White Paper

DICOM Glossary

By OTech, Inc.

This so-called "DICOM Expert Cheat sheet" is used at our DICOM seminars and allows you to be a real "expert".

Abstract Syntax: Rules that are negotiated for exchanging objects, specified by the *SOP Class*.

ACR: American College of Radiology; Initiated the DICOM standardization effort in the early 80's.

ACR-NEMA: Predecessor of the DICOM standard defined by the *ACR* and *NEMA*; two versions were defined 1.0 and 2.0.

ACSE: Association Control Service Element, defined by *OSI*, which is used by DICOM to negotiate an *Association*.

AE: Application entity; a software process which implements *DICOM*, most implementations use multiple *AE*'s when implementing multiple *Service Classes*. Requires a unique identification "AE Title", typically set up during installation by which AE's identify themselves at application level.

Application Context: The context, which is negotiated between AE's. For DICOM, this is always "DICOM 3.0".

Attribute: Attributes are the components of an object (*IOD*), describing its properties. Examples of attributes are Patient Name attribute, Patient ID, etc. describing an image object.
Association: A connection between AE's for DICOM exchange. Length of association is undefined, but typically specified in the DICOM Conformance statement of a device. It could last for the duration of exchanging a complete image study.

ASCII: American Standard Code for Information Interchange;

known for standardizing codes for text.

Big Endian: An encoding method storing the most significant Byte in the high order bits of a 16 bit word. Motorola based CPU's expect information to be stored this way. Exchanged as part of the *transfer syntax.* Conversion to *Little Endian* would require swapping each byte within the words.

CD-R: Compact Disk, Read only, an option for the physical specification for the DICOM media exchange standard

Composite IOD: A composite IOD is an object containing parts of more than one entity, for example an Image IOD is a composite IOD, containing information about the patient, study, etc. and the image itself.

CR: Computerized Radiography system acquiring images using a photo-Stimulable phosphor plate typically to be read by a *CR* reader for image conversion.

CT: Computerized Tomography system acquiring axial images of patients by rotating an X-ray and Detector system.

DICOM: Digital Imaging Communications in Medicine standard, version 3.0 is the current defined version.

DICOMDIR: The standard directory structure specified for DICOM media exchange.

DIMSE: *DICOM* Message Service Element, the *DICOM* set of commands (e.g. C_STORE, C_FIND, etc.)

Explicit VR: Explicit Value Representation, a *transfer syntax* which is negotiated by which the receiver is explicitly told the VR syntax and context. For example, when receiving a Patient Name using Explicit VR, the message specifies explicitly that VR for each attribute. This is in contract to the *Implicit VR.*

FSC: File Set Creator, the function of a device that creates DICOM exchange media, typically an acquisition device such as a Ultrasound.

FSR: File Set Reader, the function of a device that reads DICOM exchange media, typically a viewing station.

FSU: File Set Updater, the function of a device that can read DICOM exchange media and update the *DICOMDIR.*

HL7: Health Level 7, the standard used by Hospital Information Systems for communicating information and status

Systems for communicating information and status.

IE: Information Entity, used to identify a real world object (patient, study, etc.)

Implementation Class UID: A unique number, which is exchanged during the set up of the *Association*, by which an AE identifies itself. Each class of AE's have these identical UID's, for example, each specific CT vendor have the same UID for a specific DICOM implementation.

Implicit VR: Implicit Value Representation, a *transfer syntax* which is negotiated by which the receiver is assumed ("implied") to know the VR syntax and context. For example, when receiving a Patient Name using Implicit VR, it is assumed that the receiver know the VR rules for that attribute. This is in contract to the *Explicit VR.*

IOD: Information Object Definition, Specification of a DICOM object such as a CT Image object.

ISO: International Standards Organization; defined the 7-layer communications model as well as the *ACSE* commands.

JND: Just Noticeable Differences, a term used in the Display standard to identify steps in luminance that are just noticeable by a human.

Little Endian: An encoding method by which the Least significant Byte is stored in the high order bits of a 16 bit word. This is how Intel based CPU's store data. Exchanged as part of the transfer syntax during negotiation. Conversion to *Big Endian* would require swapping each byte within the words.

LUT: Look Up Table, specifying mapping from specific values such as pixel values into luminance

M/M: Usage specification for a specific service, meaning that both *SCU* and *SCP* shall support it.

MOD: Magneto Optical Disk, used as one of the physical exchange media options for the DICOM exchange standard.

Modality: Acquisition system such as a *CT, MR, US, NM, CR*.

Module: A group of Attributes, specified as a unit for convenience reasons, Examples are the Patient, Study Module, etc.

MR: Magnetic resonance Imaging system acquiring images of

patients using a very strong magnetic field.

NEMA: National Electrical Manufacturing Association, US trade organization, members of which defined the first version of the *DICOM* standard together with the *ACR*.

NIE: Network Interface Equipment (AKA NIU) for interfacing a system to a network.

NM: Nuclear Medicine system acquiring images of patients using radio-active tracers or agents.

Normalized IOD: A Normalized *IOD* is an object representing a single entity of the real world. For example, a Patient *IOD*.

OSI: Open Systems Interconnection, standards organization standardizing the 7-layer communications model and also the *ACSE* commands.

Overlay: Graphics or text typically specified in addition to the image as an annotation.

PDU: Protocol data Unit, packet that is created at the DICOM lower level protocol.

PDV: Protocol data Value, packet that is created at the DICOM lower level protocol.

Pixel: Smallest, single element or dot of an image.

Presentation Context: Specification of the context that is negotiated and used for DICOM message exchange. It consists of the Presentation Context ID (a temporary number, assigned for the duration of an Association), and the *Abstract* and *Transfer Syntax*.

Query/Retrieve: DICOM service used to Query a device using the FIND and subsequently Retrieve the IOD's using the MOVE (or GET).

RIS: Radiology Information System, which typically schedules and maintains patient demographic information.

Root: The Root identifies the specific Information model or database scheme that is used for a Query/Retrieve service. Examples are Patient Root, Study Root, etc.

SC: Secondary Capture, object intended for images acquired by capturing video and digitizing it again. Also used for Digitized film, and any other modality which has (yet) no own *IOD* such as

film, and any other modality which has (yet) no own IOD such as 3D generated images.

SCP: Service Class Provider, DICOM *AE* which functions as a server, or "provides" a service such as Storage, Print etc.

SCU: Service Class User, DICOM *AE* which functions as a client, or "uses" a service, i.e. for printing, storage, etc.

Service Class: A service Class is a group of one or more *SOP Classes*. e.g. the Storage Service class contains all of the Storage SOP Classes (CT_Store, MR_ Store, etc.)

SOP Class: Service Object Pair, combination of a service such as Store, Retrieve, and an Object such as Image, Print queue, etc. The Class defines the rules on how to use these; a Class is negotiated as a capability between devices during negotiation of the *Association.* Analogy of a Class is a type of fruit, e.g. Granny Smith.

SOP Instance: This is a single, unique occurrence of a SOP Class. It is always identified with a SOP Instance *UID.* An analogy is a specific apple of the type ("Class") Granny Smith.

TCP/IP: Transmission Control Protocol/Internet Protocol, the communication standard supported by DICOM.

Transfer Syntax: Encoding specification of DICOM messages, negotiated while setting up an Association. Examples of different transfer syntaxes are *Little or Big Endian, Implicit or Explicit VR*, or a compression scheme (JPEG).

Type: Specification of rule for attributes to be present in an object.Type 1 attributes are required, Type 2, required, but can be left out when unknown, and Type 3 are optional.

U/U: Usage specification for a specific service, meaning (User-) optional for both *SCU* and *SCP* .

U/M: Usage specification for a specific service, meaning (User-) optional for *SCU*, mandatory for *SCP* .

UID: Unique Identifier, a world-wide unique numbering scheme which is used by the NEMA for example to identify *SOP Classes*, syntaxes, etc., and vendors for identifying *SOP Instances*.

US: Identification of objects acquired by an Ultrasound unit.

VM: Value Multiplicity, defining whether or not an attribute can

have multiple elements, for example multiple phone numbers.

VOI LUT: Value Of Interest *Look Up Table,* defining the mapping to the image pixel data resulting in the information that one is interested in. Also described by Window width and Center, when linear.

VR: Value representation, the definition of rules and encoding of groups of similar attributes. An example is the VR PN, Person Name which specifies exactly the sequence of the last name, first etc, max number of characters, character repertoire, etc. As part of the negotiation, one can agree on Explicit or Implicit VR encoding.

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