eUnity™

eUnity 7.1

Enterprise Viewing, Integration, and Collaboration Platform

User Guide

Document ID: USER-001

Revision number: 2.2

Revision date: November 8, 2021

103 Bauer Place, Suite 3 Waterloo, Ontario Canada N2L 6B5 | +1 888-87-MACH7 | info@mach7t.com

Mammography

Mammography overview

eUnity™ supports the display of mammography images / exams with modality type as MG or CR and one of the following SOP class UIDs:

- Digital Mammography X-Ray Image Storage for Presentation (1.2.840.10008.5.1.4.1.1.1.2)
- Breast Tomosynthesis Image Storage (1.2.840.10008.5.1.4.1.1.13.1.3)
- Computed Radiography Image Storage and other DICOM elements, Organ Exposed=Breast, Body Part Examined=Breast (1.2.840.10008.5.1.4.1.1.1)

Mammography images with the following SOP class UID are not displayed by default. If desired, contact your system administrator to have this SOP class configured to be viewable.

- Digital Mammography X-Ray Image Storage - for Processing (1.2.840.10008.5.1.4.1.1.1.2.1)

Mammography tools

This feature requires a separate license and may not be available. Contact your system administrator to have this feature licensed and enabled.

This section provides an overview of the mammography tools. See Mammography CAD objects, Navigate Relevant Priors and Navigate Study List, Quadrant View and Fit to Window , orToggle 2D and 3D views for more information.

Fit to Window

Zoom the identified breast bounding box to fit the viewport and maintain "same size" on each viewport.

Toggle between 2D and 3D series

Switch between a tomosynthesis slice and the 2D reconstructed view for the selected series in a mammography study.

Toggle CAD

Show or hide CAD data in mammography images.

Quadrant View

Divide the mammography image into four equally sized quadrants of "same size" to evaluate the entire breast in four separate sections.

Quadrant View Backward

Step through the four quadrants of the image moving backward (counter-clockwise).

Quadrant View Forward

Step through the four quadrants of the image moving forward (clockwise).

Mammography indicators

The following indicators may be displayed in the viewport when viewing mammography studies:

CAD: Calc: 2 Mass: 1

CAD markers displayed

Shown in the viewport to indicate that CAD markers are displayed. The numbers represent the count for every type of displayed marker.

CAD: No Findings

No CAD findings

Shown in the viewport to indicate that CAD markers are NOT displayed. That is, CAD exists, but there are no findings to display for the image.

CAD: FAIL

Error with CAD information

Shown in the viewport to indicate that CAD markers are NOT displayed. That is, a fatal error with CAD information.

No CAD for Image

Image not related to CAD

Shown in the viewport to indicate that CAD markers are NOT displayed. That is, the image is not related to CAD.

No CAD for Study

No CAD in study

Shown in the viewport to indicate that CAD markers are NOT displayed. That is, there is no CAD in the study.

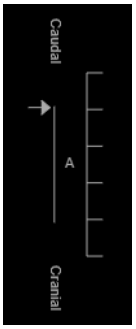
Quadrant View indicator

When in Quadrant View mode, this indicator is shown in the viewport on the non-breast wall side to indicate which quadrant of the breast is currently visible.

Related series indicator

In mammography studies, if the hanging protocol is set to Navigate Related Series, images of the same view type are stacked in the same viewport. This indicator is shown in the viewport to indicate how many images are stacked in the viewport and where you are in the stack.

System administrators can configure eUnity to include tomosynthesis images with the same view type in related series stacks.



Tomosynthesis indicator

Shown in the viewport for breast tomosynthesis studies to show the location of the current slice in relation to the other images in the series. The indicator shows directional markers to indicate whether you are scrolling in a caudal / cranial, or a medial / lateral direction.

Mammography base view

WARNING

When the breast zoom to fit feature is applied on a series basis, the resulting zoom to fit action on the images with different orientation may zoom the anatomy of any of the images out of the field of view.

To avoid this, create a hanging protocol to split out the images of the series into single series so each series consists of a single orientation.

When a mammography study is first opened, eUnity automatically presents a consistent layout for evaluation and interpretation. This default layout is referred to as base view. eUnity will not apply the base view to mammography studies if the following required DICOM attributes are missing, and the Orientation Marker is set as an Unknown View.

- Patient Orientation (0020,0020)
- Image Laterality (0020,0062)
- View Code Sequence (0054,0220)
- View Code Modifier Sequence (0054,0222), when present

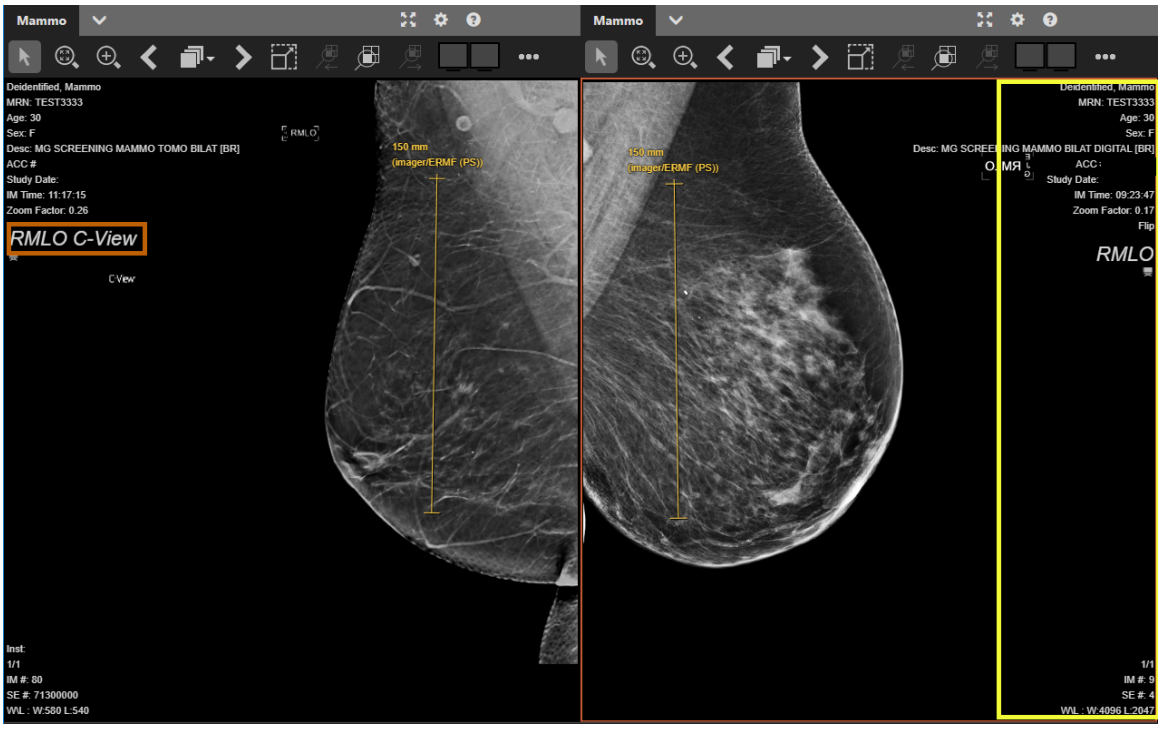


Figure 4: : eUnity mammography base view

Ventral view

The viewer displays the left breast with the nipple pointing to the right of the viewport and a right breast displays the nipple pointing to the left of the viewport.

Chest wall alignment

The chest walls are aligned to the viewport edge.

Same size

Images are scaled in the viewport so that images from the same patient, performed at different times on different detectors can be displayed at the same size.

This allows for evaluation of developing densities and allows the radiologist to evaluate for a change in size of known lesions during temporal comparison with prior digital images or even film mammograms. See the yellow measurement lines in the above image.

Demographic overlay

The viewer shows the demographic overlay opposite the chest wall by default so it does not cover the relevant anatomy.

The demographic overlay is outlined in yellow in the above image.

Orientation marker

The orientation marker is always shown opposite the chest wall and it cannot be turned off. If C-View (Hologic : Synthesized 2D Mammographic Imaging) is present, it is added to the orientation marker so that the user is always aware that they are viewing a synthesized image (for example, RCC C-View).

The orientation marker is outlined in orange in the above image.

Flip images

eUnity always flips images that would otherwise present upside down. When an image is flipped, the viewer shows the rotate indicator in the viewport.

Breast tomosynthesis viewing

eUnity shows a breast tomosynthesis indicator in the viewport to show the type of breast tomosynthesis and location of the current slice in relation to the other images in the series.

Air gap suppression

eUnity uses air gap suppression so that the air gap area (the viewport background) retains its color when the Window Level is changed or an image is inverted in a mammography study.

For air gap suppression to work, the image cannot be a secondary capture, color, or lossy and the Pixel Padding Value (0028,0120) and Pixel Padding Range Limit (0028,0121) tags must be populated in the DICOM header. If these values are missing or incorrect, air gap suppression may not work as expected. Note that air gap supression can be disabled by a system administrator.

Mammography CAD objects

eUnity™ supports the display of Mammographic Computer-Aided Detection objects.

This feature requires a separate license and may not be available. Contact your system administrator to have this feature licensed and enabled.

Toggle CAD

Show or hide CAD data in mammography images.

Turn on CAD objects

Note: Mammo CAD markers are not displayed under the Magnifying Glass.

1. To turn on CAD objects, on the **Mammo** tab, click 

   CAD markers are displayed on the image. See the Mammo CAD markers and outlines table below for information on what each marker means.

Mammo CAD markers and outlines

Note that CAD outlines can be enabled or disabled by administrators. Certain vendors may not display markers or outlines for CAD objects. See Vendor-specific display below for more information.

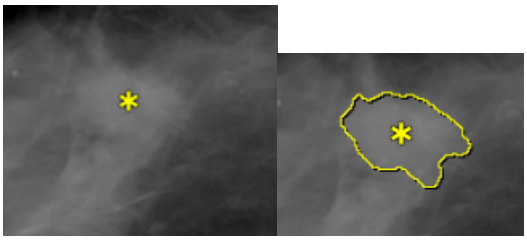


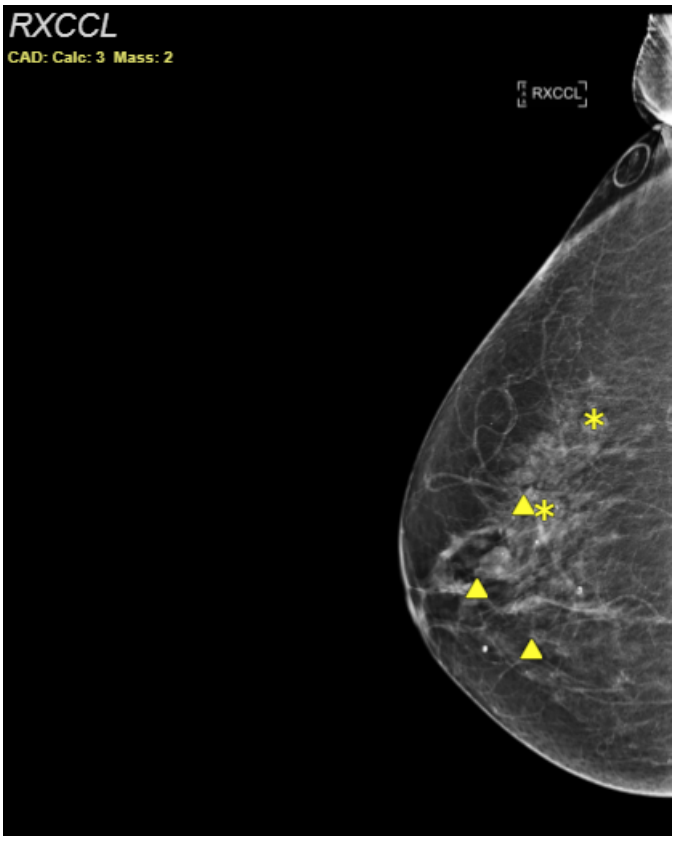
Figure 5:: CAD marker (left) and CAD outline (right)

▲	Calcification cluster
△	Individual calcification
*	Mass (density)
✦	Mass with calcifications

Vendor-specific display

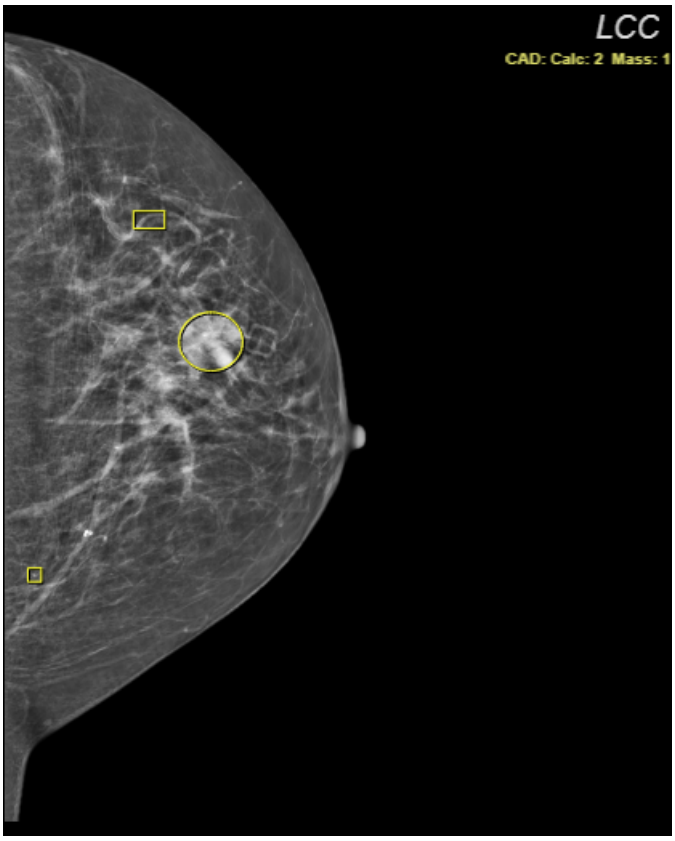
Hologic1 R21

No outlines are displayed by default (that is, only markers are shown)



iCAD2

Only outlines are displayed for mass and calcification clusters (that is, markers are not shown).



Other vendors

Both outlines and markers are displayed.

Mammo CAD indicators

CAD: Calc: 2 Mass:1	**CAD markers displayed** Shown in the viewport to indicate that CAD markers are displayed. The numbers represent the count for every type of displayed marker.
CAD: No Findings	**No CAD findings** Shown in the viewport to indicate that CAD markers are NOT displayed. That is, CAD exists, but there are no findings to display for the image.
CAD: FAIL	**Error with CAD information** Shown in the viewport to indicate that CAD markers are NOT displayed. That is, a fatal error with

	CAD information.
No CAD for Image	**Image not related to CAD** Shown in the viewport to indicate that CAD markers are NOT displayed. That is, the image is not related to CAD.
No CAD for Study	**No CAD in study** Shown in the viewport to indicate that CAD markers are NOT displayed. That is, there is no CAD in the study.

Quadrant View and Fit to Window

This feature requires a separate license and may not be available. Contact your system administrator to have this feature licensed and enabled.

Fit to Window

Zoom the identified breast bounding box to fit the viewport and maintain "same size" on each viewport.

Quadrant View

Divide the mammography image into four equally sized quadrants of "same size" to evaluate the entire breast in four separate sections.

Quadrant View Backward

Step through the four quadrants of the image moving backward (counter-clockwise).

Quadrant View Forward

Step through the four quadrants of the image moving forward (clockwise).

About Quadrant View and Fit to Window

WARNING

While the Fit to Window and Quadrant View tools can be used to view images, it is not intended to be the default and only method to view images. Never view an entire study in these modes as it risks not seeing the entire original image.

The Quadrant View and Fit to Window tools are available in Mammography mode to zoom in on a breast image for diagnostic reading. These tools can be turned on after initial load or invoked as an action of a hanging protocol. Quadrant View and Fit to Window maintain the "same size"

property, so images in different viewports may be updated with a new zoom factor whenever the screen layout is changed, the series is navigated, or a new series is dragged in.

The Fit to Window and Quadrant View tools calculate the area that contains anatomical content for each image in a mammography study. The output of these tools' calculation creates a Breast Bounding Box for each image that is zoomed to fit whole breast area or breast quadrant area to each viewport when the tool is activated.

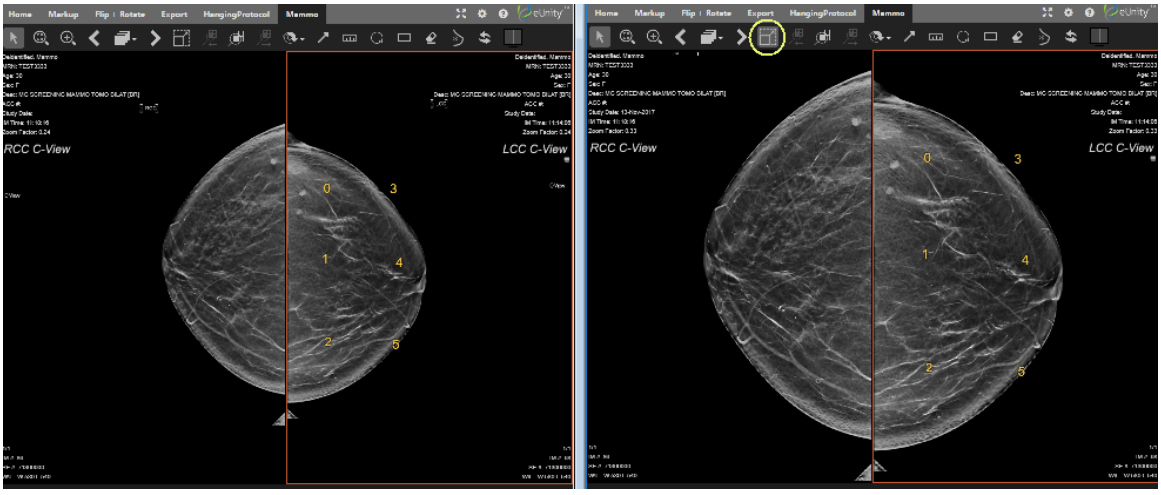
Note: Fit to Window and Quadrant View cannot be applied if any of the following conditions are met. In any of these cases, these images are reverted to "image fit to viewport" and the tools are disabled.

- The DICOM object does not contain pixel spacing.
- The image contains an invalid MammoView marker.
- A presentation state (GSPS) with a zoom factor or rotation is applied to images. Note that if the presentation state is unselected (or set to None), these tools should be enabled.
- The breast bounding box cannot be identified (ex. image contains spot compression device or biopsy needle).

Fit to Window

In Fit to Window mode, eUnity zooms in on the breast bounding box to fit the viewport and maintains "same size" on each viewport.

1. Select an image in the viewing area.
2. On the Mammo tab, click 



Quadrant View

In Quadrant View mode, eUnity divides the mammography image into four equally sized quadrants of "same size" so you can evaluate the entire breast in four separate sections. The first quadrant is displayed in the active viewport.

Quadrant View indicator

When in Quadrant View mode, this indicator is shown in the viewport on the non-breast wall side to indicate which quadrant of the breast is currently visible.

1. Select an image in the viewing area.
2. On the **Mammo** tab, click 
   - Click  to step forward (clockwise) to the next quadrant.
   - Click  to step backward (counter-clockwise) to the previous quadrant.

Toggle 2D and 3D views

Toggle between 2D and 3D series

Switch between a tomosynthesis slice and the 2D reconstructed view for the selected series in a mammography study.

Toggle between 2D and 3D view

When viewing a breast tomosynthesis slice, quickly switch between the current slice and the 2D reconstruction in the selected series.

1. In a tomosynthesis stack, click  . The 2D reconstruction is shown.
2. Click  again to switch back to the tomosynthesis slice you were previously viewing.

Mark Location

Mark Location

Outline a region of interest with an ellipse and automatically add a line segment that measures from the edge of the ellipse to a landmark such as a nipple.

Use the Mark Location tool in mammography studies to outline a region of interest with an ellipse and automatically add a line segment that measures from the edge of the ellipse to a landmark

such as a nipple. The tool provides a number of labels (such as Microcalcification, Asymmetry etc.) that you can select from that will be used to label the measurement. The measurement can then be saved as a Key Image or Presentation State.

NOTE: The Mark Location tool cannot be used in Advanced Visualization modes.

The Mark Location tool may need to be added to your toolbar or context menu. For more information, see Customize the toolbar or Customize the context menu or contact your system administrator.

1. On the toolbar, click  and select a label for the measurement.
2. Place your cursor near the region of interest, left-click to start the ellipse and left-click again to end it.
3. The line segment will be drawn automatically as soon as you move the cursor. Left-click to set its end point.

To discard the measurement before it is completed, press the Esc key.

Edit a measurement

1. Click the measurement to select it and do any of the following:
    - To resize the ellipse, drag the handles on the edge of the ellipse.
    - To reposition the entire ellipse, drag from the center of the ellipse.
    - To resize the linear measurement, drag the handle at the end of the line segment.
    - To reposition the entire measurement, drag the handle in the center of the line segment.
    - To reposition the measurement label, drag it to the desired location.

Related

- Customize keyboard shortcuts
- Presentation States