



# **Radiology Module with DCM4CHEE**

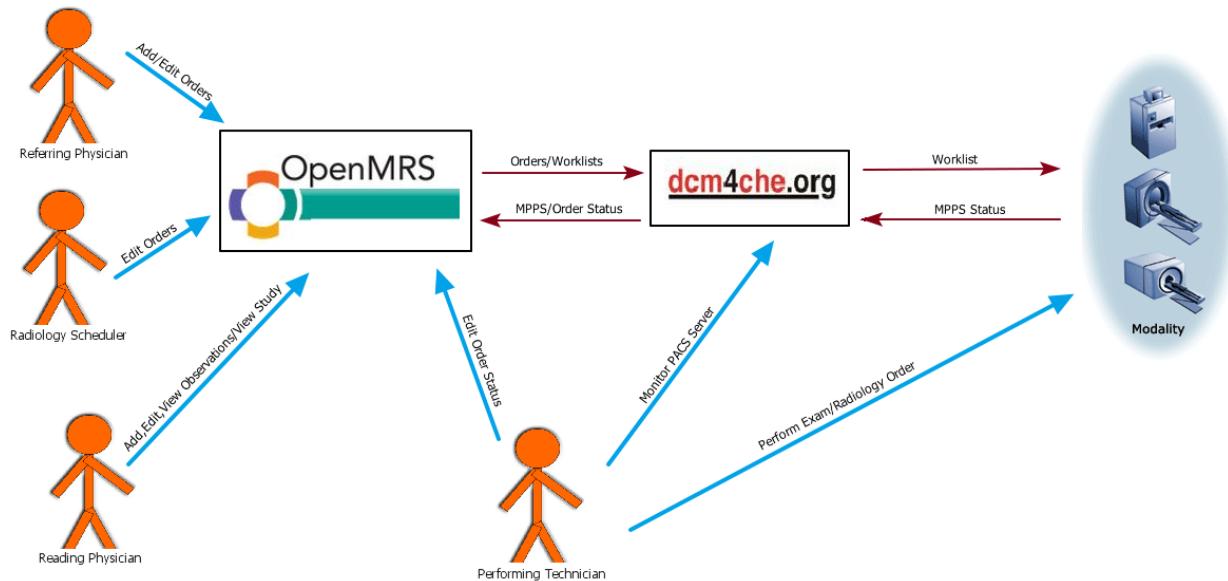
## **User Guide**

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## Overview



The radiology workflow contains a number of users, each with their own dedicated tasks and interactions with specified parts of the system:

- Physicians have the ability to add/edit radiology orders and view studies/images from completed orders while diagnosing a patient.
- Orders can be scheduled at an appropriate by time personnel in charge of allocating orders.
- Radiologists/Specialists can view the study to evaluate the image and provide their diagnoses.
- The orders are stored in dcm4chee as modality worklists via HL7 and can be retrieved by modalities by requesting them from dcm4chee.
- The status of the order being performed will be updated in dcm4chee and in turn OpenMRS during each phase of the procedure.
- The images will be stored in dcm4chee within their appropriate study details which can be viewed using DICOM image viewers such as Oviyam 2.0 and Weasis.
- Physicians interact with only OpenMRS.
- Hospital personnel who manage scheduling, resource allocation interact with OpenMRS and dcm4chee.
- Lab technicians control their station and its corresponding modalities while needing to access dcm4chee and OpenMRS only if there are irregularities in communication between the various systems.

## Notes

- Run DCM4CHEE, OpenMRS and the DVTK Modality Emulator.
- **NOTE:** The modality emulator runs only on Windows.
- **NOTE:** If the module has trouble starting up due to port errors or java socket problems.
  - **Start Tomcat or Jetty with the following parameters.**  
`-Djava.net.preferIPv4Stack=true`
- Google Chrome is preferred browser for viewing images via Oviyam.
- Java Web Start is necessary to launch Weasis from the browser.

## Manage Radiology Orders

- Go to OpenMRS → Administration → Manage Radiology Orders.
- Radiology Orders can be added directly from this screen.
- All radiology orders are listed chronologically by default with options to rearrange the table in ascending/descending order based on any column in the table.
- Search for specific orders based on patient or range of dates as to when order was scheduled to take place.
- Hide certain columns in the table that are not necessary.
- Click on the corresponding entry number in the ‘Edit’ column to view and edit order details.
  - Ability to edit depends on user permissions and privileges.
  - If a reading physician views the order, it redirects to the order’s observation form page.

## OpenMRS Radiology Module

The screenshot shows the 'Manage Radiology Orders' page in the OpenMRS application. At the top, there is a navigation bar with links for Home, Find/Create Patient, Dictionary, and Administration. A message indicates the user is currently logged in as Super User. Below the navigation is a sub-navigation bar with Admin and Manage Radiology Orders.

The main content area is titled 'Manage Radiology Orders' and features a 'Worklist' table. The table has columns for Edit, Patient Id, Patient Full Name, Priority, Referring Physician, Scheduler, Performing Technician, Reading Physician, Order Start Date, Modality, Status, Instructions, DCM4CHEE Modality, and Worklist Sync Status. There are 20 entries displayed, with rows 1, 2, and 3 highlighted by a red border. Row 1 shows an order for Mr. Horatio L Hornblower Esq. with STAT priority, scheduled for Akhil Ravindran on 2013-10-29 at Ultrasound. Row 2 shows an order for Mr. Horatio L Hornblower Esq. with HIGH priority, scheduled for Akhil Ravindran on 2013-11-18 at Computed Radiography. Row 3 shows an order for Mr. John D Patient with STAT priority, scheduled for Super User on 2013-11-22 at Magnetic Resonance.

Edit	Patient Id	Patient Full Name	Priority	Referring Physician	Scheduler	Performing Technician	Reading Physician	Order Start Date	Modality	Status	Instructions	DCM4CHEE Modality	Worklist Sync Status
1	101-6	Mr. Horatio L Hornblower Esq.	STAT	Super User	Super User	Super User	Akhil Ravindran	2013-10-29 00:00:00.0	Ultrasound	SCHEDULED COMPLETED	testing again	In Sync : Save order successful.	
2	101-6	Mr. Horatio L Hornblower Esq.	HIGH	Super User	Super User	Super User	Akhil Ravindran	2013-11-18 00:00:00.0	Computed Radiography	SCHEDULED IN PROGRESS	Testing_2	Out of Sync : Void order failed. Try again!	
3	100-8	Mr. John D Patient	STAT	Super User	Super User	Super User	Super User	2013-11-22 00:00:00.0	Magnetic Resonance	SCHEDULED IN PROGRESS	asdfg	In Sync : Save order successful.	

At the bottom of the page, there are links for English (United States) | English (United Kingdom), Last Build: 2013-12-02 14:00, Version: 1.9.3 Build f525e9, and Powered by OpenMRS.

## Patient Dashboard – View Radiology Section

- Goto OpenMRS → Find Patient → Patient Dashboard (for specific patient) → Radiology
- It will list the radiology order history for that respective patient.
- Radiology orders can be added from this screen which will redirect you to the add radiology order form.
- Every orders observation and their corresponding images/studies can be viewed from this interface.
- If an order is completed, observations can be added provided the logged in user has privileges.

## OpenMRS Radiology Module

Screenshot of the OpenMRS Patient Dashboard showing the Radiology tab selected.

**Mr. John D Patient**

OpenMRS Identification Number: **100-8**  
Old Identification Number: 100

BMI: ? ( Weight: 100.0 kg , Height: ) CD4: 22.0 | Regimen:

Overview | Regimens | Visits | Demographics | Graphs | **Radiology**

Add Radiology Order

Patient Radiology Orders

No Radiology Orders Present.

English (United States) | English (United Kingdom) Last Build: 2013-12-02 14:00 Version: 1.9.3 Build f535e9

Powered by OpenMRS

Screenshot of the OpenMRS Patient Dashboard showing the Radiology tab selected, with a red box highlighting the "1" in the row count of the table.

**Mr. John D Patient**

OpenMRS Identification Number: **100-8**  
Old Identification Number: 100

BMI: ? ( Weight: 100.0 kg , Height: ) CD4: 22.0 | Regimen:

Overview | Regimens | Visits | Demographics | Graphs | Radiology

Add Radiology Order

Patient Radiology Orders

Show	20	entries	Search:	Show/Hide Columns									
View Obs.	Priority	Referring Physician	Scheduler	Performing Technician	Reading Physician	Order Start Date	Modality	Status	Instructions	Sample Order			
1	STAT	Referring Physician	Scheduling Physician	Performing Technician	Reading Physician	2013-12-03 00:00:00.0	Computed Tomography	SCHEDULED	Unknown	<a href="#">Sample Order</a>			

Viewing 1 - 1 of 1

first Previous [1](#) Next last

English (United States) | English (United Kingdom) Last Build: 2013-12-02 14:00 Version: 1.9.3 Build f535e9

Powered by OpenMRS

## OpenMRS Radiology Module

Screenshot of the OpenMRS Patient Dashboard showing the Radiology : Order Observations section for Mr. John D Patient.

**Mr. John D Patient**  
38 yrs ( 01-Jan-1975 )

OpenMRS Identification Number: **100-8**  
Old Identification Number: 100

**Radiology : Order Observations**

Person : Mr. John D Patient  
Order : 60

No Radiology Observations Present.

Show	20	entries	Search:	Show/Hide Columns								
View Obs.	Priority	Referring Physician	Scheduler	Performing Technician	Reading Physician	Order Start Date	Modality	Status	Instructions			
1	STAT	Referring Physician	Scheduling Physician	Performing Technician	Reading Physician	2013-12-03 00:00:00.0	Computed Tomography	SCHEDULED Unknown	Sample Order			

Viewing 1 - 1 of 1

Screenshot of the OpenMRS Patient Dashboard showing the Radiology : Order Observations section for Mr. John D Patient.

**Mr. John D Patient**  
38 yrs ( 01-Jan-1975 )

OpenMRS Identification Number: **100-8**  
Old Identification Number: 100

BMI: ? ( Weight: 100.0 kg , Height: ) CD4: 22.0 | Regimen:

**Radiology**

Add Radiology Order

Patient Radiology Orders

Show	20	entries	Search:	Show/Hide Columns								
View Obs.	Priority	Referring Physician	Scheduler	Performing Technician	Reading Physician	Order Start Date	Modality	Status	Instructions			
1	STAT	Referring Physician	Scheduling Physician	Performing Technician	Reading Physician	2013-12-03 00:00:00.0	Computed Tomography	COMPLETED	Sample Order			

Viewing 1 - 1 of 1

## OpenMRS Radiology Module

Screenshot of the OpenMRS Patient Dashboard showing the Radiology module interface.

**Header:** OpenMRS - Patient Dashb | DCM4CHEE DICOM Arch | localhost:8080/openmrs/patientDashboard.form?patientId=3&phrase=john

- Mr. John D Patient
- 38 yrs ( 01-Jan-1975 )
- BMI: ? ( Weight: 100.0 kg , Height: ) CD4: 22.0 | Regimen:

- OpenMRS Identification Number: **100-8**
- Old Identification Number: 100

- Overview | Regimens | Visits | Demographics | Graphs | Radiology

Mr. John D Patient

60

View Study

Redirects to Add/Edit Observations Page

ID	Reading Physician	Location	Observation Date	Question Concept	Value	Comment
102	Reading Physician	Unknown Location	2013-12-03 00:00:00.0	REVIEW OF SYSTEMS, CARDIOPULMONARY	<a href="#">View</a>	Sample Observation

Screenshot of the OpenMRS Patient Dashboard showing the Radiology module interface.

OpenMRS - Patient Dashb | DCM4CHEE DICOM Arch | localhost:8080/openmrs/patientDashboard.form?patientId=3&phrase=john

- Mr. John D Patient
- 38 yrs ( 01-Jan-1975 )
- BMI: ? ( Weight: 100.0 kg , Height: ) CD4: 22.0 | Regimen:

- OpenMRS Identification Number: **100-8**
- Old Identification Number: 100

- Overview | Regimens | Visits | Demographics | Graphs | Radiology

Mr. John D Patient

60

View Study

ID	Reading Physician	Location	Observation Date	Question Concept	Value	Comment
102	Reading Physician	Unknown Location	2013-12-03 00:00:00.0	REVIEW OF SYSTEMS, CARDIOPULMONARY	<a href="#">View</a>	Sample Observation

<b>ID:</b> 102
<b>Encounter:</b> None
<b>Location:</b> Unknown Location
<b>Observation Date:</b> 03-Dec-2013
<b>Question Concept:</b> REVIEW OF SYSTEMS, CARDIOPULMONARY
<b>Value:</b> SHORTNESS OF BREATH
<b>Comment:</b> Sample Observation
<b>Created By:</b> Reading Physician - 03-Dec-2013

## Roles Perspective

### Administrator/Super User

- Has the ability to change/edit all the fields related to a Radiology Order and Study along with the ability to add a new order which is complete. The Super User can also add observations to the order but by going through Patient Dashboard to view the order's observations. An order can be added from Patient Dashboard as well.

The screenshot shows a web browser window for the OpenMRS Radiology Order form. The URL is [localhost:8080/openmrs/module/radiology/radiologyOrder.form](http://localhost:8080/openmrs/module/radiology/radiologyOrder.form). The page title is "Admin | Manage Radiology Orders". The main section is titled "Order" and contains various input fields:

Patient	<input type="text"/> Enter patient name or <a href="#">More Information</a>
Related Concept	<input type="text"/> Enter concept name or <a href="#">(Optional)</a>
Priority	<input type="button" value="Select"/>
Scheduled status	<input type="button" value="Select"/>
Performed status	<input type="button" value="Select"/>
Modality	<input type="button" value="Computed Radiography"/>
Instructions	<input type="text"/>
Related Encounter	<input type="text"/> Enter encounter id, patient name or id <a href="#">(Optional)</a>
Orderer	<input type="text"/> Enter user name <small>(Default value is logged in User)</small>
Start date	<input type="text"/> dd/mm/yyyy
Auto-expire date	<input type="text"/> dd/mm/yyyy
Scheduler	<input type="text"/> Enter user name
Performing Technician	<input type="text"/> Enter user name
Reading Physician	<input type="text"/> Enter user name

At the bottom left is a  button. At the top right, it says "Currently logged in as Super User" with links to Log out, My Profile, and Help. The bottom of the page includes links for English (United States) and English (United Kingdom), last build information, and a Powered by OpenMRS logo.

## OpenMRS Radiology Module

**OpenMRS**

Currently logged in as Super User | [Log out](#) | [My Profile](#) | [Help](#)

Home | Find/Create Patient | Dictionary | Administration

Admin | Manage Radiology Orders

**Order**

Patient	John D Patient <a href="#">More Information</a>
Related Concept	FRACTURE (Optional)
Priority	STAT
Scheduled status	SCHEDULED
Performed status	Select
Modality	Computed Tomography
Instructions	Sample Order
Related Encounter	Enter encounter id, patient name or id (Optional)
Orderer	Referring Physician (Default value is logged in User)
Start date	03/12/2013 (dd/mm/yyyy)
Auto-expire date	04/12/2013 (dd/mm/yyyy)
Scheduler	Scheduling Physician
Performing Technician	Performing Technician
Reading Physician	Reading Physician
Created By	Scheduling Physician - 03 December 2013 14:03:52 PST

[Save Order](#)

Discontinued date  (dd/mm/yyyy)  
 Reason discontinued  Enter Concept for discontinuing order  
[Discontinue this Order](#)

Void Reason  [Void this Order](#)

↑  
Text Input

English (United States) | English (United Kingdom) Last Build: 2013-12-02 14:00 Version: 1.9.3 Build f535e9 Powered by OpenMRS

OpenMRS DCM4CHEE DICOM Arch localhost:8080/openmrs/module/radiology/radiologyObs.form?orderId=30&obsId=

Apps The Official Website... Official Site of the Pr... Soccer news, live sc... Sky Sports | Football... Latest Football New... Arsenal Mania - The... Facebook | Home Getting Started with ... Other bookmarks

Currently logged in as Super User | [Log out](#) | [My Profile](#) | [Help](#)

**OpenMRS**

Home | Find/Create Patient | Dictionary | Administration

Admin | Manage Radiology Orders

**Previous Observations**

Id	Reading Physician	Location	Observation Date	Question Concept	Value	Comment
72	Akhil Ravindran	Unknown Location	2013-11-14 00:00:00.0	CHILDS CURRENT HIV STATUS	<a href="#">View</a>	edit2
78	Akhil Ravindran	Unknown Location	2013-11-20 00:00:00.0	CHILDS CURRENT HIV STATUS	<a href="#">View</a>	edit3
81	Akhil Ravindran	Unknown Location	2013-11-14 00:00:00.0	CHILDS CURRENT HIV STATUS	<a href="#">View</a>	edit4
84	Akhil Ravindran	Unknown Location	2013-11-14 00:00:00.0	CHILDS CURRENT HIV STATUS	<a href="#">View</a>	addnew
85	Akhil Ravindran	Unknown Location	2013-11-14 00:00:00.0	CHILDS CURRENT HIV STATUS	<a href="#">View</a>	ZXcvxvbnmnb
87	Akhil Ravindran	Unknown Location	2013-11-14 00:00:00.0	CHILDS CURRENT HIV STATUS	<a href="#">View</a>	qwerty'12
88	Akhil Ravindran	Unknown Location	2013-11-14 00:00:00.0	CHILDS CURRENT HIV STATUS	<a href="#">View</a>	edit 3344
93	Akhil Ravindran	Unknown Location	2013-11-15 00:00:00.0	CHILDS CURRENT HIV STATUS	<a href="#">View</a>	qweqe
94	Akhil Ravindran	Unknown Location	2013-11-15 00:00:00.0	CHILDS CURRENT HIV STATUS	<a href="#">View</a>	test different user
96	abc zyx	Unknown Location	2013-11-19 00:00:00.0	CHILDS CURRENT HIV STATUS	<a href="#">View</a>	

[Add Observation](#)

**Observation**

Person	Horatio L Hornblower <a href="#">More Information</a>
Encounter	Select
Order	30
Location	<input type="text"/>
Observation Date	<input type="text"/> (Format: dd/mm/yyyy)
Question Concept	Select
Comment	<input type="text"/>
Study Results	<a href="#">View Study</a>

[Save Observation](#) [Cancel](#)

## Referring Physician

- Has the ability to add orders with relevant information needed to perform the order from *Manage Radiology Orders or Patient Dashboard*.

The screenshot shows the OpenMRS Patient Dashboard for Mr. John D Patient. The Radiology tab is highlighted with a red border. A red box highlights the "Add Radiology Order" button. The status bar at the bottom indicates "Powered by OpenMRS".

The screenshot shows the Admin | Manage Radiology Orders page. A red arrow points to the "Patient" field, which contains "John D Patient" and a "More Information" link. The "Related Concept" field is set to "FRACTURE". The "Priority" dropdown is set to "Select". The "Modality" dropdown is set to "Computed Tomography". The "Instructions" field contains "Sample Order". The "Save Order" button is visible at the bottom. A red box highlights the "Referring Physician's fields to add Radiology Order" text.

## OpenMRS Radiology Module

The screenshot shows the 'Manage Radiology Orders' page. At the top, there are links for 'Admin' and 'Manage Radiology Orders'. Below that is a 'Worklist' table with columns for Edit, Patient Id, Patient Full Name, Priority, Referring Physician, Scheduler, Performing Technician, Reading Physician, Order Start Date, Modality, Status, Instructions, DCM4CHEE Modality Worklist Sync Status, and a 'Show/Hide Columns' button.

Edit	Patient Id	Patient Full Name	Priority	Referring Physician	Scheduler	Performing Technician	Reading Physician	Order Start Date	Modality	Status	Instructions	DCM4CHEE Modality Worklist Sync Status
1	101-6	Mr. Horatio L Hornblower Esq.	STAT	Super User	Super User	Super User	Akhil Ravindran	2013-10-29 00:00:00.0	Ultrasound	SCHEDULED COMPLETED	testing again	In Sync : Save order successful.
2	100-8	Mr. John D Patient	STAT	Referring Physician					Computed Tomography	Unknown Unknown	Sample Order	In Sync : Update order successful.

At the bottom left, it says 'Viewing 1 - 2 of 2'. The status bar at the bottom indicates 'English (United States) | English (United Kingdom) Last Build: 2013-12-02 14:00 Version: 1.9.3 Build f535e9' and 'Powered by OpenMRS'.

Note : The below screenshot reflects the order's information in the *Patient Dashboard* after the scheduler has entered scheduling and reading physician information.

The screenshot shows the 'Patient Dashboard' for 'Mr. John D Patient'. At the top, it displays the patient's name, age (38 yrs), and ID (100-8). Below that is a navigation bar with tabs for Overview, Regimens, Visits, Demographics, Graphs, and Radiology. The Radiology tab is selected.

The 'Patient Radiology Orders' section shows a table with columns for View Obs., Priority, Referring Physician, Scheduler, Performing Technician, Reading Physician, Order Start Date, Modality, Status, and Instructions. A red box highlights the 'View Obs.' column header. The table contains one row of data:

View Obs.	Priority	Referring Physician	Scheduler	Performing Technician	Reading Physician	Order Start Date	Modality	Status	Instructions
1	STAT	Referring Physician	Scheduling Physician	Performing Technician	Reading Physician	2013-12-03 00:00:00.0	Computed Tomography	SCHEDULED Unknown	Sample Order

At the bottom left, it says 'Viewing 1 - 1 of 1'. A red arrow points from the 'View Obs.' column header in the first screenshot to the 'Viewing 1 - 1 of 1' text here. The status bar at the bottom indicates 'English (United States) | English (United Kingdom) Last Build: 2013-12-02 14:00 Version: 1.9.3 Build f535e9' and 'Powered by OpenMRS'.

## OpenMRS Radiology Module

The screenshot shows the OpenMRS Patient Dashboard for Mr. John D Patient. The top navigation bar includes links for Home, Find Patient, Dictionary, and Administration. A message at the top right indicates the user is currently logged in as a Referring Physician. The main content area displays a table titled "Radiology : Order Observations" with one entry:

View Obs.	Priority	Referring Physician	Scheduler	Performing Technician	Reading Physician	Order Start Date	Modality	Status	Instructions
1	STAT	Referring Physician	Scheduling Physician	Performing Technician	Reading Physician	2013-12-03 00:00:00.0	Computed Tomography	SCHEDULED Unknown	<a href="#">Sample Order</a>

Below the table, a message states "No Radiology Observations Present." The bottom of the page includes a search bar, pagination controls (first, previous, next, last), and language and build information.

## Radiology Scheduler

- Has the ability to set up a time for the order/exam to take place, update the status of the order and assign the physician(reading physician) to diagnose the results of the radiology order.

## OpenMRS Radiology Module

Screenshot of the OpenMRS Radiology Module - Worklist page:

The page title is "Manage Radiology Orders". It shows a table of radiology orders with columns for Patient ID, Patient Full Name, Priority, Referring Physician, Scheduler, Performing Technician, Reading Physician, Order Start Date, Modality, Status, Instructions, DCM4CHEE Modality, and Worklist Sync Status.

Edit	Patient Id	Patient Full Name	Priority	Referring Physician	Scheduler	Performing Technician	Reading Physician	Order Start Date	Modality	Status	Instructions	DCM4CHEE Modality	Worklist Sync Status
1	101-6	Mr. Horatio L. Hornblower Esq.	STAT	Super User	Super User	Super User	Akhil Ravindran	2013-10-29 00:00:00.0	Ultrasound	SCHEDULED	testing again	In Sync : Save order successful.	
2	100-8	Mr. John D Patient	STAT	Referring Physician					Computed Tomography	Unknown	Sample Order	In Sync : Update order successful.	

Viewing 1 - 2 of 2

Screenshot of the OpenMRS Radiology Module - Order form page:

The page title is "Admin | Manage Radiology Orders". It shows a form for creating a new radiology order. A red callout box points to the "Related Concept" field (FRACTURE) and the "Priority" field (STAT), stating: "Radiology Scheduler's input fields for setting appointment date and Reading/Diagnosing Physician for the exam. Remaining fields are Read Only."

Form fields include:

- Patient: Mr. John D Patient
- Related Concept: FRACTURE (Optional)
- Priority: STAT
- Scheduled status: SCHEDULED
- Modality: Computed Tomograph
- Instructions: Sample Order
- Related Encounter: (Optional)
- Orderer: Referring Physician (Default value is logged in User)
- Start date: 03/12/2013 (dd/mm/yyyy)
- Auto-expire date: 04/12/2013 (dd/mm/yyyy)
- Reading Physician: Reading Physician
- Created By: Referring Physician - 03 December 2013 13:40:30 PST

Buttons: Save Order, Discontinue this Order, Void this Order.

Discontinued date: [ ] (dd/mm/yyyy)  
Reason discontinued: [Enter concept name o]  
[Discontinue this Order]

Void Reason: [ ] [Void this Order]

## OpenMRS Radiology Module

The screenshot shows a web browser window for the OpenMRS Radiology module. The title bar says "OpenMRS" and "DCM4CHEE DICOM Arch". The address bar shows "localhost:8080/openmrs/module/radiology/radiologyOrder.list". The page header includes links for "Home", "Find Patient", "Dictionary", and "Administration". A message at the top says "Order saved". Below it are links for "Admin" and "Manage Radiology Orders", and a link to "Add Radiology Order". The main content area is titled "Manage Radiology Orders" and displays a "Worklist" table. The table has columns for Edit, Patient Id, Patient Full Name, Priority, Referring Physician, Scheduler, Performing Technician, Reading Physician, Order Start Date, Modality, Status, Instructions, and DCM4CHEE Modality Worklist Sync Status. There are 20 entries shown. The first entry is for patient 101-6, Mr. Horatio L Hornblower Esq., STAT priority, Super User referring physician, Super User scheduler, Super User performing technician, Akhil Ravindran reading physician, order start date 2013-10-29 00:00:00.0, Ultrasound modality, SCHEDULED status, testing again instructions, and In Sync : Save order successful sync status. The second entry is for patient 100-8, Mr. John D Patient, STAT priority, Referring Physician referring physician, Scheduling Physician scheduler, Reading Physician performing technician, order start date 2013-12-03 00:00:00.0, Computed Tomography modality, SCHEDULED status, Sample Order instructions, and In Sync : Update order successful sync status. At the bottom of the table, it says "Viewing 1 - 2 of 2". The footer of the page includes links for English (United States) and English (United Kingdom), and a note about the last build date and version.

## Performing Technician

- Has the ability to change the performed status of the order. The performing technician details are reflected in the manage radiology orders table only if the user changes saves the order again after he views it or changes the value of the performed status. This is not necessary under normal operation of the module. The performed status is updated automatically under normal circumstances.

## OpenMRS Radiology Module

OpenMRS DCM4CHEE DICOM Archi localhost:8080/openmrs/module/radiology/radiologyOrder.form?orderId=60

Currently logged in as Performing Technician | Log out | My Profile | Help

**Order**

Patient	Mr. John D Patient
Related Concept	FRACUTURE (Optional)
Priority	STAT
Performed status	IN PROGRESS
Modality	Select IN PROGRESS
Instructions	DISCONTINUED COMPLETED
Related Encounter	(Optional)
Orderer	Referring Physician (Default value is logged in User)
Reading Physician	Reading Physician
Created By	Scheduling Physician - 03 December 2013 13:51:20 PST
<input type="button" value="Save Order"/>	
Discontinued date <input type="text"/> (dd/mm/yyyy) Reason discontinued <input type="text"/> Enter concept name <input type="button" value="Discontinue this Order"/>	
Void Reason <input type="text"/> <input type="button" value="Void this Order"/>	

English (United States) | English (United Kingdom) Last Build: 2013-12-02 14:00 Version: 1.9.3 Build f525e9 Powered by OpenMRS

OpenMRS DCM4CHEE DICOM Archi localhost:8080/openmrs/module/radiology/radiologyOrder.list

Currently logged in as Performing Technician | Log out | My Profile | Help

**Manage Radiology Orders**

Add Radiology Order

**Worklist**

Search:												Clear Results	
Show	20	entries											Show/Hide Columns
Edit	Patient Id	Patient Full Name	Priority	Referring Physician	Scheduler	Performing Technician	Reading Physician	Order Start Date	Modality	Status	Instructions	DCM4CHEE Modality Worklist Sync Status	
1	101-6	Mr. Horatio L Hornblower Esq.	STAT	Super User	Super User	Super User	Akhil Ravindran	2013-10-29 00:00:00.0	Ultrasound	SCHEDULED COMPLETED	<a href="#">testing again</a>	In Sync : Save order successful.	
2	100-8	Mr. John D Patient	STAT	Referring Physician	Scheduling Physician	Performing Technician	Reading Physician	2013-12-03 00:00:00.0	Computed Tomography	SCHEDULED UNKNOWN	<a href="#">Sample Order</a>	In Sync : Update order successful.	

Viewing 1 - 2 of 2

Only on saving order(with or without changing value) the Performing Technician field gets

English (United States) | English (United Kingdom) Last Build: 2013-12-02 14:00 Version: 1.9.3 Build f525e9 Powered by OpenMRS

## Reading Physician

- Has the ability to view the order and its corresponding images and enter observations for that particular study as long as he is assigned to view the study.

The screenshot shows a web browser window for the OpenMRS Radiology module. The title bar reads "OpenMRS DCM4CHEE DICOM Arch..." and the address bar shows "localhost:8080/openmrs/module/radiology/radiologyObs.form?orderId=60&obsid". The page header includes the OpenMRS logo and navigation links: Home, Find Patient, Dictionary, Administration, Admin, and Manage Radiology Orders. A red box highlights the status bar message "Currently logged in as Reading Physician | Log\_out | My Profile | Help". The main content area is titled "Observation" and contains fields for Person (John D Patient), Encounter (Select), Order (60), Location (Select), Observation Date (dd/mm/yyyy), Question Concept (Select), and Comment (text area). At the bottom are "Save Observation" and "Cancel" buttons. The footer includes language and build information: "English (United States) | English (United Kingdom) Last Build: 2013-12-02 14:00 Version: 1.9.3 Build f535e9" and "Powered by OpenMRS".

- Once the order is completed, the reading physician will be able to view the study and correspondingly add, view and edit older observations.

## OpenMRS Radiology Module

**Worklist**

Patient: [Patient ID] Start Date: [Start Date] End Date: [End Date]

Find

Show 20 entries Search:

Obs.	Patient Id	Patient Full Name	Priority	Referring Physician	Scheduler	Performing Technician	Reading Physician	Order Start Date	Modality	Status	Instructions	DCM4CHEE Modality Worklist Sync Status
1	101-6	Mr. Horatio L. Hornblower Esq.	STAT	Super User	Super User	Super User	Akhil Ravindran	2013-10-29 00:00:00.0	Ultrasound	COMPLETED	testing again	In Sync : Save order successful.
2	100-8	Mr. John D Patient	STAT	Referring Physician	Scheduling Physician	Performing Technician	Reading Physician	2013-12-03 00:00:00.0	Computed Tomography	COMPLETED	Sample Order	In Sync : Update order successful.

Showing 1 - 2 of 2

first|Previous|1|Next|last|

**Observation**

Person: John D Patient [More Information](#)

Encounter:

Order: 60

Location:

Observation Date:  (Format: dd/mm/yyyy)

Question Concept:

Comment:

[Study Results](#) [View Study](#)

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## OpenMRS Radiology Module

OpenMRS DCM4CHEE DICOM Archi localhost:8080/openmrs/module/radiology/radiologyObs.form?orderId=60&obsid

The Official Website... Official Site of the Pr... Soccer news, live sc... Sky Sports | Football... Latest Football New... Arsenal Mania - The... Facebook | Home Getting Started with ... Other bookmarks

Currently logged in as Reading Physician | Log out | My Profile | Help

**OpenMRS**

Home | Find Patient | Dictionary | Administration

Admin | Manage Radiology Orders

**Observation**

Person	John D Patient	More Information
Encounter	Select	
Order	60	
Location	Unknown Location	
Observation Date	03/12/2013	(Format: dd/mm/yyyy)
Question Concept	REVIEW OF SYSTEMS, CARDIOPULMONARY	<a href="#">Change</a>
Question which ascertains number of symptoms related to the cardiopulmonary system.		
Value	SHORTNESS OF BREATH	Select
Sensation of being out of breath.		
Comment	Sample Observation	
Study Results	<a href="#">View Study</a>	

[Save Observation](#) [Cancel](#)

Reading Physicians inputs fields to add observation.  
Question concept with Answer necessary to complete Observation.  
Click on Order number to view order information.  
Click on View Study to launch Oviyam/Weasis

English (United States) | English (United Kingdom) Last Build: 2013-12-02 14:00 Version: 1.9.3 Build f535e9 Powered by OpenMRS

OpenMRS DCM4CHEE DICOM Archi localhost:8080/openmrs/module/radiology/radiologyObs.form?orderId=60&obsid

The Official Website... Official Site of the Pr... Soccer news, live sc... Sky Sports | Football... Latest Football New... Arsenal Mania - The... Facebook | Home Getting Started with ... Other bookmarks

Currently logged in as Reading Physician | Log out | My Profile | Help

**OpenMRS**

Home | Find Patient | Dictionary | Administration

Admin | Manage Radiology Orders

**Previous Observations**

Id	Reading Physician	Location	Observation Date	Question Concept	Value	Comment
102	Reading Physician	Unknown Location	2013-12-03 00:00:00.0	REVIEW OF SYSTEMS, CARDIOPULMONARY	<a href="#">View</a>	Sample Observation

[Add Observation](#)

**Observation**

Person	John D Patient	More Information
Encounter	Select	
Order	60	
Location	Unknown Location	
Observation Date	<input type="text"/>	(Format: dd/mm/yyyy)
Question Concept	Select	
Comment	<input type="text"/>	
Study Results	<a href="#">View Study</a>	

[Save Observation](#) [Cancel](#)

View Previous Observation

English (United States) | English (United Kingdom) Last Build: 2013-12-02 14:00 Version: 1.9.3 Build f535e9 Powered by OpenMRS

The screenshot shows the OpenMRS Radiology Module interface. At the top, there is a navigation bar with links for Home, Find Patient, Dictionary, and Administration. A message box indicates "Currently logged in as Reading Physician". Below the navigation bar, there are links for Admin and Manage Radiology Orders.

### Previous Observations

A table displays previous observations:

Id	Reading Physician	Location	Observation Date	Question Concept	Value	Comment
102	Reading Physician	Unknown Location	2013-12-03 00:00:00.0	REVIEW OF SYSTEMS, CARDIOPULMONARY	<a href="#">View</a>	Sample Observation

[Add Observation](#)

### Observation

This section shows a detailed form for adding a new observation:

<b>Id</b>	102
<b>Person</b>	John D Patient <a href="#">More Information</a>
<b>Encounter</b>	Select
<b>Order</b>	60
<b>Location</b>	Unknown Location
<b>Observation Date</b>	03/12/2013 (Format: dd/mm/yyyy)
<b>Question Concept</b>	REVIEW OF SYSTEMS, CARDIOPULMONARY Question which ascertains number of symptoms related to the cardiopulmonary system.
<b>Value</b>	SHORTNESS OF BREATH <a href="#">Change</a> Sensation of being out of breath.
<b>Comment</b>	Sample Observation
<b>Study Results</b>	<a href="#">View Study</a>
<b>Created By</b>	Reading Physician - 03-Dec-2013
<b>Edit Reason</b> <input type="text"/>	
<b>Save Observation</b> <b>Cancel</b>	

**Void this Observation**

Reason  ← Text input here to void Observation.  
[Void this Observation](#)

- Observations can be viewed from Patient Dashboard. But adding/editing observations will need privileges to do so. The reading physician or authorized user can add observations from Patient Dashboard as well.

## OpenMRS Radiology Module

OpenMRS - Patient Dashb DCM4CHEE DICOM Archi localhost:8080/openmrs/patientDashboard.form?patientId=3&phrase=john

Home | Find Patient | Dictionary | Administration

**Mr. John D Patient**  
38 yrs ( 01-Jan-1975 )  
BMI: ? ( Weight: 100.0 kg , Height: ) CD4: 22.0 | Regimen:

OpenMRS Identification Number: **100-8**  
Old Identification Number: 100

Overview | Regimens | Visits | Demographics | Graphs | Radiology

Add Radiology Order

Patient Radiology Orders

Show 20 entries	Search:	Show/Hide Columns									
View Obs.	Priority	Referring Physician	Scheduler	Performing Technician	Reading Physician	Order Start Date	Modality	Status	Instructions		
1	STAT	Referring Physician	Scheduling Physician	Performing Technician	Reading Physician	2013-12-03 00:00:00.0	Computed Tomography	COMPLETED	Sample Order		
Viewing 1 - 1 of 1											

first|Previous|1|Next|last

English (United States) | English (United Kingdom) Last Build: 2013-12-02 14:00 Version: 1.9.3 Build f535e9

Powered by OpenMRS

OpenMRS - Patient Dashb DCM4CHEE DICOM Archi localhost:8080/openmrs/patientDashboard.form?patientId=3&phrase=john

Home | Find Patient | Dictionary | Administration

**Mr. John D Patient**  
38 yrs ( 01-Jan-1975 )  
BMI: ? ( Weight: 100.0 kg , Height: ) CD4: 22.0 | Regimen:

OpenMRS Identification Number: **100-8**  
Old Identification Number: 100

Overview | Regimens | Visits | Demographics | Graphs | Radiology

Add Radiology Order

Radiology : Order Observations

Radiology Observations	
Person	: Mr. John D Patient
Order	: 60
Study Results : <a href="#">View Study</a>	
<a href="#">Add/Edit Observations</a> ← Redirects to Add/Edit Observations Page	

Previous Observations

ID	Reading Physician	Location	Observation Date	Question Concept	Value	Comment
102	Reading Physician	Unknown Location	2013-12-03 00:00:00	REVIEW OF SYSTEMS, CARDIOPULMONARY	<a href="#">View</a>	Sample Observation

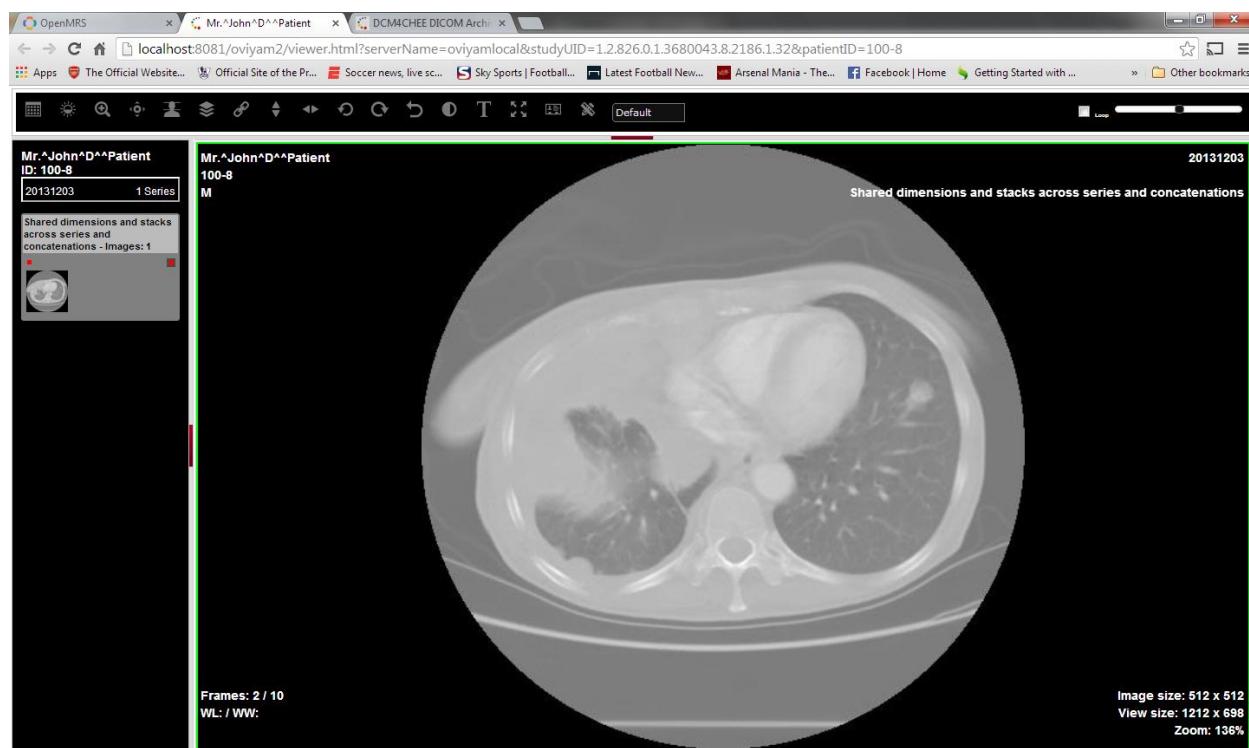
English (United States) | English (United Kingdom) Last Build: 2013-12-02 14:00 Version: 1.9.3 Build f535e9

Powered by OpenMRS

## OpenMRS Radiology Module

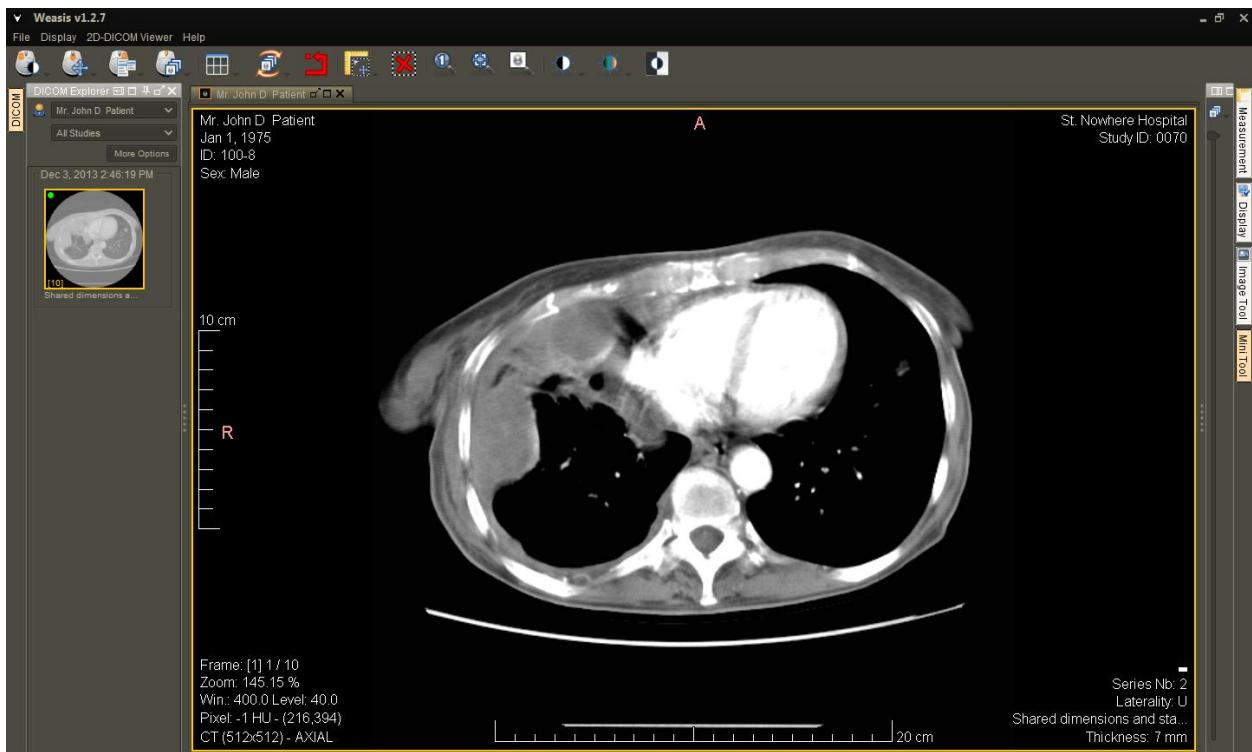
The screenshot shows the OpenMRS Patient Dashboard for Mr. John D Patient (ID: 100-8). The dashboard includes sections for Overview, Regimens, Visits, Demographics, Graphs, and Radiology. The Radiology section is active, displaying a 'Radiology : Order Observations' table. The table has columns for Id, Reading Physician, Location, Observation Date, Question Concept, Value, and Comment. One row is shown: '102 Reading Physician Unknown Location 2013-12-03 00:00:00.000 REVIEW OF SYSTEMS, CARDIOPULMONARY View Sample Observation'. A red arrow points from the 'Value' column to the 'View' link in the table row.

- The reading physician can view the study from Oviyam/Weasis.



*Study in Oviyam2.0*

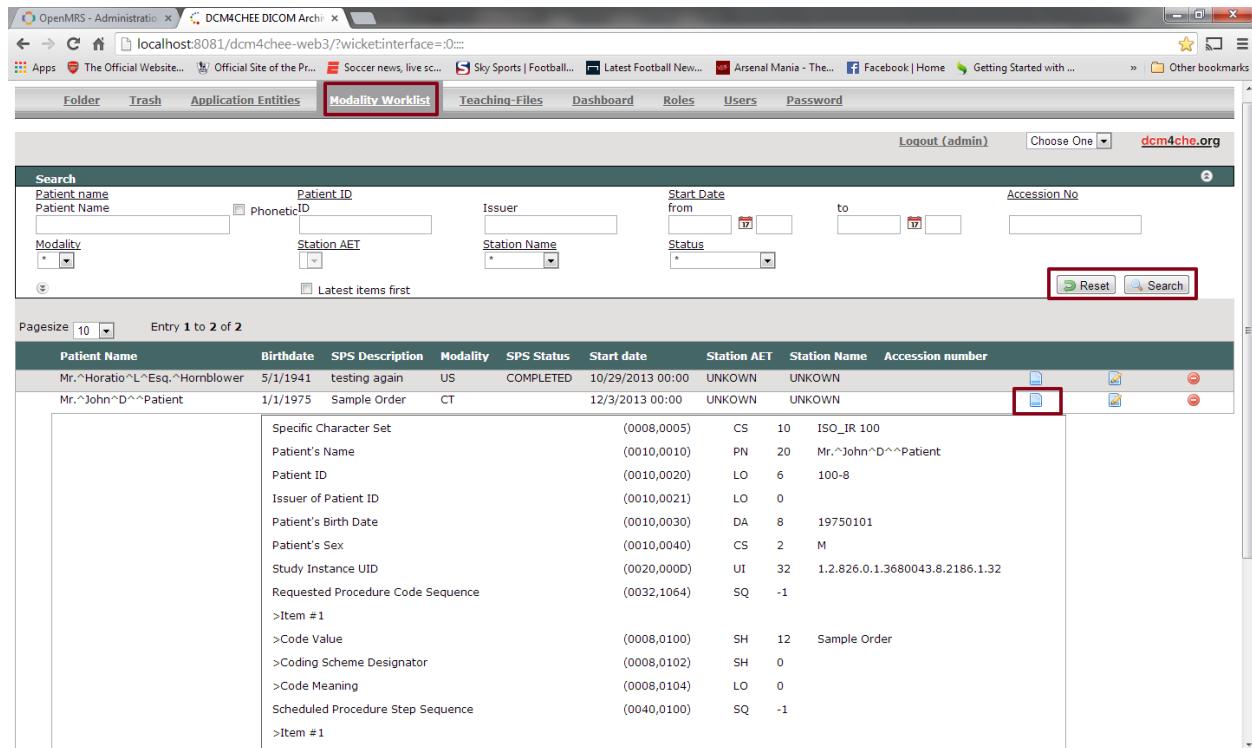
## OpenMRS Radiology Module



*Study in Weasis.*

## Radiology Module Workflow using DVTK Modality Emulator

- **Modality Worklist in DCM4CHEE** - The order details are continually updated as and when relevant information is entered by the different users to complete the order details. The completed order/worklist in dcm4chee is shown below. Worklist creation/editing/deletion is managed through HL7 messages.
- Check the dcm4chee console for modality worklists. Run an empty search to retrieve all Worklists(orders).

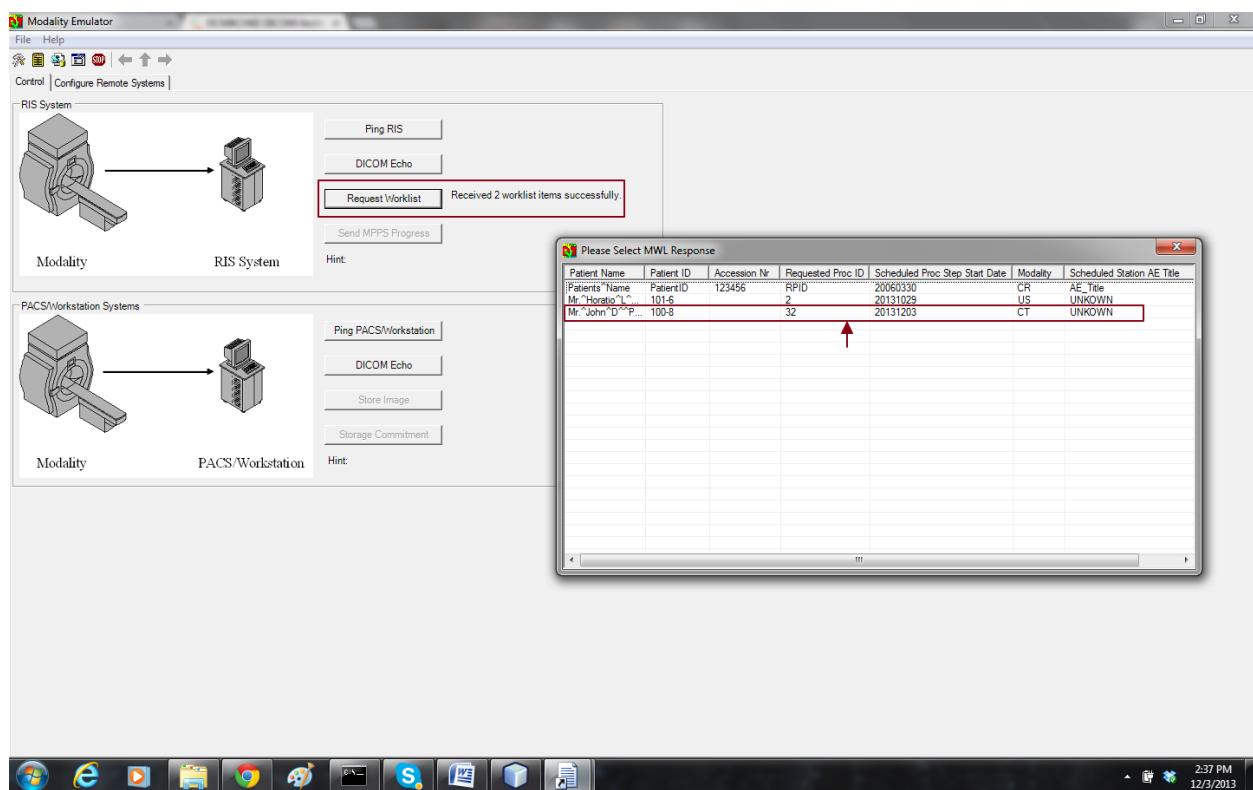
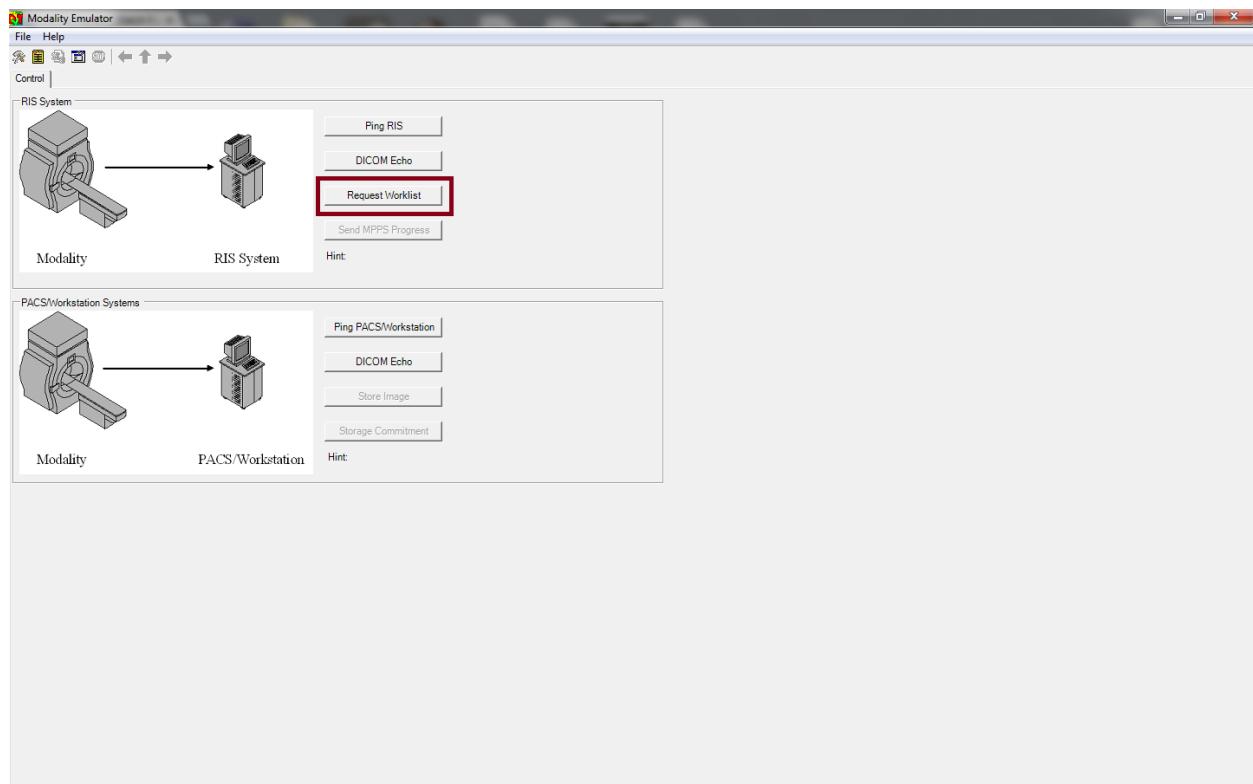


The screenshot shows the DCM4CHEE Modality Worklist interface. At the top, there is a search form with fields for Patient name, Patient ID, Issuer, Start Date, and Accession No. Below the search form is a table with columns: Patient Name, Birthdate, SPS Description, Modality, SPS Status, Start date, Station AET, Station Name, and Accession number. There are two rows of data in the table. The second row, which corresponds to the 'Mr.^John^D^^Patient' entry, has a red box drawn around its 'Request' button (the fourth column from the left). The table also includes a 'Pagesize' dropdown set to 10 and an 'Entry 1 to 2 of 2' indicator.

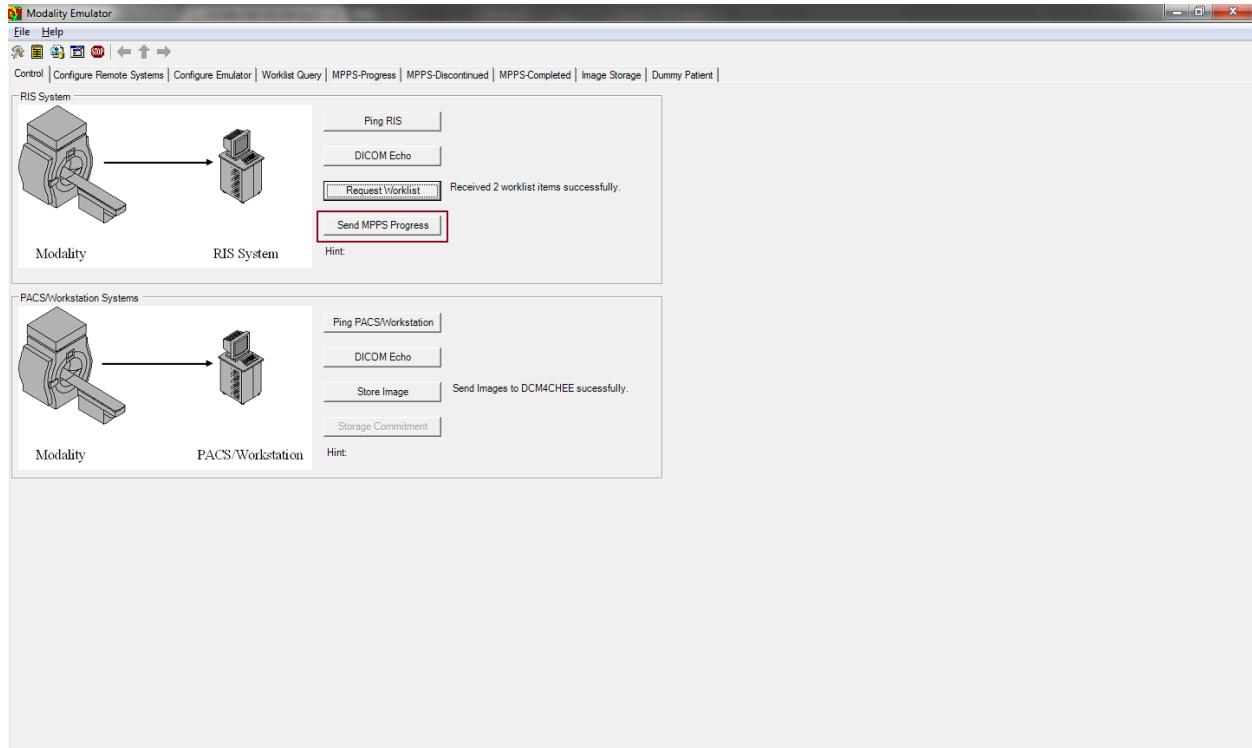
Patient Name	Birthdate	SPS Description	Modality	SPS Status	Start date	Station AET	Station Name	Accession number
Mr.^Horatio^L^Esq.^Hornblower	5/1/1941	testing again	US	COMPLETED	10/29/2013 00:00	UNKOWN	UNKOWN	
Mr.^John^D^^Patient	1/1/1975	Sample Order	CT		12/3/2013 00:00	UNKNOWN		

- In the Modality Emulator, Click Request Worklist and choose the order that was just made in OpenMRS.

## OpenMRS Radiology Module



- Send MPPS In progress to indicate the procedure has started.



- Once the In progress status has been sent, the updated status message is reflected in dcm4chee and OpenMRS. The emulator gives you options to discontinue the order or store image

## OpenMRS Radiology Module

Screenshot of the OpenMRS Radiology Module - Modality Worklist screen.

The search bar includes fields for Patient Name, Phonetic ID, Issuer, Start Date, and Accession No. It also has dropdowns for Modality, Station AET, Station Name, and Status, along with checkboxes for "Latest items first" and "Search".

The table displays two rows of data:

Patient Name	Birthdate	SPS Description	Modality	SPS Status	Start date	Station AET	Station Name	Accession number		
Mr.^Horatio^L^Esq.^Hornblower	5/1/1941	testing again	US	COMPLETED	10/29/2013 00:00	UNKNOWN	UNKNOWN			
Mr.^John^D^Patient	1/1/1975	Sample Order	CT	STARTED	12/3/2013 00:00	UNKNOWN	UNKNOWN			

A red arrow points upwards from the "STARTED" status cell of the second row towards the "Modality Worklist" tab in the top navigation bar.

Screenshot of the OpenMRS Radiology Module - Manage Radiology Orders screen.

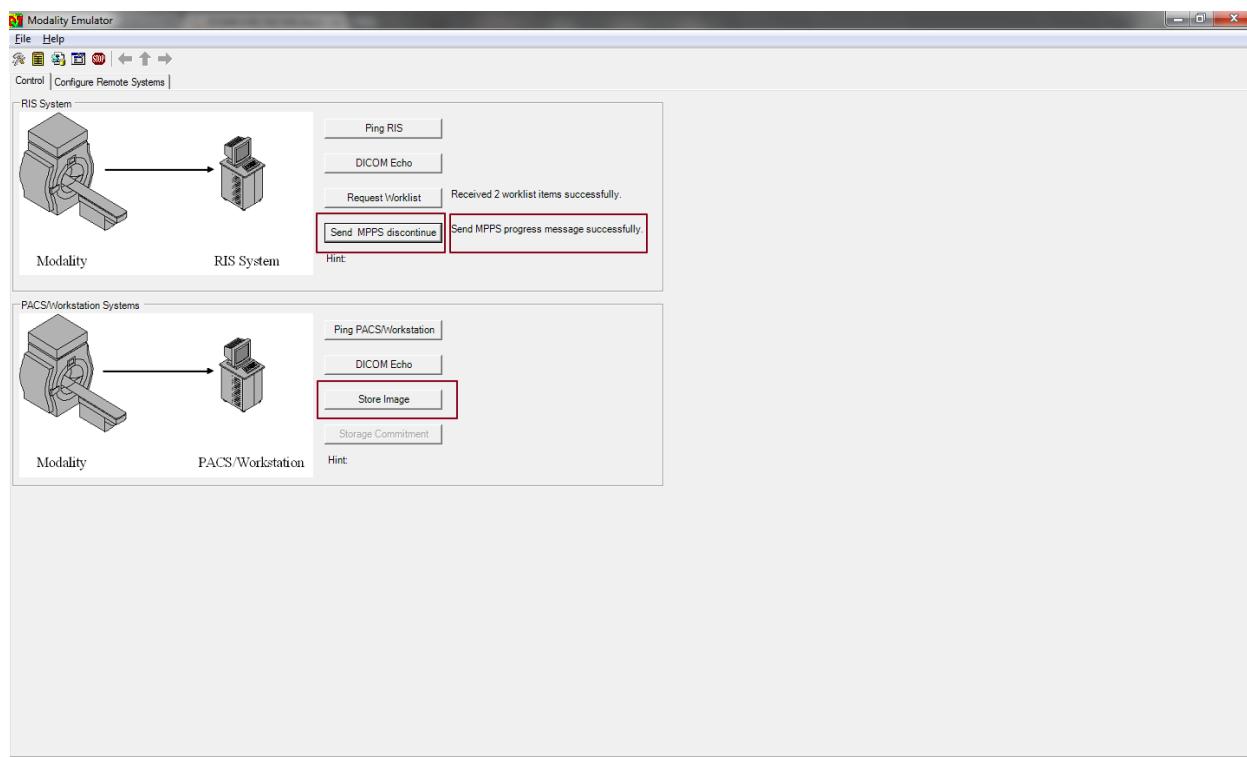
The top navigation bar shows "Currently logged in as Super User" and links for Log out, My Profile, and Help.

The main table displays two radiology orders:

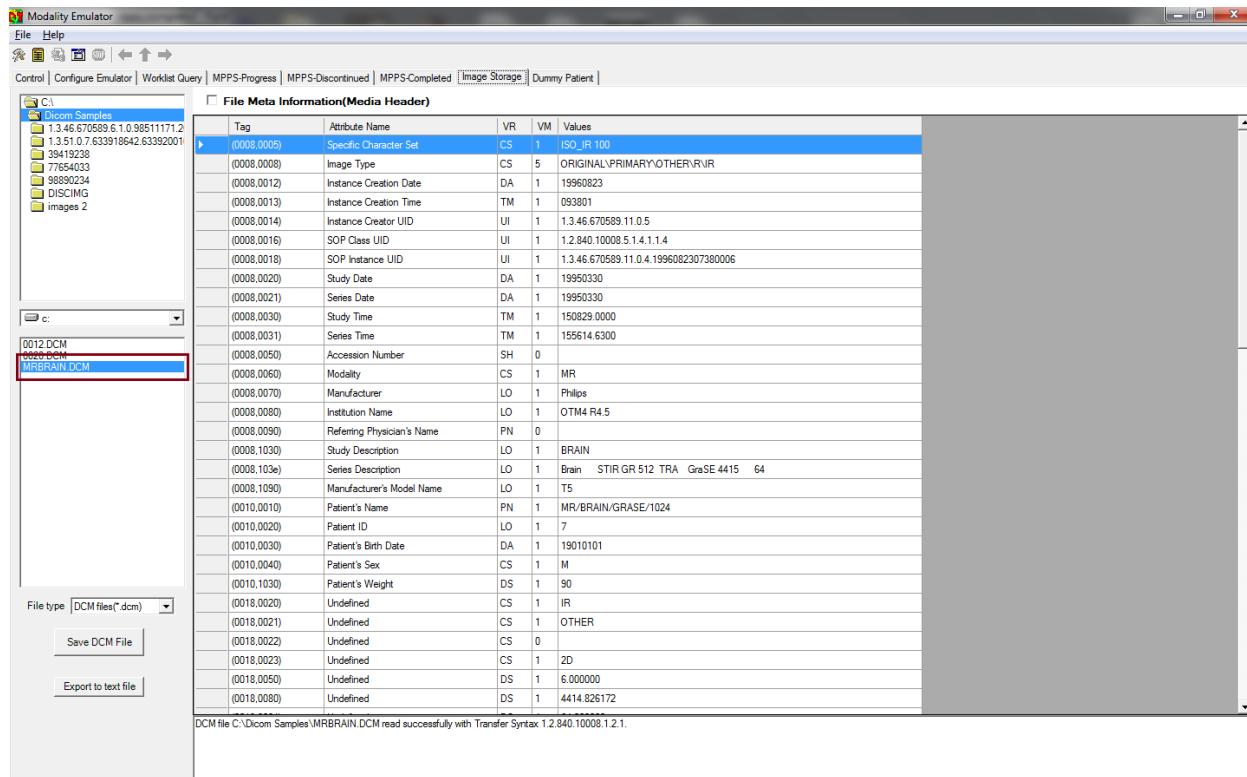
Order ID	Patient	Patient Full Name	Priority	Referring Physician	Scheduler	Performing Technician	Reading Physician	Order Start Date	Modality	Status	Instructions	DCM4CHEE Modality Worklist Sync Status
1	101-6	Mr. Horatio L Hornblower Esq.	STAT	Super User	Super User	Super User	Akhil Ravindran	2013-10-29 00:00:00	Ultrasound	SCHEDULED COMPLETED	testing again	In Sync : Save order successful
2	100-8	Mr. John D Patient	STAT	Referring Physician	Scheduling Physician	Performing Technician	Reading Physician	2013-12-03 00:00:00	Computed Tomography	SCHEDULED IN PROGRESS	Sample Order	In Sync : Update order successful.

A red arrow points upwards from the "SCHEDULED IN PROGRESS" status cell of the second row towards the "Manage Radiology Orders" link in the top navigation bar.

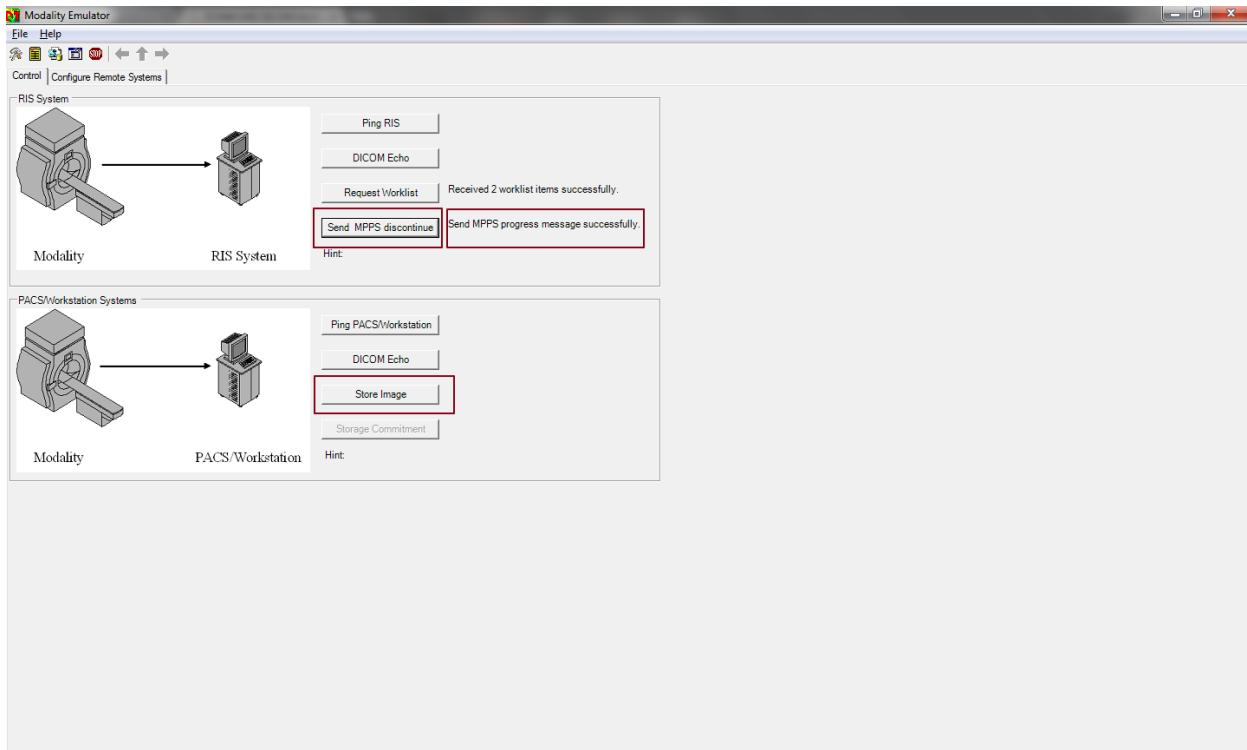
## OpenMRS Radiology Module



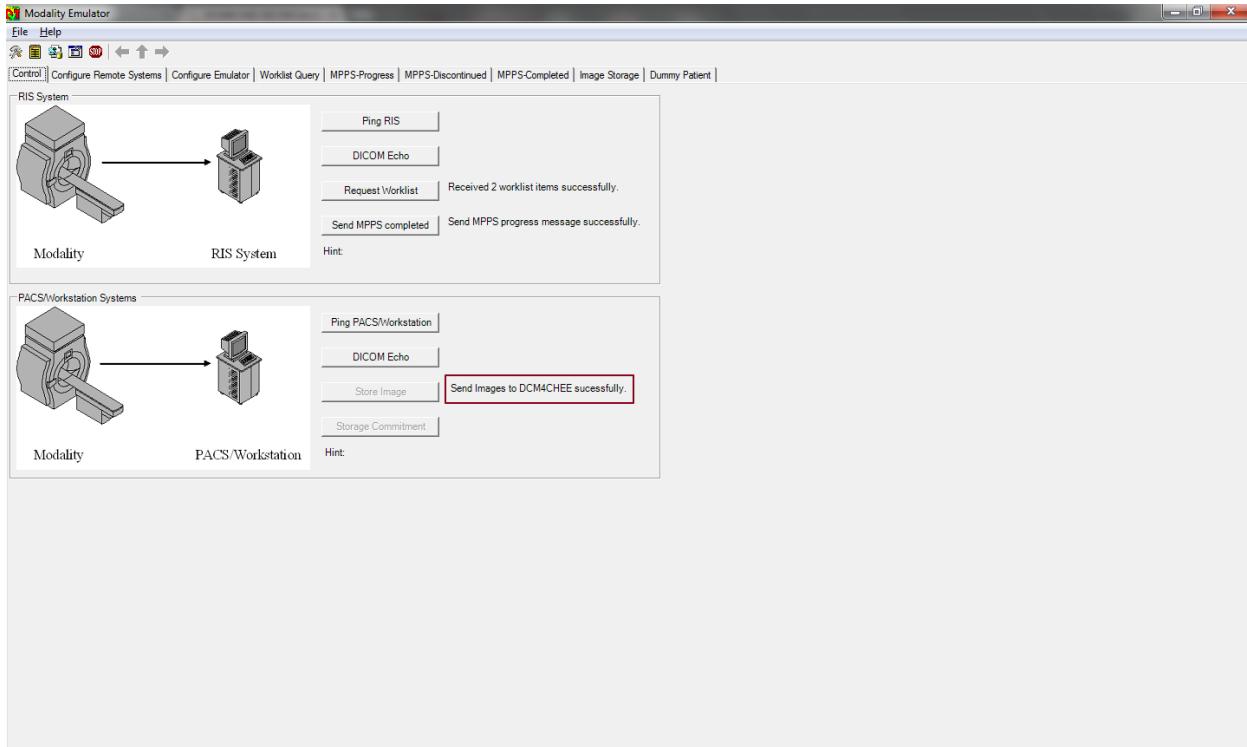
- Click on the image storage tab to choose the image you want to send and return to the control and click “Store Image”.



## OpenMRS Radiology Module



- After the image has been sent successfully, the image will appear in the archive.



## OpenMRS Radiology Module

**Search**

Patient Name	Patient ID	Issuer	Study Date from	to	Accession No
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input checked="" type="checkbox"/> Phonetic	<input type="checkbox"/> Modality	<input type="checkbox"/> Source AET			
<input type="checkbox"/> Exact search					
<input type="checkbox"/> Latest studies first					

Pagesize: 10 Study 1 to 2 of 2

Patient Name	Patient ID/Issuer	Birth Date	Sex	Comments	#S/#I	Availability
Mr.^Horatio^L^Esq.^Hornblower	101-6	5/1/1941	M	Description	1/1	ONLINE
10/29/2013 11:29	StdId:001		US	Exercise Echocardiogram		
Mr.^John^D^Patient	100-8	1/1/1975	M		1/1	ONLINE
12/3/2013 14:46	0070		CT			

Show column titles

Delete  Move  Export

Reset  Search

- Click on the 'Send MPPS Complete' button to complete the order.

RIS System

Modality → RIS System

Ping RIS  
DICOM Echo  
Request Worklist  
**Send MPPS completed** [Send MPPS progress message successfully.]  
Hint:

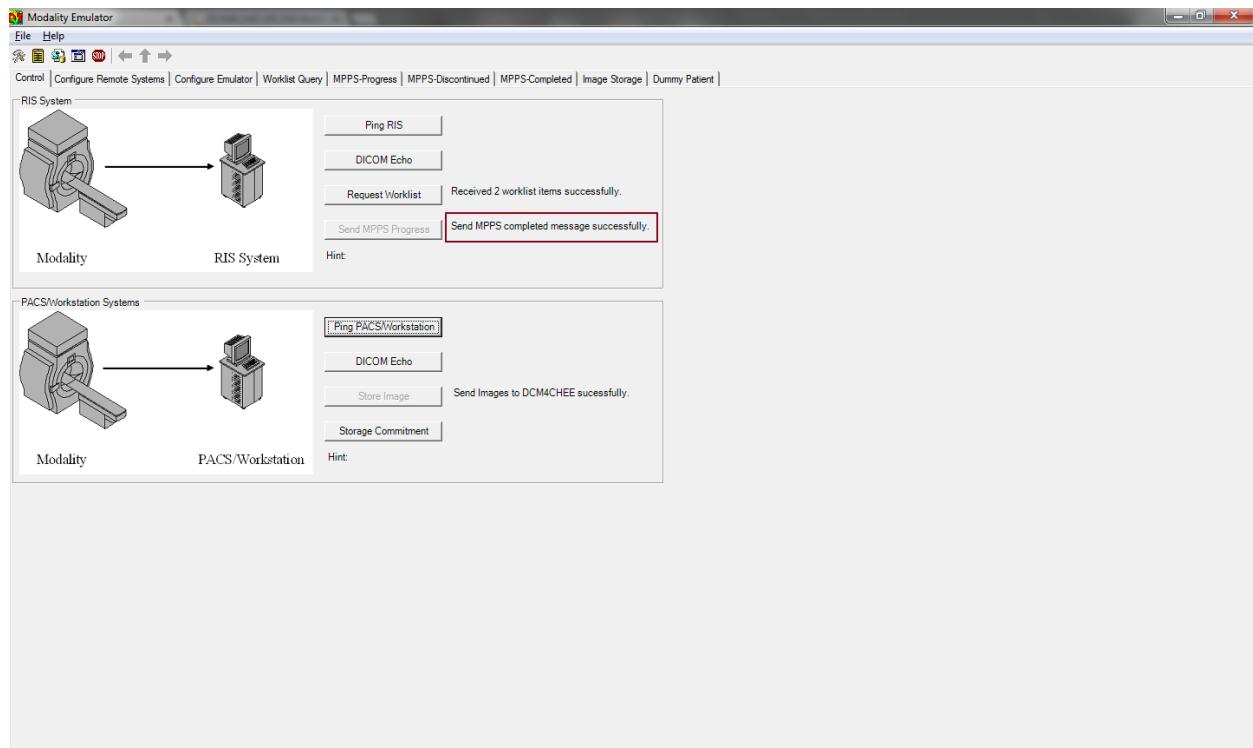
PACS/Workstation Systems

Modality → PACS/Workstation

Ping PACS/Workstation  
DICOM Echo  
Store Image  
Storage Commitment  
Hint:

- The completed status will be reflected in dcm4chee and OpenMRS once the MPPS completed message is sent successfully.

## OpenMRS Radiology Module



The screenshot shows the 'DCM4CHEE DICOM Arch' interface in a web browser. The top navigation bar includes links like 'Folder', 'Trash', 'Application Entities', 'Modality Worklist' (which is highlighted in red), 'Teaching-Files', 'Dashboard', 'Roles', 'Users', 'Password', 'Logout (admin)', 'Choose One', and 'dcm4chee.org'.  
**Search:**  
 - Search fields: Patient name, Patient ID, Issuer, Start Date from/to, Accession No, Modality, Station AET, Station Name, Status, and a checkbox for 'Latest items first'.  
 - Buttons: Reset, Search.  
**Modality Worklist:**  
 - Pagesize: 10, Entry 1 to 2 of 2.  
 - Table columns: Patient Name, Birthdate, SPS Description, Modality, SPS Status, Start date, Station AET, Station Name, Accession number.  
 - Data rows:  
 1. Mr.^Horatio^L^Esq.^Hornblower, 5/1/1941, testing again, US, COMPLETED, 10/29/2013 00:00, UNKNOWN, UNKNOWN,   
 2. Mr.^John^D^^Patient, 1/1/1975, Sample Order, CT, COMPLETED, 12/3/2013 00:00, UNKNOWN, UNKNOWN,

## OpenMRS Radiology Module

The screenshot shows the 'Manage Radiology Orders' page in the OpenMRS application. The page title is 'Manage Radiology Orders' and the sub-page title is 'Add Radiology Order'. The main content area is titled 'Worklist' and contains a table of radiology orders. The table has columns for Patient ID, Patient Full Name, Priority, Referring Physician, Scheduler, Performing Technician, Reading Physician, Order Start Date, Modality, Status, Instructions, DCM4CHEE Modality, and Worklist Sync Status. Two rows of data are visible:

Edit	Patient Id	Patient Full Name	Priority	Referring Physician	Scheduler	Performing Technician	Reading Physician	Order Start Date	Modality	Status	Instructions	DCM4CHEE Modality	Worklist Sync Status
1	101-6	Mr. Horatio L Hornblower Esq.	STAT	Super User	Super User	Super User	Akhil Ravindran	2013-10-29 00:00:00.0	Ultrasound	SCHEDULED COMPLETED	<a href="#">testing again</a>	In Sync : Save order successful.	
2	100-8	Mr. John D Patient	STAT	Referring Physician	Scheduling Physician	Performing Technician	Reading Physician	2013-12-03 00:00:00.0	Computed Tomography	SCHEDULED COMPLETED	<a href="#">Sample Order</a>	In Sync : Update order successful.	

At the bottom of the table, there is a message: 'Viewing 1 - 2 of 2'.

- The image can be viewed in Oviyam/Weasis by the Reading Physician and observations can be added for the Radiology Study.
- NOTE: If Modalities have only image storage capabilities but do not have the MPPS feature as part of their specification. DCM4CHEE has an MPPS emulation service which can be used for reflecting the order/worklist status in OpenMRS which can be done as shown below.

## OpenMRS Radiology Module

Screenshot of the OpenMRS Radiology Module interface showing the Modality Worklist screen.

The top navigation bar includes: Folder, Trash, Application Entities, Modality Worklist, Teaching-Files, Dashboard, Roles, Users, and Password. The top right shows Logout (admin), Choose One, and dcm4che.org.

**Search:**

- Patient Name:
- Patient ID:
- Issuer:
- Study Date: from  to
- Accession No:
- Modality:  Phonetic,  Exact search,  Latest studies first.
- Source AET:
- Search for: Study, Expand To: auto, Reset, Search.

**Pagesize:** 10, Study 1 to 6 of 6. Buttons: Delete, Move, Export.

**Show column titles:**

Patient Name	Patient ID/Issuer	Birth Date	Sex	Comments	#S/#I	Availability	Actions
Akhil^Ravindran	200-6	10/7/1987	M	Demonstration Patient for enhanced XA testing activities!	9/9	ONLINE	
9/27/2013 22:35	UNKNOWN		CR	Echocardiogram	1/1	ONLINE	
9/27/2013 22:45	UNKNOWN		XA	Echocardiogram	1/1	ONLINE	
enhanced XA^Test^^Siemens	SMSenhXAtest200906	11/4/1958	M	Demonstration Patient for enhanced XA testing activities!	8/8	ONLINE	
6/2/2009 15:59	090602enhXAdemo1	20090602MSenhXA	XA	derived enhXA3D from enhXA rotational Acq1/1	1/1	ONLINE	
Mr.^John^Patient	100-8	1/1/1975	M	Demonstration Patient for enhanced XA testing activities!	8/8	ONLINE	
10/17/2013 01:27	UNKNOWN		MR	Echocardiogram	1/1	ONLINE	
MR/DTIN/GRASE/1024	7	1/1/1901	M	BRAIN	1/1	ONLINE	
3/30/1995 15:08	191		MR		1/1	ONLINE	
Rubo DEMO	123-45-6789	10/16/1923	F		1/1	ONLINE	
3/23/1994 18:51	027893462		US	Echocardiogram	1/1	ONLINE	

**Modality Worklist:**

Search for: Study, Expand To: auto, Reset, Search.

**Show column titles:**

Patient Name	Patient ID/Issuer	Birth Date	Sex	Comments	#S/#I	Availability	Actions
Akhil^Ravindran	200-6	10/7/1987	M	Demonstration Patient for enhanced XA testing activities!	9/9	ONLINE	
9/27/2013 22:35	UNKNOWN		CR	Echocardiogram	1/1	ONLINE	
9/27/2013 22:45	UNKNOWN		XA	Echocardiogram	1/1	ONLINE	
enhanced XA^Test^^Siemens	SMSenhXAtest200906	11/4/1958	M	Demonstration Patient for enhanced XA testing activities!	8/8	ONLINE	
6/2/2009 15:59	090602enhXAdemo1	20090602MSenhXA	XA	derived enhXA3D from enhXA rotational Acq1/1	1/1	ONLINE	
Mr.^John^Patient	100-8	1/1/1975	M	Demonstration Patient for enhanced XA testing activities!	8/8	ONLINE	
10/17/2013 01:27	UNKNOWN		MR	Echocardiogram	1/1	ONLINE	
10/17/2013 01:26			MR	SeriesDescription	1	ONLINE	
10/17/2013 01:26	1	MODALITY	MR	SeriesDescription	1	ONLINE	
10/17/2013 01:26	1	MODALITY	MR	SeriesDescription	1	ONLINE	
10/17/2013 01:26			MR		1/1		
10/17/2013 01:27	1	MODALITY	MR	Brain STIR GR 512 TRA GraSE 4415.61	1	ONLINE	
10/17/2013 01:26			MR		1/1		
10/17/2013 01:26	1	MODALITY	MR	SeriesDescription	1	ONLINE	
10/17/2013 01:26	2	MODALITY	MR	Post-Stress	1	ONLINE	
10/17/2013 01:27			MR		1/1		
10/17/2013 01:27	3	MODALITY	MR	RotationalAngioNative	1	ONLINE	
10/17/2013 01:25	1605.0	27	MR	Directional Coronary Atherectomy	1/9	COMPLETED	
10/17/2013 01:26	5	MODALITY	MR		1	ONLINE	
10/17/2013 01:26			MR		1/1		