

---

# DICOM

## Conformance Statement

iE33 Release 1.1.x.x

8500-0082-00022 Rev B, 2005-09-22



## REVISION HISTORY

| Document Version | Author   | Description   |
|------------------|----------|---|
| A                | M. Leif  | <p>Initial Release for iE33 1.1. Derived from the iE33 1.0 DCS with extensive changes to Echo and Vascular SR sections, the addition of new private codes.</p> <p>Changes to Table 84, 85 and 86.</p> <p>Changed Table 82 to refer only to US objects, not US MF objects</p> <p>Incorporated changes to TDI measurements and calculations, added two Mitral Valve Measurements and several missing Optional Modifiers</p> <p>Removed retired Private Codes from Echo SR tables.</p> <p>Removed unneeded Context tables from Vascular SR and removed unused codes.</p> |
| B                | J. Vasil | <p>Added date of document to cover page and made minor formatting changes to improve readability of PDF version.</p>  |

# 1 CONFORMANCE STATEMENT OVERVIEW

iE33 implements the necessary DICOM® services to download worklists from an information system, save acquired US images and associated Structured Reports to a network storage device, CD or DVD, print to a networked hardcopy device and inform the information system about the work actually done.

Table 1 provides an overview of the supported network services.

**Table 1  
NETWORK SERVICES**

| <b>Networking SOP Classes</b>       | <b>User of Service (SCU)</b> | <b>Provider of Service (SCP)</b> |
|-------------------------------------|------------------------------|----------------------------------|
| <b>Image Transfer</b>               |                              |                                  |
| Ultrasound Image Storage            | Yes                          | No                               |
| Ultrasound Multiframe Image Storage | Yes                          | No                               |
| Storage Commitment Push Model       | Yes                          | No                               |
| Private 3D Presentation State       | Yes                          | No                               |
| <b>Structured Report Transfer</b>   |                              |                                  |
| Comprehensive SR                    | Yes                          | No                               |
| <b>Workflow</b>                     |                              |                                  |
| Modality Worklist                   | Yes                          | No                               |
| <b>Print</b>                        |                              |                                  |
| Basic Grayscale Print Management    | Yes                          | No                               |
| Basic Color Print Management        | Yes                          | No                               |
| <b>General</b>                      |                              |                                  |
| Verification                        | Yes                          | Yes                              |

Table 2 specifies the Media Storage Application Profiles supported.

**Table 2  
MEDIA SERVICES**

| <b>Media Storage Application Profile</b> | <b>Write Files (FSC or FSU)</b> | <b>Read Files (FSR)</b> |
|--|---------------------------------|-------------------------|
| <b>DVD-Rewriteable</b>                   |                                 |                         |
| STD-US-SC-SF-DVD                         | Yes / Yes                       | Yes <sup>(1)(2)</sup>   |
| STD-US-SC-MF-DVD                         | Yes / Yes                       | Yes <sup>(1)(2)</sup>   |

(1) Structured Reports and some image formats (e.g. Native Data, 3D Volume Data, and 3D Subpages) cannot be imported.

(2) Only reads and imports data from other Philips iE33 and iU22 systems.

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

**This page intentionally blank.**

## 2 TABLE OF CONTENTS

|  |    |
|--|----|
| Revision History .....   | 2  |
| 1 CONFORMANCE STATEMENT OVERVIEW.....  | 3  |
| 2 TABLE OF CONTENTS .....  | 5  |
| 3 INTRODUCTION.....  | 11 |
| 3.1 AUDIENCE.....  | 11 |
| 3.2 REMARKS.....   | 11 |
| 3.3 DEFINITIONS, TERMS AND ABBREVIATIONS .....   | 11 |
| 3.4 REFERENCES.....  | 12 |
| 4 NETWORKING.....  | 13 |
| 4.1 IMPLEMENTATION MODEL.....  | 13 |
| 4.1.1 Application Data Flow.....   | 13 |
| 4.1.2 Functional Definition of AEs .....   | 14 |
| 4.1.2.1 Functional Definition of Storage Application Entity.....   | 14 |
| 4.1.2.2 Functional Definition of Workflow Application Entity .....   | 14 |
| 4.1.2.3 Functional Definition of Hardcopy Application Entity.....  | 14 |
| 4.1.3 Sequencing of Real-World Activities .....  | 15 |
| 4.2 AE SPECIFICATIONS.....   | 17 |
| 4.2.1 Storage Application Entity Specification.....  | 17 |
| 4.2.1.1 SOP Classes .....  | 17 |
| 4.2.1.2 Association Establishment Policy.....  | 17 |
| 4.2.1.2.1 General .....  | 17 |
| 4.2.1.2.2 Number of Associations .....   | 17 |
| 4.2.1.2.3 Asynchronous Nature .....  | 17 |
| 4.2.1.2.4 Implementation Identifying Information.....  | 18 |
| 4.2.1.3 Association Initiation Policy .....  | 18 |
| 4.2.1.3.1 Activity – Store Images, Loops and Structured Reports.....   | 18 |
| 4.2.1.3.1.1 Description and Sequencing of Activities .....   | 18 |
| 4.2.1.3.1.2 Proposed Presentation Contexts .....   | 19 |
| 4.2.1.3.1.3 SOP Specific Conformance for Image and Comprehensive Structured<br>Report Storage SOP Classes..... | 20 |
| 4.2.1.3.1.4 SOP Specific Conformance for Storage Commitment Push Model<br>SOP Class 21                         |    |
| 4.2.1.3.1.4.1 Storage Commitment Operations (N-ACTION).....  | 21 |
| 4.2.1.3.1.4.2 Storage Commitment Notifications (N-EVENT-REPORT)21  |    |
| 4.2.1.4 Association Acceptance Policy.....   | 22 |
| 4.2.1.4.1 Activity – Receive Storage Commitment Response .....   | 22 |
| 4.2.1.4.1.1 Description and Sequencing of Activities .....   | 22 |
| 4.2.1.4.1.2 Accepted Presentation Contexts.....  | 22 |
| 4.2.1.4.1.3 SOP Specific Conformance for Storage Commitment Push Model<br>SOP Class 22                         |    |
| 4.2.1.4.1.3.1 Storage Commitment Notifications (N-EVENT-REPORT)22  |    |
| 4.2.2 Workflow Application Entity Specification.....   | 23 |
| 4.2.2.1 SOP Classes .....  | 23 |
| 4.2.2.2 Association Establishment Policy.....  | 23 |
| 4.2.2.2.1 General .....  | 23 |
| 4.2.2.2.2 Number of Associations .....   | 23 |
| 4.2.2.2.3 Asynchronous Nature .....  | 23 |
| 4.2.2.2.4 Implementation Identifying Information.....  | 23 |

|               |   |    |
|---------------|---|----|
| 4.2.2.3       | Association Initiation Policy .....                             | 24 |
| 4.2.2.3.1     | Activity – Worklist Update .....                                | 24 |
| 4.2.2.3.1.1   | Description and Sequencing of Activities .....                  | 24 |
| 4.2.2.3.1.2   | Proposed Presentation Contexts .....                            | 25 |
| 4.2.2.3.1.3   | SOP Specific Conformance for Modality Worklist .....            | 25 |
| 4.2.3         | Hardcopy Application Entity Specification .....                 | 29 |
| 4.2.3.1       | SOP Classes .....   | 29 |
| 4.2.3.2       | Association Establishment Policy .....                          | 29 |
| 4.2.3.2.1     | General .....   | 29 |
| 4.2.3.2.2     | Number of Associations .....                                    | 29 |
| 4.2.3.2.3     | Asynchronous Nature .....                                       | 29 |
| 4.2.3.2.4     | Implementation Identifying Information .....                    | 29 |
| 4.2.3.3       | Association Initiation Policy .....                             | 30 |
| 4.2.3.3.1     | Activity – Film Images .....                                    | 30 |
| 4.2.3.3.1.1   | Description and Sequencing of Activities .....                  | 30 |
| 4.2.3.3.1.2   | Proposed Presentation Contexts .....                            | 31 |
| 4.2.3.3.1.3   | Common SOP Specific Conformance for all Print SOP Classes ..... | 31 |
| 4.2.3.3.1.4   | SOP Specific Conformance for the Printer SOP Class .....        | 31 |
| 4.2.3.3.1.4.1 | Printer SOP Class Operations (N-GET) .....                      | 31 |
| 4.2.3.3.1.4.2 | Printer SOP Class Notifications (N-EVENT-REPORT) .....          | 32 |
| 4.2.3.3.1.5   | SOP Specific Conformance for the Film Session SOP Class .....   | 32 |
| 4.2.3.3.1.5.1 | Film Session SOP Class Operations (N-CREATE) .....              | 32 |
| 4.2.3.3.1.7   | SOP Specific Conformance for the Film Box SOP Class .....       | 33 |
| 4.2.3.3.1.7.1 | Film Box SOP Class Operations (N-CREATE) .....                  | 33 |
| 4.2.3.3.1.7.2 | Film Box SOP Class Operations (N-ACTION) .....                  | 34 |
| 4.2.3.3.1.8   | SOP Specific Conformance for the Image Box SOP Class .....      | 35 |
| 4.2.3.3.1.8.1 | Image Box SOP Class Operations (N-SET) .....                    | 35 |
| 4.2.3.4       | Association Acceptance Policy .....                             | 36 |
| 4.2.4         | Verification Application Entity specification .....             | 36 |
| 4.2.4.1       | SOP Class .....   | 36 |
| 4.2.4.2       | Association Establishment Policy .....                          | 36 |
| 4.2.4.2.1     | General .....   | 36 |
| 4.2.4.2.2     | Number of Associations .....                                    | 36 |
| 4.2.4.2.3     | Asynchronous Nature .....                                       | 36 |
| 4.2.4.2.4     | Implementation Identifying Information .....                    | 37 |
| 4.2.4.3       | Association Initiation Policy .....                             | 37 |
| 4.2.4.3.1     | Activity – Verify as SCU and SCP .....                          | 37 |
| 4.2.4.3.2     | Description and Sequencing of Activities .....                  | 37 |
| 4.2.4.3.3     | Proposed Presentation Contexts .....                            | 38 |
| 4.2.4.3.4     | SOP Specific Conformance for Verification .....                 | 38 |
| 4.2.4.3.5     | Association Acceptance Policy .....                             | 39 |
| 4.2.4.3.5.1   | Verification SOP Class Notifications .....                      | 39 |
| 4.3           | PHYSICAL NETWORK INTERFACES .....                               | 39 |
| 4.3.1         | Supported Communication Stacks .....                            | 39 |
| 4.3.1.1       | TCP/IP Stack .....  | 39 |
| 4.3.2         | Physical Network Interface .....                                | 39 |
| 4.4           | CONFIGURATION .....   | 39 |
| 4.4.1         | AE Title/Presentation Address Mapping .....                     | 39 |
| 4.4.1.1       | Local AE Title .....  | 40 |
| 4.4.1.2       | Remote AE Title/Presentation Address Mapping .....              | 40 |
| 4.4.1.2.1     | Storage .....   | 40 |
| 4.4.1.2.2     | Workflow .....  | 40 |
| 4.4.1.2.3     | Hardcopy .....  | 40 |
| 5             | MEDIA STORAGE .....   | 41 |
| 5.1           | IMPLEMENTATION MODEL .....                                      | 41 |
| 5.1.1         | Application Data Flow .....                                     | 41 |

|             |  |    |
|-------------|--|----|
| 5.1.2       | Functional Definition of AEs .....   | 41 |
| 5.1.2.1     | Functional Definition of Media Application Entity.....                       | 41 |
| 5.1.3       | Sequencing of Real-World Activities .....                                    | 41 |
| 5.1.4       | File Meta Information Options .....  | 41 |
| 5.2         | AE SPECIFICATIONS.....   | 42 |
| 5.2.1       | Media Application Entity Specification.....                                  | 42 |
| 5.2.1.1     | File Meta Information for the Application Entity .....                       | 42 |
| 5.2.1.2     | Real-World Activities.....   | 42 |
| 5.2.1.2.1   | Activity – Export to DVD.....  | 42 |
| 5.2.1.2.2   | Activity – Read from DVD .....   | 42 |
| 5.2.1.2.3   | Activity – Update to DVD .....   | 42 |
| 5.2.1.2.3.1 | Media Storage Application Profiles .....                                     | 42 |
| 5.2.1.2.3.2 | Options .....  | 42 |
| 6           | SUPPORT OF CHARACTER SETS .....  | 43 |
| 7           | SECURITY.....  | 43 |
| 8           | ANNEXES.....   | 44 |
| 8.1         | CREATED IOD INSTANCES .....  | 44 |
| 8.1.1       | US or US Multiframe Image IOD .....  | 44 |
| 8.1.2       | Comprehensive Structured Report IOD .....                                    | 45 |
| 8.1.3       | Common Modules .....   | 45 |
| 8.1.4       | US or Multiframe Image Modules.....  | 47 |
| 8.1.5       | Comprehensive Structured Report Modules .....                                | 51 |
| 8.2         | USED FIELDS IN RECEIVED IOD BY APPLICATION .....                             | 53 |
| 8.3         | ATTRIBUTE MAPPING.....   | 53 |
| 8.4         | COERCED/MODIFIED FIELDS .....  | 54 |
| 8.5         | CONTROLLED TERMINOLOGY .....   | 54 |
| 8.6         | EXTENSIONS / SPECIALIZATIONS / PRIVATIZATIONS .....                          | 54 |
| 8.6.1       | Standard Extended / Specialized / Private SOPs .....                         | 54 |
| 8.6.2       | Private SOP Class – 3D Presentation State Specification.....                 | 54 |
| 8.6.2.1     | 3D Presentation State SOP Class.....   | 54 |
| 8.6.2.2     | Association Establishment Policy.....  | 55 |
| 8.6.2.2.1   | General .....  | 55 |
| 8.6.2.2.2   | Number of Associations .....   | 55 |
| 8.6.2.2.3   | Asynchronous Nature .....  | 55 |
| 8.6.2.2.4   | Implementation Identifying Information.....                                  | 55 |
| 8.6.2.3     | Association Initiation Policy .....  | 55 |
| 8.6.2.3.1   | Activity – Store a Private 3D Presentation state.....                        | 55 |
| 8.6.2.3.2   | Description and Sequencing of Activities.....                                | 55 |
| 8.6.2.3.3   | Proposed Presentation Contexts .....   | 56 |
| 8.6.2.3.4   | SOP Specific Conformance for storage of a Private 3D Presentation State..... | 56 |
| 8.8         | PRIVATE TRANSFER SYNTAXES .....  | 60 |
| APPENDIX A  | – Echo Structured Report.....  | 61 |
| A.1         | INTRODUCTION.....  | 61 |
| A.1.1       | Clinical Scope.....  | 61 |
| A.2         | MAPPING FOR ECHOCARDIOGRAPHY DICOM SR – IE33 1.1.....                        | 61 |
|             | Reference for the columns in the mapping table .....                         | 61 |
| A.2.1       | Dimensions .....   | 62 |
| A.2.1.1     | Measurements .....   | 62 |
| A.2.1.2     | Calculations .....   | 63 |
| A.2.2       | Vessels .....  | 65 |
| A.2.2.1     | Measurements .....   | 65 |
| A.2.3       | EF and Volume.....   | 65 |

|   |    |
|---|----|
| A.2.3.1 Measurements .....  | 65 |
| A.2.3.2 Calculations .....  | 65 |
| A.2.4 Mass .....  | 67 |
| A.2.4.1 Measurements .....  | 67 |
| A.2.4.2 Calculations .....  | 68 |
| A.2.5 Valves .....  | 68 |
| A.2.5.1 Measurements .....  | 68 |
| A.2.5.2 Calculations .....  | 68 |
| A.2.6 Mitral Valve .....  | 68 |
| A.2.6.1 Measurements .....  | 68 |
| A.2.6.2 Calculations .....  | 69 |
| A.2.7 Tricuspid Valve .....   | 70 |
| A.2.7.1 Measurements .....  | 70 |
| A.2.7.2 Calculations .....  | 71 |
| A.2.8 Aortic Valve.....   | 71 |
| A.2.8.1 Measurement .....   | 71 |
| A.2.8.2 Calculations .....  | 72 |
| A.2.9 Pulmonic Valve .....  | 72 |
| A.2.9.1 Measurements .....  | 72 |
| A.2.9.2 Calculations .....  | 73 |
| A.2.10 Pulmonic and Hepatic Veins.....                                    | 73 |
| A.2.10.1 Measurements .....   | 73 |
| A.2.10.2 Calculations .....   | 74 |
| A.2.11 TDI .....  | 74 |
| A.2.11.1 Measurements .....   | 74 |
| A.2.11.2 Calculations .....   | 74 |
| A.2.12 Private Code Dictionary for Echo .....                             | 75 |
| Private Code(s) Retired in iE33 1.1.....                                  | 75 |
| Private extensions to the Echo templates.....                             | 76 |
| Extensions to TID 5200.....   | 76 |
| Extension to TID 5203.....  | 76 |
| Private Extension(s) Retired with iE33 1.1.....                           | 76 |
| Extended Echocardiography Context Groups from PS3-16, Annex C, 2004 ..... | 77 |
| CID 12200 – Echocardiography Left Ventricle.....                          | 77 |
| CID 12201 – Left Ventricle Linear.....                                    | 77 |
| CID 12203 – Left Ventricle Other.....                                     | 78 |
| CID 12204 – Echocardiography Right Ventricle .....                        | 78 |
| CID 12205 – Echocardiography Left Atrium .....                            | 78 |
| CID 12206 – Echocardiography Right Atrium.....                            | 78 |
| CID 12207 – Echocardiography Mitral Valve.....                            | 78 |
| CID 12208 – Echocardiography Tricuspid Valve .....                        | 79 |
| CID 12209 – Echocardiography Pulmonic Valve .....                         | 79 |
| CID 12210 – Echocardiography Pulmonary Artery.....                        | 80 |
| CID 12211 – Echocardiography Aortic Valve .....                           | 80 |
| CID 12212 – Echocardiography Aorta .....                                  | 80 |
| CID 12214 – Echocardiography Pulmonary Veins .....                        | 80 |
| CID 12216 – Echocardiography Hepatic Veins .....                          | 81 |
| CID 12217 – Echocardiography Cardiac Shunt.....                           | 81 |
| CID 12220 – Echocardiography Common Measurements .....                    | 81 |
| CID 12221 – Flow Direction .....  | 81 |
| CID 12222 – Orifice Flow Properties .....                                 | 81 |
| CID 12223 – Echocardiography Stroke Volume Origin .....                   | 82 |
| CID 12224 – Ultrasound Image Modes.....                                   | 82 |
| CID 12226 – Echocardiography Image View.....                              | 82 |
| CID 12228 – Volume Methods.....   | 82 |
| CID 12229 – Area Methods .....  | 83 |
| CID 12231 – Volume Flow Methods .....                                     | 83 |



|  |    |
|--|----|
| CID 12233 – Cardiac Phase .....  | 83 |
| CID 12239 – Cardiac Output Properties .....  | 83 |
| CID 12240 – Left Ventricle Area .....  | 83 |
| APPENDIX B Vascular Structured Report .....  | 84 |
| B.1 INTRODUCTION.....  | 84 |
| B.1.1 Clinical Scope .....   | 84 |
| B.2    MAPPING FOR VASCULAR DICOM SR – IE33 1.1 .....  | 84 |
| Reference for the columns in the mapping table .....   | 84 |
| B.2.1 Carotid .....  | 84 |
| B.2.2 Lower Extremity Arterial .....   | 84 |
| B.2.3 Lower Extremity Venous.....  | 85 |
| B.2.4 Upper Extremity Arterial .....   | 86 |
| B.2.5 Upper Extremity Venous.....  | 87 |
| B.2.6 Grafts .....   | 87 |
| B.2.7 Private Code Dictionary for Vascular.....  | 88 |
| CID - 12104    Extracranial Arteries .....   | 88 |
| CID - 12107    Upper Extremity Arteries.....   | 88 |
| CID - 12108    Upper Extremity Veins .....   | 88 |
| CID - 12109    Lower Extremity Arteries.....   | 89 |
| CID - 12110    Lower Extremity Veins (this table additionally references DICOM CP499*) ..... | 89 |
| CID - 12116    Vessel Segment Modifiers.....   | 89 |
| CID - 12117    Vessel Branch Modifiers .....   | 90 |
| CID - 12120    Blood Velocity Measurements .....   | 90 |
| CID - 12121    Vascular Indices and Ratios .....   | 90 |
| CID - 12122    Other Vascular Properties .....   | 90 |
| CID - 12123    Carotid Ratios .....  | 90 |
| APPENDIX C – 3D VOLUME PRIVATE TAG LIST .....  | 91 |
| C.1    3D VOLUME IMAGE PRIVATE TAG DESCRIPTION .....   | 91 |

**This page intentionally blank.**

## 3 INTRODUCTION

### 3.1 AUDIENCE

This document is intended for hospital staff, health system integrators, software designers or implementers. It is assumed that the reader has a working understanding of DICOM.

### 3.2 REMARKS

DICOM, by itself, does not guarantee interoperability. However, the Conformance Statement facilitates a first-level validation for interoperability between different applications supporting the same DICOM functionality.

This Conformance Statement is not intended to replace validation with other DICOM equipment to ensure proper exchange of information intended.

The scope of this Conformance Statement is to facilitate communication with Philips Medical Systems and other vendors' Medical equipment. The Conformance Statement should be read and understood in conjunction with the DICOM Standard [DICOM]. However, by itself it is not guaranteed to ensure the desired interoperability and a successful interconnectivity.

The user should be aware of the following important issues:

- The comparison of different conformance statements is the first step towards assessing interconnectivity between Philips Medical Systems and non - Philips Medical Systems equipment.
- Test procedures should be defined to validate the desired level of connectivity.
- The DICOM standard will evolve to meet the users' future requirements. Philips Medical Systems is actively involved in developing the standard further and therefore reserves the right to make changes to its products or to discontinue its delivery.

### 3.3 DEFINITIONS, TERMS AND ABBREVIATIONS

Definitions, terms and abbreviations used in this document are defined within the different parts of the DICOM standard.

Abbreviations and terms are as follows:

|      |                                       |
|------|---------------------------------------|
| AE   | DICOM Application Entity              |
| AET  | Application Entity Title              |
| ASCE | Association Control Service Element   |
| CD-R | Compact Disk Recordable               |
| CSE  | Customer Service Engineer             |
| FSC  | File-Set Creator                      |
| FSU  | File-Set Updater                      |
| FSR  | File-Set Reader                       |
| GSDP | Grayscale Standard Display Function   |
| IOD  | (DICOM) Information Object Definition |
| ISO  | International Standard Organization   |
| MSPS | Modality Scheduled Procedure Step     |

|       |   |
|-------|---|
| MWL   | Modality Worklist   |
| R     | Required Key Attribute  |
| O     | Optional Key Attribute  |
| PDU   | DICOM Protocol Data Unit  |
| PDE   | Patient Data Entry  |
| SCU   | DICOM Service Class User (DICOM client)                         |
| SCP   | DICOM Service Class Provider (DICOM server)                     |
| SOP   | DICOM Service-Object Pair                                       |
| U     | Unique Key Attribute  |
| US    | Ultrasound  |
| VistA | Veterans Health Information Systems and Technology Architecture |

### 3.4 REFERENCES

[DICOM] Digital Imaging and Communications in Medicine (DICOM), NEMA PS 3.1-3.18, 2004

DICOM Correction Item CP-499 More Ultrasound Vascular Terms, Final Text version, January 1, 2005

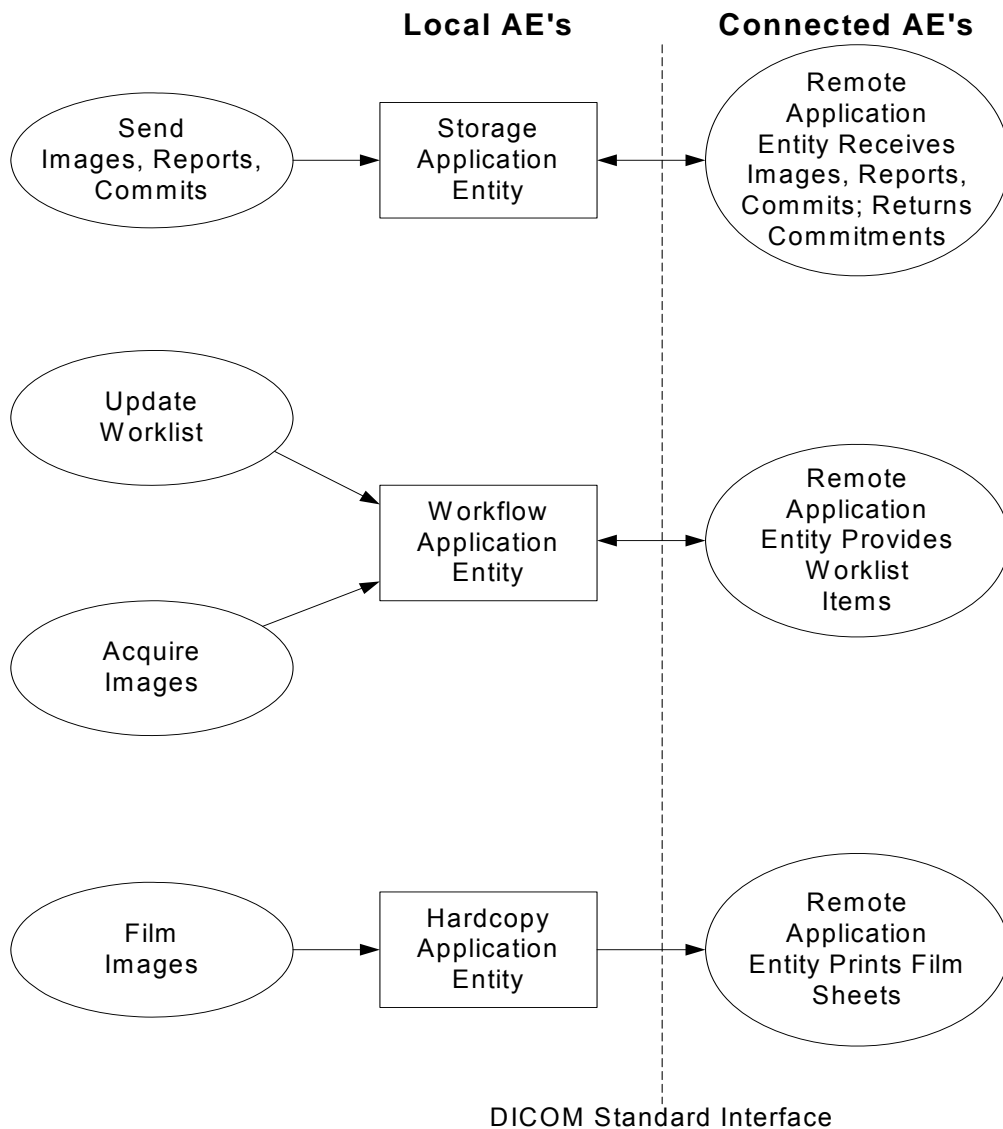
VistA DICOM Conformance Requirements for Image Acquisition Modalities in Radiology and Other Specialties, Department of Veterans Affairs, version 2.3 January 3, 2003

DICOM Conformance Statements for other Philips Medical Systems products, including the 1.0 release of the iE33, are available on the Philips web site at <http://www.medical.philips.com/main/company/connectivity>.

## 4 NETWORKING

### 4.1 IMPLEMENTATION MODEL

#### 4.1.1 Application Data Flow



**Figure 1**  
**APPLICATION DATA FLOW DIAGRAM**

- The Storage Application Entity sends images and Structured Reports to a remote AE. It is associated with the local real-world activity "Acquire" for single frame and Multiframe or Cineloops. A single frame is sent if the control panel FREEZE key is pressed first. Alternately, the user may select "Acquire Frame" from the left touch screen. Loops may also be acquired using the "Acquire Loop" key on the left touch

screen. Sending of images depends on user configuration, either “After Each Print/Acquire” or “At End of Exam.” Sending Structured Reports occurs only at End of Exam. A Structured Report will be sent with an exam when the exam is selected from the Patient Directory using “Review”. If configured for After Each, images are transferred immediately after acquisition, and the association is closed. If the remote AE is configured as an archive device, the Storage AE will request Storage Commitment and if a commitment is successfully obtained, will record this information in the local database, signaling the Auto-delete function that the exam qualifies for deletion.

- The Workflow Application Entity receives Worklist information from a remote AE. It is associated with the local real-world activities “Update Worklist”. When the “Update Worklist” local real-world activity is performed, the Workflow Application Entity queries a remote AE for worklist items and provides the set of worklist items matching the query request. “Update Worklist” is performed as a result of an operator request or can be performed automatically at specific time intervals.
- The Hardcopy Application Entity prints images on a remote AE (Printer). It is associated with the local real-world activity “Acquire Frame”. “Acquire Frame” creates a print queue containing one or more virtual film sheets composed from images acquired by the user. It creates and sends fully rendered pages, already containing the user’s selected formatting choices. Only a single image per sheet is sent to the printer. This print object may be very large.
- Exam data is sent to all selected Store, Print and media destinations simultaneously in accordance with system configuration of “After Each Print/Acquire” or “At End of Exam”, with the exception of Structured Reports, which only are sent at End of Exam. When exams are selected for export from Patient Directory, the user may select specific destinations from the list of configured devices.

#### **4.1.2 Functional Definition of AEs**

##### **4.1.2.1 Functional Definition of Storage Application Entity**

The existence of a Network Store queue with associated network destination will activate the Storage AE. An association request is sent to the destination AE and upon successful negotiation of a Presentation Context the image transfer is started. If the association cannot be opened, the related queue is set to a “Failed” state, indicated by a Red dot on the Network Icon, and can be restarted by the user via the queue management interface.

Store Maximums:           Number of exams on the system = 200\*  
                                  Number of Frames in cineloop = 1000

\* Unless system hard drive capacity is exceeded first

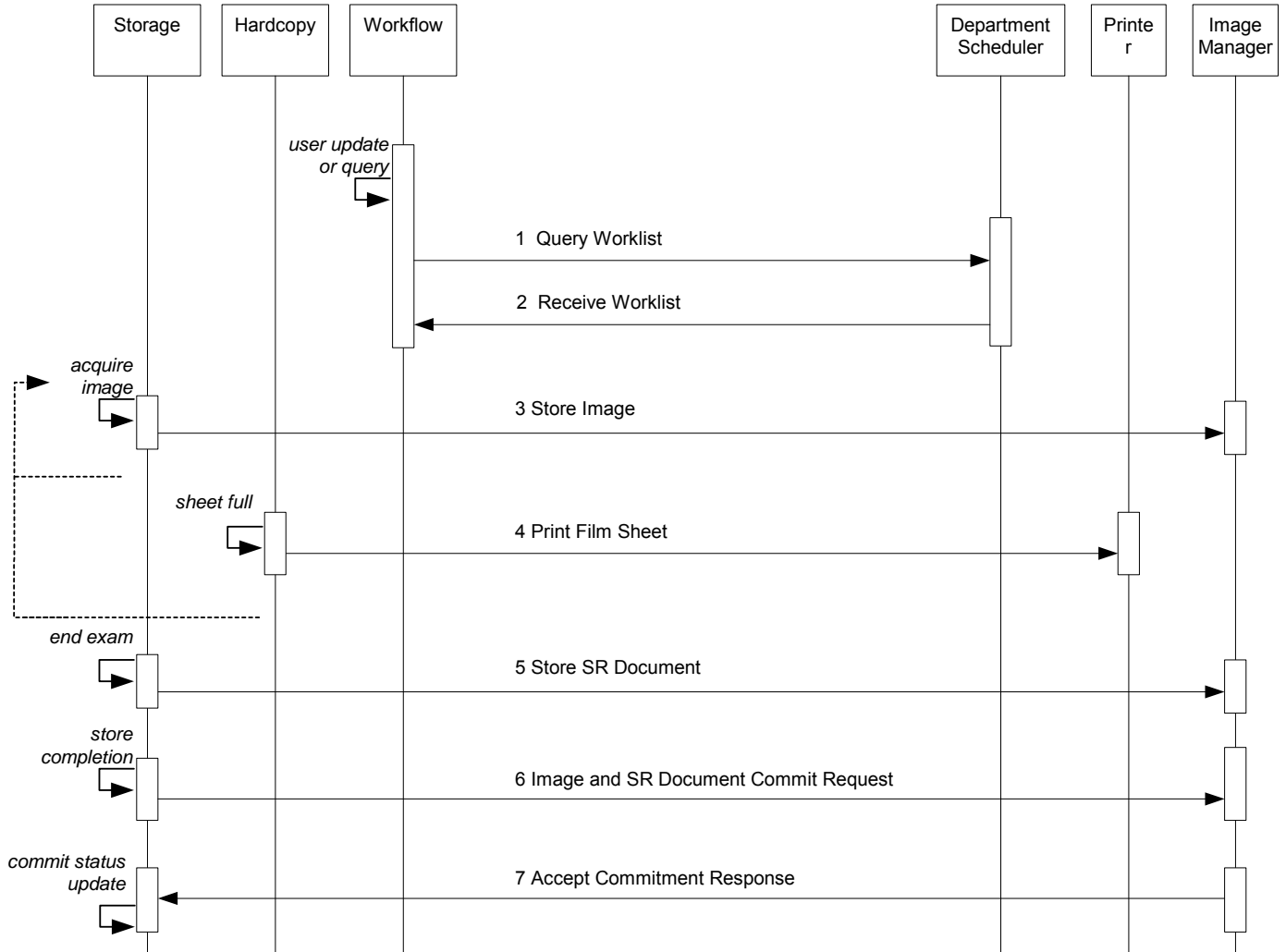
##### **4.1.2.2 Functional Definition of Workflow Application Entity**

Update Worklist attempts to download a Modality Worklist from a Modality Worklist server with studies matching US for ultrasound and the current date. If the Workflow AE establishes an Association to a remote AE, it will transfer all worklist items via the open Association. The results of a successful Worklist Update will overwrite the data in the Worklist display. If no matches are returned, the current patient list will not be changed. Specific queries for Patient Last Name, Patient ID, Accession #, Date, and Requested Procedure ID may be performed using the Patient Search. There is no queue management for Worklist.

##### **4.1.2.3 Functional Definition of Hardcopy Application Entity**

The existence of a print queue will activate the Hardcopy AE. An association is established with the printer(s) and the printer’s status determined. If the printer is operating normally, the film sheets will be printed. Changes in printer status will be detected (e.g. out of film) and reported to the user. If the printer is not operating normally, the print queue will set to a “Failed” state and can be restarted by the user via the queue management interface.

### 4.1.3 Sequencing of Real-World Activities



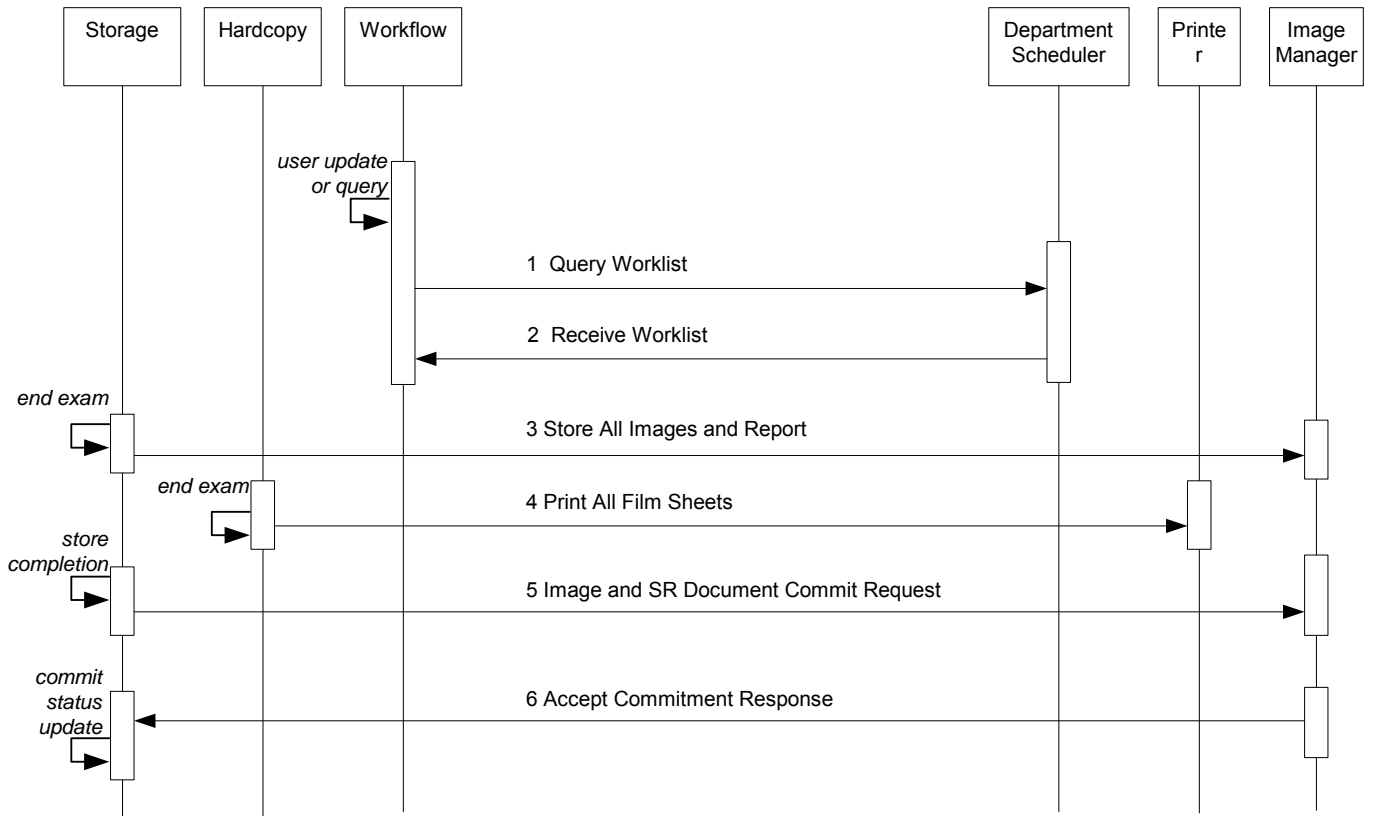
**Figure 2a:  
SEQUENCING CONSTRAINTS – “AFTER EACH” CONFIGURATION**

Figures 2a and 2b illustrate normal scheduled workflow conditions.

Notes:

- Printing to DICOM printers may occur independent of any other DICOM activity.
- All selected store, print and DVD devices will be sent data during the exam when configured for sending “After Each Print/Acquire” or at “At End of Exam.”
- Selecting a study from Review for export will send to all selected devices.

Other workflow situations (e.g. unscheduled procedure steps) will have other sequencing constraints. Printing or storage could equally take place after image acquisition. Printing could be omitted completely if no printer is connected or hardcopies are not required.



**Figure 2b:  
SEQUENCING CONSTRAINTS – “END OF EXAM” CONFIGURATION**



## 4.2 AE SPECIFICATIONS

### 4.2.1 Storage Application Entity Specification

#### 4.2.1.1 SOP Classes

iE33 provides Standard Conformance to the following SOP Classes:

**Table 3  
SOP CLASSES FOR AE STORAGE**

| SOP Class Name                          | SOP Class UID                 | SCU | SCP |
|---|-------------------------------|-----|-----|
| US Image Storage                        | 1.2.840.10008.5.1.4.1.1.6.1   | Yes | No  |
| US Multiframe Image Storage             | 1.2.840.10008.5.1.4.1.1.3.1   | Yes | No  |
| Comprehensive Structured Report Storage | 1.2.840.10008.5.1.4.1.1.88.33 | Yes | No  |
| Storage Commitment Push Model           | 1.2.840.10008.1.20.1          | Yes | No  |
| Private 3D Presentation State*          | 1.3.46.670589.2.5.1.1         | Yes | No  |

\* See [Section 8.6.2](#) for details on this Private SOP Class.

#### 4.2.1.2 Association Establishment Policy

##### 4.2.1.2.1 General

The DICOM standard application context name for DICOM 3.0 is always proposed:

**Table 4  
DICOM APPLICATION CONTEXT FOR AE STORAGE**

|                          |                       |
|--------------------------|-----------------------|
| Application Context Name | 1.2.840.10008.3.1.1.1 |
|--------------------------|-----------------------|

##### 4.2.1.2.2 Number of Associations

iE33 initiates one Association at a time for each destination to which a transfer request is being processed in the active job queue list. Three 'Archive' destinations may be selected simultaneously, but only one job will be active at a time, the other(s) remain pending until the active job is completed or failed.

**Table 5  
NUMBER OF ASSOCIATIONS INITIATED FOR AE STORAGE**

|   |   |
|---|---|
| Maximum number of simultaneous Associations | 5 |
|---|---|

1 for each configured storage device 1 for each store destination, 1 Structured Report and 1 Storage Commitment

iE33 accepts Associations for N-EVENT-REPORT notifications for the Storage Commitment Push Model SOP Class.

**Table 6  
NUMBER OF ASSOCIATIONS ACCEPTED FOR AE STORAGE**

|   |   |
|---|---|
| Maximum number of simultaneous Associations | 1 |
|---|---|

##### 4.2.1.2.3 Asynchronous Nature

iE33 does not support asynchronous communication (multiple outstanding transactions over a single Association).

**Table 7  
ASYNCHRONOUS NATURE AS A SCU FOR AE STORAGE**

|   |   |
|---|---|
| Maximum number of outstanding asynchronous transactions | 1 |
|---|---|

#### 4.2.1.2.4 Implementation Identifying Information

The implementation information for this Application Entity is:

**Table 8**  
**DICOM IMPLEMENTATION CLASS AND VERSION FOR AE STORAGE**

|                             |                      |
|-----------------------------|----------------------|
| Implementation Class UID    | 1.3.46.670589.5.2.10 |
| Implementation Version Name | ACP1.1L4             |

#### 4.2.1.3 Association Initiation Policy

##### 4.2.1.3.1 Activity – Store Images, Loops and Structured Reports

##### 4.2.1.3.1.1 Description and Sequencing of Activities

A user can select exams or individual images from Review and request them to be sent to multiple destinations (up to 3). Reports may not be selected individually, but are sent when “End Exam” is pressed, and when an entire study is selected from the Review Directory. Each object (single frame, Multiframe, 3D, report) is entered into the job queue. When the “Send After Each Print/Capture” option is active, the queue is serviced continuously during the exam. There is a default 10-minute timeout for “Send After Each,” after which the association is closed. Any additional images acquired during the exam will be sent on a subsequent association.

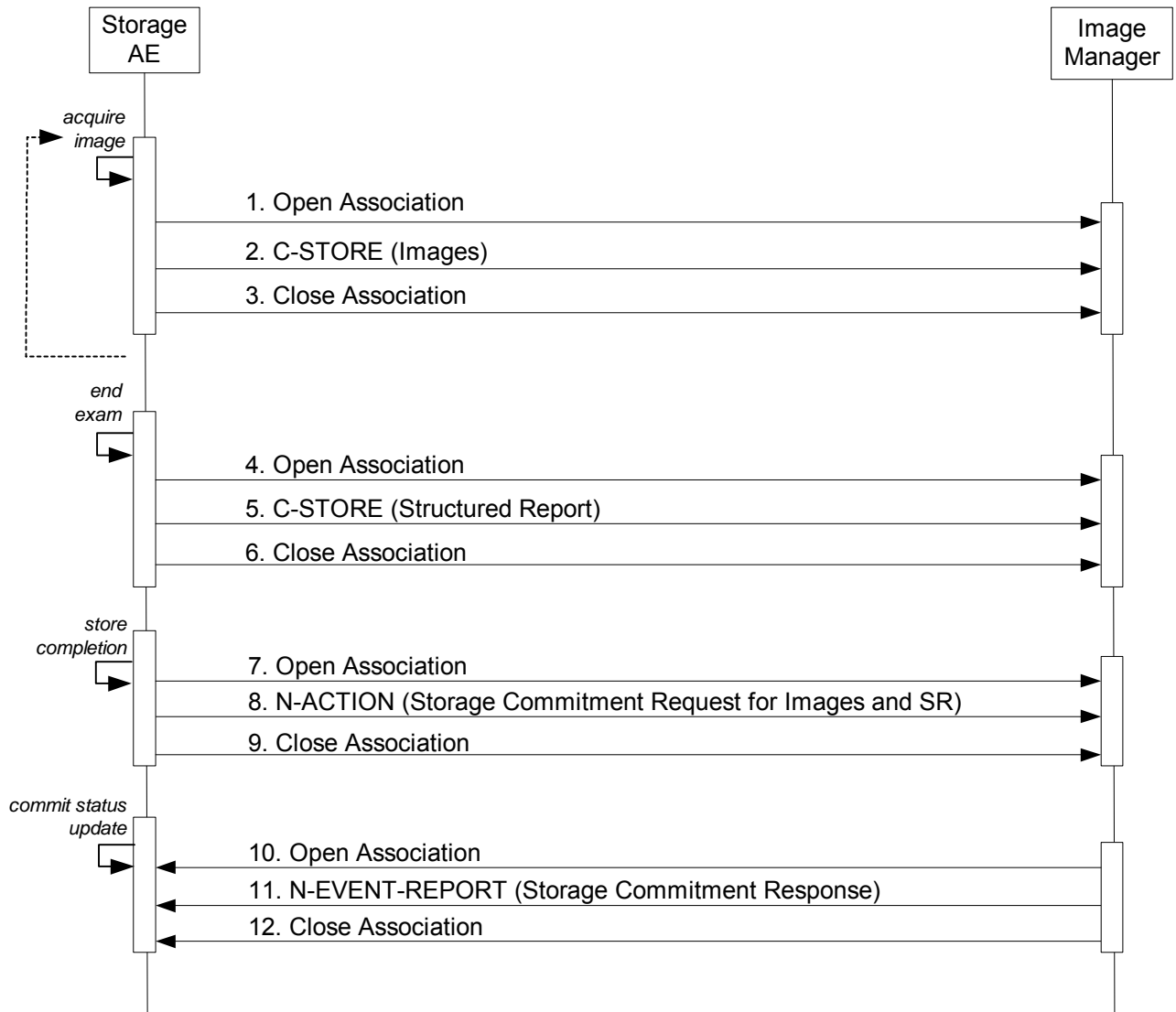
The Network Status icon reports the status of the job, Green is ok, Yellow is paused, and Red is failed. If the C-STORE Response from the remote Application contains a status other than Success or Warning, the Association is aborted and the related Job is switched to a failed state. It can be restarted any time by user interaction. When a system configured with selected network destinations is used without the network connected, it is considered in “Portable” mode. Each network status Icon will be Yellow with status of “Pending” for each study acquired while the network was not connected. When returning from portable, reconnecting the network cable will initiate transfer beginning again.

If a device is configured for Storage Commitment service, the Storage AE will, after all images and reports have been sent, transmit a single Storage Commitment request (N-ACTION) over a separate Association. The Storage AE can only receive an N-EVENT-REPORT request in a subsequent association initiated by the SCP employing PDU 54H SCP/SCU Role Negotiation in the SCP’s Association Request.

Multiframe objects (cineloops) will not be stored for imaging modes that include scrolling data, i.e., spectral Doppler or Mmode displays.

All supported measurements and calculations created by iE33 will be exported even if they are not selected for display in the iE33 report. Measurements or calculations that are not supported for export are listed in Appendix A and B in the Mapping Tables for each report and indicated by “Not Mapped”

Echo measurements generate an Adult Echocardiography Procedure report; Vascular measurements generate a Vascular SR report.



**Figure 3**  
**SEQUENCING OF ACTIVITY – SEND IMAGES**

The sequence of interactions between the Storage AE and an Image Manager is illustrated in Figure 3 for the “Store” configuration option “After Each.” The alternative option, “End Exam” differs only in the removal of the loop symbol on the ‘acquire images’ activity

NOTE: Message sequences vary depending on the relative time of the SCP AE’s. The N-EVENT-REPORT can also be sent over a separate association initiated by the Image Manager (see Section 4.2.1.4.1 on Activity – Receive Storage Commitment Response).

#### 4.2.1.3.1.2 Proposed Presentation Contexts

iE33 is capable of proposing the Presentation Contexts shown in the following table:

**Table 9  
PROPOSED PRESENTATION CONTEXTS FOR ACTIVITY SEND IMAGES**

| Presentation Context Table              |                               |   |  |      |           |
|---|-------------------------------|---|--|------|-----------|
| Abstract Syntax                         |                               | Transfer Syntax   |  | Role | Ext. Neg. |
| Name                                    | UID                           | Name List   | UID List   |      |           |
| US Image Storage                        | 1.2.840.10008.5.1.4.1.1.6.1   | Implicit VR Little Endian<br>Explicit VR Little Endian                        | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1                           | SCU  | None      |
| US Multiframe Image Storage*            | 1.2.840.10008.5.1.4.1.1.3.1   | Implicit VR Little Endian<br>Explicit VR Little Endian<br>JPEG Lossy Baseline | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.4.50 | SCU  | None      |
| Comprehensive Structured Report Storage | 1.2.840.10008.5.1.4.1.1.88.33 | Implicit VR Little Endian<br>Explicit VR Little Endian                        | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1                           | SCU  | None      |
| Storage Commitment Push Model           | 1.2.840.10008.1.20.1          | Implicit VR Little Endian<br>Explicit VR Little Endian                        | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1                           | SCU  | None      |
| Private 3D Presentation State**         | 1.3.46.670589.2.5.1.1         | Implicit VR Little Endian<br>Explicit VR Little Endian                        | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1                           | SCU  | None      |

\* Loops will be YBR\_FULL\_422 unless “Uncompressed” is selected in setups, which will produce RGB loops.

\*\* Intended for use only on QLAB and Xcelera workstations.

Presentation Contexts are proposed for each Archive device based on selected options. Storage Commitment N-Action Requests will only be sent to a device that is also configured as the Storage Commitment server, and a target archive is selected that images are sent to.

“Target Archive” is one of the three possible archives that images are sent to. “Commit Server” may be the same device but must be configured in Global Config/Devices.

**4.2.1.3.1.3 SOP Specific Conformance for Image and Comprehensive Structured Report Storage SOP Classes**

All Image and Comprehensive Structured Report Storage SOP Classes supported by the Storage AE exhibit the same behavior, except where stated, and are described together in this section.

Table 10 describes C-Store response behavior.

**Table 10  
STORAGE C-STORE RESPONSE STATUS HANDLING BEHAVIOR**

| Service Status | Further Meaning | Error Code             | Behavior   |
|----------------|-----------------|------------------------|--|
| Success        | Success         | 0000                   | The SCP successfully stored the SOP Instance. If all SOP Instances succeed, the job is marked as complete. |
| *              | *               | Any other status code. | The Association is aborted using A-ABORT and the transfer fails. The status is logged.                     |

The behavior of Storage AE during communication failure is summarized in Table 11.

**Table 11  
STORAGE COMMUNICATION FAILURE BEHAVIOR**

| Exception  | Behavior  |
|--|---|
| Timeout  | Same as Service Status "Refused" in Table 10 above. |
| Association aborted by the SCP or network layers | Same as Service Status "Refused" in Table 10 above. |

A green dot on the Network Transfer Icon indicates a successful transfer or an active queue. A red dot indicates failure. By using the Queue Manager, the user can restart a failed transfer. Open the Queue Manager by clicking on the Network Transfer Icon. Select the failed transfer and click Resume.

The contents of US Image, US Multiframe Storage and Comprehensive Structured Report Storage SOP Instances conform to the DICOM IOD definitions described in section 8.1.

**4.2.1.3.1.4 SOP Specific Conformance for Storage Commitment Push Model SOP Class**

**4.2.1.3.1.4.1 Storage Commitment Operations (N-ACTION)**

The Storage AE will request storage commitment for the configured device.

Table 12 summarizes the behavior of Storage AE when receiving response status codes.

**Table 12  
STORAGE COMMITMENT N-ACTION RESPONSE STATUS HANDLING BEHAVIOR**

| Service Status | Further Meaning | Error Code             | Behavior  |
|----------------|-----------------|------------------------|---|
| Success        | Success         | 0000                   | The system waits for the N-Event-Report.                    |
| *              | *               | Any other status code. | Retry The commit status remains incomplete for all objects. |

Table 13 summarizes the behavior of Storage AE during communication failure.

**Table 13  
STORAGE COMMITMENT COMMUNICATION FAILURE BEHAVIOR**

| Exception  | Behavior                                |
|--|---|
| Timeout  | Same as non-success status in Table 12. |
| Association aborted by the SCP or network layers | Same as non-success status in Table 12. |

**4.2.1.3.1.4.2 Storage Commitment Notifications (N-EVENT-REPORT)**

The Storage AE can receive an N-EVENT-REPORT notification received from the SCP via Reverse-role negotiation.

If no N-EVENT-REPORT is received after a ten-minute time-out, the transaction is treated as a failure

Table 14 summarizes the behavior of Storage AE when receiving Event Types within the N-EVENT-REPORT.

**Table 14  
STORAGE COMMITMENT N-EVENT-REPORT BEHAVIOUR**

| Event Type Name                       | Event Type ID | Behavior  |
|---------------------------------------|---------------|---|
| Storage Commitment Request Successful | 1             | The commit status is set to complete for each object. |

|  |   |   |
|--|---|---|
| Storage Commitment Request Complete – Failures Exist | 2 | The commit status remains incomplete. The commit comment for each object is logged. |
|--|---|---|

The reasons for returning specific status codes in a N-EVENT-REPORT response are summarized in Table 15.

**Table 15  
STORAGE COMMITMENT N-EVENT-REPORT RESPONSE STATUS REASONS**

| Service Status | Further Meaning        | Error Code | Reasons  |
|----------------|------------------------|------------|--|
| Success        | Success                | 0000       | The storage commitment result has been successfully received.  |
| Failure        | Unrecognized Operation | 0211H      | The Transaction UID was not sent in an N-ACTION request.   |
| Failure        | Resource Limitation    | 0213H      | The Transaction UID has expired.   |
| Failure        | No Such Event Type     | 0113H      | Invalid Event Type ID supplied.  |
| Failure        | Processing Failure     | 0110H      | Internal error during processing. Error Comment (0000,0902) contains a short description.                        |
| Failure        | Invalid Argument Value | 0115H      | The unrecognized SOP Instance UIDs will be returned within the Event Information of the N-EVENT-REPORT response. |

**4.2.1.4 Association Acceptance Policy**

**4.2.1.4.1 Activity – Receive Storage Commitment Response**

**4.2.1.4.1.1 Description and Sequencing of Activities**

The Storage AE accepts associations for pending responses to a Storage Commitment Request.

**4.2.1.4.1.2 Accepted Presentation Contexts**

Table 17 summarizes Presentation Contexts that the Storage AE accepts.

**Table 17  
ACCEPTABLE PRESENTATION CONTEXTS FOR  
ACTIVITY RECEIVE STORAGE COMMITMENT RESPONSE**

| Presentation Context Table    |                      |  |  |      |           |
|-------------------------------|----------------------|--|--|------|-----------|
| Abstract Syntax               |                      | Transfer Syntax  |  | Role | Ext. Neg. |
| Name                          | UID                  | Name List  | UID List                                 |      |           |
| Storage Commitment Push Model | 1.2.840.10008.1.20.1 | Implicit VR Little Endian<br>Explicit VR Little Endian | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1 | SCU  | None      |

**4.2.1.4.1.3 SOP Specific Conformance for Storage Commitment Push Model SOP Class**

**4.2.1.4.1.3.1 Storage Commitment Notifications (N-EVENT-REPORT)**

Upon receipt of a N-EVENT-REPORT the timer associated with the Transaction UID will be canceled.

Table 14 summarizes the behavior of Storage AE when receiving Event Types within the N-EVENT-REPORT.

Table 15 summarizes the reasons for returning specific status codes in a N-EVENT-REPORT response.

#### 4.2.2 Workflow Application Entity Specification

##### 4.2.2.1 SOP Classes

iE33 provides Standard Conformance to the following SOP Classes:

**Table 18**  
**SOP CLASSES FOR AE WORKFLOW**

| SOP Class Name               | SOP Class UID          | SCU | SCP |
|------------------------------|------------------------|-----|-----|
| MWL Information Model – FIND | 1.2.840.10008.5.1.4.31 | Yes | No  |

##### 4.2.2.2 Association Establishment Policy

###### 4.2.2.2.1 General

The DICOM standard application context name for DICOM 3.0 is always proposed:

**Table 19**  
**DICOM APPLICATION CONTEXT FOR AE WORKFLOW**

|                          |                       |
|--------------------------|-----------------------|
| Application Context Name | 1.2.840.10008.3.1.1.1 |
|--------------------------|-----------------------|

###### 4.2.2.2.2 Number of Associations

iE33 initiates one Association at a time for a Worklist request.

**Table 20**  
**NUMBER OF ASSOCIATIONS INITIATED FOR AE WORKFLOW**

|   |   |
|---|---|
| Maximum number of simultaneous Associations | 1 |
|---|---|

###### 4.2.2.2.3 Asynchronous Nature

iE33 does not support asynchronous communication.

**Table 21**  
**ASYNCHRONOUS NATURE AS A SCU FOR AE WORKFLOW**

|   |   |
|---|---|
| Maximum number of outstanding asynchronous transactions | 1 |
|---|---|

###### 4.2.2.2.4 Implementation Identifying Information

The implementation information for this Application Entity is:

**Table 22**  
**DICOM IMPLEMENTATION CLASS AND VERSION FOR AE WORKFLOW**

|                             |                      |
|-----------------------------|----------------------|
| Implementation Class UID    | 1.3.46.670589.5.2.10 |
| Implementation Version Name | ACP1.1L4             |

**4.2.2.3 Association Initiation Policy**

**4.2.2.3.1 Activity – Worklist Update**

**4.2.2.3.1.1 Description and Sequencing of Activities**

Two events may initiate worklist queries for Modality (US) only:

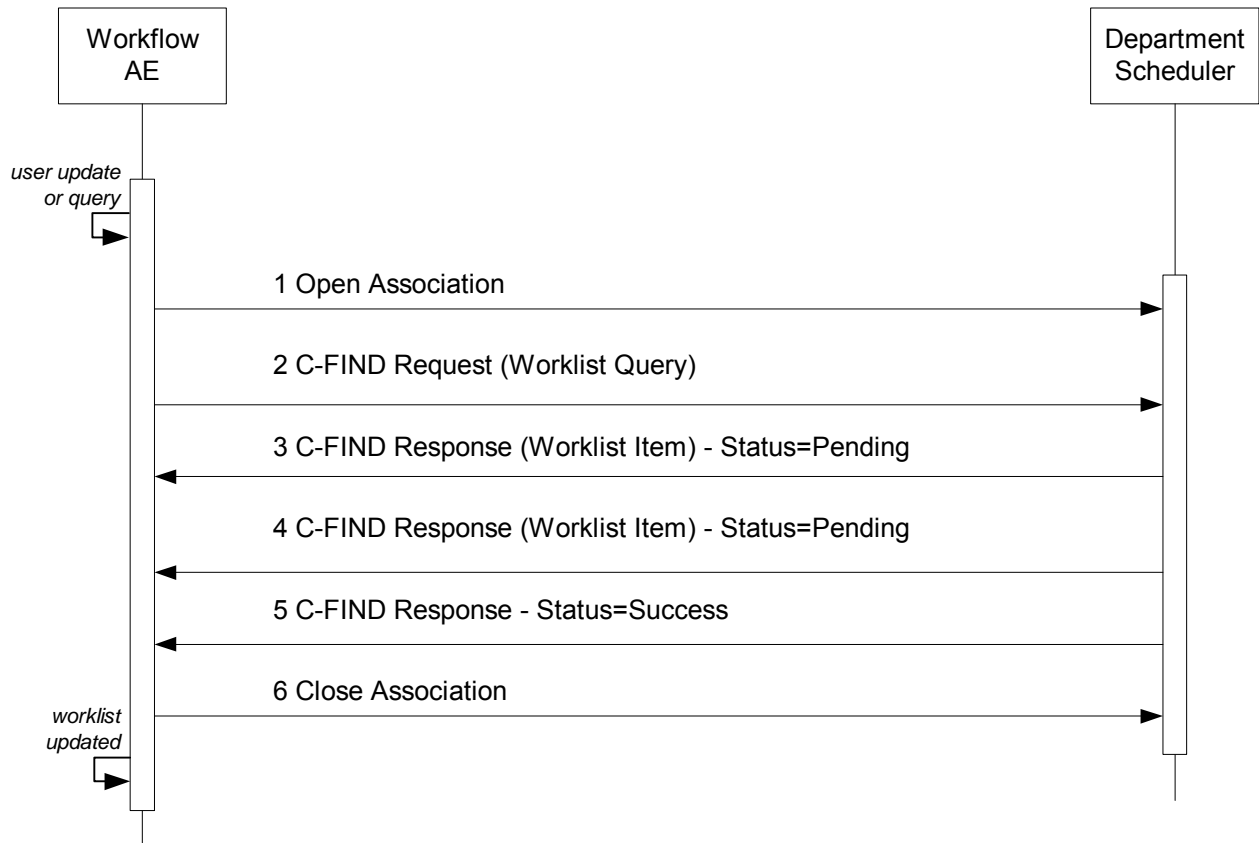
- User may key “Update Worklist” or ”Patient Search...” and enter matching fields to start a query: Patient Name, Patient ID, Accession #, Exam Date or Requested Procedure ID
- The system may periodically update with a configurable time interval (between 15 and 120 minutes at 15 minute increments), Current Date and configured query fields: System AE Title, Station Name, and System Location

The user at may cancel a worklist update anytime between sending the update request and receiving the final response.

**“Update Worklist” sends:**  
Modality = US and Current Date

**“Patient Search,,,” sends:**  
Modality = US and any combination of  
Last Name (Wild Card (\*) or Matching  
Leading Letters)  
Patient ID (Exact Match)  
Accession # (Exact Match)  
Exam Date (Exact Match)  
Requested Procedure ID (Exact Match)





**Figure 5  
SEQUENCING OF ACTIVITY – WORKLIST UPDATE**

A possible sequence of interactions between the Workflow AE and a Departmental Scheduler (e.g. a device such as a RIS or HIS which supports the MWL SOP Class as an SCP) is illustrated in Figure 5:

**4.2.2.3.1.2 Proposed Presentation Contexts**

iE33 will propose Presentation Contexts as shown in the following table:

**Table 23  
PROPOSED PRESENTATION CONTEXTS FOR ACTIVITY WORKLIST UPDATE**

| Presentation Context Table                 |                        |  |  |      |           |
|--|------------------------|--|--|------|-----------|
| Abstract Syntax                            |                        | Transfer Syntax  |  | Role | Ext. Neg. |
| Name                                       | UID                    | Name List  | UID List                                 |      |           |
| Modality Worklist Information Model – FIND | 1.2.840.10008.5.1.4.31 | Implicit VR Little Endian<br>Explicit VR Little Endian | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1 | SCU  | None      |

**4.2.2.3.1.3 SOP Specific Conformance for Modality Worklist**

Table 24 summarizes the behavior of iE33 when encountering status codes in a MWL C-FIND response.

A message “query failed” will appear on the user interface if iE33 receives any other SCP response status than “Success” or “Pending.”

**Table 24**  
**MODALITY WORKLIST C-FIND RESPONSE STATUS HANDLING BEHAVIOR**

| <b>Service Status</b> | <b>Further Meaning</b>   | <b>Error Code</b>      | <b>Behavior</b>   |
|-----------------------|--|------------------------|---|
| Success               | Matching is complete   | 0000                   | The system replaced the worklist from the response.                     |
| Pending               | Matches are continuing   | FF00                   | Continue.   |
| Pending               | Matches are continuing – Warning that one or more Optional Keys were not supported | FF01                   | Continue.   |
| *                     | *  | Any other status code. | The Association is aborted using A-ABORT. The worklist is not replaced. |

Table 25 summarizes the behavior of iE33 during communication failure.

**Table 25**  
**MODALITY WORKLIST COMMUNICATION FAILURE BEHAVIOR**

| <b>Exception</b>                                 | <b>Behavior</b>                                |
|--|--|
| Timeout  | Same as Service Status “*” in the table above. |
| Association aborted by the SCP or network layers | Same as Service Status “*” in the table above. |

Table 26 describes the iE33 Worklist Matching Keys and requested attributes. Unexpected attributes returned in a C-FIND response are ignored.

Non-matching responses returned by the SCP due to unsupported optional matching keys are ignored.



|                              |             |    |  |   |  |  |   |
|------------------------------|-------------|----|--|---|--|--|---|
| <b>Patient Medical</b>       |             |    |  |   |  |  |   |
| Medical Alerts               | (0010,2000) | LO |  |   |  |  |   |
| Additional Patient's History | (0010,21B0) | LT |  | x |  |  | x |
| Pregnancy Status             | (0010,21C0) | US |  | x |  |  | x |
| Last Menstrual Date          | (0010,21D0) | DA |  |   |  |  |   |

X\* = Additionally mapped to "Study ID" (0020,0010) in Composite Objects

The above table should be read as follows:

Module Name: The name of the associated module for supported worklist attributes.

Attribute Name: Attributes supported to build an iE33 Worklist Request Identifier.

Tag: DICOM tag for this attribute.

VR: DICOM VR for this attribute.

M: Matching keys for (automatic) Worklist Update. An "S" indicates that iE33 supplies an attribute value for Single Value Matching or additional specific tags indicated by "(S)". See <sup>1</sup> below.

R: Return keys. An "x" indicates that iE33 supplies this attribute as a Return Key with zero length for Universal Matching.

Q: Interactive Query Key. An "x" indicates that iE33 supplies this attribute as matching key, if entered in the Patient Search dialog.

D: Displayed keys. An "x" indicates that this worklist attribute is displayed to the user in the Worklist tab of the Patient Data screen.

IOD: An "x" indicates that this Worklist attribute is included into all Object Instances created during performance of the related Procedure Step.

<sup>1</sup> Entered in Global Configuration – System tab, "AE Title", selected in Device Selection – Worklist tab, Define Query section

<sup>2</sup> From Patient Search tab in Patient Data Entry – "Exam Date" field

<sup>3</sup> Fixed at "US"

<sup>4</sup> From Global Configuration – System tab, "Station Name", selected in Device Selection – Worklist tab, Define Query section

<sup>5</sup> From Global Configuration – System tab, "System Location", selected in Device Selection – Worklist tab, Define Query section

<sup>6</sup> From Patient Search tab in Patient Data Entry – "Procedure ID" field.

<sup>7</sup> From Patient Search tab in Patient Data Entry – "Accession #" field

<sup>8</sup> From Patient Search tab in Patient Data Entry – "Last Name" field

<sup>9</sup> From Patient Search tab in Patient Data Entry – "Patient ID" field

#### 4.2.3 Hardcopy Application Entity Specification

##### 4.2.3.1 SOP Classes

iE33 provides Standard Conformance to the following SOP Classes:

**Table 27**  
**SOP CLASSES FOR AE HARDCOPY**

| 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  |

##### 4.2.3.2 Association Establishment Policy

###### 4.2.3.2.1 General

The DICOM standard application context name for DICOM 3.0 is always proposed:

**Table 28**  
**DICOM APPLICATION CONTEXT FOR AE HARDCOPY**

|                          |                       |
|--------------------------|-----------------------|
| Application Context Name | 1.2.840.10008.3.1.1.1 |
|--------------------------|-----------------------|

###### 4.2.3.2.2 Number of Associations

iE33 initiates one Association at a time for each configured hardcopy device. Multiple hardcopy devices can be configured.

**Table 29**  
**NUMBER OF ASSOCIATIONS INITIATED FOR AE HARDCOPY**

|   |   |
|---|---|
| Maximum number of simultaneous Associations | 2 (number of configured hardcopy devices) |
|---|---|

###### 4.2.3.2.3 Asynchronous Nature

iE33 does not support asynchronous communication (multiple outstanding transactions over a single Association).

**Table 30**  
**ASYNCHRONOUS NATURE AS A SCU FOR AE HARDCOPY**

|   |   |
|---|---|
| Maximum number of outstanding asynchronous transactions | 1 |
|---|---|

###### 4.2.3.2.4 Implementation Identifying Information

The implementation information for this Application Entity is:

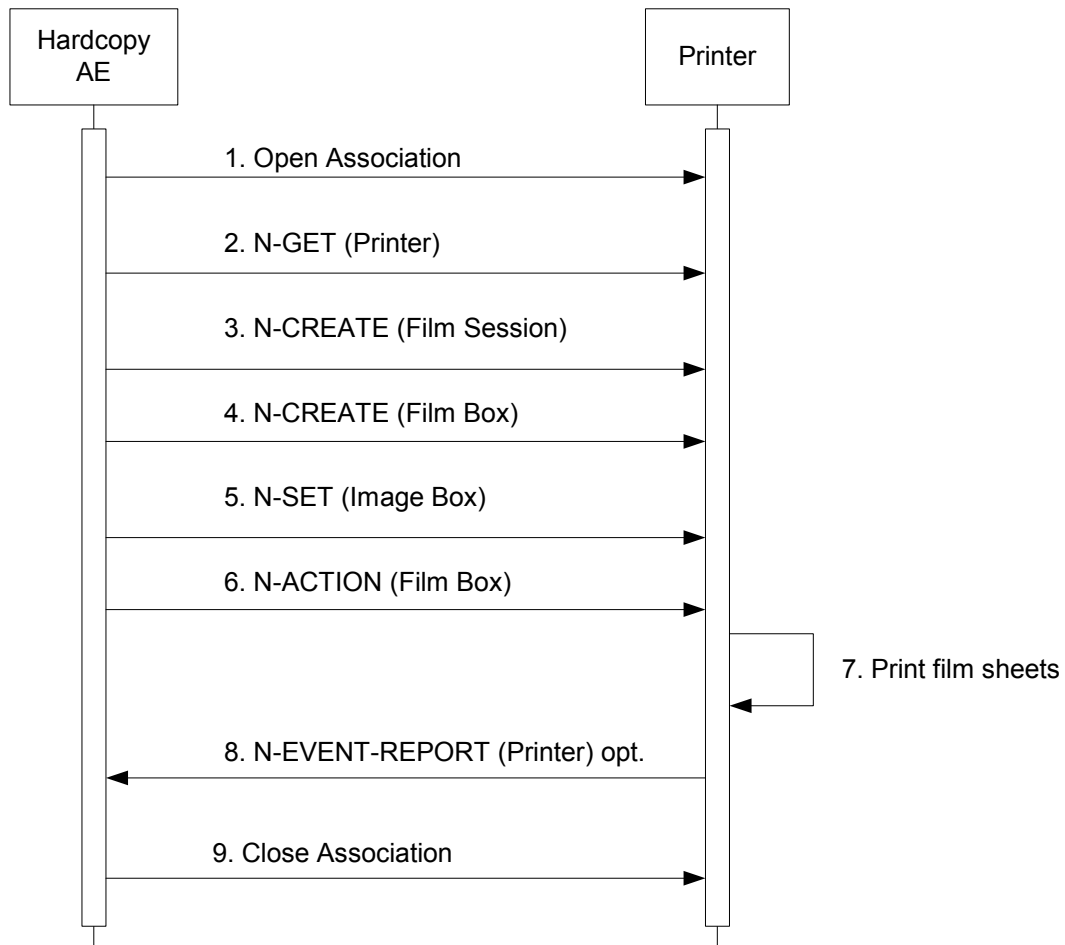
**Table 31**  
**DICOM IMPLEMENTATION CLASS AND VERSION FOR AE HARDCOPY**

|                             |                      |
|-----------------------------|----------------------|
| Implementation Class UID    | 1.3.46.670589.5.2.10 |
| Implementation Version Name | ACP1.1L4             |

4.2.3.3 Association Initiation Policy  
 4.2.3.3.1 Activity – Film Images  
 4.2.3.3.1.1 Description and Sequencing of Activities

The system composes images onto film sheets and sends print requests to job queue.

Figure 7 illustrates the print sequence.



**Figure 7**  
**SEQUENCING OF ACTIVITY – FILM IMAGES**

Figure 7 illustrates a typical sequence of DIMSE messages sent over an association between Hardcopy AE and a Printer.

Status of the print-job is reported through the print queue interface. Only one job will be active at a time for each separate hardcopy device. If any Response from the remote Application contains a status other than Success or Warning, the Association is aborted and the related Job is switched to a failed state. It can be restarted any time by user interaction.

#### 4.2.3.3.1.2 Proposed Presentation Contexts

Table 32 shows the Presentation Contexts iE33 is capable of proposing.

**Table 32  
PROPOSED PRESENTATION CONTEXTS FOR ACTIVITY FILM IMAGES**

| Presentation Context Table            |                        |                           |                     |      |           |
|---------------------------------------|------------------------|---------------------------|---------------------|------|-----------|
| Abstract Syntax                       |                        | Transfer Syntax           |                     | Role | Ext. Neg. |
| Name                                  | UID                    | Name List                 | UID List            |      |           |
| Basic Grayscale Print Management Meta | 1.2.840.10008.5.1.1.9  | Implicit VR Little Endian | 1.2.840.10008.1.2   | SCU  | None      |
|                                       |                        | Explicit VR Little Endian | 1.2.840.10008.1.2.1 |      |           |
| Basic Color Print Management Meta     | 1.2.840.10008.5.1.1.18 | Implicit VR Little Endian | 1.2.840.10008.1.2   | SCU  | None      |
|                                       |                        | Explicit VR Little Endian | 1.2.840.10008.1.2.1 |      |           |

#### 4.2.3.3.1.3 Common SOP Specific Conformance for all Print SOP Classes

Table 33 summarizes the general behavior of Hardcopy AE during communication failure. This behavior is common for all SOP Classes supported by Hardcopy AE.

**Table 33  
HARDCOPY COMMUNICATION FAILURE BEHAVIOR**

| Exception  | Behavior   |
|--|--|
| Timeout  | The Association is aborted and reported as "Failed." |
| Association aborted by the SCP or network layers | "Network Communication Failure" is reported.         |

#### 4.2.3.3.1.4 SOP Specific Conformance for the Printer SOP Class

Hardcopy AE supports the following DIMSE operations and notifications for the Printer SOP Class:

- N-GET

Details of the supported attributes and status handling behavior are described in the following subsections.

##### 4.2.3.3.1.4.1 Printer SOP Class Operations (N-GET)

Hardcopy AE uses the Printer SOP Class N-GET operation to obtain information about the current printer status. Table 34 lists the attributes obtained via N-GET.

**Table 34  
PRINTER SOP CLASS N-GET RESPONSE ATTRIBUTES**

| Attribute Name      | Tag         | VR | Value               | Presence of Value | Source  |
|---------------------|-------------|----|---------------------|-------------------|---------|
| Printer Status      | (2110,0010) | CS | Provided by Printer | ALWAYS            | PRINTER |
| Printer Status Info | (2110,0020) | CS | Provided by Printer | ALWAYS            | PRINTER |

The Printer Status information is evaluated as follows:

1. If Printer status (2110,0010) is NORMAL, the print-job continues to be printed.
2. If Printer status (2110,0010) is FAILURE, the print-job is marked as failed.

3. If Printer status (2110,0010) is WARNING, the print-job continues to be printed.

Table 35 summarizes the behavior of Hardcopy AE when encountering status codes in a N-GET response.

**Table 35  
PRINTER SOP CLASS N-GET RESPONSE STATUS HANDLING BEHAVIOR**

| Service Status | Further Meaning | Error Code             | Behavior   |
|----------------|-----------------|------------------------|--|
| Success        | Success         | 0000                   | The request to get printer status information was success. |
| *              | *               | Any other status code. | Same as Timeout above.                                     |

#### 4.2.3.3.1.4.2 Printer SOP Class Notifications (N-EVENT-REPORT)

Hardcopy AE is capable of receiving an N-EVENT-REPORT request at any time during an association.

Table 36 summarizes the behavior of Hardcopy AE when receiving Event Types within the N-EVENT-REPORT.

**Table 36  
PRINTER SOP CLASS N-EVENT-REPORT BEHAVIOUR**

| Event Type Name | Event Type ID | Behavior   |
|-----------------|---------------|--|
| Normal          | 1             | The print-job continues to be printed.   |
| Warning         | 2             | The print-job. For user-recoverable warnings, the job fails and a 1-hour retry period starts, retrying every 20 seconds. |
| Failure         | 3             | The print-job is marked as failed.   |
| *               | *             | Status code of 0113H   |

Table 37 summarizes the reasons for returning specific status codes in a N-EVENT-REPORT response.

**Table 37  
PRINTER SOP CLASS N-EVENT-REPORT RESPONSE STATUS REASONS**

| Service Status | Further Meaning    | Error Code | Reasons   |
|----------------|--------------------|------------|---|
| Success        | Success            | 0000       | The notification event has been successfully received.  |
| Failure        | No Such Event Type | 0113H      | An invalid Event Type ID was supplied in the N-EVENT-REPORT request.  |
| Failure        | Processing Failure | 0110H      | An internal error occurred during processing of the N-EVENT-REPORT. A short description of the error will be returned in Error Comment (0000,0902). |

#### 4.2.3.3.1.5 SOP Specific Conformance for the Film Session SOP Class

Hardcopy AE supports the following DIMSE operations for the Film Session SOP Class:

— N-CREATE

Details of the supported attributes and status handling behavior are described in the following subsections.

##### 4.2.3.3.1.5.1 Film Session SOP Class Operations (N-CREATE)

Table 38 lists the attributes supplied in an N-CREATE Request.



**Table 38**  
**FILM SESSION SOP CLASS N-CREATE REQUEST ATTRIBUTES**

| Attribute Name   | Tag         | VR | Value  | Presence of Value | Source |
|------------------|-------------|----|--|-------------------|--------|
| Number of Copies | (2000,0010) | IS | Default 1. User defined in Device Configuration. | ALWAYS            | USER   |
| Medium Type      | (2000,0030) | CS | BLUE FILM, CLEAR FILM or PAPER*                  | ALWAYS            | USER   |
| Film Destination | (2000,0040) | CS | MAGAZINE or PROCESSOR*                           | ALWAYS            | USER   |

\* Dependent on the specific printer selected

Table 39 summarizes the behavior of Hardcopy AE when encountering status codes in a N-CREATE response.

**Table 39**  
**FILM SESSION SOP CLASS N-CREATE RESPONSE STATUS HANDLING BEHAVIOR**

| Service Status | Further Meaning              | Error Code             | Behavior  |
|----------------|------------------------------|------------------------|---|
| Success        | Success                      | 0000                   | The SCP has completed the operation successfully.   |
| Warning        | Attribute Value Out of Range | 0116H                  | System continues operations.                        |
| Warning        | Attribute List Error         | 0107H                  | Same as above.                                      |
| *              | *                            | Any other status code. | The Association is aborted and the print-job fails. |

#### 4.2.3.3.1.7 SOP Specific Conformance for the Film Box SOP Class

Hardcopy AE supports the following DIMSE operations for the Film Box SOP Class:

- N-CREATE
- N-ACTION

Details of the supported attributes and status handling behavior are described in the following subsections.

##### 4.2.3.3.1.7.1 Film Box SOP Class Operations (N-CREATE)

Table 40 lists the attributes supplied in an N-CREATE Request.

**Table 40**  
**FILM BOX SOP CLASS N-CREATE REQUEST ATTRIBUTES**

| Attribute Name                   | Tag         | VR | Value   | Presence of Value | Source    |
|----------------------------------|-------------|----|---|-------------------|-----------|
| Image Display Format             | (2010,0010) | ST | STANDARD\1,1 or CUSTOM\xxx depending on printer. Default is displayed, and is user editable. Use only when substitute value is known. | ALWAYS            | AUTO/USER |
| Referenced Film Session Sequence | (2010,0500) | SQ |   | ALWAYS            | AUTO      |
| >Referenced SOP Class UID        | (0008,1150) | UI | 1.2.840.10008.5.1.1.1   | ALWAYS            | AUTO      |
| >Referenced SOP Instance UID     | (0008,1155) | UI | From created Film Session SOP Instance  | ALWAYS            | AUTO      |

|                           |             |    |   |        |           |
|---------------------------|-------------|----|---|--------|-----------|
| Film Orientation          | (2010,0040) | CS | PORTRAIT or LANDSCAPE   | ALWAYS | USER      |
| Film Size ID              | (2010,0050) | CS | Depends on configuration file selected. DICOM Defined Terms plus US_Letter. | ALWAYS | USER      |
| Magnification Type        | (2010,0060) | CS | Default Value = NONE  | ALWAYS | AUTO      |
| Border Density            | (2010,0100) | CS | BLACK   | ALWAYS | AUTO      |
| Empty Image Density       | (2010,0110) | CS | BLACK   | ALWAYS | AUTO      |
| Min Density               | (2010,0120) | US | Default value displayed, user editable                                      | ALWAYS | AUTO/USER |
| Max Density               | (2010,0130) | US | Default value displayed, user editable                                      | ALWAYS | AUTO/USER |
| Configuration Information | (2010,0150) | ST | Default value displayed, user editable                                      | ALWAYS | AUTO/USER |

Table 41 summarizes the behavior of Hardcopy AE when encountering status codes in a N-CREATE response.

**Table 41  
FILM BOX SOP CLASS N-CREATE RESPONSE STATUS HANDLING BEHAVIOR**

| Service Status | Further Meaning  | Error Code             | Behavior  |
|----------------|--|------------------------|---|
| Success        | Success  | 0000                   | The SCP has completed the operation successfully.                                 |
| Warning        | Requested Max Density outside of printer's operating range | B605H                  | The N-CREATE operation is considered successful but the status meaning is logged. |
| *              | *  | Any other status code. | The Association is aborted and the job failed.                                    |

#### 4.2.3.3.1.7.2 Film Box SOP Class Operations (N-ACTION)

The Hardcopy AE issues an N-ACTION Request to instruct the Print SCP to print the contents of the Film Box.

Table 42 summarizes the behavior of Hardcopy AE when encountering status codes in an N-ACTION response.

**Table 42  
FILM BOX SOP CLASS N-ACTION RESPONSE STATUS HANDLING BEHAVIOR**

| Service Status | Further Meaning   | Error Code             | Behavior   |
|----------------|---|------------------------|--|
| Success        | Success   | 0000                   | The SCP has completed the operation successfully. The film has been accepted for printing. |
| Warning        | Film Box SOP Instance hierarchy does not contain Image Box SOP Instances (empty page) | B603H                  | The Association is aborted and the job is failed.  |
| Failure        | Unable to create Print Job SOP Instance; print queue is full.                         | C602                   | Same as B603H above.   |
| *              | *   | Any other status code. | Same as B603H above.   |

#### 4.2.3.3.1.8 SOP Specific Conformance for the Image Box SOP Class

Hardcopy AE supports the following DIMSE operations for the Image Box SOP Class:

— N-SET

Details of the supported attributes and status handling behavior are described in the following subsections.

##### 4.2.3.3.1.8.1 Image Box SOP Class Operations (N-SET)

Table 43 lists the attributes supplied in an N-SET Request.

**Table 43  
IMAGE BOX SOP CLASS N-SET REQUEST ATTRIBUTES**

| Attribute Name                 | Tag         | VR    | Value  | Presence of Value | Source                     |
|--------------------------------|-------------|-------|--|-------------------|----------------------------|
| Image Position                 | (2020,0010) | US    | 1  | ALWAYS            | AUTO                       |
| Polarity                       | (0020,0020) | CS    | NORMAL   | ALWAYS            | AUTO                       |
| Basic Grayscale Image Sequence | (2020,0110) | SQ    | Used for BW (Monochrome2) print                                  | ALWAYS*           | AUTO                       |
| Basic Color Image Sequence     | (2020,0111) | SQ    | Used for Color (RGB) print                                       | ALWAYS*           | AUTO                       |
| >Samples Per Pixel             | (0028,0002) | US    | 1 for Monochrome2, 3 for Color                                   | ALWAYS            | AUTO                       |
| >Photometric Interpretation    | (0028,0004) | CS    | MONOCHROME2 or RGB   | ALWAYS            | AUTO                       |
| Planar Configuration           | (0028,0006) |       | Always "01" for Color by Plane, only used in Color print.        | ANAP              | AUTO                       |
| >Rows                          | (0028,0010) | US    | Depends on film size, number of rows for entire sheet of film    | ALWAYS            | Printer Configuration File |
| >Columns                       | (0028,0011) | US    | Depends on film size, number of columns for entire sheet of film | ALWAYS            | Printer Configuration File |
| >Bits Allocated                | (0028,0100) | US    | 8  | ALWAYS            | AUTO                       |
| >Bits Stored                   | (0028,0101) | US    | 8  | ALWAYS            | AUTO                       |
| >High Bit                      | (0028,0102) | US    | 7  | ALWAYS            | AUTO                       |
| >Pixel Representation          | (0028,0103) | US    | 0  | ALWAYS            | AUTO                       |
| >Pixel Data                    | (7FE0,0010) | OB/OW | Pixels of rendered film sheet.<br>OB – BW, OW – RGB              | ALWAYS            | AUTO                       |

\* Mutually exclusive attributes

Table 44 summarizes the behavior of Hardcopy AE when encountering status codes in a N-SET response.

**Table 44  
IMAGE BOX SOP CLASS N-SET RESPONSE STATUS HANDLING BEHAVIOR**

| Service Status | Further Meaning                                    | Error Code | Behavior  |
|----------------|--|------------|---|
| Success        | Success  | 0000       | The SCP has completed the operation successfully. |
| Failure        | Insufficient memory in printer to store the image. | C605       | The Association is aborted and the job is failed. |

|   |   |                        |                     |
|---|---|------------------------|---------------------|
| * | * | Any other status code. | Same as C605 above. |
|---|---|------------------------|---------------------|

#### 4.2.3.4 Association Acceptance Policy

The Hardcopy Application Entity does not accept Associations.

#### 4.2.4 Verification Application Entity specification

##### 4.2.4.1 SOP Class

iE33 provides Standard Conformance to the following SOP Class:

**Table 45  
SOP CLASSES FOR AE VERIFICATION**

| SOP Class Name | SOP Class UID     | SCU | SCP |
|----------------|-------------------|-----|-----|
| Verification   | 1.2.840.10008.1.1 | Yes | Yes |

#### 4.2.4.2 Association Establishment Policy

##### 4.2.4.2.1 General

The DICOM standard application context name for DICOM 3.0 is always proposed:

**Table 46  
DICOM APPLICATION CONTEXT FOR AE VERIFICATION**

|                          |                       |
|--------------------------|-----------------------|
| Application Context Name | 1.2.840.10008.3.1.1.1 |
|--------------------------|-----------------------|

#### 4.2.4.2.2 Number of Associations

iE33 initiates one Association at a time for a Verification request.

**Table 47a  
NUMBER OF ASSOCIATIONS INITIATED FOR AE VERIFICATION**

|   |  |
|---|--|
| Maximum number of simultaneous Associations | Up to 8, one for each configured remote device |
|---|--|

**Table 47b  
NUMBER OF ASSOCIATIONS ACCEPTED FOR AE VERIFICATION**

|   |  |
|---|--|
| Maximum number of simultaneous Associations | Unlimited, however, calling AE must be already configured in iE33. |
|---|--|

#### 4.2.4.2.3 Asynchronous Nature

iE33 does not support asynchronous communication (multiple outstanding transactions over a single Association).

**Table 48  
ASYNCHRONOUS NATURE AS A SCU FOR AE VERIFICATION**

|   |   |
|---|---|
| Maximum number of outstanding asynchronous transactions | 1 |
|---|---|

**4.2.4.2.4 Implementation Identifying Information**

The implementation information for this Application Entity is:

**Table 49  
DICOM IMPLEMENTATION CLASS AND VERSION FOR AE VERIFICATION**

|                             |                      |
|-----------------------------|----------------------|
| Implementation Class UID    | 1.3.46.670589.5.2.10 |
| Implementation Version Name | ACP1.1L4             |

**4.2.4.3 Association Initiation Policy**

**4.2.4.3.1 Activity – Verify as SCU and SCP**

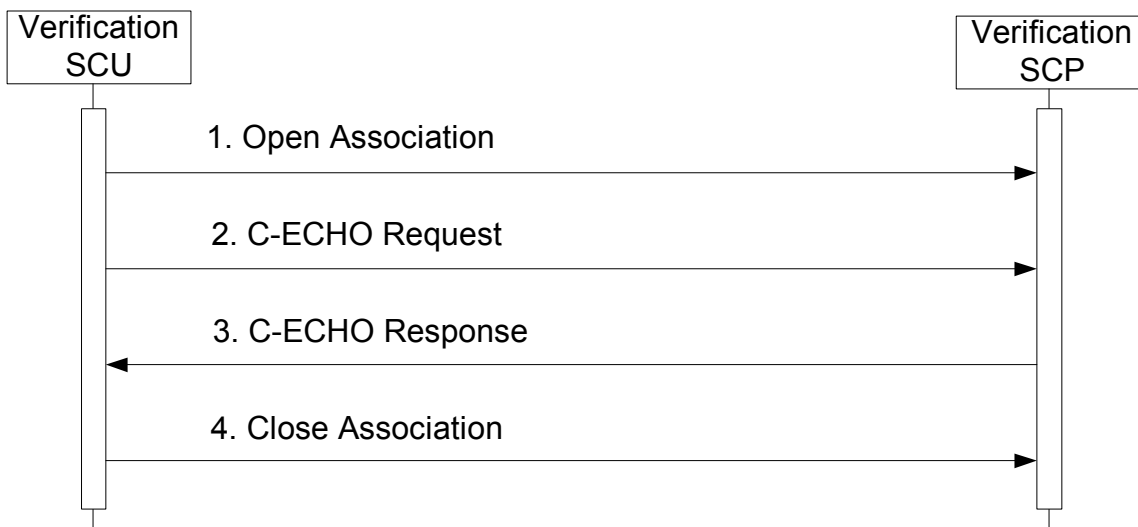
**4.2.4.3.2 Description and Sequencing of Activities**

**SCU:** The user selecting the “Verify” button on the Device configuration page initiates the verification request to the device whose data has just been configured. This tool allows the user to ensure all data was correctly entered and the remote device may be contacted. It uses C-Echo and verifies the remote device supports all configured SOP Classes. Any SOP Classes requested that are not supported will report, “failed”. Operations may continue, but objects of the type that are not supported will not be exported. See note in 4.2.4.3.5.1 Verification SOP Class Notifications.

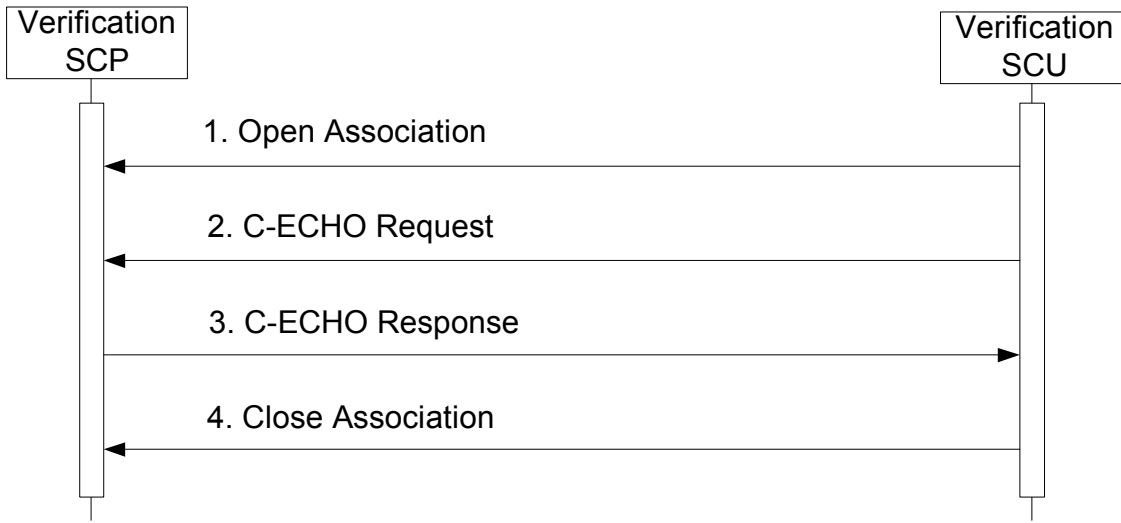
**SCP:** The system listens on the port configured on the Global System Configuration screen for Verification requests initiated by other remote devices. The calling device AE must already be configured as a remote device in order for iE33 to respond.

iE33 initiates an Association in order to issue:

- C-ECHO request according to the Verification SOP Class.



**Figure 8a  
SEQUENCING OF ACTIVITY – ISSUE VERIFY**



**Figure 8b**  
**SEQUENCING OF ACTIVITY – RECEIVE VERIFY**

**4.2.4.3.3 Proposed Presentation Contexts**  
iE33 will propose Presentation Contexts as shown in the following table:

**Table 50**  
**PROPOSED PRESENTATION CONTEXTS FOR ACTIVITY VERIFICATION**

| Presentation Context Table |                   |                           |                     |          |           |
|----------------------------|-------------------|---------------------------|---------------------|----------|-----------|
| Abstract Syntax            |                   | Transfer Syntax           |                     | Role     | Ext. Neg. |
| Name                       | UID               | Name List                 | UID List            |          |           |
| Verification               | 1.2.840.10008.1.1 | Implicit VR Little Endian | 1.2.840.10008.1.2   | SCU /SCP | None      |
|                            |                   | Explicit VR Little Endian | 1.2.840.10008.1.2.1 |          |           |

**4.2.4.3.4 SOP Specific Conformance for Verification**  
Table 51 summarizes the behavior of iE33 when encountering status codes in a Verification C-ECHO response. A message will appear on the user interface if iE33 receives any other SCP response status than “Success.”

**Table 51**  
**VERIFICATION C-ECHO RESPONSE STATUS HANDLING BEHAVIOR**

| Service Status | Further Meaning   | Error Code             | Behavior                              |
|----------------|-------------------|------------------------|---------------------------------------|
| Success        | xxxxxxx           | 0000                   | Device Status is set to: Verified     |
| Refused        | Out of Resources  | A700                   | Device Status is set to: Not Verified |
| Failed         | Unable to Process | C000 – CFFF            | Same as “Refused” above.              |
| *              | *                 | Any other status code. | Same as “Refused” above.              |

**4.2.4.3.5 Association Acceptance Policy**  
**4.2.4.3.5.1 Verification SOP Class Notifications**

Possible Responses:

|                                  |                                      |
|----------------------------------|--------------------------------------|
| Device Verification Succeeded    | Device Verification Failed           |
| {SOP Class(es)}: <b>Verified</b> | {SOP Class(es)}: <b>Not Verified</b> |
| Verification: <b>Verified</b>    |                                      |

Note: A given “Archive” server may not support all of the SOP Classes requested in the Verification request. Receiving failures (“Not Verified”) responses for SOP Classes outside the scope or capability of the server will not result in a communications failure. For example, if the correct Image Store SOP Classes are supported and Structured Report is not, then Image Storage will work successfully, and SRs will not be sent to the server. If multiframe is not supported and loops are acquired, the transfer will fail. In this case however, the single frame images will transfer.

Compressed Multiframe SOP Class is only negotiated for the actual image transfer.

**4.3 PHYSICAL NETWORK INTERFACES**

**4.3.1 Supported Communication Stacks**

**4.3.1.1 TCP/IP Stack**

All iE33 DICOM applications provide DICOM TCP/IP Network Communication Support as defined in Part 8 of the DICOM Standard.

**4.3.2 Physical Network Interface**

iE33 supports a single network interface. The following physical network interface is available:

**Table 52**  
**SUPPORTED PHYSICAL NETWORK INTERFACES**

|   |
|---|
| Ethernet 10/100BaseT, RJ-45, UTP, STP; AutoDetect Duplex, Full or Half Duplex |
|---|

**4.4 CONFIGURATION**

**4.4.1 AE Title/Presentation Address Mapping**

The Devices Configuration section allows the following device types to be configured:

| Device Type                    | Supported SOPs   |
|--------------------------------|--|
| DICOM Archive Server           | Ultrasound Store<br>Ultrasound Multiframe Store<br>Comprehensive Structured Report Store*<br>Storage Commitment Push Model** |
| DICOM Commit Server            | Storage Commitment Push Model**  |
| DICOM Worklist Server          | Modality Work List   |
| DICOM Structured Report Server | Comprehensive Structured Report Store*   |
| DICOM BW Printer               | Basic Grayscale Print Meta   |
| DICOM Color Printer            | Basic Color Print Meta   |

\* See section 4.4.1.2.1 below.

\*\* Storage Commitment must only be configured if supported by the Archive Server or a stand-alone server. In either case, the “Commit Server” and “Target Archive Server” must ONLY be configured if commitment is used.

To configure a single server that supports image store and commitment, then a separate Device must be configured using the appropriate AE Title, IP Address and Port data.

#### **4.4.1.1 Local AE Title**

All local AEs use the AE Title and TCP/IP Port configured via the Global Configuration Screen. All local AEs use the same AE Title. The system listens for Verification requests and Storage Commitment reports on the configured Port. All devices also support Verification as an SCU, allowing the use of the Verify button.

#### **4.4.1.2 Remote AE Title/Presentation Address Mapping**

The AE Titles, IP Addresses and Port numbers of remote applications are configured using the Devices Configuration Screen.

The “Device Name” field is used only as an ‘alias’ to contain the user/site specified name for the device that will be presented to the user for selection in the system configuration user interface. The contents of this field are not used in DICOM communications.

#### **4.4.1.2.1 Storage**

The New Device button on the Global Devices Setup screen opens the Add Device dialog that allows configuration of the AE Titles, Port numbers, and IP Addresses for the remote Storage SCPs. Multiple remote Storage SCPs can be defined.

- Structured Reports will be sent to an Archive device if SR support is confirmed using Verify. If the Archive does not support SR, configure the DICOM Structured Report Server. If SR support is confirmed using verify and measurements are made during the exam, a Structured Report will be sent to the archive.

Custom or User Defined measurements will not be sent in an SR. If no separate SR server is configured and the SOP Class fails negotiation on the Archive, then no SR objects will be created.

#### **4.4.1.2.2 Workflow**

Setup is used to set the AE Title, Port number and IP Address the remote MWL SCP. Multiple MWL SCPs may be defined, but only a single remote MWL SCP can be selected at a time.

All MWL queries use Modality = US. This cannot be changed.

Automated queries may be set for a specific time interval, Startup and every 15, 30, 45, 60, 75, 90, 105 or 120 minutes, or at End of Exam. Automated queries use the current data and Modality = US. They may additionally use “Station Name”, “System Location” and “AE Title” to further refine the search.

#### **4.4.1.2.3 Hardcopy**

Setup is used to set the AE Titles, Port numbers and IP Addresses for the remote Print SCPs.

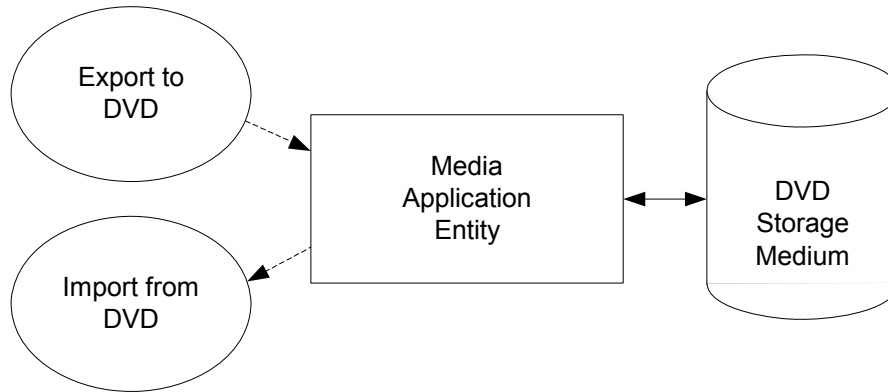
Multiple remote Print SCPs can be defined, but up to one Grayscale and one Color Print SCP may be selected at a time.



## 5 MEDIA STORAGE

### 5.1 IMPLEMENTATION MODEL

#### 5.1.1 Application Data Flow



**Figure 9**  
**APPLICATION DATA FLOW DIAGRAM FOR MEDIA STORAGE**

- Throughout this section, the term “DVD” refers to any of the media listed below which is in use.
- The Media Application Entity exports images and Presentation States to a DVD Storage medium. It is associated with the local real-world activity “Export to DVD”. “Export to DVD” is performed upon user request for selected patients, studies, series or instances (images or structured reports).
- iE33 will support the use of most writable media including CD-R, DVD-R, DVD+R, DVD-RW and DVD+RW. DVD+RW is recommended. DICOM directory structure will be the same regardless of media used. CD-R media will be initially formatted UDF, but **MUST** be ‘closed’ and converted to ISO-9660 format using “**Soft Eject**”, the eject button on the Review Directory screen. The user **must not** use eject button on the DVD drive to eject media, only to insert. After using CD-R media, it may be returned to the system for further use if the media supports multi-session.

Note that although –R or +R media may be “formatted”, the media cannot be erased. If a –R or +R media is formatted, the previously written data is no longer available, and only the remaining unwritten space on the media is available after format. This restriction does not apply to +RW media. Formatting +RW media allows the entire disk space to be used.

#### 5.1.2 Functional Definition of AEs

##### 5.1.2.1 Functional Definition of Media Application Entity

Activation of the “Export to DVD” icon or menu entry will pass the currently selected patients exams or individually selected images to the Media Application Entity. The SOP Instances associated with the selection will be collected into one or more export jobs. The contents of each export job will be written to a single DVD media.

#### 5.1.3 Sequencing of Real-World Activities

At least one image must exist and be selected before the Media Application Entity can be invoked. The operator can insert a new DVD media at any time. The Media Application Entity will wait indefinitely for a media to be inserted before starting to write to the DVD device. If no DVD media is available, the DVD queue management Icon will be Yellow.

#### 5.1.4 File Meta Information Options

The implementation information written to the File Meta Header in each file is:

**Table 65  
DICOM IMPLEMENTATION CLASS AND VERSION FOR MEDIA STORAGE**

|                             |                      |
|-----------------------------|----------------------|
| Implementation Class UID    | 1.3.46.670589.5.2.10 |
| Implementation Version Name | ACP1.1L4             |

**5.2 AE SPECIFICATIONS**

**5.2.1 Media Application Entity Specification**

The Media Application Entity provides standard conformance to the DICOM Interchange Option of the Media Storage Service Class. The Application Profiles and roles are listed in

**Table 66  
APPLICATION PROFILES, ACTIVITIES AND ROLES FOR OFFLINE-MEDIA**

| Application Profiles Supported | Real World Activity | Role       | SC Option   |
|--------------------------------|---------------------|------------|-------------|
| STD-US-SC-SF-DVD               | Export to DVD       | FSC, R*, U | Interchange |
| STD-US-SC-MF-DVD               |                     |            |             |

\* File Set Reader functionality is limited only to media created by other iE33 or iU22 systems.

**5.2.1.1 File Meta Information for the Application Entity**

The File-Set Identifier included in the File Meta Header is "PHILIPS MIP".

**5.2.1.2 Real-World Activities**

**5.2.1.2.1 Activity – Export to DVD**

The Media Application Entity acts as an FSC using the interchange option when requested to export SOP Instances from the local database to a DVD medium.

The contents of the export job will be written together with a corresponding DICOMDIR to a single-session DVD. Writing in multi-session mode is not supported. The user can cancel an export job in the job queue.

**5.2.1.2.2 Activity – Read from DVD**

The Media Application Entity acts as an FSR using the interchange option when requested to import SOP Instances from a DVD medium to the local database. Only media and images written by iE33 or iU22 systems may be read.

The Patient directory UI presents the directory of the system or the offline media. Selected exams are transferred from the media to the system for review. Objects transferred to the system retain their original SOP Instance UIDs.

Note: No native data, 3D objects, 3D Subpages or Structured Reports may be read back into the iE33.

**5.2.1.2.3 Activity – Update to DVD**

The Media Application Entity acts as an FSU using the interchange option when requested to export SOP Instances from the local database to a DVD medium.

The system user selects exams from the system's directory for transfer to a DVD that already contains data. The DICOMDIR is updated allowing access to original and new data.

DVD media may be formatted at any time, removing all previously recorded data.

**5.2.1.2.3.1 Media Storage Application Profiles**

The Media Application Entity supports the STD-US-SC-SF-DVD and STD-US-SC-MF-DVD Application Profiles.

**5.2.1.2.3.2 Options**

The Media Application Entity supports the SOP Classes and Transfer Syntaxes listed in Table 67.

**Table 67**

**IODS, SOP CLASSES AND TRANSFER SYNTAXES FOR OFFLINEMEDIA**

| <b>Information Object Definition</b>    | <b>SOP Class UID</b>          | <b>Transfer Syntax</b>          | <b>Transfer Syntax UID</b> |
|---|-------------------------------|---------------------------------|----------------------------|
| Media Storage Directory Storage         | 1.2.840.10008.1.3.10          | Explicit VR Little Endian       | 1.2.840.10008.1.2.1        |
| US Image Storage                        | 1.2.840.10008.5.1.4.1.1.6.1   | Explicit VR Little Endian       | 1.2.840.10008.1.2.1        |
| US Multiframe Image Storage             | 1.2.840.10008.5.1.4.1.1.3.1   | Explicit VR Little Endian       | 1.2.840.10008.1.2.1        |
|   |                               | JPEG Baseline Lossy Compression | 1.2.840.10008.1.2.4.50     |
| Comprehensive Structured Report Storage | 1.2.840.10008.5.1.4.1.1.88.33 | Explicit VR Little Endian       | 1.2.840.10008.1.2.1        |
| Private 3D Presentation State*          | 1.3.46.670589.2.5.1.1         | Explicit VR Little Endian       | 1.2.840.10008.1.2.1        |

\* For import to QLAB or Xcelera workstations only.

Media Export – Import Support Table

| <b>Export</b>       | <b>Import</b>       |
|---------------------|---------------------|
| Single Frame Images | Single Frame Images |
| Multiframe Images   | Multiframe Images   |
| Structured Reports  |                     |
| Native Data*        |                     |
| 3D Volume Data*     |                     |
| 3D Subpage Data*    |                     |

\* Intended for use on QLAB and Xcelera workstations only

## 6 SUPPORT OF CHARACTER SETS

All iE33 DICOM applications support the

ISO\_IR 100 (ISO 8859-1:1987 Latin Alphabet No. 1 supplementary set)

## 7 SECURITY

DICOM security is not implemented on the iE33 at this time.

iE33 incorporates an internal firewall that only accepts incoming traffic on the designated listening port, as configured in the System tab of the Global Configuration screen.

## 8 ANNEXES

### 8.1 CREATED IOD INSTANCES

Table 69 specifies the attributes of an Ultrasound Image transmitted by the iE33 storage application.

Table 70 specifies the attributes of a Comprehensive Structured Reports transmitted by the iE33 storage application.

The following tables use a number of abbreviations. The abbreviations used in the “Presence of ...” column are:

- VNAP Value Not Always Present (attribute sent zero length if no value is present)
- ANAP Attribute Not Always Present
- ALWAYS Always Present
- EMPTY Attribute is sent without a value

The abbreviations used in the “Source” column:

- MWL the attribute value source Modality Worklist
- USER the attribute value source is from User input
- AUTO the attribute value is generated automatically
- CONFIG the attribute value source is a configurable parameter

NOTE: All dates and times are encoded in the local configured calendar and time. Date, Time and Time zone are configured using the Service/Installation Tool.

#### 8.1.1 US or US Multiframe Image IOD

**Table 69**  
**IOD OF CREATED US OR US MULTIFRAME SOP INSTANCES**

| IE        | Module                | Reference | Presence of Module  |
|-----------|-----------------------|-----------|---------------------|
| Patient   | Patient               | Table 71  | ALWAYS              |
| Study     | General Study         | Table 72  | ALWAYS              |
|           | Patient Study         | Table 73  | ALWAYS              |
| Series    | General Series        | Table 74  | ALWAYS              |
| Equipment | General Equipment     | Table 75  | ALWAYS              |
| Image     | General Image         | Table 76  | ALWAYS              |
|           | Image Pixel           | Table 77  | ALWAYS              |
|           | Cine                  | Table 78  | Only if Multi-frame |
|           | Multi-frame           | Table 79  | Only if Multi-frame |
|           | US Region Calibration | Table 80  | ANAP                |
|           | US Image              | Table 81  | ALWAYS              |
|           | VOI LUT               | Table 82  | ALWAYS              |
|           | SOP Common            | Table 83  | ALWAYS              |

8.1.2 Comprehensive Structured Report IOD

**Table 70**  
**IOD OF CREATED COMPREHENSIVE STRUCTURED REPORT SOP INSTANCES**

| IE        | Module              | Reference | Presence of Module |
|-----------|---------------------|-----------|--------------------|
| Patient   | Patient             | Table 71  | ALWAYS             |
| Study     | General Study       | Table 72  | ALWAYS             |
|           | Patient Study       | Table 73  | ALWAYS             |
| Series    | SR Document Series  | Table 84  | ALWAYS             |
| Equipment | General Equipment   | Table 75  | ALWAYS             |
| Document  | SR Document General | Table 85  | ALWAYS             |
|           | SR Document Content | Table 86  | ALWAYS             |
|           | SOP Common          | Table 87  | ALWAYS             |

8.1.3 Common Modules

**Table 71**  
**PATIENT MODULE OF CREATED SOP INSTANCES**

| Attribute Name       | Tag         | VR | Value  | Presence of Value | Source                |
|----------------------|-------------|----|--|-------------------|-----------------------|
| Patient's Name       | (0010,0010) | PN | Same attribute of MWL or PDE input                               | ALWAYS            | MWL/<br>USER          |
| Patient ID           | (0010,0020) | LO | From MWL, user input or system generated. Maximum 64 characters. | ALWAYS            | MWL/<br>USER/<br>AUTO |
| Patient's Birth Date | (0010,0030) | DA | Same attribute of MWL or PDE input                               | VNAP              | MWL/<br>USER          |
| Patient's Sex        | (0010,0040) | CS | Same attribute of MWL or PDE input                               | VNAP              | MWL/<br>USER          |
| Other Patient Ids    | (0010,1000) | LO | Same attribute of MWL  | VNAP              | MWL                   |
| Ethnic Group         | (0010,2160) | SH | Same attribute of MWL  | VNAP              | MWL                   |
| Patient Comments     | (0010,4000) | LT | Same attribute of MWL or PDE input                               | VNAP              | MWL/<br>USER          |

**Table 72**  
**GENERAL STUDY MODULE OF CREATED SOP INSTANCES**

| Attribute Name             | Tag         | VR | Value  | Presence of Value | Source       |
|----------------------------|-------------|----|--|-------------------|--------------|
| Study Instance UID         | (0020,000D) | UI | Same value as in MWL or auto generated                   | ALWAYS            | MWL/<br>AUTO |
| Study Date                 | (0008,0020) | DA | Study's Start Date (0040,0244).                          | ALWAYS            | AUTO         |
| Study Time                 | (0008,0030) | TM | Study's Start Time (0040,0245).                          | ALWAYS            | AUTO         |
| Referring Physician's Name | (0008,0090) | PN | Same value as in MWL or PDE input.                       | VNAP              | MWL/<br>USER |
| Study ID                   | (0020,0010) | SH | MWL Requested Procedure ID (0040,1001) or auto-generated | ALWAYS            | MWL/<br>AUTO |

|                                  |             |    |   |      |              |
|----------------------------------|-------------|----|---|------|--------------|
| Accession Number                 | (0008,0050) | SH | Same attribute of MWL or user PDE input.                                      | VNAP | MWL/<br>USER |
| Study Description                | (0008,1030) | LO | MWL Scheduled Procedure Step Description (0040,0007) or PDE input             | VNAP | MWL/<br>USER |
| Physician(s) of Record           | (0008,1048) | PN | Same attribute as MWL   | ANAP | MWL          |
| Referenced Study Sequence        | (0008,1110) | SQ | One item per item in the MWL Reference Study Sequence. Absent if unscheduled. | ANAP | MWL          |
| >Referenced SOP Class UID        | (0008,1150) | UI | Same value as in of the Reference Study Sequence in the MWL                   | VNAP | MWL          |
| >Referenced SOP Instance UID     | (0008,1155) | UI | Same value as in of the Reference Study Sequence in the MWL                   | VNAP | MWL          |
| >Requested Procedure Description | (0032,1060) | LO | Same value as in of the Reference Study Sequence in the MWL                   | VNAP | MWL          |
| Procedure Code Sequence          | (0008,1032) | SQ | MWL Requested Procedure Code Sequence (0032,1064)                             | ANAP | MWL          |
| >Code Value                      | (0008,0100) | SH | Same value as MWL attribute   | VNAP | MWL          |
| >Coding Scheme Designator        | (0008,0102) | SH | Same value as MWL attribute   | VNAP | MWL          |
| >Coding Scheme Version           | (0008,0103) | SH | Same value as MWL attribute   | VNAP | MWL          |
| >Code Meaning                    | (0008,0104) | LO | Same value as MWL attribute   | VNAP | MWL          |

**Table 73  
PATIENT STUDY MODULE OF CREATED SOP INSTANCES**

| Attribute Name                  | Tag         | VR | Value                                    | Presence of Value | Source       |
|---------------------------------|-------------|----|--|-------------------|--------------|
| Admitting Diagnosis Description | (0008,1080) | LO | Same attribute as MWL attribute          | VNAP              | MWL          |
| Patient Size                    | (0010,1020) | DS | Same value as MWL attribute or PDE input | VNAP              | MWL/<br>USER |
| Patient's Weight                | (0010,1030) | DS | Same value as MWL attribute or PDE input | VNAP              | MWL/<br>USER |
| Additional Patient's History    | (0010,21B0) | LT | Same value as MWL attribute              | VNAP              | MWL          |
| Pregnancy Status                | (0010,21C0) | US | Same value as MWL attribute              | ANAP              | MWL          |

**Table 74  
GENERAL SERIES MODULE OF CREATED SOP INSTANCES**

| Attribute Name      | Tag         | VR | Value                             | Presence of Value | Source |
|---------------------|-------------|----|-----------------------------------|-------------------|--------|
| Modality            | (0008,0060) | CS | "US"                              | ALWAYS            | AUTO   |
| Series Instance UID | (0020,000E) | UI | Auto-generated                    | ALWAYS            | AUTO   |
| Series Number       | (0020,0011) | IS | A number unique within the Study. | ALWAYS            | AUTO   |
| Series Date         | (0008,0021) | DA | Date of first image in series.    | ALWAYS            | AUTO   |
| Series Time         | (0008,0031) | TM | Time of first image in series.    | ALWAYS            | AUTO   |

|                                       |             |    |   |        |      |
|---------------------------------------|-------------|----|---|--------|------|
| Performing Physician's Name           | (0008,1050) | PN | MWL Scheduled Performing Physician's Name (0040,0006)   | VNAP   | MWL  |
| Protocol Name                         | (0018,1030) | LO | "Free Form"<br>"Exercise 2 Stage"<br>"Exercise 3 Stage"<br>"Pharmacological 4 Stage"<br>"Wall Contrast"<br>"Quantitative 4 Stage" | ALWAYS | AUTO |
| Series Description                    | (0008,103E) | LO | Same as Study Description.  | ANAP   | USER |
| Operator's Name                       | (0008,1070) | PN | From PDE "Sonographer" field  | VNAP   | USER |
| Request Attributes Sequence           | (0040,0275) | SQ | Present if scheduled from MWL. One item.  | VNAP   | AUTO |
| >Requested Procedure ID               | (0040,1001) | SH | Same value as MWL attribute.  | ALWAYS | MWL  |
| >Scheduled Procedure Step ID          | (0040,0009) | SH | Same value as MWL attribute.  | ALWAYS | MWL  |
| >Scheduled Procedure Step Description | (0040,0007) | LO | Same value as MWL attribute.  | VNAP   | MWL  |
| >Scheduled Protocol Code Sequence     | (0040,0008) | SQ | Same value as MWL attribute.  | VNAP   | MWL  |

**Table 75  
GENERAL EQUIPMENT MODULE OF CREATED SOP INSTANCES**

| Attribute Name            | Tag         | VR | Value                     | Presence of Value | Source |
|---------------------------|-------------|----|---------------------------|-------------------|--------|
| Manufacturer              | (0008,0070) | LO | Philips Medical Systems   | ALWAYS            | AUTO   |
| Institution Name          | (0008,0080) | LO | Setups configuration      | VNAP              | CONFIG |
| Station Name              | (0008,1010) | SH | Setups configuration      | VNAP              | CONFIG |
| Manufacturer's Model Name | (0008,1090) | LO | iE33                      | ALWAYS            | AUTO   |
| Device Serial Number      | (0018,1000) | LO | Automatically set         | ALWAYS            | AUTO   |
| Software Version          | (0018,1020) | LO | PMS1.1 Ultrasound Neo 1.0 | ALWAYS            | AUTO   |

#### 8.1.4 US or Multiframe Image Modules

**Table 76  
GENERAL IMAGE MODULE OF CREATED US SOP INSTANCES**

| Attribute Name  | Tag         | VR | Value  | Presence of Value | Source |
|-----------------|-------------|----|--|-------------------|--------|
| Instance Number | (0020,0013) | IS | Generated by device, increments from "1" in each series          | ALWAYS            | AUTO   |
| Content Date    | (0008,0023) | DA | <yyyymmdd>   | ALWAYS            | AUTO   |
| Content Time    | (0008,0033) | TM | <hhmmss>   | ALWAYS            | AUTO   |
| Image Type      | (0008,0008) | CS | ORIGINAL/PRIMARY for uncompressed, DERIVED/PRIMARY if compressed | ALWAYS            | CONFIG |

|                         |             |    |  |        |      |
|-------------------------|-------------|----|--|--------|------|
| Derivation Description  | (0008,2111) | ST | “Uncompressed”, “Low”, “Medium”, “High” based on configuration setting | ALWAYS | AUTO |
| Burned In Annotation    | (0028,0301) | CS | Set to “YES”   | ALWAYS | AUTO |
| Lossy Image Compression | (0028,2110) | CS | Present “01” if image is lossy compressed, “00” if not.                | ALWAYS | AUTO |
| Presentation LUT Shape  | (2050,0020) | CS | “IDENTITY” Only if “Image Export Format” is GSDF. Else, not sent.      | ANAP   | AUTO |

**Table 77  
IMAGE PIXEL MODULE OF CREATED US OR US MULTIFRAME SOP INSTANCES**

| Attribute Name             | Tag         | VR      | Value  | Presence of Value | Source |
|----------------------------|-------------|---------|--|-------------------|--------|
| Samples per Pixel          | (0028,0002) | US      | See US Image Module Table 81                             | ALWAYS            | AUTO   |
| Photometric Interpretation | (0028,0004) | CS      | See US Image Module Table 81                             | ALWAYS            | AUTO   |
| Rows                       | (0028,0010) | US      | Image height in pixels: 240*, 480**, 768***, 1024****    | ALWAYS            | CONFIG |
| Columns                    | (0028,0011) | US      | Image width in pixels: 320*, 640**, 1024***, or 1280**** | ALWAYS            | CONFIG |
| Bits Allocated             | (0028,0100) | US      | 8 Bits per pixel.  | ALWAYS            | AUTO   |
| Bits Stored                | (0028,0101) | US      | Number of info bits in pixel: “8”                        | ALWAYS            | AUTO   |
| High Bit                   | (0028,0102) | US      | High bit is 7  | ALWAYS            | AUTO   |
| Pixel Representation       | (0028,0103) | US      | “0” pixels are Unsigned integers                         | ALWAYS            | AUTO   |
| Pixel Data                 | (7FE0,0010) | OW / OB |  | ALWAYS            | AUTO   |
| Planar Configuration       | (0028,0006) | US      | Value is always “0”.                                     | ALWAYS            | AUTO   |

Image Size details: \* = ROI Multiframe images, \*\* = Multiframe images, \*\*\* = Single Frame Display Area only images and \*\*\*\* = Single Frame Full Screen images (no scaling data).

**Table 78  
CINE MODULE OF CREATED US MULTIFRAME SOP**

| Attribute Name | Tag         | VR | Value                      | Presence of Value | Source |
|----------------|-------------|----|----------------------------|-------------------|--------|
| Frame Time     | (0018,1063) | DS | Frame time in milliseconds | ANAP              | AUTO   |

**Table 79  
MULTI-FRAME MODULE OF CREATED US MULTIFRAME SOP INSTANCES**

| Attribute Name          | Tag         | VR | Value                       | Presence of Value | Source |
|-------------------------|-------------|----|-----------------------------|-------------------|--------|
| Number of Frames        | (0028,0008) | IS | # of frames in object       | ANAP              | AUTO   |
| Frame Increment Pointer | (0028,0009) | AT | (0018,1063) Frame Time only | ANAP              | AUTO   |



**Table 80**  
**US REGION CALIBRATION MODULE OF CREATED US OR US MULTIFRAME SOP INSTANCES**  
 Not sent in Full Screen Single Frame images.

| Attribute Name                      | Tag         | VR | Value   | Presence of Value | Source |
|-------------------------------------|-------------|----|---|-------------------|--------|
| Sequence of Ultrasound Regions      | (0018,6011) | SQ | A sequence is present for each region on the system display, except for ECG regions. Only when set for "Display Area". No scaling for "Full Screen" images. | ANAP              | AUTO   |
| >Region Location Min x <sub>0</sub> | (0018,6018) | UL | Top Left position of region.  | ALWAYS            | AUTO   |
| >Region Location Min y <sub>0</sub> | (0018,601A) | UL | Top Left position of region   | ALWAYS            | AUTO   |
| >Region Location Max x <sub>1</sub> | (0018,601C) | UL | Bottom Right position of region   | ALWAYS            | AUTO   |
| >Region Location Max y <sub>1</sub> | (0018,601E) | UL | Bottom Right position of region   | ALWAYS            | AUTO   |
| >Physical Units X Direction         | (0018,6024) | US | Enumerated Value.<br>2D Image = 0003H = CM<br>Mmode / Doppler = 0004H = SEC   | ALWAYS            | AUTO   |
| >Physical Units Y Direction         | (0018,6026) | US | Enumerated Value.<br>2D Image = 0003H = CM<br>Mmode = 0003H = CM<br>Doppler = 0007H = CM / SEC  | ALWAYS            | AUTO   |
| >Physical Delta X                   | (0018,602C) | FD | The physical value per pixel increment  | ALWAYS            | AUTO   |
| >Physical Delta Y                   | (0018,602E) | FD | The physical value per pixel increment  | ALWAYS            | AUTO   |
| >Reference Pixel X <sub>0</sub>     | (0018,6020) | SL | The X pixel value of baseline   | ANAP              | AUTO   |
| >Reference Pixel Y <sub>0</sub>     | (0018,6022) | SL | The Y pixel value of baseline   | ANAP              | AUTO   |
| >Region Spatial Format              | (0018,6012) | US | A bit mask 0-5 if: none, 2d, Mmode, spectral Doppler. See DICOM PS3.3 C.8.5.5.1.1   | ALWAYS            | AUTO   |
| >Region Data Type                   | (0018,6014) | US | Enumerated Value. See DICOM PS3.3 C.8.5.5.1.2   | ALWAYS            | AUTO   |
| >Region Flags                       | (0018,6016) | UL | Bit mask. See DICOM PS3.3 C.8.5.5.1.3   | ALWAYS            | AUTO   |

**Table 81**  
**US IMAGE MODULE OF CREATED US OR US MULTIFRAME SOP INSTANCES**

| Attribute Name             | Tag         | VR | Value   | Presence of Value | Source |
|----------------------------|-------------|----|---|-------------------|--------|
| Samples Per Pixel          | (0028,0002) | US | "3"   | ALWAYS            | AUTO   |
| Photometric Interpretation | (0028,0004) | CS | Uncompressed: "RGB"<br>Compressed: "YBR_FULL_422" | ALWAYS            | CONFIG |

|                               |             |    |  |        |        |
|-------------------------------|-------------|----|--|--------|--------|
| Bits Allocated                | (0028,0100) | US | 8 Bits per pixel.  | ALWAYS | AUTO   |
| Bits Stored                   | (0028,0101) | US | Number of info bits in pixel: "8"                                | ALWAYS | AUTO   |
| High Bit                      | (0028,0102) | US | High bit is 7  | ALWAYS | AUTO   |
| Planar Configuration          | (0028,0006) | US | Value is always "0".   | ALWAYS | AUTO   |
| Pixel Representation          | (0028,0103) | US | "0" Pixels are Unsigned integers                                 | ALWAYS | AUTO   |
| Frame Increment Pointer       | (0028,0009) | AT | (0018,1063) "Frame Time" only.                                   | ANAP   | AUTO   |
| Image Type                    | (0008,0008) | CS | ORIGINAL/PRIMARY for uncompressed, DERIVED/PRIMARY if compressed | ALWAYS | CONFIG |
| Lossy Image Compression       | (0028,2110) | CS | "01" if image is lossy compressed, "00" if not.                  | ALWAYS | AUTO   |
| Number of Stages              | (0008,2124) | IS | 2-n  | ANAP   | AUTO   |
| Number of Views in Stage      | (0008,212A) | IS | 1-n  | ANAP   | AUTO   |
| Stage Name                    | (0008,2120) | SH | REST, PEAK, POST, IMPOST, BASE, LOW, user defined                | ANAP   | AUTO   |
| Stage Number                  | (0008,2122) | IS | 1-n  | ANAP   | AUTO   |
| View Name                     | (0008,2127) | SH | LAX, SAX, AP4, AP2, AP3, user defined                            | ANAP   | AUTO   |
| View Number                   | (0008,2128) | IS | 1-n  | ANAP   | AUTO   |
| Number of Event Timers        | (0008,2129) | IS | 1-n  | ANAP   | AUTO   |
| Event Elapsed Time(s)         | (0008,2130) | DS | nnn sec.   | ANAP   | AUTO   |
| Event Timer Name(s)           | (0008,2132) | LO | 1-n  | ANAP   | AUTO   |
| Trigger Time                  | (0018,1060) | DS | nnn sec.   | ANAP   | AUTO   |
| Heart Rate                    | (0018,1088) | IS | Beats per minute   | ANAP   | AUTO   |
| Ultrasound Color Data Present | (0028,0014) | US | 01   | ALWAYS | AUTO   |
| Transducer Data               | (0018,5010) | LO | Transducer name.   | ALWAYS | AUTO   |
| Processing Function           | (0018,5020) | LO | Imaging optimization name.                                       | ALWAYS | AUTO   |

**Table 82  
VOI LUT MODULE OF CREATED US SOP INSTANCES**

| Attribute Name | Tag         | VR | Value        | Presence of Value | Source |
|----------------|-------------|----|--------------|-------------------|--------|
| Window Center  | (0028,1050) | DS | Fixed at 127 | ALWAYS            | AUTO   |
| Window Width   | (0028,1051) | DS | Fixed at 254 | ALWAYS            | AUTO   |

**Table 83  
SOP COMMON MODULE OF CREATED US OR US MULTIFRAME SOP INSTANCES**

| Attribute Name         | Tag         | VR | Value  | Presence of Value | Source |
|------------------------|-------------|----|--|-------------------|--------|
| Specific Character Set | (0008,0005) | CS | Attribute only sent if an Extended or Replacement Character Set is used                | ANAP              | AUTO   |
| Instance Creation Date | (0008,0012) | DA | <yyyymmdd>   | ALWAYS            | AUTO   |
| Instance Creation Time | (0008,0013) | TM | <hhmmss>   | ALWAYS            | AUTO   |
| SOP Class UID          | (0008,0016) | UI | 1.2.840.10008.5.1.4.1.1.6.1 for US or<br>1.2.840.10008.5.1.4.1.1.3.1 for US Multiframe | ALWAYS            | AUTO   |
| SOP Instance UID       | (0008,0018) | UI | Generated by device  | ALWAYS            | AUTO   |

### 8.1.5 Comprehensive Structured Report Modules

**Table 84**  
**SR DOCUMENT SERIES MODULE OF CREATED COMPREHENSIVE SR SOP INSTANCES**

| Attribute Name                                | Tag         | VR | Value   | Presence of Value | Source |
|---|-------------|----|---|-------------------|--------|
| Modality                                      | (0008,0060) | CS | SR  | ALWAYS            | AUTO   |
| Series Instance UID                           | (0020,000E) | UI | Auto-generated  | ALWAYS            | AUTO   |
| Series Number                                 | (0020,0011) | IS | A number unique within the Study  | ALWAYS            | AUTO   |
| >Referenced Performed Procedure Step Sequence | (0008,1111) | SQ | Identifies the Performed Procedure Step SOP Instance for which this SR is related | ALWAYS            | AUTO   |
| >>Referenced SOP Class UID                    | (0008,1150) | UI | PPS SOP Class = "1.2.840.10008.3.1.2.3.3"   | ALWAYS            | AUTO   |
| >>Referenced SOP Instance UID                 | (0008,1155) | UI | PPS Instance UID of the PPS generating this document                              | ALWAYS            | AUTO   |

**Table 85**  
**SR DOCUMENT GENERAL MODULE OF CREATED COMPREHENSIVE SR SOP INSTANCES**

| Attribute Name              | Tag         | VR | Value   | Presence of Value | Source       |
|-----------------------------|-------------|----|---|-------------------|--------------|
| Instance Number             | (0020,0013) | IS | Unique number   | ALWAYS            | AUTO         |
| Completion Flag             | (0040,A491) | CS | PARTIAL   | ALWAYS            | AUTO         |
| Verification Flag           | (0040,A493) | CS | UNVERIFIED  | ALWAYS            | AUTO         |
| Content Date                | (0008,0023) | DA | Date content created.   | ALWAYS            | AUTO         |
| Content Time                | (0008,0033) | TM | Time content created.   | ALWAYS            | AUTO         |
| Referenced Request Sequence | (0040,A370) | SQ | Identifies Requested Procedures being fulfilled by creation of this Document. | Not Used*         | MWL          |
| >Study Instance UID         | (0020,000D) | UI | Same value as in MWL or auto generated  | ALWAYS            | MWL/<br>AUTO |
| >Referenced Study Sequence  | (0008,1110) | SQ | 1 item per item in MWL, absent if unscheduled                                 | ANAP              | MWL          |

|                                    |             |    |   |           |              |
|------------------------------------|-------------|----|---|-----------|--------------|
| >>Referenced SOP Class UID         | (0008,1150) | UI | Identifies the Referenced SOP Class                           | ANAP      | MWL          |
| >>Referenced SOP Instance UID      | (0008,1155) | UI | Instance UID  | ANAP      | MWL          |
| >Accession Number                  | (0008,0050) | SH | Same attribute of MWL or user PDE input.                      | VNAP      | MWL/<br>USER |
| >Requested Procedure ID            | (0040,1001) | SH | 1 item per item in MWL, generated if unscheduled              | ALWAYS    | MWL/<br>AUTO |
| >Requested Procedure Description   | (0032,1060) | LO | 1 item per item in MWL, absent if unscheduled                 | ANAP      | MWL          |
| >Requested Procedure Code Sequence | (0032,1064) | SQ | 1 item per item in MWL, absent if unscheduled                 | ANAP      | MWL          |
| Performed Procedure Code Sequence  | (0040,A372) | SQ | Codes for the performed procedure. May be zero or more items. | Not Used* | AUTO         |

\* Not present in current release.

**Table 86**  
**SR DOCUMENT CONTENT MODULE OF CREATED COMPREHENSIVE SR SOP INSTANCES**

This table describes the template-specific data summarized from the following tables in the DICOM Standard:  
Document Content Macro, Document Relationship Macro, Numeric Measurement Macro and Code Macro

| Attribute Name                     | Tag         | VR | Value  | Presence of Value | Source |
|------------------------------------|-------------|----|--|-------------------|--------|
| Content Template Sequence          | (0040,A504) | SQ |  | ALWAYS            | AUTO   |
| >Mapping Resource                  | (0008,0105) | CS | DCMR   | ALWAYS            | AUTO   |
| >Template Identifier               | (0040,DB00) | CS | The Root Content Item identifies TID 5200 (Echo) or 5100 (Vascular).                             | ALWAYS            | AUTO   |
| Content Sequence                   | (0040,A730) | SQ |  | ALWAYS            | AUTO   |
| >Relationship Type                 | (0040,A010) | CS | For details see <a href="#">Appendix A for Echo</a> or <a href="#">Appendix B for Vascular</a> . | ALWAYS            | AUTO   |
| <i>Document Relationship Macro</i> |             |    | For details see <a href="#">Appendix A for Echo</a> or <a href="#">Appendix B for Vascular</a> . | ALWAYS            | AUTO   |
| <i>Document Content Macro</i>      |             |    | For details see <a href="#">Appendix A for Echo</a> or <a href="#">Appendix B for Vascular</a> . | ALWAYS            | AUTO   |
| Value Type                         | (0040,A040) | CS | CONTAINER, always first tag of SR  | ALWAYS            | AUTO   |
| Concept Name Code Sequence         | (0040,A043) | SQ |  | ALWAYS            | AUTO   |
| >Code Value                        | (0008,0100) |    | 125200 or 125100   | ALWAYS            | AUTO   |
| >Coding Scheme Designator          | (0008,0102) |    | DCM  | ALWAYS            | AUTO   |
| >Code Meaning                      | (0008,0104) |    | "Adult Echocardiography Procedure Report" or "Vascular Ultrasound Procedure Report"              | ALWAYS            | AUTO   |
| Continuity of Content              | (0040,A050) | CS | SEPARATE   | ALWAYS            | AUTO   |
| <i>Numeric Measurement Macro</i>   |             |    | For details see <a href="#">Appendix A for Echo</a> or <a href="#">Appendix B for Vascular</a> . | ALWAYS            | AUTO   |
| <i>Code Macro</i>                  |             |    | For details see <a href="#">Appendix A for Echo</a> or <a href="#">Appendix B for Vascular</a> . | ALWAYS            | AUTO   |

**Table 87**  
**SOP COMMON MODULE OF CREATED COMPOSITE SR SOP INSTANCES**

| Attribute Name         | Tag         | VR | Value   | Presence of Value | Source |
|------------------------|-------------|----|---|-------------------|--------|
| Specific Character Set | (0008,0005) | CS | Attribute only sent if an Extended or Replacement Character Set is used | ANAP              | AUTO   |
| SOP Class UID          | (0008,0016) | UI | 1.2.840.10008.5.1.4.1.1.88.33   | ALWAYS            | AUTO   |
| SOP Instance UID       | (0008,0018) | UI | Generated by device   | ALWAYS            | AUTO   |

## 8.2 USED FIELDS IN RECEIVED IOD BY APPLICATION

The iE33 storage application does not receive SOP Instances. The usage of attributes received via MWL is described in section 4.2.2.3.1.3 SOP Specific Conformance for Modality Worklist.

## 8.3 ATTRIBUTE MAPPING

Table 88 summarizes the relationships between attributes received via MWL, and stored in acquired images. The format and conventions used in Table 89 are the same as the corresponding table in IHE Technical Framework, Rev. 5.5 04-07-2003, vol. II: Transactions.

**Table 88**  
**ATTRIBUTE MAPPING BETWEEN MODALITY WORKLIST, AND IMAGE**

| Modality Worklist                    | Image IOD                             |
|--------------------------------------|---------------------------------------|
| Patient's Name                       | Patient's Name                        |
| Patient ID                           | Patient ID                            |
| Patient's Birth Date                 | Patient's Birth Date                  |
| Patient's Sex                        | Patient's Sex                         |
| Patient's Weight                     | Patient's Weight                      |
| Referring Physician's Name           | Referring Physician's Name            |
| ----                                 | ----                                  |
| Study Instance UID                   | Study Instance UID                    |
| Referenced Study Sequence            | Referenced Study Sequence             |
| Accession Number                     | Accession Number                      |
| ----                                 | Request Attributes Sequence           |
| Requested Procedure ID               | >Requested Procedure ID               |
| Requested Procedure Description      | >Requested Procedure Description      |
| Scheduled Procedure Step ID          | >Scheduled Procedure Step ID          |
| Scheduled Procedure Step Description | >Scheduled Procedure Step Description |
| Scheduled Protocol Code Sequence     | >Scheduled Protocol Code Sequence     |
| ----                                 | Performed Protocol Code Sequence      |
| ----                                 | Study ID – Requested Procedure        |

|                                   |  |
|-----------------------------------|--|
|                                   | ID from MWL, else generated                  |
| ----                              | Performed Procedure Step ID                  |
| ----                              | Performed Procedure Step Start Date          |
| ----                              | Performed Procedure Step Start Time          |
| ----                              | Performed Procedure Step Description         |
| ----                              | ----   |
| Requested Procedure Code Sequence | Procedure Code Sequence                      |
| ----                              | Referenced Performed Procedure Step Sequence |
| ----                              | >Referenced SOP Class UID                    |
| ----                              | >Referenced SOP Instance UID                 |
| ----                              | Protocol Name                                |

#### 8.4 COERCED/MODIFIED FIELDS

The MWL AE will truncate attribute values received in the response to a MWL Query if the value length is longer than the maximum length permitted by the attribute's VR.

#### 8.5 CONTROLLED TERMINOLOGY

The Workflow AE is capable of supporting arbitrary coding schemes for Procedure and Protocol Codes. The contents of Requested Procedure Code Sequence (0032,1064) and Scheduled Protocol Code Sequence (0040,0008) supplied in Worklist Items will be mapped to Image IOD attributes as described in Table 88.

#### 8.6 EXTENSIONS / SPECIALIZATIONS / PRIVATIZATIONS

##### 8.6.1 Standard Extended / Specialized / Private SOPs

The US or US Multiframe Image Storage SOP Classes are extended to create a Standard Extended SOP Class by addition of standard and private attributes to the created SOP Instances as documented in section 8.1.

Private Creator tag ranges

2001,xxxx

200D,xxxx

are used to communicate a variety of data. These private tags are intended for use with Philips workstations and ultrasound systems only.

The next section describes the use of the private SOP Class for 3D Subpages. Appendix C lists the private tags used in 3D Volume data.

Additional private tag data, known as "Native Data" also uses tags within these groups.

The tags that are sent via network or media are depended on settings for the specific destination, as found in "Print/Network>Device Selection and either the "DVD" tab or "Archive" tab and the "Advanced" button for the highlighted archive device.

##### 8.6.2 Private SOP Class – 3D Presentation State Specification

###### 8.6.2.1 3D Presentation State SOP Class

iE33 provides Standard Conformance to the following Private SOP Class:

**Table 89**  
**SOP CLASS FOR PRIVATE 3D PRESENTATION STATE**

| SOP Class Name                | SOP Class UID         | SCU | SCP |
|-------------------------------|-----------------------|-----|-----|
| Private 3D Presentation State | 1.3.46.670589.2.5.1.1 | Yes | No  |

**8.6.2.2 Association Establishment Policy**

**8.6.2.2.1 General**

The DICOM standard application context name for DICOM 3.0 is always proposed:

**Table 90**  
**DICOM APPLICATION CONTEXT FOR PRIVATE 3D PRESENTATION STATE**

|                          |                       |
|--------------------------|-----------------------|
| Application Context Name | 1.2.840.10008.3.1.1.1 |
|--------------------------|-----------------------|

**8.6.2.2.2 Number of Associations**

iE33 initiates one Association at a time for storage of a Private 3D Presentation state.

**Table 91**  
**NUMBER OF ASSOCIATIONS INITIATED FOR PRIVATE 3D PRESENTATION STATE**

|   |  |
|---|--|
| Maximum number of simultaneous Associations | 3, one for each configured remote device |
|---|--|

**8.6.2.2.3 Asynchronous Nature**

iE33 does not support asynchronous communication (multiple outstanding transactions over a single Association).

**Table 92**  
**ASYNCHRONOUS NATURE AS A SCU FOR PRIVATE 3D PRESENTATION STATE**

|   |   |
|---|---|
| Maximum number of outstanding asynchronous transactions | 1 |
|---|---|

**8.6.2.2.4 Implementation Identifying Information**

The implementation information for this Application Entity is:

**Table 93**  
**DICOM IMPLEMENTATION CLASS AND VERSION FOR PRIVATE 3D PRESENTATION STATE**

|                             |                      |
|-----------------------------|----------------------|
| Implementation Class UID    | 1.3.46.670589.5.2.10 |
| Implementation Version Name | ACP1.1L4             |

**8.6.2.3 Association Initiation Policy**

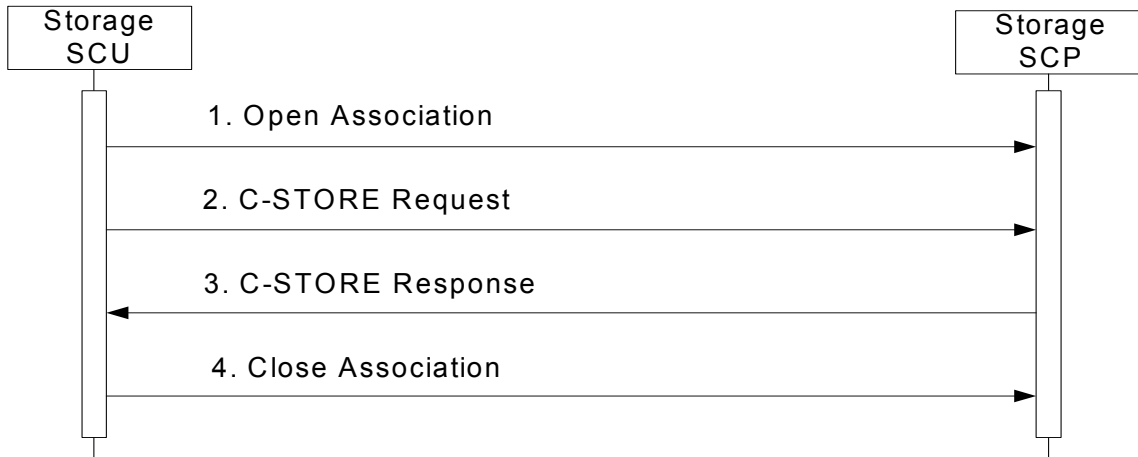
**8.6.2.3.1 Activity – Store a Private 3D Presentation state**

**8.6.2.3.2 Description and Sequencing of Activities**

The user's selection to store a 3D image initiates the activity to store the 3D Presentation State to the configured and selected remote storage device(s), using standard DICOM C-Store DIMSE commands.

iE33 initiates an Association in order to issue:

— C-STORE request to store 3D Presentation State.



**Figure 8a**  
**SEQUENCING OF ACTIVITY – STORE PRIVATE 3D PRESENTATION STATE**

**8.6.2.3.3 Proposed Presentation Contexts**

iE33 will propose Presentation Contexts as shown in the following table:

**Table 94**  
**PROPOSED PRESENTATION CONTEXTS FOR ACTIVITY STORE PRIVATE 3D PRESENTATION STATE**

| Presentation Context Table    |                       |  |  |      |           |
|-------------------------------|-----------------------|--|--|------|-----------|
| Abstract Syntax               |                       | Transfer Syntax  |  | Role | Ext. Neg. |
| Name                          | UID                   | Name List  | UID List                                 |      |           |
| Private 3D Presentation State | 1.3.46.670589.2.5.1.1 | Implicit VR Little Endian<br>Explicit VR Little Endian | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1 | SCU  | None      |

**8.6.2.3.4 SOP Specific Conformance for storage of a Private 3D Presentation State**

Table 96 summarizes the behavior of iE33 when encountering status codes in a Private 3D Presentation State C-STORE response.

A message will appear on the user interface if iE33 receives any other SCP response status than “Success.”

**Table 95**  
**PRIVATE 3D PRESENTATION STATE C-STORE RESPONSE STATUS HANDLING BEHAVIOR**

| Service Status | Further Meaning         | Error Code             | Behavior   |
|----------------|-------------------------|------------------------|--|
| Success        | None                    | 0000                   | Operations continue  |
| Refused        | SOP Class Not Supported | 0112                   | Object is not stored, error message is logged and the user is informed |
| Failed         | Unable to Process       | C000 – CFFF            | Same as “Refused” above.   |
| *              | *                       | Any other status code. | Same as “Refused” above.   |



Table 97 contains the tags used in the private 3D Presentation State objects sent when 3D Subpages are stored.

**Table 96  
CREATED PRIVATE 3D PRESENTATION STATE OBJECT CONTENTS**

| <b>Attribute Name</b>                 | <b>DICOM Tag</b> | <b>VR</b> | <b>Description</b>   |
|---------------------------------------|------------------|-----------|--|
| Threedpr Image Layout                 | 200D,3A09        | IS        | Int value that defines the 3D image layout   |
| Threedpr Xres Filtering Enabled       | 200D,3A0A        | IS        | Boolean value for XresFilteringEnabled, Turn Xres on/off   |
| Threedpr Echo Twod Chroma Map Enabled | 200D,3A0B        | IS        | Boolean value for Echo2dChromaMapEnabled, Chroma Map on/off  |
| Threedpr Box Outlined Enabled         | 200D,3A0C        | IS        | Boolean value for BoxOutlineEnabled, Turns on or off the display of a 3D box outline in the volume view.   |
| Threedpr Smoothing Enabled            | 200D,3A0D        | IS        | Boolean value for SmoothingEnabled, on/off   |
| Threedpr Reference Graphic Enabled    | 200D,3A0E        | IS        | Boolean value for ReferenceGraphicEnabled, Turns on or off the display of a Reference graphic in the Volume View.  |
| Threedpr Map Inverted                 | 200D,3A0F        | IS        | Boolean value for MapInverted, on/off  |
| Threedpr Color Stream Display Enabled | 200D,3A10        | IS        | Indicates whether or not color data is being rendered.   |
| Threedpr Echo Stream Display Enabled  | 200D,3A11        | IS        | Indicates whether or not grayscale data is being rendered.   |
| Threedpr Basic Vol Brightness         | 200D,3A17        | IS        | Int value for Basic Volume Brightness, The brightness controls how dim or bright the volume appears.   |
| Threedpr Echo Smoothing               | 200D,3A1A        | IS        | Int value for EchoSmoothing, A rendering control applied to the volume. The echo smoothing is applied to the echo data, while the color value is applied to the color data.  |
| Threedpr Color Smoothing              | 200D,3A1B        | IS        | Int value for ColorSmoothing, A rendering control applied to the volume. The echo smoothing is applied to the echo data, while the color value is applied to the color data. |
| Threedpr Num Completed Trim Planes    | 200D,3A1E        | IS        | Int value for NumCompletedTrimPlanes   |
| Threedpr Depth                        | 200D,3A1F        | IS        | Int value for Depth, The depth of the MPR view. The depth is defined by the distance from the origin of the data VOI to the intersection point of the MPR views.             |
| Threedpr Wall Filter                  | 200D,3A21        | IS        | Int value for WallFilter   |
| Threedpr Baseline                     | 200D,3A23        | FD        | Double value for Baseline  |

| Attribute Name                  | DICOM Tag | VR | Description   |
|---------------------------------|-----------|----|---|
| Threedpr Gain                   | 200D,3A24 | FD | Double value for Gain. Its intent is to mimic the performance of the acquisition gain control used in 2D but is applied as a visualization parameter.   |
| Threedpr Compress               | 200D,3A25 | FD | Double value for Compress, . Its primary effect is to modify transparency. Its intent is to mimic the performance of the acquisition dynamic range adjustment control used in 2D but is applied as a visualization parameter.   |
| Threedpr Light Brightness       | 200D,3A26 | FD | Double value for LightBrightness  |
| Threedpr Elevation Scale Factor | 200D,3A27 | FD | Double value for ElevationScaleFactor   |
| Threedpr Zoom Factor            | 200D,3A28 | FD | Double value for ZoomFactor   |
| Threedpr Color Write Priority   | 200D,3A29 | FD | Double value for ColorWritePriority   |
| Threedpr Rotation Angle X       | 200D,3A2A | FD | Double value for rotation of the active trim plane around the x-axis.   |
| Threedpr Rotation Angle Y       | 200D,3A2B | FD | Double value for rotation of the active trim plane around the y-axis.   |
| Threedpr Data Voi Center        | 200D,3A2C | FD | Array of Double value for dataVoiCenter[3],   |
| Threedpr View Translation       | 200D,3A2D | FD | Array of Double value for ViewTranslation [3].  |
| Threedpr Data Voi Min Point     | 200D,3A2E | FD | Array of Double value for DataVoiMinPoint[3], The minimum point of the RT VOI.  |
| Threedpr Data Voi Max Point     | 200D,3A2F | FD | Array of Double value for DataVoiMaxPoint[3], The maximum point of the RT VOI.  |
| Threedpr Box Crop Min Point     | 200D,3A30 | FD | Array of Double value for BoxCropMinPoint[3], The min point of the box crop box. The point is defined in data space where element 0 corresponds to the lateral dimension, element 1 is the depth, and element 2 is elevation. This is read by SIP to define a subset of the data VOI to render. |
| Threedpr Box Crop Max Point     | 200D,3A31 | FD | Array of Double value for BoxCropMaxPoint[3], The max point of the box crop box. The point is defined in data space where element 0 corresponds to the lateral dimension, element 1 is the depth, and element 2 is elevation. This is read by SIP to define a subset of the data VOI to render. |
| Threedpr Mpr Rotation Matrix    | 200D,3A32 | FD | Array of Double value for MprRotationMatrix[9], Orientation of the view relative to the Data VOI. One for all MPRs and linked volume, one for unlinked volume.  |

| Attribute Name                           | DICOM Tag | VR | Description  |
|--|-----------|----|--|
| Threedpr Vol Rotation Matrix             | 200D,3A33 | FD | Array of Double value for VolRotationMatrix[9], The rotation matrix of the active trim plane.                            |
| Threedpr Trim Plane Equation             | 200D,3A34 | FD | Array of Double value for TrimPlaneEquations[128], The plane equation of the trim plane the user is currently modifying. |
| Threedpr Subpage Data Version            | 200D,3A35 | IS | Threed Presentation State Version  |
| Threedpr Is Arbitrary Crop               | 200D,3A36 | IS | Boolean value for IsArbitraryCrop, on/off  |
| Threedpr Arbitrary Crop Dist From Center | 200D,3A37 | IS | Double value of the distance from the center for arbitrary cropping  |
| Threedpr Arbitrary Crop Rotation Matrix  | 200D,3A38 | FD | Array of Double value for ArbitraryCropRotationMatrix[9]   |
| Threedpr Color Gain                      | 200D,3A39 | FD | Double value of the gain for the color box when in Color Full Volume Review  |
| Threedpr Color Wall Filter Index         | 200D,3A40 | IS | An integer value representing the wall filter index when in Color Full Volume Review.                                    |
| Threedpr Cursor Enabled                  | 200D,3A41 | IS | Boolean value of the state of the cursor as displayed on the image, either "on" (show it) or "off"(don't show it)        |
| Threedpr Bondbox Graphic Enabled         | 200D,3A42 | IS | Boolean value of the state of the bounding box on the image, either "on"(show it ) or "off"(don't show it)               |
| Threedpr Echo Vision Setting             | 200D,3402 | IS | An integer value representing the active grayscale recipe.   |
| Threedpr Color Vision Setting            | 200D,3403 | IS | An integer value representing the active color recipe  |
| Threedpr Transparency                    | 200D,3404 | IS | Grayscale transparency setting.  |
| Threedpr Vision Vol Brightness           | 200D,3406 | FD | Grayscale brightness level.<br>Double value for Vision Volume Brightness   |
| Threedpr Low Threshold                   | 200D,3408 | IS | Grayscale threshold level.   |
| Threedpr Opacity Map                     | 200D,340A | IS | Grayscale opacity map setting.   |
| Threedpr Lighting                        | 200D,340C | IS | Diffuse lighting level.  |
| Threedpr Echo Chroma Map Hue             | 200D,340D | IS | Colorize settings. Values:<br>0 = OFF,<br>1 = SEPIA<br>2 = RAINBOW<br>3 = THALLIUM<br>4 = WHEAT<br>5 = ANGIO             |

| Attribute Name                    | DICOM Tag | VR | Description   |
|-----------------------------------|-----------|----|---|
| Threedpr Echo Twod Gray Map       | 200D,340E | IS | Grayscale map setting. Values:<br>1, 2, 3, 4, and 5   |
| Threedpr Color Map                | 200D,340F | IS | Color map setting. Values:<br>1, 2, 3, 4, 5, and 6<br>Only present for color images.          |
| Dicom Image Date                  | 0008,0023 | DA | A reference to the image Date   |
| Dicom Image Time                  | 0008,0033 | TM | A reference to the image Time   |
| Dicom Sop Class Uid               | 0008,0016 | UI | A reference to the 3D Presentation State Private Object SOP_CLASS_UID                         |
| Dicom Sop Instance Uid            | 0008,0018 | UI | A reference to the 3D Presentation State Private Object SOP_INSTANCE_UID                      |
| Dicom Instance Number             | 0020,0013 | IS | A reference to the 3D Presentation State Private Object INSTANCE_NUMBER                       |
| Dicom Referenced SOP Class UID    | 0008,1150 | UI | A reference to the image Object SOP_CLASS_UID in which this Presentation State belongs to.    |
| Dicom Referenced SOP Instance UID | 0008,1155 | UI | A reference to the image Object SOP_INSTANCE_UID in which this Presentation State belongs to. |

## 8.8 PRIVATE TRANSFER SYNTAXES

There are no Private Transfer Syntaxes.

## APPENDIX A – Echo Structured Report

### A.1 INTRODUCTION

iE33 implements the Adult Echocardiography Procedure Report template (TID 5200) from the DICOM Standard, Part 16, Annex A. This appendix describes the scope and manner that iE33 measurements appear in DICOM reports.

Note: Instead of using the "HAS ACQ CONTEXT" relationship defined in TID 5203, row 5 and 6, the iE33 uses "HAS CONCEPT MOD", as the former is prohibited for Comprehensive SR IOD (ref. PS3.3-2004, Section A.35.3.3.1.2).

#### A.1.1 Clinical Scope

The supported measurements in the Adult Card Calcs package are accessed when the system is using the transducer and preset combination associated with the exam type in progress, the system is placed in Freeze and the "Analysis" softkey is pressed on the left touch screen. Specific setups for analysis behavior and report pages are available through the Analysis Setups pages. Measurements for a given SR section may come from several sources, and may be used in different calculated values.

Section A.2 shows the relationship between measurement labels used in iE33 Echo reports and the Finding site, Concept Name and Optional Modifiers. DICOM Codes associated with the Finding Site, Concept and Optional Modifiers for Echo SR are located in the section immediately following A.2.

Note: Some measurements are not mapped to DICOM outputs as indicated by "Not mapped" in the mapping table.

### A.2 MAPPING FOR ECHOCARDIOGRAPHY DICOM SR – IE33 1.1

#### Reference for the columns in the mapping table

|              |   |
|--------------|---|
| Finding Site | TID5200, Row 7 through 20, value passed as \$SectionSubject |
| Concept      | TID5200, Row 7 through 20, value passed as \$MeasType       |
| Mode         | TID5202, Row 4, value OR TID5203, Row 5, value              |
| Target       | TID5203, Row 1, value passed as \$TargetSite                |
| Method       | TID5202, Row 6, value passed as \$Method                    |
| View         | TID5203, Row 6, value                                       |
| Direction    | TID5203, Row 2, value                                       |
| Phase        | TID5203, Row 4, value                                       |
| Disk         | TID5203, Row 4, code Private Extension                      |

#### New in iE33 1.1:

All instances of a measurement are now exported, in addition to the average, if selected. See the Edit Report page for option selection.

Note: In Analysis setups, it is possible to select multiple results for a single measurement. Default settings are listed in setups via Analysis Config>Adult Echo>Measurements. In most cases, the primary measurement is the only one exported via DICOM. As an example, it is possible to select an automatically derived area measurement based on a single distance. The distance measurement will export, the area will not. Generally, diameter measurements may have an optional area displayed, which will not export.

- Which value selected is communicated using TID310, row 6, Selection Status
- The mean value is encoded using TID300, row 4, Derivation
- Subresults are now exported

Note: In the following section, iE33 labels appear per default settings in Analysis setups. Therefore a given label may appear in more than one table, as may occur on system touch screen displays.

## A.2.1 Dimensions

### A.2.1.1 Measurements

| iE33 Label        | Finding site    | Concept   | Optional modifiers                                 |
|-------------------|-----------------|---|--|
| RVAWd (2D)        | Right Ventricle | Right Ventricular Anterior Wall Diastolic Thickness | mode: 2D mode                                      |
| RVIDd (2D)        | Right Ventricle | Right Ventricular Internal Diastolic Dimension      | mode: 2D mode                                      |
| IVSd (2D)         | Left Ventricle  | Interventricular Septum Diastolic Thickness         | mode: 2D mode                                      |
| LVIDd (2D)        | Left Ventricle  | Left Ventricle Internal End Diastolic Dimension     | mode: 2D mode                                      |
| LVPWd (2D)        | Left Ventricle  | Left Ventricle Posterior Wall Diastolic Thickness   | mode: 2D mode                                      |
| IVSs (2D)         | Left Ventricle  | Interventricular Septum Systolic Thickness          | mode: 2D mode                                      |
| LVIDs (2D)        | Left Ventricle  | Left Ventricle Internal Systolic Dimension          | mode: 2D mode                                      |
| LVPWs (2D)        | Left Ventricle  | Left Ventricle Posterior Wall Systolic Thickness    | mode: 2D mode                                      |
| LVOT Diam         | Left Ventricle  | Cardiovascular Orifice Diameter                     | target: Left Ventricle Outflow Tract               |
| AoR Diam (2D)     | Aorta           | Aortic Root Diameter                                | mode: 2D mode                                      |
| LA Dimension (2D) | Left Atrium     | Left Atrium Antero-poster Systolic Dimension        | mode: 2D mode                                      |
| RVAWd (MM)        | Right Ventricle | Right Ventricular Anterior Wall Diastolic Thickness | mode: M mode                                       |
| RVIDd (MM)        | Right Ventricle | Right Ventricular Internal Diastolic Dimension      | mode: M mode                                       |
| IVSd (MM)         | Left Ventricle  | Interventricular Septum Diastolic Thickness         | mode: M mode                                       |
| LVIDd (MM)        | Left Ventricle  | Left Ventricle Internal End Diastolic Dimension     | mode: M mode                                       |
| LVPWd (MM)        | Left Ventricle  | Left Ventricle Posterior Wall Diastolic Thickness   | mode: M mode                                       |
| IVSs (MM)         | Left Ventricle  | Interventricular Septum Systolic Thickness          | mode: M mode                                       |
| LVIDs (MM)        | Left Ventricle  | Left Ventricle Internal Systolic Dimension          | mode: M mode                                       |
| LVPWs (MM)        | Left Ventricle  | Left Ventricle Posterior Wall Systolic Thickness    | mode: M mode                                       |
| LVOT Diam         | Left Ventricle  | Cardiovascular Orifice Diameter                     | mode: M mode, target: Left Ventricle Outflow Tract |
| AoR Diam (MM)     | Aorta           | Aortic Root Diameter                                | mode: M mode                                       |
| LA Dimension (MM) | Left Atrium     | Left Atrium Antero-posterior Systolic Dimension     | mode: M mode                                       |

|         |                |            |
|---------|----------------|------------|
| HR - LV | Left Ventricle | Heart rate |
|---------|----------------|------------|

### A.2.1.2 Calculations

| iE33 Label     | Finding site   | Concept   | Optional modifiers                                  |
|----------------|----------------|---|---|
| EDV (2D-Teich) | Left Ventricle | Left Ventricular End Diastolic Volume                     | mode: 2D mode, method: Teichholz                    |
| ESV (2D-Teich) | Left Ventricle | Left Ventricular End Systolic Volume                      | mode: 2D mode, method: Teichholz                    |
| SV (2D-Teich)  | Left Ventricle | Stroke Volume   | mode: 2D mode, method: Teichholz                    |
| FS (2D-Teich)  | Left Ventricle | Left Ventricular Fractional Shortening                    | mode: 2D mode, method: Teichholz                    |
| EF (2D-Teich)  | Left Ventricle | Left Ventricular Ejection Fraction                        | mode: 2D mode, method: Teichholz                    |
| CO (2D-Teich)  | Left Ventricle | Cardiac Output  | mode: 2D mode, method: Teichholz                    |
| CI (2D-Teich)  | Left Ventricle | Cardiac Index   | mode: 2D mode, method: Teichholz                    |
| SI (2D-Teich)  | Left Ventricle | Stroke Index  | mode: 2D mode, method: Teichholz                    |
| EDV (2D-Cubed) | Left Ventricle | Left Ventricular End Diastolic Volume                     | mode: 2D mode, method: Cube Method                  |
| ESV (2D-Cubed) | Left Ventricle | Left Ventricular End Systolic Volume                      | mode: 2D mode, method: Cube Method                  |
| SV (2D-Cubed)  | Left Ventricle | Stroke Volume   | mode: 2D mode, method: Cube Method                  |
| FS (2D-Cubed)  | Left Ventricle | Left Ventricular Fractional Shortening                    | mode: 2D mode, method: Cube Method                  |
| EF (2D-Cubed)  | Left Ventricle | Left Ventricular Ejection Fraction                        | mode: 2D mode, method: Cube Method                  |
| CO (2D-Cubed)  | Left Ventricle | Cardiac Output  | mode: 2D mode, method: Cube Method                  |
| CI (2D-Cubed)  | Left Ventricle | Cardiac Index   | mode: 2D mode, method: Cube Method                  |
| SI (2D-Cubed)  | Left Ventricle | Stroke Index  | mode: 2D mode, method: Cube Method                  |
| LA/Ao (2D)     | Left Atrium    | Left Atrium to Aortic Root Ratio                          | mode: 2D mode                                       |
| IVS % (2D)     | Left Ventricle | Interventricular Septum % Thickening                      | mode: 2D mode                                       |
| LVPW % (2D)    | Left Ventricle | Left Ventricle Posterior Wall % Thickening                | mode: 2D mode                                       |
| IVS/LVPW (2D)  | Left Ventricle | Interventricular Septum to Posterior Wall Thickness Ratio | mode: 2D mode                                       |
| LVOT Area      | Left Ventricle | Cardiovascular Orifice Area                               | mode: 2D mode, target: Left Ventricle Outflow Tract |
| EDV (MM-Teich) | Left Ventricle | Left Ventricular End Diastolic Volume                     | mode: M mode, method: Teichholz                     |

|                       |                |   |                                   |
|-----------------------|----------------|---|-----------------------------------|
| ESV (MM-Teich)        | Left Ventricle | Left Ventricular End Systolic Volume                      | mode: M mode, method: Teichholz   |
| SV (MM-Teich)         | Left Ventricle | Stroke Volume   | mode: M mode, method: Teichholz   |
| FS (MM-Teich)         | Left Ventricle | Left Ventricular Fractional Shortening                    | mode: M mode, method: Teichholz   |
| EF (MM-Teich)         | Left Ventricle | Left Ventricular Ejection Fraction                        | mode: M mode, method: Teichholz   |
| CO (MM-Teich)         | Left Ventricle | Cardiac Output  | mode: M mode, method: Teichholz   |
| CI (MM-Teich)         | Left Ventricle | Cardiac Index   | mode: M mode, method: Teichholz   |
| SI (MM-Teich)         | Left Ventricle | Stroke Index  | mode: M mode, method: Teichholz   |
| EDV (MM-Cubed)        | Left Ventricle | Left Ventricular End Diastolic Volume                     | mode: M mode, method: Cube Method |
| ESV (MM-Cubed)        | Left Ventricle | Left Ventricular End Systolic Volume                      | mode: M mode, method: Cube Method |
| SV (MM-Cubed)         | Left Ventricle | Stroke Volume   | mode: M mode, method: Cube Method |
| FS (MM-Cubed)         | Left Ventricle | Left Ventricular Fractional Shortening                    | mode: M mode, method: Cube Method |
| EF (MM-Cubed)         | Left Ventricle | Left Ventricular Ejection Fraction                        | mode: M mode, method: Cube Method |
| CO (MM-Cubed)         | Left Ventricle | Cardiac Output  | mode: M mode, method: Cube Method |
| CI (MM-Cubed)         | Left Ventricle | Cardiac Index   | mode: M mode, method: Cube Method |
| SI (MM-Cubed)         | Left Ventricle | Stroke Index  | mode: M mode, method: Cube Method |
| LA/Ao (MM)            | Left Atrium    | Left Atrium to Aortic Root Ratio                          | mode: M mode                      |
| IVS % (MM)            | Left Ventricle | Interventricular Septum % Thickening                      | mode: M mode                      |
| LVPW % (MM)           | Left Ventricle | Left Ventricle Posterior Wall % Thickening                | mode: M mode                      |
| IVS/LVPW (MM)         | Left Ventricle | Interventricular Septum to Posterior Wall Thickness Ratio | mode: M mode                      |
| LV Mass (Cubed)       | Left Ventricle | Left Ventricle Mass                                       | mode: M mode, method: Cube Method |
| LV Mass Index (Cubed) | Left Ventricle | Left Ventricle Mass Index                                 | mode: M mode, method: Cube Method |



## A.2.2 Vessels

### A.2.2.1 Measurements

| iE33 Label      | Finding site     | Concept                         | Optional modifiers                                   |
|-----------------|------------------|---------------------------------|--|
| AoR Diam (2D)   | Aorta            | Aortic Root Diameter            | mode: 2D mode  |
| Asc Aorta Diam  | Aorta            | Ascending Aortic Diameter       | mode: 2D mode  |
| Desc Aorta Diam | Aorta            | Descending Aortic Diameter      | mode: 2D mode  |
| Ao Arch Diam    | Aorta            | Aortic Arch Diameter            | mode: 2D mode  |
| Ao Isthmus Diam | Aorta            | Aortic Isthmus Diameter         | mode: 2D mode  |
| MPA Diam        | Pulmonary artery | Main Pulmonary Artery Diameter  | mode: 2D mode  |
| LPA Diam        | Pulmonary artery | Left Pulmonary Artery Diameter  | mode: 2D mode  |
| RPA Diam        | Pulmonary artery | Right Pulmonary Artery Diameter | mode: 2D mode  |
| RVOT Diam       | Right Ventricle  | Cardiovascular Orifice Diameter | mode: 2D mode, target: Right Ventricle Outflow Tract |

## A.2.3 EF and Volume

### A.2.3.1 Measurements

| iE33 Label | Finding site   | Concept                 | Optional modifiers   |
|------------|----------------|-------------------------|--|
| A4Cs       | Left Ventricle | Left Ventricle MOD Diam | view: Apical four chamber, phase: End Systole, disk: 1 - 20  |
| A4Cd       | Left Ventricle | Left Ventricle MOD Diam | view: Apical four chamber, phase: End Diastole, disk: 1 - 20 |
| A2Cs       | Left Ventricle | Left Ventricle MOD Diam | view: Apical two chamber, phase: End Systole, disk: 1 - 20   |
| A2Cd       | Left Ventricle | Left Ventricle MOD Diam | view: Apical two chamber, phase: End Diastole, disk: 1 - 20  |
| HR - LV    | Left Ventricle | Heart rate              |  |
| LVs (A/L)  | Not mapped     |                         |  |
| LVd (A/L)  | Not mapped     |                         |  |

### A.2.3.2 Calculations

| iE33 Label  | Finding site   | Concept                               | Optional modifiers  |
|-------------|----------------|---------------------------------------|---|
| LVLd (A4C)  | Left Ventricle | Left Ventricle diastolic major axis   | mode: 2D mode, view: Apical four chamber, method: Method of Disks, Single Plane |
| LVLs (A4C)  | Left Ventricle | Left Ventricle systolic major axis    | mode: 2D mode, view: Apical four chamber, method: Method of Disks, Single Plane |
| LVAAd (A4C) | Left Ventricle | Left Ventricular Diastolic Area       | mode: 2D mode, view: Apical four chamber, method: Method of Disks, Single Plane |
| LVAAs (A4C) | Left Ventricle | Left Ventricular Systolic Area        | mode: 2D mode, view: Apical four chamber, method: Method of Disks, Single Plane |
| EDV (A4C)   | Left Ventricle | Left Ventricular End Diastolic Volume | mode: 2D mode, view: Apical four chamber, method: Method of Disks, Single Plane |
| ESV (A4C)   | Left Ventricle | Left Ventricular End Systolic Volume  | mode: 2D mode, view: Apical four chamber, method: Method of Disks, Single Plane |

|             |                |                                       |   |
|-------------|----------------|---------------------------------------|---|
| SV (A4C)    | Left Ventricle | Stroke Volume                         | mode: 2D mode, view: Apical four chamber, method: Method of Disks, Single Plane |
| EF (A4C)    | Left Ventricle | Left Ventricular Ejection Fraction    | mode: 2D mode, view: Apical four chamber, method: Method of Disks, Single Plane |
| CO (A4C)    | Left Ventricle | Cardiac Output                        | mode: 2D mode, view: Apical four chamber, method: Method of Disks, Single Plane |
| CI (A4C)    | Left Ventricle | Cardiac Index                         | mode: 2D mode, view: Apical four chamber, method: Method of Disks, Single Plane |
| SI (A4C)    | Left Ventricle | Stroke Index                          | mode: 2D mode, view: Apical four chamber, method: Method of Disks, Single Plane |
| LVLd (A2C)  | Left Ventricle | Left Ventricle diastolic major axis   | mode: 2D mode, view: Apical two chamber, method: Method of Disks, Single Plane  |
| LVLs (A2C)  | Left Ventricle | Left Ventricle systolic major axis    | mode: 2D mode, view: Apical two chamber, method: Method of Disks, Single Plane  |
| LVAd (A2C)  | Left Ventricle | Left Ventricular Diastolic Area       | mode: 2D mode, view: Apical two chamber, method: Method of Disks, Single Plane  |
| LVAAs (A2C) | Left Ventricle | Left Ventricular Systolic Area        | mode: 2D mode, view: Apical two chamber, method: Method of Disks, Single Plane  |
| EDV (A2C)   | Left Ventricle | Left Ventricular End Diastolic Volume | mode: 2D mode, view: Apical two chamber, method: Method of Disks, Single Plane  |
| ESV (A2C)   | Left Ventricle | Left Ventricular End Systolic Volume  | mode: 2D mode, view: Apical two chamber, method: Method of Disks, Single Plane  |
| SV (A2C)    | Left Ventricle | Stroke Volume                         | mode: 2D mode, view: Apical two chamber, method: Method of Disks, Single Plane  |
| EF (A2C)    | Left Ventricle | Left Ventricular Ejection Fraction    | mode: 2D mode, view: Apical two chamber, method: Method of Disks, Single Plane  |
| CO (A2C)    | Left Ventricle | Cardiac Output                        | mode: 2D mode, view: Apical two chamber, method: Method of Disks, Single Plane  |
| CI (A2C)    | Left Ventricle | Cardiac Index                         | mode: 2D mode, view: Apical two chamber, method: Method of Disks, Single Plane  |
| SI (A2C)    | Left Ventricle | Stroke Index                          | mode: 2D mode, view: Apical two chamber, method: Method of Disks, Single Plane  |
| EDV (BP)    | Left Ventricle | Left Ventricular End Diastolic Volume | mode: 2D mode, method: Method of Disks, Biplane                                 |

|             |                |                                       |   |
|-------------|----------------|---------------------------------------|---|
| ESV (BP)    | Left Ventricle | Left Ventricular End Systolic Volume  | mode: 2D mode, method: Method of Disks, Biplane |
| SV (BP)     | Left Ventricle | Stroke Volume                         | mode: 2D mode, method: Method of Disks, Biplane |
| EF (BP)     | Left Ventricle | Left Ventricular Ejection Fraction    | mode: 2D mode, method: Method of Disks, Biplane |
| CO (BP)     | Left Ventricle | Cardiac Output                        | mode: 2D mode, method: Method of Disks, Biplane |
| CI (BP)     | Left Ventricle | Cardiac Index                         | mode: 2D mode, method: Method of Disks, Biplane |
| SI (BP)     | Left Ventricle | Stroke Index                          | mode: 2D mode, method: Method of Disks, Biplane |
| LVLd (A/L)  | Left Ventricle | Left Ventricle diastolic major axis   | mode: 2D mode, method: Single Plane Ellipse     |
| LVLs (A/L)  | Left Ventricle | Left Ventricle systolic major axis    | mode: 2D mode, method: Single Plane Ellipse     |
| LVAd (A/L)  | Left Ventricle | Left Ventricular Diastolic Area       | mode: 2D mode, method: Single Plane Ellipse     |
| LVAAs (A/L) | Left Ventricle | Left Ventricular Systolic Area        | mode: 2D mode, method: Single Plane Ellipse     |
| EDV (A/L)   | Left Ventricle | Left Ventricular End Diastolic Volume | mode: 2D mode, method: Single Plane Ellipse     |
| ESV (A/L)   | Left Ventricle | Left Ventricular End Systolic Volume  | mode: 2D mode, method: Single Plane Ellipse     |
| SV (A/L)    | Left Ventricle | Stroke Volume                         | mode: 2D mode, method: Single Plane Ellipse     |
| EF (A/L)    | Left Ventricle | Left Ventricular Ejection Fraction    | mode: 2D mode, method: Single Plane Ellipse     |
| CO (A/L)    | Left Ventricle | Cardiac Output                        | mode: 2D mode, method: Single Plane Ellipse     |
| CI (A/L)    | Left Ventricle | Cardiac Index                         | mode: 2D mode, method: Single Plane Ellipse     |
| SI (A/L)    | Left Ventricle | Stroke Index                          | mode: 2D mode, method: Single Plane Ellipse     |

## A.2.4 Mass

### A.2.4.1 Measurements

| iE33 Label    | Finding site   | Concept   | Optional modifiers   |
|---------------|----------------|---|--|
| LVAd Sax Epi  | Left Ventricle | Left Ventricle Epicardial Diastolic Area, psax pap view | view: Parasternal short axis at the Papillary Muscle level |
| LVAd Sax Endo | Left Ventricle | Left Ventricular Diastolic Area                         | view: Parasternal short axis at the Papillary Muscle level |
| LVLd Apical   | Left Ventricle | Left Ventricle diastolic major axis                     | view: Apical four chamber                                  |

#### A.2.4.2 Calculations

| iE33 Label          | Finding site   | Concept                   | Optional modifiers |
|---------------------|----------------|---------------------------|--------------------|
| LV Mass (A/L)       | Left Ventricle | Left Ventricle Mass       | mode: 2D mode      |
| LV Mass Index (A/L) | Left Ventricle | Left Ventricle Mass Index |                    |

#### A.2.5 Valves

##### A.2.5.1 Measurements

| iE33 Label       | Finding site    | Concept                         | Optional modifiers                                   |
|------------------|-----------------|---------------------------------|--|
| LVOT Diam        | Left Ventricle  | Cardiovascular Orifice Diameter | target: Left Ventricle Outflow Tract                 |
| AV Area          | Aortic Valve    | Cardiovascular Orifice Area     | mode: 2D mode, method: Planimetry                    |
| AI Radius        | Aortic Valve    | Flow Radius                     | direction: Regurgitant Flow                          |
| AI Alias Vel     | Aortic Valve    | Alias Velocity                  |  |
| MV Diam          | Mitral Valve    | Cardiovascular Orifice Diameter | mode: 2D mode  |
| MV Area (Planim) | Mitral Valve    | Cardiovascular Orifice Area     | mode: 2D mode, method: Planimetry                    |
| MV Radius        | Mitral Valve    | Flow Radius                     | direction: Antegrade Flow                            |
| MV Alias Vel     | Mitral Valve    | Alias Velocity                  |  |
| MR Radius        | Mitral Valve    | Flow Radius                     | direction: Regurgitant Flow                          |
| MR Alias Vel     | Mitral Valve    | Alias Velocity                  | direction: Regurgitant Flow                          |
| TV Diam          | Tricuspid Valve | Cardiovascular Orifice Diameter | mode: 2D mode  |
| TV Radius        | Tricuspid Valve | Flow Radius                     | direction: Antegrade Flow                            |
| TV Alias Vel     | Tricuspid Valve | Alias Velocity                  |  |
| TR Radius        | Tricuspid Valve | Flow Radius                     | direction: Regurgitant Flow                          |
| TR Alias Vel     | Tricuspid Valve | Alias Velocity                  | direction: Regurgitant Flow                          |
| RVOT Diam        | Right Ventricle | Cardiovascular Orifice Diameter | mode: 2D mode, target: Right Ventricle Outflow Tract |

##### A.2.5.2 Calculations

| iE33 Label | Finding site    | Concept                     | Optional modifiers                                   |
|------------|-----------------|-----------------------------|--|
| MV Area    | Not mapped      |                             |  |
| LVOT Area  | Left Ventricle  | Cardiovascular Orifice Area | mode: 2D mode, target: Left Ventricle Outflow Tract  |
| RVOT Area  | Right Ventricle | Cardiovascular Orifice Area | mode: 2D mode, target: Right Ventricle Outflow Tract |
| TV Area    | Tricuspid Valve | Cardiovascular Orifice Area | mode: 2D mode  |

#### A.2.6 Mitral Valve

##### A.2.6.1 Measurements

| iE33 Label   | Finding site | Concept                    | Optional modifiers |
|--------------|--------------|----------------------------|--------------------|
| MV D-E Exc   | Mitral Valve | Mitral Valve D-E Excursion | mode: M mode       |
| MV D-E Slope | Mitral Valve | Mitral Valve D-E Slope     | mode: M mode       |

|                   |                |   |                             |
|-------------------|----------------|---|-----------------------------|
| MV E-F Slope      | Mitral Valve   | Mitral Valve E-F Slope by M-Mode                            | mode: M mode                |
| MV EPSS           | Mitral Valve   | Mitral Valve EPSS, E wave                                   | mode: M mode                |
| MV E-E Separation | Mitral Valve   | Mitral Valve E-E Separation                                 | mode: M mode                |
| MV A-C Interval   | Mitral Valve   | Mitral Valve A-C Interval                                   | mode: M mode                |
| MV Dec Slope      | Mitral Valve   | Deceleration Slope<br>Deceleration Time                     | direction: Antegrade Flow   |
| MV Peak E Vel     | Mitral Valve   | Mitral Valve E-Wave Peak Velocity                           | direction: Antegrade Flow   |
| MV Peak A Vel     | Mitral Valve   | Mitral Valve A-Wave Peak Velocity                           | direction: Antegrade Flow   |
| MV Diam           | Mitral Valve   | Cardiovascular Orifice Diameter                             | mode: 2D mode               |
| MV VTI            | Mitral Valve   | Mean Gradient   | direction: Antegrade Flow   |
|                   |                | Velocity Time Integral<br>Mean Velocity                     | direction: Antegrade Flow   |
| MV Vmax           | Mitral Valve   | Peak Velocity   | direction: Antegrade Flow   |
|                   |                | Peak Gradient   | direction: Antegrade Flow   |
| MV Accel Time     | Mitral Valve   | Acceleration Time   | direction: Antegrade Flow   |
| MV Decel Time     | Mitral Valve   | Deceleration Time   | direction: Antegrade Flow   |
| MV A Dur          | Mitral Valve   | Mitral Valve A-Wave Duration                                |                             |
| IVRT              | Left Ventricle | Left Ventricular Isovolumic Relaxation Time                 |                             |
| IVCT              | Left Ventricle | Left Ventricular Isovolumic Contraction Time                |                             |
| LV dP/dt          | Mitral Valve   | Mitral Regurgitation dP/dt derived from Mitral Reg velocity |                             |
| MV P ½ t          | Mitral Valve   | Pressure Half-Time Peak Velocity<br>Pressure Half-Time      |                             |
| MR VTI            | Mitral Valve   | Mean Gradient   | direction: Regurgitant Flow |
|                   |                | Velocity Time Integral<br>Mean Velocity                     |                             |
| MR Vmax           | Mitral Valve   | Peak Velocity   | direction: Regurgitant Flow |
|                   |                | Peak Gradient   |                             |
| HR - MV           | Mitral Valve   | Heart rate  |                             |

#### A.2.6.2 Calculations

| iE33 Label   | Finding site | Concept                     | Optional modifiers                                    |
|--------------|--------------|-----------------------------|---|
| MVA (VTI)    | Mitral Valve | Cardiovascular Orifice Area | method: Continuity Equation by Velocity Time Integral |
| MVA (P ½ t ) | Mitral Valve | Cardiovascular Orifice Area | method: Area by Pressure Half-Time                    |
| MVA (PISA)   | Mitral Valve | Cardiovascular Orifice Area | method: Proximal Isovelocity Surface Area             |

|              |              |                              |  |
|--------------|--------------|------------------------------|--|
| MV E/A       | Mitral Valve | Mitral Valve E to A Ratio    |  |
| PISA (MR)    | Mitral Valve | Mitral Valve Flow Area       | method: Proximal Isovelocity Surface Area, direction: Regurgitant Flow |
| MR Flow Rate | Mitral Valve | Peak Instantaneous Flow Rate | direction: Regurgitant Flow  |
| MR ERO       | Mitral Valve | Cardiovascular Orifice Area  | method: Proximal Isovelocity Surface Area, direction: Regurgitant Flow |
| MR Volume    | Mitral Valve | Volume Flow                  | method: Proximal Isovelocity Surface Area, direction: Regurgitant Flow |
| MR Fraction  | Mitral Valve | Regurgitant Fraction         | direction: Regurgitant Flow  |
| SV (MV)      | Mitral Valve | Stroke Volume                |  |
| CO (MV)      | Mitral Valve | Cardiac Output               |  |
| Tei Index    | Mitral Valve | Tei Index                    |  |

## A.2.7 Tricuspid Valve

### A.2.7.1 Measurements

| iE33 Label      | Finding site    | Concept  | Optional modifiers   |
|-----------------|-----------------|--|--|
| TV D-E Exc      | Tricuspid Valve | Tricuspid Valve D-E Excursion                            | mode: M mode   |
| TV D-E Slope    | Tricuspid Valve | Tricuspid Valve D-E Slope                                | mode: M mode   |
| TV E-F Slope    | Tricuspid Valve | Tricuspid Valve E-F Slope                                | mode: M mode   |
| TV A-C Interval | Tricuspid Valve | Tricuspid Valve A-C Interval                             | mode: M mode   |
| TV Diam         | Tricuspid Valve | Cardiovascular Orifice Diameter                          | mode: 2D mode  |
| TV Peak E Vel   | Tricuspid Valve | Tricuspid Valve E Wave Peak Velocity                     | direction: Antegrade Flow                                  |
| TV Peak A Vel   | Tricuspid Valve | Tricuspid Valve A Wave Peak Velocity                     | direction: Antegrade Flow                                  |
| TV VTI          | Tricuspid Valve | Mean Gradient<br>Velocity Time Integral<br>Mean Velocity | direction: Antegrade Flow                                  |
| TV Vmax         | Tricuspid Valve | Peak Velocity<br>Peak Gradient                           | direction: Antegrade Flow                                  |
| TV Accel Time   | Tricuspid Valve | Acceleration Time  | direction: Antegrade Flow                                  |
| TR VTI          | Tricuspid Valve | Mean Gradient<br>Velocity Time Integral<br>Mean Velocity | direction: Regurgitant Flow<br>direction: Regurgitant Flow |
| TR Vmax         | Tricuspid Valve | Peak Velocity<br>Peak Gradient                           | direction: Regurgitant Flow                                |
| RA Pressure     | Right Atrium    | Right Atrium Systolic Pressure                           |  |
| HR - TV         | Tricuspid Valve | Heart rate   |  |

### A.2.7.2 Calculations

| iE33 Label   | Finding site    | Concept                                  | Optional modifiers   |
|--------------|-----------------|--|--|
| TVA (PISA)   | Tricuspid Valve | Cardiovascular Orifice Area              | method: Proximal Isovelocity Surface Area                              |
| PISA (TR)    | Tricuspid Valve | Tricuspid Valve Flow Area                | method: Proximal Isovelocity Surface Area, direction: Regurgitant Flow |
| TR Flow Rate | Tricuspid Valve | Peak Instantaneous Flow Rate             | direction: Regurgitant Flow  |
| TR ERO       | Tricuspid Valve | Cardiovascular Orifice Area              | method: Proximal Isovelocity Surface Area, direction: Regurgitant Flow |
| TR Volume    | Tricuspid Valve | Volume Flow                              | direction: Regurgitant Flow  |
| TR Fraction  | Tricuspid Valve | Regurgitant Fraction                     | direction: Regurgitant Flow  |
| SV(TV)       | Tricuspid Valve | Stroke Volume                            |  |
| CO(TV)       | Tricuspid Valve | Cardiac Output                           |  |
| TV E/A       | Tricuspid Valve | Tricuspid Valve E to A Ratio             |  |
| RVSP         | Right Ventricle | Right Ventricular Peak Systolic Pressure |  |

### A.2.8 Aortic Valve

#### A.2.8.1 Measurement

| iE33 Label          | Finding site   | Concept  | Optional modifiers                   |
|---------------------|----------------|--|--------------------------------------|
| AV Cusp Sep         | Aortic Valve   | Aortic Valve Cusp Separation                             | mode: M mode                         |
| LV Eject Time       | Left Ventricle | Eject Time   | mode: M mode                         |
| LV Pre-Eject Period | Left Ventricle | Pre-Eject Time   | mode: M mode                         |
| LVOT Diam           | Left Ventricle | Cardiovascular Orifice Diameter                          | target: Left Ventricle Outflow Tract |
| LVOT VTI            | Left Ventricle | Mean Gradient<br>Velocity Time Integral<br>Mean Velocity | target: Left Ventricle Outflow Tract |
| LVOT Vmax           | Left Ventricle | Peak Velocity<br>Peak Gradient                           | target: Left Ventricle Outflow Tract |
| LVOT Accel Time     | Left Ventricle | Acceleration Time  | target: Left Ventricle Outflow Tract |
| AV VTI              | Aortic Valve   | Mean Gradient<br>Velocity Time Integral<br>Mean Velocity | direction: Antegrade Flow            |
| AV Vmax             | Aortic Valve   | Peak Velocity<br>Peak Gradient                           | direction: Antegrade Flow            |
| AV Accel Time       | Aortic Valve   | Acceleration Time  | direction: Antegrade Flow            |
| AV Decel Time       | Aortic Valve   | Deceleration Time  | direction: Antegrade Flow            |
| AI VTI              | Aortic Valve   | Mean Gradient<br>Velocity Time Integral<br>Mean Velocity | direction: Regurgitant Flow          |

|                 |              |   |                             |
|-----------------|--------------|---|-----------------------------|
| AI Vmax         | Aortic Valve | Peak Velocity<br>Peak Gradient          | direction: Regurgitant Flow |
| AI End Dias Vel | Aortic Valve | End Diastolic Velocity                  | direction: Regurgitant Flow |
| AI Accel Time   | Aortic Valve | Acceleration Time                       | direction: Regurgitant Flow |
| AI P ½ t        | Aortic Valve | Pressure Half-Time                      | direction: Regurgitant Flow |
| HR - AV         | Aortic Valve | Heart rate                              |                             |
| AI Dec Slope    | Aortic Valve | Deceleration Slope<br>Deceleration Time | direction: Regurgitant Flow |

### A.2.8.2 Calculations

| iE33 Label   | Finding site        | Concept                                | Optional modifiers   |
|--------------|---------------------|--|--|
| LV PEP/ET    | Left Ventricle      | PEP/ET                                 |  |
| AVA(Vmax)    | Aortic Valve        | Cardiovascular Orifice Area            | method: Continuity Equation by Peak Velocity                           |
| AVA(VTI)     | Aortic Valve        | Cardiovascular Orifice Area            | method: Continuity Equation by Velocity Time Integral                  |
| PISA (AI)    | Aortic Valve        | Aortic Valve Flow Area                 | method: Proximal Isovelocity Surface Area, direction: Regurgitant Flow |
| AI Flow Rate | Aortic Valve        | Peak Instantaneous Flow Rate           | direction: Regurgitant Flow  |
| AI ERO       | Aortic Valve        | Cardiovascular Orifice Area            | method: Proximal Isovelocity Surface Area, direction: Regurgitant Flow |
| AI Volume    | Aortic Valve        | Volume Flow                            | direction: Regurgitant Flow  |
| AI Fraction  | Aortic Valve        | Regurgitant Fraction                   | direction: Regurgitant Flow  |
| SV (LVOT)    | Left Ventricle      | Stroke Volume                          | target: Left Ventricle Outflow Tract                                   |
| CO (LVOT)    | Left Ventricle      | Cardiac Output                         | target: Left Ventricle Outflow Tract                                   |
| Qp/Qs        | Cardiac Shunt Study | Pulmonary-to-Systemic Shunt Flow Ratio |  |

### A.2.9 Pulmonic Valve

#### A.2.9.1 Measurements

| iE33 Label          | Finding site    | Concept                         | Optional modifiers                                   |
|---------------------|-----------------|---------------------------------|--|
| Late Dias Slope     | Pulmonic Valve  | Late Diastolic Slope            | mode: M mode   |
| A Wave Amp          | Pulmonic Valve  | A Wave Amp                      | mode: M mode   |
| B-C Slope           | Pulmonic Valve  | B-C Slope                       | mode: M mode   |
| RV Eject Time       | Right Ventricle | Eject Time                      | mode: M mode   |
| RV Pre-Eject Period | Right Ventricle | Pre-Eject Time                  | mode: M mode   |
| RVOT Diam           | Right Ventricle | Cardiovascular Orifice Diameter | mode: 2D mode, target: Right Ventricle Outflow Tract |



|                 |                 |  |                                       |
|-----------------|-----------------|--|---------------------------------------|
| RVOT VTI        | Right Ventricle | Mean Gradient<br>Velocity Time Integral<br>Mean Velocity | target: Right Ventricle Outflow Tract |
| RVOT Vmax       | Right Ventricle | Peak Velocity<br>Peak Gradient                           | target: Right Ventricle Outflow Tract |
| PV VTI          | Pulmonic Valve  | Mean Gradient<br>Velocity Time Integral<br>Mean Velocity | direction: Antegrade Flow             |
| PV Vmax         | Pulmonic Valve  | Peak Velocity<br>Peak Gradient                           | direction: Antegrade Flow             |
| PV Accel Time   | Pulmonic Valve  | Acceleration Time  | direction: Antegrade Flow             |
| PI End Dias Vel | Pulmonic Valve  | End Diastolic Velocity                                   | direction: Regurgitant Flow           |
| HR - PV         | Pulmonic Valve  | Heart rate   |                                       |

### A.2.9.2 Calculations

| iE33 Label | Finding site        | Concept                                | Optional modifiers                                    |
|------------|---------------------|--|---|
| RV PEP/ET  | Right Ventricle     | PEP/ET                                 |   |
| PVA (Vmax) | Pulmonic Valve      | Cardiovascular Orifice Area            | method: Continuity Equation by Peak Velocity          |
| PVA (VTI)  | Pulmonic Valve      | Cardiovascular Orifice Area            | method: Continuity Equation by Velocity Time Integral |
| SV (RVOT)  | Right Ventricle     | Stroke Volume                          | target: Right Ventricle Outflow Tract                 |
| CO (RVOT)  | Right Ventricle     | Cardiac Output                         | target: Right Ventricle Outflow Tract                 |
| Qp/Qs      | Cardiac Shunt Study | Pulmonary-to-Systemic Shunt Flow Ratio |   |

### A.2.10 Pulmonic and Hepatic Veins

#### A.2.10.1 Measurements

| iE33 Label       | Finding site               | Concept  | Optional modifiers |
|------------------|----------------------------|--|--------------------|
| Pulm Sys Vel     | Pulmonary Venous Structure | Pulmonary Vein Systolic Peak Velocity                    |                    |
| Pulm Dias Vel    | Pulmonary Venous Structure | Pulmonary Vein Diastolic Peak Velocity                   |                    |
| Pulm A Revs Vel  | Pulmonary Venous Structure | Pulmonary Vein Atrial Contraction Reversal Peak Velocity |                    |
| Pulm A Revs Dur  | Pulmonary Venous Structure | Pulmonary Vein A-Wave Duration                           |                    |
| Hepatic Sys Vel  | Hepatic Veins              | Hepatic Vein Systolic Peak Velocity                      |                    |
| Hepatic Dias Vel | Hepatic Veins              | Hepatic Vein Diastolic Peak Velocity                     |                    |

|                    |               |  |
|--------------------|---------------|--|
| Hepatic A Revs Vel | Hepatic Veins | Hepatic Vein Atrial Contraction Reversal Peak Velocity |
| Hepatic A Revs Dur | Hepatic Veins | Hepatic Vein A-Wave Duration                           |

### A.2.10.2 Calculations

| iE33 Label  | Finding site               | Concept                                    | Optional modifiers |
|-------------|----------------------------|--|--------------------|
| Pulm S/D    | Pulmonary Venous Structure | Pulmonary Vein Systolic to Diastolic Ratio |                    |
| Hepatic S/D | Hepatic Veins              | Hepatic Vein Systolic to Diastolic Ratio   |                    |

### A.2.11 TDI

#### A.2.11.1 Measurements

| iE33 Label        | Finding site | Concept | Optional modifiers |
|-------------------|--------------|---------|--------------------|
| MV Peak E Vel     | Not mapped   |         |                    |
| MV Peak A Vel     | Not mapped   |         |                    |
| Med E` Vel        | Not mapped   |         |                    |
| Lat E` Vel        | Not mapped   |         |                    |
| Med S Vel         | Not mapped   |         |                    |
| Med A` Vel        | Not mapped   |         |                    |
| Lat S Vel         | Not mapped   |         |                    |
| Lat A` Vel        | Not mapped   |         |                    |
| Area Under Med E` | Not mapped   |         |                    |
| Area Under Med A` | Not mapped   |         |                    |
| Area Under Lat E` | Not mapped   |         |                    |
| Area Under Lat A` | Not mapped   |         |                    |
| Time to Med E`    | Not mapped   |         |                    |
| Time to Lat E`    | Not mapped   |         |                    |
| Time to Med S     | Not mapped   |         |                    |
| Time to Lat S     | Not mapped   |         |                    |
| Med Accel Time    | Not mapped   |         |                    |
| Med Decel Time    | Not mapped   |         |                    |
| Lat Accel Time    | Not mapped   |         |                    |
| Lat Decel Time    | Not mapped   |         |                    |
| Med IVCT          | Not mapped   |         |                    |
| Med IVRT          | Not mapped   |         |                    |
| Lat IVCT          | Not mapped   |         |                    |
| Lat IVRT          | Not mapped   |         |                    |

#### A.2.11.2 Calculations

| iE33 Label | Finding site | Concept | Optional modifiers |
|------------|--------------|---------|--------------------|
| MV E/A     | Not mapped   |         |                    |

|               |            |
|---------------|------------|
| E/E` Lateral  | Not mapped |
| E/E` Medial   | Not mapped |
| E`/A` Lateral | Not mapped |
| E`/A` Medial  | Not mapped |

#### A.2.12 Private Code Dictionary for Echo

| Coding Scheme Designator | Code Value | Code Meaning                     |
|--------------------------|------------|----------------------------------|
| 99PMSBLUS                | T5200-01   | Hepatic Veins                    |
| 99PMSBLUS                | C12201-01  | Left Ventricle MOD Diam          |
| 99PMSBLUS                | C12203-01  | Left Ventricle Mass Index        |
| 99PMSBLUS                | C12203-02  | Eject Time                       |
| 99PMSBLUS                | C12203-03  | Pre-Eject Time                   |
| 99PMSBLUS                | C12203-04  | PEP/ET                           |
| 99PMSBLUS                | C12207-01  | Mitral Valve D-E Excursion       |
| 99PMSBLUS                | C12207-02  | Mitral Valve D-E Slope           |
| 99PMSBLUS                | C12207-03  | Mitral Valve E-E Separation      |
| 99PMSBLUS                | C12207-04  | Mitral Valve A-C Interval        |
| 99PMSBLUS                | C12207-05  | Tei Index                        |
| 99PMSBLUS                | C12207-06  | Mitral Valve Flow Area           |
| 99PMSBLUS                | C12208-01  | Tricuspid Valve D-E Excursion    |
| 99PMSBLUS                | C12208-02  | Tricuspid Valve D-E Slope        |
| 99PMSBLUS                | C12208-03  | Tricuspid Valve E-F Slope        |
| 99PMSBLUS                | C12208-04  | Tricuspid Valve A-C Interval     |
| 99PMSBLUS                | C12208-05  | Tricuspid Valve Flow Area        |
| 99PMSBLUS                | C12209-01  | Late Diastolic Slope             |
| 99PMSBLUS                | C12209-02  | A Wave Amp                       |
| 99PMSBLUS                | C12209-03  | B-C Slope                        |
| 99PMSBLUS                | C12211-01  | Aortic Valve Flow Area           |
| 99PMSBLUS                | C12216-01  | Hepatic Vein A-Wave Duration     |
| 99PMSBLUS                | C12222-01  | Flow Radius                      |
| 99PMSBLUS                | C12222-02  | Alias Velocity                   |
| 99PMSBLUS                | C12222-03  | Pressure Half-Time Peak velocity |

#### Private Code(s) Retired in iE33 1.1

|           |           |                           |
|-----------|-----------|---------------------------|
| 99PMSBLUS | T5200-02  | Private Concepts          |
| 99PMSBLUS | C12220-01 | Heart Rate for All Points |
| 99PMSBLUS | C12220-02 | Heart Rate for CO-MOD     |
| 99PMSBLUS | C12220-03 | Heart Rate for CO-A/L     |
| 99PMSBLUS | C12220-04 | Heart Rate for CO-LVOT    |
| 99PMSBLUS | C12220-05 | Heart Rate for CO-MV      |
| 99PMSBLUS | C12220-06 | Heart Rate for CO-RVOT    |

The code tables of this section follow the format convention of the DICOM Standard, Part 16 Annex A, 2004

The following format is used to privately extend the Echo Context groups.

#### Private extensions to the Echo templates

##### Extensions to TID 5200

|   | NL | Relation with Parent | Value Type | Concept Name             | VM | Req Type | Cond | Value Set Constraint   |
|---|----|----------------------|------------|--------------------------|----|----------|------|--|
| 4 | >  | CONTAINS             | INCLUDE    | DTID (5202) Echo Section | 1  | U        |      | \$SectionSubject = EV (99PMSBLUS, T5200-01, "Hepatic Veins")<br>\$MeasType = DCID (12216) Echocardiography Hepatic Veins |

##### Extension to TID 5203

|   | NL | Relation with Parent | Value Type | Concept Name                                      | VM | Req Type | Cond | Value Set Constraint  |
|---|----|----------------------|------------|---|----|----------|------|---|
| 4 | >  | HAS CONCEPT MOD      | TEXT       | EV (99PMSBLUS, T5203-01, "Simpson's Disk Number") | 1  | M<br>C   |      | IFF \$Measurement = (99PMSBLUS, C12201-01, "Left Ventricle MOD Diam") |

##### Private Extension(s) Retired with iE33 1.1

|   |   |          |         |                          |   |   |  |   |
|---|---|----------|---------|--------------------------|---|---|--|---|
| 4 | > | CONTAINS | INCLUDE | DTID (5202) Echo Section | 1 | U |  | \$SectionSubject = EV (99PMSBLUS, T5200-02, "Private Concepts")<br>\$MeasType = DCID (12220) Echocardiography Common Measurements |
|---|---|----------|---------|--------------------------|---|---|--|---|

## Extended Echocardiography Context Groups from PS3-16, Annex C, 2004

Context groups from the DCMR have been extended with Private Codes listed as 99PMSBLUS used between iE33 and Xcelera workstations.

### CID 12200 – Echocardiography Left Ventricle

| Code Scheme | Code Value | Concept Name   |
|-------------|------------|--|
|             |            | INCLUDE CID 12220 Echocardiography Common Measurements |
|             |            | INCLUDE CID 12201 Left Ventricle Linear                |
|             |            | INCLUDE CID 12240 Left Ventricle Area                  |
|             |            | INCLUDE CID 12202 Left Ventricle Volume                |
|             |            | INCLUDE CID 12222 Orifice Flow Properties              |
|             |            | INCLUDE CID 12203 Left Ventricle Other                 |
|             |            | INCLUDE CID 12239 Cardiac Output Properties            |

### CID 12201 – Left Ventricle Linear

| Coding Scheme Designator (0008,0102) | Code Value (0008,0100) | Code Meaning (0008,0104)                                  |
|--------------------------------------|------------------------|---|
| LN                                   | 29436-3                | Left Ventricle Internal End Diastolic Dimension           |
| LN                                   | 29438-9                | Left Ventricle Internal Systolic Dimension                |
| LN                                   | 18051-3                | Left Ventricular Fractional Shortening                    |
| LN                                   | 18154-5                | Interventricular Septum Diastolic Thickness               |
| LN                                   | 18155-2                | Interventricular Septum to Posterior Wall Thickness Ratio |
| LN                                   | 18054-7                | Interventricular Septum % Thickening                      |
| LN                                   | 18158-6                | Interventricular Septum Systolic Thickness                |
| LN                                   | 18053-9                | Left Ventricle Posterior Wall % Thickening                |
| LN                                   | 18077-8                | Left Ventricle diastolic major axis                       |
| LN                                   | 18076-0                | Left Ventricle systolic major axis                        |
| LN                                   | 18156-0                | Left Ventricle Posterior Wall Systolic Thickness          |
| LN                                   | 18152-9                | Left Ventricle Posterior Wall Diastolic Thickness         |
| 99PMSBLUS                            | C12201-01              | Left Ventricle MOD Diam                                   |

### CID 12202 – Left Ventricle Volume

| Coding Scheme Designator (0008,0102) | Code Value (0008,0100) | Code Meaning (0008,0104)              |
|--------------------------------------|------------------------|---------------------------------------|
| LN                                   | 18026-5                | Left Ventricular End Diastolic Volume |
| LN                                   | 18148-7                | Left Ventricular End Systolic Volume  |
| LN                                   | 18043-0                | Left Ventricular Ejection Fraction    |

**CID 12203 – Left Ventricle Other**

| <b>Coding Scheme Designator (0008,0102)</b> | <b>Code Value (0008,0100)</b> | <b>Code Meaning (0008,0104)</b>              |
|---|-------------------------------|--|
| LN  | 18087-7                       | Left Ventricle Mass                          |
| LN  | 18071-1                       | Left Ventricular Isovolumic Relaxation Time  |
| SRT   | G-037E                        | Left Ventricular Isovolumic Contraction Time |
| 99PMSBLUS                                   | C12203-01                     | Left Ventricle Mass Index                    |
| 99PMSBLUS                                   | C12203-02                     | Eject Time                                   |
| 99PMSBLUS                                   | C12203-03                     | Pre-Eject Time                               |
| 99PMSBLUS                                   | C12203-04                     | PEP/ET                                       |

**CID 12204 – Echocardiography Right Ventricle**

| <b>Coding Scheme Designator (0008,0102)</b>            | <b>Code Value (0008,0100)</b> | <b>Code Meaning (0008,0104)</b>                     |
|--|-------------------------------|---|
| INCLUDE CID 12220 Echocardiography Common Measurements |                               |   |
| INCLUDE CID 12222 Orifice Flow Properties              |                               |   |
| INCLUDE CID 12239 Cardiac Output Properties            |                               |   |
| LN   | 20304-2                       | Right Ventricular Internal Diastolic Dimension      |
| SRT  | G-0380                        | Right Ventricular Peak Systolic Pressure            |
| LN   | 18153-7                       | Right Ventricular Anterior Wall Diastolic Thickness |

**CID 12205 – Echocardiography Left Atrium**

| <b>Coding Scheme Designator (0008,0102)</b>            | <b>Code Value (0008,0100)</b> | <b>Code Meaning (0008,0104)</b>                 |
|--|-------------------------------|---|
| INCLUDE CID 12220 Echocardiography Common Measurements |                               |   |
| LN   | 29469-4                       | Left Atrium Antero-posterior Systolic Dimension |
| LN   | 17985-3                       | Left Atrium to Aortic Root Ratio                |

**CID 12206 – Echocardiography Right Atrium**

| <b>Coding Scheme Designator (0008,0102)</b>            | <b>Code Value (0008,0100)</b> | <b>Code Meaning (0008,0104)</b> |
|--|-------------------------------|---------------------------------|
| INCLUDE CID 12220 Echocardiography Common Measurements |                               |                                 |
| LN   | 18070-3                       | Right Atrium Systolic Pressure  |

**CID 12207 – Echocardiography Mitral Valve**

| <b>Coding Scheme Designator (0008,0102)</b>            | <b>Code Value (0008,0100)</b> | <b>Code Meaning (0008,0104)</b> |
|--|-------------------------------|---------------------------------|
| INCLUDE CID 12220 Echocardiography Common Measurements |                               |                                 |

|   |           |   |
|---|-----------|---|
| INCLUDE CID 12222 Orifice Flow Properties   |           |   |
| INCLUDE CID 12239 Cardiac Output Properties |           |   |
| LN  | 17978-8   | Mitral Valve A-Wave Peak Velocity                           |
| LN  | 18037-2   | Mitral Valve E-Wave Peak Velocity                           |
| LN  | 18038-0   | Mitral Valve E to A Ratio                                   |
| LN  | 18040-6   | Mitral Valve E-F Slope by M-Mode                            |
| LN  | 18036-4   | Mitral Valve EPSS, E wave                                   |
| SRT   | G-0385    | Mitral Valve A-Wave Duration                                |
| LN  | 18035-6   | Mitral Regurgitation dP/dt derived from Mitral Reg velocity |
| 99PMSBLUS                                   | C12207-01 | Mitral Valve D-E Excursion                                  |
| 99PMSBLUS                                   | C12207-02 | Mitral Valve D-E Slope                                      |
| 99PMSBLUS                                   | C12207-03 | Mitral Valve E-E Separation                                 |
| 99PMSBLUS                                   | C12207-04 | Mitral Valve A-C Interval                                   |
| 99PMSBLUS                                   | C12207-05 | Tei Index   |
| 99PMSBLUS                                   | C12207-06 | Mitral Valve Flow Area                                      |

#### CID 12208 – Echocardiography Tricuspid Valve

| <b>Coding Scheme Designator (0008,0102)</b>            | <b>Code Value (0008,0100)</b> | <b>Code Meaning (0008,0104)</b>      |
|--|-------------------------------|--------------------------------------|
| INCLUDE CID 12220 Echocardiography Common Measurements |                               |                                      |
| INCLUDE CID 12222 Orifice Flow Properties              |                               |                                      |
| LN   | 18031-5                       | Tricuspid Valve E Wave Peak Velocity |
| LN   | 18030-7                       | Tricuspid Valve A Wave Peak Velocity |
| LN   | 18039-8                       | Tricuspid Valve E to A Ratio         |
| 99PMSBLUS  | C12208-01                     | Tricuspid Valve D-E Excursion        |
| 99PMSBLUS  | C12208-02                     | Tricuspid Valve D-E Slope            |
| 99PMSBLUS  | C12208-03                     | Tricuspid Valve E-F Slope            |
| 99PMSBLUS  | C12208-04                     | Tricuspid Valve A-C Interval         |
| 99PMSBLUS  | C12208-05                     | Tricuspid Valve Flow Area            |

#### CID 12209 – Echocardiography Pulmonic Valve

| <b>Coding Scheme Designator (0008,0102)</b>            | <b>Code Value (0008,0100)</b> | <b>Code Meaning (0008,0104)</b> |
|--|-------------------------------|---------------------------------|
| INCLUDE CID 12220 Echocardiography Common Measurements |                               |                                 |
| INCLUDE CID 12222 Orifice Flow Properties              |                               |                                 |
| 99PMSBLUS  | C12209-01                     | Late Diastolic Slope            |
| 99PMSBLUS  | C12209-02                     | A Wave Amp                      |
| 99PMSBLUS  | C12209-03                     | B-C Slope                       |

**CID 12210 – Echocardiography Pulmonary Artery**

| <b>Coding Scheme Designator<br/>(0008,0102)</b>        | <b>Code Value<br/>(0008,0100)</b> | <b>Code Meaning<br/>(0008,0104)</b> |
|--|-----------------------------------|-------------------------------------|
| INCLUDE CID 12220 Echocardiography Common Measurements |                                   |                                     |
| LN   | 18020-8                           | Main Pulmonary Artery Diameter      |
| LN   | 18021-6                           | Right Pulmonary Artery Diameter     |
| LN   | 18019-0                           | Left Pulmonary Artery Diameter      |

**CID 12211 – Echocardiography Aortic Valve**

| <b>Coding Scheme Designator<br/>(0008,0102)</b>        | <b>Code Value<br/>(0008,0100)</b> | <b>Code Meaning<br/>(0008,0104)</b> |
|--|-----------------------------------|-------------------------------------|
| INCLUDE CID 12220 Echocardiography Common Measurements |                                   |                                     |
| INCLUDE CID 12222 Orifice Flow Properties              |                                   |                                     |
| LN   | 17996-0                           | Aortic Valve Cusp Separation        |
| 99PMSBLUS  | C12211-01                         | Aortic Valve Flow Area              |

**CID 12212 – Echocardiography Aorta**

| <b>Coding Scheme Designator<br/>(0008,0102)</b>        | <b>Code Value<br/>(0008,0100)</b> | <b>Code Meaning<br/>(0008,0104)</b> |
|--|-----------------------------------|-------------------------------------|
| INCLUDE CID 12220 Echocardiography Common Measurements |                                   |                                     |
| LN   | 18015-8                           | Aortic Root Diameter                |
| LN   | 18011-7                           | Aortic Arch Diameter                |
| LN   | 18012-5                           | Ascending Aortic Diameter           |
| LN   | 18014-1                           | Aortic Isthmus Diameter             |
| LN   | 18013-3                           | Descending Aortic Diameter          |

**CID 12214 – Echocardiography Pulmonary Veins**

| <b>Coding Scheme Designator<br/>(0008,0102)</b>        | <b>Code Value<br/>(0008,0100)</b> | <b>Code Meaning<br/>(0008,0104)</b>                      |
|--|-----------------------------------|--|
| INCLUDE CID 12220 Echocardiography Common Measurements |                                   |  |
| LN   | 29450-4                           | Pulmonary Vein Systolic Peak Velocity                    |
| LN   | 29451-2                           | Pulmonary Vein Diastolic Peak Velocity                   |
| LN   | 29452-0                           | Pulmonary Vein Systolic to Diastolic Ratio               |
| LN   | 29453-8                           | Pulmonary Vein Atrial Contraction Reversal Peak Velocity |
| SRT  | G-038B                            | Pulmonary Vein A-Wave Duration                           |



**CID 12216 – Echocardiography Hepatic Veins**

| <b>Coding Scheme Designator (0008,0102)</b>            | <b>Code Value (0008,0100)</b> | <b>Code Meaning (0008,0104)</b>                        |
|--|-------------------------------|--|
| INCLUDE CID 12220 Echocardiography Common Measurements |                               |  |
| LN   | 29471-0                       | Hepatic Vein Systolic Peak Velocity                    |
| LN   | 29472-8                       | Hepatic Vein Diastolic Peak Velocity                   |
| LN   | 29473-6                       | Hepatic Vein Systolic to Diastolic Ratio               |
| LN   | 29474-4                       | Hepatic Vein Atrial Contraction Reversal Peak Velocity |
| 99PMSBLUS  | C12216-01                     | Hepatic Vein A-Wave Duration                           |

**CID 12217 – Echocardiography Cardiac Shunt**

| <b>Coding Scheme Designator (0008,0102)</b>            | <b>Code Value (0008,0100)</b> | <b>Code Meaning (0008,0104)</b>        |
|--|-------------------------------|--|
| INCLUDE CID 12220 Echocardiography Common Measurements |                               |  |
| LN   | 29462-9                       | Pulmonary-to-Systemic Shunt Flow Ratio |

**CID 12220 – Echocardiography Common Measurements**

| <b>Coding Scheme Designator (0008,0102)</b> | <b>Code Value (0008,0100)</b> | <b>Code Meaning (0008,0104)</b> |
|---|-------------------------------|---------------------------------|
| LN  | 8867-4                        | Heart rate                      |

**CID 12221 – Flow Direction**

| <b>Coding Scheme Designator (0008,0102)</b> | <b>Code Value (0008,0100)</b> | <b>Code Meaning (0008,0104)</b> |
|---|-------------------------------|---------------------------------|
| SRT   | R-42047                       | Antegrade Flow                  |
| SRT   | R-42E61                       | Regurgitant Flow                |

**CID 12222 – Orifice Flow Properties**

| <b>Coding Scheme Designator (0008,0102)</b> | <b>Code Value (0008,0100)</b> | <b>Code Meaning (0008,0104)</b> |
|---|-------------------------------|---------------------------------|
| LN  | 33878-0                       | Volume Flow                     |
| LN  | 34141-2                       | Peak Instantaneous Flow Rate    |
| SRT   | G-038E                        | Cardiovascular Orifice Area     |
| SRT   | G-038F                        | Cardiovascular Orifice Diameter |
| SRT   | G-0390                        | Regurgitant Fraction            |
| LN  | 11653-3                       | End Diastolic Velocity          |
| LN  | 11726-7                       | Peak Velocity                   |
| LN  | 20352-1                       | Mean Velocity                   |

|           |           |                                  |
|-----------|-----------|----------------------------------|
| LN        | 20247-3   | Peak Gradient                    |
| LN        | 20256-4   | Mean Gradient                    |
| LN        | 20354-7   | Velocity Time Integral           |
| LN        | 20280-4   | Pressure Half-Time               |
| LN        | 20168-1   | Acceleration Time                |
| LN        | 20217-6   | Deceleration Time                |
| LN        | 20216-8   | Deceleration Slope               |
| 99PMSBLUS | C12222-01 | Flow Radius                      |
| 99PMSBLUS | C12222-02 | Alias Velocity                   |
| 99PMSBLUS | C12222-03 | Pressure Half-Time Peak velocity |

**CID 12223 – Echocardiography Stroke Volume Origin**

| <b>Coding Scheme Designator (0008,0102)</b> | <b>Code Value (0008,0100)</b> | <b>Code Meaning (0008,0104)</b> |
|---|-------------------------------|---------------------------------|
| SNM3  | T-32650                       | Left Ventricle Outflow Tract    |
| SNM3  | T-32550                       | Right Ventricle Outflow Tract   |

**CID 12224 – Ultrasound Image Modes**

| <b>Coding Scheme Designator (0008,0102)</b> | <b>Code Value (0008,0100)</b> | <b>Code Meaning (0008,0104)</b> |
|---|-------------------------------|---------------------------------|
| SRT   | G-03A2                        | 2D mode                         |
| SRT   | G-0394                        | M mode                          |

**CID 12226 – Echocardiography Image View**

| <b>Coding Scheme Designator (0008,0102)</b> | <b>Code Value (0008,0100)</b> | <b>Code Meaning (0008,0104)</b>                      |
|---|-------------------------------|--|
| SRT   | G-A19B                        | Apical two chamber                                   |
| SRT   | G-A19C                        | Apical four chamber                                  |
| SRT   | G-039B                        | Parasternal short axis at the Papillary Muscle level |

**CID 12228 – Volume Methods**

| <b>Coding Scheme Designator (0008,0102)</b> | <b>Code Value (0008,0100)</b> | <b>Code Meaning (0008,0104)</b> |
|---|-------------------------------|---------------------------------|
| DCM   | 125226                        | Single Plane Ellipse            |
| DCM   | 125206                        | Cube Method                     |
| DCM   | 125207                        | Method of Disks, Biplane        |
| DCM   | 125208                        | Method of Disks, Single Plane   |
| DCM   | 125209                        | Teichholz                       |

**CID 12229 – Area Methods**

| <b>Coding Scheme Designator<br/>(0008,0102)</b> | <b>Code Value<br/>(0008,0100)</b> | <b>Code Meaning<br/>(0008,0104)</b>           |
|---|-----------------------------------|---|
| DCM   | 125210                            | Area by Pressure Half-Time                    |
| DCM   | 125214                            | Continuity Equation by Peak Velocity          |
| DCM   | 125215                            | Continuity Equation by Velocity Time Integral |
| DCM   | 125216                            | Proximal Isovelocity Surface Area             |
| DCM   | 125220                            | Planimetry                                    |

**CID 12231 – Volume Flow Methods**

| <b>Coding Scheme Designator<br/>(0008,0102)</b> | <b>Code Value<br/>(0008,0100)</b> | <b>Code Meaning<br/>(0008,0104)</b> |
|---|-----------------------------------|-------------------------------------|
| DCM   | 125216                            | Proximal Isovelocity Surface Area   |

**CID 12233 – Cardiac Phase**

| <b>Coding Scheme Designator<br/>(0008,0102)</b> | <b>Code Value<br/>(0008,0100)</b> | <b>Code Meaning<br/>(0008,0104)</b> |
|---|-----------------------------------|-------------------------------------|
| SRT   | F-32011                           | End Diastole                        |
| DCM   | 109070                            | End Systole                         |

**CID 12239 – Cardiac Output Properties**

| <b>Coding Scheme Designator<br/>(0008,0102)</b> | <b>Code Value<br/>(0008,0100)</b> | <b>Code Meaning<br/>(0008,0104)</b> |
|---|-----------------------------------|-------------------------------------|
| SRT   | F-32120                           | Stroke Volume                       |
| SRT   | F-32100                           | Cardiac Output                      |
| SRT   | F-32110                           | Cardiac Index                       |
| SRT   | F-00078                           | Stroke Index                        |

**CID 12240 – Left Ventricle Area**

| <b>Coding Scheme Designator<br/>(0008,0102)</b> | <b>Code Value<br/>(0008,0100)</b> | <b>Code Meaning<br/>(0008,0104)</b>                     |
|---|-----------------------------------|---|
| SRT   | G-0374                            | Left Ventricular Systolic Area                          |
| SRT   | G-0375                            | Left Ventricular Diastolic Area                         |
| SRT   | G-0379                            | Left Ventricle Epicardial Diastolic Area, psax pap view |

## APPENDIX B Vascular Structured Report

### B.1 INTRODUCTION

iE33 implements the Vascular Report template (TID 5100). This appendix describes the scope and manner that iE33 measurements appear in DICOM reports.

#### B.1.1 Clinical Scope

According to the DICOM Vascular Template (TID 5100), vascular measurements appear in a hierarchy of regional sections (e.g. Left Vein of Lower Extremity) that contain groups of anatomically specific containers (e.g. Common Femoral Vein). The groups contain the measurements or calculations that apply to that group. A group may contain measurement when it is an anatomically non-specific, such as a ratio of velocities from different vessels.

### B.2 MAPPING FOR VASCULAR DICOM SR – IE33 1.1

#### Reference for the columns in the mapping table

Section Scope TID5100, Row 9 through 29, value passed as \$SectionScope

Anatomy Group TID5100, Row 9 through 29, value passed as \$Anatomy

Vessel Segment TID5104, Row 2

Vessel Branch TID5104, Row 3

#### B.2.1 Carotid

| iE33 Label    | Section Scope             | Anatomy Group           | Vessel Segment   |
|---------------|---------------------------|-------------------------|------------------|
| Prox CCA      | Artery of neck            | Common Carotid Artery   | Proximal         |
| Mid CCA       | Artery of neck            | Common Carotid Artery   | Mid-longitudinal |
| Dist CCA      | Artery of neck            | Common Carotid Artery   | Distal           |
| Prox ICA      | Artery of neck            | Internal Carotid Artery | Proximal         |
| Mid ICA       | Artery of neck            | Internal Carotid Artery | Mid-longitudinal |
| Dist ICA      | Artery of neck            | Internal Carotid Artery | Distal           |
| Prox ECA      | Artery of neck            | External Carotid Artery | Proximal         |
| Vertebral A   | Artery of neck            | Vertebral Artery        |                  |
| Bulb          | Artery of neck            | Carotid Bulb            |                  |
| CCA - ratio   | Not mapped                |                         |                  |
| ICA - ratio   | Not mapped                |                         |                  |
| Brachioceph A | Artery Of Upper Extremity | Innominate Artery       |                  |
| Prox SCL A    | Artery of neck            | Subclavian Artery       | Proximal         |
| ICA/CCA Ratio | Artery of neck            | ICA/CCA velocity ratio  |                  |

#### B.2.2 Lower Extremity Arterial

| iE33 Label  | Section Scope             | Anatomy Group         | Vessel Segment |
|-------------|---------------------------|-----------------------|----------------|
| Int Iliac A | Artery of Lower Extremity | Internal Iliac Artery |                |
| Com Iliac A | Artery of Lower Extremity | Common Iliac Artery   |                |

|             |                           |                            |                  |
|-------------|---------------------------|----------------------------|------------------|
| Ext Iliac A | Artery of Lower Extremity | External Iliac Artery      |                  |
| CFA         | Artery of Lower Extremity | Common Femoral Artery      |                  |
| Prox PFA    | Artery of Lower Extremity | Profunda Femoris Artery    |                  |
| Prox SFA    | Artery of Lower Extremity | Superficial Femoral Artery | Proximal         |
| Mid SFA     | Artery of Lower Extremity | Superficial Femoral Artery | Mid-longitudinal |
| Dist SFA    | Artery of Lower Extremity | Superficial Femoral Artery | Distal           |
| Prox Pop A  | Artery of Lower Extremity | Popliteal Artery           | Proximal         |
| Dist Pop A  | Artery of Lower Extremity | Popliteal Artery           | Distal           |
| Prox ATA    | Artery of Lower Extremity | Anterior Tibial Artery     | Proximal         |
| Mid ATA     | Artery of Lower Extremity | Anterior Tibial Artery     | Mid-longitudinal |
| Dist ATA    | Artery of Lower Extremity | Anterior Tibial Artery     | Distal           |
| Dor Pedis   | Artery of Lower Extremity | Dorsalis Pedis Artery      |                  |
| Prox PTA    | Artery of Lower Extremity | Posterior Tibial Artery    | Proximal         |
| Mid PTA     | Artery of Lower Extremity | Posterior Tibial Artery    | Mid-longitudinal |
| Dist PTA    | Artery of Lower Extremity | Posterior Tibial Artery    | Distal           |
| Prox Pero A | Artery of Lower Extremity | Peroneal Artery            | Proximal         |
| Mid Pero A  | Artery of Lower Extremity | Peroneal Artery            | Mid-longitudinal |
| Dist Pero A | Artery of Lower Extremity | Peroneal Artery            | Distal           |

### B.2.3 Lower Extremity Venous

| iE33 Label  | Section Scope           | Anatomy Group           | Vessel Segment | Vessel Branch |
|-------------|-------------------------|-------------------------|----------------|---------------|
| Com Iliac V | Vein of Lower Extremity | Common Iliac Vein       |                |               |
| Ext Iliac V | Vein of Lower Extremity | External Iliac Vein     |                |               |
| Int Iliac V | Vein of Lower Extremity | Internal iliac vein     |                |               |
| CFV         | Vein of Lower Extremity | Common Femoral Vein     |                |               |
| SFJ         | Vein of Lower Extremity | Saphenofemoral Junction |                |               |
| Prox DPF V  | Vein of Lower Extremity | Profunda Femoris Vein   | Proximal       |               |

|                |                         |                               |                  |
|----------------|-------------------------|-------------------------------|------------------|
| Prox SFV       | Vein of Lower Extremity | Superficial Femoral Vein      | Proximal         |
| Mid SFV        | Vein of Lower Extremity | Superficial Femoral Vein      | Mid-longitudinal |
| Dist SFV       | Vein of Lower Extremity | Superficial Femoral Vein      | Distal           |
| Prox Pop V     | Vein of Lower Extremity | Popliteal Vein                | Proximal         |
| Mid Pop V      | Vein of Lower Extremity | Popliteal Vein                | Mid-longitudinal |
| Dist Pop V     | Vein of Lower Extremity | Popliteal Vein                | Distal           |
| Prox ATV       | Vein of Lower Extremity | Anterior Tibial Vein          | Proximal         |
| Mid ATV        | Vein of Lower Extremity | Anterior Tibial Vein          | Mid-longitudinal |
| Dist ATV       | Vein of Lower Extremity | Anterior Tibial Vein          | Distal           |
| Prox PTV       | Vein of Lower Extremity | Posterior Tibial Vein         | Proximal         |
| Mid PTV        | Vein of Lower Extremity | Posterior Tibial Vein         | Mid-longitudinal |
| Dist PTV       | Vein of Lower Extremity | Posterior Tibial Vein         | Distal           |
| Prox Pero V    | Vein of Lower Extremity | Peroneal Vein                 | Proximal         |
| Mid Pero V     | Vein of Lower Extremity | Peroneal Vein                 | Mid-longitudinal |
| Dist Pero V    | Vein of Lower Extremity | Peroneal Vein                 | Distal           |
| Prox GSV Thigh | Vein of Lower Extremity | Great Saphenous Vein of Thigh | Proximal         |
| Mid GSV Thigh  | Vein of Lower Extremity | Great Saphenous Vein of Thigh | Mid-longitudinal |
| Dist GSV Thigh | Vein of Lower Extremity | Great Saphenous Vein of Thigh | Distal           |
| Prox GSV Calf  | Vein of Lower Extremity | Great Saphenous Vein of Calf  | Proximal         |
| Mid GSV Calf   | Vein of Lower Extremity | Great Saphenous Vein of Calf  | Mid-longitudinal |
| Dist GSV Calf  | Vein of Lower Extremity | Great Saphenous Vein of Calf  | Distal           |
| Prox LSV       | Vein of Lower Extremity | Lesser Saphenous Vein         | Proximal         |
| Mid LSV        | Vein of Lower Extremity | Lesser Saphenous Vein         | Mid-longitudinal |
| Dist LSV       | Vein of Lower Extremity | Lesser Saphenous Vein         | Distal           |
| Med Sural V    | Vein of Lower Extremity | Gastrocnemius vein            | Medial           |
| Lat Sural V    | Vein of Lower Extremity | Gastrocnemius vein            | Lateral          |

#### B.2.4 Upper Extremity Arterial

| iE33 Label   | Section Scope             | Anatomy Group   | Vessel Segment   |
|--------------|---------------------------|-----------------|------------------|
| Ax A         | Artery Of Upper Extremity | Axillary Artery |                  |
| Prox Brach A | Artery Of Upper Extremity | Brachial Artery | Proximal         |
| Dist Brach A | Artery Of Upper Extremity | Brachial Artery | Distal           |
| Prox Ulnar A | Artery Of Upper Extremity | Ulnar Artery    | Proximal         |
| Mid Ulnar A  | Artery Of Upper Extremity | Ulnar Artery    | Mid-longitudinal |
| Dist Ulnar A | Artery Of Upper Extremity | Ulnar Artery    | Distal           |
| Prox Rad A   | Artery Of Upper Extremity | Radial Artery   | Proximal         |

|            |                           |                   |                  |
|------------|---------------------------|-------------------|------------------|
| Mid Rad A  | Artery Of Upper Extremity | Radial Artery     | Mid-longitudinal |
| Dist Rad A | Artery Of Upper Extremity | Radial Artery     | Distal           |
| Mid SCL A  | Artery Of Upper Extremity | Subclavian Artery | Mid-longitudinal |
| Antecube   | Artery Of Upper Extremity | Antecube          |                  |

### B.2.5 Upper Extremity Venous

| iE33 Label     | Section Scope           | Anatomy Group         | Vessel Segment   |
|----------------|-------------------------|-----------------------|------------------|
| IJV            | Vein Of Upper Extremity | Internal Jugular vein |                  |
| Brachioceph V  | Vein Of Upper Extremity | Innominate vein       |                  |
| Prox SCL V     | Vein Of Upper Extremity | Subclavian vein       | Proximal         |
| Mid SCL V      | Vein Of Upper Extremity | Subclavian vein       | Mid-longitudinal |
| Ax V           | Vein Of Upper Extremity | Axillary vein         |                  |
| Prox Brach V   | Vein Of Upper Extremity | Brachial vein         | Proximal         |
| Dist Brach V   | Vein Of Upper Extremity | Brachial vein         | Distal           |
| Prox Ulnar V   | Vein Of Upper Extremity | Ulnar vein            | Proximal         |
| Mid Ulnar V    | Vein Of Upper Extremity | Ulnar vein            | Mid-longitudinal |
| Dist Ulnar V   | Vein Of Upper Extremity | Ulnar vein            | Distal           |
| Prox Rad V     | Vein Of Upper Extremity | Radial vein           | Proximal         |
| Mid Rad V      | Vein Of Upper Extremity | Radial vein           | Mid-longitudinal |
| Dist Rad V     | Vein Of Upper Extremity | Radial vein           | Distal           |
| Prox Ceph V    | Vein Of Upper Extremity | Cephalic vein         | Proximal         |
| Mid Ceph V     | Vein Of Upper Extremity | Cephalic vein         | Mid-longitudinal |
| Dist Ceph V    | Vein Of Upper Extremity | Cephalic vein         | Distal           |
| Prox Basilic V | Vein Of Upper Extremity | Basilic vein          | Proximal         |
| Mid Basilic V  | Vein Of Upper Extremity | Basilic vein          | Mid-longitudinal |
| Dist Basilic V | Vein Of Upper Extremity | Basilic vein          | Distal           |

### B.2.6 Grafts

| iE33 Label        | Section Scope | Anatomy Group |
|-------------------|---------------|---------------|
| Inflow Vessel     | Not mapped    |               |
| Outflow Vessel    | Not mapped    |               |
| Prox Anast        | Not mapped    |               |
| Prox Gft          | Not mapped    |               |
| Mid Gft           | Not mapped    |               |
| Dist Gft          | Not mapped    |               |
| Dist Anast        | Not mapped    |               |
| Dist Outflow Vess | Not mapped    |               |
| Pre Anast Artery  | Not mapped    |               |
| Post Anast Artery | Not mapped    |               |
| Anast             | Not mapped    |               |
| Pre Anast Vein    | Not mapped    |               |

|                 |            |
|-----------------|------------|
| Post Anast Vein | Not mapped |
| Composite Site  | Not mapped |

### B.2.7 Private Code Dictionary for Vascular

| Coding Scheme Designator | Code Value | Code Meaning |
|--------------------------|------------|--------------|
| 99PMSBLUS                | sup71_001  | Antecube     |

The following section describes the Codes associated with Vascular measurements and calculations.

The tables below lists which context groups and their contents specified by TID 5100 used in this implementation.

#### CID - 12104 Extracranial Arteries

| Coding Scheme Designator<br>(0008,0102) | Code Value<br>(0008,0100) | Code Meaning<br>(0008,0104) |
|---|---------------------------|-----------------------------|
| SRT                                     | T-45170                   | Carotid Bulb                |
| SRT                                     | T-45100                   | Common Carotid Artery       |
| SRT                                     | T-45200                   | External Carotid Artery     |
| SRT                                     | T-45300                   | Internal Carotid Artery     |
| SRT                                     | T-46100                   | Subclavian Artery           |
| SRT                                     | T-45700                   | Vertebral Artery            |

#### CID - 12107 Upper Extremity Arteries

| Coding Scheme Designator<br>(0008,0102) | Code Value<br>(0008,0100) | Code Meaning<br>(0008,0104) |
|---|---------------------------|-----------------------------|
| SRT                                     | T-47100                   | Axillary Artery             |
| SRT                                     | T-47160                   | Brachial Artery             |
| SRT                                     | T-46010                   | Innominate Artery           |
| SRT                                     | T-47300                   | Radial Artery               |
| SRT                                     | T-46100                   | Subclavian Artery           |
| SRT                                     | T-47200                   | Ulnar Artery                |
| 99PMSBLUS                               | sup71_001                 | Antecube                    |

#### CID - 12108 Upper Extremity Veins

| Coding Scheme Designator<br>(0008,0102) | Code Value<br>(0008,0100) | Code Meaning<br>(0008,0104) |
|---|---------------------------|-----------------------------|
| SRT                                     | T-49110                   | Axillary vein               |
| SRT                                     | T-48052                   | Basilic vein                |
| SRT                                     | T-49350                   | Brachial vein               |
| SRT                                     | T-49240                   | Cephalic vein               |
| SRT                                     | T-48620                   | Innominate vein             |
| SRT                                     | T-48170                   | Internal Jugular vein       |
| SRT                                     | T-49340                   | Radial vein                 |



|     |         |                 |
|-----|---------|-----------------|
| SRT | T-48330 | Subclavian vein |
| SRT | T-49330 | Ulnar vein      |

**CID - 12109 Lower Extremity Arteries**

| <b>Coding Scheme Designator<br/>(0008,0102)</b> | <b>Code Value<br/>(0008,0100)</b> | <b>Code Meaning<br/>(0008,0104)</b> |
|---|-----------------------------------|-------------------------------------|
| SRT   | T-46710                           | Common Iliac Artery                 |
| SRT   | T-47700                           | Anterior Tibial Artery              |
| SRT   | T-47400                           | Common Femoral Artery               |
| SRT   | T-47741                           | Dorsalis Pedis Artery               |
| SRT   | T-46910                           | External Iliac Artery               |
| SRT   | T-46740                           | Internal Iliac Artery               |
| SRT   | T-47630                           | Peroneal Artery                     |
| SRT   | T-47500                           | Popliteal Artery                    |
| SRT   | T-47600                           | Posterior Tibial Artery             |
| SRT   | T-47440                           | Profunda Femoris Artery             |
| SRT   | T-47403                           | Superficial Femoral Artery          |

**CID - 12110 Lower Extremity Veins (this table additionally references DICOM CP499\*)**

| <b>Coding Scheme Designator<br/>(0008,0102)</b> | <b>Code Value<br/>(0008,0100)</b> | <b>Code Meaning<br/>(0008,0104)</b> |
|---|-----------------------------------|-------------------------------------|
| SRT   | T-49630                           | Anterior Tibial Vein                |
| SRT   | G-035B                            | Common Femoral Vein                 |
| SRT   | T-48920                           | Common Iliac Vein                   |
| SRT   | T-48930                           | External Iliac Vein                 |
| SRT   | T-4942D                           | Gastrocnemius vein                  |
| SRT   | R-10259                           | Great Saphenous Vein of Thigh *     |
| SRT   | R-1025A                           | Great Saphenous Vein of Calf *      |
| SRT   | T-49550                           | Lesser Saphenous Vein               |
| SRT   | T-49650                           | Peroneal Vein                       |
| SRT   | T-49640                           | Popliteal Vein                      |
| SRT   | T-49620                           | Posterior Tibial Vein               |
| SRT   | T-49660                           | Profunda Femoris Vein               |
| SRT   | T-D930A                           | Saphenofemoral Junction             |
| SRT   | G-035A                            | Superficial Femoral Vein            |
| SRT   | T-48940                           | Internal iliac vein                 |

\*CP 499 table modification date: 20050110

**CID - 12116 Vessel Segment Modifiers**

| <b>Coding Scheme Designator<br/>(0008,0102)</b> | <b>Code Value<br/>(0008,0100)</b> | <b>Code Meaning<br/>(0008,0104)</b> |
|---|-----------------------------------|-------------------------------------|
| SRT   | G-A119                            | Distal                              |

|     |        |                  |
|-----|--------|------------------|
| SRT | G-A188 | Mid-longitudinal |
| SRT | G-A118 | Proximal         |

**CID - 12117 Vessel Branch Modifiers**

| <b>Coding Scheme Designator<br/>(0008,0102)</b> | <b>Code Value<br/>(0008,0100)</b> | <b>Code Meaning<br/>(0008,0104)</b> |
|---|-----------------------------------|-------------------------------------|
| SRT   | G-A104                            | Lateral                             |
| SRT   | G-A101                            | Left                                |
| SRT   | G-A109                            | Medial                              |
| SRT   | G-A100                            | Right                               |

**CID - 12120 Blood Velocity Measurements**

| <b>Coding Scheme Designator<br/>(0008,0102)</b> | <b>Code Value<br/>(0008,0100)</b> | <b>Code Meaning<br/>(0008,0104)</b> |
|---|-----------------------------------|-------------------------------------|
| 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         |

**CID - 12121 Vascular Indices and Ratios**

| <b>Coding Scheme Designator<br/>(0008,0102)</b> | <b>Code Value<br/>(0008,0100)</b> | <b>Code Meaning<br/>(0008,0104)</b>  |
|---|-----------------------------------|--------------------------------------|
| LN  | 20167-3                           | Acceleration Index                   |
| LN  | 12008-9                           | Pulsatility Index                    |
| LN  | 12023-8                           | Resistivity Index                    |
| LN  | 12144-2                           | Systolic to Diastolic Velocity Ratio |

**CID - 12122 Other Vascular Properties**

| <b>Coding Scheme Designator<br/>(0008,0102)</b> | <b>Code Value<br/>(0008,0100)</b> | <b>Code Meaning<br/>(0008,0104)</b> |
|---|-----------------------------------|-------------------------------------|
| LN  | 20168-1                           | Acceleration Time                   |
| LN  | 20217-6                           | Deceleration Time                   |

**CID - 12123 Carotid Ratios**

| <b>Coding Scheme Designator<br/>(0008,0102)</b> | <b>Code Value<br/>(0008,0100)</b> | <b>Code Meaning<br/>(0008,0104)</b> |
|---|-----------------------------------|-------------------------------------|
| LN  | 33868-1                           | ICA/CCA velocity ratio              |

## APPENDIX C – 3D VOLUME PRIVATE TAG LIST

### C.1 3D VOLUME IMAGE PRIVATE TAG DESCRIPTION

The private tags listed in this section are intended for analysis of iE33 3D datasets.

| Attribute Name  | DICOM Tag | VR | Description   |
|---|-----------|----|---|
| Private Native Threed Data Sequence <sup>(1)</sup>      | 200D,3016 | SQ | Contains private Native Threed Data object Array  |
| Private Native Data Type                                | 200D,300D | LO | Contains data type of Native Data such as UDM_USD_DATATYPE_DIN_3D_ECHO, UDM_USD_DATATYPE_DIN_PHYSIO   |
| Private Native Total Num Sample                         | 200D,3010 | IS | An integer value that defines the total number of native data sample  |
| Native Data Sample Size                                 | 200D,3011 | IS | An integer value that defines the native data sample size   |
| Private Native Data Stream Array                        | 200D,3020 | SQ | Contains Bulk data and instance number.   |
| Private Native Data Stream                              | 200D,300E | OB | Contains Native Data Bulk data such as 3D Echo Volume, 3D Color Volume and Physio.  |
| Private Native Data Instance Num                        | 200D,3021 | IS | An integer value that defines the instance number of the private data. For example, the instance number of Biplane is 2.  |
| Vdb Param Echo 3d Estimate Dimension <sup>(2)</sup>     | 200D,3315 | LO | Defines the number of data points in each dimension ( $\rho$ , $\theta$ , $\phi$ , $t$ ) of the echo volume. List of 4 integers. First three values are the size in voxels in the $\rho\theta\phi$ dimensions of the volume(s). . Last value ( $t$ dimension) |
| Vdb Param Echo 3d Estimate Pitch <sup>(2)</sup>         | 200D,3316 | LO | Pitch (aka stride) of the color volume data in each dimension.<br>List of 3 integers.   |
| Vdb Param Echo 3d Estimate Scale <sup>(2)</sup>         | 200D,3317 | LO | Scale (aka spatial or temporal offset) of the volume data in each dimension. List of 4 doubles.   |
| Vdb Param Echo 3d Estimate Apex Position <sup>(2)</sup> | 200D,3318 | LO | Transducer apex position relative to the first voxel in the volume, in voxels.<br>List of 3 doubles. Last value ( $t$ dimension) is always 0.   |

<sup>(1)</sup> 3D Native Data Sequence.

| Attribute Name   | DICOM Tag | VR | Description  |
|--|-----------|----|--|
| Vdb Param Color 3d Estimate Dimension <sup>(2)</sup>     | 200D,3610 | LO | Defines the number of data points in each dimension of the color volume. List of 4 integers.<br>Only present for color images. <i>If present, value matches that of the Volume Dimension tag (color volume is currently always the same size as the echo volume).</i>  |
| Vdb Param Color 3d Estimate Pitch <sup>(2)</sup>         | 200D,3611 | LO | Pitch (aka stride) of the color volume data in each dimension.<br>List of 3 integers.<br>Only present for color images. <i>If present, value matches that of the Volume Pitch tag (color volume is currently always the same size as the echo volume).</i>   |
| Vdb Param Color 3d Estimate Scale <sup>(2)</sup>         | 200D,3612 | LO | Scale (aka spatial or temporal offset) of the color volume data in each dimension. List of 4 doubles.<br>Only present for color images. <i>If present, value matches that of the Volume Scale tag (color volume is currently always the same size as the echo volume).</i>   |
| Vdb Param Color 3d Estimate Apex Position <sup>(1)</sup> | 200D,3613 | LO | Transducer apex position relative to the first voxel in the color volume, in voxels.<br>List of 3 doubles. Last value (t dimension) is always 0.<br>Only present for color images. <i>If present, value matches that of the Apex Position tag (color volume is currently always the same size as the echo volume).</i> |
| Vdb Param Color 3d Estimate Color Offset                 | 200D,3614 | LO | Offset in voxels at which the color volume data starts with respect to the echo volume data (values may be fractional).<br>List of 4 doubles.<br>Only present for color images. <i>If present, value is 0\0\0\0 (color volume is currently always the same size as the echo volume).</i>                               |
| Vdb Threed Estimate Num Dimensions                       | 200D,330a | UL | Value = 4 ( $\rho$ , $\theta$ , $\phi$ , $t$ )   |
| Vdb Param Matrix Encryption Random Number                | 200D,3920 | LO | A generated random number used in encryption algorithm.  |

END OF DOCUMENT