RIS-PACS in mammografia 3D

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What IHE Delivers

Be careful of what you ask for……

…….you just may get it

-Author Unknown

Be careful what you DON'T ask for……

…….because it may not work

RFPs for Digital Mammography

So, how do you know what to ask for?

For a start, ask for the:

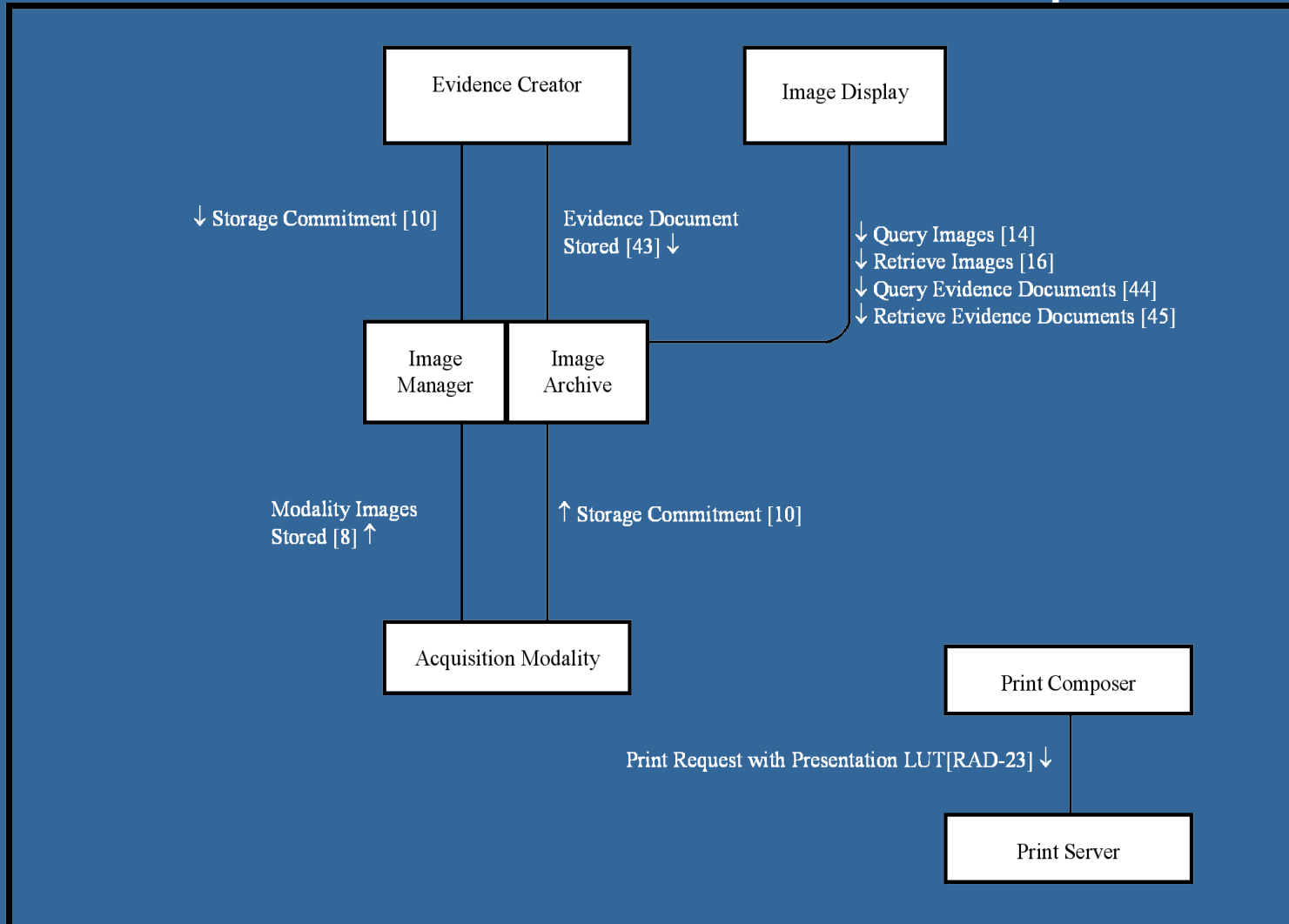☑ IHE Mammography Image Integration Profile

- **Helps meet desire to have multiple FFDM vendors and use any vendor's workstation for diagnosis**

- **Ensures that FFDM modalities provide adequate information to facilitate downstream applications**

- **Ensures systems support required data objects for interoperability**

- **Defines image display and printing operations required for effective and efficient diagnoses**

Mammography Image Integration

Scope

Evidence Creator

Image Display

↓ Storage Commitment [10]

Evidence Document
Stored [43] ↓

↓ Query Images [14]
↓ Retrieve Images [16]
↓ Query Evidence Documents [44]
↓ Retrieve Evidence Documents [45]

Image Manager

Image Archive

Modality Images
Stored [8] ↑

↑ Storage Commitment [10]

Acquisition Modality

Print Composer

Print Request with Presentation LUT[RAD-23] ↓

Print Server

● **Acquisition Modality**

- ➤ Send both for processing and for presentation images with reference that ties them together
- ➤ Additionally required DICOM attributes
- ➤ Detection and indication of tissue vs. air gap
- ➤ Partial View Option (breast is larger than detector)
- ➤ Modified requirements for film digitizers

Image Display

- Hanging protocols based upon view, laterality, patient orientation, and specialty views
- Maintain a black air gap during window/center operations and inverted pixel data
- Sizing
  - Same relative size
  - True size
  - 1:1 detector pixels to display pixels

Image Display cont'd

> Measurement calculation requirements

> Display calibration and grayscale rendering

> Labeling requirements

> Mammo CAD Structured Report rendering on "for presentation" images

> Partial View Option (breast larger than detector)

Image Manager

- ➢ Storage and retrieval of For Presentation and For Processing SOP Classes for Digital Mammography X-Ray

- ➢ Storage and retrieval of Mammography CAD Structured Report SOP Class

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Evidence Creator (CAD)

➢ Support for Mammography CAD SR SOP Class and Storage Commitment

➢ No specifics on how Evidence Creator obtains mammography images

Print Composers/Print Servers

- ➤ True Size printing (Requested Image Size)
- ➤ Justify chestwall and print with 5mm borders or less
- ➤ Render VOI LUTS if present
- ➤ Specify/Support maximum density
- ➤ Specify/Support Presentation LUT
- ➤ Labeling requirements
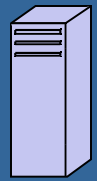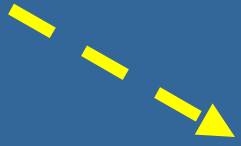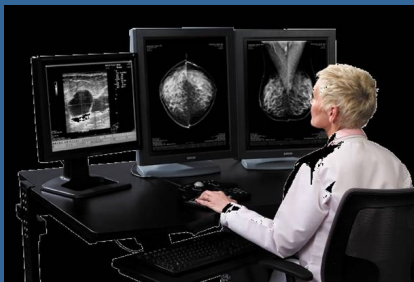- ➤ Support for 12 bit pixel depth
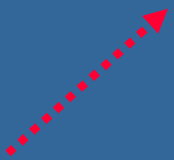
Mammography Image
Use Case

Modality

Archive

Workstation

CAD

Printer

Legend:
- "For Presentation" Image Data
- "For Processing" Image Data
- Mammo CAD Structured Rpt

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Things to keep in mind

- **Profile was just published in 2006**
- **1st real world test at Connectathon Jan 2007**
- **Vendor adoption takes time**
- **Product development takes time**
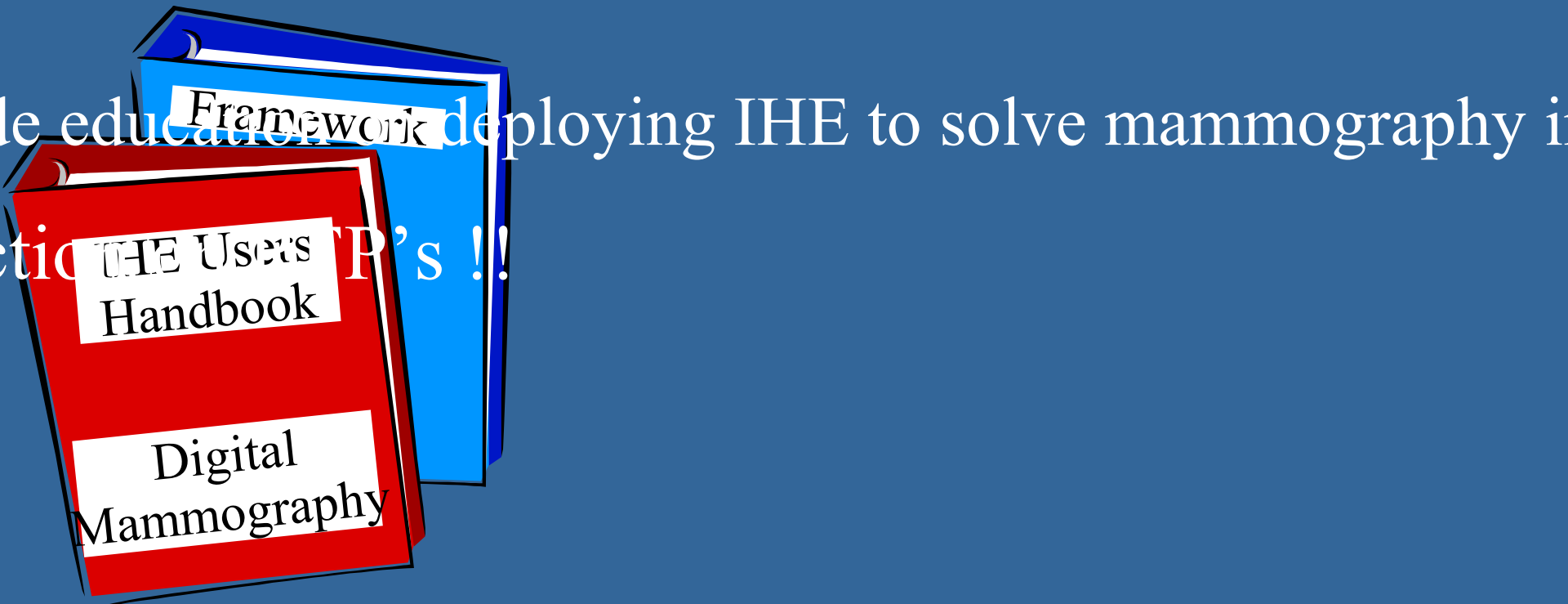- **Not all equipment is replaced at the same time**

The Good News

- **Many IHE Mammo features are available, today**

- **Other applicable IHE profiles may be of interest**
  - Have been around for a while
  - Are widely adopted
  - Increase success in various clinical challenges
  - e.g. scheduling exams, storing data to CD's

- **Education and knowledge are key**

Digital Mammography User Handbook

le education deploying IHE to solve mammography i

ctio IHE Users P's !!

Framework

IHE Users Handbook

Digital Mammography

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General RFP: Recommendations

- **Ask vendor(s) for commitment to the IHE Mammography Image Integration Profile (MAMMO).**

- **Ask about:**
  - Upgrade to existing product or new product
  - Anticipated availability
  - Budgetary pricing or other possible charges

General RFP: Recommendations

- **For each of the components that you will be purchasing….**
  - Request a DICOM Conformance Statement
  - Request an IHE Integration Statement

Example IHE Integration Statement

IHE Integration Statement			
Vendor	**Product**	**Version**	**Date**
Integrated Medical System	Awesome FFDM	1.2.3	1 July 2006

This product implements all transactions required in the IHE Technical Framework to support the IHE Integration Profiles, Actors and Options listed below:

Integration Profiles Implemented	Actors Implemented	Options Implemented
Mammography Image Integration	Acquisition Modality	Partial View
Scheduled Workflow	Acquisition Modality	Assisted Acquisition Protocol Setting
		PPS Exception Management Option
		Broad Worklist Query
		Patient Based Worklist Query
Patient Information Reconciliation	Acquisition Modality	None
Portable Data for Imaging	Media Creator	None

Links to Standards Conformance Statements for the Implementation	
HL7	Not applicable
DICOM	http://integratedmedsys/dicom.htm

Links for general information on IHE		
In North America: www.ihe.net	In Europe: www.ihe-europe.org	In Japan: www.jira-net.or.jp/ihe-j

Does your workstation:

Support and display DICOM Digital Mammography X-Ray objects with an intent type of FOR PRESENTATION?	Yes___	No___
Support and display Mammography CAD Structured Reports?	Yes___	No___
Use the Referenced Source Image Sequence attributed to tie "for presentation" images to CAD results performed on "for processing" images?	Yes___	No___

Hanging protocol determined by:

❖View Type (i.e. CC vs. MLO)

❖Specialty View Type (i.e. Spot, Mag)

❖Laterality

❖Patient Orientation

R CC — L CC
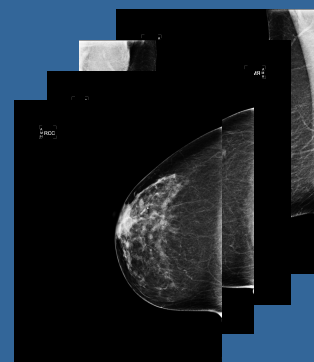
R MLO — L MLO

ng based upon series or study descriptions
e order as acquired
e orientation as acquired
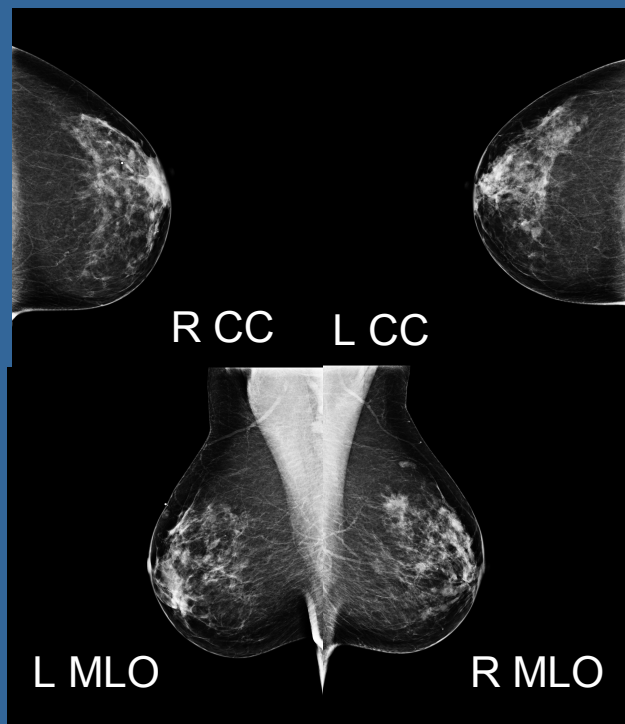
❖Stacked series example

R CC   L CC

L MLO   R MLO

Acquisition Modality-Presentation Requirements

Does your modality:

Differentiate spot and magnified views from regular views (i.e. CC View)?	Yes___	No___
Detect the skin line and differentiate breast tissue from non-breast tissue in the image?	Yes___	No___
Contain any private or proprietary methods of image display not communicated through the standard DICOM img path?	Yes___	No___

Workstations Hanging Protocols

Can your hanging protocols simultaneously display current & prior 4 view screening mammographic images?	Yes___	No___
Do your hanging protocols use the following attributes to determine placement and orientation of mammography images?		
View Code Sequence	Yes___	No___
Laterality	Yes___	No___
Patient Orientation	Yes___	No___
View Code Sequence Modifier	Yes___	No___
Do your hanging protocols require specific values in study description or series description attributes?	Yes___	No___

Workstations Size Presentation

Can your workstation:

|		
Display a patient's images the same relative size, based upon the imager pixel spacing attribute, even if images were captured on detectors of different size and resolution?	Yes___	No___
Display images in the actual physical size as on the detector by using the imager pixel spacing attribute and the physical size of the monitor in calculations? ("true size" mode)	Yes___	No___
Display image pixels such that one pixel on the monitor's resolution equates to one pixel of the detector resolution? (1:1 pixel mode)	Yes___	No___

Variances in FFDM Vendor Data
Detector Size Example

Typical "Fit to Viewport" effect

Prior Exam from Vendor A's system
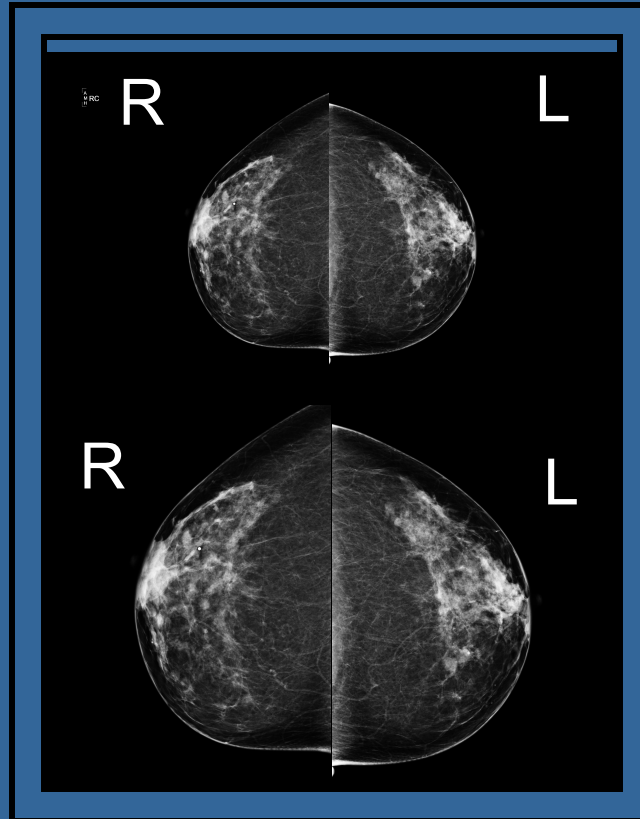
Current Exam from Vendor B's system
❖ Different resolution
❖ Different pixel matrix

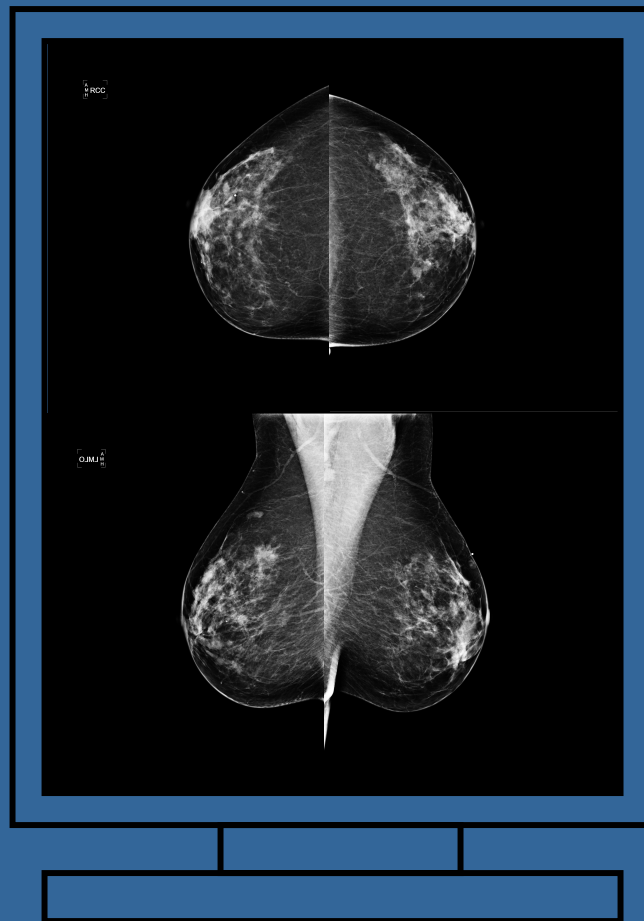**IHE** Changing the Way Healthcare CONNECTS
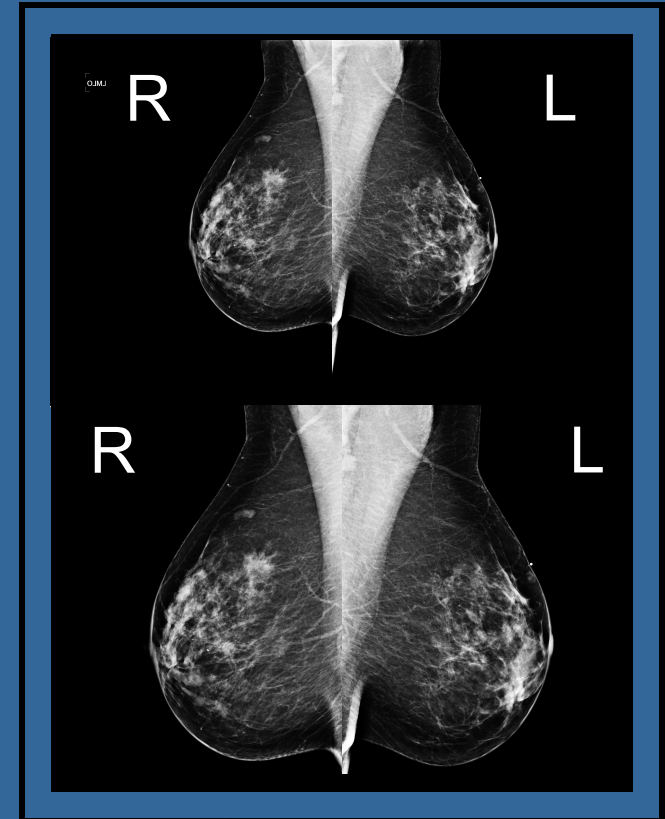
Workstations
Display & Contrast Adjustment

Can the workstation be calibrated according to the DICOM Grayscale Display Function which site control over maximum and minimum luminance?	Yes___	No___
When adjusting contrast and inverting image pixels, can the workstation keep the air gap black.	Yes___	No___
Use imager pixel padding value multiplied by radiographic magnification for the basis of measurement tools?	Yes___	No___
Does the workstation provide a method to render and apply all available window/center, VOI LUTs, or VOI LUT Function attributes?	Yes___	No___

Window/Center Adjustments

Does your archive:

Support storing and returning in tact all attributes for DICOM Digital Mammography-for presentation image objects?	Yes___	No___
Support storing and returning in tact all attributes DICOM Digital Mammography for processing image objects?	Yes___	No___
Support storing and returning in tact all DICOM Mammography CAD Structured Reports?	Yes___	No___
Knowingly add, change, or delete any DICOM attributes related to the above objects? If so, explain_____	Yes___	No___

When printing:

Does your product use the Imager Pixel Spacing attribute to send the Requested Image Size attribute to the printer (a.k.a. true size printing)?	Yes___	No___
Does your product justify the chestwall to the edge of the image before printing?	Yes___	No___
Can your product send the maximum density attribute to the printer for mammography images, recognizing that it is likely different than that used for other modalities?	Yes___	No___

Printers

Can your printer:

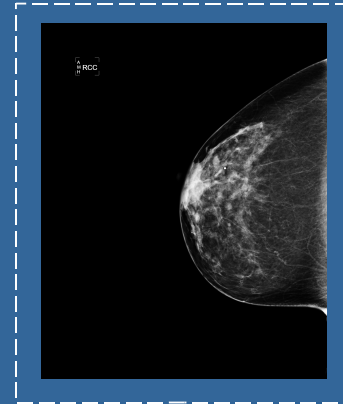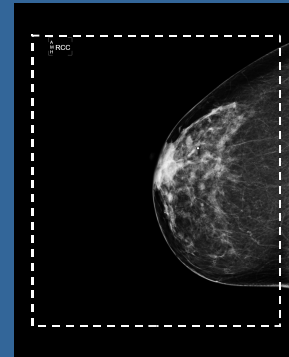|		
Print true size based on the Requested Image Size (2020,0030) within a precision of a maximum 2% error in linear distance?	Yes___	No___
Justify and print mammography images such that film borders are less than 5mm at the chestwall (edge of the image)?	Yes___	No___
Apply the requested Maximum Density attribute, printing with a maximum optical density no less than 3.5?	Yes___	No___

Printing Considerations
True Size
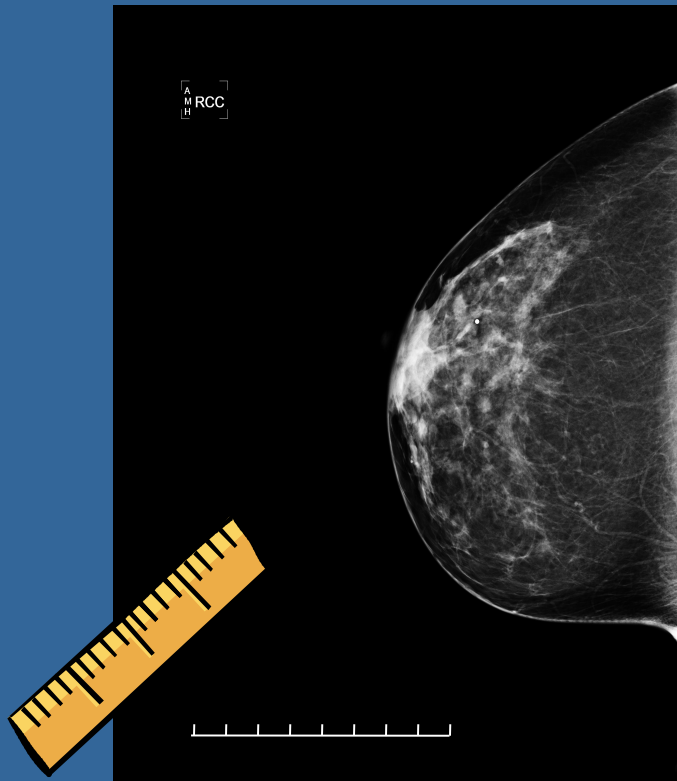
10in x12in
Film size

8inx10in
Film size
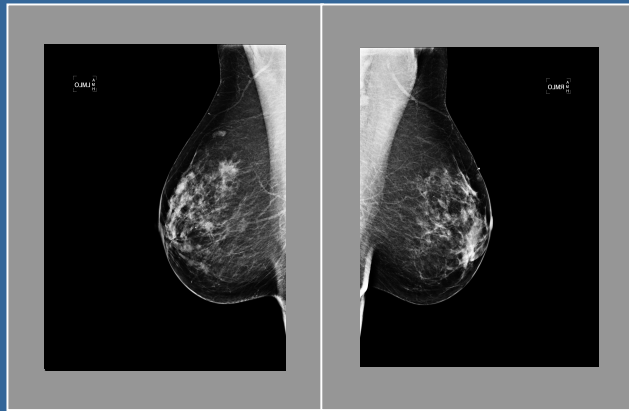
Precision of <2% error

Film size vs. Detector Size

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Centered images offset with chestwall side having minima

Image offset
create large borders
at chestwall

CAD System

Can your CAD system:

Provide results using the Mammography CAD Structured Report DICOM object?	Yes___	No___
Send results to both PACS and workstations automatically?	Yes___	No___
Use DICOM Storage Commitment transaction for reports sent to any destination?	Yes___	No___

Summary

- **Educate yourself on what to ask for**
- **Ask vendors about their commitment to IHE Mammo**
- **Get a copy of the existing IHE Users Handbook**
- **Get a copy of the IHE Mammography User handbook – RSNA 2006**
- **Have technical resources read the IHE Mammo Technical Framework**

Mammography
has painted itself into a corner

We have purchased systems that do not meet our informatics needs.