



## CellBeans Healthcare Informatics Pvt. Ltd. (CBHI) MODALITY WORK LIST

Modality worklist (MWL) is one of DICOM's workflow services that really make a difference. DICOM Modality Worklist (MWL) makes patient demographic information from a Radiology Information System (RIS) available at a modality, eliminating dual data entry and providing data integrity.

### Abstract

The development and acceptance of the digital communication in medicine (DICOM) standard has become a basic requirement for the implementation of electronic imaging in radiology. DICOM is now evolving to provide a standard for electronic communication between radiology and other parts of the hospital enterprise. In a completely integrated filmless radiology department, there are 3 core computer systems, the picture archiving and communication system (PACS), the hospital or radiology information system (HIS, RIS), and the acquisition modality. Ideally, each would have bidirectional communication with the other 2 systems. At a minimum, a PACS must be able to receive and acknowledge receipt of image and demographic data from the modalities. Similarly, the modalities must be able to send images and demographic data to the PACS. Now that basic DICOM communication protocols for query or retrieval, storage, and print classes have become established through both conformance statements and intervendor testing, there has been an increase in interest in enhancing the functionality of communication between the 3 computers. Historically, demographic data passed to the PACS have been generated manually at the modality despite the existence of the same data on the HIS or RIS. In more current sophisticated implementations, acquisition modalities are able to receive patient and study-related data from the HIS or RIS. DICOM Modality Worklist is the missing electronic link that transfers this critical information between the acquisition modalities and the HIS or RIS. This report describes the concepts, issues, and impact of DICOM Modality Worklist implementation in a PACS environment.

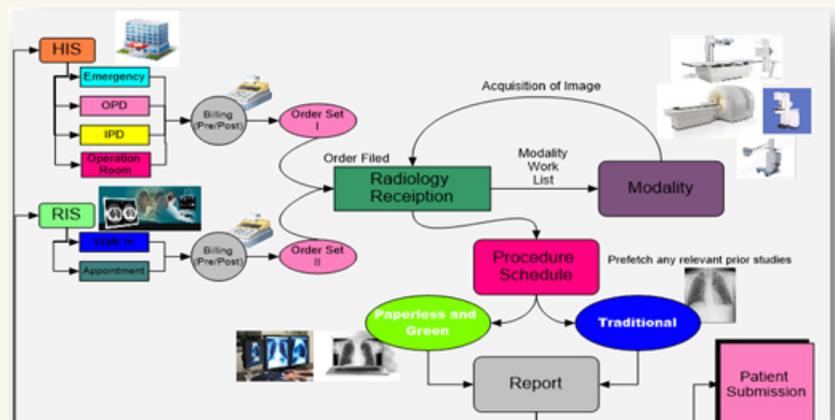
### Issues in Paper-Driven Process

- Paper is easily lost/destroyed Management is time-consuming
- Storage is costly
- Risk to patient confidentiality
- Promotes manual entry of data other messages
- Generates duplicate data
- Relies on human intervention
- Introduces data integrity issues
- Resources may be wasted if paper is not available when resource are

### Advantages of Modality Worklist

- The advantage of the Modality Worklist service is that retyping patient demographic and scheduling information is eliminated at the modality. (Demographic information such as patient name, birth date, sex, etc. is copied from the retrieved worklist. In addition to the time saved)
- Provides Worklist to DICOM modalities to ensure accurate patient demographic data for each study.
- Accepts inbound message streams from multiple HIS/RIS and allows the re-directing of the original data streams to multiple destinations.

### Automating the transfer of patient's data from HIS/RIS to modalities



Today most medical centers use information systems (HIS – Hospital Information Systems or RIS – Radiology Information Systems), storing patients demographics and exams scheduling information. These data are then required during the image acquisition phase at the acquisition modality, since digital acquisition devices must know all relevant patient and study information to store them into the digital images they produce. Instead of requesting the technician to manually re-enter patient's demographics on the modality's console, the DICOM modality worklist service allows for an automated, reliable, error-free transfer of the information stored in the HIS/RIS directly to the modality, in a standard way which is supported by almost all manufacturers of digital DICOM modalities. DICOMMod has been expressly designed to implement this DICOM service.

## Radiology Information System – Hospital Information System Interfacing for data verification

Equally essential, particularly at acquisition, is integrating the RIS and/or HIS with the PACS. This greatly facilitates input of patient demographics (name, date, time, medical record number [MRN] to uniquely identify a patient, accession number [AccNum] to uniquely identify an imaging examination, exam type, imaging parameters, etc.), and enables automatic PACS data verification, correlation and error correction with the data recorded in the RIS-HIS. Most imaging modalities are now tightly coupled with the RIS, providing automatic downloading of demographic information from the RIS via barcode readers or directly to the scanner console (via modality worklist capability) and hence to the DICOM header. This eliminates the highly error-prone manual entry of data at acquisition.

Health Level Seven (HL7) is the RIS-HIS standard, and compliance with it is desirable. RIS-HIS databases are typically patient centric, enabling query and retrieval of information by the patient, study, series, or image data hierarchy. Integration of RIS-HIS data with the PACS add intelligence to the system, helping to move data around the system based on “how and what data should be delivered where and when,” automating the functions performed traditionally by the film librarian.

## Modality Worklist

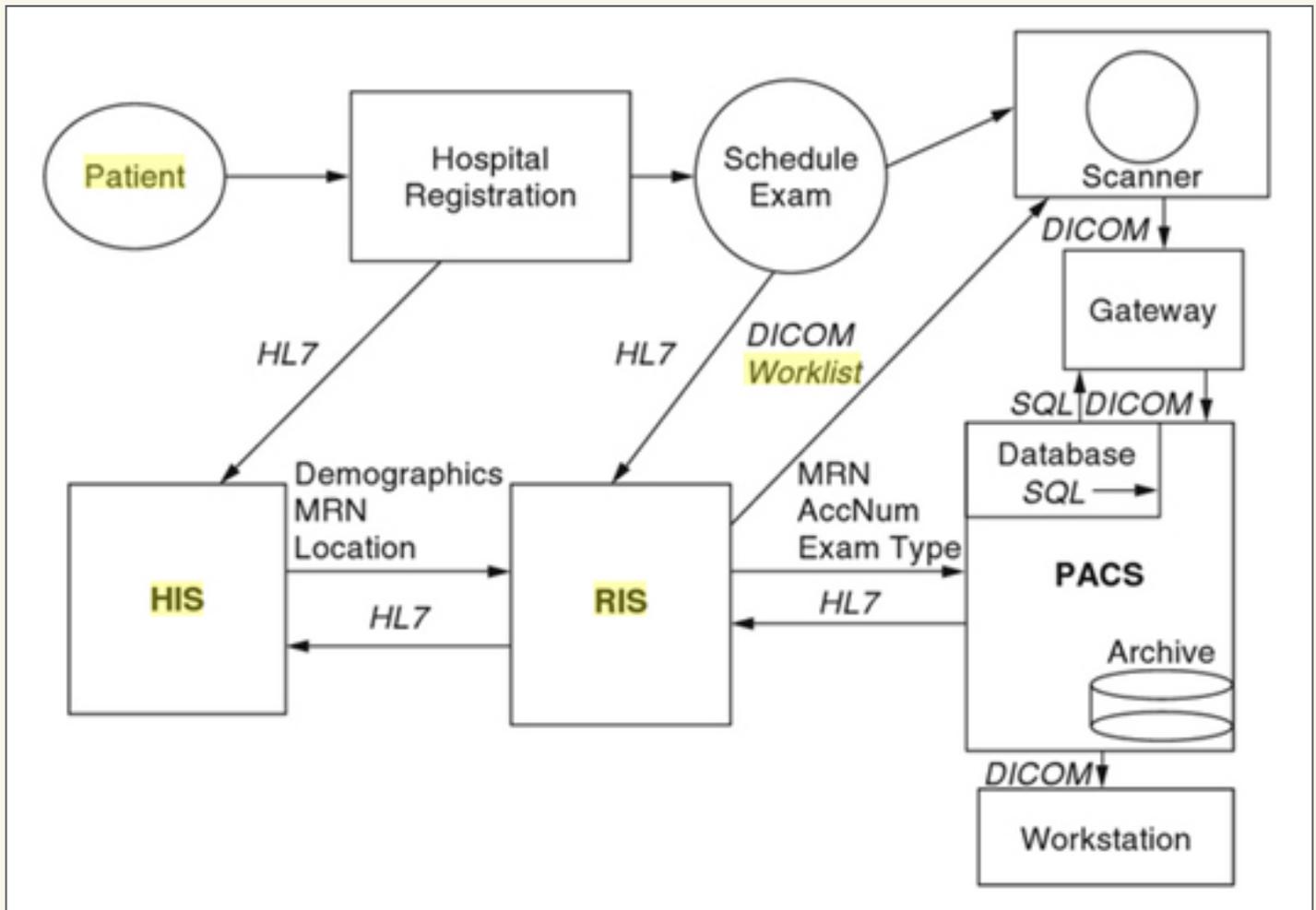


Diagram of how RIS, HIS and PACS systems might interact upon scheduling an examination for image acquisition into a PACS

Many vendors now provide the capability to download RIS-HIS schedules and worklist directly to the imaging modality, such as most CT, MRI, DF and US scanners. In these circumstances, the imaging technologist need only choose the appropriate patient's name from a list on the scanner console monitor (by printing to it in on a touch screen pad) and the information contained within the RIS-HIS database will be downloaded into the PACS header and associated with the image data for that patient examination.

In the general DICOM model for acquisition of image and relevant data from imaging modality, the modality devices acts as a SCU and the data is stored to a Service Class Provider (SCP) device such as a PACS acquisition gateway or on image display workstation. In the modality workstation function, however, the image device receives pertinent the patient demographics and image study information from a worklist server, such as a PACS, RIS or RIS-HIS interfaced device.

The benefits of the DICOM Modality worklist cannot be overstated. Incorrectly (manually) entered patient demographic data, such as all the permutations of patient name (e.g. James Jones, J Jones, Jones J) can result in mislabeled image files and incomplete study information; correct demographic data are crucial to maintaining integrity of the PACS database. Furthermore, the improvements in departmental workflow efficiency and device usability are greatly facilitated by modality worklist capabilities. For those few vendors not offering a DICOM modality worklist for their imaging devices, several interface or broker boxes are available that interconnects PACS to RIS-HIS databases translating DICOM to HL7 (Health Level Seven) and vice versa.

## Health Level Seven (HL7)

HL7 is a Standard for exchanging information between Medical Applications and is an Abbreviation of "Health Level Seven". "Level seven" refers to the seventh OSI layer protocol for the health Environment. In general terms, HL7 is a protocol for data exchange. It defines the format and the Content of the messages that Applications must use when exchanging data with each another in Various Circumstances. Hospitals and other medical institutions typically use many different types of systems to communicate with one another. Everything, from patient records to billing information, is tracked and recorded in computer systems. In order for these different types of systems to communicate with each other, they Use a standard like HL7.

### Broker Solutions

To solve the language barrier, a translation was needed between HL7 and DICOM. Enter the broker: a software and hardware device that accepts HL7 messages from the RIS then translates, or maps, the data to produce DICOM messages for transmission to the PACS. With RIS information now available electronically, PACS and modalities could accept RIS data (Figure 2). Technologist workflow requires patient and exam information from the RIS to flow to the modality. The broker provides support for this by taking advantage of the DICOM Modality Worklist (DMWL). Scheduling messages are transmitted from the RIS to the broker and stored. The technologist is then able to request the list of scheduled studies by sending a query from the modality to the broker using the DMWL service. The result of the query would, in effect, provide a list of technologists' "work to do" (Figure 3).

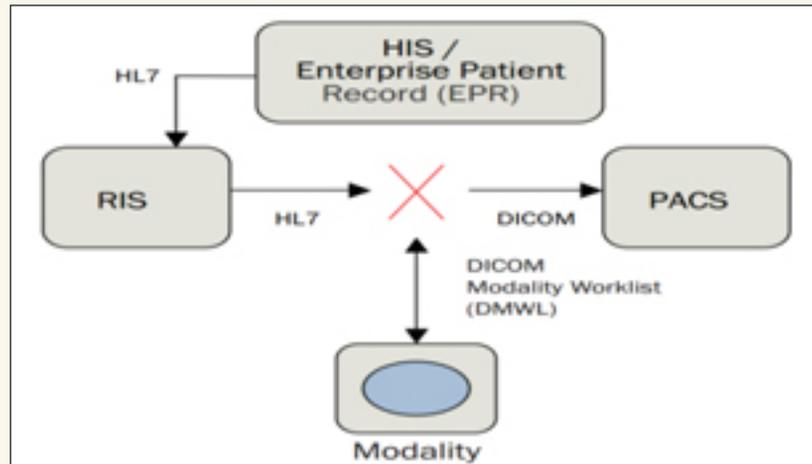


Figure 1: HIS/RIS/PACS Compatibility Issues

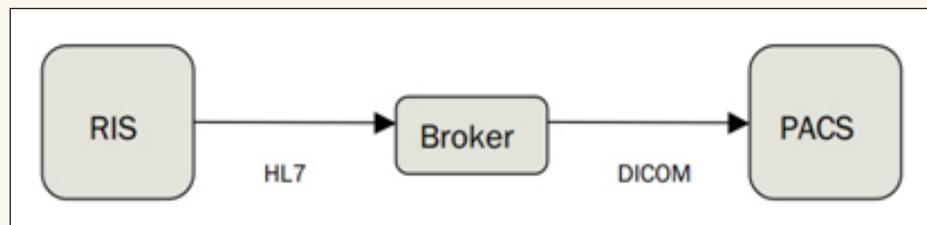


Figure 2: Unidirectional Brokered Integration

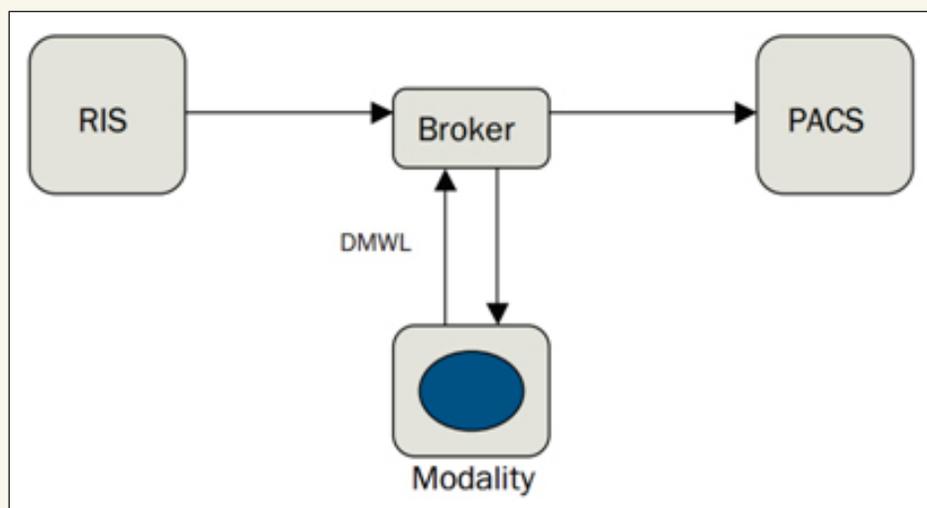


Figure 3: Modality Query for patient and Exam Information

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