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**HIMSS and RSNA**  
**Integrating the Healthcare Enterprise**

**IHE/MESA Report Reader Tests**

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# 1 Report Reader Tests

## 1.1 Introduction

Report Reader systems are tested in three areas.

1. Each Report Reader will be asked to send queries (DICOM C-Find, DICOM C-Move) to a MESA Report Repository. These queries are analyzed for correctness according to the DICOM Standard.
2. Each Report Repository will be asked to query by specific attributes (e.g. Accession Number as a matching key) as defined in section 6.14 of the IHE Technical Framework: Year 3.
3. Each Report Repository will be asked to render a set of SR objects and send a copy of the display to the Technical Project Manager (email, mail, fax).

### 1.1.1 Integration Profiles and Test Procedures

This document lists a number of tests for Report Reader 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

Report Readers may make queries using a number of attributes. The tests defined in this document will request queries by specific attributes listed in the table below. It is expected that the Report Reader software will contain other attributes as well; the tests require only that some attributes are present.

The tests also allow you to perform multiple queries to cover all of the requested attributes. That is, we list a number of attributes in the table below and do not expect your system to use all of these attributes as matching keys in a single query.

**Matching Key Attributes for Report Readers**

<b>Attribute Name</b>	<b>Tag</b>
Study Date	0008 0020
Accession Number	0008 0050
Patient Name	0010 0010
Patient ID	0010 0020
Modalities in Study	0008 0061

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### 1.3 Message Values

Tests described in section 2 will require specific values in the matching keys. These are defined in tables in section 2.

### 1.4 Configuration

The MESA Image Manager and MESA Report Repository each maintain a database of DICOM applications used for C-Move operations. Add an entry for the storage SCP associated with your workstation. Edit the text file `$MESA_TARGET/db/loaddicomapp.pgsql` (Unix) or `$MESA_TARGET/db/loaddicomapp.sql` (Windows NT) Use the existing entries as a template and add entries for your workstations as appropriate. The column names found in the SQL insert statements are described in the following table.

Column Name	Description
aet	DICOM Application Entity Title. Must be unique.
host	Host name (or IP address) of the application.
port	TCP/IP port number for receiving associations.
org	The organization that operates the device. Useful if multiple organizations use the Image Manager.
com	A comment field.

You can test your work as follows:

```
perl load_apps.pl imgmgr
perl load_apps.pl rpt_repos
```

The files `$MESA_TARGET/runtime/rpt_repos/ds_dcm.cfg` and `$MESA_TARGET/runtime/imgmgr/ds_dcm.cfg` are used to configure the MESA Report Repository and MESA Image Manager (separately). 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.

Application	AE Title	Port
MESA Report Repository	REPORT_ARCHIVE	2800
MESA Image Manager	MESA_IMG_MGR	2350

Read the *Runtime Notes* section of the *Installation Guide* to determine the proper settings for the MESA runtime environment.

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## 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 Report Repository and MESAImage Manager servers. Make sure the appropriate database is running (PostgreSQL, SQL Server). To start the MESA servers:

1. Enter the Report Reader exam folder: *mesa\_tests/rad/actors/rpt\_reader*.
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/imgmgr/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 Loading Test Data

The Report Reader tests use a common set of Image and SR objects. Report Readers that are not image displays may ignore the Image objects. You may load these objects into the MESA servers one time before any of the tests are started. After you start the MESA servers as described in section 1.5, load the test data:

```
perl 90x/load_90x.pl
```

This script loads images into the MESA Image Manager and SR objects into the MESA Report Repository.

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## 2 Individual Tests

### 2.1 Report Reader Test 901: SR SCU Query Keys

In this test, the Report Reader is required to query the MESA Report Repository using specific matching keys. For each matching key and value in the table below, direct the Report Reader to make one or more queries of the MESA Report Repository. Repeat or multiple queries are allowed. That is, you might choose to query several times with a certain matching key. We do not expect the Report Repository to send individual queries with multiple matching keys (Patient Name and Patient ID), but the test software will allow that.

Attribute Name	Tag	Matching Key Value
Study Date	0008 0020	19950126
Accession Number	0008 0050	2001B20
Patient Name	0010 0010	CRTHREE*
Patient ID	0010 0020	CR3
Modalities in Study	0008 0061	MR

1. Create/modify the SQL script to identify the Report Reader under test.
2. Start the MESA servers as described in section 1.5 above.
3. Load the data sets into the MESA Report Repository as described in section 1.6 above.
4. Send at least one DICOM Study Level C-Find request (Study Root model) to the MESA Report Repository for each attribute/matching key value defined in the table above.
5. Run the evaluation script to verify that each attribute was requested in a query.

```
perl 901/eval_901.pl <AE Title of Report Reader>
```

Results will be found in the file *901/grade\_901.txt*. If you need to clear the existing queries to run the test again, you can restart at step 3 or run this script:

```
perl scripts/clear_queries.pl
```

---

## 2.2 Report Reader Test 902: SCU Query Evaluation

This test uses the queries sent by the Report Reader during Test 901 and any other queries you want to evaluate. This test examines all queries sent by the Report Reader to determine if they are legal DICOM queries.

After you conclude Test 901, the MESA Report Repository will still have a record of the queries sent by your Report Reader. If you want to send more queries to the Report Repository, you may do so. There are no required queries. You might want to send queries at the Series and SOP Instance level.

Evaluate the Report Reader queries as follows:

```
perl 902/eval_902.pl <AE Title of Report Reader>
```

Query results are stored in the file *902/grade\_902.txt*.

As above, you can clear the queries stored by the MESA Report Repository as follows:

```
perl scripts/clear_rpt_repos_queries.pl
```

## 2.3 Report Reader Test 601: Simple Image Report

1. Create/modify the SQL script to identify the Report Reader under test.
2. Start the MESA servers as described in section 1.5 above.
3. Load the data sets into the MESA Report Repository as described in section 1.6 above.
4. Retrieve the SR for patient CRTHREE^PAUL. This report will have 0 image references. Render the report and send a copy of the rendered report to the Project Manager.

## 2.4 Report Reader Test 602: Simple Image Report with One Reference

1. Create/modify the SQL script to identify the Report Reader under test.
  2. Start the MESA servers as described in section 1.5 above.
  3. Load the data sets into the MESA Report Repository as described in section 1.6 above.
  4. Retrieve the SR for patient CTFIVE^JIM. This report will have 1 image reference to an image stored on the MESA Image Manager. You may retrieve and display that image if your application supports that feature. If you do not display images, you need to at least indicate there is a reference to an image.
  5. Render the report and send a copy of the rendered report to the Project Manager.
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## **2.5 Report Reader Test 603: Simple Image Report with Two References**

1. Create/modify the SQL script to identify the Report Reader under test.
2. Start the MESA servers as described in section 1.5 above.
3. Load the data sets into the MESA Report Repository as described in section 1.6 above.
4. Retrieve the SR for patient MRTHREE^STEVE. This report will have 2 references to images stored on the MESA Image Manager. You may retrieve and display those images if your application supports that feature. If you do not display images, you need to at least indicate there is a reference to an image.
5. Render the report and send a copy of the rendered report to the Project Manager.

## **2.6 Report Reader Test 611: Numeric Report**

1. Create/modify the SQL script to identify the Report Reader under test.
  2. Start the MESA servers as described in section 1.5 above.
  3. Load the data sets into the MESA Report Repository as described in section 1.6 above.
  4. Retrieve the SR for patient CRTEN^GEORGE. This report has a measurement of the length of the patient's left leg.
  5. Render the report and send a copy of the rendered report to the Project Manager.
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### 3 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.

#### 3.1 Report Reader Test 1511: Simple Imaging Report

Report Reader Test 1511 uses the same structure as test 601. The Report Reader 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 Report Reader. 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 Report Reader.

Identifier	Description	Source	Destination
1511.022	DICOM-instances-used	Report Reader	Audit Record Repos

1. Create/modify the SQL script to identify the Report Reader under test. This may be different from the step for test 601 for your secure node.
  2. Start the secure MESA servers as instructed in section 1.5.
  3. Load the data sets into the MESA Report Repository:  

```
perl 90x/load_90x_secure.pl
```
  4. Clear the MESA Audit Record Repository:  

```
perl scripts/clear_audit.pl
```
  5. Retrieve the SR for patient CRTHREE^PAUL. This report will have 0 image references. Render the report and send a copy of the rendered report to the Project Manager.
  6. Evaluate the Audit Records produced by your system:  

```
perl 1511/eval_1511.pl
```
  7. Grab all of the files (tar/zip) in `$MESA_TARGET/logs/syslog` and send these to the Project Manager.
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5. Create/modify the SQL script to identify the Report Reader under test.
  6. Start the MESA servers as described in section 1.5 above.
  7. Load the data sets into the MESA Report Repository as described in section 1.6 above.
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Retrieve the SR for patient CRTHREE^PAUL. This report will have 0 image references.  
Render the report and send a copy of the rendered report to the Project Manager.

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## **4 Test Cases: PDI**

These test cases are generally associated with the Radiology PDI profile

### **4.1 Test Case 1931: Media “Reader” Read RSNA 2004 CD**

The purpose of this test is for the Display actor to open the DICOMDIR file on the RSNA 2004 CD and render the images and other composite objects on the CD.

#### **4.1.1 References**

RAD TF

#### **4.1.2 Instructions**

To run this test, follow these steps:

1. Obtain the RSNA 2004 PDI Demonstration CD. If you do not have a physical copy of the CD, download the ISO image of the CD from the MESA distribution page and create a CD from the ISO image.
2. Obtain the text file RSNA2004CD.txt from the MESA documentation page. This file will list all of the vendor studies on the RSNA CD.
3. Use your DICOM application to open the DICOMDIR file on the RSNA CD.
4. Select and display all of the studies on the CD. For those studies with multiple images, you can select a small subset of the images.
5. For each set of vendor data, modify the file RSNA2004CD.doc to indicate if you can successfully render the data. Questions are Yes/No. You can add comments at the bottom of the file.

#### **4.1.3 Evaluation**

1. Submit the modified text file to the Project Manager.
2. If there are problems with rendering, submit a screen capture demonstrating the problem and/or submit additional documentation in the RSNA2004CD.doc file.

### **4.2 Test Case 1932: Media “Reader” Reads Vendor CDs**

The purpose of this test is for the Display actor to open the DICOMDIR file on CDs provided by vendors for the RSNA 2004 PDI demonstration and to render the composite objects on those CDs.

#### **4.2.1 References**

RAD TF

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#### **4.2.2 Instructions**

To run this test, follow these steps:

1. Obtain the vendor CDs from the RSNA 2004 PDI Demonstration. If you do not have a physical copy of the CDs, download the ISO images from the MESA distribution page and create a CD from the ISO image.
2. Obtain the text file VENDOR2004CD.doc from the MESA documentation page. This file will list all of the vendor CDs.
3. Use your DICOM application to open the DICOMDIR file on each vendor CD.
4. Select and display all of the studies on the CD. For those studies with multiple images, you can select a small subset of the images.
5. For each set of vendor data, modify the file VENDOR2004CD.doc to indicate if you can successfully render the data. Questions are Yes/No. You can add comments at the bottom of the file.

#### **4.2.3 Evaluation**

1. Submit the modified text file to the Project Manager.
  2. If there are problems with rendering, submit a screen capture demonstrating the problem and/or submit additional documentation in the VENDOR2004CD.doc file.
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