Image Distribution: Why

- So..the Radiology Department is ready to become filmless, except maybe for mammography and some other indications.
- This means that film will not be available anymore for distribution outside radiology!
- Who needs the images and reports outside the radiology department?
- How do we get the electronic images and reports to the users?
- What technologies are available?
- What are the issues, the do’s and don'ts?
**Identify Users and Requirements**

- Users of images and reports outside the radiology department – Step 1
  - In order to identify where healthcare providers need to view images and reports, look for light boxes.
  - Ask who is using the light boxes.
  - Interview these users and ask them for what purpose they viewed film.
  - What did they do with the film?
  - Just Viewing? Or maybe making measurements?
  - Maybe comparing new and previous films?
  - Is having access to images critical to perform their job?
  - Maybe they were producing their own images (OR, ER, ..)

**Load the Matrix**

- Users of images and reports outside the radiology department – Step 2
- Compile a list in Matrix format

<table>
<thead>
<tr>
<th>Location</th>
<th># of “lightboxes”</th>
<th>Diagnostic View</th>
<th>Measure</th>
<th>Planning</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Practitioner Offices</td>
<td>200</td>
<td>Y</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ER</td>
<td>5</td>
<td>Y</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>OR</td>
<td>15</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Orthopedics</td>
<td>10</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Wards</td>
<td>40</td>
<td>Y</td>
<td>Y</td>
<td></td>
</tr>
</tbody>
</table>
**Load the Matrix**

- Users of images and reports outside the radiology department – Step 2
- Compile a list in Matrix format

<table>
<thead>
<tr>
<th>Location</th>
<th>Image producer</th>
<th>Criticality (1 to 3)</th>
<th>Display required</th>
<th># of screens</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Practitioner Offices</td>
<td>N</td>
<td>1</td>
<td>PC grade</td>
<td>1</td>
</tr>
<tr>
<td>ER</td>
<td>Y</td>
<td>3</td>
<td>Hi RES</td>
<td>2</td>
</tr>
<tr>
<td>OR</td>
<td>Y</td>
<td>3</td>
<td>Hi RES</td>
<td>2 X 2 / room</td>
</tr>
<tr>
<td>Orthopedics</td>
<td>Y</td>
<td>3</td>
<td>Hi RES</td>
<td>4</td>
</tr>
<tr>
<td>Wards</td>
<td>N</td>
<td>2</td>
<td>PC grade</td>
<td>1</td>
</tr>
</tbody>
</table>

**Image Distribution**

- For the general practitioner
  - Large number of users
  - Fairly simple requirements
  - Image distribution technology choices include:
    - Burning images and reports on CD
    - Online web based access over Intranet/ Internet
- For the specialist
  - Large number of users
  - Thick or thin client workstation
  - LAN, WAN, Web based
  - Specialty dependent image processing options
  - Various display configurations
Technologies for Image Distribution

- **Sneaker-net**: Distribution of CD with images and reports
- CD’s can be produced by Imaging Department, will require dedicated hardware/software (workstation dedicated in film library, burning of CD, printing of label).
- Can be produced by other image-producing departments (OR, ER, etc.)
- CD needs to have DICOM image viewing software

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**Thick Client Workstations**

PACS Workstations & Modalities

Push / Pull

LAN

PACS Server

Local Disk Storage

ER

Clinical review
Hybrid: Thick/Thin

Central PACS Archive

n-Modalities

Clinical review workstations

CR

Diagnostic Workstations

LAN

Reports

Interface

WAN

PC's in Enterprise

On Campus

PC's Off Campus

Optional embedding in EMR

Firewall, secure ID

Encryption SSL

HTTP

IE Browser

Optional Embedding in EMR

Compression:
Not needed on LAN
Optional:
JPEG
Wavelet
Modality dependent

Optional: Embedding in EMR

Maximizing Redundancy

Imaging Modalities

ARCHIVE

DB Manager

Clinical Review

Diagnostic Workstation
Maximizing Redundancy

PACS Workstations & Modalities

PACS Server

Disk Storage

OR

PACS Web Server 1

PACS Web Server 2

LAN

Enterprise

Practical Examples
Clinical Review Area: ICU, ER, OR

- View reports and images simultaneously
- 1 or 2 Monitors, color or grayscale
- DICOM SCP/SCU
- Server/Client Clusters
- Import /Export
- CD burning with DICOM viewer
- Image Processing options

Bedside
OR

Neurosurgery Room
General Operating Room

Clinical Viewing Station: Location, location, location

Nurses Station: Too much light

Storeroom closet. Good lighting
**Coronary Care Unit**

Remove lights from directly overhead

Darkened nurses station provides good lighting

**Clinical Viewing Trauma**

Remove light directly overhead

Partition with curtains to reduce light

Trauma Bays

1  2  3
Clinical Viewing Station PICU

Nurses station:
Lighting OK evenings. Too much light during days

Lounge:
Non-conventional viewing area, Encourage use of blinds & light switch

Dashboard for Physicians

Patient Results
- Email integration for follow-up
- Single sign-on and access to patient’s record

Today’s Schedule
- Results pushed to the Physician
- Access to medical literature, outcomes data, supports Best Practices