

HIMSS and RSNA
Integrating the Healthcare Enterprise

**IHE/MESA Acquisition Modality
Tests**

Electronic Radiology Laboratory
Mallinckrodt Institute of Radiology
510 South Kingshighway Blvd.
St. Louis, MO 63110
314.362.6965 (Voice)
314.362.6971 (Fax)

Revision 9.6.0
18-November-2005

1	Modality Tests	4
1.1	Introduction.....	4
1.1.1	Integration Profiles and Test Procedures	4
1.2	Message Attributes.....	4
1.3	Message Values	4
1.4	Configuration	4
1.5	Starting the MESA Servers.....	5
1.6	Submission of Results.....	6
2	Individual Tests.....	7
2.1	Modality Test 201: Unscheduled Case	8
2.2	Modality Test 211: Simple Case, One SPS	9
2.3	Modality Test 213: Simple Case, Two SPS.....	10
2.4	Modality Test 214: Simple Case, Two SPS.....	11
2.5	Modality Test 215: Perform Different Procedure.....	12
2.6	Modality Test 216: Assisted Protocol, One SPS	13
2.7	Modality Test 218: Billing and Material Option	13
2.8	Modality Test 221: Group Case, One Scheduled Procedure	14
2.9	Modality Test 222: Group Case, Two Scheduled Procedure.....	15
2.10	Modality Test 231: Append Case	16
2.11	Modality Test 241: Abandoned Case.....	17
2.12	Modality Test 242: Exception Management.....	18
2.13	Modality Test 251: Storage Commitment Association Negotiation.....	19
2.14	Modality Test 271: Patient Update Tests.....	19
2.15	Modality Test 281: Example Images	20
2.16	Modality Test 282: Example GSPS Objects.....	20
2.17	Test 283: DICOM Composite Object Evaluation – DVT.....	21
2.18	Test 284: DICOM Composite Object Evaluation – DICOM3TOOLS.....	21
2.19	Modality Test 511: Key Image Note 511	22
3	1xx Series Modality Tests.....	23
3.1	Modality Test 106: Presentation of Grouped Procedures	23
3.2	Modality Test 108: PGP Test Data	23
4	Charge Processing Tests	24
4.1	Modality Test 1301: Charge Processing Test 1	24
4.2	Modality Test 1302: Charge Processing Test 2	24
4.3	Modality Test 1303: Charge Processing Test 3	24
5	Basic Security Tests.....	25
5.1	Modality Test 1591: Simple Case, One SPS	25
6	Consistent Presentation of Images Tests.....	26
6.1	Modality Test 521: Consistent Presentation of Images	26
7	Evidence Documents Tests	27
7.1	Evidence Creator Test 1700: Evidence Document Description	27
7.2	Modality Test Case 20640: Evidence Creation – Cath –Vendor Interoperability	27
7.3	Modality Test Case 20641: Evidence Creation – Echo –Vendor Interoperability	28
8	Nuclear Medicine Tests	28
8.1	Modality Test 2201: NM Image Type (test 0008, 0008 Value 3)	28

8.2	Modality Test 2202: NM Image IOD: Multi-Frames and Vectors	29
8.3	Modality Test 2203: NM Image Required Attributes	30
8.4	Modality Test 2210: NM Modality STATIC	30
8.5	Modality Test 2211: NM Modality WHOLEBODY	31
8.6	-Modality Test 2212: NM Modality DYNAMIC	31
8.7	Modality Test 2213: NM Modality GATED	33
8.8	Modality Test 2214: NM Modality TOMO	33
8.9	Modality Test 2215: NM Modality GATED TOMO	34
8.10	Modality Test 2216: NM Modality RECON TOMO	35
8.11	Modality Test 2217: NM Modality RECON GATED TOMO	35
9	Cardiology Echo Modality Tests	37
9.1	Modality Test 20403: Stress Echo Option	37
9.2	Modality Test 20404: Echo Image Sets	37
10	Cardiology Cath Modality Tests	38
	Modality Test 20405: Cath Image Sets	38
10.1	38

1 Modality Tests

1.1 Introduction

This document describes several tests for Acquisition Modality systems. The tests depend on the Integration Profiles supported by the Modality. The Display Consistency tests are defined in a separate document: *Display Consistency Test Plan for Image Creators*.

1.1.1 Integration Profiles and Test Procedures

This document lists a number of tests for Acquisition Modality Systems. You may not be responsible for all of these tests.

Please refer to the Connectathon web tool to list the required tests for your system. The web address of this tool depends on the year and project manager. Please contact the appropriate project manager to obtain this information.

1.2 Message Attributes

1.3 Message Values

1.4 Configuration

The Modality scripts use an ASCII configuration file to identify parameters such as host names and port numbers. The configuration file is named *mod_test.cfg* and is included in the directory *\$MESA_TARGET/ mesa_tests/rad/actors/mod*. Edit the file and change entries (host name, port number) which pertain to your system. Your system is identified by entries that begin with TEST.

For IHE Basic Security tests, all messages are exchanged using TLS. MESA servers are run on the same ports but with the TLS option. The configuration file that identifies your information is *mod_secure.cfg*. This separate file allows you to use different port numbers for secure and standard configurations. You may decide to use the same port numbers for both types of communication. The MESA software will only use all secure or all standard communication for a test; we do not mix communication protocols.

This version of the software assumes the AE title of your modality is MODALITY1. That will be the Scheduled AE title and the AE title we assume you use when you send images, mpps events and storage commitment requests. Please use this AE title for your modality.

Modalities will communicate with two MESA servers during these tests. Parameters for the tests are listed below. Worklist queries should be sent to the MESA MWL Server. All other messages (storage, storage commitment, MPPS) should be sent to the MESA Image Manager.

The file *\$MESA_TARGET/runtime/imgmgr/ds_dcm.cfg* is used to configure the MESA Image Manager. The only parameter users should change is the LOG_LEVEL value. Log levels are defined in section 1.5. DICOM configuration parameters are listed in the table below.

System	Application Entity Title	Port
--------	--------------------------	------

MESA Image Manager	MESA_IMG_MGR	2350
MESA MWL Server	MESA_MWL	2250
MESA Audit Record Repository		4000

There is a one-time setup step to run before any tests are started. DICOM UIDs and other identifiers have seed values which are stored in the MESA databases. You should reset the UIDs one time before you start the tests. If you decide to rerun tests, you should not have to reset the UIDs. If you decide to reload the Modality Worklist, you will get different Study Instance UIDs (which is probably the behavior that you want).

To set the UIDs for the first time or reset them at a later time:

```
perl scripts/reset_uids.pl
```

1.5 Starting the MESA Servers

These instructions assume you are using a terminal emulator on Unix systems or an MS DOS command window under Windows NT. Each test uses a command line interface; there is no graphical user interface. Before you start the test procedure, you need to start the MESA Order Placer and MESA Order Filler servers. Make sure the appropriate database is running (PostgreSQL, SQL Server). To start the MESA servers:

1. Enter the Modality exam folder: *mesa_tests/rad/actors/mod*
2. Execute the appropriate script to start the servers:

```
scripts/start_mesa_servers.csh (Unix)
```

```
scripts\start_mesa_servers.bat (Windows)
```

Log levels are set for the MESA Image Manager in the file:

\$MESA_TARGET/runtime/rpt_manager/ds_dcm.cfg. / Log levels are:

- 0 no logging
- 1 errors
- 2 warnings
- 3 verbose
- 4 conversational (really verbose)

When you are finished running one or more tests, you can stop the servers:

```
scripts/stop_mesa_servers.csh (Unix)
```

```
scripts\stop_mesa_servers.bat (Windows)
```

Log files are stored in *\$MESA_TARGET/logs*.

For the security tests, the MESA servers are started with different scripts. These are *scripts/start_mesa_secure.csh* and *scripts\start_mesa_secure.bat*. The log levels are the same as

for the standard tests. The MESA servers are stopped using these scripts:
scripts/stop_mesa_secure.csh and *scripts\stop_mesa_secure.bat*.

1.6 Submission of Results

Test descriptions below inform the reader to “submit results to the Project Manager”. This does not mean “email”. The current submission process should be documented by the Project Manager, but will not include emailing files directly to the Project Manager.

2 Individual Tests

The table below gives a terse summary of the modality tests for scheduled workflow. The table uses a notation for procedure steps and action items such as X1/X1_A1. That means the procedure step is X1 and the corresponding action item is X1_A1. You will not see X1 in the modality worklist, but you will see the action item X1_A1. Some procedure steps have two action items. For example, the procedure step X4B has associated action items X4B_A1 and X4B_A2.

The individual test sections below should provide a more complete description of each test and what the modality is expected to produce.

Test	Description	Requested Procedure	SPS / Action Items	PPS / Action Items	PPS
201	Unscheduled	none	none	X1/X1_A1	1
211	Simple Case	P1	X1 / X1_A1	X1 / X1_A1	1
213	Simple Case	P8	X8A / X8A_A1 X8B / X8B_A1	X8A / X8A_A1 X8B / X8B_A1	2
214	Simple	P4	X4 A / X4A_A1 X4B / X4B_A1, X4B_A2	X4A / X4A_A1 X4B / X4B_A1, X4B_A2	2
215	Simple, but perform different procedure	P10	X10/X10_A1	X2/X2_A1	1
221	Group Case	P3	X3A / X3A_A1 X3B / X3B_A1	X3A/X3_A1, X3B_X3B_A1	1
222	Group Case	P6 P7	X6 / X6_A1 X7/ X7_A1	X6 / X6_A1 X7/ X7_A1	1
231	Append Case	P5	X5 / X5_A1	X5 / X5_A1 X1 / X1_A1	2
241	Abandoned Case	P2	X2 / X2_A1	Abandoned	1

We assume you are using an interactive terminal or terminal emulator and are logged on to the MESA test system. Change directory to `$MESA_TARGET/ mesa_tests/rad/actors/mod`.

Before you run any tests, you need to produce the MESA test data (modality worklist and comparison data). Once the MESA servers have been started, create the test data as follows:

```
perl 2xx/2xx.pl
```

This is a one-time step that should not have to be repeated.

The test scripts assume that you produce images and series that correspond exactly to the test instructions. For example, if the test requires two Performed Procedure Steps, the scripts expect the modality to produce two sets of MPPS messages and two corresponding series of images. If you run a test once and produce incorrect data, you will need to clear the MESA system of those messages before you run the test a second time. If you do not clear the system, the test scripts will likely evaluate the incorrect data again. To clear the Image Manager, use this command:

```
perl scripts/clear_img_mgr.pl
```

You should not have to clear the Image Manager if you complete one test (say 201) and are starting a different test (211). When you clear the Image Manager, you lose your ability to run the evaluation for a test you have already completed. However, this does not clear the text files with the results from the previous tests. Therefore, the general procedure to follow is:

1. Run a test to completion.
2. Obtain the results by running the proper script. These results will stay in place.
3. Start a new test; if you need to clear the Image Manager to complete the new test, your old results are not affected. However, you cannot run the evaluation scripts for old tests after clearing the Image Manager.

2.1 Modality Test 201: Unscheduled Case

Unscheduled cases imply that there is no Modality Worklist available to the Modality. In this test, you should produce a study according to the table below. The following table lists the patient demographics. Because this is an unscheduled case, your Modality will provide the Study Instance UID.

Test	Description	Requested Procedure	SPS / Protocol Code Items	PPS / Protocol Code Items
201	Simple Case	None	None	X1 / X1_A1

Attribute	Value
Patient Name	WHITE^CHARLES
Patient ID	583020
Patient DOB	19980704
Patient Sex	M

1. Start the MESA servers as described in section 1.5.
2. Clear the MESA Image Manager (if necessary)
3. Send your MPPS events, images and Storage Commitment requests to the MESA Image Manager. The MESA Image Manager does not automatically send Storage Commitment N-Event reports. To trigger these reports:

```
perl scripts/send_storage_commit_nevents.pl
```

4. Compare your results to expected results:

```
perl 201/eval_201.pl [output level] <AE Title MPPS
SCU> [Japanese]
```

where <AE Title MPPS SCU> is the Application Entity title of your modality, and <output level> is a value from 1 to 4 indicating the amount of output to log (1 = errors

only, 4 = full output). Follow with the optional keyword Japanese if using that version of the software.

If you need to rerun these tests, you can start again at step 2.

2.2 Modality Test 211: Simple Case, One SPS

This test is for one Requested Procedure (P1) leading to one Scheduled Procedure Step with one Protocol Item (X1_A1). The modality is expected to perform one Performed Procedure Step as scheduled.

Producing the Performed Protocol Code Sequence in the MPPS data is required if the modality supports the “Assisted Acquisition Protocol Setting” option. If the modality supports that option, set the “Protocol Flag” to “1” in step 6 below. Otherwise, set the value to 0.

1. Start the MESA servers as described in section 1.5.

2. Clear the MESA Image Manager (if necessary)

```
perl scripts/clear_img_mgr.pl
```

3. Obtain the MWL entry for the patient: MODALITY^211. This entry should have one Scheduled Procedure Step with one Protocol Code: X1_A1.

4. Perform the one procedure as defined in the MWL.

5. Send your MPPS events, images and Storage Commitment requests to the MESA Image Manager. The MESA Image Manager does not automatically send Storage Commitment N-Event reports. To trigger these reports:

```
perl scripts/send_storage_commit_nevents.pl
```

6. Compare your results to expected results:

```
perl 211/eval_211.pl <output level> <Protocol Flag> <AE Title MPPS SCU>
[Japanese]
```

where <AE Title MPPS SCU> is the Application Entity title of your modality, <output level> is a value from 1 to 4 indicating the amount of output to log (1 = errors only, 4 = full output), and <Protocol Flag> is 0 or 1. Follow with the optional keyword Japanese if using that version of the software.

If you need to rerun these tests, you can start again at step 2.

Note: You might want to read the instructions for Modality Test 281 and extract the images required for that test. After this test has been completed, you could skip most of the steps in Test 281 and just harvest the images produced in this test.

2.3 Modality Test 213: Simple Case, Two SPS

Starting with this test, you no longer need to send Storage Commitment events. If you choose to do so (because your system does that automatically), the MESA system will accept your messages, but will not evaluate them. If you want the MESA system to respond with the proper N-Event reports, you can do so using the same script described in the tests above:

```
perl scripts/send_storage_commit_nevents.pl
```

This test is for one Requested Procedure (P8) leading to two Scheduled Procedure Steps each with a single Protocol Item (X8A_A1 and X8B_A1).

Producing the Performed Protocol Code Sequence in the MPPS data is required if the modality supports the “Assisted Acquisition Protocol Setting” option. If the modality supports that option, set the “Protocol Flag” to “1” in step 6 below. Otherwise, set the value to 0.

1. Start the MESA servers as described in section 1.5.
2. Clear the MESA Image Manager (if necessary)

```
perl scripts/clear_img_mgr.pl
```

3. Obtain the MWL entry for the patient: MODALITY^213. This entry should have two Scheduled Procedure Steps each with a single Protocol Item (X8A_A1, X8B_A1).
4. Perform the two SPS as described in the MWL.
5. Send your MPPS events, images and Storage Commitment requests to the MESA Image Manager. The MESA Image Manager does not automatically send Storage Commitment N-Event reports. To trigger these reports:

```
perl scripts/send_storage_commit_nevents.pl
```

6. Compare your results to expected results:

```
perl 213/eval_213.pl <output level> <Protocol Flag> <AE Title MPPS SCU>
[Japanese]
```

where <AE Title MPPS SCU> is the Application Entity title of your modality, and <output level> is a value from 1 to 4 indicating the amount of output to log (1 = errors only, 4 = full output). Follow with the optional keyword Japanese if using that version of the software.

If you need to rerun these tests, you can start again at step 2.

2.4 Modality Test 214: Simple Case, Two SPS

This test is for one Requested Procedure (P4) leading to two Scheduled Procedure Steps. The first SPS uses a single Protocol Code Item; the second SPS uses two Protocol Code Items. The modality is expected to perform both Scheduled Procedure Steps and include all Protocol Code Items.

Producing the Performed Protocol Code Sequence in the MPPS data is required if the modality supports the “Assisted Acquisition Protocol Setting” option. If the modality supports that option, set the “Protocol Flag” to “1” in step 6 below. Otherwise, set the value to 0.

1. Start the MESA servers as described in section 1.5.
2. Clear the MESA Image Manager (if necessary)

```
perl scripts/clear_img_mgr.pl
```

3. Obtain the MWL entry for the patient: MODALITY^214. This entry should have two Scheduled Procedure Steps; as described above, one step will have one Protocol Item and the second step will have two Protocol Items.
4. Perform the two SPS as described in the MWL.
5. Send your MPPS events, images and Storage Commitment requests to the MESA Image Manager. The MESA Image Manager does not automatically send Storage Commitment N-Event reports. To trigger these reports:

```
perl scripts/send_storage_commit_nevents.pl
```

6. Compare your results to expected results:

```
perl 214/eval_214.pl <output level> <AE Title MPPS SCU> <Protocol Flag> [Japanese]
```

where <AE Title MPPS SCU> is the Application Entity title of your modality, and <output level> is a value from 1 to 4 indicating the amount of output to log (1 = errors only, 4 = full output). Follow with the optional keyword Japanese if using that version of the software.

If you need to rerun these tests, you can start again at step 2.

2.5 Modality Test 215: Perform Different Procedure

In this test, the MWL entry is for Requested Procedure P10 with Protocol Item X10_A1. At the modality, we decide to perform procedure P2 with Protocol Item X2_A1. Procedure P10 is not performed.

1. Start the MESA servers as described in section 1.5.
2. Clear the MESA Image Manager (if necessary)
3. Obtain the MWL entry for the patient: MODALITY^215. This entry should have one Scheduled Procedure Step with a single Protocol Item.
4. Perform procedure P2 with Protocol Item X2_A1 rather than the scheduled X10_A1.
5. Send your MPPS events, images and Storage Commitment requests to the MESA Image Manager. The MESA Image Manager does not automatically send Storage Commitment N-Event reports. To trigger these reports:

```
perl scripts/send_storage_commit_nevents.pl
```

6. Compare your results to expected results:

```
perl 215/eval_215.pl <output level> <AE Title MPPS  
SCU> [Japanese]
```

where <AE Title MPPS SCU> is the Application Entity title of your modality, and <output level> is a value from 1 to 4 indicating the amount of output to log (1 = errors only, 4 = full output). Follow with the optional keyword Japanese if using that version of the software.

If you need to rerun these tests, you can start again at step 2.

2.6 Modality Test 216: Assisted Protocol, One SPS

2.7 Modality Test 218: Billing and Material Option

Test 218 exercises the Billing and Material Management Option for Acquisition Modalities (see IHE TF Vol II: section 4.7.4.1.2.3). With this option, a modality must provide one or more of the values listed in Vol II: Table 4.7-2.

Instructions:

1. Obtain the MWL entry for patient MODALITY^218.
2. Perform the one Scheduled Procedure Step as entered in the worklist. Generate appropriate MPPS messages and fill in one or more of these sequences:

0040 0320 Billing Procedure Step Sequence

0040 0321 Film Consumption Sequence

0040 0324 Billing Supplies and Devices Sequence

3. The table below lists the values to supply for the coded items in the sequences

Attribute Name	Tag	Value
Billing Procedure Step Sequence	(0040,0320)	
> Code Value	(0008,0100)	BP1001
> Coding Scheme Designator	(0008,0102)	IHEDEMO
>Code Meaning	(0008,0104)	Billing Procedure 1001
Film Consumption Sequence	(0040,0321)	
>Number of Films	(2100,0170)	1
>Medium Type	(2000,0030)	CLEAR FILM
>Film Size ID	(2000,0050)	8INX10IN
Billing Supplies and Devices Sequence	(0040,0324)	
> Billing Item Sequence	(0040,0296)	
>> Code Value	(0008,0100)	SUP_X109
>> Coding Scheme Designator	(0008,0102)	IHEDEMO
>> Code Meaning	(0008,0104)	Catheter
>Quantity Sequence	(0040,0293)	
>>Quantity	(0040,0294)	2

To evaluate your MPPS messages:

```
perl 218/eval_218.pl <log level> <AE Title MPPS SCU>
```

2.8 Modality Test 221: Group Case, One Scheduled Procedure

In this test, a single Requested Procedure (P3) is expanded by the Order Filler into two Scheduled Procedure Steps, each with a single Protocol Item (X3A_A1, X3B_A1). The modality performs the group case by combining these two SPS.

Because this is taken from a single Requested Procedure, the modality should use the Study Instance UID found in the MWL.

1. Start the MESA servers as described in section 1.5.
2. Clear the MESA Image Manager (if necessary)

```
perl scripts/clear_img_mgr.pl
```
3. Obtain the MWL entry for the patient: MODALITY^221. This entry should have two Scheduled Procedure Steps each with a single Protocol Item.
4. Group the two SPS together and perform a single acquisition. That means you produce one series of images and one set of MPPS messages. *The order of the Scheduled Procedure steps in the MPPS messages and composite objects (images) should not matter. This is a group case and there is no implied order of SPS items.*
5. Send your MPPS events, images and Storage Commitment requests to the MESA Image Manager. The MESA Image Manager does not automatically send Storage Commitment N-Event reports. To trigger these reports:

```
perl scripts/send_storage_commit_nevents.pl
```

6. Compare your results to expected results:

```
perl 221/eval_221.pl <output level> <AE Title MPPS  
SCU> [Japanese]
```

where <AE Title MPPS SCU> is the Application Entity title of your modality, and <output level> is a value from 1 to 4 indicating the amount of output to log (1 = errors only, 4 = full output). Follow with the optional keyword Japanese if using that version of the software.

If you need to rerun these tests, you can start again at step 2.

2.9 Modality Test 222: Group Case, Two Scheduled Procedure

This test is optional for modalities in IHE Year 3.

In this test, two Requested Procedures (P6, P7) are scheduled by the MESA Order Filler as two separate Scheduled Procedure Steps. Each SPS has one Protocol Item. The modality performs the group case by combining these two SPS.

Because this is taken from two Requested Procedures, the modality should produce a new Study Instance UID. The Referenced Study UIDs are still copied from the MWL entries.

1. Start the MESA servers as described in section 1.5.
2. Clear the MESA Image Manager (if necessary)

```
perl scripts/clear_img_mgr.pl
```
3. Obtain the MWL entry for the patient: MODALITY^222. This entry should have two Scheduled Procedure Steps each with a single Protocol Item.
4. Group the two SPS together and perform a single acquisition. That means you produce one series of images and one set of MPPS messages. *The order of the Scheduled Procedure steps in the MPPS messages and composite objects (images) should not matter. This is a group case and there is no implied order of SPS items.*
5. Send your MPPS events, images and Storage Commitment requests to the MESA Image Manager. The MESA Image Manager does not automatically send Storage Commitment N-Event reports. To trigger these reports:

```
perl scripts/send_storage_commit_nevents.pl
```

6. Compare your results to expected results:

```
perl 222/eval_222.pl <output level> <AE Title MPPS  
SCU> [Japanese]
```

where <AE Title MPPS SCU> is the Application Entity title of your modality, and <output level> is a value from 1 to 4 indicating the amount of output to log (1 = errors only, 4 = full output). Follow with the optional keyword Japanese if using that version of the software.

If you need to rerun these tests, you can start again at step 2.

2.10 Modality Test 231: Append Case

In the Append Case, the modality first performs the procedures as listed in the MWL and then adds another procedure at a later time. In this test, the scheduled Requested Procedure is P5 with a Protocol Code Item X5_A1. The appended step will use the same Protocol Code Item: X5_A1. This test is when the Append Case is used to take a second set of images. For example, the first set is to be discarded because of some artifact.

In previous versions of this test, the modality was expected to perform a step that was different than the value on the Modality Worklist. That has been changed in this document to use the same step.

Producing the Performed Protocol Code Sequence in the MPPS data is required if the modality supports the “Assisted Acquisition Protocol Setting” option. If the modality supports that option, set the “Protocol Flag” to “1” in step 7 below. Otherwise, set the value to 0.

1. Start the MESA servers as described in section 1.5.
2. Clear the MESA Image Manager (if necessary)

```
perl scripts/clear_img_mgr.pl
```

3. Obtain the MWL entry for the patient: MODALITY^231. This entry should have one Scheduled Procedure Step for Procedure P5.
4. Perform the Procedure P5 as listed in the MWL.
5. Send your MPPS events, images and Storage Commitment requests to the MESA Image Manager. The MESA Image Manager does not automatically send Storage Commitment N-Event reports. To trigger these reports:

```
perl scripts/send_storage_commit_nevents.pl
```

6. Now perform the append step. Perform the same step that is found in the Modality Worklist. Send the MPPS events and images to the MESA Image Manager as above.
7. Compare your results to expected results:

```
perl 231/eval_231.pl <AE Title MPPS SCU> <Protocol Code>[output level]
```

where <AE Title MPPS SCU> is the Application Entity title of your modality, and <output level> is a value from 1 to 4 indicating the amount of output to log (1 = errors only, 4 = full output).

If you need to rerun these tests, you can start again at step 2.

2.11 Modality Test 241: Abandoned Case

In the Abandoned Case, the modality retrieves the MWL entry and abandons the case by setting the status in the MPPS messages to discontinued. We assume that the modality does not produce any images in this test (but we do not test for that).

1. Start the MESA servers as described in section 1.5.
2. Clear the MESA Image Manager (if necessary)
3. Obtain the MWL entry for the patient: MODALITY^241. This entry should have one Scheduled Procedure Step for Procedure P2.
4. Abandon this procedure by sending MPPS events with status of DISCONTINUED to the MESA Image Manager.
5. Compare your results to expected results:

```
perl 241/eval_241.pl <output level> <AE Title MPPS
SCU> [Japanese]
```

where <AE Title MPPS SCU> is the Application Entity title of your modality, and <output level> is a value from 1 to 4 indicating the amount of output to log (1 = errors only, 4 = full output). Follow with the optional keyword Japanese if using that version of the software.

If you need to rerun these tests, you can start again at step 2.

2.12 Modality Test 242: Exception Management

The Exception Management test is similar to test 241, Abandoned Case. With the Exception Management option, the modality should include the Modality Procedure Step Discontinuation Reason Code Sequence (0040, 0281). In this test, we require that you discontinue one procedure step with a specific code value/reason.

1. Start the MESA servers as described in section 1.5.

2. Clear the MESA Image Manager:

```
perl scripts/clear_img_mgr.pl
```

3. Obtain the MWL entry for the patient: MODALITY^242. This entry should have one Scheduled Procedure Step for requested procedure P1.

4. Abandon this procedure by sending MPPS events with status of DISCONTINUED to the MESA Image Manager. You need to include the sequence (0040 0281) with the specific code value: 110505, Patient refused to continue procedure.

5. Compare your results to expected results:

```
perl 242/eval_242.pl <output level> <AE Title MPPS SCU>  
[Japanese]
```

If you need to rerun these steps, you can start again at step 2.

2.13 Modality Test 251: Storage Commitment Association Negotiation

This is a test of association negotiation with your modality. An Image Manager that wants to send Storage Commitment N-Event reports will initiate a DICOM association with your modality and should propose to be an SCP of the Storage Commitment SOP Class (Push Model).

In this test, one association will be proposed. The MESA Image Manager proposes the SCP role. Your modality should accept this association and proposed presentation context.

1. Start your server process that accepts Image Manager Storage Commitment association requests.
2. Run the evaluation script for this test. This script sends the appropriate association requests and records results in 251/grade_251.txt:

```
perl 251/eval_251.pl [-v]
```

2.14 Modality Test 271: Patient Update Tests

In these tests, you will retrieve a DICOM Modality Worklist with patient demographic information. The worklist entries on the server will be modified, and you will be asked to obtain the updated demographics for use in procedures. You will not need to update demographics after an exam has started.

1. Start the MESA servers as described in section 1.5.
2. Obtain the MWL entry for the patient: MODALITY^271. This entry should have one Scheduled Procedure Step for requested procedure P1.
3. Run the perl script for test 271. This script will tell you to query for the existing worklist, prompt you for a new patient name, update the worklist and tell you to query the worklist again.

```
perl 271/271_mod.pl
```

4. There is no evaluation script for this test. You will be able to tell if your worklist has been updated with the proper name.

2.15 Modality Test 281: Example Images

In this “test”, you use the MESA tools to collect images and then send those images to the Project Manager for distribution to other vendors. These are the images that you would expect to use in the demonstration. The MWL entries should have the codes used for the demonstration, but these are not available with this release. We will use the MWL entry for the simple 211 case.

If your modality produces both images and GSPS objects, skip these instructions and proceed to the instructions for Test 282.

1. Start the MESA servers as described in section 1.5.

2. Clear the MESA Image Manager.

```
perl scripts/clear_img_mgr.pl
```

3. Obtain the MWL entry for the patient: MODALITY^211. This entry should have one Scheduled Procedure Step with one Protocol Code: X1_A1.
4. Perform the one procedure as defined in the MWL.
5. Send the appropriate images to the MESA Image Manager.
6. Locate the images stored by the MESA Image Manager. These are in \$MESA_STORAGE/instances. Tar or zip these files and send them to the Project Manager.

2.16 Modality Test 282: Example GSPS Objects

In this “test”, you use the MESA tools to collect GSPS object and then send those objects to the Project Manager for distribution to other vendors. These are the objects that you would expect to use in the demonstration. The MWL entries should have the codes used for the demonstration, but these are not available with this release. We will use the MWL entry for the simple 211 case.

For modalities that produce GSPS objects, you should combine these instructions with those of Test 281 and send a set of images and corresponding GSPS objects.

Some modalities qualify for the CPI Integration Profile and do not produce GSPS objects. These are the modalities that produce images already in P-values. In that case, this test (282) is not necessary (unless you produce GSPS objects for other reasons).

1. Start the MESA servers as described in section 1.5.

2. Clear the MESA Image Manager.

```
perl scripts/clear_img_mgr.pl
```

3. Obtain the MWL entry for the patient: MODALITY^211. This entry should have one Scheduled Procedure Step with one Protocol Code: X1_A1.
4. Perform the one procedure as defined in the MWL.
5. Send the appropriate images and GSPS objects to the MESA Image Manager.

Locate the images and GSPS objects stored by the MESA Image Manager. These are in \$MESA_STORAGE/instances. Tar or zip these files and send them to the Project Manager.

2.17 Test 283: DICOM Composite Object Evaluation – DVT

In this test, you evaluate samples of Composite Objects that you create using the Agfa/Philips DVT. The number of evaluations you run depends on the types of images that you produce. We will not list specific requirements, but ask you to apply good judgment. For example, a CT scanner that produces Localizer and Axial images would evaluate samples from both of those image types. A CR device may evaluate an AP chest, a lateral chest and an image of a limb.

You need to evaluate and provide the output for at least one DICOM Composite Object. Evaluating other objects can only help your implementation.

1. Produce a DICOM Part 10 file containing your composite object for evaluation.
2. Run the evaluation script for test 283 as follows:

```
perl 283/eval_283.pl <output level> <path to file>
```

3. The output is stored in 283/grade_283.txt. Submit the file to the Project Manager for evaluation.

Test 283 assumes you have installed the DVT on a Windows system. You may elect not to run this test, but you will be required to run test 284. If you choose not to run this test, create a file with a message that indicates you have chosen to run test 284 and submit that file as the results for test 283.

2.18 Test 284: DICOM Composite Object Evaluation – DICOM3TOOLS

In this test, you evaluate samples of Composite Objects that you create using the Dave Clunie DICOM3TOOLS. The number of evaluations you run depends on the types of images that you produce. We will not list specific requirements, but ask you to apply good judgment. For example, a CT scanner that produces Localizer and Axial images would evaluate samples from both of those image types. A CR device may evaluate an AP chest, a lateral chest and an image of a limb.

You need to evaluate and provide the output for at least one DICOM Composite Object. Evaluating other objects can only help your implementation.

1. Produce a DICOM Part 10 file containing your composite object for evaluation.
2. Run the evaluation script for test 283 as follows:

```
perl 284/eval_284.pl <output level> <path to file>
```

3. The output is stored in 284/grade_284.txt. Submit the file to the Project Manager for evaluation.

Test 284 assumes you have installed the MESA tools on a Unix system. You may elect not to run this test, but you will be required to run test 283. If you choose not to run this test, create a file with a message that indicates you have chosen to run test 283 and submit that file as the results for test 284.

2.19 Modality Test 511: Key Image Note 511

In this test, the Image Creator will create a Key Image Note that refers to a single image.

1. Start the MESA servers as described above.
2. Clear the MESA Image Manager.

```
perl scripts/clear_img_mgr.pl
```

3. Create one series of images with patient name: CRTHREE^PAUL and patient ID: CR3. Assume this is the unscheduled case (no MWL). Send the image or images to the MESA Image Manager.
4. Create a Key Image Note with the parameters described below. Send the DICOM composite object to the MESA Image Manager.
5. Evaluate the contents of your Key Image Note as follows:

```
perl 511/eval_511.pl [-v]
```

6. Locate the composite objects stored by the MESA Image Manager. These should be in \$MESA_STORAGE/instances. Tar or zip the files for the images and Key Image Note and send them to the Project Manager for distribution to other vendors.

If you need to send the note a second time, you should clear the MESA Image Manager first. This will allow the evaluation software to examine your latest object.

```
perl scripts/clear_img_mgr.pl
```

Template Identifier	2010:DCMR
Document Title	113000:DCM:Of Interest
HAS OBS CONTEXT	CODE 121005:DCM:Observer Type = 121006:DCM:Person
HAS OBS CONTEXT	PNAME 121008:DCM:Person Observer Name = MOORE^STEVE
CONTAINS TEXT	113012:DCM:Key Object Description = Key Object Test 511
Image Reference	Should refer to one image

3 1xx Series Modality Tests

These tests are similar to the 2xx series modality tests. The setup steps are the same as for the 2xx setup steps (section 2 of this document) with one exception. To create the test data, start the MESA servers and use the following script:

```
perl 1xx/1xx.pl
```

3.1 Modality Test 106: Presentation of Grouped Procedures

1. Start the MESA servers as described in section 1.5.
2. Clear the MESA Image Manager.

```
perl scripts/clear_img_mgr.pl
```

3. Obtain the MWL entries for the patient: ROSE^CARL. There should be two separate Requested Procedures (P6, P7), each with a single Scheduled Procedure Step.
4. Group the two procedures (P6, P7) and produce one series of images and one corresponding set of MPPS messages. Send the images and MPPS events to the MESA Image Manager.
5. Produce one GSPS object that “splits” the image series for Requested Procedure P6. Produce MPPS events for this Requested Procedure. This GSPS object will be in a different series than the original images. Send the GSPS object and MPPS events to the MESA Image Manager.
6. Produce one GSPS object that “splits” the image series for Requested Procedure P7. Produce MPPS events for this Requested Procedure. This GSPS object will be in a different series than the original images. Send the GSPS object and MPPS events to the MESA Image Manager.
7. Run the evaluation script for this test. This script sends the appropriate association requests and records results in 106/grade_106.txt:

```
perl 106/eval_106.pl [-v]
```

3.2 Modality Test 108: PGP Test Data

This test uses the data generated in Modality Test 106. It assumes that you have cleared the Image Manager before running test 106 and that the only data in the Image Manager is from this test.

1. Find the data stored in the Image Manager for the 106 test. This is located in \$MESA_STORAGE/imgmgr. You need all subdirectories.
2. Tar / zip the contents of this directory and send to the Project Manager. This data will be distributed to Image Manager actors for testing with their systems.

4 Charge Processing Tests

4.1 Modality Test 1301: Charge Processing Test 1

4.2 Modality Test 1302: Charge Processing Test 2

4.3 Modality Test 1303: Charge Processing Test 3

5 Basic Security Tests

This section describes tests that are specific to the IHE Basic Security integration profile. If you have the MESA servers running for the “standard” tests, you should stop those servers now. You will need to start the MESA secure servers with a different script.

Before you run any tests, you need to produce the MESA test data (modality worklist and comparison data). Once the MESA servers have been started, create the test data as follows:

```
perl 15xx/15xx.pl
```

5.1 Modality Test 1591: Simple Case, One SPS

Order Filler Test 1591 uses the same sequence of events as test 211. The Acquisition Modality is expected to communicate with other systems using TLS negotiation and to send appropriate audit messages to the MESA syslog server.

The table below lists the Audit Messages that should be generated by your system. Please refer to the document *IHE Tests: Transaction Sequences* for the full context of these messages. You might trigger other messages to the Audit Record Repository based on your interaction with your Acquisition Modality.

Identifier	Description	Source	Destination
1591.010	Begin-storing-instances	Modality	Audit Record Rep

1. Start the ***secure*** MESA servers as described in section 1.5.
2. Create the MESA test data as described above using the 15xx script.
3. Clear the MESA Image Manager.

```
perl scripts/clear_img_mgr.pl
```
4. Obtain the MWL entry for the patient: MODALITY^211. This entry should have one Scheduled Procedure Step with one Protocol Code: X1_A1.
5. Perform the one procedure as defined in the MWL.
6. Send your MPPS events, images and Storage Commitment requests to the MESA Image Manager. The MESA Image Manager does not automatically send Storage Commitment N-Event reports. To trigger these reports:

```
perl scripts/send_storage_commit_nevents_secure.pl
```
7. As part of the process of storing the images for this procedure step, your system should send a Begin-storing-instances audit message to the MESA Audit Record Repository.
8. Run the evaluation script for this test. This script sends the appropriate association requests and records results in 1591/grade_1591.txt:

```
perl 1591/eval_1591.pl <AE Title>
```

where <AE Title> is the Application Entity title of your modality.

9. Grab all of the files (tar/zip) in *\$MESA_TARGET/logs/syslog* and send these to the Project Manager.

6 Consistent Presentation of Images Tests

6.1 Modality Test 521: Consistent Presentation of Images

This test is for Modalities that support the Consistent Display of Images integration profile. These modalities should use the MESA Image Display reference system (DICOMscope) to validate the images and presentation states they create. Instructions for this test are found in the document *Display Consistency Test Plan for Evidence Creator*.

7 Evidence Documents Tests

7.1 Evidence Creator Test 1700: Evidence Document Description

In the Evidence Documents profile, Evidence Documents are defined as DICOM SR objects that are to be used to assist in diagnosis. An example would be measurements on an Ultrasound device.

The purpose of this test is to make sure that Evidence Creators in the Evidence Documents profile understand the content they are to produce is contained in DICOM SR objects according to the Evidence Document Profile. As mentioned above, the most obvious example are Ultrasound measurements. Another example could be a Mammography CAD file. Evidence Documents (in the Evidence Document Profile) are not images, nor are they DICOM SR Diagnostic Reports.

The instructions below are not a joke. We have had experience with this profile indicating users do not understand the intent of the Evidence Documents profile.

1. Create a text file and answer the questions below:
 - a. What DICOM SOP class is used by your system to generate Evidence Documents? This should be a Structured Report Class.
 - b. Describe in 500 words why your documents are to be considered evidence and are not merely diagnostic reports or other SR objects.
 - c. Describe in 500 words what problems other vendors will have in rendering your document or incorporating your results in a diagnostic report.
2. Name the text file using the convention: Vendor_1700.txt
3. Submit the text file to the Project Manager for evaluation.

7.2 Modality Test Case 20640: Evidence Creation – Cath –Vendor Interoperability

Test 20640 tests the creation and content of an SR with a Cath template. The ED Profile assumes that the Acquisition Modality is part of Cath Scheduled Workflow. Although the acquisition of a DMWL response set is not part of the Evidence Documents Profile, the transactions are included here as test set up, but not explicitly tested. See the Radiology Technical Framework Volume 1:14 for a more complete explanation.

The purpose of this test is to collect SR object/cath templates from all Acquisition Modalities actors prior to the Connectathon. These vendors/actors are required to submit SR objects for every Cath template and SR SOP Class supported. These files should be submitted to the IHE web tool as part of the results of these tests. These files will be used by the Image Display vendors/actors as Test Case 20650. It is requested that this test, in particular, be completed at least one month in advance of the MESA test completion date to allow the Image Display actors

to test the display of each of these objects and to allow time for communication if there is a problem.

MESA: There is no MESA software required for this test. See the Cardiology Transaction Sequences Test Plan for more test details.

The vendor should create a file using the naming convention of: CompanyName_Product_20640_ACQ_n_2005.doc , where n is any number to that you make up to differentiate the files if the SR Vendor has submitted multiple objects. Submit this file to the Project Manager for evaluation.

7.3 Modality Test Case 20641: Evidence Creation – Echo –Vendor Interoperability

Test 20641 tests the creation and content of an SR with an Echo template. The ED Profile assumes that the Acquisition Modality is part of Echo Scheduled Workflow. Although the acquisition of a DMWL response is not part of the Evidence Documents Profile, the transaction is included here as test set up, but not explicitly tested. See the Radiology Technical Framework Volume 1:14 for a more complete explanation.

The purpose of this test is to collect SR object/cath templates from all Acquisition Modalities actors prior to the Connectathon. These vendors/actors are required to submit SR objects for every Echo template and SR SOP Class supported. These files should be submitted to the IHE web tool as part of the results of these tests. These files will be used by the Image Display vendors/actors as Test Case 20651. It is requested that this test, in particular, be completed at least one month in advance of the MESA test completion date to allow the Image Display actors to test the display of each of these objects and to allow time for communication if there is a problem.

MESA: There is no MESA software required for this test. See the Cardiology Transaction Sequences Test Plan for more test details.

The vendor should create a file using the naming convention of: CompanyName_Product_20641_ACQ_n_2005.doc , where n is any number to that you make up to differentiate the files if the SR Vendor has submitted multiple objects. Submit this file to the Project Manager for evaluation.

8 Nuclear Medicine Tests

8.1 Modality Test 2201: NM Image Type (test 0008, 0008 Value 3)

Reference: Rad TF-1: E.4.

Test 2201 examines the Value 3 in the Image Type attribute (0008, 0008) produced by NM modalities. Allowed image types are:

- STATIC
- WHOLEBODY
- DYNAMIC
- GATED
- TOMO
- RECON TOMO
- GATED TOMO
- RECON GATED TOMO

1. Start the MESA servers as described in section 1.5.
2. Clear the MESA Image Manager.

```
perl scripts/clear_img_mgr.pl
```

3. Perform an MPPS unscheduled case and produce one or more series of images. The Patient ID should be MESA2201. The patient name should be MESA^NM. These values are not critical to the test.
4. Send the appropriate images to the MESA Image Manager.
5. Run the evaluation script for test 2201:

```
perl 2201/eval_2201.pl <log level>
```

6. Send the evaluation log (2201/grade_2201.txt) to the Project Manager.

Log level is a value from 1 to 4 (1 is low, 4 is more messages). When sending the evaluation output to the Project Manager, use a value of 3 or 4.

You can repeat this test as many times as you like. You can send multiple images; the test will evaluate all images stored by the Image Manager.

8.2 Modality Test 2202: NM Image IOD: Multi-Frames and Vectors

Reference: Rad TF-1: E.4.2.

Test 2202 tests the relationship between Image Type (0008, 0008 value 3) and Frame Increment Pointers. For a specific Image Type, DICOM defines the frame increment pointers and the order of those pointers. In this test, a modality creates NM multi-frame images, and the test software examines the Frame Increment Pointers.

You can follow the steps for test 2201. You do not need to send new images. To run the evaluation script:

```
perl 2202/2202_eval.pl -l <log level>
```

Send the evaluation log (2202/grade_2202.txt) to the Project Manager. Use a log level of 3 or 4 when you run the evaluation script.

8.3 Modality Test 2203: NM Image Required Attributes

Reference Rad TF-2: 4.8.4.1.2.2

Nuclear Medicine images

Test 2202 tests the relationship between Image Type (0008, 0008 value 3) and required values as defined in Rad TF-2: Table 4.8-2.

You can follow the steps for test 2201. You do not need to send new images. To run the evaluation script:

```
perl 2203/2203_eval.pl -l <log level>
```

Send the evaluation log (2203/grade_2203.txt) to the Project Manager. Use a log level of 3 or 4 when you run the evaluation script.

8.4 Modality Test 2210: NM Modality STATIC

Reference Rad TF-2: 4.16.4.2.2.3

Test 2210 examines the frames produced by an Acquisition Modality to determine if they are displayable by Image Display actors. All output images are produced in the imgdisp/2210 directory.

1. Start the MESA servers as described in section 1.5.
2. Clear the MESA Image Manager.

```
perl scripts/clear_img_mgr.pl
```
3. Perform an MPPS unscheduled case and produce one or more series of images. The Patient ID should be MESA2210. The patient name should be MESA^NM. These values are not critical to the test.
4. Send one STATIC image to the MESA Image Manager.

For the next steps, the MESA tools will produce a cine image using all of the frames in your multi-frame image. The output image will use the frames in the order stored in your image with no sorting. The purpose is to determine if all frames are present.

5. Instruct the MESA system to produce a Cine image:

```
perl scripts/cine.pl loglevel STATIC 2210/2210cine
```
6. Display the gif file that results (use IE or another browser). Verify that the Static image matches with the frames produced by your system.
7. Create an archive of the 2210 directory (tar/zip) and send to the Project Manager for evaluation. There will be separate instructions for uploading the images (ftp, web upload). Do not email the images.

8.5 Modality Test 2211: NM Modality WHOLEBODY

Reference Rad TF-2: 4.16.4.2.2.3

Test 2211 examines the frames produced by an Acquisition Modality to determine if they are displayable by Image Display actors. All output images are produced in the imgdisp/2211 directory.

1. Start the MESA servers as described in section 1.5.
2. Clear the MESA Image Manager.

```
perl scripts/clear_img_mgr.pl
```
3. Perform an MPPS unscheduled case and produce one or more series of images. The Patient ID should be MESA2211. The patient name should be MESA^NM. These values are not critical to the test.
4. Send one WHOLEBODY image to the MESA Image Manager.

For the next steps, the MESA tools will produce a cine image using all of the frames in your multi-frame image. The output image will use the frames in the order stored in your image with no sorting. The purpose is to determine if all frames are present.

5. Instruct the MESA system to produce a CINE image:

```
perl scripts/cine.pl loglevel "WHOLE BODY"  
2211/2211cine
```
6. Display the gif file that results (use IE or another browser). Verify that the Wholebody image matches the frames produced by your system.
7. Create an archive of the 2211 directory (tar/zip) and send to the Project Manager for evaluation. There will be separate instructions for uploading the images (ftp, web upload). Do not email the images.

8.6 -Modality Test 2212: NM Modality DYNAMIC

Reference Rad TF-2: 4.16.4.2.2.3

Test 2212 examines the frames produced by an Acquisition Modality to determine if they are displayable by Image Display actors. All output images are produced in the mod/2212 directory.

1. Start the MESA servers as described in section 1.5.
2. Clear the MESA Image Manager.

```
perl scripts/clear_img_mgr.pl
```
3. Perform an MPPS unscheduled case and produce one or more series of images. The Patient ID should be MESA2212. The patient name should be MESA^NM. These values are not critical to the test.

4. Send one DYNAMIC image to the MESA Image Manager.

For the next steps, the MESA tools will produce a cine image using all of the frames in your multi-frame image. The output image will use the frames in the order stored in your image with no sorting. The purpose is to determine if all frames are present.

5. Instruct the MESA system to produce a Cine image:

```
perl scripts/cine.pl loglevel DYNAMIC 2212/2212cine
```

This will produce the file 2212/2212cine101.gif. If you have stored more than one DYNAMIC image, multiple GIF files will be produced (102, 103, ...).

6. Display the gif file that results (use IE or another browser). Verify that the Cine image matches the frames produced by your system.

For the remaining steps, you are using the MESA tools to select a subset of the frames in your image to produce an animated display that would be reasonable to show to the end user. For example, one might fix values for Energy Window, Detector and Phase and let the time access vary.

7. For the next steps, you will need to pick single values for Energy Window, Detector and Phase for your dynamic image. The test software does not dictate what values are used for acquisition.
8. For the combinations of Energy Window, Detector and Phase, generate a Cine image using the tools as described below. You do not need to use all combinations of these values, but do generate a reasonable set of representative images. The output file name should indicate the imaging parameters, or should be mappable to the image parameters. Instruct the MESA system to produce a Cine image:

```
perl scripts/cine_dynamic.pl loglevel  
2212/2212cine_001 EnergyWindow Detector Phase 0
```

For example, EnergyWindow = 1, Detector = 2, Phase = 1

```
perl scripts/cine_dynamic.pl 3 2212/2212cine_A 1 2 1 0
```

This will produce the output file 2212/2212cine_A101.gif. If you have stored more than one DYNAMIC image, multiple GIF files will be produced (102, 103, ...). You can repeat the process and produce output files with different names (B, C, ...). It is also helpful to include an abbreviation for your company name in the file name.

9. Display the gif file that results (use IE or another browser). Verify that the image or images produced by selecting Energy Window match those produced by your system.
10. Create an archive of the 2212 directory (tar/zip) and send to the Project Manager for evaluation. There will be separate instructions for uploading the images (ftp, web upload). Do not email the images.

8.7 Modality Test 2213: NM Modality GATED

Reference Rad TF-2: 4.16.4.2.2.3

Test 2213 examines the frames produced by an Acquisition Modality to determine if they are displayable by Image Display actors. All output images are produced in the mod/2213 directory.

1. Start the MESA servers as described in section 1.5.
2. Clear the MESA Image Manager.

```
perl scripts/clear_img_mgr.pl
```

3. Perform an MPPS unscheduled case and produce one or more series of images. The Patient ID should be MESA2213. The patient name should be MESA^NM. These values are not critical to the test.
4. Send one GATED image to the MESA Image Manager.

For the next steps, the MESA tools will produce a cine image using all of the frames in your multi-frame image. The output image will use the frames in the order stored in your image with no sorting. The purpose is to determine if all frames are present.

5. Instruct the MESA system to produce a Cine image:

```
perl scripts/cine.pl loglevel GATED 2213/2213cine
```

This will produce the file 2213/2213cine101.gif. If you have stored more than one GATED image, multiple GIF files will be produced (102, 103, ...).

6. Display the gif file that results (use IE or another browser). Verify that the Cine image matches the frames produced by your system.
7. Create an archive of the 2213 directory (tar/zip) and send to the Project Manager for evaluation. There will be separate instructions for uploading the images (ftp, web upload). Do not email the images.

8.8 Modality Test 2214: NM Modality TOMO

Reference Rad TF-2: 4.16.4.2.2.3

Test 2214 examines the frames produced by an Acquisition Modality to determine if they are displayable by Image Display actors. All output images are produced in the imgdisp/2214 directory.

1. Start the MESA servers as described in section 1.5.
2. Clear the MESA Image Manager.

```
perl scripts/clear_img_mgr.pl
```

3. Perform an MPPS unscheduled case and produce one or more series of images. The Patient ID should be MESA2214. The patient name should be MESA^NM. These values are not critical to the test.
4. Send one TOMO image to the MESA Image Manager.

For the next steps, the MESA tools will produce a cine image using all of the frames in your multi-frame image. The output image will use the frames in the order stored in your image with no sorting. The purpose is to determine if all frames are present.

5. Instruct the MESA system to produce a Cine image:

```
perl scripts/cine.pl loglevel TOMO 2214/2214cine
```

This will produce the file 2214/2214cine101.gif. If you have stored more than one GATED image, multiple GIF files will be produced (102, 103, ...).

6. Display the gif file that results (use IE or another browser). Verify that the Cine image matches the frames produced by your system.
7. Create an archive of the 2214 directory (tar/zip) and send to the Project Manager for evaluation. There will be separate instructions for uploading the images (ftp, web upload). Do not email the images.

8.9 Modality Test 2215: NM Modality GATED TOMO

Reference Rad TF-2: 4.16.4.2.2.3

Test 2215 examines the frames produced by an Acquisition Modality to determine if they are displayable by Image Display actors. All output images are produced in the imgdisp/2215 directory.

1. Start the MESA servers as described in section 1.5.
2. Clear the MESA Image Manager.

```
perl scripts/clear_img_mgr.pl
```

3. Perform an MPPS unscheduled case and produce one or more series of images. The Patient ID should be MESA2215. The patient name should be MESA^NM. These values are not critical to the test.
4. Send one GATED TOMO image to the MESA Image Manager.

For the next steps, the MESA tools will produce a cine image using all of the frames in your multi-frame image. The output image will use the frames in the order stored in your image with no sorting. The purpose is to determine if all frames are present.

5. Instruct the MESA system to produce a Cine image:

```
perl scripts/cine.pl loglevel "GATED TOMO"  
2215/2215cine
```

This will produce the file 2215/2215cine101.gif. If you have stored more than one GATED image, multiple GIF files will be produced (102, 103, ...).

6. Display the gif file that results (use IE or another browser). Verify that the Cine image matches the frames produced by your system.
7. Create an archive of the 2215 directory (tar/zip) and send to the Project Manager for evaluation. There will be separate instructions for uploading the images (ftp, web upload). Do not email the images.

8.10 Modality Test 2216: NM Modality RECON TOMO

Reference Rad TF-2: 4.16.4.2.2.3

Test 2216 examines the frames produced by an Acquisition Modality to determine if they are displayable by Image Display actors. All output images are produced in the imgdisp/2216 directory.

1. Start the MESA servers as described in section 1.5.
2. Clear the MESA Image Manager.

```
perl scripts/clear_img_mgr.pl
```

3. Perform an MPPS unscheduled case and produce one or more series of images. The Patient ID should be MESA2216. The patient name should be MESA^NM. These values are not critical to the test.
4. Send one RECON TOMO image to the MESA Image Manager.

For the next steps, the MESA tools will produce a cine image using all of the frames in your multi-frame image. The output image will use the frames in the order stored in your image with no sorting. The purpose is to determine if all frames are present.

5. Instruct the MESA system to produce a Cine image:

```
perl scripts/cine.pl loglevel "RECON TOMO"  
2216/2216cine
```

This will produce the file 2216/2216cine101.gif. If you have stored more than one GATED image, multiple GIF files will be produced (102, 103, ...).

6. Display the gif file that results (use IE or another browser). Verify that the Cine image matches the frames produced by your system.
7. Create an archive of the 2216 directory (tar/zip) and send to the Project Manager for evaluation. There will be separate instructions for uploading the images (ftp, web upload). Do not email the images.

8.11 Modality Test 2217: NM Modality RECON GATED TOMO

Reference Rad TF-2: 4.16.4.2.2.3

Test 2217 examines the frames produced by an Acquisition Modality to determine if they are displayable by Image Display actors. All output images are produced in the imgdisp/2217 directory.

1. Start the MESA servers as described in section 1.5.
2. Clear the MESA Image Manager.

```
perl scripts/clear_img_mgr.pl
```

3. Perform an MPPS unscheduled case and produce one or more series of images. The Patient ID should be MESA2217. The patient name should be MESA^NM. These values are not critical to the test.
4. Send one GATED RECON TOMO image to the MESA Image Manager.

For the next steps, the MESA tools will produce a cine image using all of the frames in your multi-frame image. The output image will use the frames in the order stored in your image with no sorting. The purpose is to determine if all frames are present.

5. Instruct the MESA system to produce a Cine image:

```
perl scripts/cine.pl loglevel "RECON GATED TOMO"  
2217/2217cine
```

This will produce the file 2217/2217cine101.gif. If you have stored more than one GATED image, multiple GIF files will be produced (102, 103, ...).

6. Display the gif file that results (use IE or another browser). Verify that the Cine image matches the frames produced by your system.
7. Create an archive of the 2217 directory (tar/zip) and send to the Project Manager for evaluation. There will be separate instructions for uploading the images (ftp, web upload). Do not email the images.

9 Cardiology Echo Modality Tests

9.1 Modality Test 20403: Stress Echo Option

This test is for Acquisition Modalities which have implemented the Stress Echo Option of the Echocardiography Workflow. In this test, you use the MESA tools to collect images and then send those images to the Project Manager to manually verify the DICOM headers and verify the Stress Echo data attributes. Please see the IHE Year 1 CARD 2:4.2.3 of the Cardiology Technical Framework for the attribute definitions. This test verifies that the data attributes are present and that defined codes and values are used, but cannot check that the defined attributes are accurate (ie., that a “Parasternal short axis at the aortic valve level” is in fact what was imaged). That exercise is left to the vendors to test internally.

1. Start the MESA servers as described in section 1.5.
2. Clear the MESA Image Manager. (if necessary)

```
perl scripts/clear_img_mgr.pl
```
3. Use any patient demographics desired.
4. Send the appropriate images to the MESA Image Manager.

Locate the images stored by the MESA Image Manager. These are in `$MESA_STORAGE/instances`. Tar or zip these files and send them to the Project Manager.

9.2 Modality Test 20404: Echo Image Sets

In this “test”, you use the MESA tools to collect images and then send those images to the Project Manager for distribution to other vendors. Please note the following:

- These are the images that may be used in the demonstration. That is, they should be of reasonable clinical quality.
- Note that these images **MUST NOT** contain real patient demographics.
- Note that these image sets will be distributed to other vendors.

The MWL entries should have the codes used for the demonstration, but these are not available with this release. Use any MWL entry and codes.

1. Start the MESA servers as described in section 1.5.
2. Clear the MESA Image Manager.

```
perl scripts/clear_img_mgr.pl
```
3. Send the appropriate images to the MESA Image Manager.
4. Locate the images stored by the MESA Image Manager. These are in `$MESA_STORAGE/instances`. Tar or zip these files and send them to the Project Manager.

5. Repeat this test for EVERY SOP class which your product supports from the SOP class table in CARD-TF 2:4.2.2 (Table 4.2-5. Echocardiography SOP Classes).

Note that if the Stress Echo Option of CARD-2 is supported that the attributes identified in CARD-2 must be included.

10 Cardiology Cath Modality Tests

10.1 Modality Test 20405: Cath Image Sets

In this “test”, you use the MESA tools to collect images and then send those images to the Project Manager for distribution to other vendors. Please note the following:

- These are the images that may be used in the demonstration. That is, they should be of reasonable clinical quality.
- Note that these images MUST NOT contain real patient demographics.
- Note that these image sets will be distributed to other vendors.

The MWL entries should have the codes used for the demonstration, but these are not available with this release. Use any MWL entry and codes.

1. Start the MESA servers as described in section 1.5.
2. Clear the MESA Image Manager.

```
perl scripts/clear_img_mgr.pl
```

3. Send the appropriate images to the MESA Image Manager.
4. Locate the images stored by the MESA Image Manager. These are in \$MESA_STORAGE/instances. Tar or zip these files and send them to the Project Manager.
5. Repeat this test for EVERY SOP class which your product supports from the SOP class table in CARD-TF 2:4.2.1 (Table 4.2-1. Cardiac Cath SOP Classes).