

# THE DICOM 2013 INTERNATIONAL CONFERENCE & SEMINAR

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## DICOM Fields of Use

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**This presentation provides a journey  
through the world of DICOM Information  
Object Definitions.**

**It's not complete  
It only touches the surface  
It goes beyond DICOM**

# Well-known DICOM IODs



**CR**

Digital X-Ray



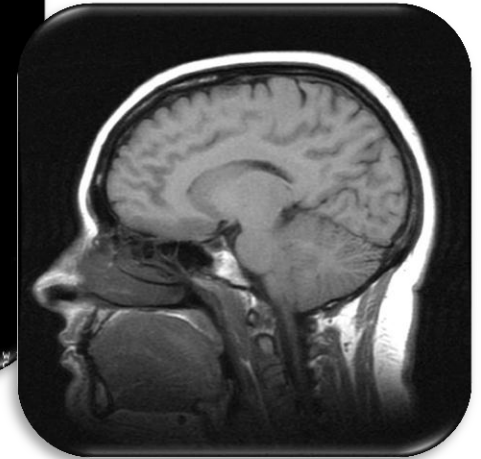
**XA**

Digital  
Angiography



**CT**

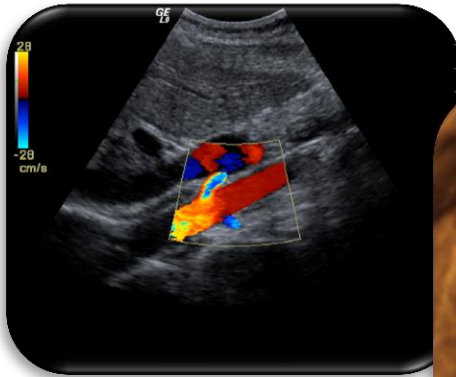
Computed  
Tomography



**MR**

Magnetic  
Resonance  
Tomography

# Well-known DICOM IODs



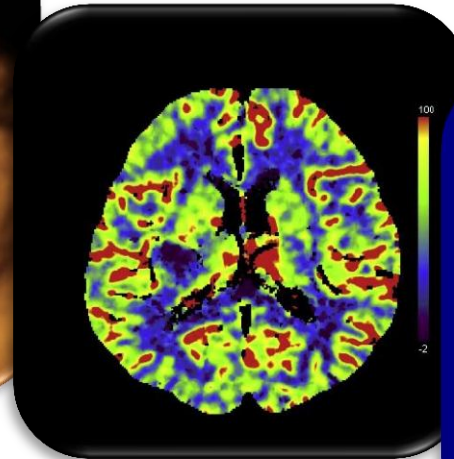
**US**

Ultrasound



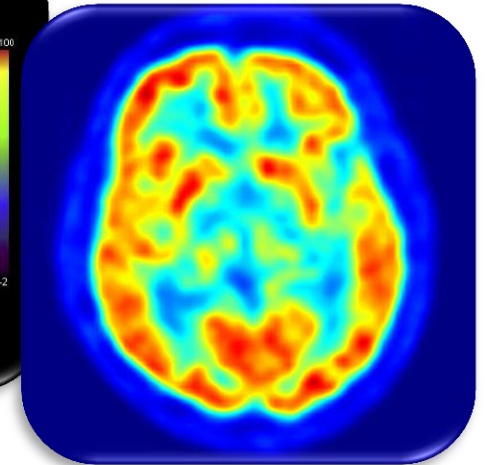
**US**

3D Ultrasound



**NM**

e.g., Single-photon  
Emission  
Computed  
Tomography



**PET**

Positron Emission  
Tomography

## Presentation States

Annotations, shutters, overlays, regions of interest, flipping, rotation, zoom, windowing, device independent display.

## Segmentation

Either provides a binary classification of pixels or a polygonal representation of a 3D surface, e.g., defining organs.

## Registration

Rigid or deformable spatial relationship between images in one or more frame of references.

## Encapsulated Document

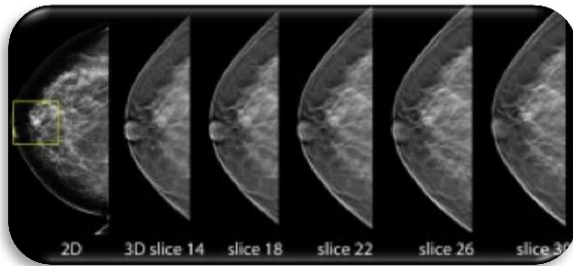
Encapsulates, e.g., PDF documents.

## Structured Report

Representation of reports with a hierarchical structure containing text, measurements and references.

## Key Object Selection Document

Flags or relates one or more (significant) images, waveforms or other composite IODs.

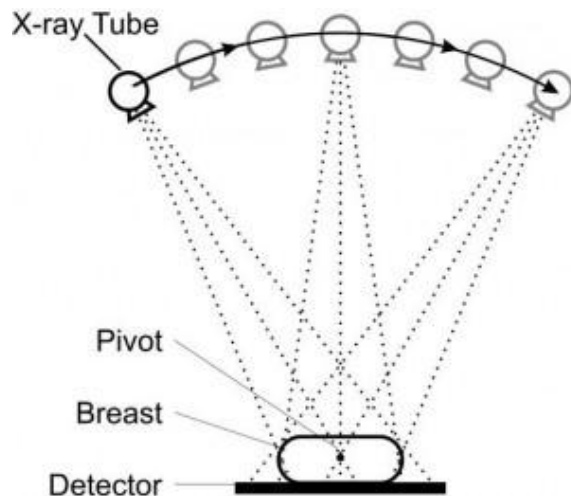


## MG

Digital Mammography X-Ray

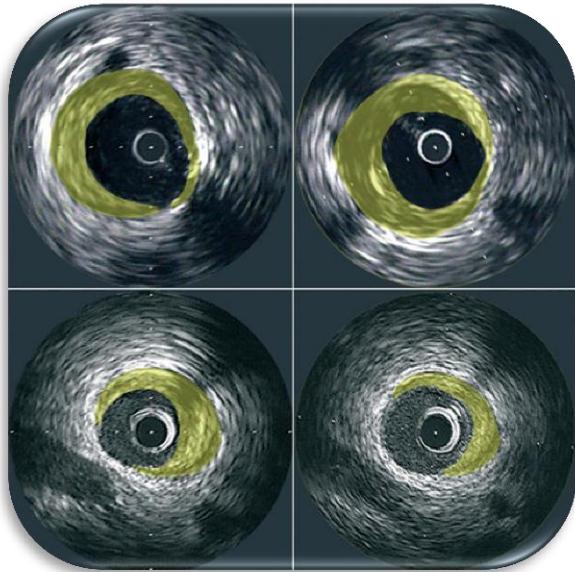
## Breast Tomosynthesis

High-resolution limited-angle tomography at mammographic dose levels.



## Mammography CAD SR

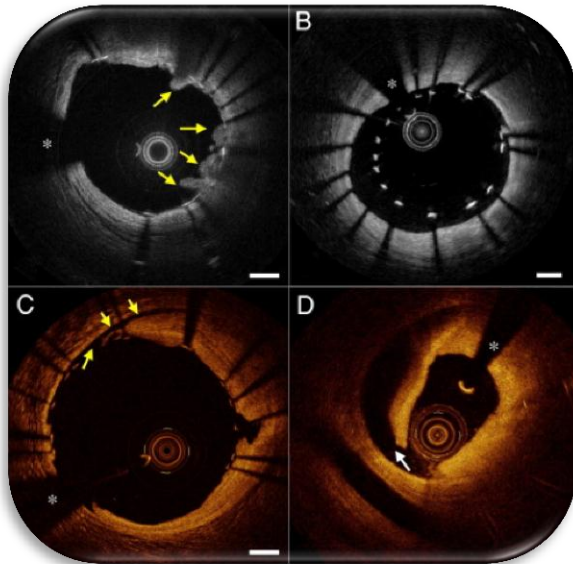
Used to convey mammography detection and analysis results, e.g., textual information, coded information, measurements, regions of interest and references to other IODs.



## Intravascular Ultrasound (IVUS)

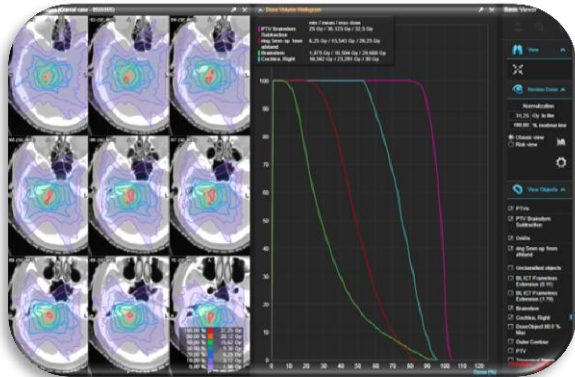
A catheter-based imaging modality with a miniaturized ultrasound probe. It allows images from inside blood vessels out through the surrounding blood column, visualizing the endothelium (inner wall) of blood vessels in living individuals.





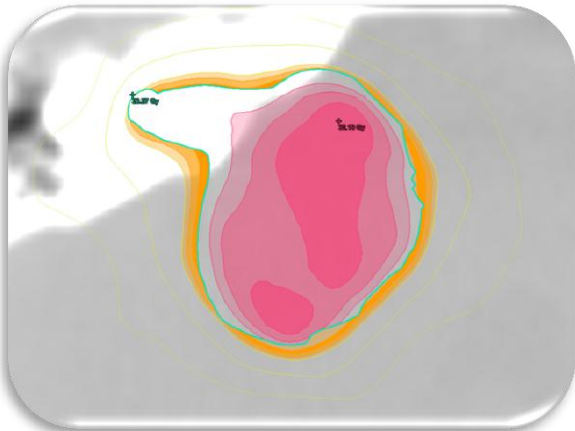
## Intravascular Optical Coherence Tomography (IVOCT)

A high resolution catheter-based imaging modality upon low coherence interferometry to visualize coronary artery lesions.



## RT Dose

Dose distributions and dose volume histograms calculated by radiotherapy treatment planning systems.

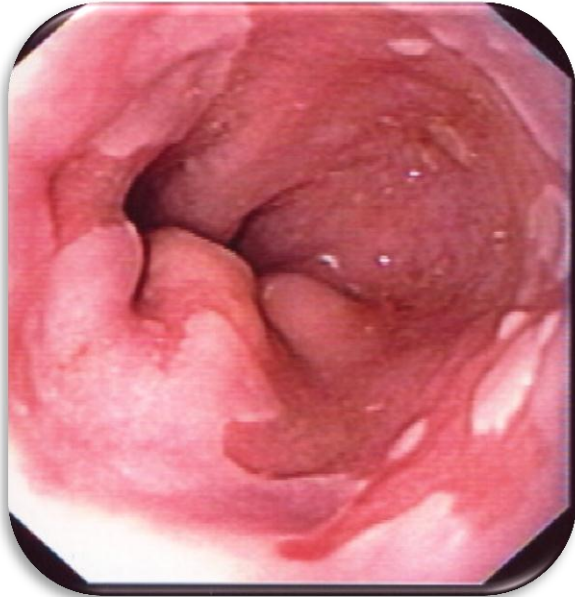


## RT Structure Set

Structures derived from CT or MR images defining organs and target volumes.

## RT Plan

Treatment plan



## VL

The Visible Light IODs specify images that are acquired by means of a camera or other sensors for visible or near-visible light.

## Equipment Examples

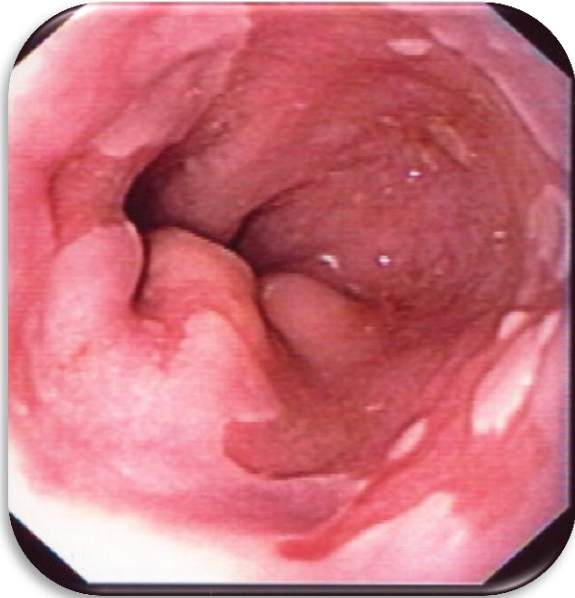
Rigid and flexible endoscopy equipment

Operation microscopes / colposcopes

Analysis microscopes

Ophthalmology equipment

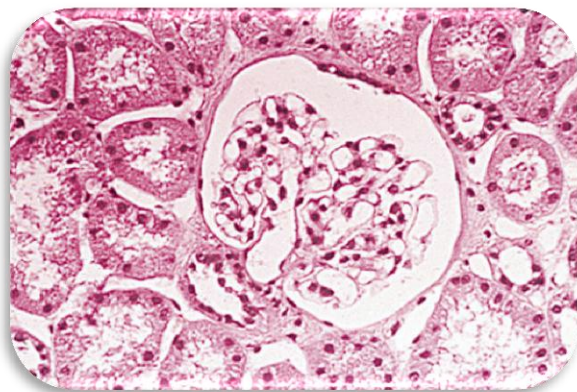
Digital or Video Cameras



## Endoscopy

VL Endoscopic Image

Video Endoscopic Image



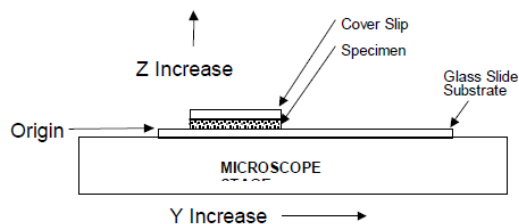
## Pathology

VL Microscopic Image

VL Slide-Coordinates Microscopic Image

VL Whole Slide Microscopy

Video Microscopic Image

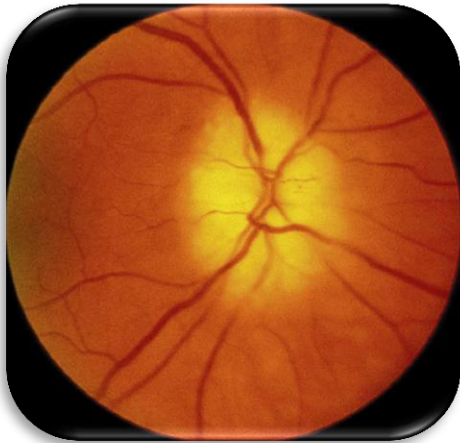




## Dermatology

VL Photographic Image

Video Photographic Image



## Ophthalmic Photography

## Ophthalmic Tomography

## Ophthalmic Refractive Measurements

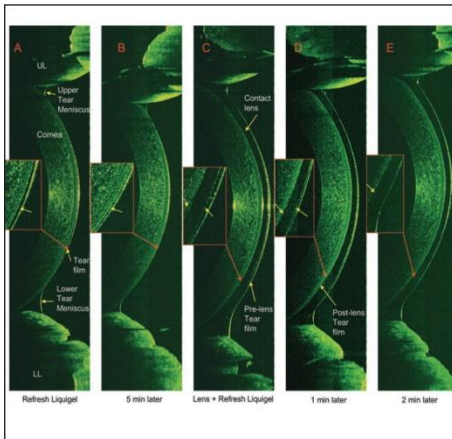
Lensometry Measurements

Autorefraction Measurements

Visual Acuity Measurements

Ophthalmic Axial Measurements

Intraocular Lens Calculations





## Digital Intra-oral X-ray



## X-Ray 3D Angiography

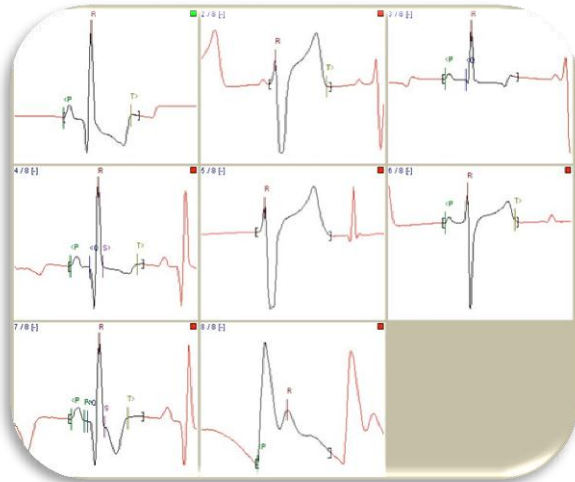




## Audio

Basic Voice Audio

General Voice Audio



## Cardiac

12-Lead Electrocardiogram (ECG)

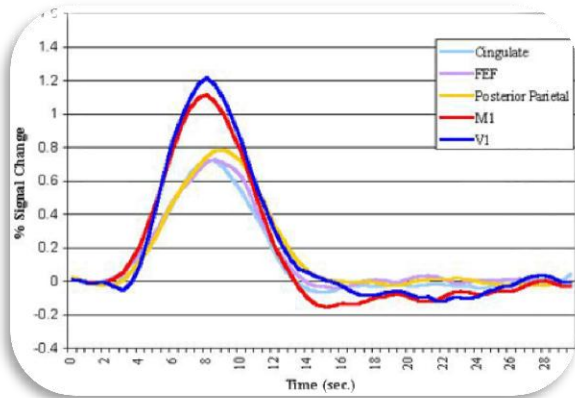
General ECG

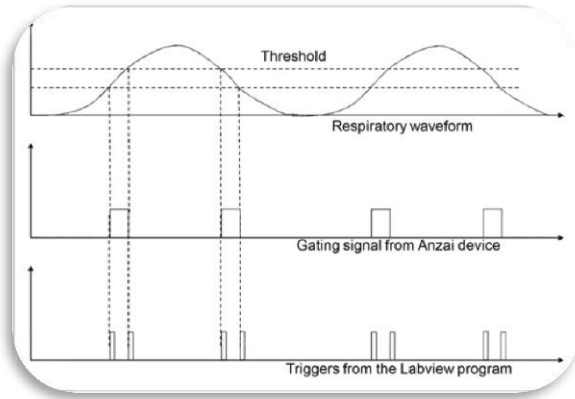
Ambulatory ECG

Hemodynamic

Basic Cardiac Electrophysiology

Arterial Pulse Waveform





## Respiratory Waveform



## Implant Templates

Generic Implant Template

Implant Assembly Template

Implant Template Group

## Implantation Plan SR Document



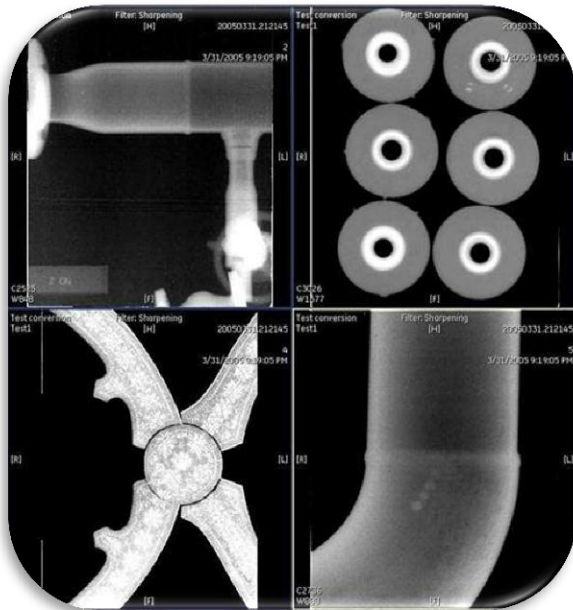
## CP-643

Veterinary IODs require additional identifying attributes to define the owner as well as characteristics of the species and breed.

## Digital Imaging and Communication in Nondestructive Evaluation

A standard by ASTM International:

- E2339 General DICONDE Standard
- E2663 DICONDE for Ultrasonic Test Methods
- E2699 DICONDE for Digital Radiographic (DR) Test Methods
- E2738 DICONDE for Computed Radiography (CR) Test Methods
- E2767 DICONDE for X-ray Computed Tomography (CT) Test Methods



**Study** Component ID, Component Name, Study ID, Serial #, ...

↳ **Series** Typically based on date/time stamp,  
Series Description, ...

↳ **Instance** Image or Data

**Study** MyPart123, Casting, 20080403, 123-ABC

↳ **Series** 20080112, Ser1

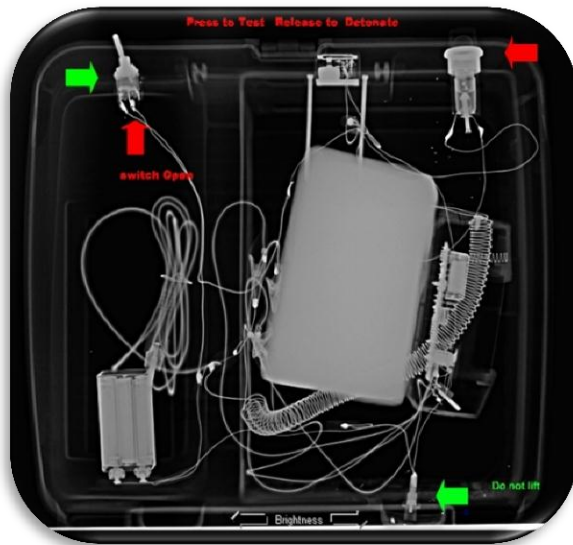
↳ **Instance** Tech1, Side, 90 kV, 3 mA, 5 sec

↳ **Instance** Tech2, Top, 80 kV, 4 mA, 5 sec

↳ **Series** 20080403, Ser2

↳ **Instance** Tech1, Side, 90 kV, 3 mA, 5 sec

↳ **Instance** Tech2, Top, 80 kV, 4 mA, 5 sec



## Digital Imaging and Communications in Security

Facilitates data information interchange (demographic information, x-ray radiographs, CT images, material specific information, trace detection signatures, threat assessment, ...) of objects of inspection (checked luggage, carry-on luggage, parcels, personnel, ...) for security screening applications.



# References



<http://dicom.nema.org/>




<http://www.astm.org/>

<http://www.ndt.net/article/wcndt2008/papers/460.pdf>



<http://www.nema.org/>

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***Thank you for your attention !***