



**Starviewer** Medical Imaging Software

## Marc Ruiz & Adrià Julià

GILab

Universitat de Girona





## 2004 collaboration agreement





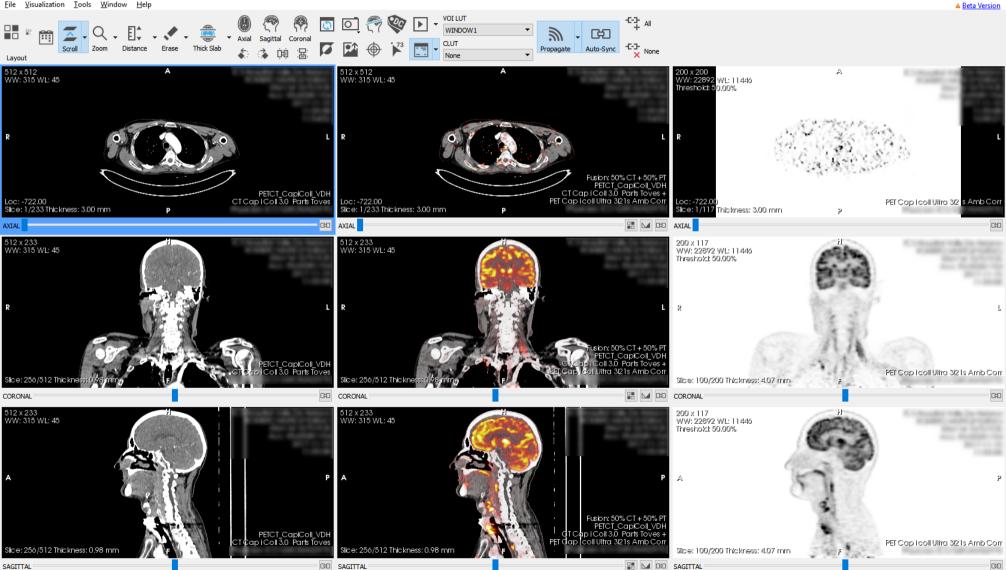
## Research knowledge

Radiology experience



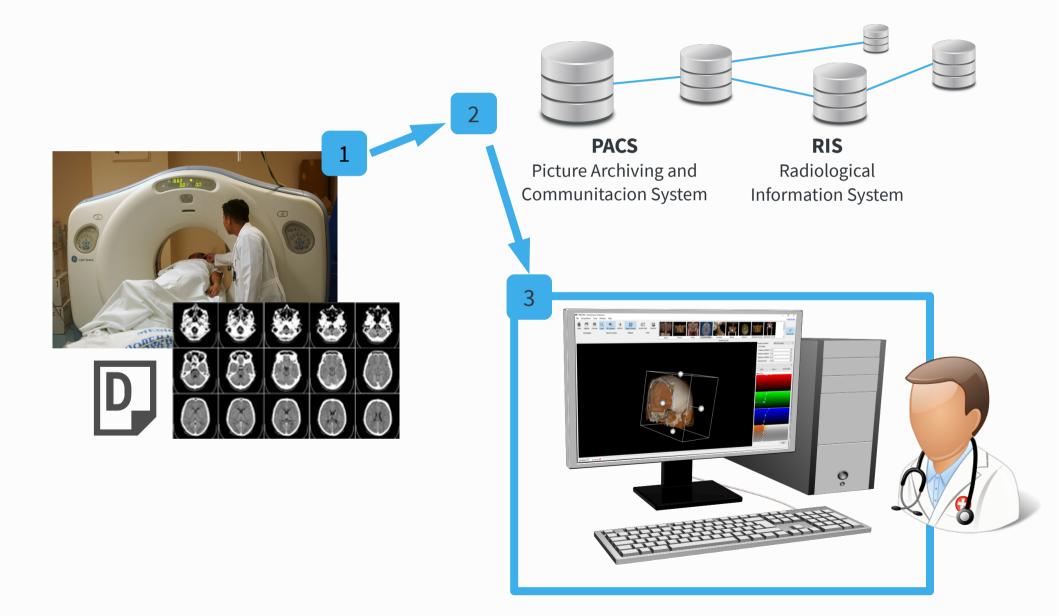
#### \$ File Visualization Tools Window Help

Ð  $\times$ 

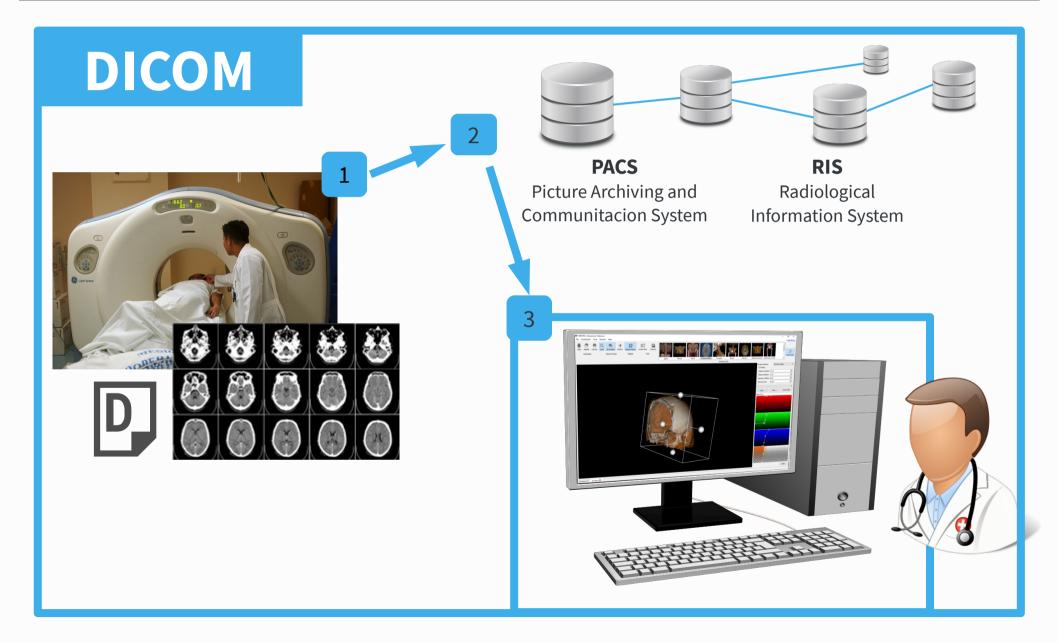


2D Viewer 🔯

# Radiological viewers are essential in the medical imaging workflow



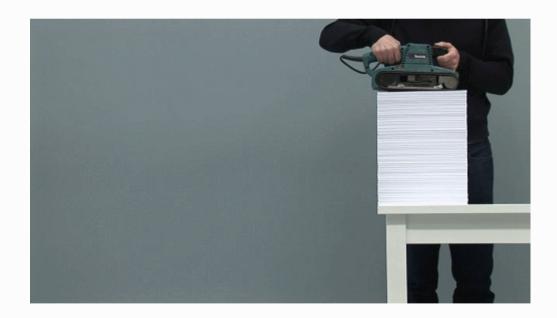
# Radiological viewers are essential in the medical imaging workflow

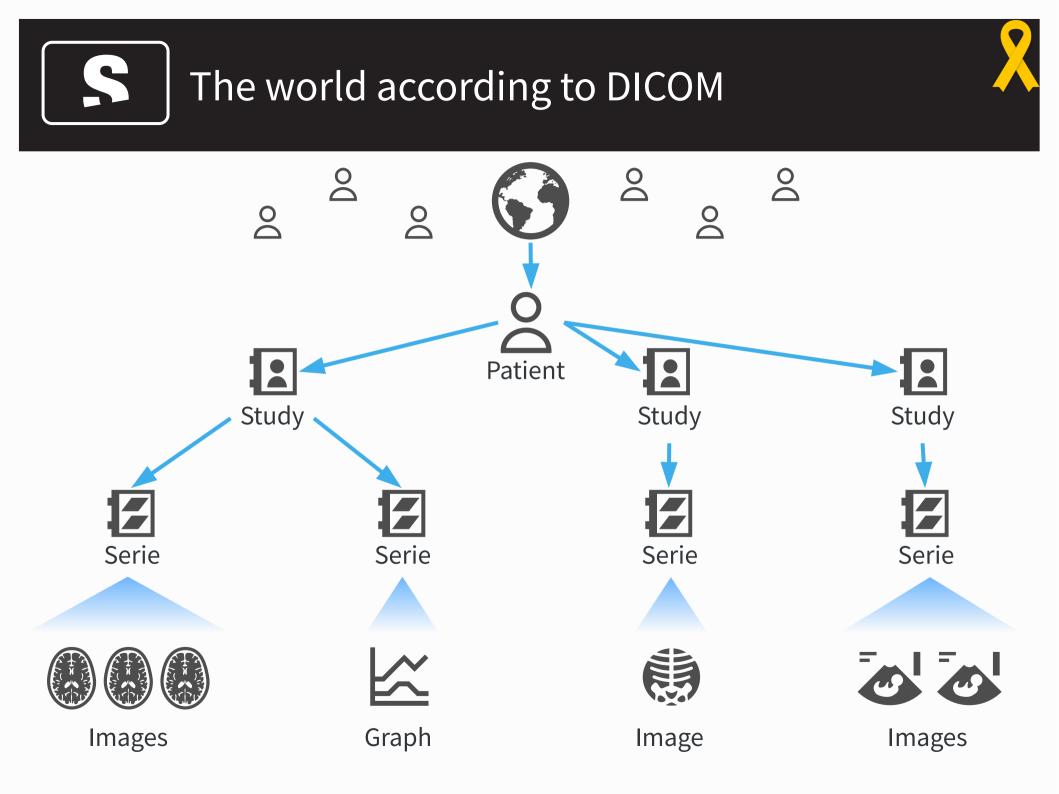


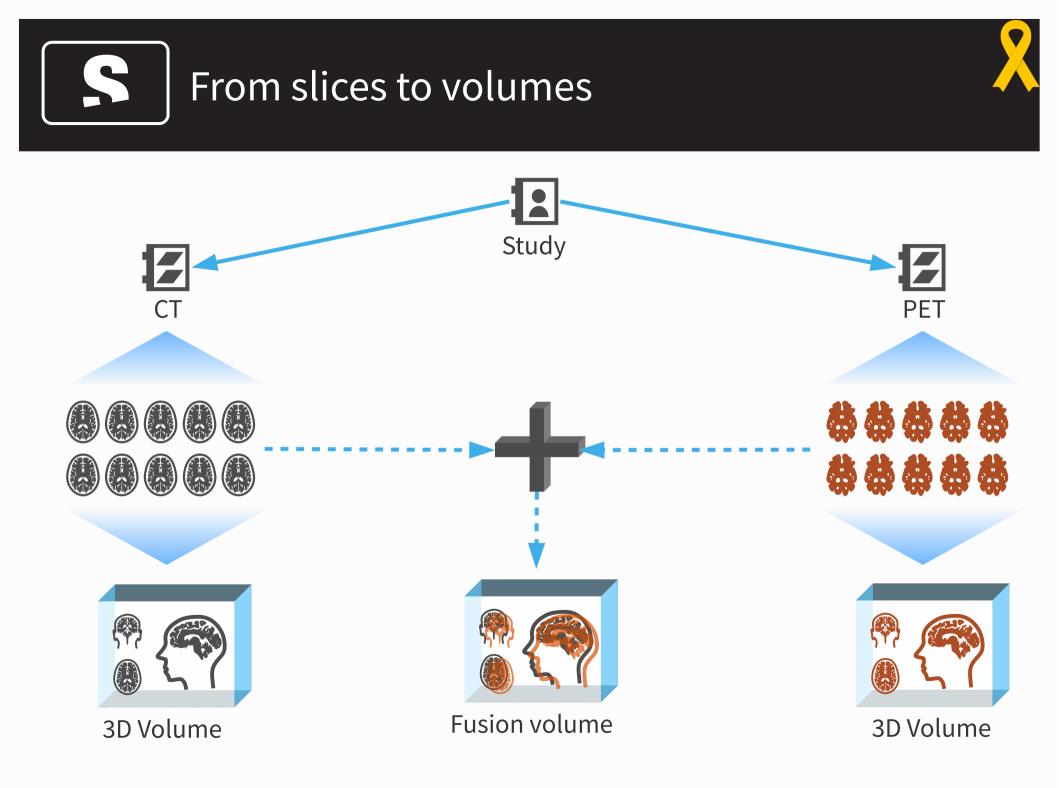




- Digital Imaging and Communications in Medicine
- Extensive medical imaging standard:
  - 21 parts
  - 145 MB of PDF's
  - 6074 pages
  - 30.4 Kg of paper
  - 68.3 cm tall









- C++11
- Qt, VTK, ITK, GDCM, DCMTK, ThreadWeaver, Breakpad, easylogging++
- Qmake
- Multiplatform (Windows, macOS, GNU/Linux)
- x86 and OpenGL 3.2
- Multilanguage (ca, en, es)
- GPLv3+ since 2014

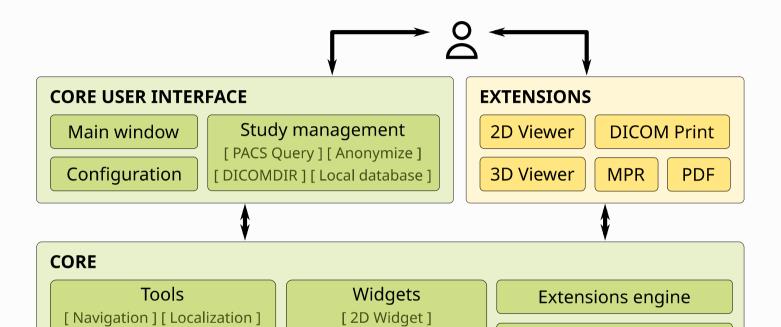


[Synchronization] [Drawing]

[Transfer functions]

[Thick slab]





[ 3D Widget ]

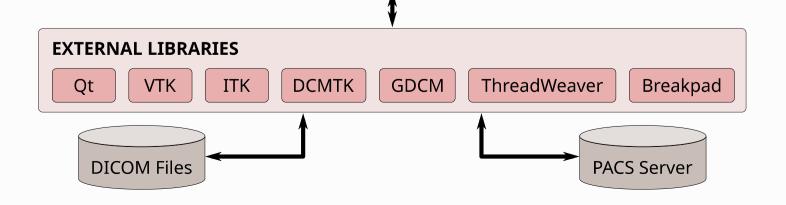
[Layouts]

[Hanging protocols]

Input / Output

[PACS] [Image loading]

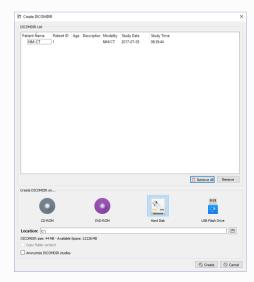
[Local database]





atent									PACS	Institution	Description		
atert None					Patient ID				AWSPIXELMED		PixelMed Publishing Public DICOM Server		
udy Date			Series Mod						DICOMSERVER_	<ul> <li>Medical Conne</li> </ul>	DICOMServer @ Medical Connections Ltd		
				any									
Any Date			M 🖂										
) Today	Custonii		1 OR	ES ES	NM	C RF	N	A					
Yesterday	From	15/01/2018	□ cr	I MG		_ sc	1 x						
Clast Week	To To	15/01/2018 ~			🗌 рт	au 🗌		ther					
Advanced search >> 🛱 PACS nodes	**											C Dear	Q Sea
Local Database B PACS Server	RT DECOMOR												
me	Patient ID Date	Description	Modality		Age In	stitution UID	Study ID	Protocol Name	Acc. Num Ref. Ph	ysician's Name	PP Start Date PP Start Time Reg. Proc. ID Sche. Proc. Step ID		
Abrasion*Corneal	D288DF5 2018-01-10		OT	2007-05-15		edical. 1.2							
E Jefferson*Sally*	938264785 2018-01-04		US			edical. 1.2			API*AI				
E Kent*Gregg*	23847862 2018-01-04					edical. 1.2			APITA				
Patient^New^	32846787 2018-01-04					edical. 1.2			API+A	21			
E Family^Given^M^Title	123 2018-01-03		WSD			edical, 1.2							
E ClipExportey*US8^		12:0405 Abdomen				edical. 1.2			APINA				
Exportey^US8*		12:02:26 Abdomen				edical. 1.2			A01*A1				
E Lungley*Lery*	LL 2018-01-03 23423566 2018-01-03	11:17:15 Lung	US	1987-05-12		edical. 1.2			491-4				
E MM*Mmm*	23423566 2018-01-03 MMMMM 2018-01-03		US	1987-05-12		echcal. 1.2			APICAL				
a officiant Mar	32847823., 2018-01-03		US	1989-08-21		edical, 1.2.,			401-41				
E OpeFrame^Muscle^		10:12:45 MSK	US	( Barrowski		efical. 1.2			101-11				
E Patient^Unknown*		07:59:38 08	US			efical. 1.2.			APICAL				
E Patient^Unknown*		07:58:33 Abdomen				ecical. 1.2			APICAL				
E Lungo*LLLuny*		09:37:20 Lung	US			edical. 1.2.			APICAL				
E Patient^Unknown*		09:2456 Abdomen				ecical. 1.2			APICAL				
E Tuesdey*Unknown*	23987678., 2018-01-02	09:07:56 Gyn	SR	1997-04-09	20Y M	edical, 1.2.	Study 1		APICAL				
II Smith "Unknown"	982167863 2018-01-02	09:04:49 MSK	US	1976-06-02	41Y M	ecfical, 1.2.	Study 1		APICAL				
Young*Mike*	32984792 2018-01-02	09:02:35 Abdomen	US	1987-08-21	30Y M	edical. 1.2	Study 1		APITAL	21			
E Gentry "Heather"	32984789 2018-01-02	08:56:27 08	US	1989-06-21	28Y M	ecfical. 1.2	Study 1		APITAL	21			
E Adam*Mike		11:42:27 Imported.				edical. 1.2							
E Boop*Betty*	32884788 2017-12-27		US	1989-06-02		edical. 1.2			API^A				
E Boop*Betty*	32884788 2017-12-27		US	1989-06-02		edical. 1.2			APITA				
E Boop*Betty*	32884788 2017-12-27		US	1989-06-02		edical. 1.2			APITAL				
E Boop*Betty*	32894798 2017-12-27		US	1989-06-02		edical, 1.2			API+A				
E Boop*Betty*	32894798 2017-12-27		US	1989-06-02		edical. 1.2			APINA				
E Boop*Betty*	32894798 2017-12-27		US	1989-06-02		edical. 1.2			APITA				
E Boop*Betty*	32894798 2017-12-27		US	1989-06-02		edical. 1.2			APITA				
E Boop*Betty*	32894798 2017-12-27 32894798 2017-12-27		US	1989-06-02		edical. 1.2			API*AI 401*41				
E Boop*Betty* E Rogen*Randy*	893247234 2017-12-27			1909-06-02		edical. 1.2			491-4				
E Rogers*Randy^	893247234 2017-12-27 893247234 2017-12-27					echcal. 1.2			491-4				
E Rogers*Randy*	893247234 2017-12-27					edical, 1.2.,			401-41				
E nogen nanoy.	003247234 2011-12-21	AND AN AN AN A				C 1 43	200491		APITAL STATE				
													>

### Study management



DICOMDIR export

S Exporter			? >	×
Series description:				
Images to export:	Exported series will b	e stored in the local	database	
Ourrent image only		ported series to the l	PACS selected below:	
<ul> <li>All images of the series</li> </ul>	PACS	Institution	Description	
Preview	AWSPIXELMED	PixelMed	PixelMed Publishing Public DICOM Server	
1/1	DICOMSERVER	Medical Conne	DICOMServer @ Medical Connections Ltd	
			🗔 Export 🚫 Cancel	1

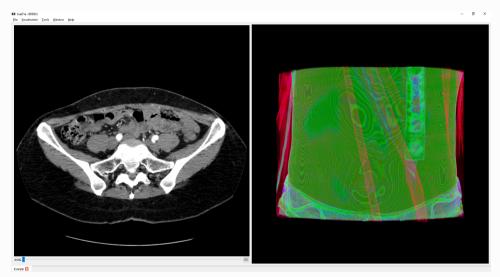
### Series export

2D Viewer	20	Viewer Configur	ation									
2D Viewer Layout		Scrol Infinite mouse scrol Infinite mouse scrol Phase scrol loop Change series with mouse wheel										
PACS	Enable refe	erence lines for				Enable automatic synchronization for CT MR						
Local Database	Zoom tool b CR CT Z DX	oy default for ES MG MR	□ NM ☑ OP □ PT	RF SC US	□ XA □ XC	Enable pro	pagation for ES MG	□ NM □ OP ☑ PT	RF SC	□ XA □ XC		
RIS Listener DICOMDIR	Measureme Minima Minima Verbos Verbos	e explicit	verbosity			<ul> <li>Body V</li> <li>Lean B</li> </ul>	SUV measureme Veight (bw) - g/ ody Mass (bm) surface Area (bs	ml - g/ml	type			
External application		glass tool zoom ) 2x  ) 4x		1								

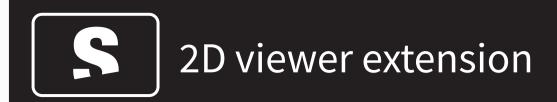
## Configuration screen



- Support general or specific workflows or features
- Currently 5 stable extensions
- New custom extensions can be easily created
- Static libraries
  - Recompile :(
  - But could use LTO :)
- Both static and dynamic in the future



134 lines of C++



#### File Visualization Tools Window Help A Beta Version VOI LUT ~다구 All 0 WINDOW1 E‡ en + 🕲 Sagittal Coronal **∆**vial CLUT Propagate Auto-Sync Distance Thick Slab Zoom Erase :묩 ĊΟ ं • None Layout 512 x 512 WW: 315 WL: 45 512 x 512 WW: 315 WL: 45 A 00 x 200 WW: 22892 WL: 11 Threshold: 50,00% WE:11446 Þ Fusion: 50% CT + 50% PT PETCT\_CapiColl\_VDH CT CapiColl 3.0 Parts Toves + PET Capicoll Ultra 3121s Amb Corr PETCT\_CapiColl\_VDH CT Cap i Coll 3.0 Parts Toves Loc: -722.00 Slice: 1/233 Thickness: 3.00 mm Loc: -722.00 Slice: 1/233 Thickness: 3.00 mm Loc: -722.00 Silce: 1/117 Th/ckness: 3.00 mm PEF Cap I coll Ulira 32's Amb Corr C+D AXIAL 🔡 🖬 🖾 AXIAL XIAL 512 x 233 WW: 315 WL: 45 512 x 233 WW: 315 WL: 45 200 x 117 WW: 22892 WL: 11446 Threshold: 50.00% usion: 50% CT + 50% P1 PETCT\_CapiColl\_VDh oll 3.0 Parts Toves + CT\_CapiColl\_VDH oll 3.0 Parts Tove: PEF Cap I coll Ultra 3/21s Amb Corr 3121s Amb Cor Slice: 256/512 Thickne Slice: 256/512 Thickn Slice: 100/200 Thickness: 4.07 mm CORONAL CORONAL 🔡 🖂 🖾 CORONAL ся 512 x 233 WW: 315 WL: 45 512 x 233 WW: 315 WL: 45 200 x 117 WW: 22892 WL: 11446 Threshold: 50.00% Fusion: 50% CT + 50% PT PETCT\_Cap(Coll\_VDH ap i Coll 3.0\_Parts Toves + PETCT\_CapiColl\_VDH Cap i Coll 3.0 Parts Toves PET dap (coll Ultra 3121s Amb Cor СТ PEF Cap I coll Ultra 321s Amb Corr ٠ Slice: 256/512 Thickness: 0.98 mm Slice: 256/512 Thickness: 0.98 mm Slice: 100/200 Thickness: 4.07 mm 2 The P GI SAGITTAL 🔡 🖂 🖾 SAGITTAL පා SAGITTAL

o ×

2D Viewer 🔯

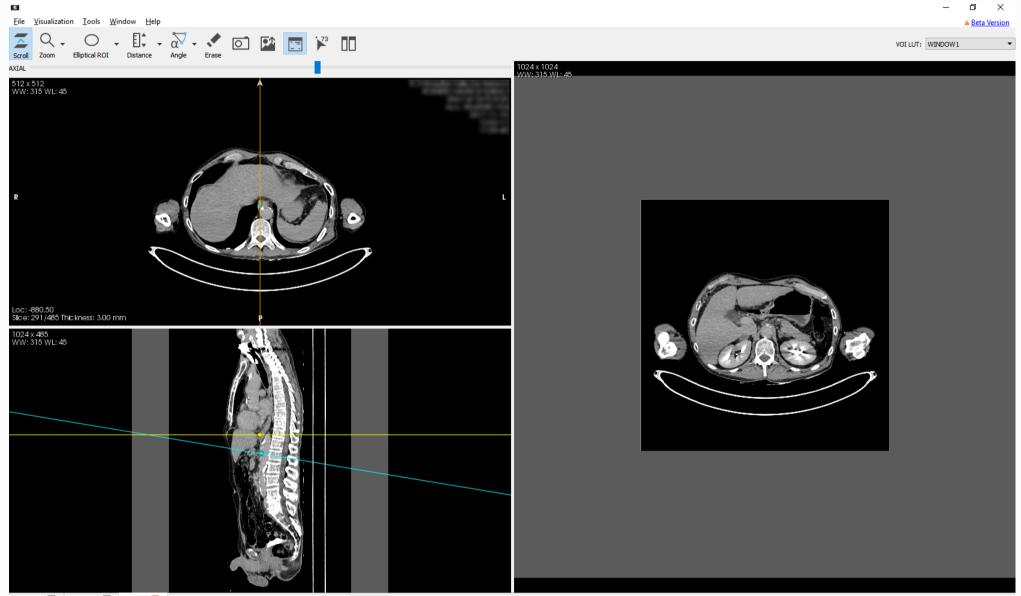
\$



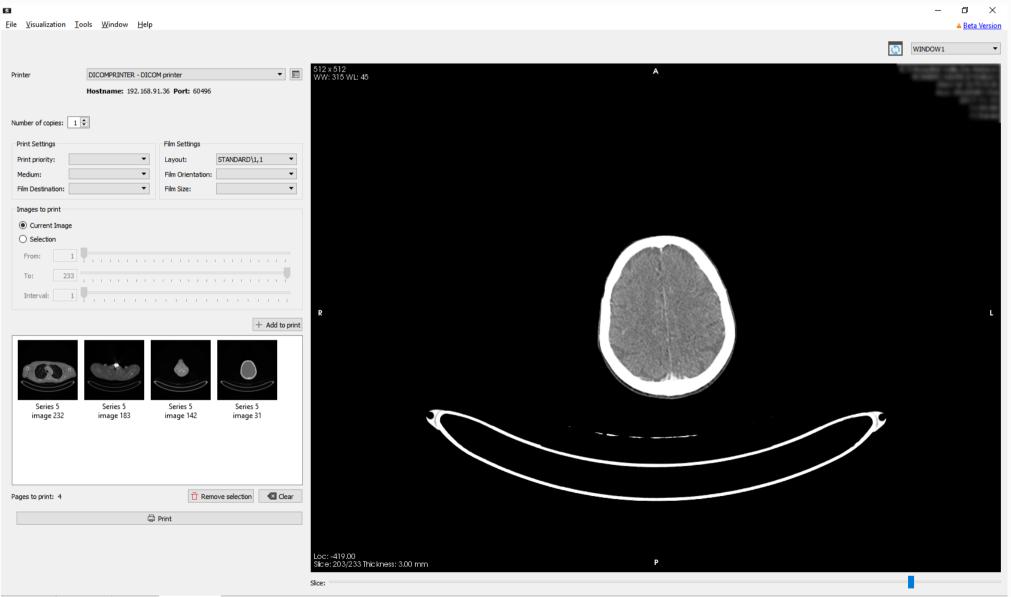


#### Ð 18845765 : Anonymous^Unknown X File Visualization Tools Window Help A Beta Version Ø 0 ۶Ŷ -Q 1 . Axial Coronal WW/WL Screen Shot Exporter Sagittal Zoom Clipping Planes 3D Rotation -Orientation Mouse Function Widgets Tools Custom style Thorax Pelvis Circle of Willis Carotids Abdomen bones Abdomen run-off Spine Rones Bones 2 Rendering style Rendering Method GPU Ray Casting Shading -Ambient coefficient 0.10 + Diffuse coefficient 0.70 + Specular coefficient 0.00 \$ Specular power 64.00 -Load... Save... Switch editor Name Cow Apply











#### \$

File Visualization Tools Window Help



faither that PROPER AND 1.004

families of the PERMIT AND ADDRESS OF ADDRESS OF

Coldman Color protection. Name of share \$1.50 Labor. -

States and states and Indiana Chan contraction. Name of

share do to take -



A Beta Version

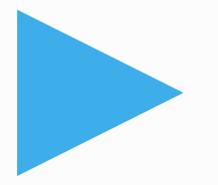
 $\times$ 

đ

\_









- contact@starviewer.udg.edu
- http://starviewer.org
- https://github.com/starviewer-medical/starviewer
- DICOM: https://www.dicomstandard.org/current/

