USER'S GUIDE
Web Clinical System

Version 2.0
About This Manual

Thank you for purchasing our RAYPAX PACS solution.

RAYPAX is a PACS (Picture Archiving and Communication System) that can capture, diagnose, review, and archive medical images and patient data.

This User’s Manual was written to help users to better understand and use the functions of the RAYPAX system.

Please read this manual thoroughly before operating the RAYPAX system.

This manual should be kept for reference purposes.

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Getting Started

Web Clinical System
Introduction

RAYPAX Web Clinical System (WCS) is a PC-based medical viewing system designed for clinical purposes, while RAYPAX Display Workstation is for Radiologists or Technicians for diagnostic purposes.

It is very easy to implement a PACS environment that runs on Microsoft Internet Explorer, under Windows NT/2000/XP or Windows 95/98, in a hospital as it is familiar to millions of PC users and does not need client installation, plug-ins, etc.

RAYPAX WCS uses the same user interface as all components of the RAYPAX product line for consistency.

RAYPAX WCS is based in part on OCX (OLE Custom Control), allowing increases in productivity and compatibility as well as convenient program upgrades.

The most important function of the WCS is Teleradiology, which utilizes a web browser as a medical PACS client viewing workstation. By using Teleradiology functions, images of patients can be sent to other doctors in various hospitals through e-mail in order to get their opinion.
Log-in

The following is the login window of RAYPAX WCS.

- **User login window**

![Login window](image)

Depending on the User ID, users can have different levels of authorization. Please contact the administrator.

**Login window**

RAYPAX WCS runs in a web browser for viewing of images (Microsoft Internet Explorer 5.0 or higher is needed).

After opening the homepage of RAYPAX WCS, type in the **Login ID** and **Password**.

Click on the **OK** button to login to RAYPAX WCS. The Exam Explorer will be displayed. The viewer software will be loaded on your local system if you have not visited previously. This program will be an image viewer overlay on the existing Internet Browser and will take a few minutes to install the first time web access is used. After that initial contact, the immediate access to the exams is allowed.

Users who are not registered must contact the administrator for assistance.
1 Exam Explorer

RAYPAX WCS Exam Explorer GUI

The Exam Explorer main window consists of 4 different sections; Folder List, Navigation, Exam List and Tool Menu Icons.

Folder List

It’s possible to customize to the hospital’s own workflow.

Folder list, a tree-based browser similar to Windows Explorer, is a visual file system that makes exam list management easier and more intuitive.

When the ☑ mark beside a folder name is clicked on, it subfolders will be displayed.

A ☑ mark means all subfolders are displayed.

If a folder has an exam list, it will display the list on the right side of the Exam Explorer (called Exam List).
If the amount of exam data is large, it will not display the entire list on the tree-based browser. For example, if the All Patients folder is selected, the data list will be long; therefore, it will display the patient list on the right side of the window (Exam List window) instead of showing the whole list in the tree-based browser.

* Simply select the arrow at the left of each exam to accrue the exams to be reviewed and then select the open button above the exams to open them in the image viewer. You can also simply select the name of the patient and the exam will be opened in the image viewer window.

Folder Content

The Folder Content section displays the Patient and Exam data according to the folder type. The following shows the list of folder types by content.

- **Exam** Folder containing exam information.
- **Patient** Folder containing patient information.

Exam List

This shows the entire list of contents of the Exam folder, which can be selected in the folder list.

Using the various query fields you can search for an exam or patient.

Search Grid
In the Query Field, query conditions can be entered to filter the contents of a folder. The Query Field is composed of the Field Header area and the Field Editing area. In the Fielding Editing area, it is possible to query strings and press the “Enter” key. The field content will be refreshed according to the query condition.

According to the folder content, the name and count of the Field Header items are changed during folder navigation.

There are 4 different ways to search for a patient or an exam.

- **Calendar Search**

  Click the Calendar button.

  Change year and month using arrow keys. (← →)

  Select the date.

  The selected data will be displayed.

- **Numeric Search**

  Type in the number that is to be searched, then select from one of equal to, greater than or less than. For example, if 70 is typed in the image count field and the “=” (equal sign) is selected; it will display all exam lists which contain 70 images.

**Search Online**

- **I** Thumbnail manager creates thumbnail images. These images are online but not verified (In Progress).

- **N** Images are in the LTA (Long Term Archive) or images are not yet acquired (Offline).

- **Y** Images are online, and can be accessed (Online).
Search by Sex

- **F** Female
- **M** Male
- **U** Unknown

Worklist

The worklist consists of 6 different folders; Verify, Unread, Dictated, Approval, Forwarded and Completed Queue. It also shows the exam status.

RAYPAX WCS was designed for clinical use only, so reading, verifying, dictating, and approving images will not likely occur. The exam status can be verified by using the worklist, but workflow tasks, such as verifying, dictating, approving, etc, can only be done in the Display Workstation. It is not possible to perform workflow tasks in the WCS.

To view images, the status of the exam must be at least verified. This is because thumbnail images are created after finishing the verify workflow task.

Reports for an exam can be read after the exam is approved.

To learn more about workflow, please refer to the workflow menu in the Display Workstation manual.
All Exam List

All Patients are displayed. If one patient is selected, all exams that belong to the selected patient will be displayed.

Desired patients can be found easily by using the search grid and query fields.

All Recent Exams

The number of rows, which is displayed in the exam or patient list, can be set in Preferences. Please refer to the Preference menu.

All recent exams are displayed. Retrieving all exams of a specific patient can be done in this folder.
Tool Menu

Viewer Launch

Images can be acquired and verified by technicians on the Display Workstation; afterward, the images are ready to be sent to the Web Server, where the thumbnail manager can automatically make thumbnail images.

When this progress is finished, the check box to the left of the exam can be seen.

The viewer launch tool is only activated when the check box is checked.

If the Viewer Launch button is clicked on, it will display the image viewer.

Preferences

The setting for thumbnails can be changed and the display row and default tab can be placed in the image viewer by clicking the Preferences button.

Compression Setting

In Compression Setting, you can determine the compression method by modality to compress DICOM images to be displayed in Image Viewer.
× Lossless: It displays the selected images, located in the STS (Short Term Storage), by lossless compression.

× Lossy: It displays the selected images, located in the web server, which were created by thumbnail manager, by Lossy compression.

**Others Setting**

× Main List Display Row Setting: It will display the set number of rows shown for the selected list in the exam explorer.

× Image Viewer Default Tab Setting: The selected tab will be displayed first when the viewer launch button is clicked and the image viewer is opened.
2 Web Image Viewer

This describes the RAYPAX-WCS Image Viewer.

It is possible to move the Tool Bar manually, and to show or hide the Tool Bar and Thumbnail bar.

RAYPAX-WCS Image Viewer GUI

The tool menu can be seen on the right side of the window and the thumbnail image for each series and exam in the left side of the window.

Clicking the right mouse button can also show the same menu items.

The main Image Display Window has 4 different tabs, which are Thumbnail Image, Selected Image, Key Image and Report.

The Thumbnail Bar and Tool Bar can be hidden to view a larger main Image Display Window.
Thumbnail Image

- Thumbnail Images

When images are acquired and verified by technicians in the Display Workstation, the images will be sent to the Web Server and the Thumbnail Manager (daemon program in the Web Server) starts to create thumbnail images from DICOM images into JPEG file format.

The thumbnail images created by Thumbnail Manager are displayed in this Thumbnail Image Window.

Speed is an important issue when using PACS through the Internet.

PACS uses medical images, which make for large file sizes.

This Thumbnail Image Window enables users to select only desired series of images for optimal speed.

Select images from the Thumbnail Bar to be viewed in the Selected Image Window.

To see all the images in the series, click the Select All button, which is located on the right side of the series name.

The Thumbnail bar and Tool Bar are not activated in the Thumbnail Image Window.
Selected Image

After selecting images in the Thumbnail Image Window, click the Selected Image tab.

Format

Format re-displays exam images using the defined number of rows and columns.

It allows the format of the display window to be configured. The number of rows and columns can be configured from 1 through 30.

To change the layout of the display window,

- Click the format button on the left corner of the selected series. Drag the mouse and select the column and row configuration that is desired; release the mouse button.
Key Image

Displays only the images that are marked as Key images in the Display Workstation.

Key images can be displayed without any selection from the Thumbnail Image Window if the series has pre-selected key images.

- Click the right mouse button to use the popup menu.
- The Thumbnail Bar and Tool Bar are activated in this view.
Report

To read the selected exam’s report, click the Report tab.

It displays the report after converting to an html file. Please refer to the Web Report Template menu in the Admin Tool.

- Write a Report

A report cannot be written in WCS. It only provides a read function.

To make a report, please use the Display Workstation.

Annotation Bar

With RAYPAX, all kinds of annotations can be added to images to indicate points of interest. Such an annotation is created on top of the image that is annotating; hence, the original image data is not affected.

All annotations - such as text, markers, and measurement tools - will remain in the same relative position on the image even if panned or zoomed.
Once an annotation has been created, it can be displayed or hidden with the exam or deleted.

To modify annotations,

- Click the right mouse button and select Properties from the popup menu.

- When the Annotation Properties dialog window is displayed, select one of the three tool tabs; Size/Statistics, Color/Line and Text.

- Modify annotation as desired.

**Annotation Properties: Size/Statistics**

Check the box of the size and statistics that you wish to view. The checked section will be displayed on the image.
Annotation Properties: Color/Line

The annotation color or line style can be changed.

Annotation Properties: Text

Text can be modified. Select font, style, size, color, etc.
Line

Length (distance) can be measured or points of interest can be indicated.

In accordance with the DICOM standard, distances are measured in millimeters for CT and MR studies and for some CR images.

- Click the Line button in the Tool Box, or
- Select Annotation > Line from the popup menu.

Angle

Measurements of an angle can be made.

Click the Angle button in the Tool Box, or

Select Annotation > Angle from the popup menu.

To make an angle measurement,

- Point to the image and click a base point
- Click once on a point along one side of the angle
- Click again on a point along the other side of angle. An angle will be drawn in.

Cobb’s Angle

Cobb’s angle measurements are particularly useful for small angles and when the intersection point is outside the image area.

To measure with a Cobb’s Angle,

- Click the Cobb’s Angle button in the Tool Box, or
- Select Annotation > Cobb’s Angle from the menu, or
× Select **Annotation > Cobb’s Angle** from the popup menu.

**Rectangle**

A rectangle can be created in the image window, with calculation for height, width and area of the created rectangle.

× Click the **Rectangle** button in the Tool Box, or

× Select **Annotation > Rectangle** from the popup menu.

**Ellipse**

An ellipse can be created in the image window, with calculation for area of the created ellipse.

× Click the **Ellipse** button in the Tool Box, or

× Select **Annotation > Ellipse** from the popup menu.

**Polygon**

A polygonal region can be drawn, with calculation for area and length of the region.

× Click the **Polygon** button in the Tool Box, or

× Select **Annotation > Polygon** from the popup menu.

To draw a polygonal region,

× Click a start point.

× Move the mouse pointer to the next desired point.

× Click again on the next desired point on the image.

× Repeat the process as many times as desired to create a polygon.
× Click twice with the left mouse button on the final point to finish.

**Memo**

It is possible to write and edit text to an image.

× Click the Memo button in the Tool Box, or

× Select Annotation > Memo from the popup menu.

**Note**

It is possible to write and edit text to an image with an arrow line. It is useful when writing text to indicate something.

× Click the Note button in the Tool Box, or

× Select Annotation > Note from the popup menu.

**Show Annotation**

Displays the annotation of the selected images. This is a toggle-style menu.

Nothing will be displayed if the selected images do not have any annotations.

This can be toggled by clicking the Show Annotation button in the Tool Box.
**Show Information**

Displays the general information of the exam. This is a toggle-style menu.

The information is from the DICOM header. The information, which is displayed on the images, is different by modality such as CR, MRI, CT, etc. For example, for MR images, the TI, TR, and TE values are displayed; while for CT images, the KV and mAs values are displayed instead of TI, TR, and TE.
The information can be seen by clicking the **Show Information** button.

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**Tool Bar**

**Popup**

This is useful when the selected image(s) and other images are being compared. The popup window can be maximized by double clicking on the title bar or simply clicking the maximize button. Also, the popup image can be seen with the report.

As many popup images can be used at one time as desired.

Popup images do not move if the move button is clicked, so the popup image and other images can be statically compared.

- Select an image that is desired to use as a popup image, then

- Click the **Popup** button from the tool bar.
Other image-processing tasks can be done in the selected popup image. If a window/leveling task is done in the selected popup, the window/level value of the original image will also be changed. If the popup image is not closed, it will not close even if the exam to which it belongs to is closed.

**Show DICOM Information**

Displays the DICOM information of the selected image.

DICOM files consist of the header information and the image pixel raw data. The DICOM header information of the selected image can be seen.

DICOM information is divided into 6 different parts; Patient, Study, Patient Study, Series, Equipment and Image information. Each part shows the information for attribute, value and tag.

To view the DICOM Information,

- Click the right mouse button, then select **Show DICOM Information** from the popup menu, or
- Click the **Show DICOM Information** button on the Tool Box.
Copy to Clipboard

Copies the selected image to the clipboard.

- Select an image to copy, then

- Click the Copy to Clipboard button from the Tool Bar or

- Select Copy to Clipboard from the popup menu.

- Run the Clipboard program or paste the images in another application.

Stack Viewer

Stack mode is used when the exam is composed of several images. Images in each series are stacked up, examined and compared one by one at the same slice position. The stack view displays images in a cine sequential order for movie-like viewing.

- Choose Series > Stack Viewer... from the menu, or

- Click the Stack Viewer button on the Tool Box.

- The following window will be shown. The play button in the Stack Viewer or popup menu can be used when the right mouse button is clicked.
Sync Helps to scroll through images in different series at the same time. If more than 2 series are opened and the box on the left of Sync is checked, the selected images can be compared. It is useful in viewing different MR series for a comparison.

View Zoom in and out from 50% ~ 300%. If the right mouse button is clicked on the image in the Stack Viewer, the popup menu for cine will be seen. If View is selected from the menu, the left image will be seen. Select one to be zoomed in or out

Show Information Show and Hide the information of the images.

Split

Divides the Image Display Window into 2 or 4 parts.

Various series from several exams can be compared at the same time using only a single monitor.

None Displays images using one Image Display Window.

2V Divides the Image Display Window into 2 vertical sections. Therefore, an Image Display Window can be selected for each exam or series. It is useful when comparing images by series or exam.
× 2H It divides the Image Display Window into 2 horizontal sections. Thus it is possible to select an Image Display Window for each exam or series.

× 2X2 Divides the Image Display Window into 4 sections. Up to 4 separate exams can be viewed and compared at one time.

Print Report

This function enables report printing from the Report tab. This function is enabled only under the Report tab.

Save JPEG Image

This function enables saving DICOM images displayed under the Selected Image or Key Image tab to the user’s local hard disk drive as an original size JPEG image format.

When the Save dialog box is displayed, specify the location to save the image and the file name in the dialog box.
About

Processing Bar

Selection

Images in the display window can be selected, or multiple images can be selected as well. It is also used to de-select previously selected images.

- Choose Selection from the popup menu, or
- Click the Selection button from the Tool Box.

- <Shift> Selects all images in a certain range, select the first image and then with the Shift key pressed drop the mouse button when the last image is selected.

- <Ctrl> With the Ctrl key pressed down, multiple images can be selected. If it is already selected, the image is then unselected.
Window/Level

- **Window/Level**
  
  Adjust the displayed Window/Level value of the image.

  While clicking the left mouse button, the Window width can be adjusted by moving the mouse to the right or left and the Level height can be adjusted by moving the mouse up or down.

  The following steps show how to adjust the image contrast and brightness by changing the image window width and level.

  - Choose Window/Level from the popup menu, or
  - Click the Window/Level button from the Tool Box.

  To adjust the Window/Level,

  - Dragging the mouse to the right on the image increases the window value (decreases contrast), while dragging the mouse to the left decreases the window value (increases contrast)
  - Dragging the mouse up increases the level value (increases brightness), while dragging the mouse down decreases the level value (decreases brightness)
By dragging the mouse left and right, up and down, the Window/Level value will change

![Window/Level value](image)

**Zoom**

- **Zoom**
- Allows you to enlarge or shrink a selected image.
- Select the desired image and press and hold the left mouse button. If the mouse is dragged up, the image zooms in; if it is dragged down, the image zooms out.

To use the **Zoom** function,

- Click the **Zoom** button in the Tool Box, or
- Select **Zoom** from the popup menu.

The image can be enlarged to a maximum of 16 times its original size, while it can be shrunk to the size of the fixed window.

**Pan**

- Allows you to move an image within the viewing window when the image is larger than the window.
When zooming or magnifying an image, it will become larger than the viewing window. It is then that panning (moving the image within a viewing window) becomes useful.

When the left mouse button is clicked and held, the X and Y coordinate values can be seen at the bottom right-hand corner of the Image Display Window. This value corresponds to the relation of the viewed point to the vertex in the original image.

To use the Pan function,

- Click the Pan button in the Tool Box, or
- Select Pan from the popup menu.

### Magic Glass

The Magic Glass function has undergone some significant improvements. It is now possible to change the size of the Magic Glass window independently of the underlying viewing window, as well as apply independent window/level settings to the contents of the magic glass. Zoom in the Magic Glass window can also be increased to a greater magnification, which is especially useful for high-resolution systems.

Magic Glass creates a small magnifying window that allows quick magnification of a small area of an image. When an image is currently displayed at a size equal to or larger than the size defined by the DICOM header information (for example, after zooming), the magnification ratio is 2:1. When an image is currently displayed at a size smaller than the size defined by the DICOM header information, the magnification ratio is 1:1.

To use the Magic Glass function,

- Click the Magic Glass button in the Tool Box, or
- Select Magic Glass from the popup menu.
To change the size of the magic glass, click the left mouse button with the <Shift> and <Ctrl> key together.

Press <Shift> with the left mouse button; the window/level value can be changed.

The way to change the window/level value is the same as the Window/Level. (Please refer to Window/Level)

Press <Ctrl> with the left mouse button; the part of the image in the magic glass can be enlarged.

**Local Window/Level**

This functions works in the same manner as the Window/Level function. However, Window/Level changes the values of the selected image manually while Local Window/Level changes the window/level values of the image based on the values in the selected local area. It is useful for viewing the full image in relation to the Window/Level of a certain area of the image.

To use the Local Window/Level function,

- Click the Local Window/Level button in the Tool Box, or
- Select Local Window/Level from the popup menu.

Click the left mouse button and drag the mouse to form a local window over the desired area of the image. Dragging the mouse will change the window/level values displayed on the bottom right-hand corner of the Image Display Window. The window/level value of the entire image will change to the value in the selected area when the mouse button is released.
Pixel Value

This function displays the pixel value and coordinates where the mouse pointer (shown as cross hairs) is located.

Depending on the image type, the pixel value will have different meanings. The chart on the sidebar shows the meaning of the pixel value for various image types.

To use the **Pixel Value** function,

- Click the **Pixel Value** button in the Tool Box, or
- Select **Pixel Value** from the popup menu.

When the cross hairs (as seen in the icon on the side bar) appear on the image, drag the mouse around to view the **pixel value** and the **coordinates** at the bottom right-hand corner of the image.

Invert

This function inverts the image to a negative grayscale image.

This means it reverses the gray shading of an image. Therefore, the black part of the image changes to white, and the white changes to black.

To use the **Invert** function,

- Click the **Invert** button in the Tool Box, or
- Select **Invert** from the popup menu.
Flip

This function enables an image to be flipped on its vertical or horizontal axis.

This is useful if the image has been scanned upside down, or if another view of the image is desired.

Flip Horizontal

- Click the Flip Horizontal button in the Tool Box, or
- Select Processing > Flip > Horizontal in the menu, or
- Select Rotate/Flip > Flip Horizontal from the popup menu.

Flip Vertical

- Click the Flip Vertical button in the Tool Box, or
- Select Processing > Flip > Vertical in the menu, or
- Select Rotate/Flip > Flip Vertical from the popup menu.

Rotate

This function rotates an image in a counter-clockwise manner.

To rotate an image,

- Click the Rotate button in the Tool Box, or
- Select Rotate/Flip > Rotate 90 or Rotate 270 from the popup menu.
Rotate from the popup menu

After rotating an image, the patient orientation signs will change appropriately, as seen above.

### Popup menu

#### Window/Level

Please refer to **Window/Level** in the Processing Bar.

#### Zoom

Please refer to **zoom** in Processing Bar.

#### Pan

Please refer to **Pan** in the Processing Bar.
Local Window/Level

Please refer to Local Window/Level in the Processing Bar.

Magic Glass

Please refer to Magic Glass in the Processing Bar.

Pixel Value

Please refer to Pixel Value in the Processing Bar.

Invert

Please refer to Invert in the Processing Bar.

Rotate/Flip

Please refer to Rotate, Flip Horizontal and Flip Vertical in the Processing Bar.

Rotate/Flip sub menu from the popup menu.
Enhancement

Histogram Equalization

Histogram Equalization is the image processing feature to adjust the distribution of brightness so that a visually better image can be created.

To apply Histogram Equalization,

× Select an image that is desired, then

× Select Processing > Histogram Equalization in the menu, or

× Select Enhancement > Histogram Equalization from the popup menu.

Sharpen

This function uses a filter that increases the visibility of small lines and fissures, which may otherwise be difficult to spot. It brings an image into better focus and sharpens the detail by increasing the contrast of adjacent pixels.

To sharpen an image,

× Select the image to sharpen, then

× Select Processing > Sharpen in the menu, or

× Select Enhancement > Sharpening from the popup menu.
Smoothen

This function uses a filter that effectively makes an image look smoother by softening hard or rough edges.

To smoothen an image,

- Select an image to smoothen, then
- Select Processing > Smoothen in the menu, or
- Select Enhancement > Smoothing from the popup menu.

Annotation

Please refer to Annotation in the Annotation Bar.

Properties...

Please refer to Properties in the Annotation Bar.

Popup

Please refer to the Popup in the Tool Bar.

Show Dicom Information

Please refer to Show Dicom Information in the Tool Bar.

Copy to Clipboard

Please refer to Copy to Clipboard in the Tool Bar.
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