



Everything DICOM and Integration

Metron X-Ray Integration and the use of DICOM with top PIMS



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EVERY VETERINARY PRACTICE THESE DAYS WILL HAVE AN ACTIVE PRACTICE INFORMATION MANAGEMENT SOFTWARE (PIMS) PROGRAM. THE PIMS IS RESPONSIBLE FOR INVOICING, MEDICAL RECORDS, AND CLIENT COMMUNICATIONS. OFTEN THE PRACTICE WILL WANT TO HAVE A TIGHT CONNECTION BETWEEN THE PATIENT MEDICAL RECORD AND THE RELATED DIAGNOSTIC IMAGES.

PRACTICES CAN SHARE IMAGES AND INFORMATION BETWEEN IMAGE ACQUISITION SYSTEMS AND THEIR PIMS FOR DIFFERENT PURPOSES AND BY DIFFERENT METHODS. SOME PROCESSES MAY BE SIMPLE AND EASY TO EXECUTE WHILE OTHERS REQUIRE SOPHISTICATED INTEGRATION. BECAUSE INTEGRATION CAN MEAN MANY THINGS, IT IS IMPORTANT TO UNDERSTAND THE GOALS OF THE PRACTICE.

Purposes for sharing images and information

- Use the PIMS as the resource for presenting images to clients
- Save duplicate data entry - when adding client/patient in Metron
- Initiate and document radiograph requests from PIMS (using MWL)
- Use the PIMS as the exclusive patient medical record archive

Simple to do, one can export images from Metron and then import those images into the patient record of the clinic's PIMS patient record. This technique may be useful for presenting images to pet owners.

Difficult to do but possible, if all of the right pieces are in place, one can order a radiograph study from within the PIMS invoice process and finish with captured images matching the original order and the PIMS invoice being automatically marked with "order complete".

Use the PIMS as the resource for presenting images to clients

Most practice information management software (PIMS) programs can import and store images/pictures. This capability is practical for presenting images to pet owners or to use in client information/education content. Often practices will have PIMS workstations in their exam rooms, making it a convenient tool for client presentations.

Some PIMS can query a PACS from the patient record. This option saves the work of export/import but adds another "big" layer of system sophistication. The practice needs to have an active PACS (what is PACS will be explained later). The PACS will contain all digital X-Ray studies and the PIMS will know how to query the PACS for X-Ray studies unique to the specific patient.

Save duplicate data entry - when adding client/patient in Metron

Most X-Ray studies first require the creation of a client/patient record. Metron too requires a client/patient record be created before an X-Ray is taken. The data entry is simple - enter the client name, then enter the patient and species. Though easy, some practices feel it necessary to eliminate this step and deliver the client/patient information from the PIMS. The problem with that thinking - one has to initiate the information transfer from the PIMS which is in itself a laborious task and demands a greater purpose than simple data entry.

Initiate and document radiograph requests from PIMS (MWL)

It is possible to create a radiograph “request” transaction in the clinic PIMS – very much like requesting a lab test. This request carries with it the required client/patient information to generate the Metron client/patient record. It also instructs the clinic technician to take the specific X-Rays needed.

The goals of this capability include data entry efficiency and protocol management. In human medicine, radiographs are ordered and the radiograph technicians take exactly the X-Rays that were ordered – no more and no less. Completing the loop, the technician marks the X-Ray order completed which then informs the original “billing” order that the work has been completed.

This capability is useful in the largest of veterinary practices but the average practice may find this both expensive to implement and obtrusive to their casual style. In veterinary medicine, an advantage to digital X-Ray is convenience and limited cost to taking a second X-Ray. The clinic may charge the client for 1 radiograph but may actually take 3, adjusting positions etc. to improve the diagnostic value of the image. Shots 2 & 3 did not cost more than the time it took to reposition and shoot the X-Ray.

Use the PIMS as the exclusive patient medical record archive

While it is often possible to manually import images into the PIMS patient record, it is a labor intensive process. This process also introduces human errors – did the export/import task get completed? The diagnostic image quality degrades as the image moves through the export/import process.

Long ago in human medicine, the diagnostic imaging and informatics companies decided to share images and information via a single communications standard. This standard is now well known as DICOM.

Some PIMS today have the ability to query a PACS for all available radiograph studies. If initiated from a specific PIMS client/patient record, the query would retrieve a list of studies unique to that patient. This approach offers the feel that the PIMS client/patient record is host to all patient medical record information. The images stored on the PACS maintain their original diagnostic value and the practice then has the option to search and view images from the PIMS patient record.

For Metron, the only supported image transport communication with PIMS is DICOM.

It is very difficult to build custom interfaces for each PIMS. As the PIMS versions change, the interfaces have to change as well. Also, most of the major PIMS have already moved toward the DICOM standard. Metron conforms to the veterinary DICOM standard. If the PIMS product also conforms to the veterinary DICOM standard, it is easy to share images and information while avoiding “Custom” interface development.

Now that we have discussed the purposes for sharing images, the next sections will review:

- What is “DICOM”?
- What is “PACS”?
- What is “MWL”?
- What is “MPPS”?
- Metron “DICOM” capabilities.
- Each PIMS “DICOM” capabilities.

What is DICOM?

*Wikipedia definition: **DICOM (Digital Imaging and Communications in Medicine)** is a standard for handling, storing, printing, and **transmitting** information in **medical imaging**. It includes a **file format** definition and a network **communications protocol**. The communication protocol is an application protocol that uses **TCP/IP** to communicate between systems. DICOM files can be exchanged between two entities that are capable of receiving image and patient data in DICOM format.*

*DICOM enables the integration of scanners, servers, workstations, printers, and network hardware from multiple manufacturers into a **picture archiving and communication system (PACS)**.*

To the veterinary practice, DICOM is a simple label to help identify that a product is following an important communications (integration) and image storage standard. The DICOM file typically combines diagnostic images and patient information. The combination makes it easy for the receiver to process the image without communicating with the sender.

What is PACS?

*Wikipedia definition: A **picture archiving and communication system (PACS)** is a **medical imaging** technology which provides economical storage of, and convenient access to, images from multiple modalities (source machine types).^[1] **Electronic images** and reports are transmitted digitally via PACS; this eliminates the need to manually file, retrieve, or transport film jackets. The universal format for PACS image storage and transfer is **DICOM (Digital Imaging and Communications in Medicine)**. Non-image data, such as **scanned** documents, may be incorporated using consumer industry standard formats like **PDF (Portable Document Format)**, once encapsulated in DICOM.*

The PACS is typically a computer and software that hosts DICOM files and directs traffic. The DICOM files will come from image acquisition devices including X-Ray and ultrasound. The PACS will automatically store the image files (DICOM files) and possibly forward them to other computers such as radiologists. The PACS is also the key to the Modality Worklist (MWL) capability. If the PIMS wants to request a radiograph and pass over the related client/patient information, that request must be sent to a PACS.

What is MWL?

Wikipedia definition: **Modality Worklist** enables a piece of imaging equipment (a modality) to obtain details of patients and scheduled examinations electronically, avoiding the need to type such information multiple times (and the mistakes caused by retyping).

In the veterinary practice, MWL is typically a “transaction” or “request” for a digital image (X-Ray). This MWL is a DICOM communication that is sent to a PACS. In this communication to the PACS, the PIMS workstation is sending a radiograph request and the related client/patient information. Once loaded on the PACS, an acquisition workstation (Metron X-Ray computer) can query the PACS for the MWL. If the workstation retrieves and opens the MWL, Metron will automatically create new “study” including a client/patient record if that patient did not already exist in Metron.

The goal is to maximize the client billing of radiographs being taken and improve the medical records documentation – a record of X-Rays taken will be in the patient medical record. MWL will also provide reports to show X-Rays not related to any MWL requests – if on the Metron workstation someone takes an X-Ray not related to a MWL, the X-Ray will show up in the “orphan” report.

What is MPPS?

Wikipedia definition: **Modality performed procedure step** is a complementary service to Modality Worklist. This enables the modality to send a report about a performed examination including data about the images acquired, beginning time, end time, and duration of a study, dose delivered, etc. Also known as MPPS, this service allows a modality to better coordinate with image storage servers by giving the server a list of objects to send before or while actually sending such objects.

The MPPS is not needed for DICOM image storage. MPPS is necessary for those PIMS that are looking for a message back from the PACS that satisfies the initial MWL. The maximum “closed loop” capability context is to request a radiograph as a transaction that is not complete until the PACS receives a corresponding MPPS DICOM message to the originating MWL DICOM message. The PIMS queries the PACS to confirm receipt of the MPPS from the Metron acquisition workstation.

Metron “DICOM” capabilities

Metron supports nearly all important veterinary DICOM capabilities and in true Metron fashion continues to add new and better DICOM functions every few months.

- **DICOM “Send”**
Metron can send DICOM files to any DICOM server (usually a PACS). That DICOM server can be in the same building or an external “radiology type” service somewhere else in the world.
- **DICOM “Receive”**
Metron can act as a DICOM Server, able to receive, process, and store DICOM files. This is a PACS feature.
- **Query a PACS**
Metron can query a PACS based a variety of query criterion including client/patient name and ID; date ranges, and study ID. The query will reveal a matching study list. From the list, the user can click to retrieve a study (one or more images).
- **Host a PACS DICOM “Query/Retrieve”**
Metron supports the PACS “Query/Retrieve” function. This function is important to the PIMS activity that includes PACS query from the PIMS client/patient record.
- **Host a PACS MWL request from the PIMS**
 - Metron does not have any DICOM provision for this at this point.
 - Metron has designed HL7 capability, but not DICOM.
- **Query a PACS for MWL study requests**
Metron has the option to query a PACS for pending MWL requests. The query can be manual or automatic. Some PIMS host this PACS feature e.g. Metron queries, ImproMed® Infinity for MWL requests.
- **Host PACS MPPS function - send MPPS DICOM message to PIMS**
Metron has the MPPS capability. The PIMS program also needs to support MPPS or this feature is not useful.

Specific PIMS Details

Most of the PIMS either already support DICOM in some fashion or are developing support for DICOM. The more popular approach to DICOM support is via QueryRetrieve. The PIMS offers a quick lookup function from within the patient record. The lookup queries the PACS for DICOM images unique to that patient. (ImproMed Infinity follows this model.) The DICOM files on the PACS require accurately managed client/patient records that include client & patient IDs identical to the IDs in the PIMS database. ImproMed has a DICOM viewing program to display the image. But this would be considered a client presentation. All diagnostic viewing would be done on Metron computers. It is possible to put the Metron Viewing Station software on the same computer.

Some PIMS products such as IDEXX Cornerstone do not yet support Query/Retrieve with non-brand PACS products. Instead, Cornerstone requires the IDEXX PACS to view images from the Cornerstone patient record. In this case, Metron sends DICOM files to IDEXX PACS for storage. The Metron client/patient records require an exact match of client & patient IDs for successful transmission to the PIMS PACS. Historically, veterinary practices with this type of PIMS configuration have chosen to send only the DICOM files to the PIMS PACS that they intend to display to clients. All diagnostic viewing would be done on Metron computers.

It is our experience that only in very large practices does “complete” integration show a true economic benefit. In most cases, simple is better. Such as adding the Metron DICOM Viewer to clinic workstations

Market size estimate is 30,000 practices within US & Canada.

Most industry people consider the US & Canada veterinary market to include about 30,000 veterinary practices. Of the 30,000 more than half are made up of 1-2 doctor clinics.

The specific PIMS numbers below are estimates based on personal experience and industry discussions. These are only estimates.

AVImark has the largest market share and the most popular choice for smaller practices. IDEXX Cornerstone & ImProMed Infinity are the most popular choices for the large practices.

Henry Schein® AVImark

By far the most popular choice for smaller practices, AVImark has a good reputation but has been behind with its support of DICOM. Recently, AVImark added integration to one specific PACS program called Dragonfly. This is a proprietary interface. With this scenario, a practice must buy the Dragonfly PACS from AVImark for diagnostic images integration.

Metron X-Ray acquisition can communicate with the Dragonfly PACS in normal fashion. However, the Dragonfly PACS cannot be replaced with any other PACS. As always, it is very easy and convenient for the practice to add the Metron viewer to any workstation in their facility. It is also very easy to export/import images to the AVImark patient record.

The Dragonfly PACS can only be purchased from AVImark.

IDEXX Cornerstone®

The standard version of Cornerstone does not include any DICOM capabilities. Similar to the AVImark method, a clinic using Cornerstone needs the Cornerstone Imaging Module to receive DICOM files and the IDEXX PACS to support full DICOM communications. Both products can be purchased from IDEXX. The Cornerstone PACS can be separately purchased from IDEXX or is included with an IDEXX X-Ray system. The estimated price for the IDEXX PACS is \$5,000-8,000.

Cornerstone does not today support Query/Retrieve or Modality Work List (MWL) without the IDEXX PACS. IDEXX announced a few months ago, they will have a new Cornerstone release that supports open DICOM communications. When that Cornerstone version becomes available, the IDEXX PACS will no longer be a requirement.

Metron already easily sends DICOM files to Cornerstone if it has the Imaging Module in place. As always, it is very easy and convenient for the practice to add the Metron viewer to any workstation in their facility.

Henry Schein® ImproMed Infinity

ImproMed may be the most mature of the software for DICOM support. It now supports both Query/Retrieve and MWL. This means that with Infinity, a clinic can consider all of the DICOM options. ImproMed Infinity does not include a PACS. This configuration requires an independent PACS, such as Metron.

A potentially valuable feature, the Infinity program makes it easy to view X-Rays from the patient record without the need to import the X-Ray images. The program calls (queries) the PACS for any and all images related to the specific patient. This capability makes it possible for a clinic to view and store X-Rays from Infinity workstations throughout the facility.

Metron supports DICOM image viewing (Query/Retrieve) and the MWL capability from within the Infinity client/patient record.

Note: The ImproMed DICOM Imaging module is required.

Patterson IntraVet®

IntraVet is adding new DICOM capabilities to its upcoming V4.50 release - slated for 2013. The current version 3.50 has very limited capabilities and with one specific PACS that will not be available for the Metron/RadmediX platform.

It is very easy and convenient for the practice to add the Metron viewer to any workstation in their facility. It is also very easy to export/import specific images useful for pet owner communications.

Henry Schein® DVM Manager

While the Henry Schein DVM Manager product is used by a lot of veterinary practices, it is no longer being developed and sold. This product does not have any DICOM communications features. It does have the option to import images.

For practices that are using DVM Manager, Metron would be considered a stand-alone product. The practice can easily install Metron viewing stations where helpful for diagnostic viewing and client presentation.

ClieTrax

ClieTrax has followed the AVImark model. They require the use of their own proprietary PACS to support communications with any X-Ray acquisition system. The RadmediX/Metron system works well with the ClieTrax/PACS system. When installed, a clinic staff person can order an X-Ray study from within ClieTrax and Metron will receive that order. Once Metron has completed the X-Ray acquisition, Metron sends DICOM files to the ClieTrax PACS. The final step - the (ClieTrax) PACS tells the ClieTrax transaction/order record that the work has been completed. The ClieTrax patient record can then access the X-Ray images.

This level of X-Ray acquisition to PIMS integration does work between Metron & ClieTrax. The challenges include system complexity: Is the information integration worth the complexity? Is the integration worth paying for the ClieTrax/PACS upgrade?

DVMAX®

DVMAX is also following the AVImark model. This company does offer a PACS with its software. They have an integrated PACS that they sell called SecureRAD. The viewing program in DVMAX is the DVMAX PACS Link.

Metron can send DICOM studies to the PACS in DVMAX assuming the PACS is following normal DICOM standards. Once in the DVMAX PACS, the user can navigate to a client/patient record in DVMAX and open a patient related DICOM images.

Sound-Eklin™ VIA

VIA is owned and supported by VCA. Historically, the PIMS called VIA has been sold as an added solution to the "VCA" integrated practice and has not been very cooperative with non-Sound-Eklin X-Ray systems. VIA likely does support some DICOM capabilities that would be useful but it should not be expected that those capabilities will be available to a RadmediX/Metron system.

It will be very rare that a veterinary practice that is using VIA does not already also have a VCA Sound-Eklin X-Ray acquisition system.

DataLogixx™*Bringing data together*

The DataLogixx integration product is available for veterinary practices using either IDEXX Cornerstone® (8.3 or higher), Henry Schein® AVImark (2013 or higher), or Patterson IntraVet® (4.5 or higher) practice information management software systems (PIMS). Windows 7 or higher is also required prior to product installation.

ORDER X-RAY - Modality Worklist (MWL)
VIEW X-RAY – View Metron Images

ORDER X-RAY - MWL allows the user to be in their PIMS patient record, click the ORDER button and have the pet owner and patient information collected and presented as a MWL to the Metron Imaging Software.

Once ordered, the Metron WL button will flash RED and the user can click to create the related client/patient study.

Note: The data passed to Metron includes the Pet Owner (First and Last Name), Patient Name, Patient ID, Sex, Birth Date, and Species.

VIEW X-RAY - Viewing images in Metron is now even easier. From the PIMS patient record, click the VIEW button to open Metron and display the matching client/patient studies. For patients with multiple X-Ray studies, the most recent study will be displayed.

Note: To have this DataLogixx feature, the computer must also have a Metron Viewing License installed.



Contact us if you have additional questions.

We can be reached at metron@metronsupportservices.com or 1-877-638-3868.