RESOURCE AND PATIENT MANAGEMENT SYSTEM

Electronic Health Record

(EHR)

Installation and User Manual for IHS Imaging Viewer

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Preface

This manual provides information on the Indian Health Service (IHS) Imaging Viewer object.

VistA Imaging is used to attach images to Radiology Reports or Text Integration Utility (TIU) Progress Notes in RPMS. In the EHR application, Progress Notes and Radiology Reports are displayed in tabs that are part of the patient's electronic medical chart.

The ad-hoc patterns of usage common to the Image Viewer dictate the structure of this user manual. As a result it became more of a description of the available tools and suggestions of best practices than a procedural, how to manual.

Recommended Users:

This document addresses the needs of the end users of the IHS Imaging Viewer.

1.0 Introduction

The Indian Health Service (IHS) Imaging Viewer object was developed to provide tight integration of images with reports in the IHS Electronic Health Record (EHR) application. To meet the requirements of Meaningful Use Phase 2, the context between images and reports must be maintained all times.

The EHR application is built on a flexible framework that allows the insertion of objects that communicate with the framework. The framework then handles all exchange of information with Resource and Patient Management System (RPMS).

VistA Imaging is used to attach images to Radiology Reports or Text Integration Utility (TIU) Progress Notes in RPMS. In the EHR application, Progress Notes and Radiology reports are displayed in tabs that are part of the patient's electronic medical chart. A user with access rights to Design Mode in the EHR application can add IHS Image Viewer objects to EHR templates. This allows users to easily display abstracts (thumbnail images) associated with a patient's Progress Note or Radiology Report. The IHS Image Viewer object also allows the user to open the full resolution viewer to further interact with the images.

The IHS Imaging Viewer has two distinct visual parts. The first visual part (which is inserted into the framework) communicates with the RPMS database, displays abstracts and launches the full resolution viewer when abstracts are selected for display. The second visual part is the full resolution viewer, which has no direct connection with the RPMS database. The full resolution viewer provides a rich set of tools to view and manipulate the images.

Additionally this document contains information about the setup and configuration of EHR application to support the Imaging Viewer.

2.0 Using the IHS Image Viewer

The workflow of the typical user is a search and display process. A particular patient becomes of interest for a clinical reason, a provider looks up the patient, examines the patient chart, discovers that the patient has documentation with attached images, and the provider accesses these images at will.

3.0 Client Configuration

3.1 Add the IHS Imaging Abstract Viewer Object to a Template

1. To enter Design Mode, right-click the EHR title bar or press Ctrl/Alt/D on the keyboard.
2. Once in Design Mode, select the tab where you want to add the IHS Image Viewer object.

   In a practical setting, the Notes and Reports tabs should have an IHS Image Viewer object inserted, since these are the only RPMS reports that have image indicators in the chart.

   Note: Clinical Application Coordinators (CACs) are generally the users given access to Design Mode.

3. Right-click in the area where you want to insert the IHS Image Viewer object into the EHR template.
4. Select Add Object from the Context menu.
5. Expand the Name item from the Object tree.
6. Scroll down the list of objects and select IHS Image Viewer.
7. Click Add.

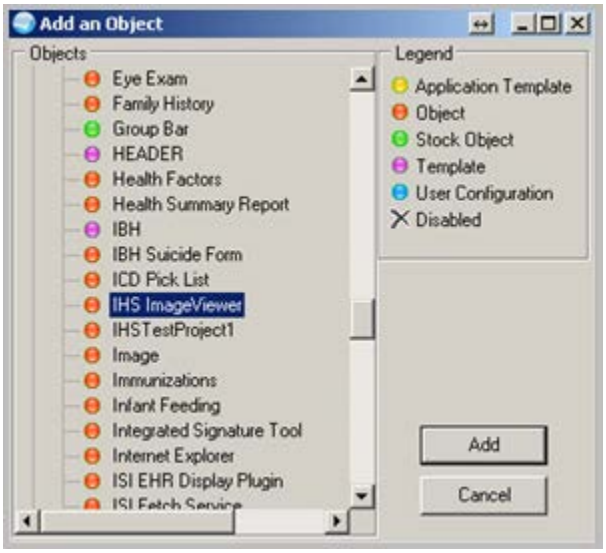


Figure 3-1: Add an Object dialog

This inserts an IHS Image Viewer object into the selected area, which can be sized to fit the client area.

8. Access the properties by right-clicking the IHS Image Viewer object just inserted.
9. Select the Properties Context Menu.

3.1.1 Properties Dialog

The Properties dialog contains the standard EHR object properties and additional custom properties. Two check boxes control what types of images are displayed in the IHS Image Viewer object, and another check box controls the object's appearance.

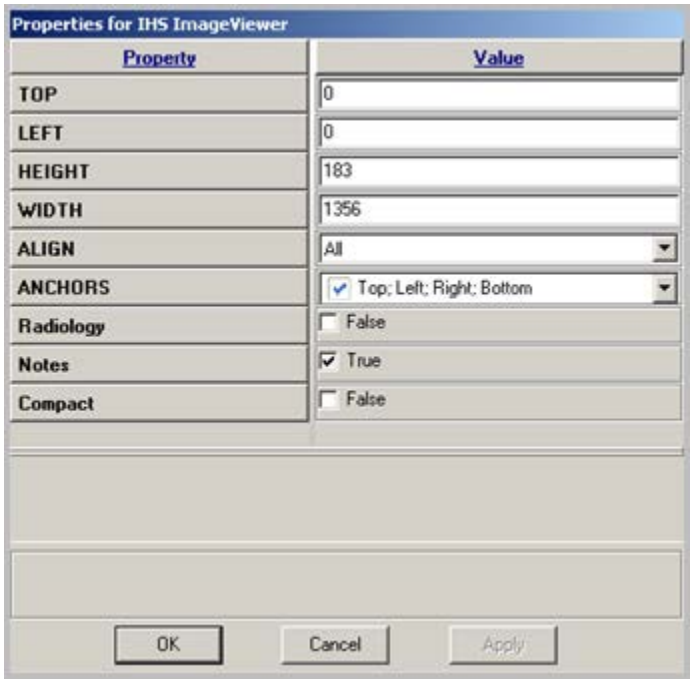


Figure 3-2: Properties dialog

- When the Radiology check box is selected, the object displays Radiology images.
- When the Notes check box is selected, the IHS Image Viewer object displays images attached to progress notes. This enables the user to have IHS Image Viewer objects inserted into tabs that display radiology reports, progress notes or both.
- The Compact check box enables the IHS Image Viewer object to operate in compact mode. It is beneficial on very crowded tabs. In this mode the IHS Image Viewer object only shows the study information. When the user clicks an object, the abstracts are displayed in a popup window. Clicking outside of the pop up reverts the Abstract Viewer to its compact display. If the compact mode is not checked the abstracts and the study information is displayed within the object in detailed mode.

Clicking OK saves the settings for the selected IHS Image Viewer object.

1. Once the object is sized appropriately, click the Design menu.
2. Select the Save as Template menu item and click Save to save the current template. You can also select a different template from the list or create a new template.
3. Exit Design Mode by right-clicking the EHR title bar and selecting Design Mode from the context menu or press Ctrl/Alt/D on the keyboard.

The details of working with EHR templates can be found in the VueCentric EHR documentation, and are beyond the scope of this manual.

Once the IHS Image Viewer object is inserted and properly sized, the object properties must be set in order to view images.

Figure 3-3 illustrates the IHS Image Viewer object inserted in Detailed Mode into the Notes tab:

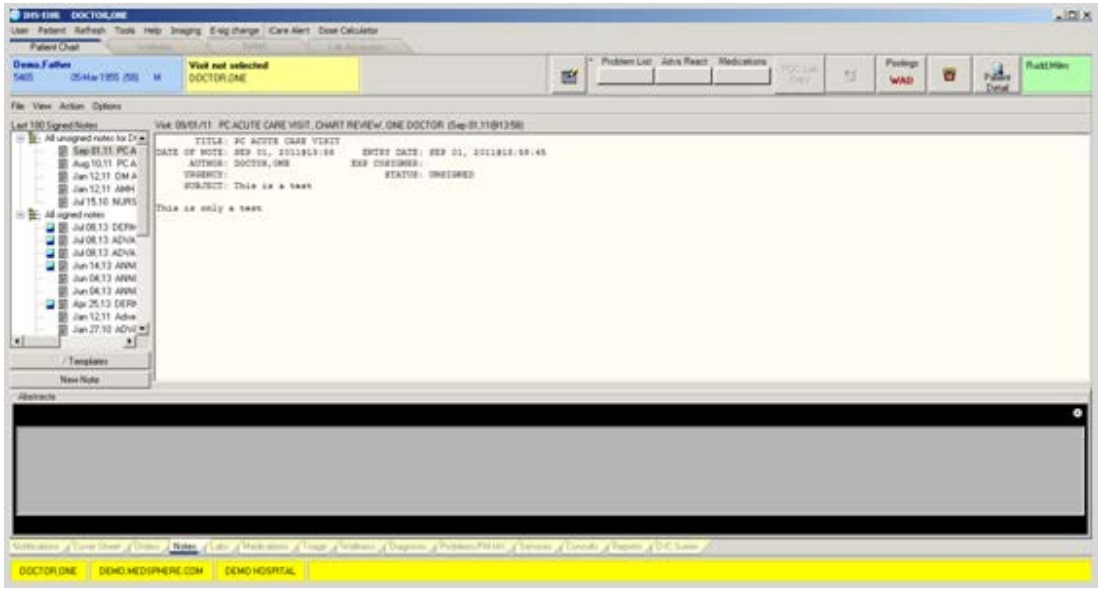


Figure 3-3: IHS Image Viewer object

3.1.2 IHS Image Viewer Property Settings

The user can access the Settings dialog for any of the inserted IHS Image Viewers by clicking the Settings (⚙) icon on the upper-right corner of the IHS Image Viewer object. Figure 3-4 shows the general settings.

3.1.2.1 General Tab

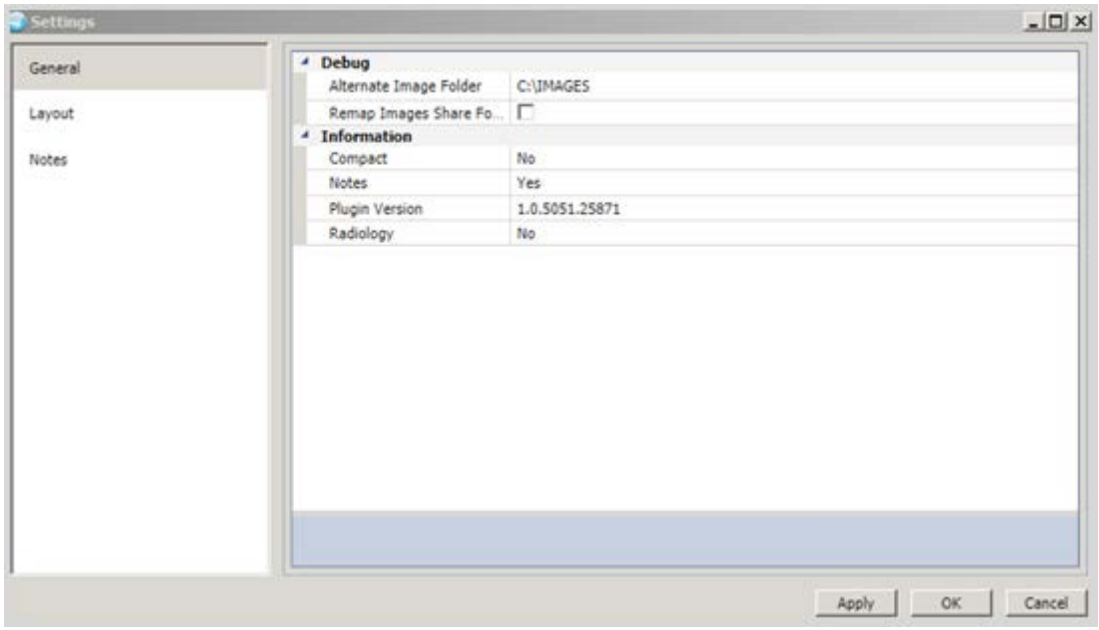


Figure 3-4: Settings dialog – General tab

On the General tab, the user may remap the image directory or force the install of the viewer component. These features are used for testing or troubleshooting.

3.1.2.2 Layout Tab

The Layout tab is used to control the appearance of radiology studies in the full resolution viewer.

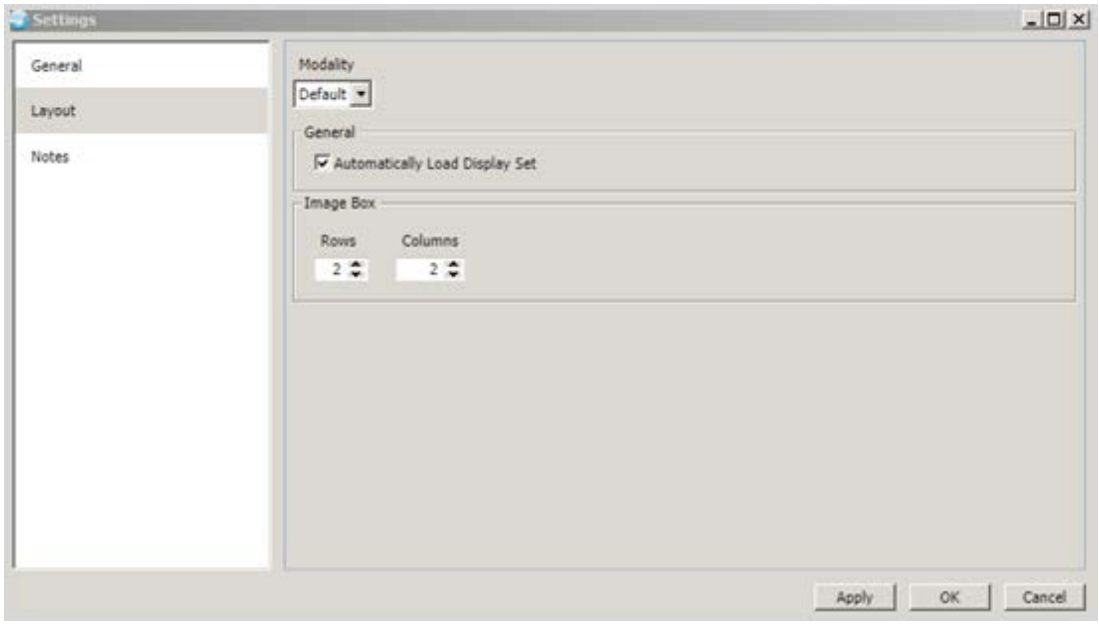


Figure 3-5: Settings dialog – Layout tab

The Layout tab provides the user with controls to select the full-resolution viewer layout based on the modality contained in the image headers. The default setting is used for the layout for modalities without specific layout definition.

The Automatically Load Display Set check box enables the loading of the entire study into the layout when the abstract is double clicked in the IHS Image Viewer object inserted into the Notes or Reports tab.

The expanded Modality drop-down list shown illustrates the currently supported Modality types.

Figure 3-6: Modality list

The layout enables the user to select optimum configurations for the most common radiology procedures.

3.1.2.3 Notes Tab

The Notes tab controls the initial layout of the viewports on the notes tab of the full resolution viewer.

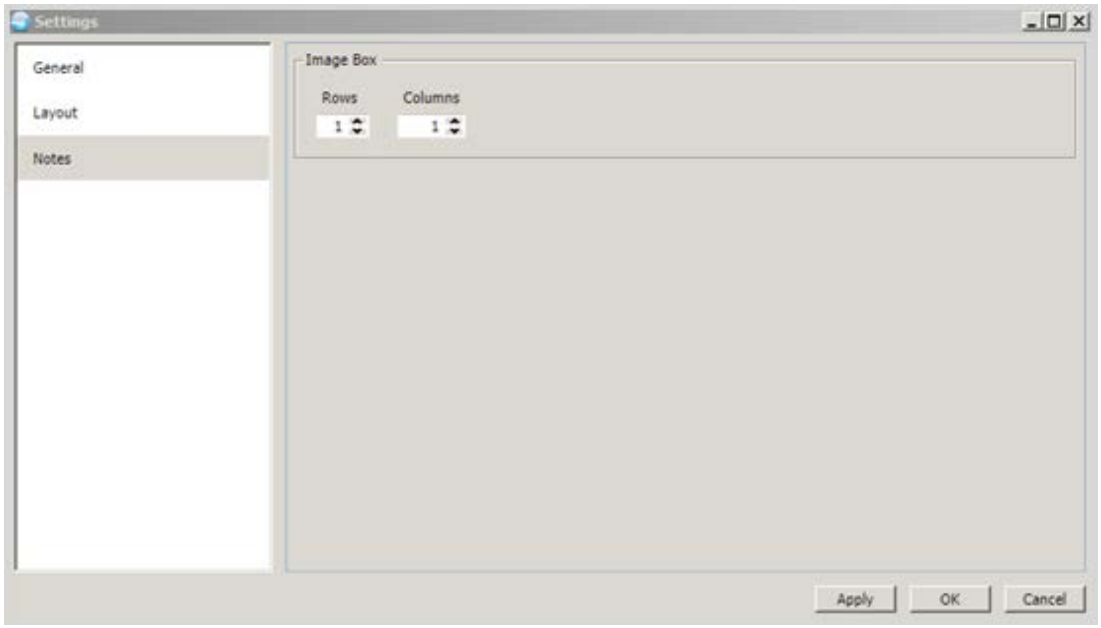


Figure 3-7: Settings dialog – Notes tab

The Image Box Row and Column selector controls the initial division of the full-resolution viewer into image boxes (also known as viewports).

4.0 Using the IHS Image Viewer

The workflow of the typical user is a search and display process. A particular patient is of interest for a clinical reason. The provider looks up the patient, examines the patient chart, discovers that the patient has documentation with attached images, and the provider can access these images at will.

4.1 Select a Patient

The top-left corner of a chart usually contains the patient pane.

Note: Sites may configure this area as well, so there is no guarantee that the Patient Information pane will be in the same location.

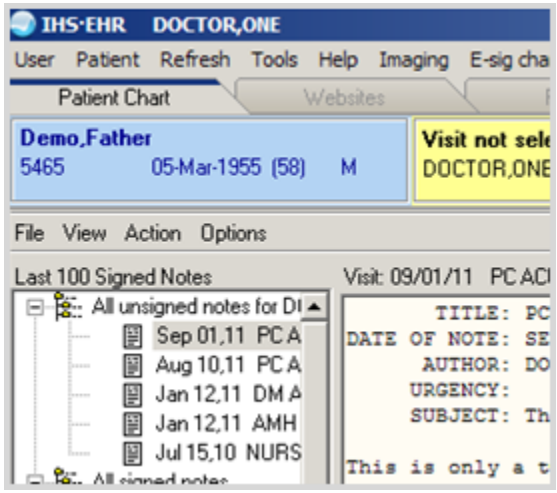


Figure 4-1: Patient Chart

Selecting the Patient Information pane brings up the Patient Search tool.

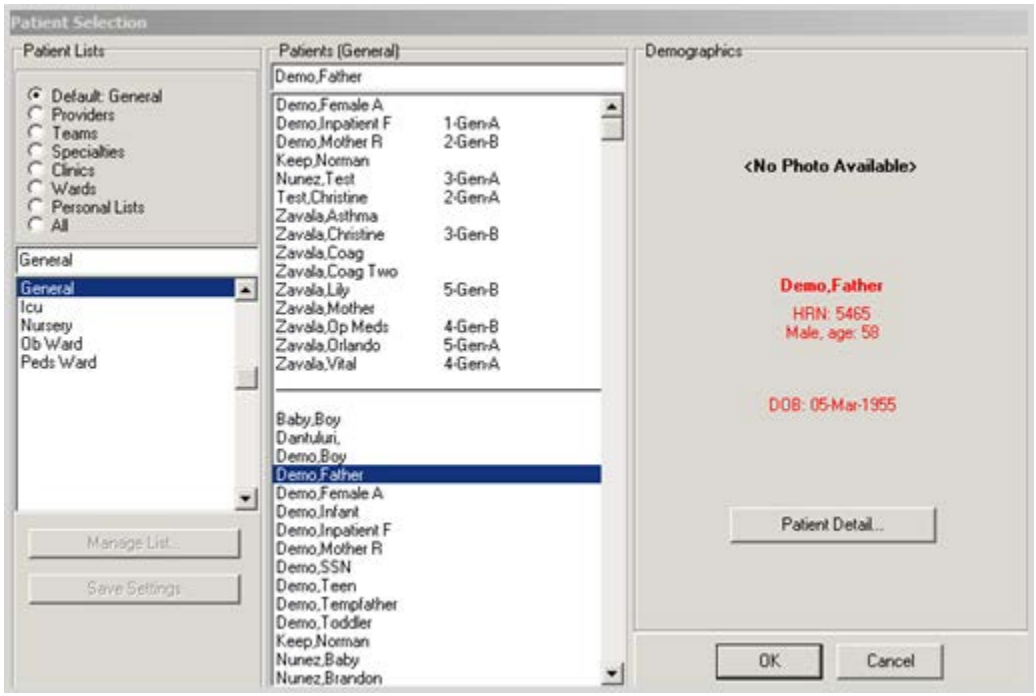


Figure 4-2: Patient Search Tool dialog

4.2 IHS Image Viewer Object

Once a patient is selected, the user may interact with the IHS Image Viewer object inserted into one of the tabs. Figure 4-3, shows a Detailed Abstract Viewer inserted into the Notes tab. When the Notes tab is selected and a note without images is selected, the Abstract Viewer is cleared.

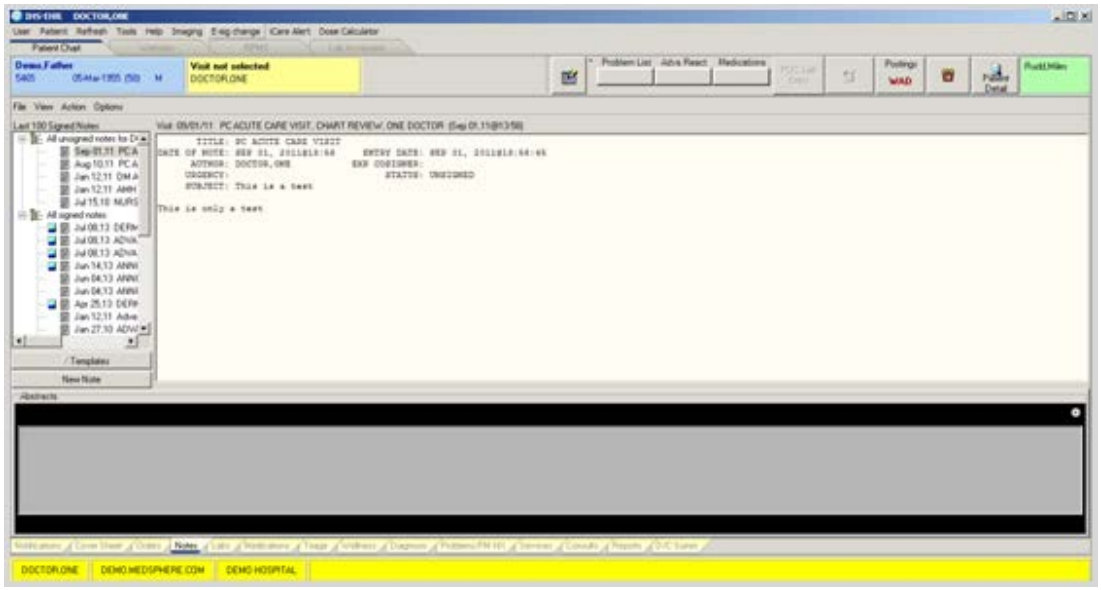


Figure 4-3: Detailed Abstract Viewer

4.2.1 Notes

When a note with attached images is selected, the Abstract Viewer loads the images and displays an abstract for each series of images attached. In most cases, note images have a single image in each series. Therefore, each abstract usually represents a single image.

Some of the more advanced imaging modalities may generate DICOM series of images attached to TIU notes, in which case an abstract may represent multiple related images.

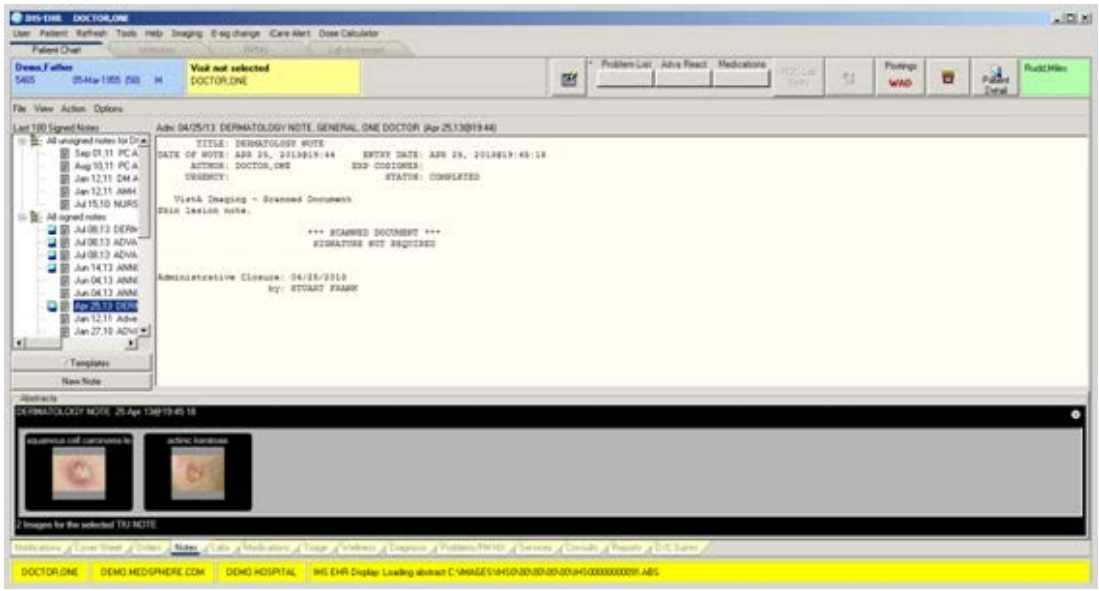


Figure 4-4: DICOM Image Series Attached to Notes

In Figure 4-4Figure12, a compact Abstract Viewer has been added to the Reports tab. When the Reports tab is selected, the Abstract Viewer is cleared of images and information if there are no exams with attached images selected.

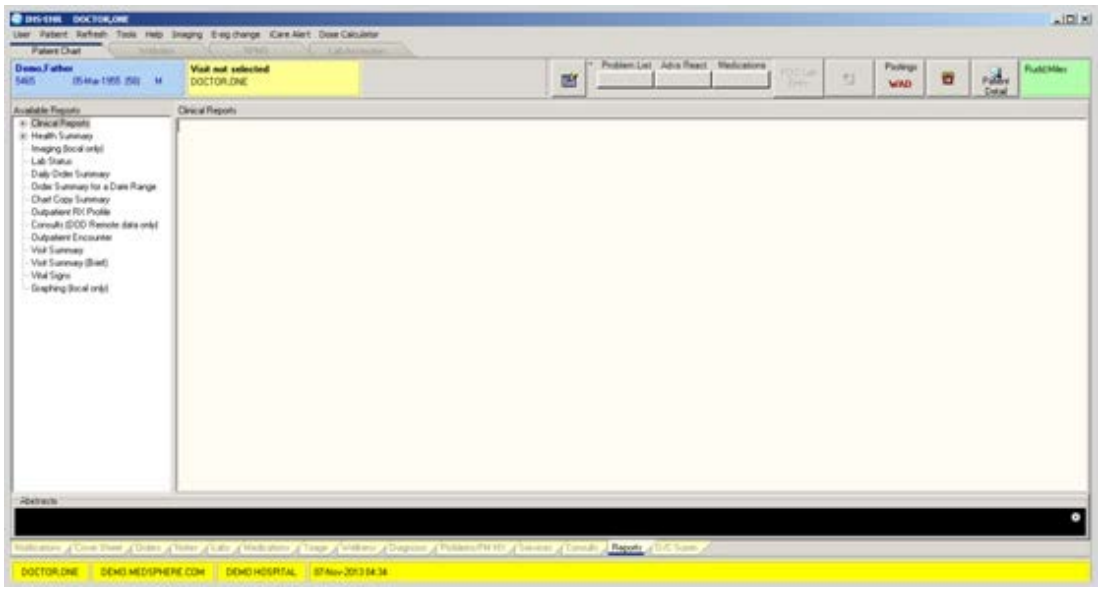


Figure 4-5: Abstract Viewer Cleared

When an exam with images is selected, the Abstract Viewer displays information related to the selected case including the exam description and the number of images in the case.

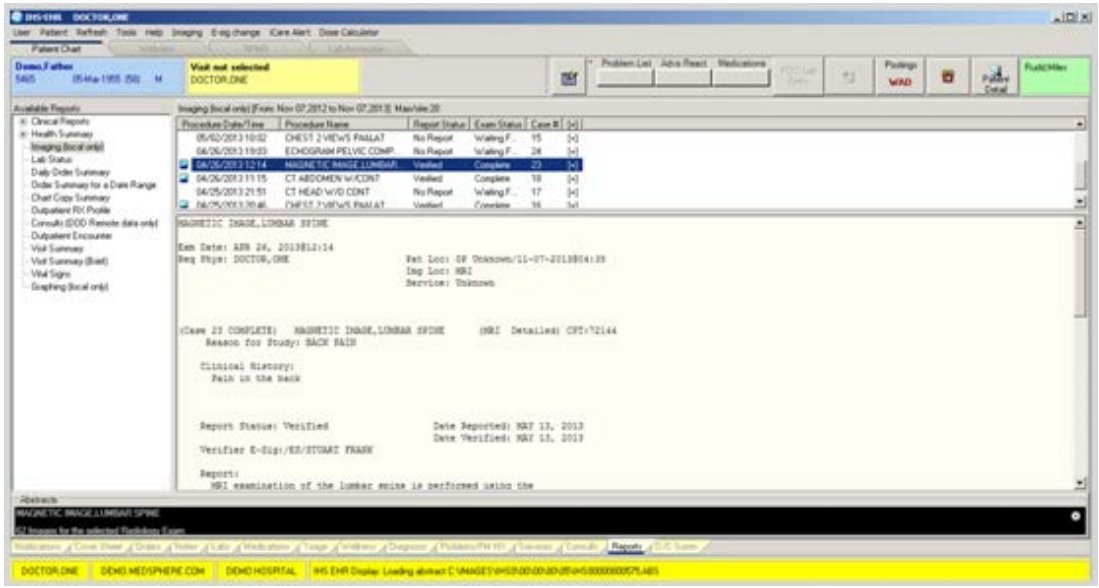


Figure 4-6: Case Information Displayed in Abstract Viewer

When the user selects the compact Abstract Viewer, the abstracts display in the dialog.

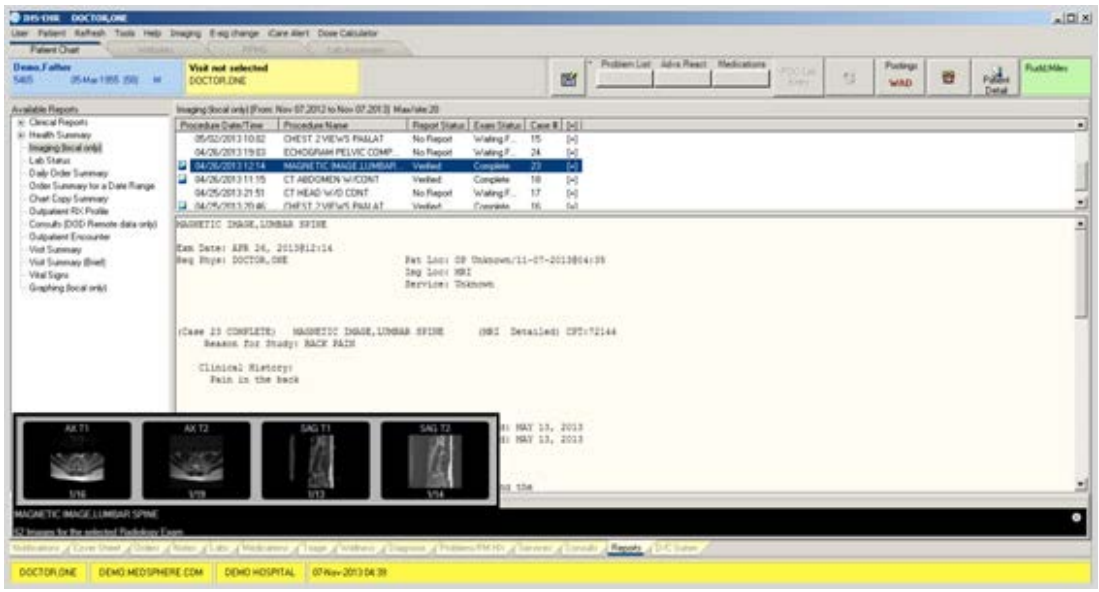


Figure 4-7: Abstracts Loaded in the Abstract Viewer

4.3 Full Resolution Viewer

Selecting an abstract opens the full resolution viewer and loads the image into the viewports. Figure 4-7 displays the full resolution viewer for images attached to a Note.

Figure 4-8: Image-Attached Notes

Selecting a Radiology abstract opens the full-resolution viewer and loads the images into viewports **if** the Autoload setting is selected in the object properties.

If the Autoload setting is not selected, the user can take one of two actions:

- Select an abstract and drag it to an unused viewport.
- Double-click an abstract, which causes all the images of the case loaded into memory and the series of the case to populate the viewports from the upper-left corner of the grid.

Figure 16 represents a set of radiology images in the full resolution viewer:

Figure 4-9: Radiology Images in Full Resolution Viewer

4.4 Work with Note Images

Once images associated with notes are loaded into the full-resolution viewer and automatically arranged into viewports, the user may start interacting with these images.

It is important to recognize that if a set of note images cannot fit into the configured number of viewports, the viewer allows paging through multiple sets of images. This is accomplished by using the viewer tools on the Notes tab. The number of images attached to the case and the number of viewports visible in the viewer, determine the number of pages occupied by images.

When there are more than one page of images, the viewer enables the Up and Down Arrow buttons as appropriate. Clicking the Down Arrow reveals the next page of images, while clicking the Up Arrow displays the previous page.

To dynamically change the layout click the Grid button ( ) to launch the Layout Selection tool.

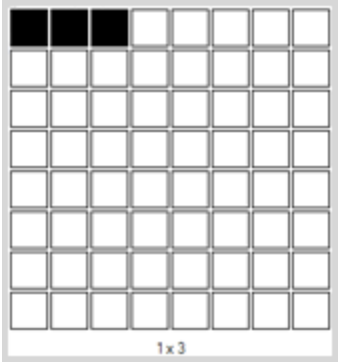


Figure 4-10: Layout Selection tool

The tool's shaded squares represent the grid layout to be applied to the viewer. Once the final selection is made, the viewer renders the case in the selected layout, where the top-left corner Viewport of the grid will be occupied by the image that is in the current layout's top-left Viewport.

The Viewport tools are used to manipulate image presentation.

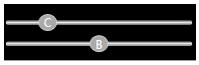

Adjusts the image magnification to fit the width of the viewport. The operation preserves the Image's aspect ratio


Adjusts the image magnification to fit into the viewport in both vertical and horizontal direction while preserving the image's aspect ratio


Magnifier tools increase or reduce the magnification of the image


Rotates the image 90 degrees to the left or to the right


Resets the image to the presentation that was used to when the image was loaded


Sliders adjust brightness and contrast

4.5 Work with Radiology Images

The loading of radiology images is controlled by the modality specific Layout settings. A radiology case may be auto loaded and laid out using all available Viewports, or may only load into the full resolution viewer's abstract strip. The user may, at any time, drag an abstract to an unused Viewport, or double-click an abstract to load the entire case into the available Viewports.

4.5.1 Viewports

The Viewer uses one or more Viewports for image display. A Viewport can contain a single image or a group of related images. How images are displayed is largely

dependent on the organization of the DICOM study. As a general guideline one can expect that:

- Images of a general radiology (CR or DX) exam are usually displayed one image per Viewport.
- Images of CT or MR exams are usually divided among several Viewports:
  - One viewport per series (or sequence)
  - Optionally one Viewport for scout (localizer) images

Images in a Viewport can be adjusted independently from images in other Viewports. Within a Viewport, all images can be adjusted at once or single images can be adjusted independently.

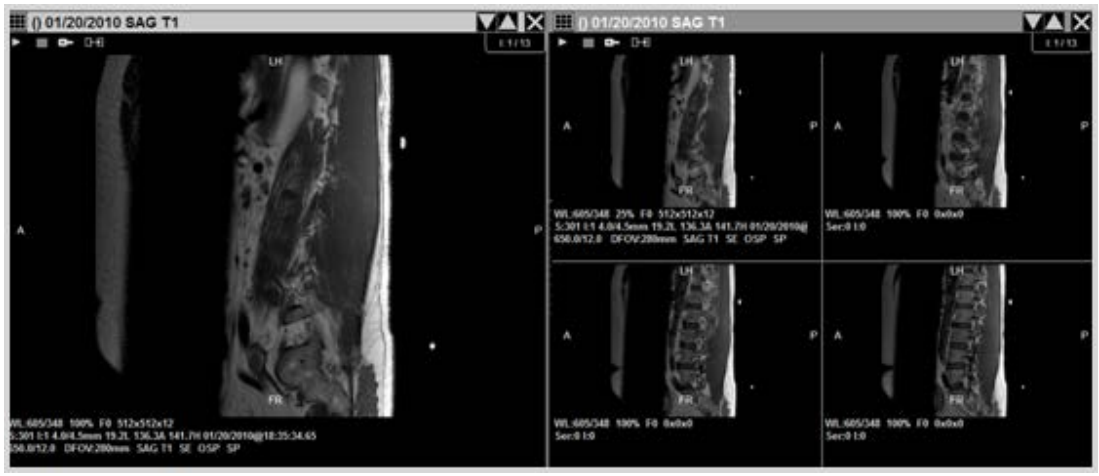


Figure 4-11: Viewport Images

Viewports can display one image at a time (stacked view) or several images at once (tiled view). Users can switch between views without having to reload an exam.

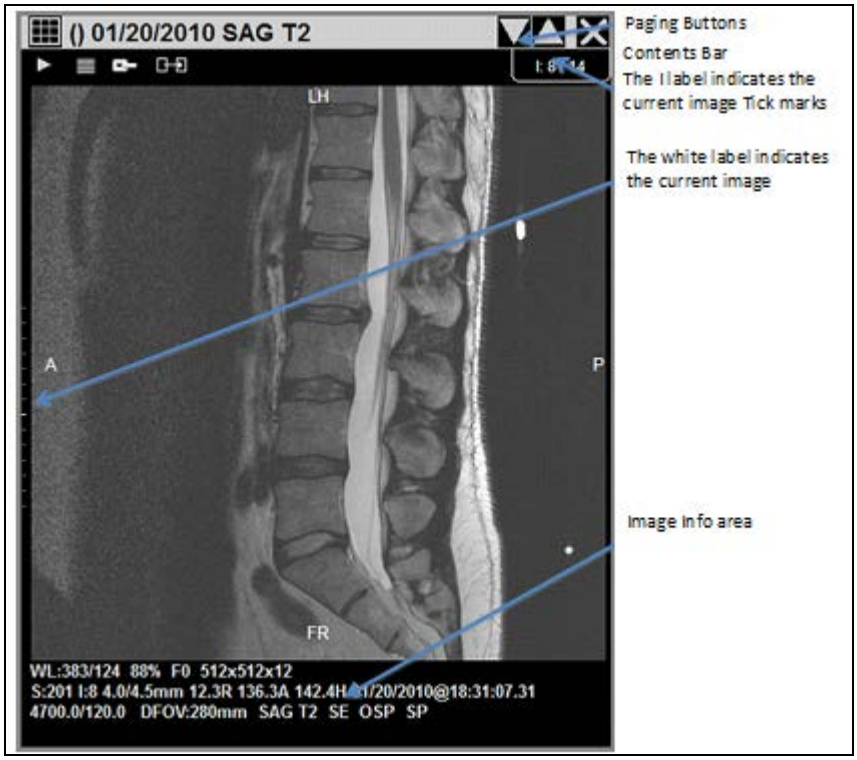


Figure 4-12: Viewport Display

4.5.1.1 The Title Bar

The Viewport Title bar displays the case ID, status, and date of the exam. The Viewport Title bar may also display other information, such as the series ID.

If there is not enough space to display all the text in the Viewport Title bar, pause the mouse pointer over the title bar to make it expand and display all its contents.

4.5.1.2 The Contents Bar

The Contents bar is located in the upper-right corner of a viewport. It displays the number of exams, image sets (series), and images in the viewport.

4.5.1.3 Tick Marks

In viewports that contain multiple images, the relative position of the selected image in the stack is indicated by tick marks on the left side of the viewport. The I label in the Contents bar can also indicate the position of an image in the stack.

4.5.1.4 The Image Information Area

The information area at the bottom of a viewport displays such details about the selected image as image number, acquisition date/time, the image's current display properties (window/level, scale, and so on), and other acquisition data.

If there is not enough space to display all image information, you can pause the mouse pointer over the area to make it expand and display all its contents.

Clicking the information area opens the Image Detail window.

4.6 Manipulate Images

4.6.1 Change Image Properties

The following changes can be made to images displayed in viewports:

- Scale
- Pan
- Window/Level
- Invert
- Orientation
- Sharpness
- Reset

4.6.1.1 Scale Images

An image can be can be dynamically zoomed from 5% to 800%, or it can be scaled to a specific percentage of its original size. You can also expand an image in the Viewer window to the size of an entire screen.

As an image's scale is changed, the current scale percentage is shown in the image information area at the bottom of the viewport.

4.6.1.1.1 Change Scale Dynamically

Select the image you want to scale and drag it with the right-mouse button while pressing the Ctrl key.

You can also turn on the Scale tool (). To do this, click the toolbar or right-click any image. Then click Scale and change scale by dragging with the left-mouse button.

When you have finished using the scale tool, turn it off by right-clicking once.

To scale an image to a specific size:

1. Click the Scale tool in the toolbar or right-click any image.
2. Click Scale.
3. Point to the image you want to change and do any of the following:

To...	Do this...
Scale image to 100%	Point near the top-left corner of the viewport. When the mouse pointer changes to  , Click once.
Scale image to fit viewport	Point near the top middle part of the viewport. When the mouse pointer changes to  , click once.
Scale image to 50, 75, 125, 150, or 200%	Point near the top-right corner of the viewport. When the mouse pointer changes to  , click once. Then click a scale option in the menu that displays.

Note: While the Scale tool is turned on, you can also zoom in or out by dragging with the left-mouse button.

4. Continue using the Scale tool, or disable it by right-clicking once or by choosing another tool.

To use full-screen view:

1. In the Viewer window, double-click an image. The image expands to fill an entire screen.
2. While the full-screen view is active, you can:
   - Adjust (window/level, flip/rotate, and so on) the current image.
   - Scroll to other images or use the Cine tool.
3. When you have finished, double-click the image to restore it to its original size.

4.6.1.2 Pan an Image

To pan an image, point to the image you want to pan and drag using the left-mouse button. Images that are completely visible cannot be panned.

Note: If the image does not pan, right-click once to make sure that no other tools are active. (The mouse pointer is an arrow pointing up and to the left when no tools are active.

4.6.1.2.1 Change Window/Level

You can change an image's window/level using the mouse, the keyboard, or a combination of both. You can also use the Auto-Window/Level tool to base window/level values on a selected area in an image.

As an image's window/level is changed, the area under the image updates to show the current window/level values. Unless Apply To settings have been changed, window/level changes affect all images in the viewport.

To change window/level:

1. Point to the image you want to adjust and drag it using the right-mouse button.
   - Drag up or down to change window (window width) values.
   - Drag left or right to change level (window center) values.
2. You can also click the Window/Level tool () in the toolbar and change window/level by dragging it with the left-mouse button.
3. When you have finished using the Window/Level tool, turn it off by right-clicking once.

To use the auto-window/level tool:

1. Click the Auto-Window/Level tool () in the toolbar.
2. In the image you want to adjust, drag the mouse pointer to define a rectangular area that includes the tissue you want to base the window/level on.
3. When the drag/highlight is completed, the new window/level values are applied to the entire image.
4. Continue using the Auto-Window/Level tool, or disable it by right-clicking once or by choosing another tool.

4.6.1.2.2 Invert Grayscale Values

You can invert grayscale values to create a Negative view of an image.

To invert an image:

1. Click the Invert tool () in the toolbar, or right-click any image and click Invert.
2. Click the image you want to invert.
3. Continue using the Invert tool, or disable it by right-clicking once or by choosing another tool.

4.6.1.2.3 Reorient Images

You can change an image's orientation by rotating it 90 degrees or by flipping it front-to- back. As changes are made, any positional indicators displayed near the edges of the image are updated to reflect the new orientation. (This does not include markers that are burned into the image itself.)

To rotate images 90 degrees:

1. Click the Rotation tool () in the toolbar.
2. Point to the image you want to rotate.
   - To rotate the image counterclockwise, click on the left side of the image.
   - To rotate the image clockwise, click on the right side of the image.
3. Continue using the Rotate tool or disable it by right-clicking once or by choosing another tool.

To flip images:

1. Click the Flip tool () in the toolbar.
2. Point to the image you want to flip.
   - To flip the image vertically, click the top part of the image.
   - To flip the image horizontally, click the bottom part of the image.

4.6.1.3 Change Layout

You can specify the layout (number of rows and columns) in a window and in each viewport. The layout of each viewport or window can be set independently.

To use full-screen view:

In the Viewer window, you can double-click an image to expand it to fit the current screen.

- While you are in full-screen view, you can adjust the image or scroll to other images.
- When you have finished, double-click again to return to the original screen layout

To change layout in a viewport:

1. In the upper-left corner of a viewport, click the Layout tool () and drag it down using the mouse.
2. In the grid that displays, move the mouse until the desired number of rows and columns are highlighted.
3. Click the left-mouse button.

> **Note:** Layout cannot be changed if the viewport contains only one image.

To change layout in the Viewer:

1. In the toolbar, click the Viewer Layout tool () and drag down using the mouse.
2. In the grid that displays, move the mouse until the desired number of rows and columns are highlighted.
3. Click the left-mouse button.

4.6.1.4 Copy Properties

You can copy properties, such as window/level, scale, position (pan), and orientation, from one viewport to another. You can copy several properties at once, or copy a single property only.

To control which properties are copied:

1. In any occupied viewport, click the Copy tool () and drag down to display the drop-down menu.
   - A check mark indicates properties to be copied
   - The absence of a check mark indicates properties that will not be copied
2. Select a property to add or remove a checkmark. The settings you choose affect all viewports in all windows, and will be retained for the duration of your session.

To copy properties (Copy icon):

1. Select the image with the properties you want to copy.
2. Click the Copy tool in the source viewport.
3. Click an image in the target viewport.
4. Continue using the Copy tool, or disable it by right-clicking once or by choosing another tool.

To set initial copy settings:

1. In the Viewer or Manager toolbar, click View | Settings.
2. Click the Viewport tab.
3. In the Copy Options area, select each property to be copied when the Copy Properties feature is used.
4. Click OK.

4.6.1.5 Link Viewports

Viewports in the Viewer can be linked. When viewports are linked, scrolling and paging changes made in one viewport affect all linked viewports. Changes to scale, orientation, and so on, performed in one viewport can affect all linked viewports as well.

When viewports are linked, the Link icon located near the top of the viewport appears as follows:

When viewports are not linked, the Link icon changes appearance:

To link viewports:

If the viewports being linked contain images from different exams, select anatomically equivalent areas in each viewport before creating the link.

1. In one of the viewports you want to link, click the not linked Link tool.
2. Click each viewport you want to link. As the link is established, the Link icon will change to the linked version.
3. When you have finished, right-click once to turn off the link function. Links are retained until the exam is closed or until the link is explicitly removed.
4. Scroll or adjust the contents of one of the linked viewports as desired. Changes are reflected in all linked viewports.

> **Important:** If the linked viewports contain images from the same exam (for example, all images have the same Frame of Reference UID), each viewport shows the same anatomy as you scroll or page through images in the linked viewports.

To unlink viewports:

1. Use either of the following methods:
   - Point to the viewport you want to unlink, press the Ctrl key, then click the Link tool.
   - In the viewport you want to unlink, click the Link tool and drag-down a short distance with the mouse.
2. Click Unlink.

To control which properties are linked:

1. In a linked viewport, click the Link tool and drag-down to open the drop-down menu.
   - A check mark indicates that changes for a particular property have been applied across all linked viewports.
   - The absence of a check mark indicates that changes for a particular property have been applied to the current viewport only.
2. Select a property to add or remove a check mark.

The settings you choose affect all linked viewports until the viewports are cleared. If there are multiple links active, settings for each link group can be set independently.

4.6.1.6 Move Image Sets

Images can be moved from one viewport to another.

To move images:

1. Locate the viewport you want to use as the target viewport:
   - The target viewport can be empty, or it can contain a single image set.
   - The target viewport cannot contain more than one image set. The Contents bar in the upper-right corner indicates how many image sets (series) are present.
2. Drag the title bar of the viewport that contains the images you want to move into the target viewport:
   - If the source viewport contains any hidden image sets, the next hidden image set is displayed when the move is completed.
   - If the target viewport was previously occupied, your current drag and drop settings determine if the contents of the target viewport are swapped or replaced.

4.6.1.7 Sort Image Sets

Images in a viewport are automatically sorted based on information from the acquisition modality. If necessary, you can override the default sorting used and set your own sort order.

4.6.1.8 Use the Cine Tool

4.6.1.8.1 Start and Stop the Cine Tool

1. If there are multiple images visible in the viewport (tiled view), click the image that you want to use as a starting point.

2. Click the Arrow ( ) button located in the upper-left corner a viewport.
3. When you have finished, click the Halt ( ) button to stop the Cine tool.

4.6.1.8.2 Set Cine Speed

1. Open the Cine drop-down menu by clicking the Arrow or Halt buttons and dragging-down with the mouse.
2. Point to Speed, then click Low, Medium, or High.

> **Note:** To set the default cine speed, click View | Settings | Viewport, then choose an option from the Cine Speed box.

4.6.1.8.3 Set Cine Direction

1. Open the Cine drop-down menu by clicking the Arrow or Halt buttons and dragging-down with the mouse.
2. Point to Direction and click Loop Forward, Loop Reverse, or Yoyo.
   - The direction you choose takes effect immediately, including any currently running Cines.
   - All viewports are affected by the change.

> **Note:** To set the default Cine direction, click View | Settings | Viewport, then choose an option from the Cine Direction box.

4.6.1.8.4 Set the Cine Range

1. If the Cine tool is running, stop it by clicking the Halt button.
2. Display the image to be the first image in the Cine range.
3. Open the Cine drop-down menu by clicking the Arrow button and dragging-down with the mouse.
4. Point to Range, then click First Cine Image.
5. Display the image to be the last image in the range.
6. Open the Cine drop-down menu by clicking the Arrow button and dragging a short distance with the mouse.
7. Point to Range, then click Last Cine Image.

4.6.1.8.5 Reset the Cine Range

1. Open the Cine drop-down menu by clicking the Arrow or Halt buttons and dragging-down with the mouse.
2. Point to Range, then click Reset.

4.6.1.8.6 Use Sharpen/Smooth

You can apply sharpen/smooth filters to an image. Unless Apply To settings have been changed, sharpen/smooth changes affect all images in the viewport.

The info area at the bottom of each viewport displays which filter is used, where F+N indicates a sharpen filter, and where F-N indicates a smooth filter.

4.6.1.8.7 Sharpen or Smooth an Image

1. Click the Sharpen tool () in the toolbar or right-click any image and then click Sharpen.
2. Point to the image you want to adjust and drag the mouse using the left-mouse button.
   - To increase sharpness, drag up or left.
   - To decrease sharpness, drag down or right.
3. Continue using the Sharpen/smooth tool, or disable it by right-clicking once or by choosing another tool.

4.6.1.9 Mensurated Scale

When an image is displayed, a mensurated scale is displayed on the left side of the image's viewport. The scale uses pixel size data in the image header. If there is no pixel size data available for the image, you can use the Calibrate tool to establish a pixel size. See Section 4.6.1.14 for additional information.

Figure 4-13: Mensurated Scale

To display the mensurated scale:

1. With an image in the viewport, right-click to display the Context menu.
2. Click the Mensurated scale option from the menu. The scale displays to the left of the image.

To remove the mensurated scale from view:

Right-click the image to display the Image Context menu.

4.6.1.10 Annotations

4.6.1.10.1 Annotation Basics

You can use annotations to call attention to areas of interest in an image. You can also add text labels or measure image features. Annotations that are added during a session are not saved with the image and will be discarded when the Image Viewer is closed.

4.6.1.10.2 Add Shapes and Labels

You can add lines, shapes, and text to an image.

Note:	Any hidden annotations in an image are displayed when you select an annotation- related tool.

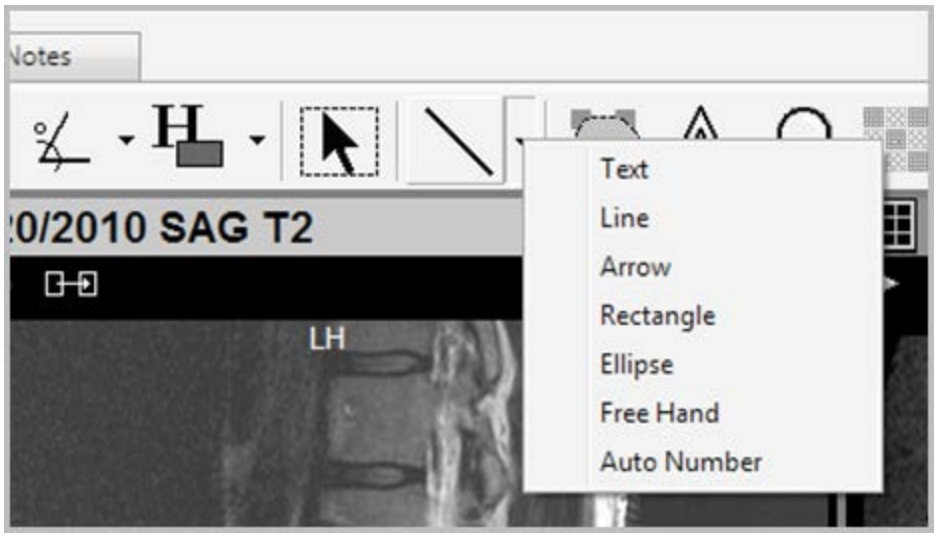


Figure 4-14: Annotation Tools

To add lines and arrows:

1. Use the Annotation button in the toolbar to turn on the Line or Arrow tool.
2. Click to set the start point of the line, drag the mouse, and release the mouse button when the line or arrow is the desired length.
3. You can add additional annotations, select a different tool, or right-click once to turn off the active tool.

To add rectangles and ellipses:

1. Use the Annotation button in the toolbar to turn on the Rectangle or Ellipse tool.
2. Drag the mouse to draw the line or shape. An outline displays as you drag the mouse.
3. Release the left-mouse button when the outlined area is the desired size.
4. You can add additional annotations, select a different tool, or right-click once to turn off the active tool.

To add freehand shapes:

1. Use the Annotation button in the toolbar to turn on the Free Hand tool.
2. Outline the area of interest by clicking three or more spots around its area.
3. Right-click once to stop adding handles.
4. Continue adding a new freehand shape, or right-click a second time to turn off the tool.

5. To make adjustments to the freehand shape, enable edit mode, then drag the handles as needed.

To add text labels:

1. Turn on the Text tool by doing one of the following:
    - Use the Annotation button in the toolbar to turn on the Text tool.
    - If the Annotation button is not visible, click the arrow next to the Annotation button (), then click Text.
2. In the image you want to annotate, drag the mouse to define a box that contains the text. When you complete the drag, a blinking cursor is displayed in the box.
3. Type the text that you want to appear in the box.
    - The text you enter wraps, based on the width of the box.
    - You can copy text to and from the text box using Ctrl+C and Ctrl+V.
    - To add a line break, use the Enter key.
4. Click once outside of the box to finalize your edits.
5. You can add additional annotations, select a different tool, or right-click once to turn off the active tool.

To add auto numbers:

1. Turn on the Auto Number tool by doing one of the following:
    - If the Annotation button is not visible, click the arrow next to the Annotation button, then click Auto Number.
    - In the Auto Number dialog that displays, click the buttons that correspond to the numbering style and starting point you want to use.
2. Click each point in the image where you want a number to appear.
3. Add additional numbers, select a different tool, or right-click once to turn off the active tool.

> **Note:** Spinal labels are incriminated from C1 to L6. After L6 is used, auto-numbering is turned off automatically.

4.6.1.11 Add Measurements

You can measure lengths, areas, angles, and Hounsfield values in an image. If you want measurements to be saved, make sure the exam is locked before adding measurements.

Note: Before measuring a small image feature, increase the scale of the image to improve the placement of the measurement.

To measure lines:

1. Click the Measure | Length tool () in the toolbar, or right-click an image and choose Measure | Length.

   Note: If the mouse pointer changes, you must use the Calibrate tool before proceeding.

2. Point to the part of the image from which you want to begin measuring.
3. Drag the mouse to create the measurement line. Once you have finished dragging, a label appears next to the line, displaying the measurement.
4. Drag the text results to reposition as needed.

   Note: If the measurement label includes a (c) or a (c*) label, the measurement is based on a manual calibration, rather than on a modality-defined pixel size.

5. Continue adding measurement lines or right-click once to turn off the tool.

To measure angles:

1. Click the Measure | Angle tool () in the toolbar, or right-click an image and choose Measure | Angle.
2. Drag the mouse to draw the first line of the angle. The second line of the angle is automatically created.
3. Drag either or both lines by their handles to adjust the angle.
4. Drag the text results to reposition as needed.
5. Continue adding angles, or right-click once to turn off the tool.

To measure Cobb angles:

1. Click the Measure | Cobb Angle tool () in the toolbar, or right-click an image and choose Measure | Cobb Angle.
2. Starting with the top-most line to be drawn, drag the mouse to create the line. The program automatically creates the second line.
3. Reposition the lines as needed by dragging the handles. Drag the text results to reposition as needed.

4. Continue adding angles or right-click once to turn off the tool.

4.6.1.12 Use the Hounsfield Tool

The Hounsfield tool offers the capabilities to measure areas captured in ellipse or freehand shape, as well as rectangles.

To measure rectangular or elliptical areas:

1. Select the area to be measured.
2. Click to set the start point of the rectangle or ellipse.
3. Drag the mouse and release the mouse button when the ellipse covers the desired area.
4. Drag the end-points of the perpendicular lines as needed to adjust.
5. Drag the text results to reposition as needed.
6. Continue adding Hounsfield measurements, or right-click once to turn off the tool.

To measure freehand areas:

1. Outline the area to be measured by clicking three or more spots around its area.
2. Right-click once to stop adding handles.
3. Continue adding a new freehand measurement, or right-click a second time to turn off the tool.
4. To make adjustments to the measurement, enable the Edit mode.
5. Reposition the text results or drag the handles as needed. See Section 4.6.1.10 for additional information.

4.6.1.13 Work with Annotations

To move annotations:

1. Click the Select tool () in the toolbar.
2. Click the Lock tool () near the annotation you want to move. Or right-click the annotation, and choose Edit Annotation.
3. Once you have finished, you can resize, move, or edit other annotations, or you can right-click once to turn off the tool.

To resize annotations:

1. Click the Select tool in the toolbar.
2. Click the Lock tool near the annotation you want to resize. Or right-click the annotation, and choose Edit Annotation.
3. Drag any of the sizing handles to change the size of the annotation.

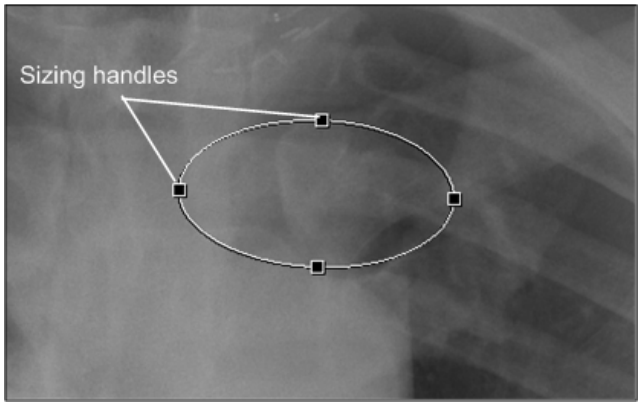


Figure 4-15: Sizing Handles

4. Once you have finished, you can resize, move, or edit other annotations, or you can right-click once to turn off the tool.

To edit annotations:

1. Click the Lock tool near the annotation you want to edit. Or right-click the annotation, and choose Edit Annotation.

> **Note:** Only one annotation at a time in an image can be unlocked for editing. Clicking the Lock tool on an annotation releases only that particular annotation from its locked state.

2. Make the changes you want to the annotation by clicking and dragging handles in a drawing tool, or clicking and dragging endpoints in a line.

> **Note:** While in Editing mode, the Arrow drawing tool has handles to drag for repositioning and re-sizing. However, to facilitate precise measurement, the Length-Measurement tool does not. When the cursor hovers at the line's endpoint, crosshairs display to show the cursor is in the correct position for clicking and dragging the line.

3. Right-click once to turn off the tool.

To edit text labels:

1. Click the Select tool in the toolbar to turn on the Select Annotation tool, or right-click the text annotation you want to edit.
2. Double-click the text annotation.
3. Edit the text.
4. Click once outside the text annotation to finalize your edits.
5. Once you have finished, you can resize, move, or edit other annotations, or you can right-click once to turn off the tool.

4.6.1.14 Use Calibrate

The Calibrate tool displays automatically if you try to measure an image that does not have a modality-defined pixel size. If the image in question has an embedded measurement scale, you can use the embedded scale and the Calibrate tool to set a pixel size manually.

If the Calibrate tool has been used, measurement values display one of the following:

- A (c) label indicates that pixel size was set manually
- A (c*) label indicates that a manually defined pixel size has been used to override a modality-defined pixel size

To use the Calibrate tool:

1. If the Calibrate tool is not already turned on, click the Calibrate tool () in the viewport and drag-down to open the drop-down menu.
2. Click Calibrate.
3. While the mouse pointer appears in this mode (), draw a line between the two points that you want to use to establish a measurement standard.
4. The Calibrate Image dialog displays as you start drawing the line.
5. If the line is not ideally placed, you can re-draw the line.
6. In the Calibrate Image dialog, enter the length of the line that you drew, and then choose the unit length (centimeters, millimeters, or inches).
7. Check the Apply to Image Set check box if you want this calibration to be used for all images in the image set. Otherwise, the calibration applies to the individual image only.
8. Click OK.

> **Note:** To remove calibration settings for a viewport, clear and reload the image in the viewport.

Using the Image Detail Window:

The Image Detail window is opened by clicking the information area at the bottom of an occupied viewport. Opening this window causes three tabs to display:

- The Full Header tab displays the entire DICOM header except for private elements and Look Up tables.
- The Display Data tab lists acquisition data for the selected image
- The Image Data tab lists DICOM header data

Information in the Image Detail window is updated if you select a different image in the same viewport.

To close the Image Detail window, click the Exit icon (✕), or click the information area that the window was opened from.

You can click the Information icon (ⓘ) in the toolbar to open an instance of this window for each occupied viewport. Clicking the Information icon again closes all windows.

Appendix A: RPCs

The Image Viewer code calls the following existing Remote Procedure Calls (RPC) to acquire contextual information upon the receipt of a windows message. All RPC calls are made from the Abstract View component, and the results are communicated to the Full-Resolution Viewer component. This allows the Full-Resolution Viewer component to be independent of EHR.

The KIDS package automatically assigns them to the proper menu options to make them accessible to the EHR client.

Table A-1: RPC Contextual Information table

RPC	Required
MAGJ USER2	Yes
RPC: **MAGG CPRS RAD EXAM** INPUT PARAMETER: **CPRSMSG** String from the CPRS Windows Message Sample CPRSMSG: **RPT^CPRS^20^RA^i6918775.83** **69-1^39** RETURN PARAMETER: Array of Image data	Yes
NAME: **MAG3 CPRS TIU NOTE** RETURN VALUE TYPE: ARRAY Returns a list of all images for a TIU document INPUT PARAMTER: **TIUDA** DESCRIPTION: internal entry number of the TIU document RETURN PARAMETER DESCRIPTION: Array of "^" delimited Image information in the format	Yes

Acronym List

CAC	Clinical Application Coordinator
EHR	Electronic Health Record
IHS	Indian Health Service
RPC	Remote Procedure Call
RPMS	Resource and Patient Management System
TIU	Text Integration Utility

Contact Information

If you have any questions or comments regarding this distribution, contact the OIT User Support (IHS) by:

Phone: (888) 830-7280

Web: http://www.ihs.gov/helpdesk/

Email: mailto:support@ihs.gov