

Table 8.5-11 General Image Module

Attribute Name	Tag	Type	Note
Instance Number	(0020,0013)	2	Documents are numbered in chronological order, starting from 1 at the beginning of a new examination
Patient Orientation	(0020,0020)	2C	Empty

Content Date	(0008,0023)	2C	Date when the document was captured.
Content Time	(0008,0033)	2C	Time when the document was captured.
Acquisition DateTime	(0008,002A)	3	Auto generated. In Enhanced US Volumes only
Anatomic Region Sequence	(0008,2218)	3	Sequence that identifies the anatomic region of interest in this Instance. In Enhanced US Volumes only.
Image Type	(0008,0008)	3	Image: “ORIGINAL\PRIMARY” Clip: “ORIGINAL\PRIMARY” Volume: “ORIGINAL\PRIMARY\VOLUME\NONE” Preview Image: “DERIVED\SECONDARY”
Burned In Annotation	(0028,0301)	3A	“YES” or “NO” (in anonymized documents)
Lossy Image Compression	(0028,2110)	3	Clips: “01” for Multi-frame Image with Lossy JPEG Transfer Syntax; otherwise - not present. Enhanced US Volumes: “00”.
Recognizable Visual Features	(0028,0302)	3	“YES” or “NO” In Enhanced US Volumes only
Presentation LUT Shape	(2050,0020)	3	“IDENTITY” In Enhanced US Volumes only

Table 8.5-12 Image Pixel Module

Attribute Name	Tag	Type	Note
Samples per Pixel	(0028,0002)	1	“3” in images, clips and preview images. “1” in Enhanced US Volumes.
Photometric Interpretation	(0028,0004)	1	Images, clips and preview images: Multi-frame with JPEG Transfer Syntax: “YBR_FULL_422”; otherwise - “RGB”. “MONOCHROME2” in Enhanced US Volumes.
Rows	(0028,0010)	1	Number of rows in the image.
Columns	(0028,0011)	1	Number of columns in the image.
Bits Allocated	(0028,0100)	1	0008H
Bits Stored	(0028,0101)	1	0008H
High Bit	(0028,0102)	1	0007H
Pixel Representation	(0028,0103)	1	0000H (= unsigned integer)
Planar Configuration	(0028,0006)	1C	“0” (color-by-pixel) or “1” (color-by-plane)
Pixel Data	(7FE0,0010)	1C	A data stream of the pixel samples that comprise the Image.

Table 8.5-13 Contrast/Bolus Module

Attribute Name	Tag	Type	Note
Contrast/Bolus Agent	(0018,0010)	2	Present and empty if Contrast Harmonic is activated. Otherwise not present.

Table 8.5-14 Cine Module

Attribute Name	Tag	Type	Note
Preferred Playback Sequencing	(0018,1244)	3	0 (looping playback)
Frame Time	(0018,1063)	1C	1000 / Frame rate of Multi-frame in Hz (Nominal time in msec per individual frame)
Recommended Display Frame Rate	(0008,2144)	3	Frame rate of Multi-frame in Hz (Recommended rate (frames/sec) for display of multi-frame sequence)
Cine Rate	(0018,0040)	3	Frame rate of Multi-frame in Hz (Number of frames per seconds)
Frame Delay	(0018,1066)	3	000H (Time in msec to start of first frame)

Table 8.5-15 Multi-frame Module

Attribute Name	Tag	Type	Note
Number of Frames	(0028,0008)	1	Number of frames in Multi-frame
Frame Increment Pointer	(0028,0009)	1	Set to Frame Time (0018,1063) from Table 8.5-14 Cine Module

Table 8.5-16 Frame Pointers Module

Attribute Name	Tag	Type	Note
Representative Frame Number	(0028,6010)	3	1 (Number of frame selected for use as icon)

Table 8.5-17 US Region Calibration Module

Attribute Name	Tag	Type	Note
Sequence of Ultrasound Regions	(0018,6011)	1	A sequence for each B-mode view. One sequence for each D/M/CW view.
>Region Location Min x0	(0018,6018)	1	
>Region Location Min y0	(0018,601A)	1	
>Region Location Max x1	(0018,601C)	1	
>Region Location Max y1	(0018,601E)	1	

>Physical Units X Direction	(0018,6024)	1	B-mode: 03H (cm) D-mode: 04H (sec) M-mode: 04H (sec) CW-mode: 04H (sec)
>Physical Units Y Direction	(0018,6026)	1	B-mode: 03H (cm) D-mode: 07H (cm/sec) M-mode: 03H (cm) CW-mode: 07H (cm/sec)
>Physical Delta X	(0018,602C)	1	
>Physical Delta Y	(0018,602E)	1	
>Reference Pixel x0	(0018,6020)	3	
>Reference Pixel y0	(0018,6022)	3	
>Ref. Pixel Physical Value X	(0018,6028)	3	0
>Ref. Pixel Physical Value Y	(0018,602A)	3	0
>Region Spatial Format	(0018,6012)	1	B-mode: 01H (2D) D-mode: 03H (Spectral) M-mode: 02H (M-Mode) CW-mode: 03H (Spectral)
>Region Data Type	(0018,6014)	1	B-mode: 01H (Tissue) D-mode: 03H (PW Spectral Doppler) M-mode: 01H (Tissue) CW-mode: 04H (CW Spectral Doppler)
>Region Flags	(0018,6016)	1	0
>Doppler Correction Angle	(0018,6034)	3	B-mode: Not applied. D-mode: Angle Correction (Degrees) M-mode: Not applied. CW-mode: Not applied

Table 8.5-18 US Image Module

Attribute Name	Tag	Type	Note
Samples per Pixel	(0028,0002)	1	See Table 8.5-12 Image Pixel Module
Photometric Interpretation	(0028,0004)	1	See Table 8.5-12 Image Pixel Module
Bits Allocated	(0028,0100)	1	See Table 8.5-12 Image Pixel Module
Bits Stored	(0028,0101)	1	See Table 8.5-12 Image Pixel Module
High Bit	(0028,0102)	1	See Table 8.5-12 Image Pixel Module
Planar Configuration	(0028,0006)	1C	See Table 8.5-12 Image Pixel Module
Pixel Representation	(0028,0103)	1	See Table 8.5-12 Image Pixel Module
Image Type	(0008,0008)	2	See Table 8.5-11 General Image Module
Lossy Image Compression	(0028,2110	1C	See Table 8.5-10 Enhanced General Equipment Module

Transducer Data	(0018,5010)	3	Name of transducer e.g. “8801”. Only set for single frame images
Mechanical Index	(0018,5022)	3	Only sent for single view images
Bone Thermal Index	(0018,5024)	3	Only sent for single view images. Only sent if TI type is TIB.
Cranial Thermal Index	(0018,5026)	3	Only sent for single view images. Only sent if TI type is TIC.
Soft Tissue Thermal Index	(0018,5027)	3	Only sent for single view images. Only sent if TI type is TIS.

Table 8.5-19 US Image Module Private Tags

Attribute Name	Tag	VR Type	Note
Private Creator Element	(0019,0010)	LO	Contains “BK Medical”
Private Tag: Sequence of regions with patient info	(0019,1047)	SQ	Sequence of regions identifying areas with patient sensitive information that should be removed to anonymize the US Image/US Multi-Frame Image.
> Private Tag: Left	(0019,1048)	UL	Left X coordinate of region
> Private Tag: Top	(0019,1049)	UL	Top Y coordinate of region
> Private Tag: Right	(0019,1050)	UL	Right X coordinate of region
> Private Tag: Bottom	(0019,1051)	UL	Bottom Y coordinate of region

Table 8.5-20 Multi-frame Functional Groups Module

Attribute Name	Tag	Type	Note
Content Date	(0008,0023)	1	Date when the document was captured.
Content Time	(0008,0033)	1	Time when the document was captured.
Instance Number	(0020,0013)	1	Documents are numbered in chronological order, starting from 1 at the beginning of a new examination
Number of Frames	(0028,0008)	1	The total number of frames contained within a Multi-frame Image.

Table 8.5-21 Multi-frame Dimension Module

Attribute Name	Tag	Type	Note
Dimension Organization Sequence	(0020,9221)	1	Sequence that lists the Dimension Organization UIDs referenced by the containing SOP Instance.

Dimension Index Sequence	(0020,9222)	1C	Identifies the Sequence containing the indices used to specify the dimension of the multi-frame object.
Dimension Organization Type	(0020,9311)	3	"3D"

Table 8.5-22 Acquisition Context Module

Attribute Name	Tag	Type	Note
Acquisition Context Sequence	(0040,0556)	2	A Sequence of Items that describes the conditions present during the acquisition of the data of the SOP Instance.

Table 8.5-23 Enhanced US Image Module

Attribute Name	Tag	Type	Note
Image Type	(0008,0008)	1	"ORIGINAL\PRIMARY\VOLUME\NONE"
Acquisition DateTime	(0008,002A)	1	Auto generated
Anatomic Region Sequence	(0008,2218)	1	Sequence that identifies the anatomic region of interest in this Instance.
Mechanical Index	(0018,5022)	1	
Bone Thermal Index	(0018,5024)	1	
Cranial Thermal Index	(0018,5026)	1	
Soft Tissue Thermal Index	(0018,5027)	1	
Depth of Scan Field	(0018,5050)	1	The depth, in mm, from the transducer face to the deepest point included in the image.
Acquisition Duration	(0018,9073)	1	Duration of the image acquisition in seconds.
Depth(s) of Focus	(0018,9801)	1	The depth or depths from the transducer face, of the manufacturer defined beam focus points used for the image, in mm.
Transducer Scan Pattern Code Sequence	(0018,9809)	1	The scan pattern the transducer is capable of.
Position Measuring Device Used	(0018,980C)	1C	"RIGID" or "FREEHAND"
Transducer Geometry Code Sequence	(0018,980D)	1	Geometric structure of the transducer.
Transducer Beam Steering Code Sequence	(0018,980E)	1	Technique used by the transducer for beam steering.
Transducer Application Code Sequence	(0018,980F)	1	The primary clinical application of the transducer.
Dimension Organization Type	(0020,9311)	1	"3D"
Samples per Pixel	(0028,0002)	1	"1"

Photometric Interpretation	(0028,0004)	1	“MONOCHROME2”
Bits Allocated	(0028,0100)	1	“8”
Bits Stored	(0028,0101)	1	“8”
Hight Bit	(0028,0102)	1	“7”
Pixel Representation	(0028,0103)	1	“000H”
Burned In Annotation	(0028,0301)	1	“NO”
Recognizable Visual Features	(0028,0302)	1	“YES” or “NO”
Rescale Intercept	(0028,1052)	1	“0”
Rescale Slope	(0028,1053)	1	“1”
Lossy Image Compression	(0028,2110)	1	“00”
View Code Sequence	(0054,0220)	1	Sequence that describes the projection of the anatomic region of interest.
Presentation LUT Shape	(2050,0020)	1	“IDENTITY”

Table 8.5-24 SOP Common Module

Attribute Name	Tag	Type	Note
SOP Class UID	(0008,0016)	1	For US Image: “1.2.840.10008.5.1.4.1.1.6.1” For US Multi-Frame Image: “1.2.840.10008.5.1.4.1.1.3.1” For Enhanced US Volume: “1.2.840.10008.5.1.4.1.1.6.2” Multi-frame True Color Secondary Capture Image: “1.2.840.10008.5.1.4.1.1.7.4”
SOP Instance UID	(0008,0018)	1	Generated when document is created
Content Qualification	(0018,9004)	1	“PRODUCT” In Enhanced US Volumes only
Specific Character Set	(0008,0005)	1C	Set according to the selected language on the scanner. See section 6.
Instance Creation Date	(0008,0012)	3	Document creation date Absent in Enhanced US Volumes
Instance Creation Time	(0008,0013)	3	Document creation time Absent in Enhanced US Volumes
Time zone Offset From UTC	(0008,0201)	3	Time zone offset from UTC. Time and time zone configuration is taken from the scanner. Absent in Enhanced US Volume and preview images

Instance Number	(0020,0013)	3	Documents are numbered in chronological order, starting from 1 at the beginning of a new examination

Table 8.5-25 SC Equipment Module

Attribute Name	Tag	Type	Note
Modality	(0008,0060)	3	“OT”
Conversion Type	(0008,0064)	1	“WSD”

Table 8.5-26 General Reference Module

Attribute Name	Tag	Type	Note
Referenced Instance Sequence	(0008,114A)	3	Non-image composite SOP Instances that are significantly related to this Image.

8.5.1 US Volume Functional Groups

Table 8.5-27 Enhanced US Volume Functional Groups

Attribute Name	Tag	Presence	Note
Frame Content Functional Group			
Frame Content Sequence	(0020,9111)	ALWAYS	
> Frame Acquisition Date Time	(0018,9074)	ALWAYS	
> Frame Reference Date Time	(0018,9151)	ALWAYS	
> Frame Acquisition Duration	(0018,9220)	ALWAYS	
> Dimension Index Values	(0020,9157)	ALWAYS	Three indices are provided: • Temporal Position Offset • Image Position (Volume) • Data Type The frames are spatially related. Temporal Position and Data Type are reserved for future use and currently sent with a constant value of “1”
Frame VOI LUT Functional Group			
Frame VOI LUT Sequence	(0028,9132)	ALWAYS	
> Window Center	(0028,1050)	ALWAYS	127.5
> Window Width	(0028,1051)	ALWAYS	255.0
Plane Position (Volume) Functional Group			

Plane Position (Volume) Sequence	(0020,930E)	ALWAYS	
>Image Position (Volume)	(0020,9301)	ALWAYS	
Plane Orientation (Volume) Functional Group			
Plane Orientation (Volume) Sequence	(0020,930F)	ALWAYS	
>Image Orientation (Volume)	(0020,9302)	ALWAYS	
Image Data Type Functional Group			
Image Data Type Sequence	(0018,9807)	ALWAYS	
> Data Type	(0018,9808)	ALWAYS	TISSUE_INTENSITY
> Aliased Data Type	(0018,980b)	ALWAYS	NO
US Image Description Functional Group			
US Image Description Sequence	(0018,9806)	ALWAYS	
> Frame Type	(0008,0064)	ALWAYS	ORIGINAL\PRIMARY\VOLUME\NONE
> Volumetric Properties	(0008,9206)	ALWAYS	VOLUME
> Volume Based Calculation Technique	(0008,9207)	ALWAYS	NONE

8.6 Overview of the Applied Comprehensive SR IOD

The Comprehensive SR IOD specifies a class of documents, the content of which may include textual and coded information, numeric measurement values, references to the DICOM Composite Instances.

The modules selected from the IOD module table of DICOM 3.0 are given in the table below.

Table 8.6-1: Applied Modules in the Comprehensive SR IOD

Information Entity	Module	Usage	Details
Patient	Patient	M	See Table 8.5-1 Patient Module
Study	General Study	M	See Table 8.5-2 General Study Module
	Patient Study	U	See Table 8.5-3 Patient Study Module
Series	SR Document Series	M	See Table 8.6-2: SR Document Series
Equipment	General Equipment	M	See Table 8.5-9 General Equipment Module

Document	SR Document General	M	See Table 8.6-3: SR Document General
	SR Document Content	M	See Table 8.6-4: SR Document Content Module
	SOP Common	M	See Table 8.6-5: SOP Common Module

The details of these applied Comprehensive SR IOD modules are given in the tables. The list of possible values is given, if applicable. If an attribute may be present conditionally/optionally or may contain a zero length value, this is also indicated.

Table 8.6-2: SR Document Series Module

Attribute Name	Tag	Type	Note
Modality	(0008,0060)	1	"SR"
SeriesInstanceUID	(0020,000E)	1	Generated at creation of the Series
SeriesNumber	(0020,0011)	1	Auto generated
Series Date	(0008,0021)	3	Date the Series started.
Series Time	(0008,0031)	3	Time the Series started.
Referenced Performed Procedure Step Sequence	(0008,1111)	2	Uniquely identifies the Performed Procedure Step SOP Instance for which the Series is created.

Table 8.6-3: SR Document General Module

Attribute Name	Tag	Type	Note
Content Date	(0008,0023)	1	Date of SR document creation
Content Time	(0008,0033)	1	Time of SR document creation
Instance Number	(0020,0013)	1	Documents are numbered in chronological order, starting from 1 at the beginning of a new examination
Performed Procedure Code Sequence	(0040,A372)	2	A Sequence that conveys the codes of the performed procedures pertaining to this SOP Instance.
Current Requested Procedure Evidence Sequence	(0040,A375)	1C	Full set of Composite SOP Instances, of which the creator is aware, which were created to satisfy the current Requested Procedure(s) for which this SR Document is generated or that are referenced in the content tree.

Referenced Request Sequence	(0040,A370)	1C	Identifies Requested Procedures that are being fulfilled (completely or partially) by creation of this Document.
>Accession Number	(0008,0050)		From MWL or manually entered by a user
>Requested Procedure ID	(0040,1001)	1C	From MWL
>Requested Procedure Description	(0032,1060)	3	From MWL
>Reason for Requested Procedure	(0040,1002)	3	From MWL
>Reason for Requested Procedure Code Sequence	(0032,1064)	3	From MWL
>>Code Value	(0008,0100)	1C	From MWL
>>Coding Scheme Designator	(0008,0102)	1C	From MWL
>>Coding Scheme Version	(0008,0103)	1C	From MWL
>>Code Meaning	0008,0104	1	From MWL
>Requested Procedure Code Sequence Attribute	(0032,1064)	2	From MWL
Referenced Performed Procedure Step Sequence	(0008,1111)	3	Uniquely identifies the Performed Procedure Step SOP Instance for which the Series has been created
>Referenced SOP Class UID	(0008,1150)	1	1.2.840.10008.3.1.2.3.3
>Referenced SOP Intance UID	(0008,1155)	1	Equal to SOP Instance of the associated MPPS
Completion Flag	(0040,A491)	1	“PARTIAL”
Verification Flag	(0040,A493)	1	“UNVERIFIED”

Table 8.6-4: SR Document Content Module

Attribute Name	Tag	Type	Note
Value Type	(0040,A040)	1	“CONTAINER”
Concept Name Code Sequence	(0040,A043)	1C	Code describing the concept represented by this Content Item. Also conveys the value of Document Title and section headings in documents.
Continuity Of Content	(0040,A050)	1	“SEPARATE”

Content Template Sequence	(0040,A504)	1C	Template used for this content item.
> MappingResource	(0008,0105)	1	“BKCMR”
> Template Identifier	(0040,DB00)	1	“BK1000”
ContentSequence	(0040,A730)	1C	Sequence of SR document content items.

Table 8.6-5: SOP Common Module

Attribute Name	Tag	Type	Note
SOP Class UID	(0008,0016)	1	For Comprehensive SR: “1.2.840.10008.5.1.4.1.1.88.33”
SOP Instance UID	(0008,0018)	1	Generated when SR or 3D SR is created
Specific Character Set	(0008,0005)	1C	Set according to the selected language on the scanner. See section 6.
Instance Creation Date	(0008,0012)	3	Date the SOP Instance was created.
Instance Creation Time	(0008,0013)	3	Time the SOP Instance was created.
Instance Creator UID	(008,0014)	3	Uniquely identifies device that created the SOP Instance.
Instance Number	(0020,0013)	3	Documents are numbered in chronological order, starting from 1 at the beginning of a new examination

8.6.1 Overview of SR Document Content Descriptions

8.6.1.1 SR Document Content Template

BK Ultrasound Systems supports the following DICOM SR root templates for Comprehensive SR SOP Instances created, generated, or displayed by the systems.

Table 8.6-6 DICOM SR Root Templates

Template ID	Template Name
BK1000	Generic Ultrasound Structured Report

8.6.1.2 DICOM Standard Extended and Private Template

BK Ultrasound Systems supports the DICOM standard extended and private defined templates in the following sections.

8.6.1.3 TID BK1000 Generic Ultrasound Structured Report – Private User Defined

The Generic Ultrasound Structured Report template Table 8.6-7: TID BK1000 – Generic Ultrasound Structured Reportprovides the specific codes for user defined measurements and calculations with public/private code designator schemes.

The TID BK1000 is used for all ExamTypes.

Table 8.6-7: TID BK1000 – Generic Ultrasound Structured Report

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	EV (PC-00001, PC, "Generic Ultrasound Structured Report")	1	M		
2	>	HAS OBS CONTEXT	INCLUDE	DTID (1001) Observation Context	1	M		
3	>	CONTAINS	CONTAINER	EV (111028, DCM, “Image Library”)	1	U		
4	>>	CONTAINS	IMAGE	No purpose of reference	1-n	M		DCID(12224) Ultrasound Image Modes
5	>	CONTAINS	INCLUDE	DTID (BK100) Summary Section	1	U		
6	>	CONTAINS	INCLUDE	DTID (BK200) Ultrasound Measurements Section	1	U		

Table 8.6-8: TID BK100 - Summary Section

Description:

Comments and observations of the procedure of immediate clinical interest

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	DT (121111, DCM, “Summary”)	1	M		
2	>	CONTAINS	TEXT	EV(DCM,121106,”Comment”)	1	M		Text Value of Report Remarks

Table 8.6-9: TID BK200 – Ultrasound Measurements Section

Description:

Main section of the Generic Ultrasound Structured Report. Consists of a number of containers relating to specific examination types.

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	DT (PC-00002, PC, “Ultrasound Measurements”)	1	U		
2	>	CONTAINS	INCLUDE	DTID (BK1000) General Measurements	1	U		
2	>	CONTAINS	INCLUDE	DTID (BK1100) Brachytherapy Measurements	1	U		
3	>	CONTAINS	INCLUDE	DTID (BK1200) Penile Measurements	1	U		
4	>	CONTAINS	INCLUDE	DTID (BK1300) Prostate Measurements	1	U		
5	>	CONTAINS	INCLUDE	DTID (BK1400) Bladder Measurements	1	U		
6	>	CONTAINS	INCLUDE	DTID (BK1500) Renal Measurements	1	U		
7	>	CONTAINS	INCLUDE	DTID (BK1600) Testis Measurements	1	U		
8	>	CONTAINS	INCLUDE	DTID (BK1700) Breast Measurements	1	U		
9	>	CONTAINS	INCLUDE	DTID (BK1800) Thyroid Measurements	1	U		
	>	CONTAINS	INCLUDE	DTID (BK1900) OB-GYN Measurements	1	U		

Table 8.6-10: TID BK1000 – General Measurements

Description: Measurements related to the Generic measurements and General calc package								
	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1	>	CONTAINS	INCLUDE	DTID gn03 “General Ultrasound Section”	1	U		
2	>	CONTAINS	INCLUDE	DTID gn10 “General Vascular Ultrasound Section”	1	U		

Table 8.6-11: TID gn03 – General Ultrasound Section

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	DT (121070, DCM, "Findings")	1	M		
2	>	CONTAINS	CONTAINER	EV (38266002, SCT, "Entire body")	1	U		
3	>>	CONTAINS	INCLUDE	DTID 300 “Measurement”	1	U		$Measurement = EV(121206, DCM, “Distance”) $Units = EV(cm, UCUM, “cm”) or EV(mm, UCUM, “mm”)
4	>>	CONTAINS	INCLUDE	DTID 300 “Measurement”	1	U		$Measurement = EV(121206, DCM, “Distance”) $Units = EV(cm, UCUM, “cm”) or EV(mm, UCUM, “mm”)
5	>>	CONTAINS	INCLUDE	DTID 300 “Measurement”	1	U		$Measurement = EV(121211, DCM, “Path length”) $Units = EV(cm, UCUM, “cm”) or EV(mm, UCUM, “mm”)
6	>>	CONTAINS	INCLUDE	DTID 300 “Measurement”	1	U		$Measurement = EV(121211, DCM, “Path length”) $Units = EV(cm, UCUM, “cm”) or EV(mm, UCUM, “mm”)
7	>>	CONTAINS	INCLUDE	DTID 300 “Measurement”	1	U		$Measurement = EV(74551000, SCT, “Circumference”) $Units = EV(cm, UCUM, “cm”) or EV(mm, UCUM, “mm”)
8	>>	CONTAINS	INCLUDE	DTID 300 “Measurement”	1	U		$Measurement = EV(42798000, SCT, “Area”) $Units = EV(cm2, UCUM, “cm2”)
9	>>	CONTAINS	INCLUDE	DTID 300 “Measurement”	1	U		$Measurement = EV(74551000, SCT, “Circumference”) $Units = EV(cm, UCUM, “cm”) or EV(mm, UCUM, “mm”)

10	>>	CONTAINS	INCLUDE	DTID 300 “Measurement”	1	U		$Measurement = EV(42798000, SCT, “Area”) $Units = EV(cm2, UCUM, “cm2”)
11	>>	CONTAINS	INCLUDE	DTID 300 “Measurement”	1	U		$Measurement = EV(GN-16841, 99BKMED, “Outer Diameter”) $Units = EV(cm, UCUM, “cm”) or EV(mm, UCUM, “mm”)
12	>>	CONTAINS	INCLUDE	DTID 300 “Measurement”	1	U		$Measurement = EV(GN-16840, 99BKMED, “Inner Diameter”) $Units = EV(cm, UCUM, “cm”) or EV(mm, UCUM, “mm”)
13	>>	CONTAINS	INCLUDE	DTID 300 “Measurement”	1	U		$Measurement = EV(GN-16890, 99BKMED, “%Reduction”) $Units = EV(%, UCUM, “%”)
14	>>	CONTAINS	INCLUDE	DTID 300 “Measurement”	1	U		$Measurement = EV(GN-16841, 99BKMED, “Outer Diameter”) $Units = EV(cm, UCUM, “cm”) or EV(mm, UCUM, “mm”)
15	>>	CONTAINS	INCLUDE	DTID 300 “Measurement”	1	U		$Measurement = EV(GN-16840, 99BKMED, “Inner Diameter”) $Units = EV(cm, UCUM, “cm”) or EV(mm, UCUM, “mm”)
16	>>	CONTAINS	INCLUDE	DTID 300 “Measurement”	1	U		$Measurement = EV(GN-16890, 99BKMED, “%Reduction”) $Units = EV(%, UCUM, “%”)
17	>>	CONTAINS	INCLUDE	DTID 300 “Measurement”	1	U		$Measurement = EV(GN-16832, 99BKMED, “Area of outer ellipse”) $Units = EV(cm2, UCUM, “cm2”)
18	>>	CONTAINS	INCLUDE	DTID 300 “Measurement”	1	U		$Measurement = EV(GN-16831, 99BKMED, “Area of inner ellipse”) $Units = EV(cm2, UCUM, “cm2”)
19	>>	CONTAINS	INCLUDE	DTID 300 “Measurement”	1	U		$Measurement = EV(GN-16890, 99BKMED, “%Reduction”)

								$Units = EV(%, UCUM, “%”)
20	>>	CONTAINS	INCLUDE	DTID 300 “Measurement”	1	U		$Measurement = EV(GN-16832, 99BKMED, “Area of outer ellipse”) $Units = EV(cm2, UCUM, “cm2”)
21	>>	CONTAINS	INCLUDE	DTID 300 “Measurement”	1	U		$Measurement = EV(GN-16831, 99BKMED, “Area of inner ellipse”) $Units = EV(cm2, UCUM, “cm2”)
22	>>	CONTAINS	INCLUDE	DTID 300 “Measurement”	1	U		$Measurement = EV(GN-16890, 99BKMED, “%Reduction”) $Units = EV(%, UCUM, “%”)
23	>>	CONTAINS	INCLUDE	DTID 300 “Measurement”	1	U		$Measurement = EV(20227-5, LN, “M-mode Height”) $Units = EV(cm, UCUM, “cm”) or EV(mm, UCUM, “mm”)
24	>>	CONTAINS	INCLUDE	DTID 300 “Measurement”	1	U		$Measurement = EV(20227-5, LN, “M-mode Height”) $Units = EV(cm, UCUM, “cm”) or EV(mm, UCUM, “mm”)
25	>>	CONTAINS	INCLUDE	DTID 300 “Measurement”	1	U		$Measurement = EV(GN-16870, 99BKMED, “Hip developmental dysplasia alpha angle”) $Units = EV(deg, UCUM, “degrees”)
26	>>	CONTAINS	INCLUDE	DTID 300 “Measurement”	1	U		$Measurement = EV(GN-16871, 99BKMED, “Hip developmental dysplasia beta angle”) $Units = EV(deg, UCUM, “degrees”)
27	>>	CONTAINS	INCLUDE	DTID 300 “Measurement”	1	U		$Measurement = EV(GN-16870, 99BKMED, “Hip developmental dysplasia alpha angle”) $Units = EV(deg, UCUM, “degrees”)
28	>>	CONTAINS	INCLUDE	DTID 300 “Measurement”	1	U		$Measurement = EV(GN-16871, 99BKMED, “Hip developmental dysplasia beta angle”)

								$Units = EV(deg, UCUM, “degrees”)
29	>>	CONTAINS	INCLUDE	DTID 300 “Measurement”	1	U		$Measurement = EV(1483009, SCT, “Angle”) $Units = EV(deg, UCUM, “degrees”)
30	>>	CONTAINS	INCLUDE	DTID 300 “Measurement”	1	U		$Measurement = EV(1483009, SCT, “Angle”) $Units = EV(deg, UCUM, “degrees”)
31	>>	CONTAINS	INCLUDE	DTID 300 “Measurement”	1	U		$Measurement = EV(GN-16881, 99BKMED, “Strain ratio”) $Units = EV(1, UCUM, “no units”)
32	>>	CONTAINS	INCLUDE	DTID 300 “Measurement”	1	U		$Measurement = EV(GN-16881, 99BKMED, “Strain ratio”) $Units = EV(1, UCUM, “no units”)
33	>>	CONTAINS	INCLUDE	DTID 300 “Measurement”	1	U		$Measurement = EV(81827009, SCT, “Diameter”) $Units = EV(cm, UCUM, “cm”) or EV(mm, UCUM, “mm”)
34	>>	CONTAINS	INCLUDE	DTID 300 “Measurement”	1	U		$Measurement = EV(81827009, SCT, “Diameter”) $Units = EV(cm, UCUM, “cm”) or EV(mm, UCUM, “mm”)
35	>>	CONTAINS	INCLUDE	DTID 300 “Measurement”	1	U		$Measurement = EV(GN-16880, 99BKMED, “E/B ratio”) $Units = EV(1, UCUM, “no units”)
36	>>	CONTAINS	INCLUDE	DTID 300 “Measurement”	1	U		$Measurement = EV(81827009, SCT, “Diameter”) $Units = EV(cm, UCUM, “cm”) or EV(mm, UCUM, “mm”)
37	>>	CONTAINS	INCLUDE	DTID 300 “Measurement”	1	U		$Measurement = EV(81827009, SCT, “Diameter”) $Units = EV(cm, UCUM, “cm”) or EV(mm, UCUM, “mm”)

38	>>	CONTAINS	INCLUDE	DTID 300 “Measurement”	1	U		$Measurement = EV(GN-16880, 99BKMED, “E/B ratio”) $Units = EV(1, UCUM, “no units”)
39	>	CONTAINS	INCLUDE	DTID 5016 “LWH Volume Group”	1	U		$GroupName = EV (38266002, SCT, "Entire body") $Width = EV (103355008, SCT, "Width") $Length = EV (410668003, SCT, "Length") $Height = EV (121207, DCM, "Height") $Volume = EV (121221, DCM, "Volume of ellipsoid") $VolumeUnits = EV (ml, UCUM, "ml") $DistanceUnits = EV(cm, UCUM, “cm”) or EV(mm, UCUM, “mm”)
40	>	CONTAINS	INCLUDE	DTID 5016 “LWH Volume Group”	1	U		$GroupName = EV (38266002, SCT, "Entire body") $Width = EV (103355008, SCT, "Width") $Length = EV (410668003, SCT, "Length") $Height = EV (121207, DCM, "Height") $Volume = EV (121221, DCM, "Volume of ellipsoid") $VolumeUnits = EV (ml, UCUM, "ml") $DistanceUnits = EV(cm, UCUM, “cm”) or EV(mm, UCUM, “mm”)
41	>	CONTAINS	INCLUDE	DTID 5016 “LWH Volume Group”	1	U		$GroupName = EV (38266002, SCT, "Entire body") $Width = EV (103355008, SCT, "Width") $Height = EV (121207, DCM, "Height") $Volume = EV (GN-16835, 99BKMED, "Volume from HW")

								$VolumeUnits = EV (ml, UCUM, "ml") $DistanceUnits = EV(cm, UCUM, “cm”) or EV(mm, UCUM, “mm”)
42	>	CONTAINS	INCLUDE	DTID 5016 “LWH Volume Group”	1	U		$GroupName = EV (38266002, SCT, "Entire body") $Width = EV (103355008, SCT, "Width") $Height = EV (121207, DCM, "Height") $Volume = EV (GN-16835, 99BKMED, "Volume from HW") $VolumeUnits = EV (ml, UCUM, "ml") $DistanceUnits = EV(cm, UCUM, “cm”) or EV(mm, UCUM, “mm”)
43	>	CONTAINS	INCLUDE	DTID 5016 “LWH Volume Group”	1	U		$GroupName = EV (38266002, SCT, "Entire body") $Width = EV (103355008, SCT, "Width") $Height = EV (121207, DCM, "Height") $Area = EV (GN-16830, 99BKMED, "Area of ellipse") $Volume = EV (GN-16835, 99BKMED, "Volume from HW") $AreaUnits = EV (cm2, UCUM, "cm2") $VolumeUnits = EV (ml, UCUM, "ml") $DistanceUnits = EV(cm, UCUM, “cm”) or EV(mm, UCUM, “mm”)
44	>	CONTAINS	INCLUDE	DTID 5016 “LWH Volume Group”	1	U		$GroupName = EV (38266002, SCT, "Entire body") $Width = EV (103355008, SCT, "Width") $Height = EV (121207, DCM, "Height") $Area = EV (GN-16830, 99BKMED, "Area of ellipse")

								$Volume = EV (GN-16835, 99BKMED, "Volume from HW") $AreaUnits = EV (cm2, UCUM, "cm2") $VolumeUnits = EV (ml, UCUM, "ml") $DistanceUnits = EV(cm, UCUM, “cm”) or EV(mm, UCUM, “mm”)

Table 8.6-12: TID gn10 – General Vascular Ultrasound Section

Description: General/Generic vascular measurements								
	NL	**Rel with Parent**	**VT**	**Concept Name**	**VM**	**Req Type**	**Condition**	**Value Set Constraint**
1	>	CONTAINS	INCLUDE	DTID 5103 “Vascular Ultrasound Section”	1	U		$GroupName = EV (38266002, SCT, "Entire body") $SectionLaterality = EV (66459002, SCT, "Unilateral") $Anatomy = EV (38266002, SCT, "Entire body")

General Measurement Post-Coordination

Section TID gn10 “General Vascular Ultrasound Section” and Section TID 5104 “Vascular Ultrasound Measurement Group” are used for permutations of these measurement results:

Table 8.6-13: General Measurement Post-Coordination

TID 5104 $Measurement				**Units**		
CSD	**CV**	**CM**	**From CID**	**CSD**	**CV**	**CM**
LN	11726-7	Peak Systolic Velocity	CID 12120	UCUM	cm/s	cm/s
LN	11653-3	End Diastolic Velocity	CID 12120	UCUM	cm/s	cm/s
LN	11665-7	Minimum Diastolic Velocity	CID 12120	UCUM	cm/s	cm/s
LN	12008-9	Pulsatility Index	CID 12121	UCUM	1	no units
LN	12023-8	Resistivity Index	CID 12121	UCUM	1	no units
LN	8867-4	Heart Rate	CID 12220	BK	b/min	b/min

LN	20352-1	Time averaged mean velocity	CID 12120	UCUM	cm/s	cm/s
LN	11692-1	Time averaged peak velocity	CID 12120	UCUM	cm/s	cm/s
LN	12144-2	Systolic to Diastolic Velocity Ratio	CID 12121	UCUM	1	no units
LN	20354-7	Velocity Time Integral	CID 12120	UCUM	cm	cm
LN	20168-1	Acceleration Time	CID 12122	UCUM	ms	ms
LN	20217-6	Deceleration Time	CID 12122	UCUM	ms	ms
DCM	110828	Flow Velocity	CID 12120	UCUM	cm/s	cm/s
LN	33867-3	Velocity Ratio	CID 12121	UCUM	1	no units
SCT	42798000	Area	CID 7471	UCUM	cm2	cm2
99BKMED	GN-16891	Volume Flow	Private code	UCUM	ml/min	ml/min

Table 8.6-14: TID BK1100 – Brachytherapy Measurements

Description:

Container with measurements related to the Brachytherapy calc package

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	DT (121070, DCM, “Findings”)				
2	>	HAS CONCEPT MODE	CODE	EV (363698007, SCT, “Finding Site”)	1	M		(41216001, SCT, “Prostate”)
3	>	CONTAINS	INCLUDE	DTID (pb04) Planimetry Summation Volume Group	1	U		$GroupName = EV (41216001, SRT, "Prostate") $Volume = EV (15315-5, LN, "Prostate Volume by derived by planimetry (US)") $Area = EV (PC-22003, PC, "Prostate Area by US") $SpacingBetweenSlices = EV (15316-3, LN, "Volume planimetry Stepsize") $VolumeUnits = EV (cc, BK, "cc")

								$AreaUnits = EV (cm2, UCUM, "cm2") $LinearUnits = EV (mm, UCUM, "mm") or EV(cm, UCUM, “cm”)

Table 8.6-15: TID pb04 – Planimetry Summation Volume Group

Description:

Container which groups a Planimetry measurement

Parameters:

$GroupName	The name of the volume group that is an anatomical structure
$Volume	Concept name of volume measurement
$Area	Concept name of area measurements
$SpacingBetweenSlices	Concept name of spacing between slices (step size)
$VolumeUnits	Units of volume measurement
$AreaUnits	Units of area measurement
$LinearUnits	Units of linear measurement

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	$GroupName	1	M		
2	>	CONTAINS	INCLUDE	DTID (BK300) Measurement Result	1	M		$Measurement = $Volume $Units = $VolumeUnits $Method = EV (122503, DCM, "Integration of sum of closed areas on contiguous slices")
3	>	CONTAINS	NUM	EV (PC-22002, PC, "Number of slices used for sum of areas")	1	M		UNITS = ({slices}, UCUM, "slices")
4	>	CONTAINS	NUM	$SpacingBetweenSlices	1	M		UNITS = $LinearUnits
5	>	CONTAINS	INCLUDE	DTID (BK300) Measurement Result	1-n	M		$Measurement = $Area $Units = $AreaUnits $Method = EV (125220, DCM, "Planimetry")

Table 8.6-16: TID BK1200 – Penile Measurements

Description: Penile measurements.								
	NL	**Rel with Parent**	**VT**	**Concept Name**	**VM**	**Req Type**	**Condition**	**Value Set Constraint**
1		CONTAINS	INCLUDE	DTID 5103 “Vascular Ultrasound Section”	1	U		$SectionScope = DT (363673006, SCT, "Vascular structure of penis") $SectionLaterality = EV (66459002, SCT, "Unilateral") $Anatomy = DCID pn102 “Unilateral Penile Veins” $FunctionalCondition = EV (264938003, SCT, "Flaccid")
2		CONTAINS	INCLUDE	DTID 5103 “Vascular Ultrasound Section”	1	U		$SectionScope = DT (363673006, SCT, "Vascular structure of penis") $SectionLaterality = EV (7771000, SCT, "Left") $Anatomy = DCID pn100 “Penile Arteries” $FunctionalCondition = EV (264938003, SCT, "Flaccid") $Method = EV (8359006, SCT, "Automated")
3		CONTAINS	INCLUDE	DTID 5103 “Vascular Ultrasound Section”	1	U		$SectionScope = DT (363673006, SCT, "Vascular structure of penis") $SectionLaterality = EV (7771000, SCT, "Left") $Anatomy = DCID pn100 “Penile Arteries” $FunctionalCondition = EV (264938003, SCT, "Flaccid") $Method = EV (87982008, SCT, "Manual")
4		CONTAINS	INCLUDE	DTID 5103 “Vascular Ultrasound Section”	1	U		$SectionScope = DT (363673006, SCT, "Vascular structure of penis") $SectionLaterality = EV (24028007, SCT, "Right")

								$Anatomy = DCID pn100 “Penile Arteries” $FunctionalCondition = EV (264938003, SCT, "Flaccid") $Method = EV (8359006, SCT, "Automated")
5		CONTAINS	INCLUDE	DTID 5103 “Vascular Ultrasound Section”	1	U		$SectionScope = DT (363673006, SCT, "Vascular structure of penis") $SectionLaterality = EV (24028007, SCT, "Right") $Anatomy = DCID pn100 “Penile Arteries” $FunctionalCondition = EV (264938003, SCT, "Flaccid") $Method = EV (87982008, SCT, "Manual")
6		CONTAINS	INCLUDE	DTID 5103 “Vascular Ultrasound Section”	1	U		$SectionScope = DT (363673006, SCT, "Vascular structure of penis") $SectionLaterality = EV (66459002, SCT, "Unilateral") $Anatomy = DCID pn102 “Unilateral Penile Veins” $FunctionalCondition = EV (PN-00001, 99KBMED, "Post-injection") $PostInjectionTime = e.g., 5, 10, 15, 20, 25 or 30 mins
7		CONTAINS	INCLUDE	DTID 5103 “Vascular Ultrasound Section”	1-n	U		$SectionScope = DT (363673006, SCT, "Vascular structure of penis") $SectionLaterality = EV (7771000, SCT, "Left") $Anatomy = DCID pn100 “Penile Arteries” $FunctionalCondition = EV (PN-00001, 99KBMED, "Post-injection") $PostInjectionTime = e.g., 5, 10, 15, 20, 25 or 30 mins $Method = EV (8359006, SCT, "Automated")

8		CONTAINS	INCLUDE	DTID 5103 “Vascular Ultrasound Section”	1-n	U		$SectionScope = DT (363673006, SCT, "Vascular structure of penis") $SectionLaterality = EV (7771000, SCT, "Left") $Anatomy = DCID pn100 “Penile Arteries” $FunctionalCondition = EV (PN-00001, 99KBMED, "Post-injection") $PostInjectionTime = e.g., 5, 10, 15, 20, 25 or 30 mins $Method = EV (87982008, SCT, "Manual")
9		CONTAINS	INCLUDE	DTID 5103 “Vascular Ultrasound Section”	1-n	U		$SectionScope = DT (363673006, SCT, "Vascular structure of penis") $SectionLaterality = EV (24028007, SCT, "Right") $Anatomy = DCID pn100 “Penile Arteries” $FunctionalCondition = EV (PN-00001, 99KBMED, "Post-injection") $PostInjectionTime = e.g., 5, 10, 15, 20, 25 or 30 mins $Method = EV (8359006, SCT, "Automated")
10		CONTAINS	INCLUDE	DTID 5103 “Vascular Ultrasound Section”	1-n	U		$SectionScope = DT (363673006, SCT, "Vascular structure of penis") $SectionLaterality = EV (24028007, SCT, "Right") $Anatomy = DCID pn100 “Penile Arteries” $FunctionalCondition = EV (PN-00001, 99KBMED, "Post-injection") $PostInjectionTime = e.g., 5, 10, 15, 20, 25 or 30 mins $Method = EV (87982008, SCT, "Manual")

Table 8.6-17: CID pn100. Penile Arteries

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
FMA	22045	Cavernous part of deep artery of penis

Table 8.6-18: CID pn102. Unilateral Penile Veins

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
SCT	367732002	Deep dorsal vein of penis

Penile Measurement Post-Coordination

Section TID BK1200 “Penile Measurements” and Section TID 5104 “Vascular Ultrasound Measurement Group” are used for permutations of these measurement results:

Table 8.6-19: Penile Vascular Measurement Results

TID 5104 $Measurement				Units		
CSD	**CV**	**CM**	**From CID**	**CSD**	**CV**	**CM**
LN	11726-7	Peak Systolic Velocity	CID 12120	UCUM	cm/s	cm/s
LN	11653-3	End Diastolic Velocity	CID 12120	UCUM	cm/s	cm/s
LN	12008-9	Pulsatility Index	CID 12121	UCUM	1	No units
LN	12023-8	Resistivity Index	CID 12121	UCUM	1	No units
SCT	81827009	Diameter	CID 12122	UCUM	cm or mm	cm or mm

Over these functional conditions, measurement methods and branches:

Table 8.6-20: Penile Measurement Post-Coordination

TID 5103 $SectionScope			TID 5103 $Section Laterality			TID 5103 $Anatomy				TID $5103 $FunctionalCondition			TID 5103 $MeasurementMethod			TID 5104 (125101, DSM, "Vessel Branch")			
CSD	CV	CM	CSD	CV	CM	CSD	CV	CM	From CID	CSD	CV	CM	CSD	CV	CM	CSD	CV	CM	From CID
SCT	363673006	Vascular structure of penis	SCT	66459002	Unilateral	SCT	367732002	Deep dorsal vein of penis	CID pn102	SCT	264938003	Flaccid	-	-	-	-	-	-	-
SCT	363673006	Vascular structure of penis	SCT	7771000	Left	FMA	22045	Cavernous part of deep artery of penis	CID pn100	SCT	264938003	Flaccid	SCT	8359006	Automated	SCT	7771000	Left	CID 12117
SCT	363673006	Vascular structure of penis	SCT	7771000	Left	FMA	22045	Cavernous part of deep artery of penis	CID pn100	SCT	264930003	Flaccid	SCT	87982008	Manual	SCT	7771000	Left	CID 12117
SCT	363673006	Vascular structure of penis	SCT	24028007	Right	FMA	22045	Cavernous part of deep	CID pn100	SCT	264938003	Flaccid	SCT	8359006	Automated	SCT	24028007	Right	CID 12117

								artery of penis										
SCT	363673006	Vascular structure of penis	SCT	24028007	Right	FMA	22045	Cavernous part of deep artery of penis	CID pn100	SCT	264930003	Flaccid	SCT	87982008	Manual	SCT	24028007	Right	CID 12117
SCT	363673006	Vascular structure of penis	SCT	66459002	Unilateral	SCT	367732002	Deep dorsal vein of penis	CID pn102	99BKMED	PN-00001	Post-injection	-	-	-	-	-	-	-
SCT	363673006	Vascular structure of penis	SCT	7771000	Left	FMA	22045	Cavernous part of deep artery of penis	CID pn100	99BKMED	PN-00001	Post-injection	SCT	8359006	Automated	SCT	7771000	Left	CID 12117
SCT	363673006	Vascular structure of penis	SCT	7771000	Left	FMA	22045	Cavernous part of deep artery of penis	CID pn100	99BKMED	PN-00001	Post-injection	SCT	87982008	Manual	SCT	7771000	Left	CID 12117

SCT	363673006	Vascular structure of penis	SCT	24028007	Right	FMA	22045	Cavernous part of deep artery of penis	CID pn100	99BKMED	PN-00001	Post-injection	SCT	8359006	Automated	SCT	24028007	Right	CID 12117
SCT	363673006	Vascular structure of penis	SCT	24028007	Right	FMA	22045	Cavernous part of deep artery of penis	CID pn100	99BKMED	PN-00001	Post-injection	SCT	87982008	Manual	SCT	24028007	Right	CID 12117

Table 8.6-21: TID BK1300 – Prostate Measurements

Description: Container with measurements related to the Prostate Exam Type								
	NL	**Rel with Parent**	**VT**	**Concept Name**	**VM**	**Req Type**	**Condition**	**Value Set Constraint**
1			CONTAINER	DT (121070, DCM, "Findings")	1	M		
2	>	HAS CONCEPT MOD	CODE	EV (363698007, SCT, “Finding Site”)	1	M		(41216001, SCT, “Prostate”)
3	>	CONTAINS	INCLUDE	DTID (5016) LHW Volume Group	1	U		$GroupName = EV (41216001, SCT, “Prostate”) $Width = EV (15302-3, LN, "Prostate Width by US") $Length = EV (15303-1, LN, "Prostate Length by US") $Height = EV (15301-5, LN, "Prostate Height by US") $Volume = EV (15308-0, LN, "Prostate Volume from HWL by US") $VolumeUnits = EV (cc, BK, "cc") $DistanceUnits = EV (cm, UCUM, "cm") or EV(mm, UCUM, “mm”) $Method = EV(87982008, SCT, Manual)
4	>>	CONTAINS	TEXT	EV (15323-9, LN, "Prostate specific Ag/Prostate volume from HWL by US")	1	U		
5	>>>	HAS CONCEPT MOD	CODE	EV (363698007, SCT, “Finding Site”)	1	U		(41216001, SCT, “Prostate”)
6	>	CONTAINS	INCLUDE	DTID (5016) LHW Volume Group	1	U		$GroupName = EV (41216001, SCT, “Prostate”) $Width = EV (15302-3, LN, "Prostate Width by US")

								$Length = EV (15303-1, LN, "Prostate Length by US") $Height = EV (15301-5, LN, "Prostate Height by US") $Volume = EV (15308-0, LN, "Prostate Volume from HWL by US") $VolumeUnits = EV (cc, BK, "cc") $DistanceUnits = EV (cm, UCUM, "cm") or EV(mm, UCUM, “mm”) $Method = EV(8359006, SCT, Automated)
7	>>	CONTAINS	TEXT	EV (15323-9, LN, "Prostate specific Ag/Prostate volume from HWL by US")	1	U		
8	>>>	HAS CONCEPT MOD	CODE	EV (363698007, SCT, “Finding Site”)	1	U		(41216001, SCT, “Prostate”)
9	>	CONTAINS	INCLUDE	DTID (5016) LHW Volume Group	1	U		$GroupName = EV (41216001, SCT, “Prostate”) $Width = EV (15302-3, LN, "Prostate Width by US") $Height = EV (15301-5, LN, "Prostate Height by US") $Volume = EV (PC-16000, PC, "Prostate Volume from Ellipse by US") $VolumeUnits = EV (cc, BK, "cc") $DistanceUnits = EV (cm, UCUM, "cm") or EV(mm, UCUM, “mm”)
10	>>	CONTAINS	TEXT	EV (15323-9, LN, "Prostate specific Ag/Prostate volume from HWL by US")	1	U		
11	>>>	HAS CONCEPT MOD	CODE	EV (363698007, SCT, “Finding Site”)	1	U		(41216001, SCT, “Prostate”)

Table 8.6-22: TID BK1400 – Bladder Measurements

Description: Container with measurements related to the Bladder								
	NL	**Rel with Parent**	**VT**	**Concept Name**	**VM**	**Req Type**	**Condition**	**Value Set Constraint**
1			CONTAINER	DT (121070,DCM, “Findings”)				
2	>	HAS CONCEPT MOD	CODE	EV (363698007, SCT, “Finding Site”)	1	M		(89837001, SCT, "Bladder")
3	>	CONTAINS	INCLUDE	DTID (5016) LHW Volume Group	1	U		$GroupName = EV (89837001, SCT, "Bladder") $FunctionalCondition = EV (109134, DCM, "Prior to voiding") $Width = EV (15299-1, LN, "Bladder Width by US") $Length = EV (15300-7, LN, "Bladder Length by US") $Height = EV (15298-3, LN, "Bladder Height by US") $Volume = EV (15309-8, LN, "Bladder Volume from HWL by US") $VolumeUnits = EV (ml, UCUM, "ml") $DistanceUnits = EV (cm, "UCUM, "cm") or EV (mm, "UCUM, "mm")
4	>	CONTAINS	INCLUDE	DTID (5016) LHW Volume Group	1	U		$GroupName = EV (89837001, SCT, "Bladder") FunctionalCondition = EV (109135, DCM, "Post voiding") $Width = EV (15299-1, LN, "Bladder Width by US") $Length = EV (15300-7, LN, "Bladder Length by US")

								$Height = EV (15298-3, LN, "Bladder Height by US") $Volume = EV (15309-8, LN, "Bladder Volume from HWL by US") $VolumeUnits = EV (ml, UCUM, "ml") $DistanceUnits = EV (cm, "UCUM, "cm") or $DistanceUnits = EV (mm, "UCUM, "mm")
5	>	CONTAINS	INCLUDE	DTID (300) Measurement	1	U		$Measurement = (PC-13002, PC, "Micturated Volume from HWL")
6	>	CONTAINS	INCLUDE	DTID (5016) LHW Volume Group	1	U		$GroupName = EV (89837001, SCT, "Bladder") FunctionalCondition = EV (109134, DCM, "Prior to voiding") $Width = EV (15299-1, LN, "Bladder Width by US") $Height = EV (15298-3, LN, "Bladder Height by US") $Volume = EV (PC-13004, PC, "Bladder Volume from Ellipse by US") $VolumeUnits = EV (ml, UCUM, "ml") $DistanceUnits = EV (cm, "UCUM, "cm") or EV (mm, "UCUM, "mm")
7	>	CONTAINS	INCLUDE	DTID (5016) LHW Volume Group	1	U		$GroupName = EV (89837001, SRT, "Bladder") FunctionalCondition = EV (109135, DCM, "Post voiding") $Width = EV (15299-1, LN, "Bladder Width by US")

								$Height = EV (15298-3, LN, "Bladder Height by US") $Volume = EV (PC-13004, PC, "Bladder Volume from Ellipse by US") $VolumeUnits = EV (ml, UCUM, "ml") $DistanceUnits = EV (cm, "UCUM, "cm") or EV (mm, "UCUM, "mm")
8	>	CONTAINS	INCLUDE	DTID (300) Measurement	1	U		$Measurement = (PC-13003, PC, "Micturated Volume from Ellipse")

Table 8.6-23: TID BK1500 – Renal Measurements

Description: Container with measurements related to the Renal Exam Type								
	NL	**Rel with Parent**	**VT**	**Concept Name**	**VM**	**Req Type**	**Condition**	**Value Set Constraint**
1	>	CONTAINS	INCLUDE	DTID kd03 “Kidney Ultrasound Section”	1	U		
2	>	CONTAINS	INCLUDE	DTID kd10 “Kidney Vascular Ultrasound Section”	1	U		

Table 8.6-24: TID kd03 – Kidney Ultrasound Section

Description: Non-vascular kidney measurements.								
	NL	**Rel with Parent**	**VT**	**Concept Name**	**VM**	**Req Type**	**Condition**	**Value Set Constraint**
1			CONTAINER	DT (121070, DCM, "Findings")	1	M		
2	>	HAS CONCEPT MOD	CODE	EV (363698007, SCT, "Finding Site")	1	M		(64033007, SCT, "Kidney")
3	>	CONTAINS	INCLUDE	DTID 5016 “LWH” Volume Group”	1	U		$GroupName = EV (64033007, SCT, "Kidney")

								$Width = EV (15290-0, LN, "Kidney - right width by US") $Length = EV (15291-8, LN, "Kidney - right length by US") $Height = EV (15289-2, LN, "Kidney - right height by US") $Volume = EV (15305-6, LN, "Kidney - right volume by from HWL (US)") $VolumeUnits = EV (cc, BK, "cc") $DistanceUnits = EV (cm, "UCUM, "cm") or EV (mm, "UCUM, "mm")
4	>	CONTAINS	INCLUDE	DTID 5016 “LWH” Volume Group”	1	U		$GroupName = EV (64033007, SCT, "Kidney") $Width = EV (15287-6, LN, "Kidney - left width by US") $Length = EV (15288-4, LN, "Kidney - left length by US") $Height = EV (15286-8, LN, "Kidney - left height by US") $Volume = EV (15304-9, LN, "Kidney - left volume by from HWL (US)") $VolumeUnits = EV (cc, BK, "cc") $DistanceUnits = EV (cm, "UCUM, "cm") or EV (mm, "UCUM, "mm")

Table 8.6-25: TID kd10 – Kidney Vascular Ultrasound Section

Description: Vascular kidney measurements.								
	NL	**Rel with Parent**	**VT**	**Concept Name**	**VM**	**Req Type**	**Condition**	**Value Set Constraint**
1	>	CONTAINS	INCLUDE	DTID 5103 “Vascular Ultrasound Section”	1	U		$SectionScope = DT (303402001, SCT, "Vascular Structure Of Kidney") $SectionLaterality = EV (7771000, SCT, "Left") $Anatomy = DCID 12115 “Renal Vessels” $AnatomyRatio = DCID 12124 “Renal Ratios”

2	>	CONTAINS	INCLUDE	DTID 5103 “Vascular Ultrasound Section”	1	U		$SectionScope = DT (303402001, SCT, "Vascular Structure Of Kidney") $SectionLaterality = EV (24028007, SCT, "Right") $Anatomy = DCID 12115 “Renal Vessels” $AnatomyRatio = DCID 12124 “Renal Ratios”
3	>	CONTAINS	INCLUDE	DTID 5103 “Vascular Ultrasound Section”	1	U		$SectionScope = DT (118634008, SCT, "Artery of Abdomen") $SectionLaterality = EV (66459002, SCT, "Unilateral") $Anatomy = (7832008, SCT, "Abdominal aorta")

Kidney Measurement Post-Coordination

Section TID k10 – “Kidney Vascular Ultrasound Sections” and Section TID 5104 “Vascular Ultrasound Measurement Group” are used for permutations of these measurement results:

Table 8.6-26: Kidney Vascular Measurement Results

TID 5104 $Measurement				Units		
CSD	**CV**	**CM**	**From CID**	**CSD**	**CV**	**CM**
LN	11726-7	Peak Systolic Velocity	CID 12120	UCUM	cm/s	cm/s
LN	11653-3	End Diastolic Velocity	CID 12120	UCUM	cm/s	cm/s
LN	12008-9	Pulsatility Index	CID 12121	UCUM	1	No units
LN	12023-8	Resistivity Index	CID 12121	UCUM	1	No units

Over these vessel segments:

Table 8.6-27: Kidney Measurement Post-Coordination

TID 5103 $SectionScope			TID 5103 $SectionLaterality			TID 5103 $Anatomy				TID 5104 (106233006, SCT, "Topographical Modifier")				TID 5104 (125101, DCM, "Vessel Branch")			
CSD	**CV**	**CM**	**CSD**	**CV**	**CM**	**CSD**	**CV**	**CM**	**From CID**	**CSD**	**CV**	**CM**	**From CID**	**CSD**	**CV**	**CM**	**From CID**
SCT	303402001	Vascular Structure of Kidney	SCT	7771000	Left	SCT	2841007	Renal Artery	CID 12115	SCT	40415009	Proximal	CID 12116	-	-	-	-
SCT	303402001	Vascular Structure of Kidney	SCT	7771000	Left	SCT	2841007	Renal Artery	CID 12115	SCT	103342007	Mid-longitudinal	CID 12116	-	-	-	-
SCT	303402001	Vascular Structure of Kidney	SCT	7771000	Left	SCT	2841007	Renal Artery	CID 12115	SCT	46053002	Distal	CID 12116				
SCT	303402001	Vascular Structure of Kidney	SCT	7771000	Left	SCT	85383006	Accessory Renal Artery	CID 12115	-	-	-	-	-	-	-	-
SCT	303402001	Vascular Structure of Kidney	SCT	7771000	Left	SCT	274231001	Arcuate Artery of the Kidney	CID 12115	-	-	-	-	-	-	-	-
SCT	303402001	Vascular Structure of Kidney	SCT	7771000	Left	SCT	120234003	Segmental Artery	CID 12115	-	-	-	-	SCT	261089000	Inferior	CID 12117

SCT	303402001	Vascular Structure of Kidney	SCT	7771000	Left	SCT	120234003	Segmental Artery	CID 12115	-	-	-	-	NCIt	C25569	Middle	CID 12117
SCT	303402001	Vascular Structure of Kidney	SCT	7771000	Left	SCT	120234003	Segmental Artery	CID 12115	-	-	-	-	SCTt	264217000	Superior	CID 12117
SCT	303402001	Vascular Structure of Kidney	SCT	7771000	Left	SCT	274143007	Interlobar Artery of Kidney	CID 12115	-	-	-	-	-	-	-	-
SCT	303402001	Vascular Structure of Kidney	SCT	7771000	Left	SCT	274329007	Interlobular Artery of Kidney	CID 12115	-	-	-	-	-	-	-	-
SCT	303402001	Vascular Structure of Kidney	SCT	7771000	Left	SCT	397405001	Hilar Artery	CID 12115	-	-	-	-	-	-	-	-
SCT	303402001	Vascular Structure of Kidney	SCT	24028007	Right	SCT	2841007	Renal Artery	CID 12115	SCT	40415009	Proximal	CID 12116	-	-	-	-
SCT	303402001	Vascular Structure of Kidney	SCT	24028007	Right	SCT	2841007	Renal Artery	CID 12115	SCT	103342007	Mid-longitudinal	CID 12116	-	-	-	-
SCT	303402001	Vascular Structure	SCT	24028007	Right	SCT	2841007	Renal Artery	CID 12115	SCT	46053002	Distal	CID 12116				

		of Kidney															
SCT	303402001	Vascular Structure of Kidney	SCT	24028007	Right	SCT	85383006	Accessory Renal Artery	CID 12115	-	-	-	-	-	-	-	-
SCT	303402001	Vascular Structure of Kidney	SCT	24028007	Right	SCT	274231001	Arcuate Artery of the Kidney	CID 12115	-	-	-	-	-	-	-	-
SCT	303402001	Vascular Structure of Kidney	SCT	24028007	Right	SCT	120234003	Segmental Artery	CID 12115	-	-	-	-	SCT	261089000	Inferior	CID 12117
SCT	303402001	Vascular Structure of Kidney	SCT	24028007	Right	SCT	120234003	Segmental Artery	CID 12115	-	-	-	-	NCIt	C25569	Middle	CID 12117
SCT	303402001	Vascular Structure of Kidney	SCT	24028007	Right	SCT	120234003	Segmental Artery	CID 12115	-	-	-	-	SCTt	264217000	Superior	CID 12117
SCT	303402001	Vascular Structure of Kidney	SCT	24028007	Right	SCT	274143007	Interlobar Artery of Kidney	CID 12115	-	-	-	-	-	-	-	-
SCT	303402001	Vascular Structure of Kidney	SCT	24028007	Right	SCT	274329007	Interlobular Artery of Kidney	CID 12115	-	-	-	-	-	-	-	-

SCT	303402001	Vascular Structure of Kidney	SCT	24028007	Right	SCT	397405001	Hilar Artery	CID 12115	-	-	-	-	-	-	-	-
SCT	118634008	Artery of Abdomen	SCT	66459002	Unilateral	SCT	7832008	Abdominal Aorta	CID 12112	SCT	40415009	Proximal	CID 12116	-	-	-	-
SCT	118634008	Artery of Abdomen	SCT	66459002	Unilateral	SCT	7832008	Abdominal Aorta	CID 12112	SCT	103342007	Mid-longitudinal	CID 12116	-	-	-	-
SCT	118634008	Artery of Abdomen	SCT	66459002	Unilateral	SCT	7832008	Abdominal Aorta	CID 12112	SCT	46053002	Distal	CID 12116	-	-	-	-

Table 8.6-28: TID BK1600 – Testis Measurements

Description: Testis calc package measurements								
	NL	**Rel with Parent**	**VT**	**Concept Name**	**VM**	**Req Type**	**Condition**	**Value Set Constraint**
1	>	CONTAINS	INCLUDE	DTID te03 “Testis Ultrasound Section”	1	U		
2	>	CONTAINS	INCLUDE	DTID ep03 “Epididymis Ultrasound Section”	1	U		
3	>	CONTAINS	INCLUDE	DTID sc03 “Scrotum Ultrasound Section”	1	U		

Table 8.6-29: TID te03 – Testis Ultrasound Section

Description: Testis measurements								
	NL	**Rel with Parent**	**VT**	**Concept Name**	**VM**	**Req Type**	**Condition**	**Value Set Constraint**
1			CONTAINER	DT (121070, DCM, "Findings")	1	M		
2	>	HAS CONCEPT MOD	CODE	EV (363698007, SCT, "Finding Site")	1	M		(40689003, SCT, "Testis")
3	>	CONTAINS	INCLUDE	DTID 5016 “LWH Volume Group”	1	U		$GroupName = EV (40689003, SCT, "Testis") $Width = EV (15296-7, LN, "Testis - right Width by US") $Length = EV (15297-5, LN, "Testis - right Length by US") $Height = EV (15295-9, LN, "Testis - right Height by US") $Volume = EV (15307-2, LN, "Testis - right Volume by derived from height, width and length (US)") $VolumeUnits = EV (cc, BK, "cc") $DistanceUnits = EV (cm, "UCUM, "cm") or EV (mm, "UCUM, "mm")

4	>	CONTAINS	INCLUDE	DTID 5016 “LWH Volume Group”	1	U		$GroupName = EV (40689003, SCT, "Testis") $Width = EV ("15293-4, LN, "Testis - left Width by US") $Length = EV (15294-2, LN, "Testis - left Length by US") $Height = EV (15292-6, LN, "Testis - left Height by US") $Volume = EV (15306-4, LN, "Testis - left Volume by derived from height, width and length (US)") $VolumeUnits = EV (cc, BK, "cc") $DistanceUnits = EV (cm, "UCUM, "cm") or EV (mm, "UCUM, "mm")

Table 8.6-30: TID ep03 – Epididymis Ultrasound Section

Description: Epididymis measurements								
	NL	**Rel with Parent**	**VT**	**Concept Name**	**VM**	**Req Type**	**Condition**	**Value Set Constraint**
1			CONTAINER	DT (121070, DCM, "Findings")	1	M		
2	>	HAS CONCEPT MOD	CODE	EV (363698007, SCT, "Finding Site")	1	M		(87644002, SCT, "Epididymis")
3	>	CONTAINS	INCLUDE	DTID 5016 “LWH Volume Group”	1	U		$GroupName = EV (87644002, SCT, "Epididymis") $Width = EV (EP-00101, 99BKMED, "Epididymis - right Width by US") $Length = EV (EP-00102, 99BKMED, "Epididymis - right Length by US") $Height = EV (EP-00103, 99BKMED, "Epididymis - right Height by US") $Volume = EV (EP-00104, 99BKMED, "Epididymis - right Volume by HWL (US)")

								$VolumeUnits = EV (cc, BK, "cc") $DistanceUnits = EV (cm, "UCUM, "cm") or EV (mm, "UCUM, "mm")
4	>	CONTAINS	INCLUDE	DTID 5016 “LWH Volume Group”	1	U		$GroupName = EV (87644002, SCT, "Epididymis") $Width = EV (EP-00111, 99BKMED, "Epididymis - left Width by US") $Length = EV (EP-00112, 99BKMED, "Epididymis - left Length by US") $Height = EV (EP-00113, 99BKMED, "Epididymis - left Height by US") $Volume = EV (EP-00114, 99BKMED, "Epididymis - left Volume by HWL (US)") $VolumeUnits = EV (cc, BK, "cc") $DistanceUnits = EV (cm, "UCUM, "cm") or EV (mm, "UCUM, "mm")

Table 8.6-31: TID sc03 – Scrotum Ultrasound Section

Description: Scrotum measurements								
	NL	**Rel with Parent**	**VT**	**Concept Name**	**VM**	**Req Type**	**Condition**	**Value Set Constraint**
1			CONTAINER	DT (121070, DCM, "Findings")	1	M		
2	>	HAS CONCEPT MOD	CODE	EV (363698007, SCT, "Finding Site")	1	M		(20233005, SCT, "Scrotum")
3	>	CONTAINS	INCLUDE	DTID BK300 “Measurement Result”	1	U		$Measurement = (SC-00201, 99BKMED, "Scrotum skin thickness - right by US") $Units = EV (cm, "UCUM, "cm") or EV (mm, "UCUM, "mm") $TargetSite = EV (81992007, SCT, "Skin of scrotum")

								$TargetSiteLaterality = EV (24028007, SCT, "Right")
4	>	CONTAINS	INCLUDE	DTID BK300 “Measurement Result”	1	U		$Measurement = (SC-00201, 99BKMED, "Scrotum skin thickness - right by US") $Units = EV (cm, "UCUM, "cm") or EV (mm, "UCUM, "mm") $TargetSite = EV (81992007, SCT, "Skin of scrotum") $TargetSiteLaterality = EV (7771000, SCT, "Left")

Table 8.6-32: TID BK1700 – Breast Measurements

Description: Breast measurements								
	NL	**Rel with Parent**	**VT**	**Concept Name**	**VM**	**Req Type**	**Condition**	**Value Set Constraint**
1			CONTAINER	DT (121070, DCM, "Findings")	1	M		
2	>	HAS CONCEPT MOD	CODE	EV (363698007, SCT, "Finding Site")	1	M		(76752008, SCT, "Breast")
3	>	CONTAINS	INCLUDE	DTID 5016 “LWH Volume Group”	1-n	U		$GroupName = EV (80248007, SCT, "Left breast") $FindingType = EV (52988006, SCT, "Lesion") $Width = EV (103355008, SCT, "Width") $Length = EV (410668003, SCT, "Length") $Height = EV (121207, DCM, "Height") $Volume = EV (121221, DCM, "Volume of ellipsoid") $VolumeUnits = EV (cc, BK, "cc") $DistanceUnits = EV (cm, "UCUM, "cm") or EV (mm, "UCUM, "mm")

4	>	CONTAINS	INCLUDE	DTID 5016 “LWH Volume Group”	1-n	U		$GroupName = EV (73056007, SCT, "Right breast") $FindingType = EV (52988006, SCT, "Lesion") $Width = EV (103355008, SCT, "Width") $Length = EV (410668003, SCT, "Length") $Height = EV (121207, DCM, "Height") $Volume = EV (121221, DCM, "Volume of ellipsoid") $VolumeUnits = EV (cc, BK, "cc") $DistanceUnits = EV (cm, "UCUM, "cm") or EV (mm, "UCUM, "mm")

Table 8.6-33: TID BK1800 – Thyroid Measurements

Description:

Thyroid measurements

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	DT (121070, DCM, "Findings")	1	M		
2	>	HAS CONCEPT MOD	CODE	EV (363698007, SCT, "Finding Site")	1	M		(69748006, SCT, "Thyroid")
3	>	CONTAINS	INCLUDE	DTID 5016 “LWH Volume Group”	1-n	U		$GroupName = EV (79163004, SCT, "Left lobe of thyroid") $FindingType = EV (27925004, SCT, "Nodule") $Width = EV (103355008, SCT, "Width") $Length = EV (410668003, SCT, "Length") $Height = EV (121207, DCM, "Height") $Volume = EV (121221, DCM, "Volume of ellipsoid") $VolumeUnits = EV (cc, BK, "cc")

								$DistanceUnits = EV (cm, "UCUM, "cm") or EV (mm, "UCUM, "mm")
4	>	CONTAINS	INCLUDE	DTID 5016 “LWH Volume Group”	1-n	U		$GroupName = EV (29565003, SCT, "Right lobe of thyroid") $FindingType = EV (27925004, SCT, "Nodule") $Width = EV (103355008, SCT, "Width") $Length = EV (410668003, SCT, "Length") $Height = EV (121207, DCM, "Height") $Volume = EV (121221, DCM, "Volume of ellipsoid") $VolumeUnits = EV (cc, BK, "cc") $DistanceUnits = EV (cm, "UCUM, "cm") or EV (mm, "UCUM, "mm")
5	>	CONTAINS	INCLUDE	DTID 5016 “LWH Volume Group”	1	U		$GroupName = EV (79163004, SCT, "Left lobe of thyroid") $FindingType = EV (119281005, SCT, "Lobe of thyroid") $Width = EV (103355008, SCT, "Width") $Length = EV (410668003, SCT, "Length") $Height = EV (121207, DCM, "Height") $Volume = EV (121221, DCM, "Volume of ellipsoid") $VolumeUnits = EV (cc, BK, "cc") $DistanceUnits = EV (cm, "UCUM, "cm") or EV (mm, "UCUM, "mm")
6	>	CONTAINS	INCLUDE	DTID 5016 “LWH Volume Group”	1	U		$GroupName = EV (29565003, SCT, "Right lobe of thyroid") $FindingType = EV (119281005, SCT, "Lobe of thyroid")

								$Width = EV (103355008, SCT, "Width") $Length = EV (410668003, SCT, "Length") $Height = EV (121207, DCM, "Height") $Volume = EV (121221, DCM, "Volume of ellipsoid") $VolumeUnits = EV (cc, BK, "cc") $DistanceUnits = EV (cm, "UCUM, "cm") or EV (mm, "UCUM, "mm")
7	>	CONTAINS	INCLUDE	DTID 1501 “Measurement and Qualitative Evaluation Group”	1	U		$Measurement = DT (410668003, SCT, "Length") $Units = EV (cm, "UCUM, "cm") or EV (mm, "UCUM, "mm") $TargetSite = EV (40867004, SCT, "Thyroid isthmus") $FindingType = EV (362892003, SCT, "Thyroid part")

Table 8.6-34: TID BK1900 – OB-GYN Measurements

Description: OB-GYN measurements								
	NL	**Rel with Parent**	**VT**	**Concept Name**	**VM**	**Req Type**	**Condition**	**Value Set Constraint**
1	>	CONTAINS	INCLUDE	DTID 5002 “OB-GYN Procedure Summary Section”	1	U		
2	>	CONTAINS	INCLUDE	DTID 5005 “Fetal Biometry Section”	1	U		
3	>	CONTAINS	INCLUDE	DTID 5006 “Fetal Long Bones Section”	1	U		
4	>	CONTAINS	INCLUDE	DTID 5007 “Fetal Cranium Section”	1	U		
5	>	CONTAINS	INCLUDE	DTID 5011 “Early Gestation Section”	1	U		
6	>	CONTAINS	INCLUDE	DTID 5010 “Amniotic Sac Section”	1	U		

7	>	CONTAINS	INCLUDE	DTID 5015 “Pelvis and Uterus Section”	1	U		
8	>	CONTAINS	INCLUDE	DTID 5012 “Ovaries Section”	1	U		
9	>	CONTAINS	INCLUDE	DTID 5013 “Follicles Section”	1	U		$Laterality = EV (7771000, SCT, "Left")
10	>	CONTAINS	INCLUDE	DTID 5013 “Follicles Section”	1	U		$Laterality = EV (24028007, SCT, "Right")
11	>	CONTAINS	CONTAINER	EV (121070, DCM, "Findings")	1	U		
12	>>	HAS CONCEPT MOD	CODE	EV (363698007, SCT, "Finding Site")	1	M		EV (281496003, SCT, "Pelvic Vascular Structure")
13	>>	CONTAINS	INCLUDE	DTID 5026 “OB-GYN Pelvic Vascular Ultrasound Measurement Group”	1-n	M		$AnatomyGroup = DCID 12140 “Pelvic Vasculature Anatomical Location”

OB-GYN Measurement Post-Coordination

Section TID 5002 “OB-GYN Procedure Summary Section”, Section TID 5003 “OB-GYN Fetus Summary”, Section TID 5005 “Fetal Biometry Section”, Section TID 5006 “Fetal Long Bones Section”, Section TID 5007 “Fetal Cranium Section”, Section TID 5010 “Amniotic Sac Section”, Section 5011 “Early Gestation Section”, Section TID 5015 “Pelvis and Uterus Section” are used for permutations of these measurements:

Table 8.6-35: OB-GYN Biometric Measurement Post-Coordination

Section	$BiometryType or $Measurement				$TargetSite			
	CSD	CV	CM	From CID	CSD	CV	CM	From CID
TID 5002 OB-GYN Procedure Summary Section > TID 5003 OB-GYN Fetus Summary	LN	11885-1	Gestational Age by LMP	CID 12019 OB-GYN Fetus Summary	-	-	-	-
TID 5002 OB-GYN Procedure Summary Section > TID 5003 OB-GYN Fetus Summary	LN	11888-5	Composite Ultrasound Age	CID 12019 OB-GYN Fetus Summary	-	-	-	-
TID 5002 OB-GYN Procedure Summary Section > TID 5003 OB-GYN Fetus Summary	LN	11727-5	Estimated Weight	CID 12019 OB-GYN Fetus Summary	-	-	-	-

TID 5002 OB-GYN Procedure Summary Section > TID 5003 OB-GYN Fetus Summary	99BKMED	OB-00001	Estimated Weight Author	CID 12019 OB-GYN Fetus Summary	-	-	-	-
TID 5002 OB-GYN Procedure Summary Section > TID 5003 OB-GYN Fetus Summary	LN	11948-7	Fetal Heart Rate	CID 12019 OB-GYN Fetus Summary	-	-	-	-
TID 5005 Fetal Biometry Section	LN	11820-8	Biparietal Diameter	CID 12005 Fetal Biometry Measurements	SCT	89546000	Skull	CID 12020 Fetal Biometry Anatomic Sites
TID 5005 Fetal Biometry Section	LN	11851-3	Occipital-Frontal Diameter	CID 12005 Fetal Biometry Measurements	SCT	89546000	Skull	CID 12020 Fetal Biometry Anatomic Sites
TID 5005 Fetal Biometry Section	LN	11984-2	Head Circumference	CID 12005 Fetal Biometry Measurements	SCT	89546000	Skull	CID 12020 Fetal Biometry Anatomic Sites
TID 5005 Fetal Biometry Section	LN	11979-2	Abdominal Circumference	CID 12005 Fetal Biometry Measurements	SCT	113345001	Abdomen	CID 12020 Fetal Biometry Anatomic Sites
TID 5005 Fetal Biometry Section	LN	11963-6	Femur Length	CID 12005 Fetal Biometry Measurements	SCT	71341001	Femur	CID 12020 Fetal Biometry Anatomic Sites
TID 5005 Fetal Biometry Section	LN	11818-2	Anterior-Posterior Abdominal Diameter	CID 12005 Fetal Biometry Measurements	SCT	113345001	Abdomen	CID 12020 Fetal Biometry Anatomic Sites
TID 5005 Fetal Biometry Section	LN	11862-0	Transverse Abdominal Diameter	CID 12005 Fetal Biometry Measurements	SCT	113345001	Abdomen	CID 12020 Fetal Biometry Anatomic Sites
TID 5005 Fetal Biometry Section	99BKMED	CM-94761	Mean Abdominal Diameter	CID 12005 Fetal Biometry Measurements	SCT	113345001	Abdomen	CID 12020 Fetal Biometry Anatomic Sites
TID 5005 Fetal Biometry Section	LN	11965-1	Foot Length	CID 12005 Fetal Biometry Measurements	SCT	56459004	Foot	CID 12020 Fetal Biometry Anatomic Sites
TID 5006 Fetal Long Bones Section	LN	11962-8	Clavicle length	CID 12006 Fetal Long Bones Biometry Measurements	SCT	51299004	Clavicle	CID 12021 Fetal Long Bone Anatomic Sites

TID 5006 Fetal Long Bones Section	LN	11966-9	Humerus length	CID 12006 Fetal Long Bones Biometry Measurements	SCT	85050009	Humerus	CID 12021 Fetal Long Bone Anatomic Sites
TID 5006 Fetal Long Bones Section	LN	11969-3	Ulna length	CID 12006 Fetal Long Bones Biometry Measurements	SCT	23416004	Ulna	CID 12021 Fetal Long Bone Anatomic Sites
TID 5006 Fetal Long Bones Section	LN	11968-5	Tibia length	CID 12006 Fetal Long Bones Biometry Measurements	SCT	12611008	Tibia	CID 12021 Fetal Long Bone Anatomic Sites
TID 5006 Fetal Long Bones Section	LN	11964-4	Fibula length	CID 12006 Fetal Long Bones Biometry Measurements	SCT	87342007	Fibula	CID 12021 Fetal Long Bone Anatomic Sites
TID 5007 Fetal Cranium Section	LN	12171-5	Lateral Ventricle width	CID 12007 Fetal Cranium	SCT	66720007	Lateral Ventricle	CID 12022 Fetal Cranium Anatomic Sites
TID 5007 Fetal Cranium Section	LN	11863-8	Transverse Cerebellar Diameter	CID 12007 Fetal Cranium	SCT	113305005	Cerebellum	CID 12022 Fetal Cranium Anatomic Sites
TID 5007 Fetal Cranium Section	LN	11860-4	Cisterna Magna length	CID 12007 Fetal Cranium	SCT	54165005	Cisterna Magna	CID 12022 Fetal Cranium Anatomic Sites
TID 5007 Fetal Cranium Section	LN	12146-7	Nuchal Fold thickness	CID 12007 Fetal Cranium	SCT	700032006	Occipital region of scalp	CID 12022 Fetal Cranium Anatomic Sites
TID 5007 Fetal Cranium Section	LN	11629-3	Binocular Distance	CID 12007 Fetal Cranium	SCT	363654007	Orbit	CID 12022 Fetal Cranium Anatomic Sites
TID 5011 Early Gestation Section	LN	11850-5	Gestational Sac Diameter	CID 12009 Early Gestation Biometry Measurements	-	-	-	-
TID 5011 Early Gestation Section	LN	11957-8	Crown Rump Length	CID 12009 Early Gestation Biometry Measurements	-	-	-	-
TID 5011 Early Gestation Section	LN	11816-6	Yolk Sac length	CID 12009 Early Gestation Biometry Measurements	-	-	-	-
TID 5011 Early Gestation Section	LN	33069-6	Nuchal Translucency	CID 12009 Early Gestation	-	-	-	-

				Biometry Measurements				
TID 5010 Amniotic Sac Section	LN	11627-7	Amniotic Fluid Index		-	-	-	-
TID 5010 Amniotic Sac Section	LN	11626-9	Second Quadrant Diameter (LUQ)	CID 12008 OB-GYN Amniotic Sac	-	-	-	-
TID 5010 Amniotic Sac Section	LN	11625-1	Third Quadrant Diameter (LLQ)	CID 12008 OB-GYN Amniotic Sac	-	-	-	-
TID 5010 Amniotic Sac Section	LN	11624-4	First Quadrant Diameter (RUQ)	CID 12008 OB-GYN Amniotic Sac	-	-	-	-
TID 5010 Amniotic Sac Section	LN	11623-6	Fourth Quadrant Diameter (RLQ)	CID 12008 OB-GYN Amniotic Sac	-	-	-	-
TID 5015 Pelvis and Uterus Section	LN	11961-0	Cervix Length	CID 12011 Ultrasound Pelvis and Uterus	SCT	71252005	Cervix	CID 12023 Pelvis and Uterus Anatomic Sites
TID 5015 Pelvis and Uterus Section	LN	12145-9	Endometrium Thickness	CID 12011 Ultrasound Pelvis and Uterus	SCT	2739003	Endometrium	CID 12023 Pelvis and Uterus Anatomic Sites

OB-GYN Vascular Post-Coordination

Section TID 5026 “OB-GYN Pelvic Vascular Ultrasound Measurement Group” is used for permutations of these measurements:

Table 8.6-36: OB-GYN Arteral Measurement Results

TID 5026 $MeasType				Units		
CSD	**CV**	**CM**	**From CID**	**CSD**	**CV**	**CM**
LN	11726-7	Peak Systolic Velocity	CID 12120	UCUM	cm/s	cm/s
LN	11653-3	End Diastolic Velocity	CID 12120	UCUM	cm/s	cm/s
LN	12023-8	Resistivity Index	CID 12121	UCUM	1	No units
LN	12144-2	Systolic to Diastolic Velocity Ratio	CID 12121	UCUM	1	No units

Over these vessels:

Table 8.6-37: OB-GYN Arterial Measurement Post-Coordination

TID 5025 $Laterality			TID 5026 $AnatomyGroup			
CSD	**CV**	**CM**	**CSD**	**CV**	**CM**	**From CID**
SCT	24028007	Right	SCT	12052000	Ovarian Artery	CID 12140
SCT	7771000	Left	SCT	12052000	Ovarian Artery	CID 12140
SCT	24028007	Right	SCT	91079009	Uterine Artery	CID 12140
SCT	7771000	Left	SCT	91079009	Uterine Artery	CID 12140
-	-	-	SCT	50536004	Umbilical Artery	CID 12140

Table 8.6-38: TID BK300 – Measurement Result

Description:

Container which holds a measurement result

Parameters:

$Measurement	Coded term or Context Group for Concept Name of measurement
$Units	Units of measurement
$TargetSite	Value(s) for Anatomic Location of measurement
$TargetSiteLaterality	Laterality Value for Anatomic Location of Measurement
$Method	Value for Measurement Method
$Derivation	Derivation of Measurement

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	DT (PC-10000, PC, “Result”)	1	M		
2	>	CONTAINS	NUM	$Measurement	1	M		UNITS = $Units
3	>	HAS CONCEPT MOD	CODE	EV (363698007, SCT, “Finding Site”)	1-n	U		$TargetSite
4	>	HAS CONCEPT MOD	CODE	EV (272741003, SCT, "Laterality")	1	U		$TargetSiteLaterality
5	>	HAS CONCEPT MOD	CODE	EV (370129005, SCT, "Measurement Method")	1	U		$Method
6	>	HAS CONCEPT	CODE	EV (121401, DCM, “Derivation”)	1	U		$Derivation

		MOD						

Table 8.6-39: TID 1501 –Measurement and Qualitative Evaluation Group

Description:

Measurement and Qualitative Evaluation Group

Parameters:

$Measurement	Coded term or Context Group for Concept Name of measurement
$Volume	Concept name of volume measurement
$Units	Units of measurement
$TargetSite	Value(s) for Anatomic Location of measurement
$FindingType	Type of the finding

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	EV (125007, DCM, "Measurement Group")	1	M		
2	>	HAS OBS CONTEXT	TEXT	DT (112039, DCM, "Tracking Identifier")	1	U		
3	>	HAS OBS CONTEXT	UIDREF	EV (112040, DCM, "Tracking Unique Identifier")	1	U		
3b	>	CONTAINS	CODE	EV (121071, DCM, "Finding")	1	U		$FindingType
10	>	CONTAINS	INCLUDE	DTID (BK300) Measurement Result	1-n	U		$Measurement = $Measurement $TargetSite = $TargetSite $Units = $Units

Table 8.6-40: TID 5002 - OB-GYN Procedure Summary Section

Description:

OB-GYN Procedure Summary Section

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	DT (121111, DCM, "Summary")	1	M		
2	>	CONTAINS	DATE	DCID 12003 “OB-GYN Dates”	1-n	U		

6	>	CONTAINS	INCLUDE	BTID 5003 “OB-GYN Fetus Summary”	1-n	UC	No more than 1 inclusion per fetus	

Table 8.6-41: TID 5003 - OB-GYN Procedure Fetus Summary

Description: OB-GYN Fetus Summary Section								
	NL	**Rel with Parent**	**VT**	**Concept Name**	**VM**	**Req Type**	**Condition**	**Value Set Constraint**
1			CONTAINER	DT (125008, DCM, "Fetus Summary")	1	M		
2	>	HAS OBS CONTEXT	TEXT	EV (11951-1, LN, “Fetus ID”)	1	MC	IF this Template is invoked more than once to describe more than one fetus	
5	>	CONTAINS	INCLUDE	DTID 300 “Measurement”	1-n	U		$Measurement = DCID 12019 “OB-GYN Fetus Summary”

Table 8.6-42: TID 5005 – Fetal Biometry Section

Description: OB-GYN Fetal Biometry Section								
	NL	**Rel with Parent**	**VT**	**Concept Name**	**VM**	**Req Type**	**Condition**	**Value Set Constraint**
1			CONTAINER	DT (125002, DCM, "Fetal Biometry")	1	M		
2	>	HAS OBS CONTEXT	TEXT	EV (11951-1, LN, “Fetus ID”)	1	MC	IF this Template is invoked more than once to describe more than one fetus	
3	>	CONTAINS	INCLUDE	DTID 5008 “Fetal Biometry Group”	1-n	M		$BiometryType = MemberOf {DCID 12005 “Fetal Biometry Measurements”}

								$TargetSite = DCID 12020 “Fetal Biometry Anatomic Sites”

Table 8.6-43: TID 5006 - Fetal Long Bones Section

Description: OB-GYN Fetal Long Bones Section								
	NL	**Rel with Parent**	**VT**	**Concept Name**	**VM**	**Req Type**	**Condition**	**Value Set Constraint**
1			CONTAINER	DT (125003, DCM, "Fetal Long Bones")	1	M		
2	>	HAS OBS CONTEXT	TEXT	EV (11951-1, LN, “Fetus ID”)	1	MC	IF this Template is invoked more than once to describe more than one fetus	
3	>	CONTAINS	INCLUDE	DTID 5008 “Fetal Biometry Group”	1-n	M		$BiometryType = MemberOf {DCID 12006 “Fetal Long Bones Biometry Measurements”} $TargetSite = DCID 12021 “Fetal Long Bone Anatomic Sites”

Table 8.6-44: TID 5007 - Fetal Cranium Section

Description: OB-GYN Fetal Cranium Section								
	NL	**Rel with Parent**	**VT**	**Concept Name**	**VM**	**Req Type**	**Condition**	**Value Set Constraint**
1			CONTAINER	DT (125004, DCM, "Fetal Cranium")	1	M		
2	>	HAS OBS CONTEXT	TEXT	EV (11951-1, LN, “Fetus ID”)	1	MC	IF this Template is invoked more than once to describe more than one fetus	

3	>	CONTAINS	INCLUDE	DTID 5008 “Fetal Biometry Group”	1-n	M		$BiometryType = MemberOf {DCID 12007 “Fetal Cranium”} $TargetSite = DCID 12022 “Fetal Cranium Anatomic Sites”

Table 8.6-45: TID 5008 - Fetal Biometry Group

Description:

The Fetal Biometry Group template is a container for a biometric value and its associated growth metrics.

Parameters:

$BiometryType	The concept name of the biometry measurement
$TargetSite	Value for Anatomic Location of the biometry measurement

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	DT (125005, DCM, "Biometry Group")	1	M		
2	>	CONTAINS	INCLUDE	DTID BK300 “Measurement Result”	1-n	MC	At least one of row 2 and 3 shall be present	$Measurement = $BiometryType $TargetSite = $TargetSite
3	>	CONTAINS	NUM	EV (18185-9, LN, “Gestational Age”)	1	M	At least one of row 2 and 3 shall be present	UNITS = EV (d, UCUM, “days”)
3b	>	CONTAINS	TEXT	EV (OB-00101, 99BKMED, “Gestational Age Author”)	1	MC	Present IF Row 3 is present	

Table 8.6-46: TID 5010 - Amniotic Sac Section

Description:

A container for amniotic sac quadrant diameters and a derived index

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	DT (121070, DCM, "Findings")	1	M		
2	>	HAS CONCEPT MOD	CODE	EV (363698007, SCT, "Finding Site")	1	M		DT (70847004, SCT, "Amniotic Sac")

3	>	CONTAINS	INCLUDE	DTID 300 “Measurement”	1	M		$Measurement = DT (11627-7, LN, "Amniotic Fluid Index")
4	>	CONTAINS	INCLUDE	DTID 300 “Measurement”	4	U		$Measurement = DCID 12008 “OB-GYN Amniotic Sac”

Table 8.6-47: TID 5011 - Early Gestation Section

Description: OB-GYN Early Gestation								
	NL	**Rel with Parent**	**VT**	**Concept Name**	**VM**	**Req Type**	**Condition**	**Value Set Constraint**
1			CONTAINER	DT (125009, DCM, "Early Gestation")	1	M		
2	>	HAS OBS CONTEXT	TEXT	EV (11951-1, LN, “Fetus ID”)	1	MC	IF this Template is invoked more than once to describe more than one fetus	
3	>	CONTAINS	INCLUDE	DTID 5008 “Fetal Biometry Group”	1-n	M		$BiometryType = MemberOf {DCID 12009 “Early Gestation Biometry Measurements”}

Table 8.6-48: CID 5012 - Ovaries Section

Description: OB-GYN Ovarian findings, other than follicles								
	NL	**Rel with Parent**	**VT**	**Concept Name**	**VM**	**Req Type**	**Condition**	**Value Set Constraint**
1			CONTAINER	DT (121070, DCM, "Findings")	1	M		
2	>	HAS CONCEPT MOD	CODE	EV (363698007, SCT, "Finding Site")	1	M		DT (15497006, SCT, "Ovary")
3	>	CONTAINS	INCLUDE	DTID 5016 “LWH Volume Group”	1	U		$GroupName = EV (15497006, SCT, "Ovary") $Width = EV (11829-9, LN, "Left Ovary Width")

								$Length = EV (11840-6, LN, "Left Ovary Length") $Height = EV (11857-0, LN, "Left Ovary Height") $Volume = EV (12164-0, LN, "Left Ovary Volume") $VolumeUnits = EV (cc, BK, "cc") $DistanceUnits = EV (cm, "UCUM, "cm") or EV (mm, "UCUM, "mm")
4	>	CONTAINS	INCLUDE	DTID 5016 “LWH Volume Group”	1	U		$GroupName = EV (15497006, SCT, "Ovary") $Width = EV (11830-7, LN, "Right Ovary Width") $Length = EV (11841-4, LN, "Right Ovary Length") $Height = EV (11858-8, LN, "Right Ovary Height") $Volume = EV (12165-7, LN, "Right Ovary Volume") $VolumeUnits = EV (cc, BK, "cc") $DistanceUnits = EV (cm, "UCUM, "cm") or EV (mm, "UCUM, "mm")
5	>	CONTAINS	INCLUDE	DTID 5016 “LWH Volume Group”	1-n	U		$GroupName = EV (15497006, SCT, "Ovary") $Laterality = EV (7771000, SCT, "Left") $FindingType = EV (52988006, SCT, "Lesion") $Width = EV (103355008, SCT, "Width") $Length = EV (410668003, SCT, "Length") $Height = EV (121207, DCM, "Height") $Volume = EV (121221, DCM, "Volume of ellipsoid") $VolumeUnits = EV (cc, BK, "cc")

								$DistanceUnits = EV (cm, "UCUM, "cm") or EV (mm, "UCUM, "mm")
6	>	CONTAINS	INCLUDE	DTID 5016 “LWH Volume Group”	1-n	U		$GroupName = EV (15497006, SCT, "Ovary") $Laterality = EV (24028007, SCT, "Right") $FindingType = EV (52988006, SCT, "Lesion") $Width = EV (103355008, SCT, "Width") $Length = EV (410668003, SCT, "Length") $Height = EV (121207, DCM, "Height") $Volume = EV (121221, DCM, "Volume of ellipsoid") $VolumeUnits = EV (cc, BK, "cc") $DistanceUnits = EV (cm, "UCUM, "cm") or EV (mm, "UCUM, "mm")
7	>	CONTAINS	INCLUDE	DTID 300 “Measurement”	1	U		$Measurement = EV (CM-94801, 99BKMED, "Left Corpus Luteum Diameter") $Units = EV (cm, "UCUM, "cm") or EV (mm, "UCUM, "mm")
8	>	CONTAINS	INCLUDE	DTID 300 “Measurement”	1	U		$Measurement = EV (CM-94802, 99BKMED, "Right Corpus Luteum Diameter") $Units = EV (cm, "UCUM, "cm") or EV (mm, "UCUM, "mm")

Table 8.6-49: TID 5013 - Follicles Section

Description:	
Follicle metrics for left or right ovarian follicles.	
Parameters:	
$Laterality	Ovary laterality

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	DT (121070, DCM, "Findings")	1	M		
2	>	HAS CONCEPT MOD	CODE	EV (363698007, SCT, "Finding Site")	1	M		DT (24162005, SCT, "Ovarian Follicle")
3	>	HAS CONCEPT MOD	CODE	EV (272741003, SCT, "Laterality")	1	M		$Laterality
5	>	CONTAINS	INCLUDE	DTID 5014 “Follicle Measurement Group”	1-n	U		
6	>	CONTAINS	INCLUDE	DTID 5016 “LWH Volume Group”	1-n	U		$GroupName = EV (24162005, SCT, "Ovarian Follicle") $Width = EV (103355008, SCT, "Width") $Length = EV (410668003, SCT, "Length") $Height = EV (121207, DCM, "Height") $Volume = EV (121221, DCM, "Volume of ellipsoid") $VolumeUnits = EV (ml, UCUM, "ml") $DistanceUnits = EV (cm, "UCUM, "cm") or EV (mm, "UCUM, "mm") $Method = EV(87982008, SCT, “Manual”
7	>>	CONTAINS	INCLUDE	DTID BK300 “Measurement Result”	1	MC	IFF Row 6 is included	$Measurement = EV(11793-7, LN, “Follicle Diameter”) $Units = EV(cm, UCUM, “cm”) or EV (mm, UCUM, “mm”) $Method = EV (87982008, SCT, “Manual”) $Dervivation = EV (56851009, SCT, “Maximum”)

Table 8.6-50: TID 5014 - Follicle Measurement Group

Description:

Follicle metrics for one ovarian follicle.

Parameters:

$Laterality Ovary laterality

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	EV (125007, DCM, "Measurement Group")	1	M		
2	>	HAS OBS CONTEXT	TEXT	EV (125010, DCM, "Identifier")	1	M		Unique among all groups of same laterality
4	>	CONTAINS	INCLUDE	DTID BK300 “Measurement Result”	1-n	U		$Measurement = EV (11793-7, LN, "Follicle Diameter") $Units = EV (cm, "UCUM, "cm") or EV(mm, UCUM, “mm”) $Method = DCID am01 “Automation of Measurement” $Derivation = DCID de01 “Derivation of Measurement”

Table 8.6-51: TID 5015 - Pelvis and Uterus Section

Description:

General measurements in the pelvis and uterus.

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	DT (125011, DCM, "Pelvis and Uterus")	1	M		
2	>	CONTAINS	INCLUDE	DTID 5016 “LWH Volume Group”	1	U		$GroupName = EV (35039007, SCT, "Uterus") $Width = EV (11865-3, LN, "Uterus Width") $Length = EV (11842-2, LN, "Uterus Length") $Height = EV (11859-6, LN, "Uterus Height") $Volume = EV (33192-6, LN, "Uterus Volume") $VolumeUnits = EV (cc, BK, "cc")

								$DistanceUnits = EV (cm, "UCUM, "cm") or EV (mm, "UCUM, "mm")
2b	>	CONTAINS	INCLUDE	DTID 5016 “LWH Volume Group”	1-n	U		$GroupName = EV (95315005, SCT, "Uterine fibroid") $Width = EV (103355008, SCT, "Width") $Length = EV (410668003, SCT, "Length") $Height = EV (121207, DCM, "Height") $Volume = EV (121221, DCM, "Volume of ellipsoid") $VolumeUnits = EV (cc, BK, "cc") $DistanceUnits = EV (cm, "UCUM, "cm") or EV (mm, "UCUM, "mm")
3	>	CONTAINS	INCLUDE	DTID 300 “Measurement”	1-n	U		$Measurement = DCID 12011 “Ultrasound Pelvis and Uterus” $TargetSite = DCID 12023 “Pelvis and Uterus Anatomic Sites”

Table 8.6-52: TID 5016 –LHW Volume Group

Description:

Container which groups an LHW volume measurement

Parameters:

$GroupName	The name of the volume group that is an anatomical structure
$Volume	Concept name of volume measurement
$Length	Concept name of length measurement
$Width	Concept name of width measurement
$Height	Concept name of height measurement
$DistanceUnits	Units of linear (height, weight, length) measurement
$VolumeUnits	Units of volume measurement
$FunctionalCondition	Functional condition present during measurement
$Method	Value for Measurement Method

		$FindingType		Type of the finding				
	NL	**Rel with Parent**	**VT**	**Concept Name**	**VM**	**Req Type**	**Condition**	**Value Set Constraint**
1			CONTAINER	$GroupName	1	M		
1b	>	HAS CONCEPT MOD	CODE	EV (370129005, SCT, "Measurement Method")	1	U		$Method
1c	>	HAS OBS CONTEXT	TEXT	EV (125010, DCM, "Identifier")	1	U		Unique among all groups of the same finding, site and laterality. Eg. “1”, “2”, etc. for nodules, fibroids or lesions
2	>	CONTAINS	INCLUDE	DTID (BK300) Measurement Result	1	MC	At least one of row 2, 2b, 3, 4, 5 shall be present	$Measurement = $Volume $TargetSite = $GroupName $Units = $VolumeUnits
2b	>	CONTAINS	INCLUDE	DTID (BK300) Measurement Result	1	MC	At least one of row 2, 2b, 3, 4, 5 shall be present	$Measurement = $Area $TargetSite = $GroupName $Units = $AreaUnits
3	>	CONTAINS	INCLUDE	DTID (BK300) Measuremen Result	1-n	MC	At least one of row 2, 2b, 3, 4, 5 shall be present	$Measurement = $Length $TargetSite = $GroupName $Units = $DistanceUnits
4	>	CONTAINS	INCLUDE	DTID (BK300) Measurement Result	1-n	MC	At least one of row 2, 2b, 3, 4, 5 shall be present	$Measurement = $Width $TargetSite = $GroupName $Units = $DistanceUnits
5	>	CONTAINS	INCLUDE	DTID (BK300) Measurement Result	1-n	MC	At least one of row 2, 2b, 3, 4, 5 shall be present	$Measurement = $Height $TargetSite = $GroupName $Units = $DistanceUnits
6	>	CONTAINS	CODE	EV (F-047E7, SRT, "Functional observable")	1	U		$FunctionalCondition
7	>	CONTAINS	CODE	EV (121071, DCM, "Finding")	1	U		$FindingType

Table 8.6-53: TID 5026 - OB-GYN Pelvic Vascular Ultrasound Measurement Group

Description:

An Anatomy specific container of OB-GYN pelvic vascular measurements.

Parameters:

$AnatomyGroup The concept name of the vascular anatomy

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	$AnatomyGroup	1	M		
2	>	HAS CONCEPT MOD	CODE	EV (272741003, SCT, "Laterality")	1	MC	IFF anatomy has laterality	DCID 244 “Laterality”
3	>	HAS CONCEPT MOD	TEXT	EV (112050, DCM, "Anatomic Identifier")	1	U		
3a	>	HAS OBS CONTEXT	TEXT	EV(11951-1, LN, "Fetus Id")	1	UC	IFF $AnatomyGroup applies per fetus and there exists more than one fetus	
4	>	CONTAINS	INCLUDE	DTID 300 “Measurement”	1-n	M		$MeasType = DCID 12119 “Vascular Ultrasound Property”

Table 8.6-54: TID 5103 –Vascular Ultrasound Section

Description:

Sections of a vascular ultrasound report are section containers of an anatomic region consisting of measurement group containers that contain the measurements

Parameters:

$SectionScope	The concept name of the section heading modifier
$SectionLaterality	The laterality (if any) of the anatomy in this section heading
$Anatomy	The concept name of the vascular anatomy
$AnatomyRatio	The concept name of anatomy-coordinated ratio concepts
$Method	Value for Measurement Method
$FunctionalCondition	Functional condition present during measurement
$PostInjectionTime	Time since injection of a substance such as a vasoldilator

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	DT (121070, DCM, "Findings")	1	M		
2	>	HAS CONCEPT MOD	CODE	EV (363698007, SCT, "Finding Site")	1	M		$SectionScope
3	>	HAS CONCEPT MOD	CODE	EV (272741003, SCT, "Laterality")	1	M		$SectionLaterality
4	>	CONTAINS	INCLUDE	DTID 5104 “Vascular Ultrasound Measurement Group”	1-n	M		$AnatomyGroup = $Anatomy $Method = $Method $FunctionalCondition = $FunctionalCondition $PostInjectionTime = $PostInjectionTime
5	>	CONTAINS	INCLUDE	DTID 300 “Measurement”	1-n	U		$Measurement = $AnatomyRatio

Table 8.6-55: TID 5104 –Vascular Ultrasound Measurement Group

Description:

This template is an anatomy specific container of measurements.

Parameters:

$AnatomyGroup	The concept name of the vascular anatomy
$Method	Value for Measurement Method
$FunctionalCondition	Functional condition present during measurement
$PostInjectionTime	Time since injection of a substance such as a vasoldilator

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	$AnatomyGroup	1	M		
2	>	HAS CONCEPT MOD	CODE	EV (106233006, SCT, "Topographical Modifier")	1	U		DCID 12116 “Vessel Segment Modifiers”
3	>	HAS CONCEPT MOD	CODE	EV (125101, DCM, "Vessel Branch")	1-n	U		DCID 12117 “Vessel Branch Modifiers”

4	>	CONTAINS	INCLUDE	DTID BK300 “Measurement Result”	1-n	M		$Measurement = DCID 12119 “Vascular Ultrasound Property” $Method = $Method
10	>>	HAS CONCEPT MOD	CODE	EV (364644000, SCT, "Functional observable")	1	U		$FunctionalCondition
11	>>	CONTAINS	NUM	EV (PN-00003, 99BKMED, "Time since injection")	1	U		$PostInjectionTime UNIT = EV (min, UCUM, "min")

Table 8.6-56: CID am01 - Automation of Measurement

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
SCT	8359006	Automated
SCT	87982008	Manual

Table 8.6-57: CID 244 - Laterality

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
SCT	7771000	Left
SCT	24028007	Right
SCT	66459002	Unilateral

Table 8.6-58: CID de01 - Derivation of Measurement

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
INCLUDE CID 3488 Min/Max/Mean		
INCLUDE CID 3627 Measurement Type		

Table 8.6-59: CID 3488 - Min/Max/Mean

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
SCT	56851009	Maximum
SCT	2556050017	Minimum
SCT	373098007	Mean

Table 8.6-60: CID 3627 - Measurement Type

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
SCT	373098007	Mean
SCT	258104002	Measured

Table 8.6-61: CID 12003 - OB-GYN Dates

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
LN	11779-6	EDD from LMP
LN	11955-2	LMP

Table 8.6-62: CID 12005 - Fetal Biometry Measurements

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
LN	11979-2	Abdominal Circumference
LN	11818-2	Anterior-Posterior Abdominal Diameter
LN	11820-8	Biparietal Diameter
LN	11963-6	Femur Length
LN	11965-1	Foot Length
LN	11984-2	Head Circumference
LN	11851-3	Occipital-Frontal Diameter
LN	11862-0	Transverse Abdominal Diameter
99BKMED	CM-94761	Mean Abdominal Diameter

Table 8.6-63: CID 12006 - Fetal Long Bones Biometry Measurements

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
LN	11966-9	Humerus length
LN	11967-7	Radius length
LN	11969-3	Ulna length
LN	11968-5	Tibia length
LN	11964-4	Fibula length
LN	11962-8	Clavicle length
LN	11963-6	Femur Length

Table 8.6-64: CID 12007 - Fetal Cranium

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
LN	12171-5	Lateral Ventricle width
LN	11860-4	Cisterna Magna length
LN	12146-7	Nuchal Fold thickness
LN	11863-8	Transverse Cerebellar Diameter
LN	11629-3	Binocular Distance

Table 8.6-65: CID 12008 - OB-GYN Amniotic Sac

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
LN	11624-4	First Quadrant Diameter
LN	11626-9	Second Quadrant Diameter
LN	11625-1	Third Quadrant Diameter
LN	11623-6	Fourth Quadrant Diameter
SCT	81827009	Diameter

Table 8.6-66: CID 12009 - Early Gestation Biometry Measurements

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
LN	11957-8	Crown Rump Length
LN	11850-5	Gestational Sac Diameter
LN	11816-6	Yolk Sac length
LN	33069-6	Nuchal Translucency

Table 8.6-67: CID 12011 - Ultrasound Pelvis and Uterus

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
LN	11961-0	Cervix Length
LN	12145-9	Endometrium Thickness

Table 8.6-68: CID 12019 - OB-GYN Fetus Summary

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
LN	11885-1	Gestational Age by LMP
LN	11888-5	Composite Ultrasound Age

LN	11727-5	Estimated Weight
99BKMED	OB-00001	Estimated Weight Author
LN	11948-7	Fetal Heart Rate

Table 8.6-69: CID 12020 - Fetal Biometry Anatomic Sites

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
SCT	113345001	Abdomen
SCT	113305005	Cerebellum
SCT	54165005	Cisterna Magna
SCT	71341001	Femur
SCT	56459004	Foot
SCT	89546000	Skull

Table 8.6-70: CID 12021 - Fetal Long Bone Anatomic Sites

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
SCT	51299004	Clavicle
SCT	71341001	Femur
SCT	87342007	Fibula
SCT	62413002	Radius
SCT	12611008	Tibia
SCT	23416004	Ulna
SCT	85050009	Humerus

Table 8.6-71: CID 12022 - Fetal Cranium Anatomic Sites

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
SCT	113305005	Cerebellum
SCT	54165005	Cisterna magna
SCT	66720007	Lateral Ventricle
SCT	700032006	Occipital region of scalp
SCT	363654007	Orbit

Table 8.6-72: CID 12023 - Pelvis and Uterus Anatomic Sites

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
SCT	71252005	Cervix
SCT	2739003	Endometrium
SCT	35039007	Uterus
SCT	95315005	Uterine Fibroid

Table 8.6-73: CID 12112 – Abdominal Arteries (Unilateral)

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
SCT	7832008	Abdominal Aorta

Table 8.6-74: CID 12115 – Renal Vessels

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
SCT	397405001	Hilar Artery
SCT	2841007	Renal Artery
SCT	120234003	Segmental Artery
SCT	274143007	Interlobar Artery of Kidney
SCT	274329007	Interlobular Artery of Kidney
SCT	274231001	Arcuate Artery of the Kidney
SCT	85383006	Accessory Renal Artery

Table 8.6-75: CID 12116 – Vessel Segment Modifiers

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
SCT	46053002	Distal
NCIt	C25569	Middle
SCT	103342007	Mid-longitudinal
SCT	40415009	Proximal

Table 8.6-76: CID 12117 – Vessel Branch Modifiers

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
SCT	255561001	Medial
SCT	7771000	Left

SCT	261089000	Inferior
SCT	24028007	Right
SCT	264217000	Superior

Table 8.6-77: CID 12119 – Vascular Ultrasound Property

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
INCLUDE CID 12120 Blood Velocity Measurements INCLUDE CID 12121 Vascular Indices and Ratios INCLUDE CID 12122 Other Vascular Properties		

Table 8.6-78: CID 12120 – Blood Velocity Measurements

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
LN	11653-3	End Diastolic Velocity
LN	11665-7	Minimum Diastolic Velocity
LN	11726-7	Peak Systolic Velocity
LN	20352-1	Time averaged mean velocity
LN	11692-1	Time averaged peak velocity
LN	20354-7	Velocity Time Integral
DCM	110828	Flow Velocity

Table 8.6-79: CID 12121 – Vascular Indices and Ratios

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
LN	12008-9	Pulsatility Index
LN	12023-8	Resistivity Index
LN	12144-2	Systolic to Diastolic Velocity Ratio
LN	33867-3	Velocity Ratio

Table 8.6-80: CID 12122 – Other Vascular Properties

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
LN	20168-1	Acceleration Time
LN	20217-6	Deceleration Time
SCT	81827009	Diameter

Table 8.6-81: CID 12124 – Renal Ratios

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
LN	33869-9	Renal Artery/Aorta velocity ratio

Table 8.6-82: CID 12140 - Pelvic Vasculature Anatomical Location

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
SCT	50536004	Umbilical Artery
SCT	12052000	Ovarian Artery
SCT	91079009	Uterine Artery

8.7 Overview of the Applied Comprehensive 3D SR IOD

The Comprehensive 3D SR IOD specifies a class of documents, the content of which may include textual and coded information, numeric measurement values, references to the DICOM Composite Instances.

The modules selected from the IOD module table of DICOM 3.0 are given in the table below.

Table 8.7-1: Applied Modules in the Comprehensive 3D SR IOD

Information Entity	Module	Usage	Details
Patient	Patient	M	See Table 8.5-1 Patient Module
Study	General Study	M	See Table 8.5-2 General Study Module
Series	SR Document Series	M	See Table 8.7-2: SR Document Series Module
Equipment	General Equipment	M	See Table 8.5-9 General Equipment Module
Document	SR Document General	M	See Table 8.7-3: SR Document General Module
	SR Document Content	M	See Table 8.7-4: SR Document Content ModuleTable 8.6-4: SR Document Content Module
	SOP Common	M	See Table 8.6-5: SOP Common Module

The details of these applied Comprehensive 3D SR IOD modules are given in the tables. The list of possible values is given, if applicable. If an attribute may be present conditionally/optionally or may contain a zero length value, this is also indicated.

Table 8.7-2: SR Document Series Module

Attribute Name	Tag	Type	Note
Modality	(0008,0060)	1	"SR"
SeriesInstanceUID	(0020,000E)	1	Generated at creation of the Series
SeriesNumber	(0020,0011)	1	Auto generated
Series Date	(0008,0021)	3	Date the Series started.
Series Time	(0008,0031)	3	Time the Series started.
Referenced Performed Procedure Step Sequence	(0008,1111)	2	Uniquely identifies the Performed Procedure Step SOP Instance for which the Series is created.
ProtocolName	(0018,1030)	3	"Exam Type/Preset"

Table 8.7-3: SR Document General Module

Attribute Name	Tag	Type	Note
Content Date	(0008,0023)	1	Date of SR document creation
Content Time	(0008,0033)	1	Time of SR document creation
Instance Number	(0020,0013)	1	Documents are numbered in chronological order, starting from 1 at the beginning of a new examination
Performed Procedure Code Sequence	(0040,A372)	2	A Sequence that conveys the codes of the performed procedures pertaining to this SOP Instance.
Current Requested Procedure Evidence Sequence	(0040,A375)	1C	Full set of Composite SOP Instances, of which the creator is aware, which were created to satisfy the current Requested Procedure(s) for which this SR Document is generated or that are referenced in the content tree.
Referenced Request Sequence	(0040,A370)	1C	Identifies Requested Procedures that are being fulfilled (completely or partially) by creation of this Document.
>Accession Number	(0008,0050)		From MWL or manually entered by a user

>Requested Procedure ID	(0040,1001)	1C	From MWL
>Requested Procedure Description	(0032,1060)	3	From MWL
>Reason for Requested Procedure	(0040,1002)	3	From MWL
>Reason for Requested Procedure Code Sequence	(0032,1064)	3	From MWL
>>Code Value	(0008,0100)	1C	From MWL
>>Coding Scheme Designator	(0008,0102)	1C	From MWL
>>Coding Scheme Version	(0008,0103)	1C	From MWL
>>Code Meaning	0008,0104	1	From MWL
>Requested Procedure Code Sequence Attribute	(0032,1064)	2	From MWL
Referenced Performed Procedure Step Sequence	(0008,1111)	3	Uniquely identifies the Performed Procedure Step SOP Instance for which the Series has been created
>Referenced SOP Class UID	(0008,1150)	1	1.2.840.10008.3.1.2.3.3
>Referenced SOP Intance UID	(0008,1155)	1	Equal to SOP Instance of the associated MPPS
Completion Flag	(0040,A491)	1	“PARTIAL”
Verification Flag	(0040,A493)	1	“UNVERIFIED”

Table 8.7-4: SR Document Content Module

Attribute Name	Tag	Type	Note
Value Type	(0040,A040)	1	“CONTAINER”
Concept Name Code Sequence	(0040,A043)	1C	Code describing the concept represented by this Content Item. Also conveys the value of Document Title and section headings in documents.
Continuity Of Content	(0040,A050)	1	“SEPARATE”
Content Template Sequence	(0040,A504)	1C	Template used for this content item.

The Comprehensive 3D SR uses the template TID 1500 (Measurement Report) as defined in PS3.17. No extensions to TID 1500, its subtemplates and its defined coded terminology except for the following.

TID 320 (Image or Spatial Coordinates) is extended by a proprietary code to express that a given NUM Value Type defines an angle. The legs of the angle are expressed in multipoint coordinates of the SCOORD3D child of the NUM value. The numeric value is given in degrees ("deg", "UCUM", "degrees").

Table 8.7-5: Coding Scheme Extension for NUM Value Concept Name

Coding Scheme Designator	Code Value	Code Meaning
BKMR	Angle	SCOORD 3D defines an angle

Table 8.7-6: SOP Common Module

Attribute Name	Tag	Type	Note
SOP Class UID	(0008,0016)	1	For Comprehensive 3D SR: "1.2.840.10008.5.1.4.1.1.88.34"
SOP Instance UID	(0008,0018)	1	Generated when 3D SR is created
Specific Character Set	(0008,0005)	1C	Set according to the selected language on the scanner. See section 6.
Instance Creation Date	(0008,0012)	3	Date the SOP Instance was created.
Instance Creation Time	(0008,0013)	3	Time the SOP Instance was created.
Instance Creator UID	(008,0014)	3	Uniquely identifies device that created the SOP Instance.
Instance Number	(0020,0013)	3	Documents are numbered in chronological order, starting from 1 at the beginning of a new examination

8.8 Attribute Mapping

If a RIS/HIS connection is configured and active, Patient and Study related information is retrieved by the Workflow AE from the RIS/HIS via the Worklist and written in the created documents (see Table 2.5-3).

Table 8.8-1 Transfer of Worklist Attributes to Created Instances and MPPS Messages

Worklist	Tag	Image/SR IOD	MPPS IO
Referring Physician's Name	(0008,0090)	Referring Physician's Name	-
Patient Name	(0010,0010)	Patient Name	Patient Name
Patient ID	(0010,0020)	Patient ID	Patient ID

Issuer of Patient ID	(0010,0021)	Issuer of Patient ID	Issuer of Patient ID
Patient's Date of Birth	(0010,0030)	Patient's Date of Birth	Patient's Date of Birth
Patient's Sex	(0010,0040)	Patient's Sex	Patient's Sex
Patient's Size	(0010,1020)	Patient's Size	-
Patient's Weight	(0010,1030)	Patient's Weight	-
Referenced Study Sequence	(0008,1110)	-	Scheduled Step Attributes Sequence -> Referenced Study Sequence
Accession Number	(0008,0050)	Accession Number	Scheduled Step AttributesSequence -> Accession Number
Study Instance UID	(0020,000D)	Study Instance UID	Scheduled Step Attributes Sequence -> Study Instance UID
Study ID	(0020,0010)	Study ID	Study ID
Admission ID	(0038,0010)	Admission ID	Admission ID
Admitting Diagnoses Description	(0008,1080)	Admitting Diagnoses Description	Admitting Diagnoses Description
Institution Name	(0008,0080)	Institution Name	-
Institution Code Sequence	(0008,0082)	Institution Code Sequence	-
Requested Procedure ID	(0040,1001) Note: the value from this tag is as well transferred to Study ID (0020,0010).	Request Attributes Sequence -> Requested Procedure ID	Requested Procedure ID
Requested Procedure Description	(0032,1060) Note: the value from this tag is transferred to Study Description (0008,1030).	Study Description	Scheduled Step Attributes Sequence -> Requested Procedure Description
Reason for Requested Procedure	(0040,1002)	Request Attributes Sequence -> Reason for Requested Procedure	Scheduled Step Attributes Sequence -> Reason the Requested Procedure
Reason for Requested Procedure Code Sequence	(0040,100A)	Request Attributes Sequence -> Reason for Requested	Scheduled Step Attributes Sequence -> Reason for

		Procedure Code Sequence	Requested Procedure Code Sequence
Scheduled Procedure Step ID	(0040,0009)	Request Attributes Sequence -> Scheduled Procedure Step ID	Scheduled Step Attributes Sequence -> Scheduled Procedure Step ID
Scheduled Procedure Step Description	(0040,0007)	Request Attributes Sequence -> Scheduled Procedure Step Description	Scheduled Step Attributes Sequence -> Scheduled Procedure Step Description
Scheduled Protocol Code Sequence	(0040,0008)	Request Attributes Sequence -> Scheduled Protocol Code Sequence	Scheduled Step Attributes Sequence -> Scheduled Protocol Code Sequence
Study Date	(0008,0020)	Study Date	-
Study Time	(0008,0030)	Study Time	-

8.9 Coded Terminology and Templates

8.9.1 Worklist

The Workflow AE is capable of supporting arbitrary coding schemes for Procedure and Protocol Codes. The Scheduled Protocol Code Sequence (0040,0008) is transferred to created SOP Instances and MPPS messages as defined in Table 8.8-1.

8.9.2 Comprehensive SR IOD

The Comprehensive SR IOD uses several standard- and private SR Templates and Coded Terminology. These are described in detail in the IOD description. See Overview of the Applied Comprehensive SR IOD8.6.

8.9.3 Comprehensive 3D SR IOD

The Comprehensive 3D SR IOD uses the standard Template TID 1500 (Measurement Report) and its associated Coded Terminology, including the use of unextended codes. That is, where the DICOM Standard proposes the usage of a CID, a sub-set of codes in this CID is used without modifications or extensions.

The only exception to this applies to angle measurements. This is described in the IOD description. See 8.7.