

VOYAGER PACS

User Guide



VOYAGER
IMAGING

Voyager PACS User Guide
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Before you begin

CAUTION: In the United States, Federal law restricts this device to sale, distribution, and use by or on the order of a physician.

This manual contains procedures and information to help you use the Voyager PACS system.

The Voyager PACS system allows you to obtain images in digital format from a variety of sources, manipulate and annotate the images, and transmit them over existing telecommunication networks.

Intended use

Voyager PACS is a Picture Archive and Communication System for computer-based image storage, retrieval and distribution.

Medical images are taken and reviewed for clinical analysis, diagnosis and treatment as part of a patient's care plan. The information collected can be used to identify any anatomical and physiological abnormalities, chart the progress of treatment and provide clinicians with a database of normal patient scans for later reference.

Indications for use

Voyager PACS stores, retrieves and distributes images from different imaging modalities, e.g. CT, digital radiography, nuclear medicine, ultrasound, magnetic resonance imaging (MRI), endoscopic imaging, bone densitometry, microscopic imaging, etc. for use in radiology, cardiology, oncology, neurology, pathology and other medical specialties.

Contraindications for use

There are no known contraindications for the Voyager system.

Warnings and Precautions



Do not use portable devices such as smart phones or iPads (tablet PCs) for diagnostic purposes.

Because of the pervasive use of lossy compression, it is at the discretion of the diagnostic viewer to treat these images as diagnostic.

Make sure that patient demographics and all images are properly completed and available on the PACS, so that all patient and image data is available for the Radiologist and Referring Physician, and diagnosis is not delayed.

Make sure you label the left and right sides of an image correctly to prevent incorrect patient orientation and the possibility of misdiagnosis.

- Make sure you follow industry best practices for correct patient orientation.
- Make sure the images were acquired correctly at the modality before using them for diagnosis.

Make sure you validate third party software to ensure that it is using the correct information from the outside source. In addition, proper validation of third-party software must be done to ensure that it is using standard DICOM tags. Images that are submitted with a different pixel spacing tag than what Voyager PACS uses (0018,1164) to perform measurements on radiography images could lead to incorrect measurement readings, thus leading to misdiagnosis and treatment planning.

Measurement values are modality dependent. The measurement values that Voyager PACS displays are derived from information sent by the modality responsible for generating the image being measured. If this modality is incorrectly configured or defective, Voyager PACS measurement values may be adversely affected and may be incorrect. Voyager strongly recommends the use of an appropriately placed object of known size for determining what magnification factor has been applied to the image.

Do not make measurements using a hardware ruler or caliper directly on a screen. Always use the built-in software measurement tools.

Images printed to paper from Voyager Workstation are not intended for diagnosis and should be used only for communication purposes.

The Link or Auto-Link function allows you to synchronize other windows/ series with the window/series you are currently browsing through. In other words, there is one master window/series (typically the one that you have selected with your mouse) and Voyager PACS tries to line up the images of the other linked windows. Therefore, you should always review each and every series by paging through them individually, and never rely on linking as a way to review all images within a given exam. Browsing through a series that is part of a link may not display all the images that are available in the other linked series. This is especially the case when series with different slice thicknesses are linked.

Linking Oblique Series

Voyager PACS allows you to link oblique series. The goal is to provide users with the ability to link oblique series that are more or less in the same orientation. However, Voyager PACS does not prevent you from explicitly linking obliques that have totally different orientation. This means that linking obliques that are not of roughly the same orientation leads to unexpected behaviour in Voyager PACS.

Cine mode with fixed frames per second

Voyager PACS may not display all frames when a multi-frame image is played in cine mode and a fixed, fast frame rate is set in the DICOM Header of the image. To ensure all frames are viewed use the mouse wheel to scroll through the multi-frame image.

Limited Warranty

Voyager Imaging warrants each new device to be free from defects in workmanship and materials under normal use and service for a period of twelve (12) months from the date of shipment. Voyager Imagings' sole obligation under this warranty will be to repair or replace, at its option, products that prove to be defective during the warranty period. The foregoing shall be the sole warranty remedy. Except as set forth herein, seller makes no warranties, either expressed or implied, including the implied warranties of merchantability and fitness for a particular purpose. This warranty is not assignable.

Safety and effectiveness

Interpretation of radiology images and subsequent diagnosis should only be performed by a qualified practitioner.

The operator must be thoroughly familiar with the information contained in this User Guide before using the equipment.

Placement of equipment

Place the system components on a sturdy and level surface. Do not place any unit on the carpet.

Do not operate the Voyager system near flammable or explosive gases or materials.

Manufacturer's recommendations

For all third-party equipment used with the Voyager system, follow all of the manufacturer's recommendations and instructions. Be sure to read, understand and follow the instructions in this User Guide and any other documentation that comes with the system and its components.

Care

Do not drop the components of the Voyager system. If a component is dropped, discontinue using it until it is determined that the component can be safely operated. Contact Voyager Imaging Product Support or your authorised representative for assistance.

Regulatory Labelling



Voyager Imaging (a division of Intellirad Solutions Pty Ltd)
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Voyager Picture Archiving and Communication System



Caution and/or Warning



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Germany



0287

Rx Only

Prescription Device. Federal law restricts this device to sale by or on the order of a licensed healthcare practitioner.

Australian Sponsor:

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Technical Support:

support@voyagerpacs.com
+61 3 9811 9001

Product Support

If you have a question regarding the use of the voyager system and/or any of its components, first refer to this User Guide and the on-line documentation provided with the Voyager PACS software.

If you are unable to find the answer to your query, contact Voyager Imaging Product Support on:

- Australia (03) 9811 9901
 - International (613) 9811 9901
- or contact your authorised representative.

If you make a call to Customer Support, please be close to the product so you can readily answer questions from Voyager Imaging trained technicians. When you call, please provide the following information:

- A description of what happened and what you were doing when the problem occurred.
- A description of any attempts you made to fix the problem.

Repairs of equipment manufactured by Voyager Imaging under warranty or service contract must be made at authorised repair centres. If the equipment needs repair, contact the Service department at Voyager Imaging for a Fault Report Number. When calling, have the model and serial number of the particular device ready.



Service items received without a Fault Report Number may be returned to the sender or remain unrepaired until such time as a report number is raised.

If you need to ship the equipment, pack it carefully to prevent shipping damage. All accessories should accompany the equipment.

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1 Voyager Overview

This chapter provides a brief introduction to the Voyager system and its modes of operation.

The Voyager system consists of computer hardware and software (referred to in this guide as Voyager), and a combination of specialist image modalities that allows medical specialists to capture, diagnose, transmit and receive images such as X-Ray, CT-Scan, MRI and Ultrasound, using Internet, IP network, PSTN, ISDN or mobile telephone communications.

Voyager systems can range in complexity from a single workstation connected to a scanner that operates all modes and performs all functions, to a network of workstations and servers designed to operate with a diverse range of modalities and archive devices over a number of different network configurations.

Voyager offers several modes of operation, all using a common software application and user interface. These are:

- Teleradiology
- Diagnostic Workstation
- Picture Archiving and Communications System (PACS)
- Scanning Station (part of PACS)
- Administration Station (part of PACS)
- CD/DVD Burn
- Windows Print
- Integration

1.1 Teleradiology Mode

Teleradiology mode enables three main functions to be performed:

- Image acquisition
- Image transmission
- Image review

This is to allow the operator to use Voyager to acquire images and documents from scanners, or images directly from DICOM compliant modalities attached to the Teleradiology Workstation. Then, using procedures described in Chapter's 2 and 3 of this User Guide, the images and documents are collated into a study, which is then made available to the consulting radiologist for review and diagnosis, using procedures described in Chapter 4 (Softcopy Radiology Mode).

1.2 Diagnostic Workstation Mode

Diagnostic Workstation Mode is primarily performed in the Study Review work center. It provides advanced image viewing and processing facilities to enable reporting to be performed and to assist in diagnosis. It enables these main functions to be performed:

- Study Review
- Image Manipulation
- Image Annotation
- Reporting

1.3 PACS

Picture Archiving and Communications Systems (PACS) is the image archive, storage, management and distribution of patient images.

Images are stored on a server, either centrally or in a distributed form, with images connected through TCP/IP protocol. This is a workgroup server and images can be shared and accessed concurrently, enabling concurrent reporting (i.e. workflow management) through Voyager workstations. Study state indicators ensure that each study is only reported once by a radiologist.

Additionally, images on the PACS archive can be accessed through a web interface option of Voyager PACS. This allows images to be viewed within a hospital or clinic, or remotely via LAN/WAN or Internet, using Windows explorer software (version 5.0 or later).

1.3.1 Voyager PACS Client Station

Voyager PACS client, as part of the Voyager Diagnostic provides the following additional features:

- Personal login
- Client – Server – review of images residing on Voyager archive server
- Concurrent reporting
- Includes all Teleradiology and Softcopy reporting

1.3.2 Voyager PACS Administration Station

Voyager as a PACS Administration Station, provides the following functionality in support of the PACS system for a hospital or clinic:

- Modify/correct Patient and Study data
- Delete studies on the PACS Archive
- Forward studies to other archives
- Print studies to film or paper

1.3.3 Voyager as a Document Scan Station

Voyager as a Document scan station for the PACS allows increased workflow in a hospital or clinic through:

- Adding a referral or worksheet document to a study on a PACS archive.

1.3.4 PACS Administrator

The PACS Administration module allows the system administrator to perform the following functions:

- Allows access to the PACS Administrative functions both locally and remotely through LAN/WAN and Internet
- Add, Edit and Delete system users.
- Set system controls and restrictions for users including; Visibility restrictions, password expiry, and access levels
- Setup and control system storage for images (lossless and lossy)

1.4 Online Help

Voyager software contains an Online Help System, which is available by pressing **F1**, clicking on the **Help** toolbar button, or clicking on the **Help** button (where available). You can also select **Help Topics** from the **Help** menu and select the **Contents** tab

The Help system is intended as the primary source of information on how to operate the Voyager system. It contains descriptions of the various windows, dialogs and fields that make up the software, as well as procedural help to assist you perform various functions.

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2 Using Voyager

This chapter describes how to use Voyager Imaging effectively.

2.1 Start Voyager

- Ensure that all peripheral devices are switched on before starting the PC.
- Turn the PC on.
- When Windows has finished booting up, log in, then double-click on the Voyager icon on the desktop.



The Software Dongle must be installed in order for the software to operate.



Figure 2-1: USB Software Dongle

2.2 Work Centers

The majority of Voyager's functions are performed from three main work centers:

- The Worklist
- The Patient/Study Info Dialogue Box
- The Study Review Window

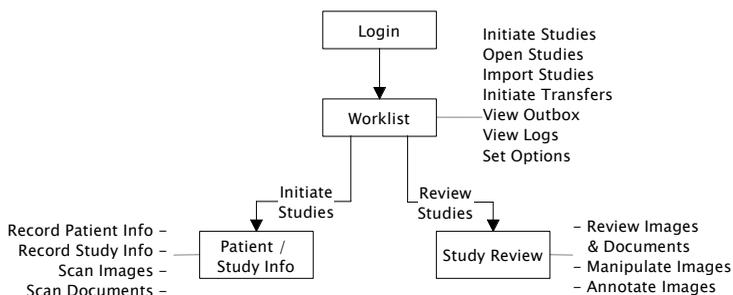


Figure 2-2: Primary Voyager Work Centers

All functionality is accessible through these areas. Which work center is accessed depends on which mode Voyager is used in at the time.

2.3 Worklist

The Worklist is used to locate studies stored in the Voyager database. This is achieved using a range of filtering and preview tools.

Studies are identified by their unique identification number (UR Number) and other demographic information relating to the patient, and the images saved with the study are shown as thumbnails.

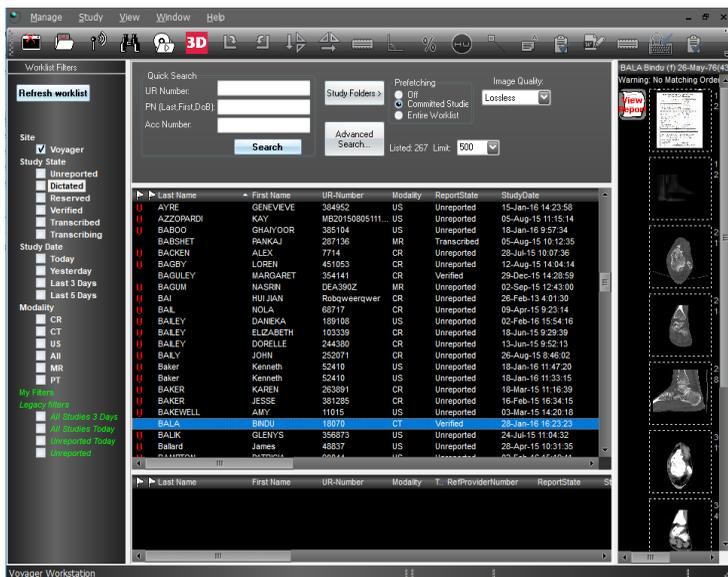


Figure 2-3: Worklist

The Worklist is divided into a number of panes.

- The left pane contains the list of worklist filters.
- The middle left pane contains the list of studies.
- The right pane contains the image thumb nails. Select **View | Options | Display** to configure thumbnail display.
- The bottom middle pane displays all other studies on the system related to the patient of the selected study.

Note

Each of the panes in the Work List can be resized by left-clicking and dragging the dividing bar in the desired direction.

Preset Worklist filters are available on the left pane. To create a custom Worklist, right click on My Filters and select Add, and then edit in specific search criteria. Apply an appropriate name for new Worklist (i.e. Unreported CT, Unreported CR, etc...) and then Save by selecting Save.

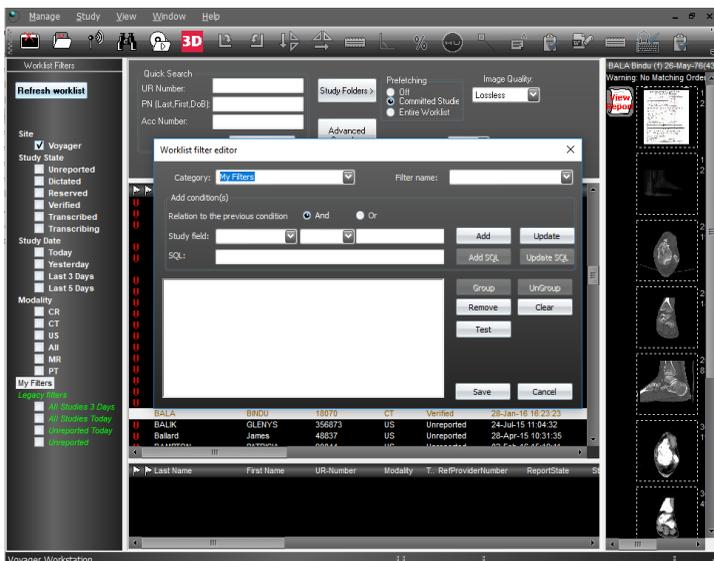


Figure 2-4: Create Custom Worklist

2.3.1 States and Priorities of Studies

To the left of the patient name is the status of the study. For unreported studies, this is indicated with a red **U** with one or more plus signs beside it, the number of plus signs indicating the priority of the study. This number may vary from none (lowest priority) to three (highest priority) corresponding to the four priority levels that may be assigned to a study when it is created.



The unreported study has low priority.

The unreported study has normal priority.

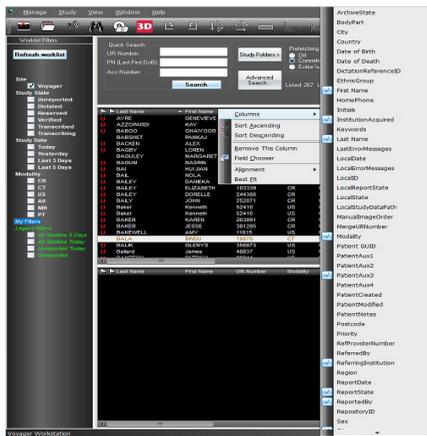
The unreported study has highest priority.

The study is in the process of being sent to remote site.

The study has been sent off to a remote site and confirmed OK by voyager.

By using the priority levels the radiologist at a reporting station can identify those studies which are more urgent and should be reported first. The unreported state (and priority) applies only to studies.

2.3.2 Configuring the Worklist Columns



Within the Worklist pane, the columns can be configured to display the specific fields selected by the user. This is done through the context menu displayed whenever you right click the mouse button whilst over one of the column headers.

Fig 2-5: Worklist Columns

The following menu commands are available:

Sort Ascending	This choice when enabled sorts the worklist in the ascending order of the entries in the selected column.
Sort Descending	As above, sorts the worklist in the descending order of the entries in the selected column.
Remove This Column	This choice is only enabled if the control is in multi column mode and two or more columns are currently displayed. Select this command to hide the column you right clicked over.
Insert Column	<p>This choice is only enabled if you do not already have all possible column choices displayed. When you move the mouse over this menu item a further pop-up menu is displayed listing the available columns. Select the column you wish to add to the display and it will be inserted to the right of the column which you right clicked over. Some of the available columns are as follows:</p> <ul style="list-style-type: none"> • UR Number • Last Name • First Name • Priority • Doctor • Date of Birth • Modality • Report Time • Studyname <p>Any given column will only be available to insert if it is not already displayed.</p>

2.3.3 Adjusting Column Widths

Whenever a column is turned on or off the width of all columns is set to standard defaults which ensure that all columns are visible.

To change the column widths, move the mouse over the column separator in the header above the control. As the mouse moves over the separator, the cursor will change to indicate that the separator can be dragged. Click and hold down the left mouse button, drag the columns to the desired width then release the mouse button.

If any text is too small to fit in the width of its column it will be truncated to the right with a trailing... to indicate the truncation. In this case, simply hold the mouse cursor over the text and a pop up window will appear showing the full text, overlapping the column (or pane) to the right as needed.

2.3.4 Saving the Patient List Layout

The layout (i.e. visible columns and widths) are remembered on a per user basis (for personal saving, this is saved when used as a PACS workstation with login configuration). Each time you run the Voyager program the tree control will be configured as you left it from the previous run.

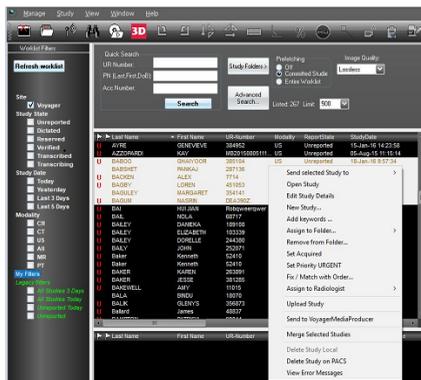
2.3.5 Sorting the List

You can sort the Study List by the information in any given column. Click the left mouse button on the column header and the list items will be sorted, in ascending order, by the information shown in that column. If the sort is already on that column then clicking in the header will reverse the order from ascending to descending.

2.3.6 Selecting Items

To select items in the Worklist simply click over the item with the left mouse button. Once an item is selected it is drawn highlighted to indicate its selected state.

2.3.7 Selecting Multiple Items



If you wish to select multiple items simply select the first study as described above. You can then extend the selection by clicking over new items while you hold down either the **Ctrl** or **Shift** keys.

Figure 2-6: Select Multiple Items

If you hold down the **Ctrl** key while clicking then each new item is added to the selection. If you click over an already selected item (while holding down the **Ctrl** key) then that study is removed from the selection (if desired you can use this method to de-select a single selected item, leaving nothing selected).

If you hold down the **Shift** key while clicking then each time you click over a new item the selection is extended from the first currently selected item to the item you click over, selecting all intervening items in the process.

Thus you use the **Ctrl** key with left clicks to select several disjoint items, use the **Shift** key with left clicks to select a block of adjacent items.

2.3.8 Study Folders

Studies can be listed by study type, where the user can store and retrieve a study in a particular study folder for educational reasons. To add a Study to a folder, right click on a study in Worklist and select **Assign to folder** option. To list a folder, select **Study Folders** on top middle pane.

2.3.9 Working with Selected Items

Many of the commands in the study menu or on the main tool bar apply to the currently selected item in the list, or this can be achieved by a right click over one of the highlighted studies.

2.3.10 Opening Selected Studies



Therefore to open a study you can select it in the list and click the open toolbar button and the single selected study will be opened. You can also double click on its name to open a study. If two studies have been highlighted and the open button is clicked, the two studies are opened for comparison (see comparison mode).

2.4 Working with Studies

If you receive studies from another Voyager station or a DICOM modality, the study will be created automatically based on information received from the remote site or from the DICOM header information (patient information can be updated, if required).

Figure 2-7: Patient / Study Details

2.4.1 Editing patient and study information

You may wish to change patient information after you have created one.

To edit an existing patient:

Right click on the desired patient in the Worklist. This will display the context menu.

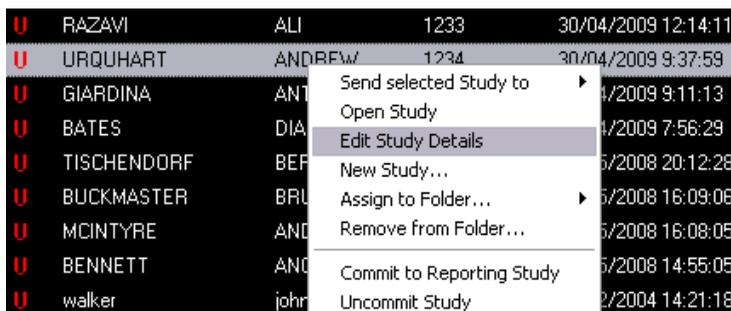


Figure 2-8: Context Menu

Select **Edit Study Details** from the popup menu.

Edit the details as required.

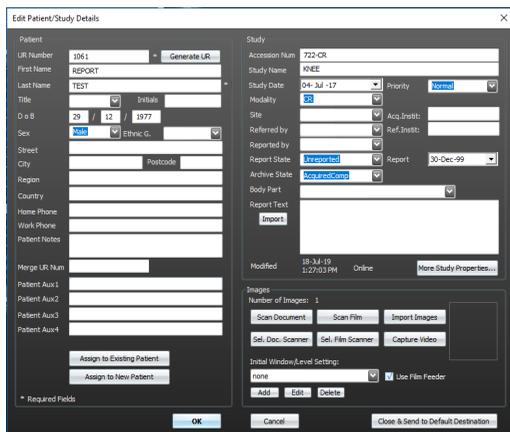


Figure 2-9: Edit Patient / Study Details

Select **OK** to save the changes.



- In this window you can also add Documents, Scan Films or Import images into a patient file.



Figure 2-10: Assign to Existing/New Patient

To correct details of multiple studies in a PACS for same patient, ‘Assign to Existing Patient’ button can be used. After entering the correct patient details in ‘Edit Patient/Study Details’ window, click on ‘Assign to Existing Patient’ button. It will launch a new window (figure 2-11), which will help in selecting the studies whose details are to be edited.



Figure 2-11: Assign Patient to a Study

Similarly, ‘Assign to a New Patient’ button can be used to assign an existing study in a PACS to a new patient.



- In this window only helps in editing the details of the studies in a PACS. It is mainly used when incorrect information of a patient is sent from modality.

Opening Studies and Images

To open a study from the Worklist:

- Double clicking on the study name; or
- Selecting **Study | Open**, or
- Right click and select **Open** from the context menu.

2.4.2 Quick Search

Voyager allows the user to quickly search based on either patient name or UR, as an alternative to a Worklist filter or through a column sort and search.



Figure 2-12: Quick Search

2.4.3 Export Images

Voyager allows the user to export all images of study in Dicom Compressed/Dicom Uncompressed/Bitmap/JPEG formats.

To export images:

- Double click on the Study in worklist to open Study
- Select **Study | Export Images...**
- Select the format under **Export As** in Pop up Window
- Browse to the folder to save the images under **Export to Folder** and select **Go**

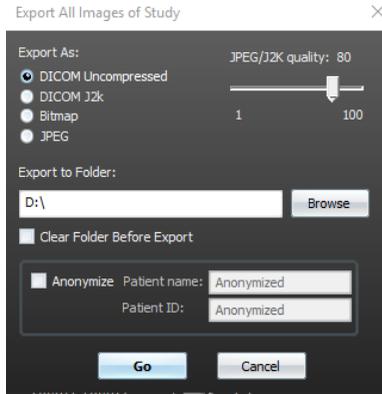


Figure 2-13: Export Images

2.5 Viewing a Study

2.5.1 Reporting a Study

When a study is first created, it is marked as unreported. An unreported study has a **U** next to the study name in the Worklist.

U	Sebastian	Miller	1231	16/03/2010 13:21:58
U	Dunkley	Cynthia	1232	10/02/2010 16:17:47
U	RAZAVI	ALI	1233	30/04/2009 12:14:11
U	URQUHART	ANDREW	1234	30/04/2009 9:37:59
U	GIARDINA	ANTHONY	1235	30/04/2009 9:11:13
U	BATES	DIANE	1236	30/04/2009 7:56:29
U	TISCHENDORF	BERNARD	1237	12/05/2008 20:12:28
U	BUCKMASTER	BRUCE	1238	12/05/2008 16:09:06
U	MCINTYRE	ANDREW	1239	12/05/2008 16:08:05
U	BENNETT	ANGELA	1240	12/05/2008 14:55:05
U	walker	johny	20100504195...	25/02/2004 14:21:18
U	BRANDENBURG	ADELE	2105	12/05/2008 11:59:34

Figure 2-1410: Study List

2.5.2 Marking Studies as Reported

A study can be marked as reported to reflect whether the study has been analyzed and reported / dictated.



You can flag a study as reported by selecting the **Study | Report**, or by using the toolbar button. This will clear the **U** symbol from the study name.



After the Report toolbar button is selected, the current study will be flagged as reported, then closed. The display returns to the Worklist.



This toolbar button flags the current study as reported and opens the next unreported study in the study list.

2.5.3 Study View Window

The Study View Window shows the opened radiology study in its own window.

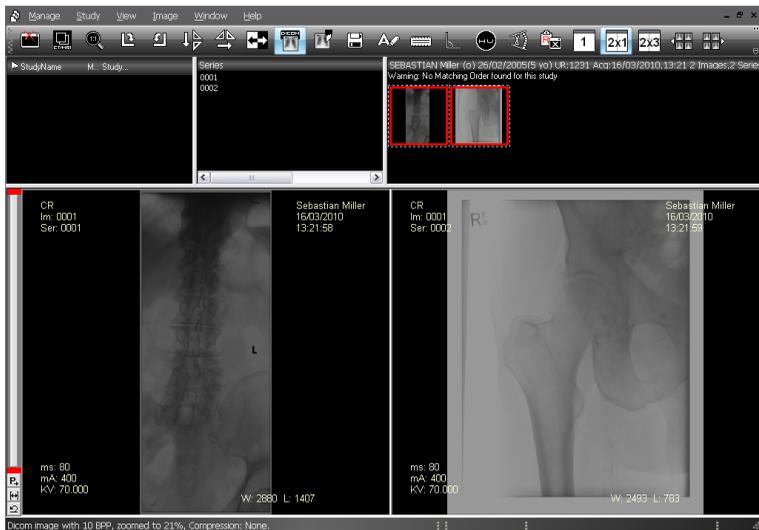


Figure 2-15: Study View Window

2.5.4 Image Thumbnails

A thumbnail represents a single image, and is shown as a reduced version of the image inside a black line box. A coloured border is used to highlight the selected thumbnails.

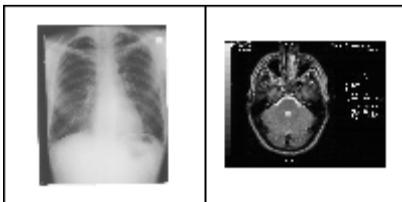


Figure 2-16: Thumbnails

2.5.5 Mark Key Images in a Study

Key images inside a study can be marked by opening the required study and once the images load up, right-click on the image and choose “Mark as Key Image”. A marked image can be identified at Study level easily as the image has a Red Border. Also, a marked image can be identified very easily at worklist level as it has a red ‘S’ on the right hand side bottom of the thumbnail of the actual image.



2.17: Mark Key images in a Study

2.5.6 Selecting Images

Select the focus image by clicking on the thumbnails window. The image will then be displayed. Move forward or backward using the single frame or full page option on tool bar. Moving through the images in stack mode can be done either by holding left mouse button and moving up & down or by rolling the mouse wheel.



Figure 2-18: Select Images

To select a predefined number of images with just one mouse click, hit the Auto-Select button on the toolbar.

2.5.7 Full Screen Viewing

If you double click on an image within a multiple image display, this will take you into a single window which you can resize to enlarge or reduce the image size. The image can be manipulated in a number of ways in this window. To go back to multiple image display mode, double left-click on the image.

2.5.8 Viewing images in Cine mode

Cine mode allows you to animate a series of images in the Image View Window. To view images in Cine mode:

1. **Open** the desired study.
2. Select **Image | Cine mode on**, or the **Cine mode on** button in the toolbar.



The first image will appear in an Image View Window for the duration specified in the display options, before switching to the next image in the series.



To turn Cine mode off, select **Cine mode off** from the **Image** window, or click on the **Cine mode off** button in the toolbar.

2.5.9 MPR or 3D Rendering

To view series in MPR:

1. **Open** the desired study.
2. Right click on the series and select **Open Series in Voyager MPR**.

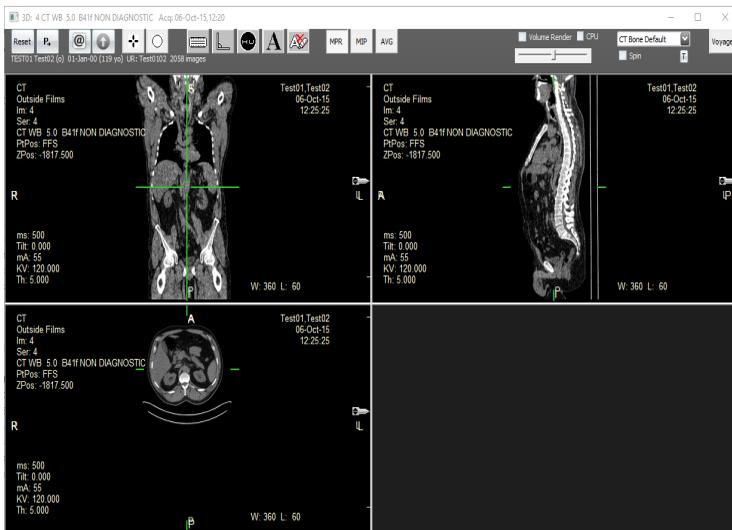
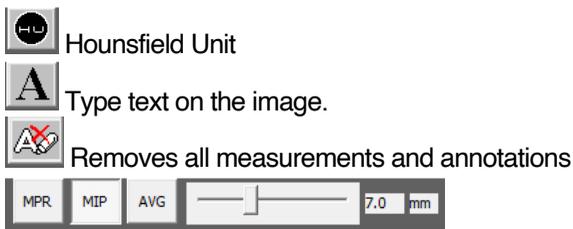


Figure 2-19: Voyager MPR

3. Description of top toolbar buttons:

-  Removes window level, annotations, measurements, text and resets the image back to default view.
-  Windows Leveling Presets suitable for different types of exams.
-  This function allows you to email a screenshot of MPR.
-  This function allows you to attach the screenshots to the exam. You will see them in Thumbnail area.
-  Toggle ON/OFF green cross lines.
-  MPR rotation mode.
-  Measurement/Ruler
-  Protractor



MIP mode: Change thickness of image slices. Move the bar to change the slice Thickness.

AVG mode: Average thickness image slices. Move the bar to change the slice average thickness.

2.5.10 Top Down display

For multiple image display, images can be displayed either left to right or top to bottom. The selection of display of either left to right or top to bottom is toggled with the TD icon on the tool bar.

2.5.11 Comparison mode

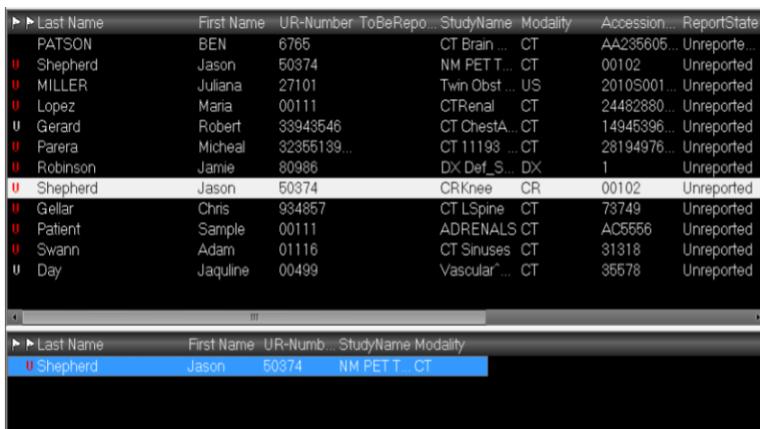
Comparison mode has been provided to allow the user to view either different image series within a study or to view two patient studies for comparison of images. Two icons we see below help us in viewing the studies in comparison mode.

First icon is for switching “**Comparison Mode On/Off**” and second icon is to “**Open Selected Studies for Comparison**”.

Comparison mode can be entered from the Worklist, where the user selects a patient then highlights in the lower left window of a patient associated study. Highlighting the study in the lower window and then selecting the comparison open folder icon, opens both images, and displays all series in the top left Series window.

Once in this mode, the user can select which side of the window to locate which series (left or right) by moving the mouse over the appropriate series and selecting the desired location. The layout can be further changed by using the Top Down icon, as previously described.

To exit comparison mode, select the **Comparison** icon and this will deselect the mode. If the user is viewing an image that has a number of series, you are able to enter comparison mode, as with the multiple study option, and select the study you wish to compare by right clicking on the study and selecting 'Compare with Current Study'.



Last Name	First Name	UR-Number	ToBeRepo	StudyName	Modality	Accession	ReportState
PATSON	BEN	6765		CT Brain ...	CT	AA235605...	Unreported
Shepherd	Jason	50374		NM PET T...	CT	00102	Unreported
MILLER	Juliana	27101		Twin Obst...	US	20105001...	Unreported
Lopez	Maria	00111		CTRenal	CT	24482880...	Unreported
Gerard	Robert	33943546		CT ChestA	CT	14945396...	Unreported
Parera	Micheal	32355139...		CT 11193	CT	28194976...	Unreported
Robinson	Jamie	80986		DX Def_S	DX	1	Unreported
Shepherd	Jason	50374		CRKnee	CR	00102	Unreported
Gellar	Chris	934857		CT LSpine	CT	73749	Unreported
Patient	Sample	00111		ADRENALS	CT	AC5556	Unreported
Swann	Adam	01116		CT Sinuses	CT	31318	Unreported
Day	Jaquiline	00499		Vascular...	CT	35578	Unreported

Figure 2-20: Initiate Comparison Mode

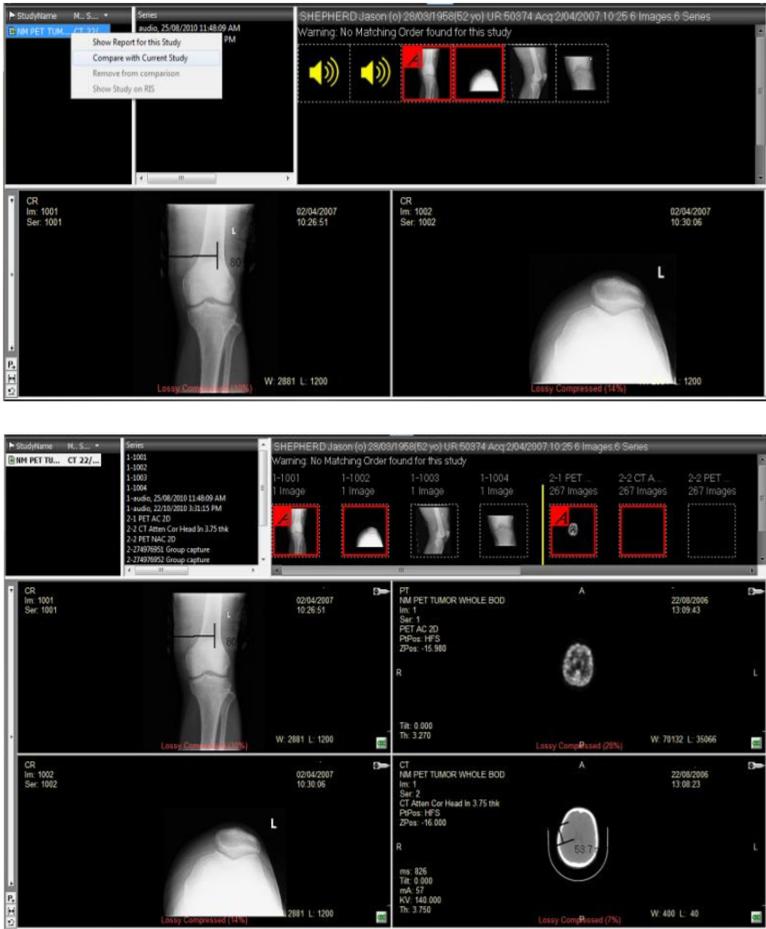
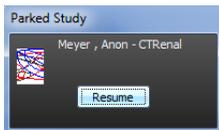


Figure 2-21: Compare Images

2.5.12 Parking a Study

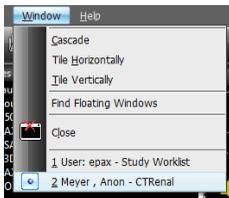
A Study can be parked by hitting on  toolbar icon. After a study has been parked, a small window will pop up which later helps to open

the parked study again. The study can be resumed by hitting the 'Resume' button.



2.22: Resume Parked Study

Another way to open a parked study is by going to Windows and selecting the study that is to be resumed.



2.23: Resume Parked study from Windows

2.6 Manipulating images

Voyager provides advanced image manipulation facilities for enhanced visualization.



Linking enables applying manipulations such as zoom and window level across a single image or all images.

Add Linking to the toolbar through **View | Options | Toolbar**.

2.6.1 Zooming the image

To zoom in on an image, click the left mouse button on the area of the image you want to zoom in on. The image will be zoomed by one level of magnification. To zoom in further, click again. Each click will increase the magnification by one level. To zoom out by one level, right click on the image and select **Zoom Out** from the pop up menu.

To zoom out and restore the image to normal view, double click on any area of the image.

You can also hold down the left mouse button until the cursor changes to a cross, then drag to select an area you wish to zoom in to.

Zooming can also be easily performed if you have a mouse equipped with a mouse wheel. Roll the mouse wheel away from you to zoom in, or toward your hand to zoom out.

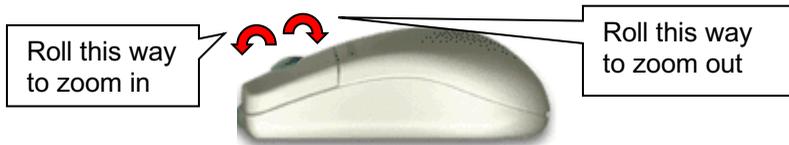


Figure 2-24: Zoom

2.6.2 Moving around the zoomed image

When an image is zoomed you can pan around the image by clicking and dragging on the scroll bars to move the focus area around.

If you have a wheel mouse, you can hold down the mouse wheel whilst the mouse pointer is over and image and drag to pan in that direction. If you do not have a mouse wheel, just hold the **CTRL** key and the left mouse button down.

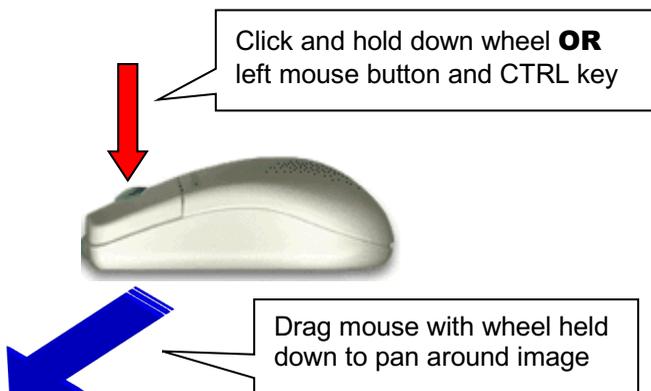


Figure 2-25: Panning

2.6.3 Windowing and Levelling

2.6.3.1 How Voyager Displays Images

Voyager displays images using 256 shades of grey (colour images are similar except that 256 shades each of red, green and blue are used). However, radiological images may have up to 65536 shades of grey (although more typical values are either 256, for 8 bit images, or 4096 for 12 bit DICOM format images).

2.6.3.2 What is Windowing and Levelling?

Window and Level refers to the way grey shades from the image are mapped to display grey shades. By changing the window/level settings for an image in Voyager, it is possible to see all of the detail in an image even if it has more shades of grey than the display is capable of showing.

You can bring out details in an image that would not otherwise be obvious or even visible to the human eye by adjusting window and level, even on 256 grey shade images, it is possible to bring out details (indicated by subtle changes in pixel values) in the image which would not otherwise be visible.

2.6.3.3 Voyager's Window / Level Control

Voyager has a **Window/Level control** that can be used to adjust an image's window and level settings. The Window Level Control is enabled on a per user basis. See Toolbar configuration in the Voyager Install Guide for information on enabling the control and selecting styles.

For a **Study View Window**, a single Window/Level Control is displayed for all the number of images currently being displayed in the study window. This single control applies to the currently active image, i.e. the image with the highlight border. If you have selected the **Image manipulations apply to whole study** option then any Window/Level changes will apply to all images, whether they are selected or not.

2.6.3.4 Window/Level Values

You can use the Window/Level control to view and change the current window and level values for an image.

Normally Window Level values are expressed in terms of image pixel values. For example a 12 bit DICOM file will usually (but not always) have window level values which vary between 0 and 4095. An 8 bit file will have values which vary between 0 and 255.

However, you can select the **Show Window/Level as a percentage** option, so that window level values are always expressed as numbers which vary between 0 and 100. This can be useful if you wish to compare window level values between images of different bit depths.

2.6.3.5 Using the Window/Level Control

The Window Level Control consists of the several components.

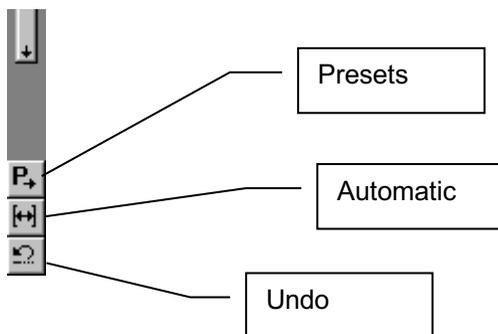


Figure 2-26: Window / Level Control

There are three buttons: **Undo Window/Level Changes**, **Automatic Window/Level**, and **Window/Level Presets**. These are described in more detail in a following section.

If the bottom of this bar is at the bottom of the adjustment area the window minimum level is set to the minimum possible pixel value. If, at the same time, the top of this bar is half way along the adjustment area the window maximum level is set to half the maximum pixel value (or 2048 for a 12 bit image) and the window

width is half of the image pixel range. Note that it is possible for the top or bottom of the window level bar to be **outside** of the adjustment area. This is indicated by an overflow line drawn at the top or bottom of the control using the currently selected highlight colour.

2.6.3.6 Viewing Window/Level Settings for an Image

If you leave the mouse cursor over the Window/Level Control for a short time, without moving it, a small pop-up information window shows the current window level settings.

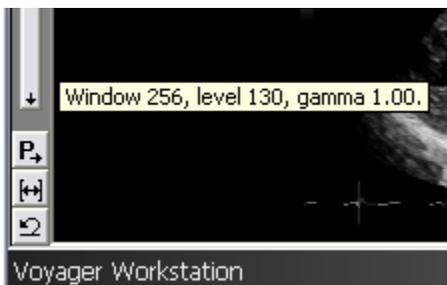


Figure 2-27: View Window / Level Settings

2.6.3.7 Adjusting Window and Level Values

The window level bar allows you to left click and drag to change the level position, or it can be resized to change the window size.

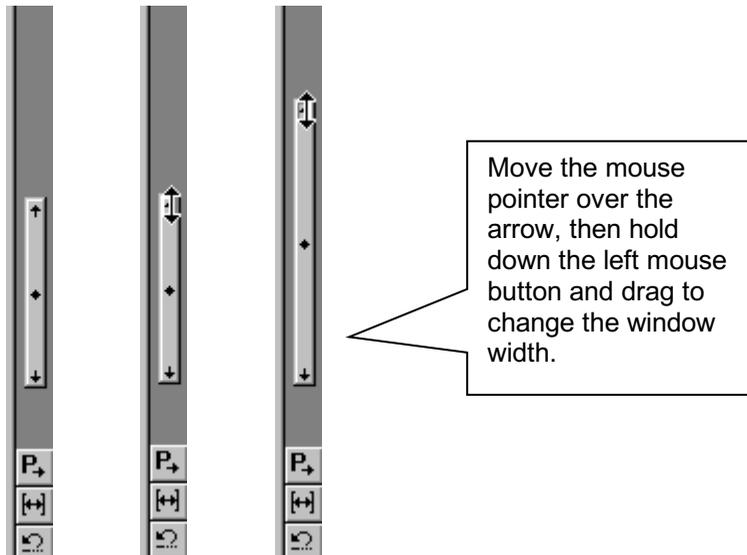


Figure 2-28: Adjust Window / Level Settings

The top and bottom ends of the window level bar have small up and down arrows. Move the mouse cursor over these arrows and click and hold the left mouse button to drag the end of the window level bar up or down to shorten or lengthen it. You can drag either end of the bar in this manner to either increase or decrease the window width. Since the window level is given by the centre position of the window level bar dragging one or other end changes both the window width and the window centre.

2.6.3.8 Gamma Diamond

In the centre of the window level bar is a small diamond shape. The position of this diamond indicates the current gamma setting for the image. If the diamond is in the very middle of the window level bar the gamma value is at the default of one. As gamma is decreased, which tends to brighten the image, the diamond moves towards the bottom end of the bar.

As gamma is increased, which tends to darken the image, the diamond moves towards the top end of the bar. If the diamond is at the very bottom of the bar then gamma is at the minimum possible value of 0 (this is normally never used since it corresponds to every pixel in the image being displayed as white). If the diamond is at the very top of the bar then gamma is at the maximum possible value of 3 (once again this is normally never used since it corresponds to most pixels in the image being displayed as black).

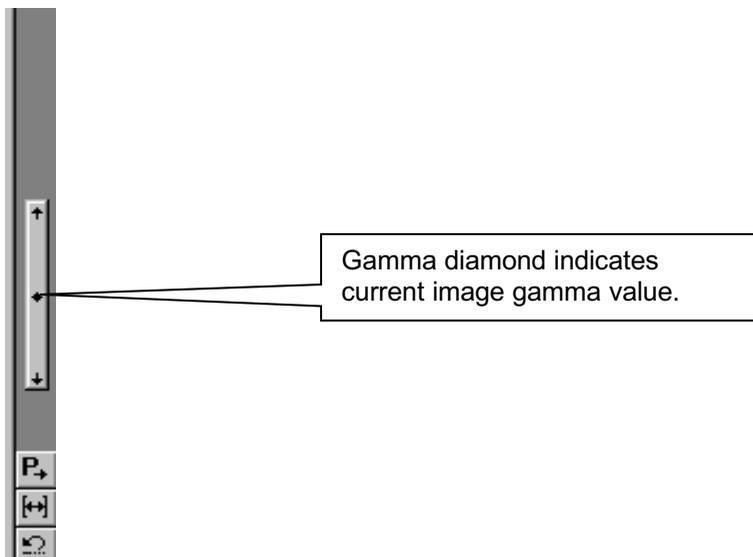


Figure 2-29: Adjust Gamma Settings

2.6.3.9 Adjusting Gamma

To adjust the gamma setting move the mouse cursor over this diamond and press and hold the left mouse button whilst dragging the diamond up or down.

2.6.3.10 Changing Window Centre

To move the window centre, without changing the window width, simply move the mouse over any other part of the window level bar (i.e.: not the end arrows or the gamma diamond) hold the left mouse button down and drag the entire window level bar up or down.

Whilst dragging any part of the window level bar if you briefly stop moving the mouse, the information window will pop-up, just beside the cursor, showing you the current settings for window width, centre and gamma. As you start moving the mouse again this pop-up window will disappear.

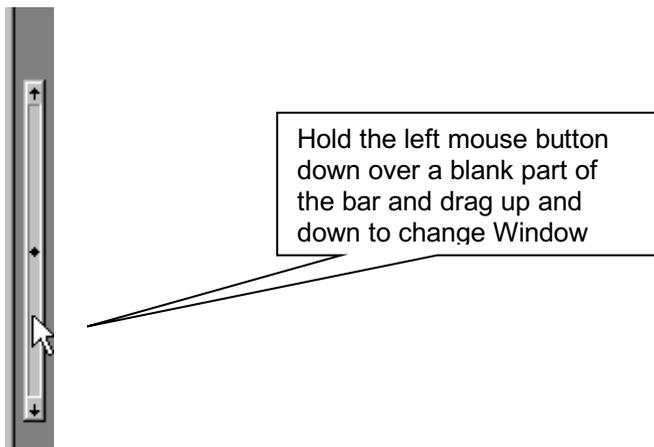


Figure 2-30: Change Window Centre

If you decide that you want to revert to the window/level settings which were in effect before you started the drag simply move the mouse, with the left mouse button still held down, off the window level control a short distance. When the settings revert to their original values you can release the mouse button.

2.6.3.11 Window/Level Settings Too Small

If the window level control becomes too small to show either the up or down arrows or gamma diamond these are no longer drawn. In this case you can only drag the control up or down to adjust the window centre, you cannot drag the ends to adjust the window width. If the window width becomes small enough the window level bar eventually becomes too small to even drag the window centre.

In this case you can use the Window/Level Control buttons to adjust the control such that the dragging points are once again visible. Alternately you can adjust the image by dragging the mouse over the image area with the right mouse button held down. For further details see the following section on **Brightness and Contrast changes**.

Similarly, for some window width and centre settings, one end or other of the window level bar will be outside of the adjustment area. In this case the overflow or underflow will be indicated by a line, drawn in the highlight colour, at the appropriate end of the adjustment area. Also, since it is now off the screen, the sizing arrow at that end of the bar will not be drawn.

Finally, while in this state, it is not possible to tell where the middle of the window level bar is so the gamma diamond is also not shown. Obviously it will then not be possible to drag the non-visible end of the sizing bar or the gamma diamond. The window level settings can still be modified, however, by dragging the visible parts of the window level bar.

2.6.3.12 Window/Level Adjustments Automatically Saved

Whenever you close an image the window level settings in effect at that time are saved. The next time you re-open the same image it will initially have the same window level (brightness contrast) settings as when you last closed it.



- Note that window level (or brightness contrast) changes affect only the way the image is displayed they never modify the image data.

2.6.3.13 Unusable Window/Level Settings

If an image is displayed as all white, or all black, or appears to have a lot of expected detail missing this may simply be because of the current window level settings. Try using the **Automatic Window/Level** button (or any of the other window/level preset commands described below), to show all of the details in the image.

2.6.3.14 The Window/Level Control Buttons

The Window/Level Control has three push buttons:



Undo Window/Level Changes

Whenever you close an image window the current window/level settings are remembered. When you subsequently re-open the same image the window/level is set to these saved values.

You can then change the values by manipulating the window/level bar as described above. Click the **Undo Window/level Changes** button to revert to the saved settings.



Automatic Window/Level

Clicking on this button will automatically set window/level values to ensure that as much information as possible is visible in the display.

For 8 bit per pixel images this simply means to set the window/level such that each of the 256 grey shades in the image maps directly to the same grey shade on the display.

This is the same as setting the image brightness to 0.0 and the contrast to 1.0. This is also the same as the default window level setting achieved by double clicking the right mouse button over the image.

For other image bit depths (for example 12 bit DICOM format images) automatic window/level maps the minimum image pixel value to 0 (or all black) and the maximum image pixel value to 255 (or all white). Other pixel values are linearly mapped as appropriate between these minimum and maximum values.

This means that each image pixel value is mapped to a valid display pixel value, and so should be visible. Note that in this case this is not the same as the default given by a right mouse double click - this default is the first window level pair from the image file. See the **Window/Level Presets** button includes further information.

P Window/Level Presets

Clicking on the window/level presets does not immediately modify the image. Instead it pops up a menu showing window/level presets saved when the image was created, and user-defined presets.

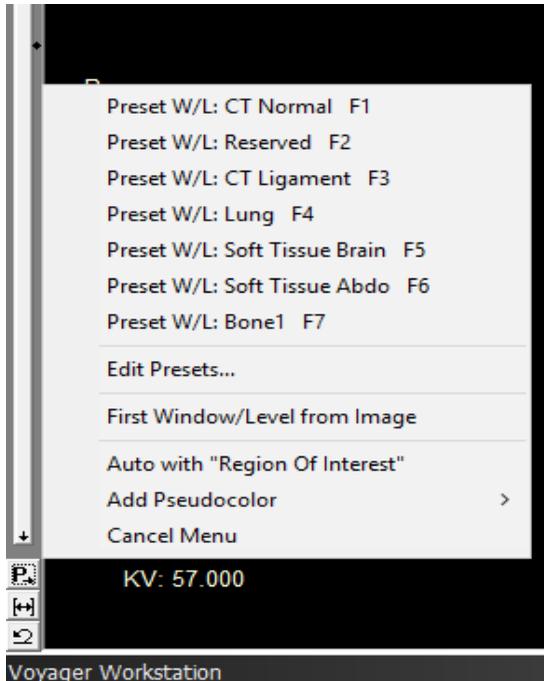


Figure 2-31: Window / Level Presets

Select **First Window/Level from Image** to set the Window/Level pairs which were saved in the image file when it was created.



- Only DICOM format files - from CT machines, etc - have Window/Level pairs in the image file and so these menu choices will only be present if this is a DICOM format file.

The number of these choices will depend on how many Window/Level pairs are available in the particular image file, up to a maximum of five. Some DICOM images will have no

Window/Level pairs in the image so these choices may not even be present for DICOM files. In many instances only one or two pairs will be available. Click on the appropriate command to select the specified Window/Level pair.

Usually these will be standardized for any given source of DICOM format files. For example, all images from the same CT machine will usually always have the same number of window/level pairs set to the same values.

Double clicking the left mouse button over an image means to set default values for the window width and centre. In the case of a DICOM format image file these default values mean the first window/level pair from the file. Thus if you select the **First Window/Level from Image** command from the presets menu for a DICOM file this is the same as double clicking the left mouse button. If a DICOM file does not have any window/level pairs then the double click reverts to an automatic window/level.

Save Current Window/Level as Preset allows the current window/level settings to be saved as a user defined preset. When this command is selected a window appears which allows you to select a name for the preset and save it into one of five available preset slots. To change the window/level to one of the user defined presets simply select the desired name from the menu.

The window/level presets are saved in a manner which is independent of the bit depth used to store the image. This means that presets can be applied to images of any bit depth, however unless the image is of the same type (for example both CT, etc), the preset will not usually be meaningful or useful.

2.6.3.15 Region of Interest Automatic Window/Level

Region of interest automatic window/level allows you to automatically set the window/level based on a particular section of the image. By holding down the **Shift** key whilst selecting a region of the image with the mouse (hold down left mouse button and move mouse) the window/level will be set on the release of the left mouse button. You may also select “Auto with region of interest” from the presets icon on the window/level control.

2.6.3.16 Brightness, Contrast, and Gamma Changes

As well as using the window level control it is possible to adjust the way an image appears by **holding the right mouse button down** and dragging over the image.

- Move the mouse **up and down** to alter the contrast
- Move the mouse **left / right** to alter the **brightness**
- Move the mouse in a **diagonal** fashion to adjust the **gamma** values of the image.

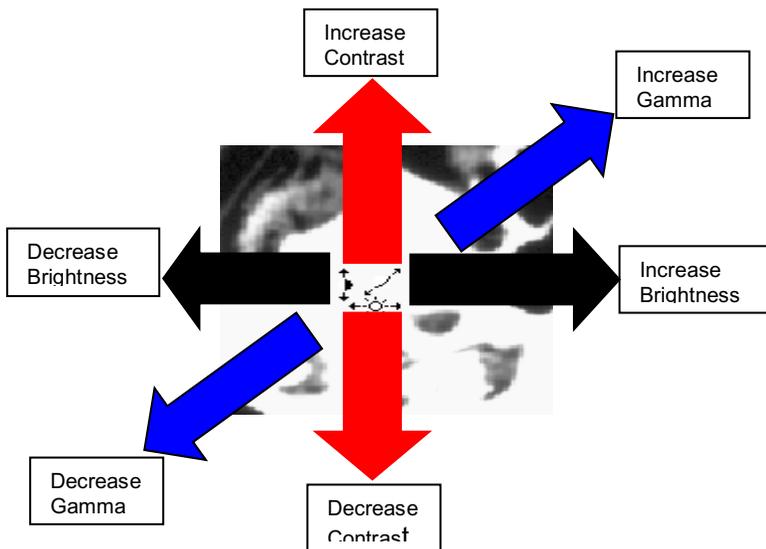


Figure 2-32: Brightness, Contrast, Gamma adjustments

Brightness can be adjusted to darken or brighten the image.

Contrast can be adjusted to increase or decrease the range of luminance for an image.

Gamma is a non-linear adjustment of pixel values which can be used to more subtly brighten or darken the image.

2.6.3.17 Brightness and Contrast vs Window/Level

These brightness and contrast changes are, in fact, directly related to an image's window and level settings. Brightness changes affect only the window level, increasing brightness decreases the value of the window centre while decreasing brightness increases the value of the window centre. Contrast changes on the other hand affect both the window width and window centre but the predominant change is to the window width. Increasing contrast decreases the window width while decreasing contrast increases the window width.

As you change brightness and contrast by dragging the mouse the window level control is continuously updated to reflect the new window width and centre values. At any time you can move the mouse over the Window Level Control to see exactly how the brightness and contrast change has affected the window width and centre values.

Whether you set given window level values by dragging the bar in the window level control or by adjusting brightness and contrast by right button dragging over the image makes no difference. If the window level values are the same the image will appear the same no matter which technique was used to set them. In fact if the window level bar has overflowed at the top or bottom of the adjustment area dragging the mouse over the image is often the best way to set new window level values.

As well as using the right mouse button, you can adjust the brightness, contrast, and gamma levels of an image to by selecting **Balance** from the **Image** menu.

2.6.4 Image Information

If you move the mouse over an image in an Image or Study View Window, the status bar will display some image properties in the left hand side. It will show:

- Image **format** (e.g. Windows BMP or DICOM)
- Image **bits per pixel** – the number of bits used to represent a pixel value. This will usually be 8 or 12.
- **Zoom level** as a percentage of the actual image size
- **Compression** information (if the study was compressed by the remote station) – either Wavelet or JPEG.

Dicom image with 16 BPP, zoomed to 37%, Compression: None.



Figure 2-33: Image Information

You can view extra image information by selecting **Image I Information** or from the right click context menu.

This will pop up a window showing the above information, and also the compression factor and the size in pixels of the image and the zoomed image size.

2.7 Image Measurement & Annotation

To aid diagnosis, the annotation facility allows you to highlight specific areas of images and add text. This includes **measurements**. The annotations are created on a 'layer' on top of the image, so that the original image remains unchanged. Annotations can then be easily resized, changed, or removed from an image without effecting the original image.

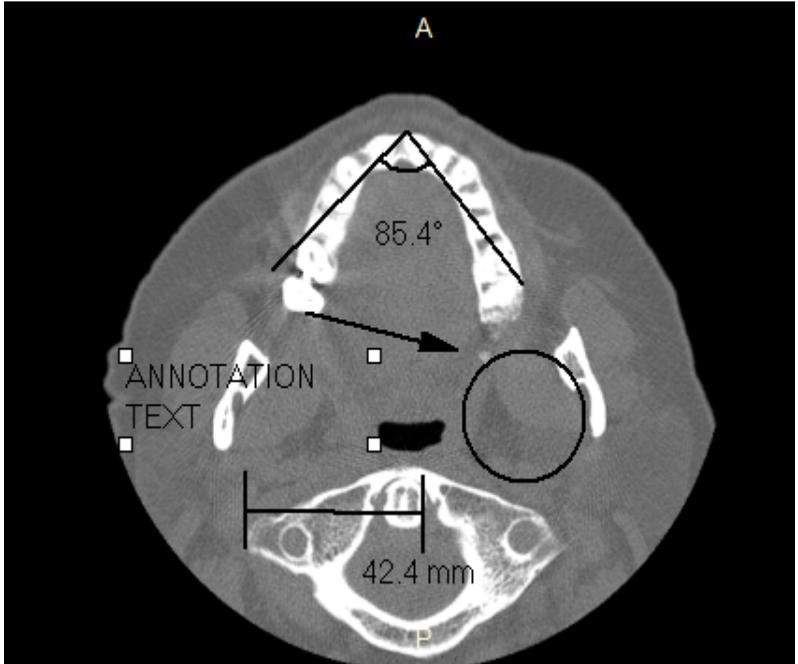


Figure 2-34: Image Annotation

Annotations are saved with an image and will be transmitted with the image if it is sent to another site.

An italic **A** will appear in the upper left corner of the image's thumbnail to indicate it has been annotated.

Manage Toolbar Configuration:

1. Click on the 'View' and select 'Toolbar Configuration'.
2. Select the appropriate tool(s) and add them to the main toolbar.
3. Choose a tool and annotate the image as desired.

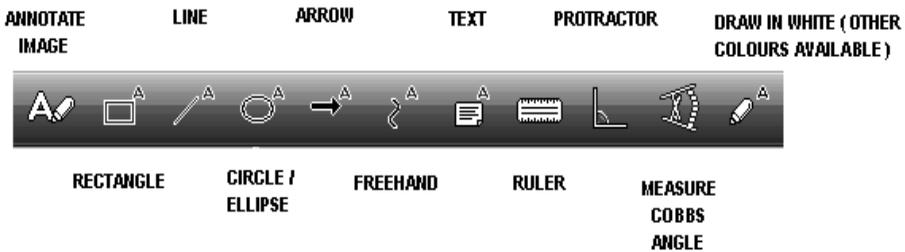


Figure 2-35: Image Annotation Tools

2.7.1 Measurement Tools



Ruler: This allows you to draw a line which will display its measurement.

Place the mouse pointer on the image where you want the ruler to begin, and click and hold down the left mouse button.

Drag the pointer by moving the mouse to where you want the end of the ruler to be. Then release the left mouse button and the line will be drawn.

When you first place a ruler, the measurement will be displayed in pixels if the image does not contain calibration information. Any 8-bit images scanned using Voyager Imaging TWAIN data sources will contain measurement information.

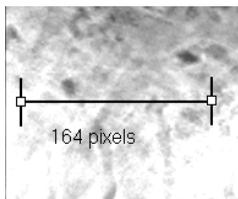


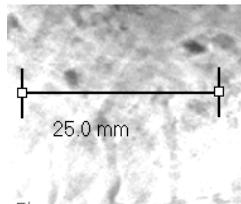
Figure 2-36: Ruler

If you have a point of reference on the image, you can calibrate the ruler to display the measurement in millimeters.



Figure 2-37: Calibrate Measurements

Select the icon for Calibrating Ruler  (or Right click on image Measure | Calibrate Rulers) and enter the length of the annotation in millimeters.



Enter a value of 0 to remove any calibration information. If you enter a value greater than zero, this and any other rulers placed on this image will now be calibrated.

You can change line size, fonts, units of measurement and so forth by going to 'View | Options | General Tab | Click on 'Select Font'.



Protractor: This allows you to create an angle which displays the arc and angle measurement.

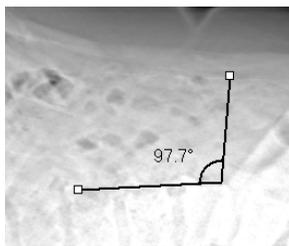


Figure 2-38: Protractor

To place measured angle, click the left mouse button and drag the mouse to create the first line of the angle.

Click the left mouse button again to end the first line. This click will also create the vertex and begin the second line.

Drag the mouse to position the second line, and click the left mouse button again to place it.



Cobbs angle: This allows you to measure the angle formed between a line drawn parallel one vertebra above the fracture and a line drawn parallel to the inferior endplate of the vertebra one level below the fracture.

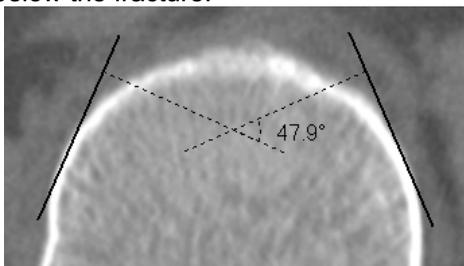


Figure 2-39: Cobbs Angle

Click on Cobbs Angle Icon, choose the two end points to position first line and then choose the two end points to position the other line. The measurement angle will appear.



Hounsfield Value: This value can be calculated by clicking on the icon shown here and then selecting the desired area by drawing a circle or ellipse using left mouse button.

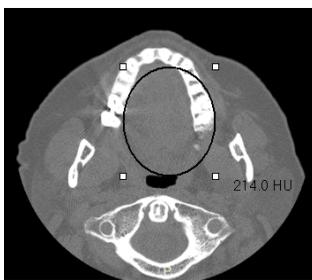


Figure 2-40: Hounsfield Value

2.7.2 Annotation Tools



Selection Arrow: When this is selected, existing annotations can be selected and edited or removed. The selection arrow will be automatically selected after each tool has been used.

When this tool is selected, click on an existing annotation to select it. You can drag annotations to move them and also resize them by dragging their sizing handles.

Right clicking over an annotation will pop up a context menu, allowing you to cut, copy, and delete annotations. You can also select **Properties** to change colours, line thickness, styles, and font

attributes.



Rectangle: Allows you to draw a rectangle annotation on the image. This is handy for surrounding areas of interest.

Click and hold down the left mouse button on the image where you want the rectangle to begin. Drag the pointer by moving the mouse to where you want the diagonally opposite corner of the rectangle to be. Release the left mouse button.



Line: Allows you to draw a line annotation on the image.

Place the mouse pointer on the image where you want the line to begin, and click and hold down the left mouse button.

Drag the pointer by moving the mouse to where you want the end of the line to be. Then release the left mouse button and the line will be drawn.



Circle / Ellipse: Allows you to draw a circle or ellipse annotation on the image. This is handy for surrounding areas of interest.

Click and hold down the left mouse button on the image where you want the ellipse to begin.

Drag the pointer by moving the mouse to size the ellipse. Release the left mouse button when the ellipse is the correct size.



Arrow: For drawing an arrow annotation on the image. This is handy for indicating an area or point of interest.

Click and hold down the left mouse button on the

image where you want the head of the arrow to be.

Drag the pointer by moving the mouse to size the arrow and indicate direction. Release the left mouse button when the arrow has been placed correctly.



Freehand Draw: Allows you to freely draw on the image, as if using a pen on paper. This can be used for indicating an area or point of interest.

Click and hold down the left mouse button on the image to start drawing. The cursor will change to a cross.

Drag the pointer by moving the mouse to draw. Release the left mouse button to finish drawing.



Text: Used to add descriptive text to the image. The text can be any font, size, or angle.

Click and hold down the left mouse button on the image where you want the text rectangle to begin.

Drag the pointer by moving the mouse to where you want the diagonally opposite corner of the text rectangle to be. Release the left mouse button.

Type the required text into the box. You can click the right mouse button on the text box to use the Text popup menu. This allows you to change the font, angle, and background colour and mode.

Click the left mouse button outside the text box to finish editing the text. The text will now be displayed at the correct angle in the selected font and size.

Editing an Existing Text Object

Double click on the text annotation (with the **Selection** arrow tool selected) to edit the text. In edit text mode you can press the right mouse button to use the Text popup menu.



Colours: When adding annotations, select the colour for the annotation by clicking on the appropriate colour button. This will draw any new annotations in this colour. Existing annotations will retain their current colours.

You can change an annotation's colour by selecting the annotation (using the **Selection** tool) and clicking on a colour button.

2.8 System Configuration Options

Voyager has a number of configuration options that can tailor the display and functionality of the system to specific user layout and usage requirements. These configuration options are available through the drop down menu's, with many functions and configuration options contained in the **View** drop down menu under:

- Options
- Toolbar Configuration

2.8.1 Options

The options menu is selected through the View drop down menu in Voyager. The options menu consists of a number of tabs, which allows the user to customize their view. Once a change has been made, select, **Apply** to accept the change, and **OK** to exit. If you do not wish to keep the change, select **Cancel**.

2.8.1.1 General tab

The General tab options allows the user to adjust and control the following functions:

- Display location across multiple monitors, including dual display for images
- Worklist reloading frequency
- Highlight colour
- Preemptive downloading options and configuration

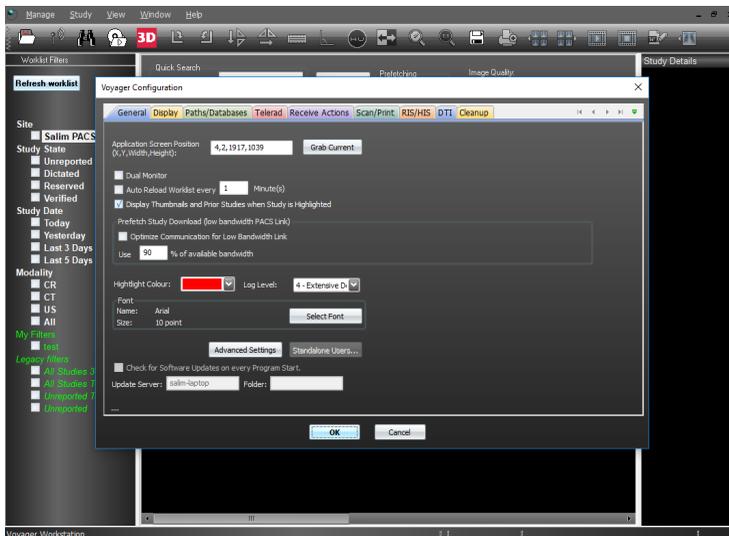


Figure 2-41: General Options

2.8.1.2 Display tab

The Display tab options allows the user to adjust and control the following functions:

- Animation Delay in Cine mode
- Size of Thumbnails and their highlight colour
- Alignment of Study information panes
- Type of images displayed when as a study is opened (lossless or lossy) and how often the Worklist is reloaded
- Modality defined layouts for specific types of studies (i.e. CR 1x1, CT 2 x6, etc..) (hanging protocol) – An image layout can be defined for every modality. You can also choose Slice Mode, Arrangement (Horizontal/Vertical/Page Split) and Page layout while comparing the Studies.

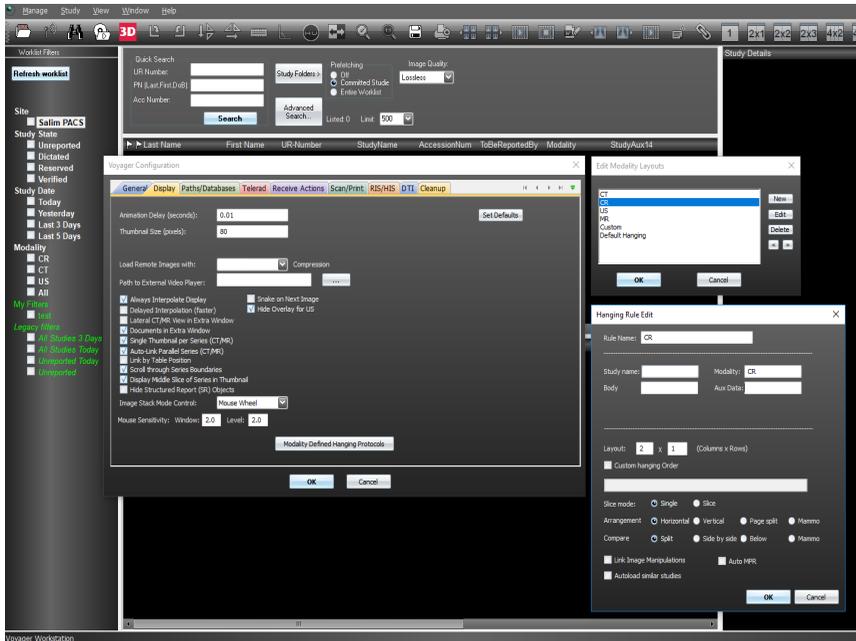


Figure 2-42: Display Options

2.8.1.3 Teleradiology tab

The Teleradiology tab options allows the user to adjust and control the following functions:

- Add, Edit and Delete Teleradiology destinations for transmission via FTP, DICOM and Email, and via Phone, ISDN, LAN, WAN or Internet
- Provides transmission compression options including; None, JPEG, Wavelet (Best Quality and Best Compression)
- Transmission controls

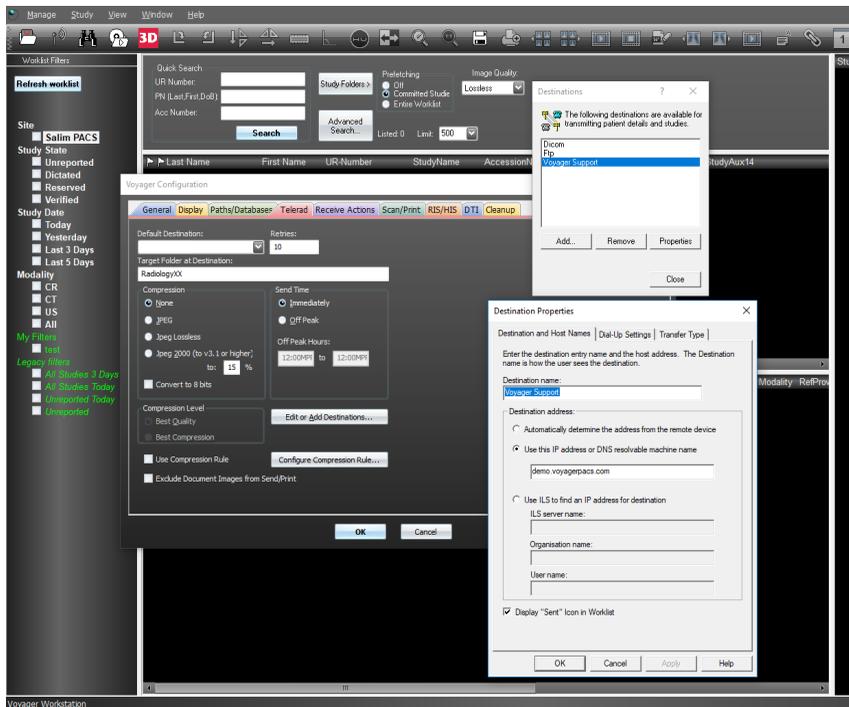


Figure 2-43: Teleradiology Options

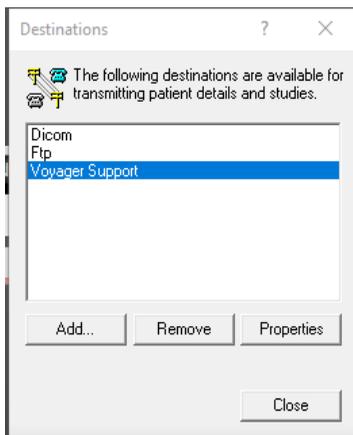


Figure 2-44: Teleradiology Options

2.8.1.4 Other

A number of other tab options are available and include:

- Receive actions (for workstations receiving images from Teleradiology stations)
- Scanning and printing options for film scanning will be removed
- Disk cleanup for standalone workstations
- Paths and databases for standalone workstations

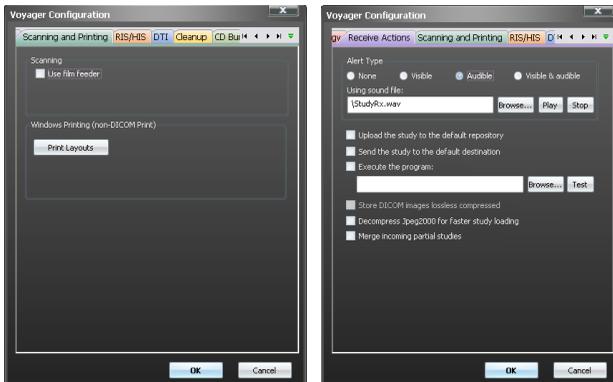


Figure 2-45: Scanning and Printing, Receive Actions Options

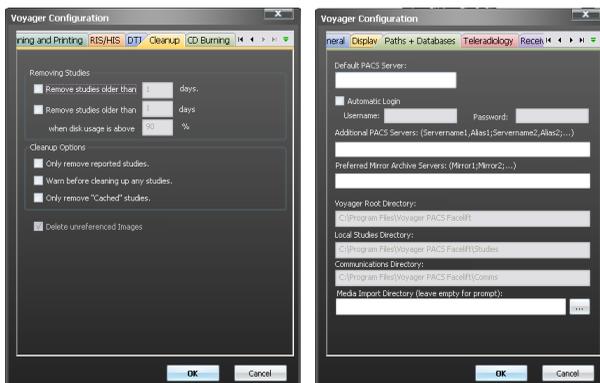


Figure 2-46: Cleanup and Paths + Destinations Options

2.9 Toolbar configuration

The Toolbar configuration menu is selected through the View drop down menu in Voyager. All tools on the tool bars can be dragged and dropped onto any toolbar of choice by the user. To determine the function of the tool on the toolbar, select the tool and the function will be displayed. To make the Toolbar selection easier the toolbars have been categorized into four groups:

Main, Study, Image and Annotation/Measurement

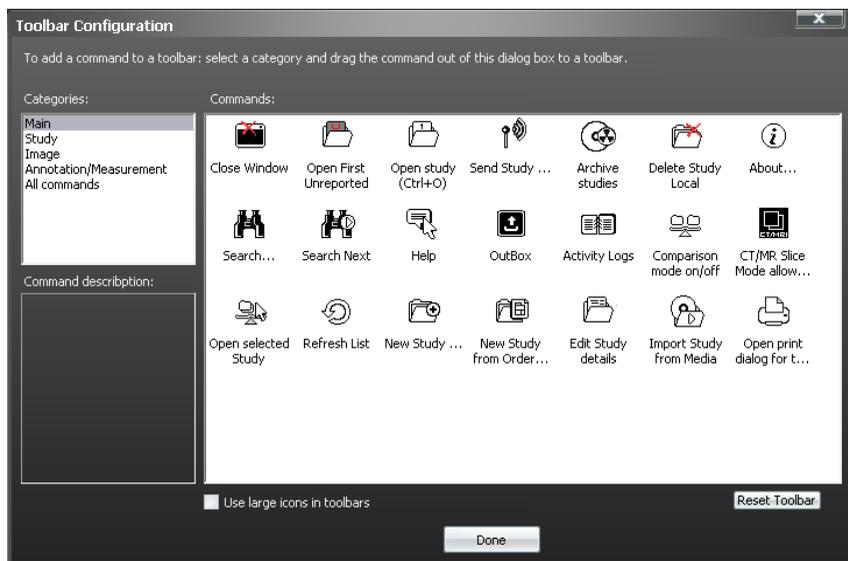


Figure 2-4711: Toolbar Options

The user can also change the size of the toolbar icons by ticking the option for 'Use large icons in toolbars'.

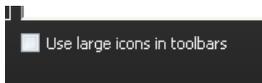


Figure 2-48: Toolbar Options

2.10 Shutting down the system

To shut down the system, do one of the following:

1. Select **Exit** from the Manage menu
2. Or select **Close** from the System menu (the System menu is accessed by clicking on the Voyager icon in the upper left hand corner of the main Voyager window).
3. Or click on the  in the upper right corner of the main Voyager window. Any pending transmissions will be postponed until Voyager is restarted, and if you have a conference in progress it will be hung up.



- Avoid closing Voyager while studies are transmitted, unless it is absolutely necessary. Transmission of studies is displayed on the status bar on the bottom of the application.

2.10.1 Shutting down the Computer

It is important that the Voyager workstation is shut down correctly.



Click **Start** on the Window's taskbar, click **Shut Down**, and then click **Shut Down The Computer**.

Warnings:



- Do not just turn the power off when you have finished using Voyager!
- Do not turn off your computer until a message appears telling you that it is safe to do so.

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3 Teleradiology Functions

This chapter describes how to use Voyager in Teleradiology Mode, as described in Chapter 1.

An overview of the Teleradiology mode workflow is indicated in Figure 3-1. Details on each step is described in this chapter and in the Voyager Online Help System.

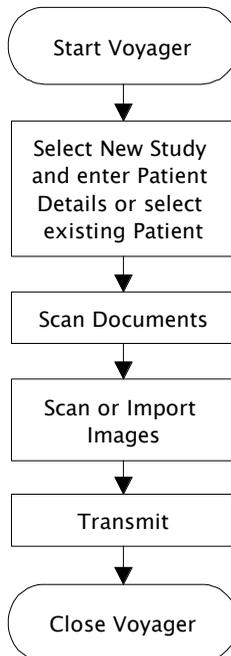


Figure 3-1: Teleradiology Mode Workflow

3.1 Patient / Study

A study is a soft copy collection of scanned images and/or DICOM Images and documents.

- Studies are associated with a patient. Voyager's database does not contain any studies that are not associated with patients, or more than one patient.
- Patients are identified uniquely by UR number. Other information such as name, address and date of birth further identify the patient. Entry of the patient surname is mandatory.
- Studies are identified by a number of fields including accession number, study name, date, modality and acquisition site.

New Patient:

When starting a new study, the user is prompted to enter a range of information associated with the patient. Where the patient has not previously had a study that is recorded in Voyager's database, it is necessary to fill out relevant information.

A new patient can be created by selecting **New Study** from the **Study** drop down menu or the New Study icon.

If DICOM images are directly sent to Voyager, DICOM header information is used to populate the appropriate patient and study detail fields.

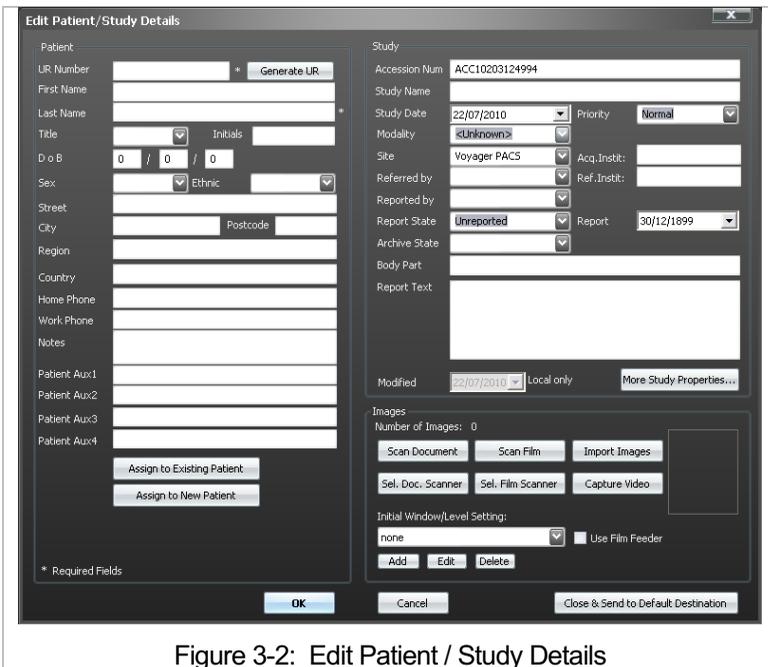


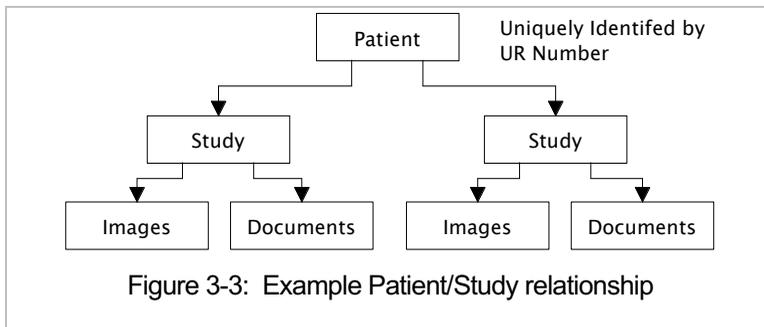
Figure 3-2: Edit Patient / Study Details

The UR Number is the patient ID. The UR and Last Name fields are mandatory, as denoted by the asterisk (*) next to them. All other fields are optional. The UR Number can be manually entered, or an automatically generated UR Number can be placed into the field by selecting **Generate UR**. The generated UR is based on date and time.

Existing Patient:

When starting a new study for a patient that has a previously acquired study already in the Voyager database, it is possible and recommended to associate the new study with the patient record that was created at the time of acquiring the first study.

Instead of filling out the patient details, select **Assign Existing Patient**. It is then possible to generate a list of patients either by filtering the contents by partial or full UR Number, DOB and Name and then selecting **List**, or from the entire database by selecting **List**, without specifying filters.

**Import Study:**

Studies created by other applications and stored on removable media can be imported into the local Voyager network. If possible, all patient and study details will be extracted from the media DICOM files.

- To import a study, select **Study | Import Study** from Media from the Voyager Worklist window.

Study Fields:

Information entered into Study fields provide useful sorting filters when retrieving the study. A description of some of the pertinent fields is provided below. For further information refer to the online help system.

- Modality:** The modality field indicates which type of scanning device was used to acquire the image.
- Site:** Site provides the ability to enter a location if the Voyager network is configured over a number of different offices.
- Referred by:** This field can contain the name of the referring physician.
- Reported by:** This should remain empty until a radiologist reviews the study.
- Report State:** Report State will be set to unreported when the study is first acquired, and later elevated by the radiologist when reviewing the study.

3.2 Scanning / Importing Images

Voyager stores images and documents with each study. These are saved in either DICOM or BMP format.

Images can be added to a study by:

- Scanning them directly from a scanning device connected to the Teleradiology Workstation
- Directly from DICOM modalities through the network
- Importing them from files that have been saved on removable media

Documents, for example referral letters or report notes, can be scanned with each study.

Image Scanning:

The scanning controls are conveniently located in the Edit Patient / Study details dialogue box (Figure 3-2), which is accessed by selecting **Study | New Study**.

- Some devices will not work if they are switched on after the PC, therefore it is recommended to have the scanning device connected to the PC and switched on prior to starting up the PC.
- If more than one scanning device is connected to the workstation, select **Set Film Scanner** as appropriate prior to scanning and verify that the correct scanner is selected.
- Select **Scan File** to initiate the scanning process.
- Set the **Initial Window/Level Setting** if necessary. This refers to the combination of brightness, contrast and gamma setting applied to the image when viewing it. Doing so here saves the radiologist the extra step if it is known beforehand that particular types of images will need these settings to be adjusted. Refer to Chapter 2 or the Online Help for further information.
- To scan additional images after having closed the study, select the study, then select **Edit Study Details** from the right-click context menu.
- Refer to the documentation accompanying the scanning device for directions on operating it.

Document Scanning:

The procedure for scanning documents is identical to that used for scanning images.

- If more than one scanning device is connected to the workstation, select **Set Document Scanner** prior to scanning and verify that the correct scanner is selected.
- Refer to the documentation accompanying the scanning device for directions on operating it.
- To scan additional documents after having closed the study, select the study, then select **Edit Study Details** from the right-click context menu.



Figure 3-4: Select from available Document Scanners

DICOM Images:

Images sent from DICOM-conforming modalities are received by Voyager. The DICOM header information populates the relevant fields of the patient details.

If documents such as referrals need to be added to the study, before being sent to another site, select **Edit Patient Details**, and add documents through the **Scan Documents** option.

Importing Images:

Individual or multiple images that have been created outside of the Voyager system can be imported into a study and stored with scanned images.

The import image controls are located in the Edit Patient / Study details dialogue box (Figure 3-2). Select Import Images and select the drive image files from the appropriate drive.

To import additional images after having closed the study, select the study, then select **Edit Study Details** from the right-click context menu.

3.3 Transmission

Studies acquired on a Teleradiology Workstation can be transmitted to other Voyager Study systems on the network or to another location (i.e. a server). This enables the study to be reviewed by the consulting radiologist using their own local Diagnostic Workstation, and to be archived on a system with the appropriate archive devices.

Transmissions can be manually initiated, or queued and transmitted at a scheduled (off peak) time.

The transmission speed varies, depending on the number of scans in a study and the selected compression setting.

Voyager can have a range of destinations either on the local area network or via the internet, and studies can be transmitted using different protocols or with different compression settings. These are configured by the system administrator using Options. Refer to the online help system for further information.

Manually initiated Transmissions:

- Transmissions can be manually initiated at any time from the Worklist by selecting a study then selecting **Send Selected Study to** from the right-click context menu, or by selecting **Close and Send to Default Destination** upon completion of scanning, in the **Edit Patient / Study Details** dialogue box (Figure 3-2).

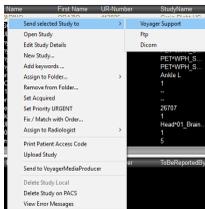


Figure 3-5: Transmit Study

- If the destination is not available in the list of destinations, contact the system administrator for assistance.

- Select **Study | Send Study...**, or click on the **Send** toolbar button. This will open the Schedule Transmission Window.

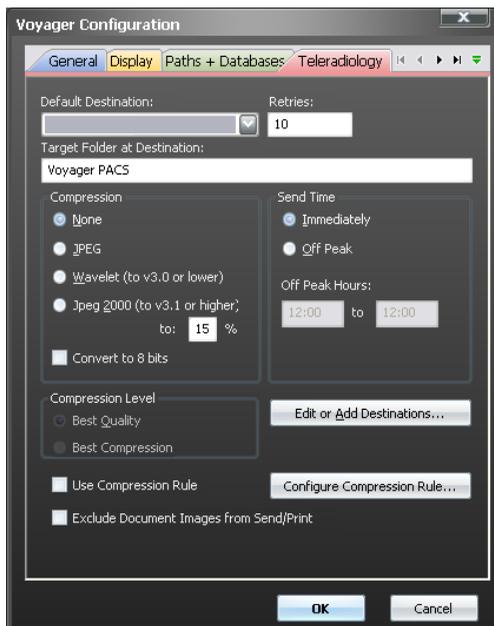


Figure 3-6: Transmit Study

- Select the type of compression you wish to use for any images. Voyager supports JPEG, JPEG2000 and Wavelet compression, or the files can be transmitted uncompressed. Voyager can drastically reduce transmission times by compressing the images prior to transmission. The images are automatically decompressed by Voyager on the receive station. JPEG2000 will usually achieve better compression than Wavelet and JPEG and is available in Voyager as an optional component. You can also specify a compression level. For Wavelet, you can choose Best Quality for optimal image quality or Best Compression to achieve greater compression.
- Specify the number of retries by entering a value between 0 and 100. This is the number of times that

Voyager will reschedule transmissions before discarding the transmission. Voyager will delay exponentially between re-schedules.

- Select **Immediately** and **Send to OutBox** to initiate the transmission.
- When a study or a patient is being sent, a grey  icon is displayed and when it is sent OK, is displayed as a green . This does not necessarily mean that the study has been received at the destination site however the system understands that it has been correctly sent from the Voyager station. If not sent, it is rescheduled for sending.



Scheduled Transmissions:

- Where Off Peak transmission is enabled in **Options**, Voyager will queue all studies to be transmitted in the **Out Box**. When the Off Peak time period specified in Options is reached, the system will automatically begin transmitting studies to the default location.
- Selecting Off Peak This will specify that a transmission can only begin in the specified time range. If the current time is in this range then the transmission will be scheduled to send immediately.
- If the transmission needs to be rescheduled by Voyager (for example due to communications problems) then it will only be rescheduled inside the off peak range.
- Enter the off peak range times in the following form - HH:MM:XX - where HH is hours, MM is minutes, and XX is either AM or PM. For example, 04:00AM and 12:52PM are valid times.

If you have selected a patient then the details for that patient will be transmitted. If you have selected a study then both the patient details and the entire study (including images) will be transmitted.

During transmission, scheduled transmissions are available for viewing in the **OutBox** (see section 3.4). A progress meter in the status bar shows how much of the study has been sent whilst it is transmitting.

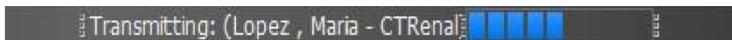


Figure 3-7: Transmit Study

The report state and the transmission status of the study are shown by two  columns.

 Last Name	First Name	UR-Number
 Lopez	Maria	00111

Figure 3-8: Study Status

3.4 Viewing Pending Transmissions

To see if any studies are queued for transmission, select the **View I OutBox**.

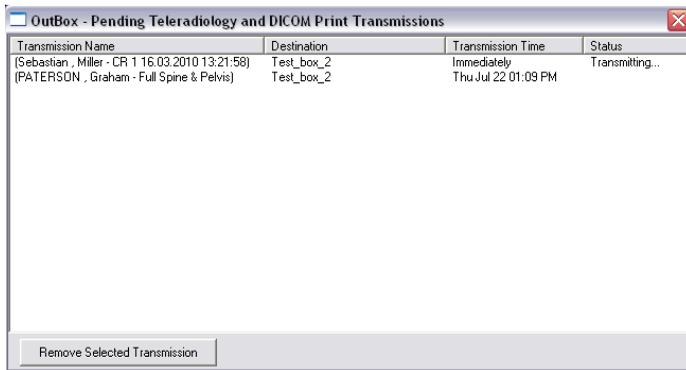


Figure 3-9: Pending Transmissions

Any pending transmissions will be displayed in the list, together with destination details, scheduled transmission time and the current status.

Transmission Name: shows the name of the study, together with the name of the patient, if a study is being transmitted.

Destination: is the Voyager destination that the transmission is being sent to.

Transmission Time: shows the date and time that the transmission is scheduled to commence. If the transmission has been scheduled to be sent straight away, the word **Immediately** appears in lieu of a time.

Status: shows the current status of the transmission. If Voyager is currently attempting to transmit the word **Transmitting** will be shown here.

3.4.1 Cancelling Transmissions

You can cancel a transmission by selecting the transmission in the list and pressing the **Delete** key or hitting Remove Selected Transmission.

3.5 Viewing the activity log

The Activity Log viewer can be used to monitor Voyager's communications activity. It allows you to select a day and the types of activities you are interested in viewing, and then displays entries in chronological order. This provides a convenient summary of the studies and /or patients that have been transmitted and received.

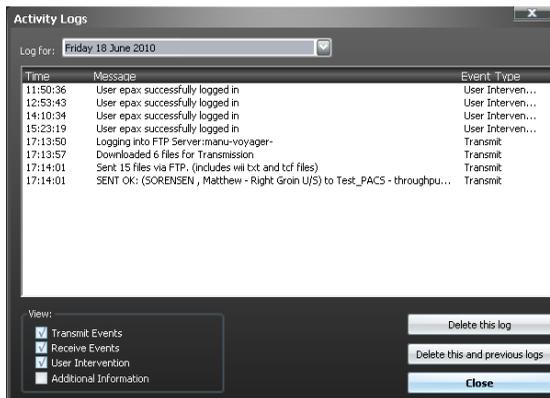


Figure 3-10: Activity Log

To view the activity log, select **Activity Logs** from the **View** menu.

Select the activities you wish to view in the View section.

Transmit Events

This will show any study transmission information, including scheduling and re-scheduling, any RAS errors, and successful transmissions (including transmission time and throughput).

Receive Events

This will show any received studies.

Reported Studies

This will show when studies were reported.

Additional Information

This is only used by service staff to locate problems with transmission of studies.

Select a date from the Log for drop down list. A list of all the activities performed on the selected date will appear in the list.

You can delete the current activity log by clicking on **Delete this log**. You can delete the current activity log and any activity logs older than the selected log by clicking on **Delete with Older Logs**.

Chapter

4

4 Picture Archiving and Communications System (PACS)

Voyager Picture Archiving and Communications System (PACS) is a server based system that allows image archiving, storage, management and distribution.

The system receives images from Modalities via DICOM or from other sources, such as Teleradiology and the images are stored on the PACS Server. The studies and images on this server can be viewed, reported and manipulated by the Voyager workstation configured as a PACS workstation. If there is an integration to RIS through HL7, information between the Voyager PACS and the RIS can be shared and exchanged.

Images that are stored on the PACS can be accessed by any Voyager PACS workstation on the network, through LAN/WAN or internet connection.

Voyager PACS also has a web server that allows access to authorized users to the images stored on the PACS via LAN/WAN or Internet, via Internet Explorer 6.0 or later on a PC.

The PACS system can utilize either centralized archive storage or distributed archive storage. With a centralized configuration, all images are stored in a central location and can be accessed through that site. With a distributed archive solution, the images reside on the network at a number of locations, with a main archive with web server at one site, with satellite archives at other sites. All sites are connected through LAN/WAN and internet, with all images on the network available to authorized users through PACS workstations, and through web viewer access.

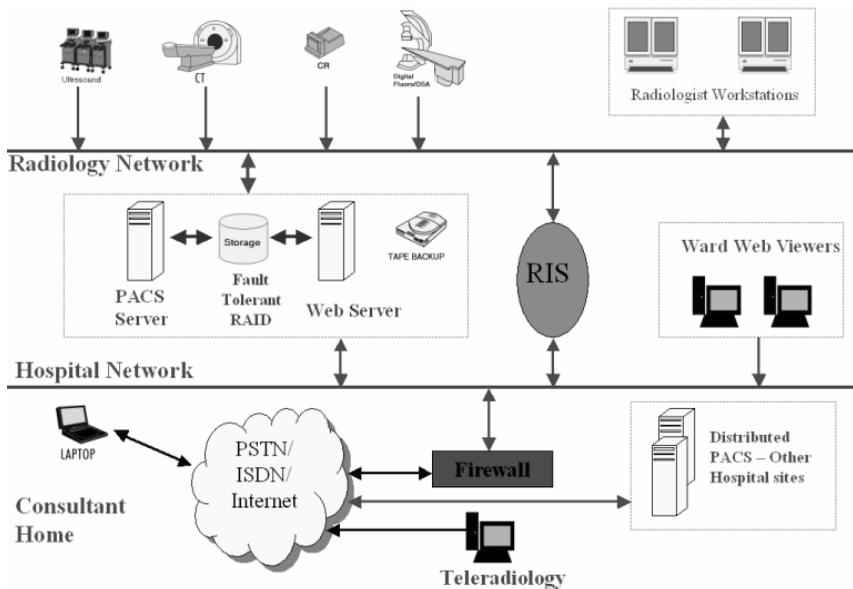


Figure 4-1: Example of a Voyager PACS setup

4.1 Voyager PACS Options

Voyager PACS options include the following modules and configurations. Details of the specific functions of the options below are included in Chapters 2 and 3 of this user guide.

- Diagnostic Workstation
- Scanning Station
- Administration Station
- PACS Archive, Web server and Administration
- Satellite Archive

4.1.1 Diagnostic Workstation

Diagnostic Workstations form part of the Voyager PACS network. The workstations access images stored on the PACS server (central or distributed) and these studies can be viewed, reviewed and reported. Access to the PACS network is via user login and provides security access to the system, as well as restoring the viewing protocols of the user, through this log in. Multiple workstations can access the PACS archive simultaneously, with concurrent reporting enabled and ensuring that studies are reported one only.

Other functions such as Prefetching of exams, where a workstation is remote to the PACS server. This function allows remote radiologists to connect to a PACS, as if local, via Low, Medium and High bandwidth connections, and view exams, while new exams are downloaded in background.

Once a workstation is connected and logged into the Voyager PACS, Prefetching can be enabled via radio buttons on the top pane above the worklist.

There are two methods of use.

1. Prefetching the entire Worklist
2. Committing to reporting specific exams which will be prefetched

Prefetching the Entire Worklist

Select a specific worklist (i.e. 'Unreported Today'), and then enable 'Prefetching entire Worklist', and Voyager progressively downloads all studies in that worklist in the order they are listed. As the worklist is updated, new studies get added or drop off the worklist once they have been reported by the local user or another workstation on the network.



Figure 4-2: Prefetching the Entire Worklist

When the Prefetching function is enabled, and studies have been downloaded, the downloaded study has a green downward arrow assigned next to the study, indicating the image set is downloaded to the local workstation. Prefetching can be turned on or off any time via the radio buttons on the pane above the worklist.

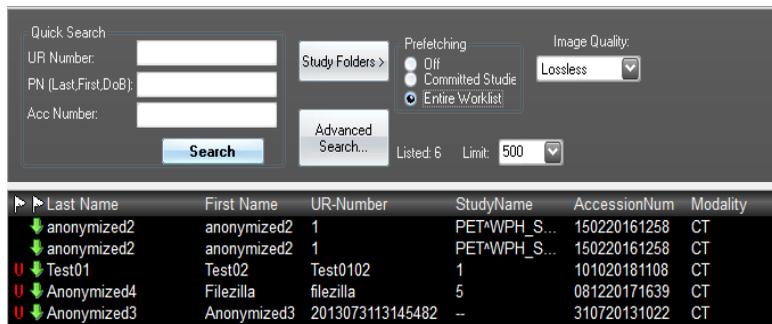


Figure 4-3: Prefetching Entire Worklist

Prefetching committed studies

The other option for prefetching of studies is to select specific studies within a worklist, and to commit those to be reported. When preemptive fetching is enabled, the workstation retrieves only the selected studies that have been committed. This function also reserves these studies on the PACS. Other reporting clinicians on

the network see a red hand  showing that the study has been reserved by another clinician. If they attempt to open the reserved study, the clinician receives a notification stating that the study has been reserved (it also specifies the reserving clinician's name).

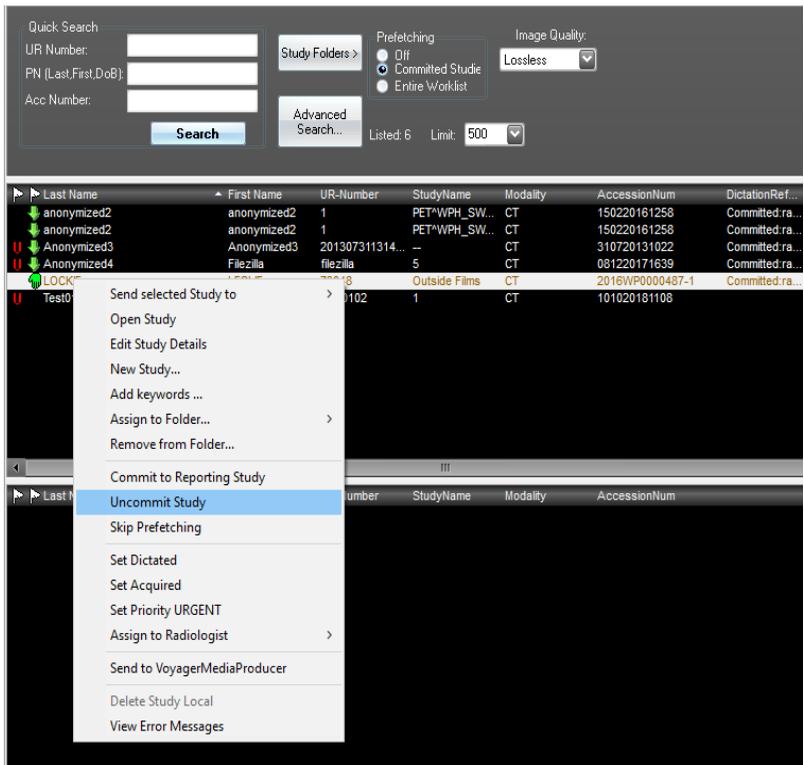


Figure 4-4: Prefetching Committed Studies

To commit studies within a worklist, select the 'Committed Studies' option in the top pane, then highlight the studies to be committed, right click and 'Commit to Reporting Studies' and the workstation will fetch and reserve those studies for reporting. Note that if the user decides to uncommit a study, this can be done so by selecting the 'Uncommit' option. When studies are committed, these are tagged with a green hand symbol, that changes to a green downward arrow when completely downloaded. User can select 'Skip Prefetching' to stop prefetching of that exam and skip to prefetch next exam if needed.

4.1.2 PACS Scanning Station

Scanning stations are an option that allows network users to add new studies to the network and append additional documents to studies (i.e. referral documents to images sent to PACS from DICOM modalities). For more information about scanning film and documents please refer to chapter 2.

4.1.3 PACS Administration Station

The Administration station allows network users to provide system administration functions to perform corrections and modifications to studies and images that are stored on the PACS server, as well as moving studies to other devices. Functions that are enabled include:

- Deletion of studies/Images
- Editing of study details
- DICOM Printing
- DICOM Store to other DICOM applications
- Teleradiology and movement of images

4.1.4 Voyager Media Burning

4.1.4.1 Overview

Voyager Workstation provides a CD/DVD/USB burning option that allows to burn one or more exams stored on the workstation or a PACS server on a CD/DVD/USB.

This allows patient studies and images to be easily distributed to patients and referrers without the need for film.

Images and studies created by Voyager Burn include the full DICOM images, and can be imported by Voyager Workstation or any DICOM Media Storage compliant (DICOMDIR) image Viewer or PACS.

An image viewer is included on external media, so images can instantly be viewed without additional software under Windows. This Viewer application allows the user to select their study of choice and has a variety of viewing and manipulation tools.

CD burning configurations:

- Manual burning of CD/DVD/USB directly on the Workstation's CD drive or USB drive using Media Producer. Printing of labels is not available.
- Automated burning of CD/DVD on specialized connected CD Robot hardware, which includes printing of labels with patient details.

4.1.4.2 Voyager Media Producer

The Voyager Media Producer is used for manual burning of CD/DVD/USB. As shown in the below diagram, a user simply selects the study they would like burned to Disc/USB and select the 'Send to VoyagerMediaProducer'. In the pop up window, select the Disk drive or USB drive under Output folder and click Go to burn exams.

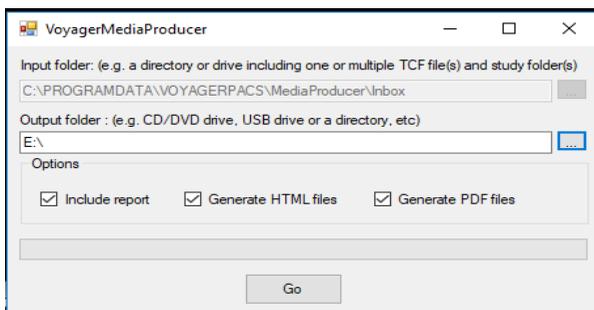
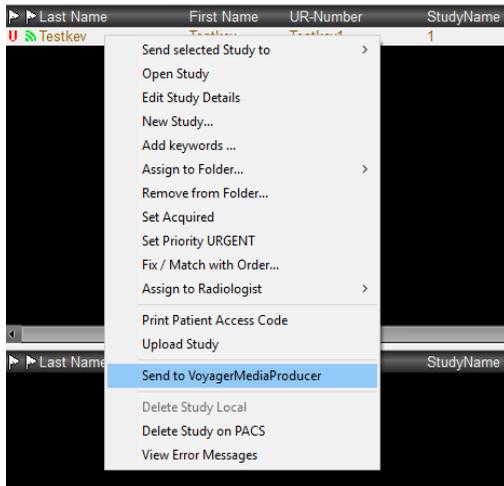


Fig 4-5: Voyager Media Producer

4.1.4.3 Automated burning

The Voyager CD Burner can receive studies sent from a Voyager workstation. As shown in the attached diagram, a user simply selects the study they would like burned to disc and selects the CD/DVD Burner destination. To view the disc burning queue, users simply refer to the Voyager Burner Frontend to see which jobs are in the queue.

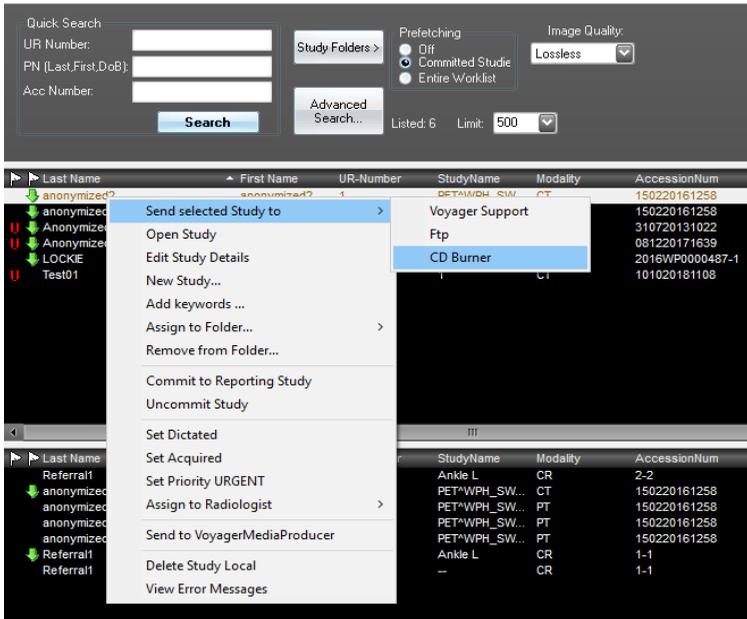


Fig 4-6: Typical method of manual sending to CD/DVD burning station

4.1.5 Voyager Patient Portal

Voyager Patient Portal allows a patient’s images to be accessed by the patient using their existing devices including PC, Mac, Mobile devices including Android and Apple tablets and phones.

A User can generate a printed card or send an SMS to the patient’s preferred mobile phone with a secure access code enabling them to view only their images. Right click on the desired exam in the Worklist and select Print Patient Access Code.

In the Pop up window, select Print to print the Card or select sms to send a text to Patient. Patient can view images by going to the Patient Portal URL (e.g. <http://images.radiology.com/PatientPortal>) and enter Code along with Date of Birth.

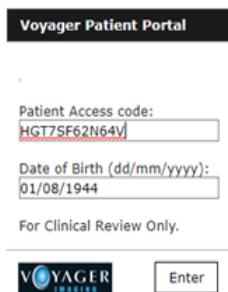
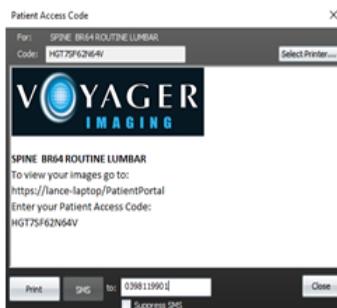
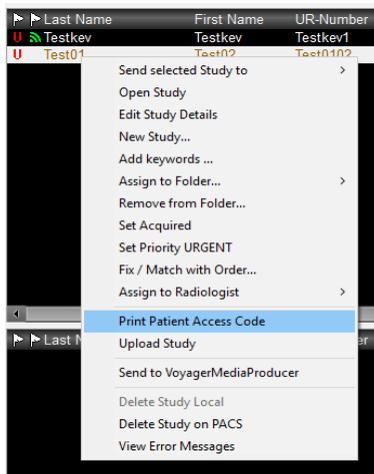


Figure 4-7: Voyager Patient Portal

4.2 Using Voyager PACS Web Viewer

To access the system, use the following steps:

1. Access Launch Internet Explorer (6.0 or later) on any Windows based computer on the network.
2. Type the URL of the Voyager Web Server into the URL field of Internet Explorer. (e.g. http://images.radiology.com). An initial small software download will take place if this is the first time
3. Then a new Voyager Web viewer window with a login screen will open. Log in with your user name and password.

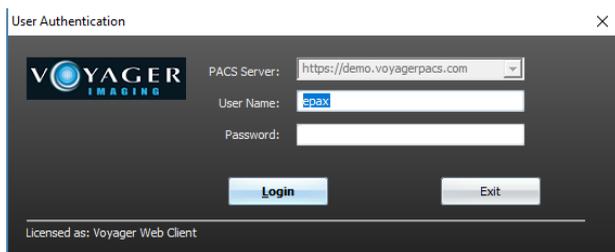


Figure 4-8: PACS Web Viewer Login

4. Select a predefined worklist in the left hand drop down list, or use the "Quick Search" function to search for a specific patient by name or accession number. Note that you can use the Patient Name (PN) search field in a flexible way to narrow down patient searches:

smith	finds all last names that start with Smith (Smith, Smithers,...)
smith,k	finds all patients whose last name is Smith and the first name begins with K (Kylie Smith;Karen Smith...)
smith,kylie	finds all patients named Kylie Smith
smith,kylie,10/12/1968	finds all patients named Kylie Smith born on the 10/12/1968

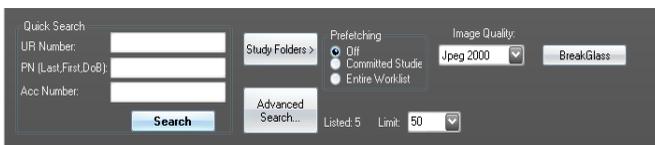


Figure 4-9: Filtering Options

Double click on a study you want to look at, and the study will open.

In the top right the image loading "Quality" can be selected. You have the options of

Lossless: Full uncompressed DICOM images

Jpeg 2000: Lossy compressed DICOM images

Stream J2000: Lossy compressed DICOM image, with progressive transmission, which allows faster initial display and navigation of images.

Stream Fully: Lossy compressed DICOM images streamed fully

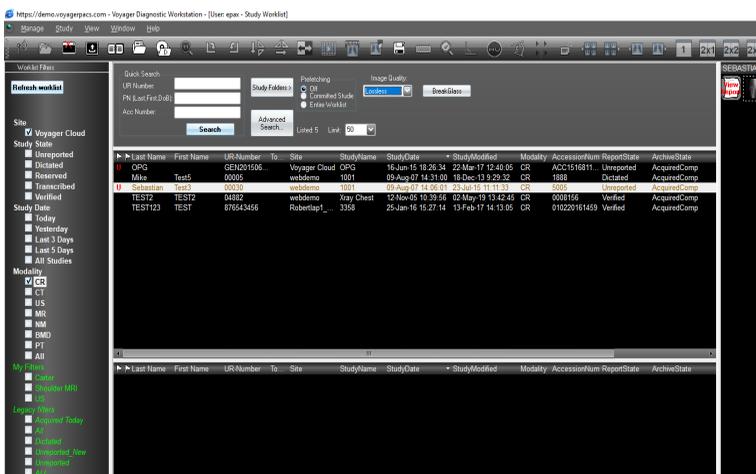


Figure 4-10: Worklist View

5. You can also select the "Prefetching" radio buttons to download all images of listed studies to a local cache in background. Once studies have been prefetched they open faster.

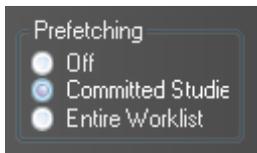


Figure 4-11: Prefetch Selection

6. Once a study is opened image navigation and manipulation functions are available in the image view ports:
 - Drag and drop thumbnail images into the image viewports.
 - Use the mouse wheel to move forward/reverse within a CT/MR series of images.
 - Right click and hold down, and you adjust brightness (left-right movement) and contrast (up-down movement).
 - Right click and release brings up a number of tool options, similar to what is on the tool bar at top of page.

Note

- The performance of the system will depend on the link you have from the remote computer and the PACS server.
- Please be aware that the first time you logon to the site the applet needs to download to your machine. This may take a minute or two.

Licensing

Voyager Web server licensing is based on a concurrent user basis. A maximum number of concurrent users is allowed for each of 3 typical user profiles:

- **Reporting Licenses**
- **Administrator Licenses**

- **Viewing Licenses**

If there are no more licenses available for a user that intends to log in, this user's profile is downgraded to the next available profile that still has licenses available. If no more licenses are available at all, the user cannot log in.

4.3 User Administration using PACS Manager

The administration functions are available to users with administrator permissions. “Administrator” can log into ‘PACS Manager’ to administer users.

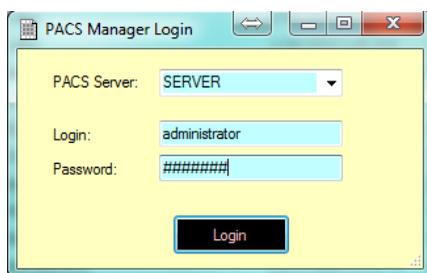


Figure 4-12: PACS Manager Login

The PACS Manager allows the system administrator to perform the following functions:

- Allows access to the PACS Administrative functions both locally and remotely through LAN/WAN and Internet
- Add, Edit and Delete system users

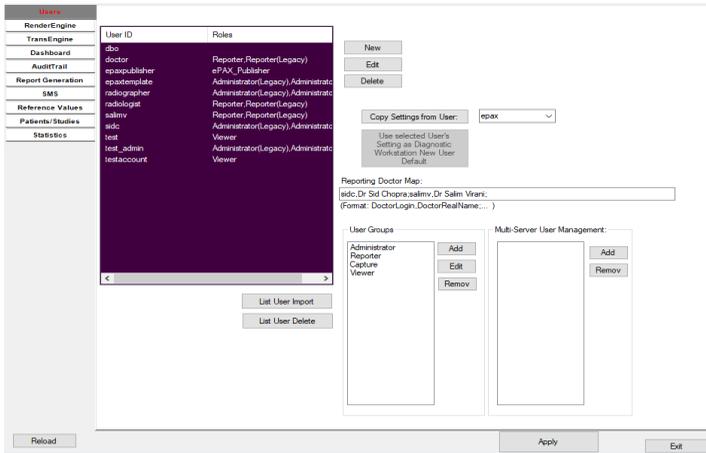


Figure 4-13: User administration

Here we can create new users by clicking on ‘New’. Already present users can either be edited or removed by selecting User ID and clicking on ‘Edit’ or ‘Remove’ respectively.

The users can be categorized into ‘User Groups’. User Groups such as Administrator, Reporter, Capture and Viewer are created by default. They can be Edited or removed by their respective buttons as shown in figure 4-13. New User Groups can be created by using ‘Add’ Button. User Groups with different privileges can be created by using ‘Add’ button (Figure 4-13).

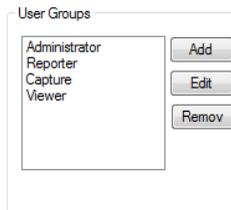


Figure 4-14: User Groups

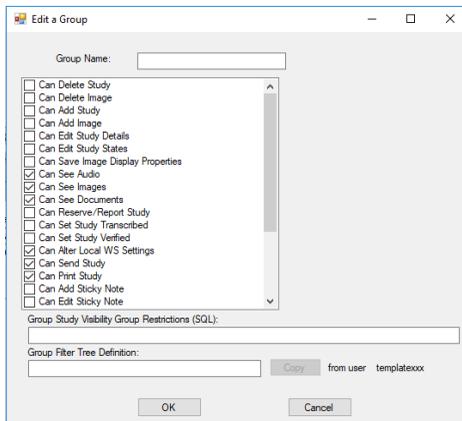


Figure 4-15: Adding User Groups

Setting user permissions and restrictions for users

'UserEditDialog' opens up when the administrator tries to add or edit a user. While adding a user following options can be set for the user:

- User ID
- Password
- Group(s) the user is member of

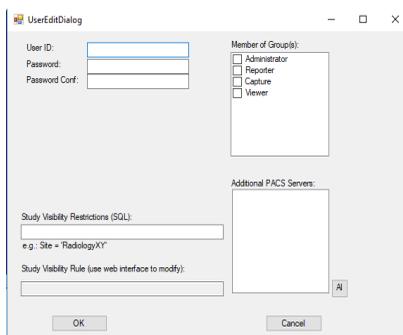


Figure 4-16: UserEditDialog

4.4 Voyager Integration

Voyager Integrator provides integration and connection to existing applications and systems within the radiology and hospital network.

Voyager Integrator can provide integration to Hospital Information Systems (HIS) and Radiology Information Systems (RIS) through HL7, allowing connection and interface through industry standard protocols, without the need for proprietary interface. Custom proprietary interfaces can be provided on request.

The combination of HL7 integration to a HIS/RIS and the Voyager DICOM Modality Worklist (DMWL) provides a radiology network with a single point of entry for patient and study details. Patient and study details are then transmitted to every modality where they can be selected for image acquisition.

Other options include seamless interface and launching of third party applications that are integrated to the Voyager workstation desktop, including 3D, MPR and digital dictation options.

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Appendix

A

A.1 Using Windows

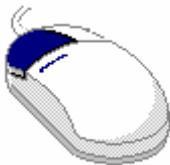
If you have not used an operating system similar to Windows XP or 2000 before then you should familiarize yourself with its basic operating principles before using the Voyager software.

This section gives a brief introduction to using the operating system. For more information you should refer to the documentation supplied with Windows. If you are already familiar with the operating system you can skip this section.

A.1.1 Using the mouse

Throughout this manual and in the on-line help, several different references to using the mouse are made.

The mouse controls the movement of the pointer/cursor on the screen. As you move the mouse around a flat surface, the pointer moves around your screen.



Any reference to **pointing** to an item requires you to move the mouse until the tip of the pointer is over the item.

Any reference to **clicking** on an item requires you to point to the item and then press and release the left mouse button to **select** it.

Double clicking on an item requires you to move the cursor over the item and then press and release the left mouse button twice in rapid succession.



Right clicking is as above, except rather than pressing the left mouse button, press the right mouse button.

Dragging refers to moving an item by pointing to it, pressing and holding the left mouse button, pointing to where you want to move the item to, then releasing the mouse button.

A mouse with a **mouse wheel**, such as the Microsoft IntelliMouse, is recommended for use with Voyager. The wheel can be rolled to zoom in and out of images, and can be held down and dragged to pan around zoomed images.

A.1.2 Starting and closing programs

To start a program:

1. Click on the **Start** button, and then point to **Programs**.
2. If the program you want is not on the menu, point to the folder that contains the program.
3. Click on the desired program.

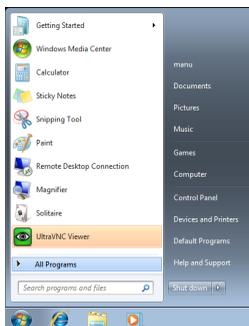


Figure Error! No text of specified style in document.-1: Start Menu



If the program doesn't appear on the Programs menu or one of its submenus, point to Find on the Start menu, and then click on Files Or Folders. Use the Find dialog to locate the program file.

A.1.3 Closing Programs

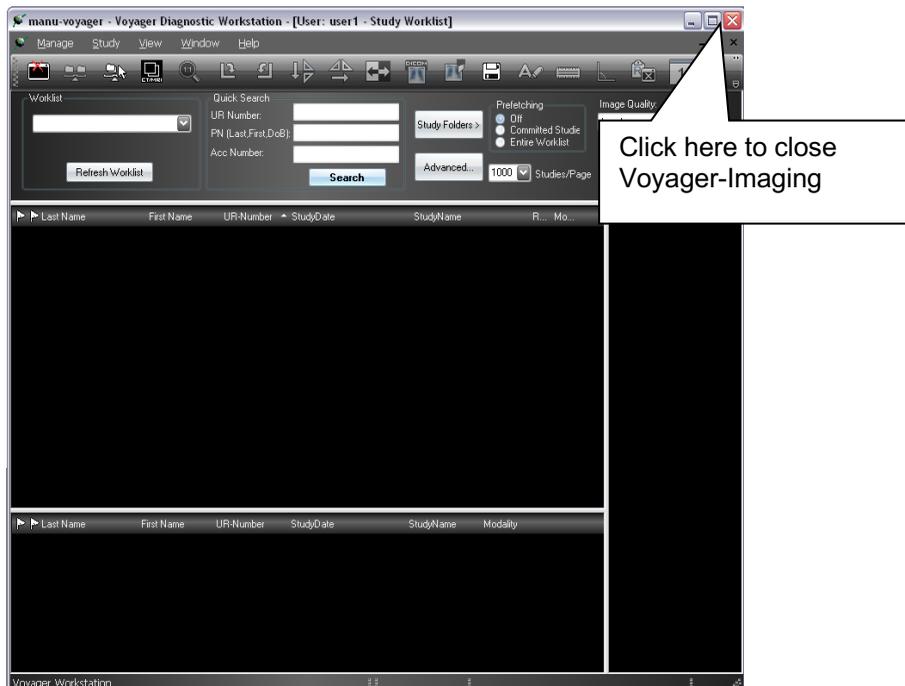


Figure Error! No text of specified style in document.-2: Close Voyager

To close a program, click on the  button in the upper right corner of the program window, or double click on the Program icon in the upper left corner of the program window.

A.1.4 Toolbars

Voyager has a menu bar directly beneath the window title bar. The sections will change depending on the window currently open.

The menu bar for the Study Window contains the following menu items:



File: This menu contains database maintenance functions and File Exit option.

Study: This menu contains items relevant to studies. These include commands for opening, closing, saving changes, and reporting.

View: This menu contains items relevant to the Voyager’s display. You can turn on and off toolbars and status bars, toggle the status window, and view activity logs, queries, and scheduled transmissions.

Window: This menu contains items relevant to Voyager’s windows.

Help: This menu contains items for opening the on-line help, viewing Voyager’s **About** box, and enabling option codes.

Using menus

You can select a menu command by left clicking on the menu name. This will show a drop down list of commands. Move the mouse pointer to the command you wish to select and left click again. The menu will disappear and the command will be performed.



When some toolbar items or options appear grayed out, they are not applicable at this time, and are unavailable for selection.

A.1.4.1 Tool tips:

To find out what a particular button does, move the cursor over the button. After a brief delay, a tool tip will appear showing what the button is used for. Alternatively, you can choose toolbar buttons with text captions when configuring the toolbars.

To select a toolbar button, simply click on it with the mouse.

A.1.5 Buttons

Some of Voyager's windows have buttons. Buttons are used to carry out the action specified on the button or access a related dialog.



For example, the **Search** button is used to Search for studies in the database.

To use a button, click on it with the mouse, or press the **Tab** key to move the focus to the button and press the space bar.

A.1.6 Dialog boxes

In some cases, selecting a menu option or pressing a button will activate a dialog box. This is a box that contains a number of different input fields relevant to that operation. For example, selecting the **About...** button from the **Help** menu will show a dialog box with information about Voyager-Imaging.

You can move the focus from field to field in a dialog box either by clicking on each entry item with the mouse or by pressing the **Tab** and **Arrow** keys to move the cursor from field to field. After entering or changing any values in a dialog box, click on **OK** to accept the changes and close the dialog.

A.1.7 Controls

There are a number of different field types used in the Voyager software. This section describes the fields appearing throughout the software and how to enter values in these fields.



Fields that are unavailable for selection are said to be disabled and appear greyed.

A.1.7.1 Text boxes

Text boxes accept text or numeric input. To make or edit an entry, click on the appropriate field, type in the required value, then move the focus elsewhere to accept the entry.

A.1.7.2 Radio buttons

Radio buttons are small, round buttons that are used to make a selection from a series of mutually exclusive items. You can select a radio button with the mouse by clicking on the button or the text beside it. Alternatively, you can move the focus to the group of buttons then select the desired option using the **arrow** keys. Selecting an option will deactivate the other options as only one option may be selected at a time.



A.1.7.3 Drop down list

A drop down list is a selection field with an arrow icon to the right of it. Clicking on the arrow icon with the mouse displays the list of options available for selection.

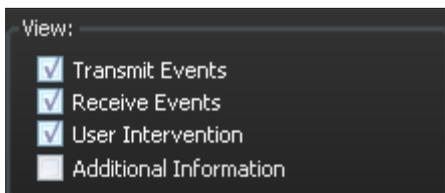
To make a selection from the list click on it once, or use the arrow keys to move the highlight bar to the desired option and press **Enter** to accept the selection.



A.1.7.4 Checkboxes

Checkboxes are small squares used to turn an option on or off. A checkbox item is selected when a tick (✓) appears in the checkbox. Within a group, any number of checkboxes may be selected.

To select or deselect a checkbox, simply click on it or the text beside it with the mouse. Alternatively, move the focus to the group of checkboxes with the **Tab** key, use the arrow keys to position the focus on the desired option and press the space bar to select or deselect it.



A.2 Voyager Workstation Shortcut Keys

A.2.1 Worklist Control Keys

Ctrl-O	Open Study
Ctrl-R	Refresh Worklist
Ctrl-N	New Study
Ctrl-Z	New Study from Order
Ctrl-E	Edit Study
Ctrl-P	Commit Study for Reporting/Prefetching

A.2.2 Exam Open Control Keys

Key	Function
Ctrl-X	Close Study
Ctrl-R	Report and Close Study
Tab	Report and Close and Next
Ctrl-T	Transcribe and Close
Ctrl-I	Show on RIS
Ctrl-M	Launch MPR / 3D Application
Ctrl-D	Launch Dictation
Ctrl-N or PgDn	Hang Next Page
Ctrl-P or PgUp	Hang Previous Page
D	Next Significant/Key image
S	Mark current image as Significant/Key Image
- (num pad)	Optimize (auto) window/Level
Ctrl-B or Esc	Reset window/Level to DICOM header
Arrow left/right	Next/previous image / slice
A	Annotation Mode on/off
M	Ruler on/off

P	Protractor on/off
R	Hounsfield on/off

A.2.3 Exam Open Mouse & Key Controls

Key	Mouse Action	Function
Ctrl	Select a rectangular region using right mouse button	Greylevel statistics over the selected rectangular area
Shift	Select a region using left mouse button	Optimize Window/Level for selected area
+ (NumPad)	Left Click into image panes	Link series for scrolling (CT/MR)
* (NumPad) or C	Scroll slices forward or backward	Offsets a linked series by number of frames scrolled
0 (NumPad)	Left Click in an image	Shows 3D Corresponding position in other views (CT/MR)
1 (NumPad)	Left Click in an image	Moves to 3D corresponding slice and shows position in other views (CT/MR)

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Appendix

B

B Glossary

- DICOM** The DICOM Standard (Digital Imaging and Communications in Medicine) addresses the exchange of digital information between medical imaging equipment and other systems.
- A standard set of information is retained with each image, allowing Voyager to interact with other DICOM-compatible systems.
- Further information can be found at <http://medical.nema.org>.
- Gamma** Factor of Intensity.
- JPG** Universal online image format.
- Lossless format jpg images are recommended for diagnostic reviews. They are uncompressed and therefore have the highest quality, but take longer to transmit over the network than Lossy.
- Lossy format jpg images are of lower quality, and are recommended for cursory inspection. They are faster to transmit over the network.
- Modality** An image acquisition device connected via a DICOM standard compliant interface to a teleradiology workstation.

PACS	Picture Archiving and Communication Systems
Series	A range of images stored in a study.
Soft Copy	Digitally stored files.
Soft copy Radiology Workstation	A computer system that is installed with Voyager software. It is used for the purpose of reviewing and reporting studies.
Study	A soft copy collection of scanned images and documents associated with a single patient
Teleradiology Workstation	A computer system that is installed with Voyager software and connected to one or more image scanning devices. It is used for the purpose of creating studies and adding them to the Voyager network database.
Transmit	Move a study from one Voyager system to another over a network or modem connection.
TWAIN	A universal public standard which links applications and image acquisition devices. Further information can be found at http://www.twain.org .
UR Number	A unique reference number used to identify patients in the Voyager database.
Worklist	A list of available studies that can be opened for review or transmitted.

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