PACs

BiomedGuy

Reasons for PACs

- **More Efficient Workflow:**
  - RTs spend up to 50% of time "handling" film
  - Reader cannot effectively interpret exams on film consisting of hundreds of images (eg, MSCT)
- **Faster Medical Care Delivery**:
  - Images available to reader at exam completion
  - Clinical consults possible via remote access
- **Potential Cost Savings:**
  - Eliminate lost film
  - Improved productivity
  - Eliminate lost film preventing lost revenue
  - No longer need for in-house radiologist
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fundamental components

- acquisition devices where the images are acquired
- short and longer term archives for storage of digital and textural data,
- diagnostic and review workstations, a communication network linking the system components,
- software to run the system,
- a database and database management,
- interfaces with other networks (hospital and radiological information systems)

fundamental components

acquisition "capture"devices

- a preview monitor and/or QA station, archiving, and display/print as well as output media such as CD burners
- Digital modalities such as CT, MRI, Xray, U/S,

fundamental components

short and longer term archives

- Computer server with Raid 5 configuration
- Supports DICOM

fundamental components
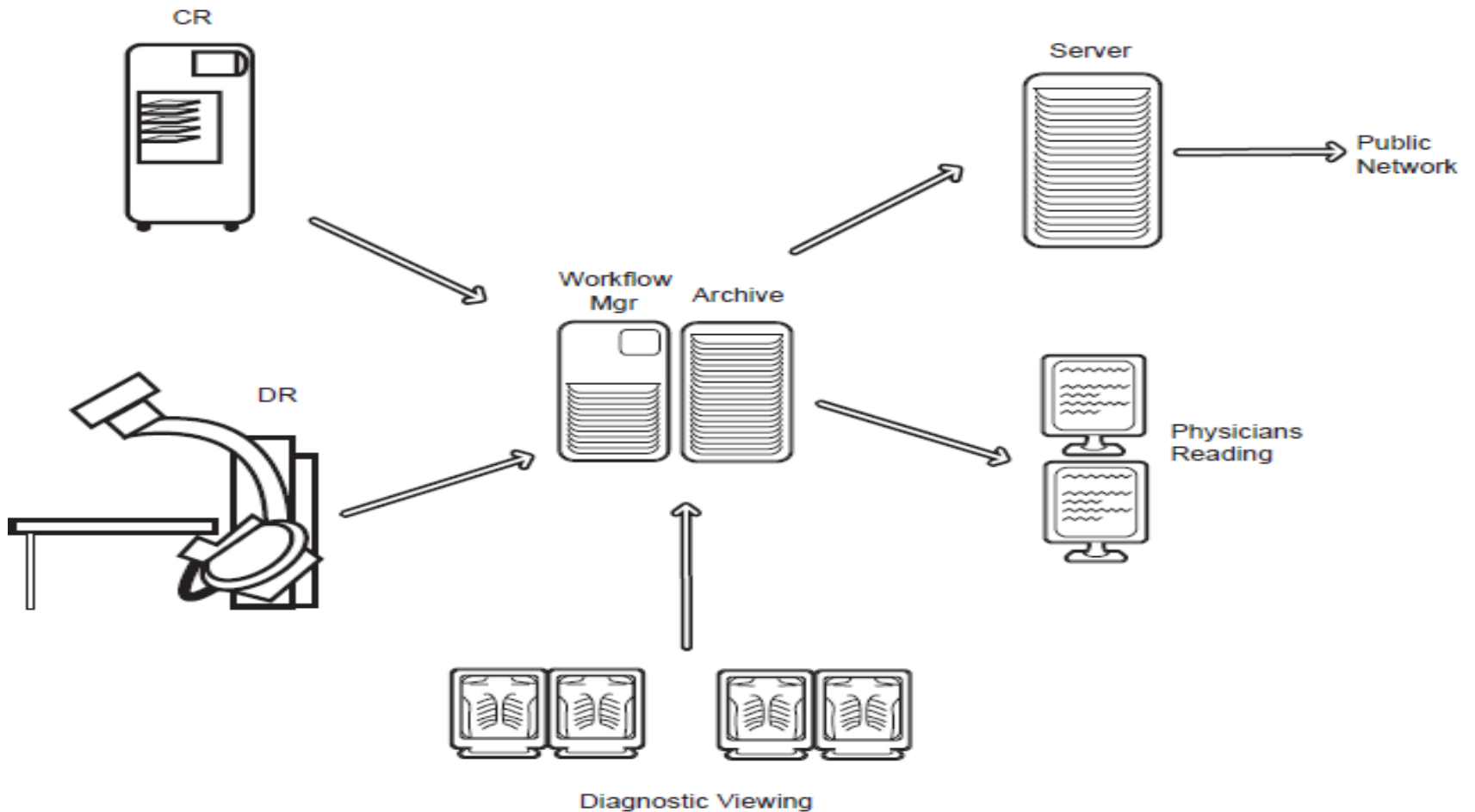
diagnostic and review workstations

- Computer workstation with mouse, monitor, and keyboard

fundamental components

software to run the system

- Windows Xp, or 7

- Digital Imaging and Communications in Medicine (DICOM) - a standard for handling, storing, printing, and transmitting information in medical imaging. Similar to TCP/IP

- HL7 - non-profit organization involved in development of international healthcare informatics interoperability standards

fundamental diagram

HL7

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Network Hardware

- **Network Hardware:**
  - Ethernet (most common) using 10- or 100-Base T
  - Gigabit (1000Base-T) & Fiber channel "backbones"
  - Full duplex configration

DICOM

- DICOM supports up to 65,536 (16 bits) shades of gray for monochrome image display, thus capturing the slightest nuances in medical imaging. In comparison, converting DICOM images into JPEGs or bitmaps (BMP), always limited to 256 shades of gray, often makes them impractical for diagnostic reading.

- End result = less space, excellent image quality

Conventional Radiography (CR)

- X-ray is an imaging technique that has been used since 1895

- X-rays are necessary to show images of abnormalities that cannot be seen from outside the body, such as broken bones (fractures) or shadows on the lungs.

Digital Radiography (DR)

- greatest technological advancement in over the last decade

- make a radiological department **filmless**
  - Can upload and store images

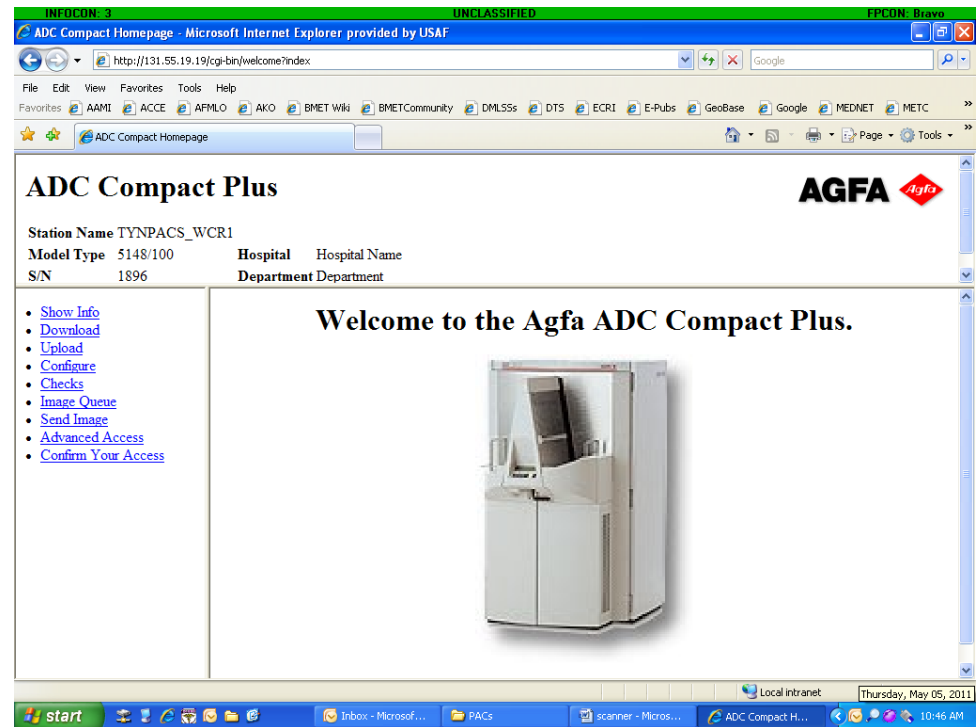- Better, clearer images

CR Reader

- CR 85-X Digitizer reads the image and store it on the server

- Cassette imaging plate reader

- Processes up to 115 cassettes/hour

Digital camera reader

Web server

- allows access by authorized users to the images stored on a web server
- OEM list
  - Agfa
  - Medweb

Broker
"Workflow Manager list"

- Electronic Broker is the database or translator where medical records, numbers (patients), and likely media images are transferred.

Application Entity Title (AE Title)

- Every device in a DICOM network has an Application Entity title, which is used to identify a DICOM service on a device – some devices use a different AE Title for each DICOM operation. AE Titles are either configured by the manufacturer of a device or are determined by the administrator of a DICOM network. AE Titles should be unique within a network.

- If the modality tries to send data to the PACS archive but does not give the archive's AE Title correctly, the archive will probably return an error and close the connection. Additionally, the archive may refuse the connection if the scanner's AE Title is not in its list of remote devices.

Service tools and tests

- Echo – a DICOM Verification test – "ping"
- TCP/IP Ping
- DICOM Emulators
- Image Anonymization - exams that have been de-identified (or "anonymized") in a HIPAA-compliant manner

Resources

- [Imaging Economics](#)