

OpenMRS Radiology Module User Guide v1.0



Victor Cortés, Juan Pastás

The radiology module is intended to help in the radiology department workflow: order creation by the referring physician, scheduling by the scheduler staff, image acquisition for an order by the performing physician either a technician or specialist and finally the diagnostics from the reading physician. The module is designed for five modalities Computed Radiography, Magnetic Resonance, Computed Tomography, Ultra Sound and Nuclear Medicine. The module is developed following DICOM standard.

University of Cauca

11/18/2011

RADIOLOGY MODULE USER GUIDE

The Radiology module supports the clinical part of the radiology department workflow by integrating the functionalities of EHR, RIS and PACS: order creation by the referring physician, scheduling by the scheduler staff, image acquisition for an order by either a technician or a specialist, and finally diagnostics by the radiologist. The module conforms to DICOM and is designed for five modalities: Computed Radiography (CR), Magnetic Resonance (MR), Computed Tomography (CT), Ultrasound (US) and Nuclear Medicine (NM).

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1. **MANAGE RADIOLOGY ORDERS:** explains the interface for radiology orders management. This interface allows access to other interfaces.
2. **REFERRING PHYSICIAN:** explains the interaction between the module and a referring physician.
3. **SCHEDULER:** explains the interaction between the module and a scheduler.
4. **READING PHYSICIAN:** explains the interaction between the module and a radiologist.

1. MANAGE RADIOLOGY ORDERS

This interface allows viewing, finding, and selecting an order from which any of the four roles (referring physician, scheduler, performing physician, reading physician) created by the module perform a specific task.

The user gets this interface (Figure 1) by clicking “Manage radiology orders” in the admin page. The following are the interface functions (look for the numbers in the figure):

The screenshot shows the OpenMRS web interface for managing radiology orders. The browser address bar shows 'localhost:8080/openmrs/module/radiology/radiologyOrder.list'. The page title is 'OpenMRS' and the user is logged in as 'Super Cortex'. The navigation menu includes 'Home', 'Find/Create Patient', 'Dictionary', and 'Administration'. The main heading is 'Manage Radiology Orders' with a sub-link 'Add Radiology Order' (1). Below this is a 'Worklist' section with a 'Clear Results' button (3). A search area (2) includes fields for 'Patient:', 'Start Date:', and 'End Date:', with a 'Find' button. A table (4) displays the worklist with columns: Edit, Patient Id, Patient Full Name, Priority, Referring Physician, Scheduler, Performing Physician, Reading Physician, Appointment Date, Modality, Status, and Instructions. A search bar (5) is above the table, and a 'Show/Hide Columns' button (6) is to the right. The table contains three rows of data. The first row (7) has a '1' in the Edit column and 'qwe' in the Instructions column. The second row (8) has a '2' in the Edit column. The third row (9) has a '3' in the Edit column and 'ggg' in the Instructions column. At the bottom of the table, it says 'Viewing 1 - 3 of 3' (9) and includes page navigation controls (10) like 'first', 'Previous', 'Next', and 'last'.

Edit	Patient Id	Patient Full Name	Priority	Referring Physician	Scheduler	Performing Physician	Reading Physician	Appointment Date	Modality	Status	Instructions
1	1	juan david pastas	Unknown	Super Cortex					CR	Scheduled: Unknown Performed: COMPLETED	qwe
2	1	juan david pastas	STAT	Referring physician					MRI	Scheduled: SCHEDULED Performed: IN PROGRESS	
3	1	juan david pastas	Unknown	Super Cortex	Scheduler		Reading physician	2011-11-09 00:00:00.0	CR	Scheduled: SCHEDULED Performed: Unknown	ggg

Figure 1. Manage Radiology Orders.

1. Allows creating a new order to a user that has ‘Add orders’ privilege.
2. Permits user to query for orders complying with the criteria (Patient, Start Date and End Date) established.
3. Clears the results in the table.
4. Selects results per page.
5. Filters currently listed entries by all columns contents.
6. Lets the user customize the columns viewed.
7. From each one of these links the user edits a radiology order or makes observations depending on the user role.
8. Shows instructions for an order. A popup window extends the information when the link is clicked on.
9. Information about entries being viewed.
10. Page navigation controls.

The order status (Status column) is showed depending on the role of the user viewing the interface (Table 1):

Table 1. Type of status showed depending on the user role.

Role	Status shown
Referring physician	Scheduled and performed
Scheduler	Scheduled
Performing physician	Scheduled and performed
Reading physician	Performed

2. REFERRING PHYSICIAN

Referring physician gets this interface (Figure 2) by clicking add or edit a radiology order in Figure 1 (functions 1 and 7). The following are the interface functions (look for the numbers in the figure):

The screenshot shows the OpenMRS interface for managing radiology orders. The browser address bar shows 'localhost:8080/openmrs/module/radiology/radiologyOrder.form'. The user is logged in as 'Referring physician'. The page title is 'Order'. The form contains the following fields:

- Patient: juan david pastas (with a 'More Information' link and a '2' next to it)
- Related Concept: ARM XRAY (with a '1' next to it)
- Priority: STAT (dropdown)
- Modality: CR (dropdown)
- Instructions: broken arm... (text area)
- Related Encounter: Unknown Location - 05/09/10 (with a '1' next to it)
- Orderer: Referring physician

A 'Save Order' button is located at the bottom left of the form.

Figure 2. Order form – Referring physician.

1. Fields that searches in database while the user is writing. It looks for: patients, concepts, encounters and system users, respectively.
2. Shows a popup window with patient overview when clicked (Figure 3).

The 'Patient Overview' popup window displays the following information for 'juan david pastas':

- Old Identification Number: 1
- 23 yrs (17-Jul-1988)
- BMI: ? (Weight, Height):
- CD4:
- Regimen:
- Start Visit button
- Allergies: None
- Problem List table:

Problem	Date	Modifier	Comments
RENAL DISEASE	17/11/2011		

Additional options include 'Add Allergy' and 'Add Problem' buttons, and a 'View Patient Dashboard' link at the bottom.

Figure 3. Patient overview popup.

Here the user can view basic information about the selected patient as well as see and add allergies and other problems.

Other fields the referring physician enters in the order form are: Priority (STAT, HIGH, ROUTINE, MEDIUM or LOW), Modality (CR, MRI, US, NM or CT) and Instructions.

3. SCHEDULER

The scheduler selects an unscheduled order and sets a date to it. He gets this interface (Figure 4) clicking edit radiology order (function 7) in Figure 1. The following are the interface functions (look for the numbers in the figure):

The screenshot shows the OpenMRS interface for editing a radiology order. The browser address bar shows the URL: localhost:8080/openmrs/module/radiology/radiologyOrder.form?orderId=7. The page title is 'OpenMRS' and the user is logged in as 'Scheduler'. The navigation bar includes 'Home', 'Find/Create Patient', 'Dictionary', and 'Administration'. The main content area is titled 'Admin | Manage Radiology Orders' and 'Order'. The form fields are as follows:

Patient	juan david pastas
Related Concept	X-RAY, ARM
Priority	STAT
Modality	CR
Instructions	broken arm...
Related Encounter	Encounter: [1 2010-C]
Orderer	Referring physician
Start date	17/11/2011 (dd/mm/yyyy) 1
Auto-expire date	17/11/2011 (dd/mm/yyyy) 1
Reading Physician	Reading physician 2
Created By	Referring physician - 17 November 2011 19:56:32 COT
Save Order	
Discontinued date	(dd/mm/yyyy) 3
Reason discontinued	Enter concept name
Discontinue this Order	
Void Reason	
Void this Order	

Figure 4. Order form – Scheduler

1. Order dates selectors. Date of the image acquisition process.
2. Reading physician selector.
3. Discontinue or void this order.

When the scheduler sets the date, the scheduled status of the order is set to SCHEDULED in the manage radiology orders interface (Figure 5).

localhost:8080/openmrs/module/radiology/radiologyOrder-list

OpenMRS Currently logged in as Scheduler | [Log out](#) | [My Profile](#) | [Help](#)

[Home](#) | [Find/Create Patient](#) | [Dictionary](#) | [Administration](#)

Order saved

[Admin](#) | [Manage Radiology Orders](#) | [Manage Radiology Reports](#)

Manage Radiology Orders

[Add Radiology Order](#)

Worklist [Clear Results](#)

Patient: Start Date: End Date:

Show 20 entries Search: [Show/Hide Columns](#)

Edit	Patient Id	Patient Full Name	Priority	Referring Physician	Scheduler	Performing Physician	Reading Physician	Appointment Date	Modality	Status	Instructions
1	1	juan david pastas	Unknown	Super Cortex					CR	Scheduled: Unknown	View
2	1	juan david pastas	STAT	Referring physician					MRI	Scheduled: SCHEDULED	View
3	1	juan david pastas	Unknown	Super Cortex	Scheduler		Reading physician	2011-11-09 00:00:00.0	CR	Scheduled: SCHEDULED	View
4	1	juan david pastas	STAT	Referring physician	Scheduler		Reading physician	2011-11-17 00:00:00.0	CR	Scheduled: SCHEDULED	View

Viewing 1 - 4 of 4 [first](#) | [Previous](#) | [Next](#) | [last](#)

Figure 5. Order status set to SCHEDULED.

4. READING PHYSICIAN

Reading physician gets the observation form (Figure 6) from function 7 in Figure 1, when the order status is set to COMPLETED. This happens after the modality has taken the image(s). The following are the interface functions (look for the numbers in the figure):

The screenshot shows the OpenMRS interface for a reading physician. The page title is 'Previous Observations' and it contains a table of previous observations. Below the table is an 'Add Observation' button. The 'Observation' form is displayed, showing details for a specific observation. The form includes fields for Id, Person, Encounter, Order, Location, Observation Date, Question Concept, Value, and Comment. There are also buttons for 'Results', 'Download', 'Save Observation', and 'Cancel'. At the bottom, there is a 'Void this Observation' section with a 'Reason' field and a 'Void this Observation' button.

Id	Reading Physician	Location	Observation Date	Question Concept	Value	Comment
5	Reading physician	HSLV	2011-11-17 00:00:00.0	CURRENT DRUGS USED	View	jjjjj
6	Reading physician	HSLV	2011-11-17 00:00:00.0	TUBERCULOSIS TREATMENT PLAN	View	lllll

Observation

Id: 5

Person: [More Information](#)

Encounter:

Order: Z

Location:

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

Question Concept: CURRENT DRUGS USED
Question on encounter forms: "Is the patient currently taking, or has the patient ever taken, any of the following other medications?" This particular concept stores a history of active use of the associated medications.

Value: FLUCONAZOLE
Fluconazole is an antifungal medication of the azole (triazole) class, and is used to treat systemic yeast and fungal infections. Commonly called Diflucan.

Comment:

Created By: Reading physician - 17-Nov-2011

[Results](#) [Download](#)

Void this Observation

Reason:

Figure 6. Observation form.

1. Previous observations for this order.
2. Adds new observation to this order.
3. Current observation. It can be a new or a previous one to be edited.
4. The user can void this observation.
5. Downloads a file that allows the user to automatically launch an application (the Weasis viewer) to see the diagnostics image(s) (Figure 7).

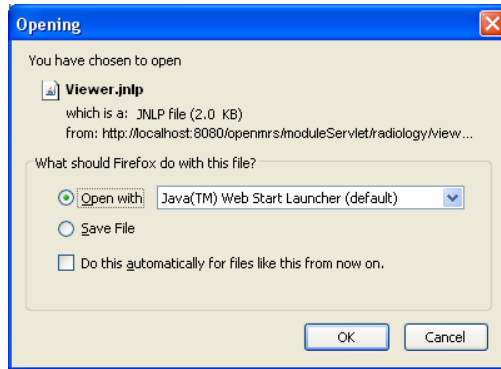


Figure 7. Application launcher in Firefox.

The downloading interface (Figure 7) depends on the user web browser. The system may ask for several confirmations before executing this file, the user should accept all of them.

When the user executes the downloaded file, the Weasis image viewer is launched (Figure 8). The following are the interface functions (look for the numbers in the figure):

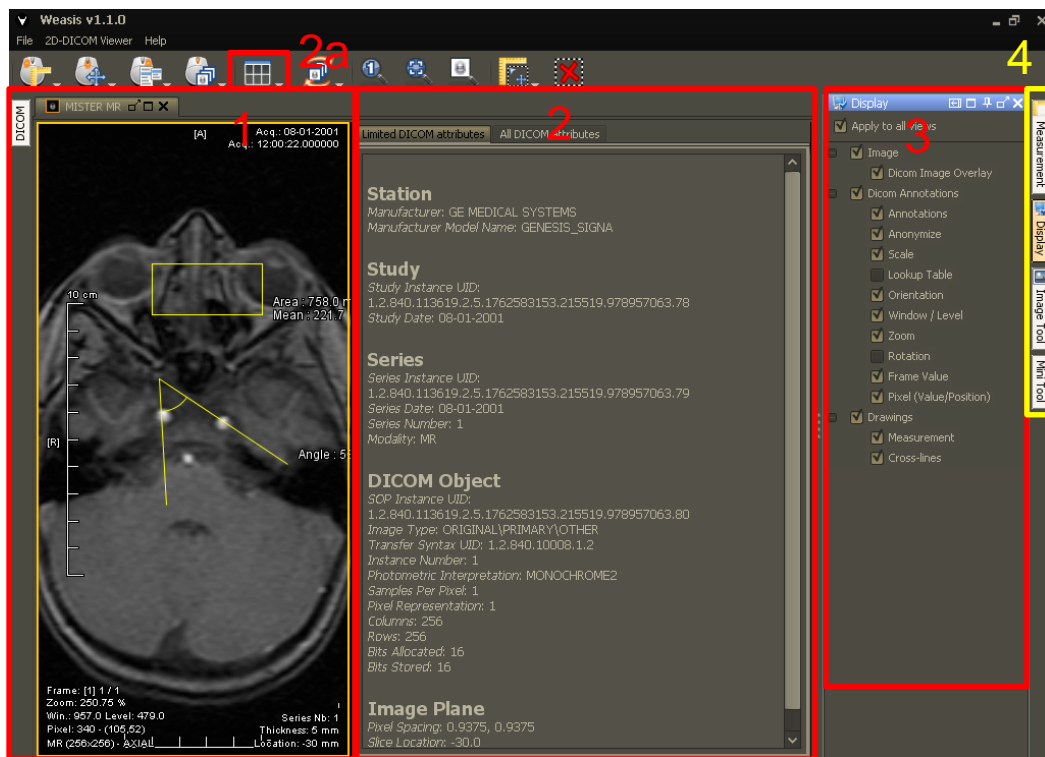


Figure 8. Weasis controls.

1. Displays the image. The example in the figure shows the viewer measurement capabilities for area and angle, but there are a lot more. You can access to them through the Measurements button in the yellow rectangle marked 4 in Figure 8.

2. Shows all DICOM information contained in the file. You can activate this function with an option (DICOM Information) in the button marked 2a in Figure 8.
3. Expanded area corresponding to the selected button in rectangle marked 4. The example in the figure shows the options for Display button, which allow the customization of the information shown around the image (e.g. for anonymization).
4. There are four menus:
 1. Measurements, for selecting measurements as shown in rectangle 1.
 2. Display, for display options as explained above.
 3. Image Tool (Figure 9). Windowing, level, lookup table (LUT), filter, zoom, rotation, frames per second options are available to the user.

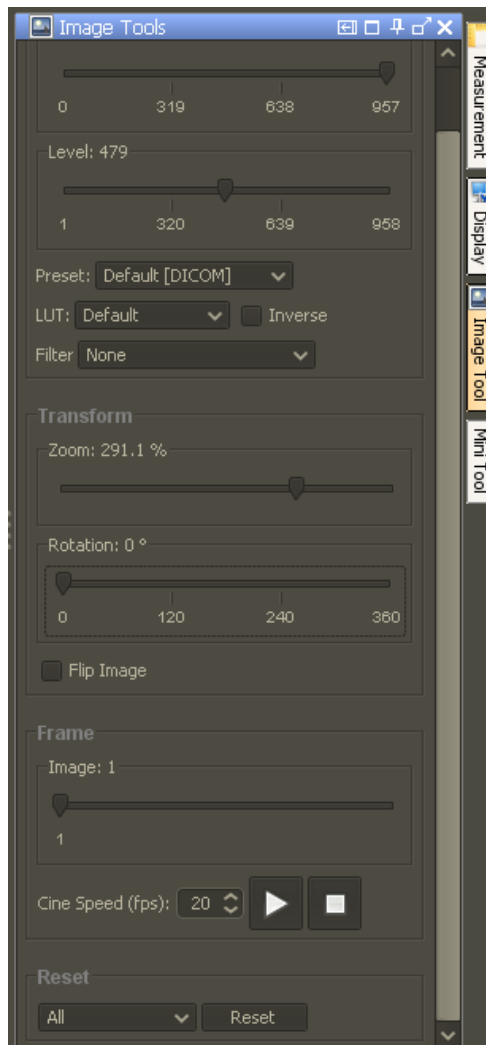


Figure 9. Image Tool.

4. Mini Tool, allows scrolling between several images in a series.