臨床大數據分析及醫療影像量化/視覺化趨勢
IoT+Health Frontier
-Trend of Clinical Big Data Analytics and Quantitative/Visualizing Image

人工智慧/區塊鏈/工業4.0與醫療結合後的未來世界
(How Emerging Technology will Empower Tomorrow's Today to Provide Better Healthcare Solution)

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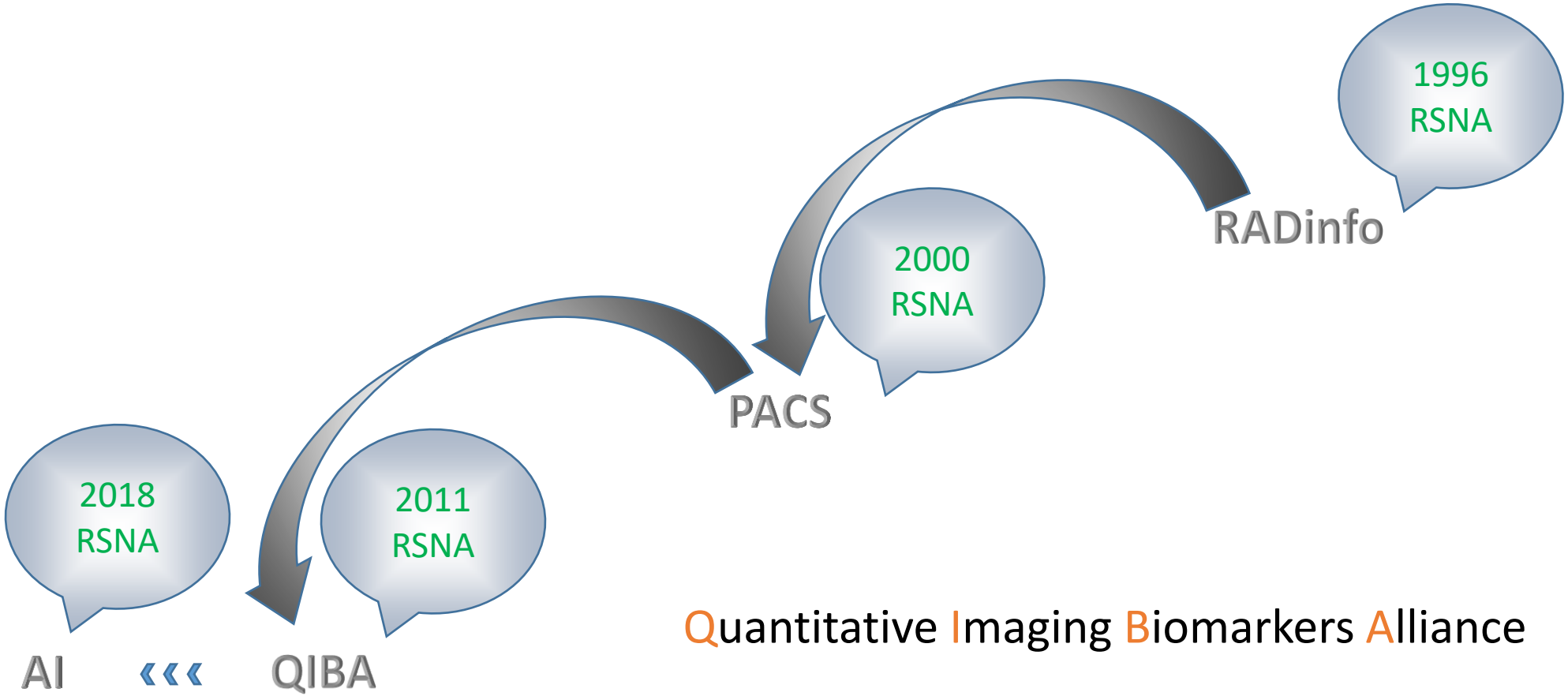
新興科技對醫療資訊產業的影響

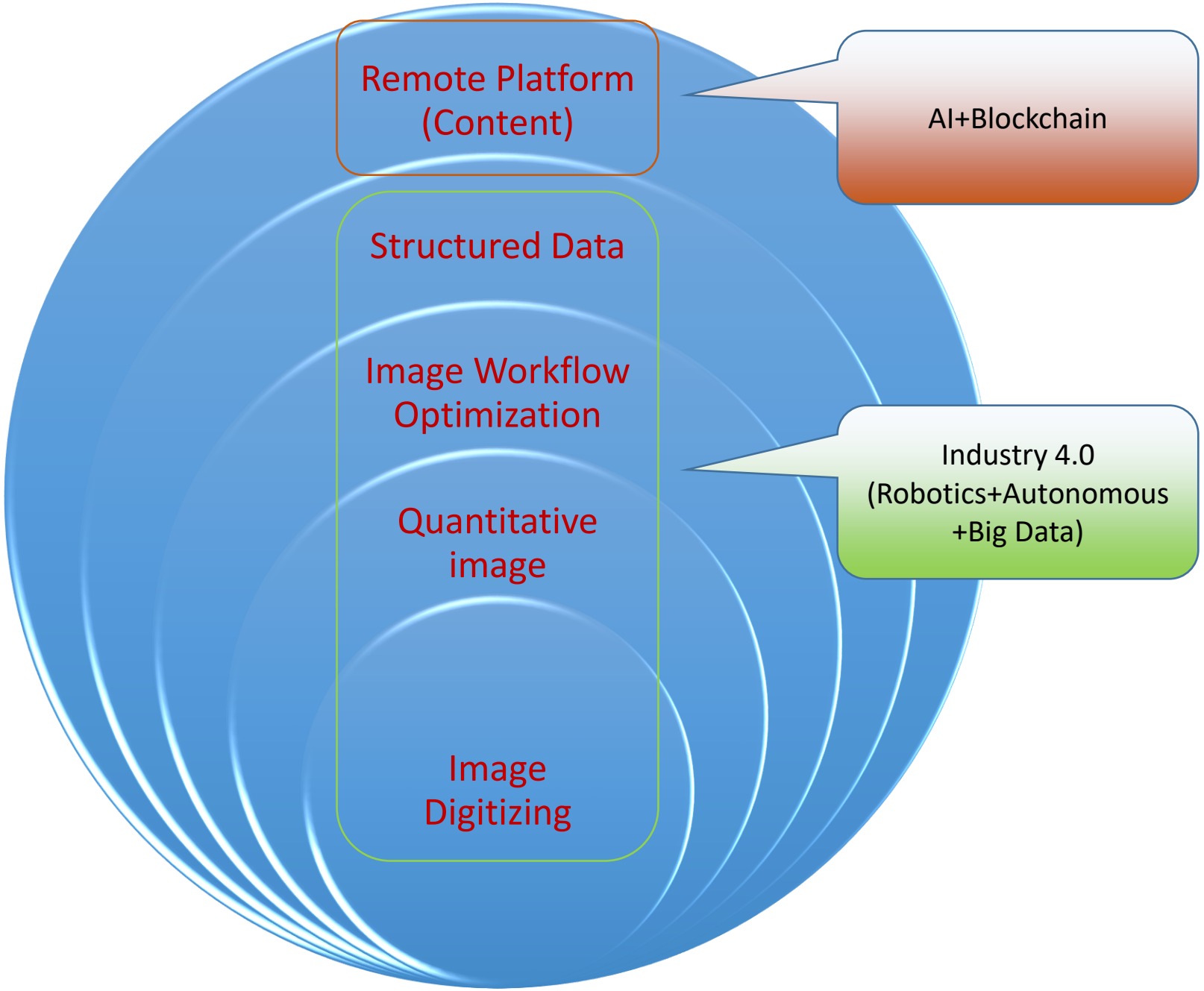
Tomorrow's Radiology Today

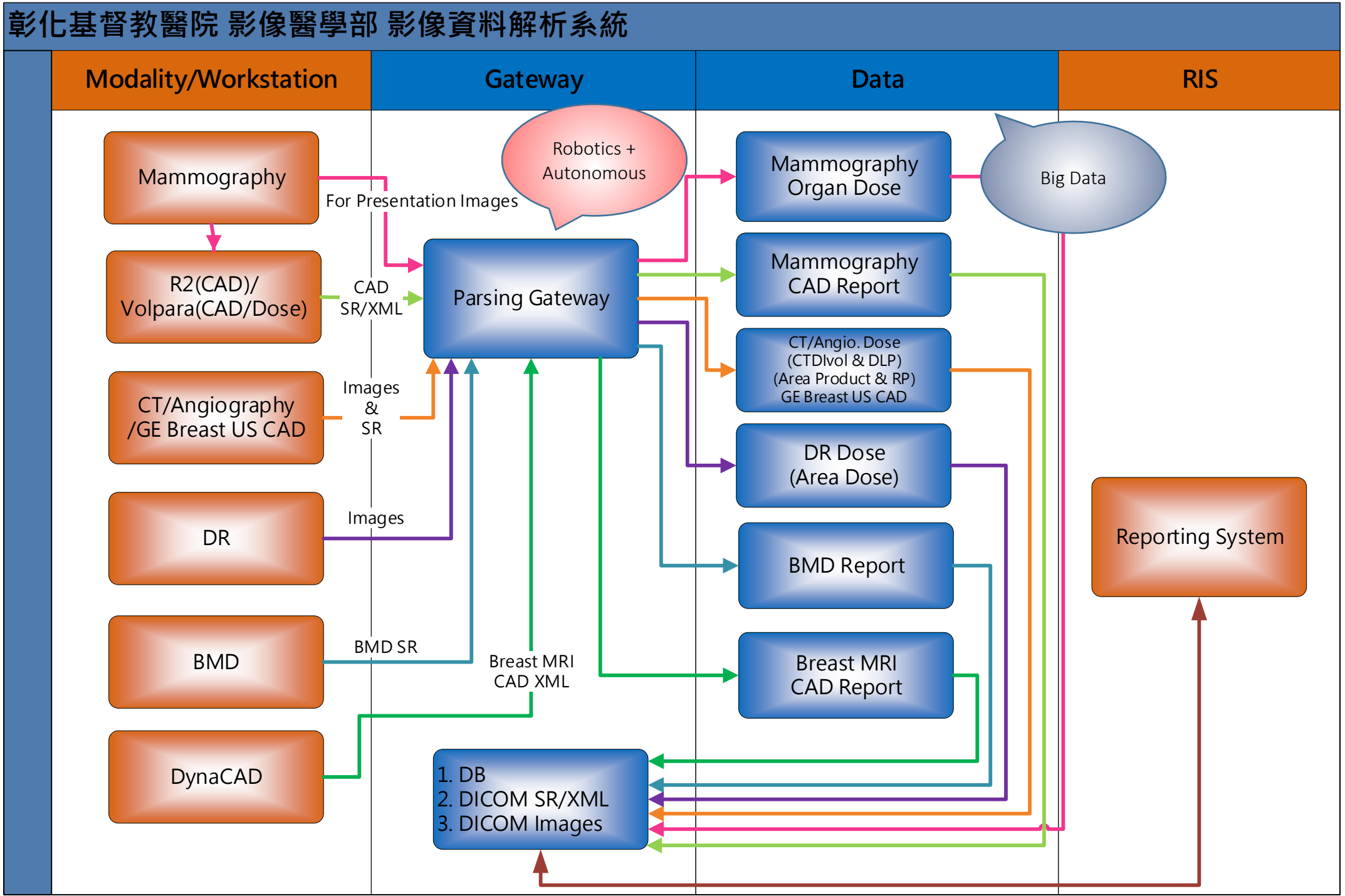
2018
RSNA

明日放射科的日常

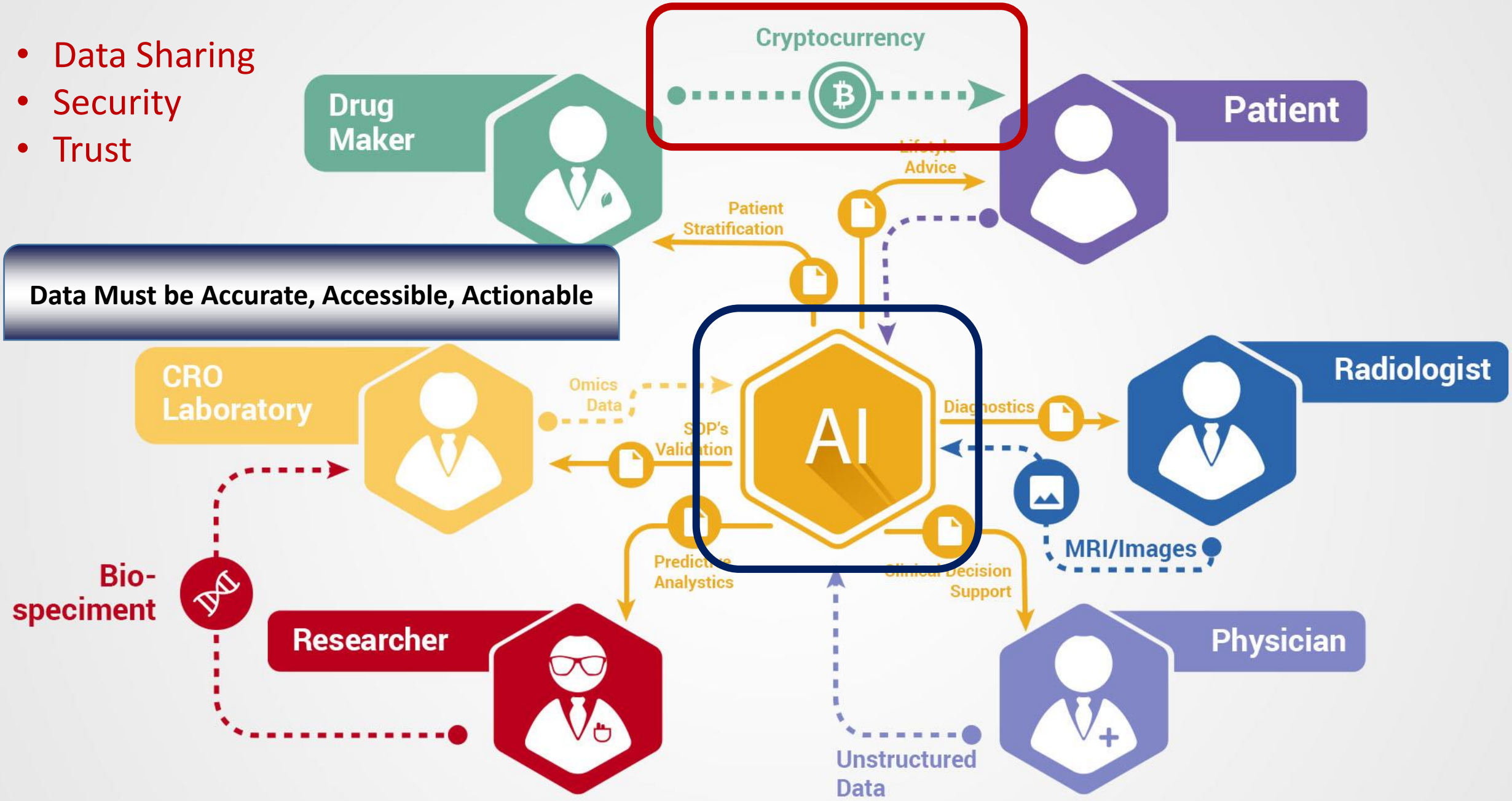


Quantitative Imaging Biomarkers Alliance


Remote Platform
(Content)
AI+Blockchain
Structured Data
Image Workflow
Optimization
Quantitative
image
Industry 4.0
(Robotics+Autonomous
+Big Data)
Image
Digitizing


彰化基督教醫院 影像醫學部 影像資料解析系統
Modality/Workstation
Gateway
Data
RIS
Mammography
For Presentation Images
Robotics + Autonomous
Mammography Organ Dose
Big Data
R2(CAD)/ Volpara(CAD/Dose)
CAD SR/XML
Parsing Gateway
Mammography CAD Report
CT/Angio. Dose (CTDIvol & DLP) (Area Product & RP) GE Breast US CAD
CT/Angiography /GE Breast US CAD
Images & SR
DR Dose (Area Dose)
DR
Images
Reporting System
BMD Report
BMD
BMD SR
Breast MRI CAD XML
Breast MRI CAD Report
DynaCAD
1. DB
2. DICOM SR/XML
3. DICOM Images

- Data Sharing
- Security
- Trust



如何落實AI？

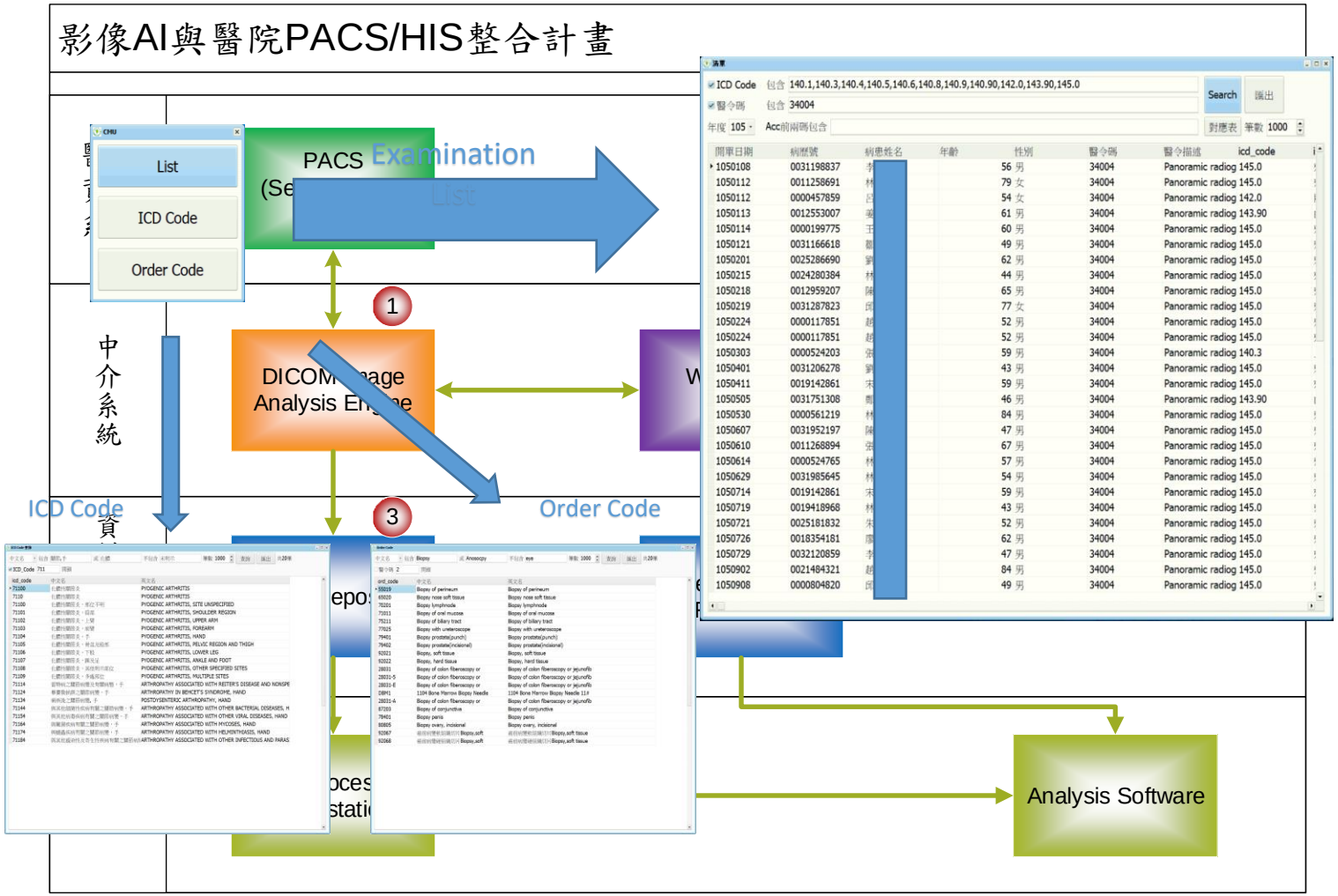
AI Tech

- ML techniques
- Deep learning
- NLP (Natural Language Processing)
- Robotics
- Computer vision
- Speech recognition

Outside the Software Industry

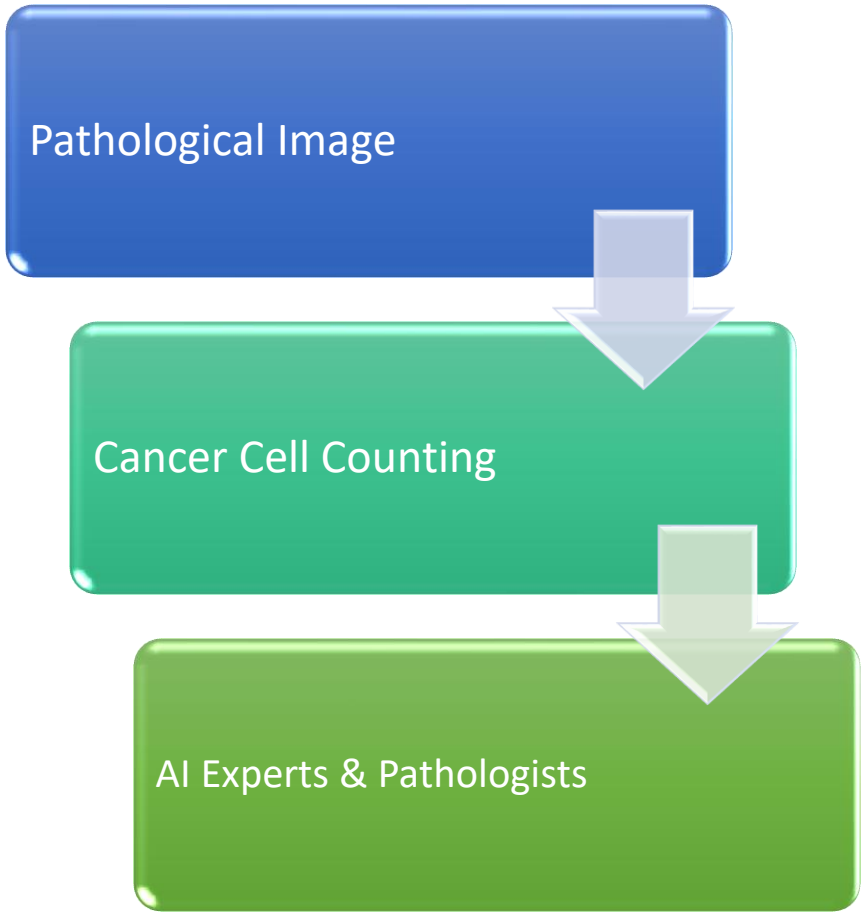
AI Kernel

- Data + Compute
- Talent + Ideals + Tools



How to choose an AI Project?

- Start Small
- Automate tasks, not jobs
- Combine AI & subject matter experts



醫療資訊產業變化

Workflow Processes

ADDITIONAL RESOURCES

IT Infrastructure in the Era of Imaging 3.0

Geraldine B. McGinty, MD, MBA[a], Bibb Allen Jr, MD[b], J. Raymond Geis, MD[c,d], Christoph Wald, MD, PhD[e,f]

Reporting & Communication (LI-RADS,BI-RADS, Lung-RADS…)

Imaging 3.0 is a blueprint for the future of radiology modeled after the description of Web 3.0 as "more connected, more open, and more intelligent." Imaging 3.0 involves radiologists' using their expertise to manage all aspects of imaging care to improve patient safety and outcomes and to deliver high-value care. IT tools are critical elements and drivers of success as radiologists embrace the concepts of Imaging 3.0. Organized radiology, specifically the ACR, is the natural convener and resource for the development of this Imaging 3.0 toolkit. The ACR's new Imaging 3.0 Informatics Committee is actively working to develop the informatics tools radiologists need to improve efficiency, deliver more value, and provide quantitative ways to demonstrate their value in new health care delivery and payment systems. This article takes each step of the process of delivering high-value Imaging 3.0 care and outlines the tools available as well as additional resources available to support practicing radiologists. From the moment when imaging is considered through the delivery of a meaningful and actionable report that is communicated to the referring clinician and, when appropriate, to the patient, Imaging 3.0 IT tools will enable radiologists to position themselves as vital constituents in cost-effective, high-value health care.

Key Words: Imaging 3.0, accountable care organizations, patient experience, value-based imaging

J Am Coll Radiol 2014;11:1197-1204.

Dose & Safety

Communication With Mobile Devices

Protocol Standardized is Everything

DICOM Standard

The development of DICOM

ACR-NEMA Standard No. 300- 1985 / 1988

(American College of Radiology and National Electrical Manufacturers Association

SPI 1987
(Standard Product Interconnect)

DICOM 3.0 1993
(Digital Imaging and COmmunication in Medicine)

The Parts of the DICOM Standard

- Part 1 - Introduction and Overview
- Part 2 - Conformance
- Part 3 - Information Object Definitions
- Part 4 - Service Class Specifications
- Part 5 - Data Structures & Encoding
- Part 6 - Data Dictionary
- Part 7 - Message Exchange
- Part 8 - Network Communication Support for Message Exchange
- ~~Part 9 - Point-to-Point Communication Support for Message Exchange~~

The Parts of the DICOM Standard

- Part 10 - Media Storage and File Format for Media Interchange
- Part 11 - Media Storage Application Profiles
- Part 12 - Media Formats and Physical Media for Media Interchange
- ~~Part 13 - Print Management Point-to-Point~~
- Part 14 - Grayscale Standard Display Function
- Part 15 - Security and System Management Profiles
- Part 16 - Content Mapping Resource
- Part 17 - Explanatory Information
- Part 18 - Web Services
- Part 19 - Application Hosting
- Part 20 - Imaging Reports using HL7 Clinical Document Architecture
- Part 21 - Transformations between DICOM and other Representations

DICOM Q&A

- DICOM 3.0 still Evolutionary or Stop?

2011
2013
2014a, 2014b, 2014c
2015a, 2015b, 2015c
2016a, 2016b, 2016c, 2016d, 2016e
2017a, 2017b, 2017c, 2017d, 2017e
2018a, 2018b, 2018c, 2018d, 2018e
2019a, 2019b, 2019c, 2019d (Nov.)…

- Part name is fixed or not?

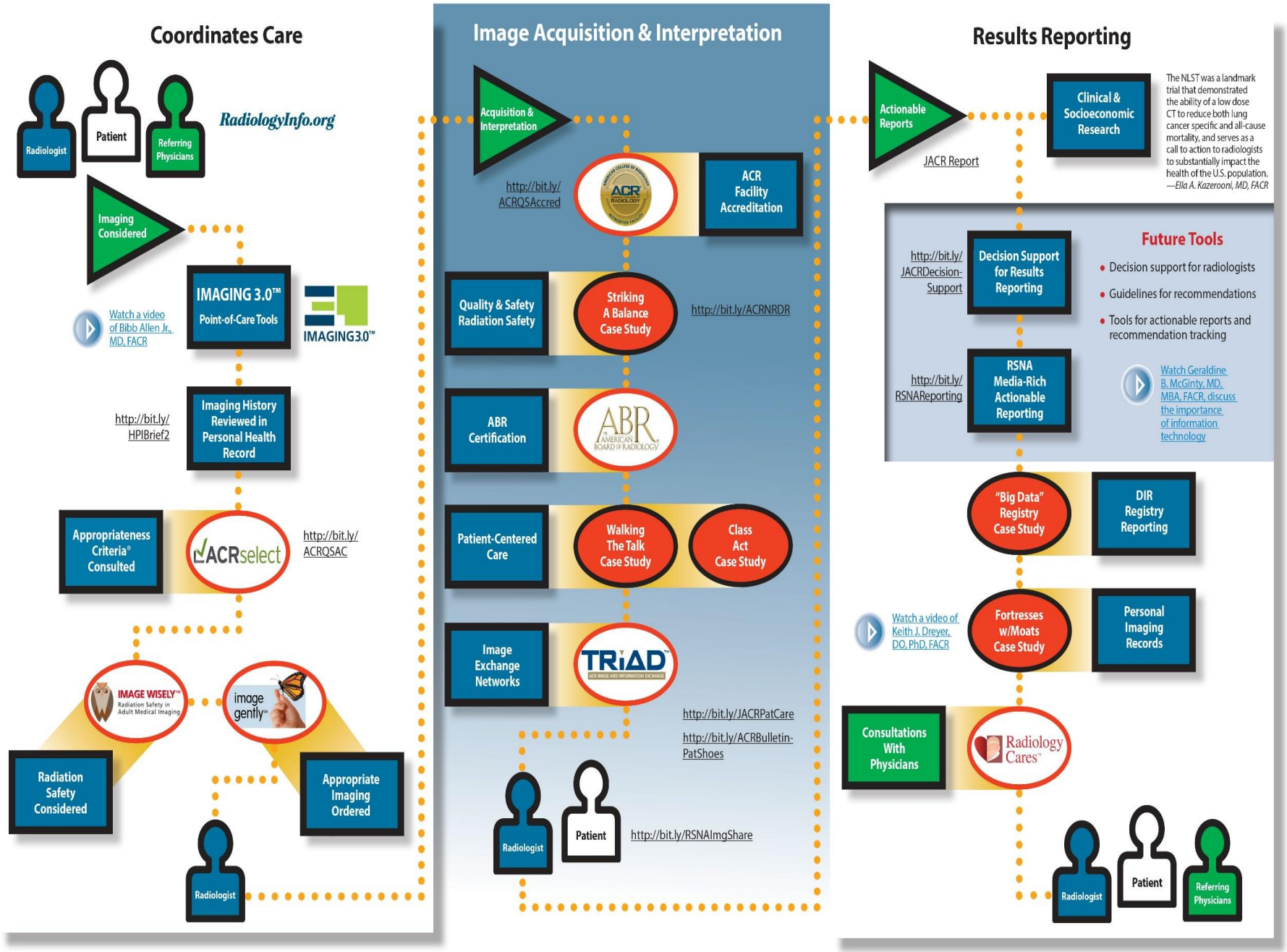
Part 18 from “Web Access to DICOM Persistent Objects (WADO)” to “Web Services”(2013)
Part 20 from “Transformation of DICOM to and from HL7 Standards” to “Imaging Reports using HL7 Clinical Document Architecture”(2015)
Add Part 21 “Transformations between DICOM and other Representations”(2017e)

- DICOM file is image-package only?

Radiomic Features(2017d)
DICOM SEG(2007)+Parametric Maps(2014)+DICOM SR(TID 1500)+Tractography(2015)

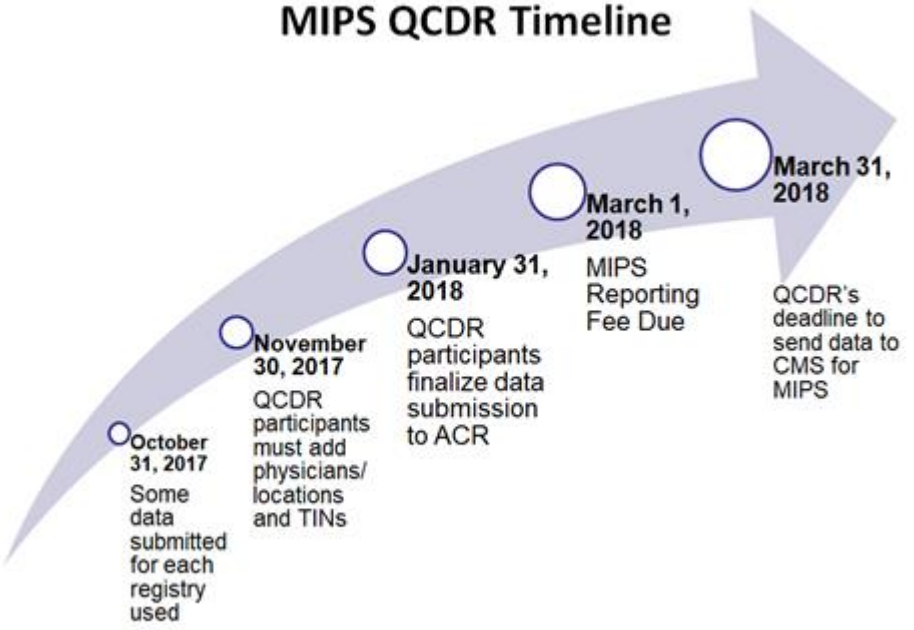
ACR Registry

IMAGING 3.0™ — Beyond Image Interpretation



ACR NRDR

- The ACR NRDR (National Radiology Data Registry) has been approved as a Qualified Clinical Data Registry (QCDR) for the CMS (Centers for Medicare & Medicaid Services) Merit-Based Incentive Payment System (MIPS) for 2017



ACR NRDR

- Lung Cancer Screening Registry
- Interventional Radiology Registry
- CT Colonography Registry
- Dose Index Registry
- General Radiology Improvement Database
- National Mammography Database
- Clinical Decision Support R-SCAN
- MIPS (Merit-Based Incentive Payment System)

DICOM Image/SR for Dose Management

Mammography Organ Dose

Mammography Organ Dose

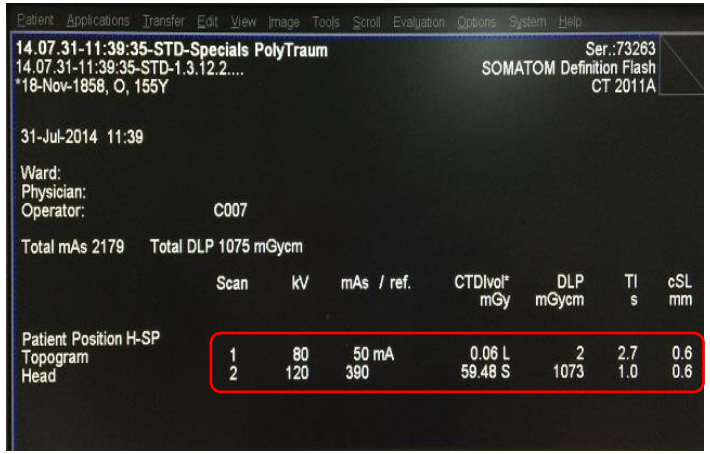
- Organ Dose Report Export

110	0028	1055	LO	Window Center & Width Explanation	NORMAL / HARDER / SOFTER
111	0028	1056	CS	VOI LUT Function	SIGMOID
112	0028	2110	CS	Lossy Image Compression	00
113	0040	0275	SQ	Request Attributes Sequence	+ Sequence +
114	0040	0007	LO	Scheduled Procedure Step Description	Mammography
115	0040	0009	SH	Scheduled Procedure Step ID	XMAGR
116	0040	1001	SH	Requested Procedure ID	8203
117	0040	0302	US	Entrance Dose	0
118	0040	0306	DS	Distance Source to Entrance	620
119	0040	0310	ST	Comments on Radiation Dose	15 %
120	0040	0316	DS	Organ Dose	0.01259
121	0040	0318	CS	Organ Exposed	BREAST
122	0040	0555	SQ	Acquisition Context Sequence	
123	0045	0010	LO	Private Creator	GEMS_SENO_02

	A	B	C	D	E	F	G	H	I
1	Hologic Imaging Biomakers								
2	病歷號：97[redacted]5 姓名：GAU^[redacted]^MEI 檢查號：L012554890101 檢查日：20131216 091904								
3									
4	Position	RCC	RMLO	LCC	LMLO				
5	Organ Dose(dGy)	0.01491	0.01515	0.01513	0.01259				
6									

CT Dose Report

Snap-Shoot Image



DICOM SR Output

```
X-Ray Radiation Dose Report
    Procedure reported - Computed Tomography X-Ray
        Has Intent - Diagnostic Intent
    Observer Type - Device
    Device Observer UIDDevice Observer Name - CTAWP73263
    Device Observer Manufacturer - SIEMENS
    Device Observer Model Name - SOMATOM Definition Flash
    Device Observer Serial Number - 73263
    Device Observer Physical Location during observation - Ser.:73263
    Start of X-Ray IrradiationEnd of X-Ray IrradiationScope of Accumulation - Study
        Study Instance UIDCT Accumulated Dose Data
        Total Number of Irradiation Events - 2 events
        CT Dose Length Product Total - 1074.74 mGycm
    CT Acquisition
        Acquisition Protocol - Topogram
        Target Region - Head
        CT Acquisition Type - Constant Angle Acquisition
        Procedure Context - CT without contrast
        Irradiation Event UIDCT Acquisition Parameters
            Exposure Time - 2.72 s
            Scanning Length - 256 mm
            Nominal Single Collimation Width - 0.6 mm
            Nominal Total Collimation Width - 3.6 mm
            Number of X-Ray Sources - 1 X-Ray sources
            CT X-Ray Source Parameters
                Identification of the X-Ray Source - A
                KVP - 80 kV
                Maximum X-Ray Tube Current - 50 mA
                X-Ray Tube Current - 50 mA
        CT Dose
            Mean CTDIvol - 0.06 mGy
            CTDIw Phantom Type - IEC Body Dosimetry Phantom
            DLP - 1.5 mGycm
        Comment - Internal technical scan parameters: Organ Characteristic - Head, Body Size - Adult, Body Region - Body, X-ray Modulation Type - OFF
        Device Role in Procedure - Irradiating Device
            Device Manufacturer - SIEMENS
            Device Model Name - SOMATOM Definition Flash
            Device Serial Number - 73263
    CT Acquisition
        Acquisition Protocol - Head
        Target Region - Head
        CT Acquisition Type - Spiral Acquisition
        Procedure Context - CT without contrast
        Irradiation Event UIDCT Acquisition Parameters
            Exposure Time - 9.53 s
            Scanning Length - 201 mm
            Nominal Single Collimation Width - 0.6 mm
            Nominal Total Collimation Width - 38.4 mm
            Pitch Factor - 0.55 ratio
            Number of X-Ray Sources - 1 X-Ray sources
            CT X-Ray Source Parameters
                Identification of the X-Ray Source - A
                KVP - 120 kV
                Maximum X-Ray Tube Current - 276 mA
                X-Ray Tube Current - 214 mA
                Exposure Time per Rotation - 1 s
        CT Dose
            Mean CTDIvol - 59.48 mGy
            CTDIw Phantom Type - IEC Head Dosimetry Phantom
            DLP - 1073.24 mGycm
        Comment - Internal technical scan parameters: Organ Characteristic - Head, Body Size - Adult, Body Region - Head, X-ray Modulation Type - X_CARE_EC
        Device Role in Procedure - Irradiating Device
            Device Manufacturer - SIEMENS
            Device Model Name - SOMATOM Definition Flash
            Device Serial Number - 73263
    Source of Dose Information - Automated Data Collection
```

DX Area/Entrance Dose

	Tag	Attribute Name	Def VR	VM	Values
	(0018,1050)	Spatial Resolution	DS	1	0.140
	(0018,1110)	Distance Source to Detector	DS	1	1800
	(0018,1111)	Distance Source to Patient	DS	1	1755
	(0018,1147)	Field of View Shape	CS	1	RECTANGLE
	(0018,1149)	Field of View Dimension(s)	IS	2	425\426
	(0018,1150)	Exposure Time	IS	1	18
	(0018,1151)	X-ray Tube Current	IS	1	200
	(0018,1152)	Exposure	IS	1	4
	(0018,1153)	Exposure in ｵAs	IS	1	3600
	(0018,115e)	Image and Fluoroscopy Area Dose Product	DS	1	1.18
	(0018,1160)	Filter Type	SH	1	0.1MM CU
	(0018,1164)	Imager Pixel Spacing	DS	2	0.14000\0.14000
	(0018,1166)	Grid	CS	1	FOCUSED
	(0018,1190)	Focal Spot(s)	DS	1	1.200
	(0018,1200)	Date of Last Calibration	DA	1	20170109
	(0018,1201)	Time of Last Calibration	TM	1	163614
	(0018,1400)	Acquisition Device Processing Description	LO	1	CHEST\CHEST PA\Custom_20170125
	(0018,1405)	Relative X-ray Exposure	IS	1	88
	(0018,1411)	Undefined	DS	1	264
	(0018,1412)	Undefined	DS	1	293.000
	(0018,1413)	Undefined	DS	1	-.454
	(0018,1508)	Positioner Type	CS	1	NONE
	(0018,1510)	Positioner Primary Angle	DS	1	0.0
	(0018,1511)	Positioner Secondary Angle	DS	1	0.0
	(0018,5100)	Patient Position	CS	0	
	(0018,5101)	View Position	CS	0	
	(0018,7004)	Detector Type	CS	1	SCINTILLATOR
	(0018,7005)	Detector Configuration	CS	1	AREA
	(0018,7006)	Detector Description	LT	1	Uarm
	(0018,700a)	Detector ID	SH	1	KR14MI9002026ADW

	Tag	Attribute Name	Def VR	VM	Values
	(0033,1011)	: private mapped to (0033,FE11)	LT	1	12 5 0 30 30 0 60 60 0 80 80 0
	(0033,1020)	: private mapped to (0033,FE20)	SH	1	263.94
	(0033,1021)	: private mapped to (0033,FE21)	LT	1	1, 7, 1800, 0, 0, 0, 3040, 0, 3040, 3024, 16, 3024, 16, 0, 0, 0
	(0033,1022)	: private mapped to (0033,FE22)	LT	1	<ExtraInfo> <Receptor>3</Receptor> <ReceptorRotation>0</ReceptorRotation> <OriginalReceptorRotation>0</Original...
	(0033,1023)	: private mapped to (0033,FE23)	LT	1	<ShutterOverlay> <Left>0</Left> <Top>0</Top> <Width>3040</Width> <Height>3036</Height> <IsCircle>false</IsC...
	(0033,1031)	: private mapped to (0033,FE31)	LO	1	DETECTOR S/N:KR14MI9002026ADWCYHBG0003
	(0040,0244)	Performed Procedure Step Start Date	DA	1	20170714
	(0040,0245)	Performed Procedure Step Start Time	TM	1	095740
	(0040,0253)	Performed Procedure Step ID	SH	1	9719876
	(0040,0254)	Performed Procedure Step Description	LO	1	CHEST (PA)
	(0040,0275)	Request Attributes Sequence	SQ	1	
	>BEGIN ITEM 1				
	>(0040,1001)	Requested Procedure ID	SH	1	K395754650201
	>END ITEM 1				
	(0040,0302)	Entrance Dose	US	1	0
	(0040,0555)	Acquisition Context Sequence	SQ	1	
	(0040,2017)	Filler Order Number / Imaging Service Request	LO	1	49335655
	(0040,8302)	Entrance Dose in mGy	DS	1	0.09
	(0088,0200)	Icon Image Sequence	SQ	1	
	>BEGIN ITEM 1				
	>(0028,0002)	Samples per Pixel	US	1	1
	>(0028,0004)	Photometric Interpretation	CS	1	MONOCHROME2
	>(0028,0010)	Rows	US	1	128
	>(0028,0011)	Columns	US	1	128
	>(0028,0100)	Bits Allocated	US	1	8
	>(0028,0101)	Bits Stored	US	1	8
	>(0028,0102)	High Bit	US	1	7
	>(0028,0103)	Pixel Representation	US	1	0
	>(7fe0,0010)	Pixel Data	OW	1	C:\Program Files (x86)\DVTk\DICOM Editor\Results\W08L0002.pix
	>END ITEM 1				
	(0903,0010)	: private mapped to (0903,00FD)	LO	1	GEIIS PACS

Fluoroscopy Dose

SR-A201711081231460_Clarity FD20C-201711081231460_65534.txt - 記事本

檔案(F) 編輯(E) 格式(O) 檢視(V) 說明(H)

X-Ray Radiation Dose Report
Procedure reported = Projection X-Ray
Has Intent = Combined Diagnostic and Therapeutic Procedure
Observer Type = Device
Device Observer UIDDevice Observer Name = Clarity FD20C
Device Observer Manufacturer = Philips Medical Systems
Device Observer Model Name = Allura Xper
Device Observer Serial Number = 1
Scope of Accumulation = Performed Procedure Step
Performed Procedure Step SOP Instance UIDAccumulated X-Ray Dose Data
Acquisition Plane = Single Plane
Reference Point Definition = 15cm below BeamIsocenter
Dose Area Product Total = 0.000190300000000 Gy.m2
Dose (RP) Total = 0.00538005190491 Gy
Fluoro Dose Area Product Total = 3E-07 Gy.m2
Fluoro Dose (RP) Total = 9.2052969885E-06 Gy
Total Fluoro Time = 2 s
Acquisition Dose Area Product Total = 0.00019 Gy.m2
Acquisition Dose (RP) Total = 0.00537084660792 Gy
Total Acquisition Time = 85.74 s
Total Number of Radiographic Frames = 220 no units
Height of System = 1065 mm
Focal Spot to ISO Center = 810 mm
Irradiation Event X-Ray Data
Acquisition Plane = Single Plane
DateTime StartedIrradiation Event Type = Fluoroscopy

Bi-Plane Dose

SR-1111_00806796_0990.txt - 記事本

檔案(F) 編輯(E) 格式(O) 檢視(V) 說明(H)

X-Ray Radiation Dose Report
Procedure reported = Projection X-Ray
Has Intent = Combined Diagnostic and Therapeutic Procedure
Observer Type = Device
Device Observer UIDDevice Observer Name = AXIS05222
Device Observer Manufacturer = Siemens
Device Observer Model Name = AXIOM-Artis
Device Observer Serial Number = 153310
Scope of Accumulation = Study
Study Instance UIDAccumulated X-Ray Dose Data
Acquisition Plane = Plane A
Calibration
Dose Measurement Device = Dosimeter
Calibration DateCalibration Factor = 1 no units
Calibration Uncertainty = 5 Percent
Calibration Responsible Party = siemens
Dose Area Product Total = 0.00427409 Gym2
Dose (RP) Total = 0.7268 Gy
Fluoro Dose Area Product Total = 0.0012005 Gym2
Fluoro Dose (RP) Total = 0.20549 Gy
Total Fluoro Time = 141 s
Acquisition Dose Area Product Total = 0.00307359 Gym2
Acquisition Dose (RP) Total = 0.52131 Gy
Total Acquisition Time = 48 s
Reference Point Definition = 15cm from Isocenter toward Source
Accumulated X-Ray Dose Data
Acquisition Plane = Plane B
Calibration
Dose Measurement Device = Dosimeter
Calibration DateCalibration Factor = 1 no units
Calibration Uncertainty = 5 Percent
Calibration Responsible Party = Siemens
Dose Area Product Total = 0.00506859 Gym2
Dose (RP) Total = 0.84664 Gy
Fluoro Dose Area Product Total = 0.00042013 Gym2
Fluoro Dose (RP) Total = 0.07247 Gy
Total Fluoro Time = 31 s
Acquisition Dose Area Product Total = 0.00464846 Gym2
Acquisition Dose (RP) Total = 0.77417 Gy
Total Acquisition Time = 41 s
Reference Point Definition = 15cm from Isocenter toward Source

DICOM SR for CAD

Mammography CAD results “BI-RADS® - like” recommendations

Mammography CAD SR

- DICOM SR Report Export

	12/31/2013						
	Total	R	L	RCC	RMLO	LCC	LMLO
Quantra	V2.0						
Vfg (cm3)	78	45	33	21	45	18	33
Vb (cm3)	1558	780	778	509	780	501	778
Vbd (%)	5	6	4	4	6	4	4
Abd (%)	0	0	0	0	1	0	0
Vbd-score	-1.32	-1.32	-1.68	-1.6	-1.03	-1.84	-1.53
Vfg-score	-0.93	-0.93	-1.16	-1.32	-0.53	-1.48	-0.85
Q_abd	1	1	1	1	2	1	1
q_abd	1.44	1.44	1.23	1.27	1.62	1.15	1.31

HOLOGIC®

No.	Group	El...	VR	Description	Value
834	0008	0100	SH	Code Value	R2cn018
835	0008	0102	SH	Coding Scheme Designator	99R2TECH
836	0008	0103	SH	Coding Scheme Version	1.0
837	0008	0104	LO	Code Meaning	Vfg:Volume of fibroglandular t...
838	0040	A300	SQ	Measured Value Sequence	+ Sequence +
839	0040	08EA	SQ	Measurement Units Code Sequence	+ Sequence +
840	0008	0100	SH	Code Value	cm3
841	0008	0102	SH	Coding Scheme Designator	UCUM
842	0008	0103	SH	Coding Scheme Version	1.4
843	0008	0104	LO	Code Meaning	Cubic centimeter
844	0040	A30A	DS	Numeric Value	78
845	0040	A730	SQ	Content Sequence	+ Sequence +
846	0040	A010	CS	Relationship Type	HAS CONCEPT MOD
847	0040	A040	CS	Value Type	CODE
848	0040	A043	SQ	Concept Name Code Sequence	+ Sequence +
849	0008	0100	SH	Code Value	G-C171
850	0008	0102	SH	Coding Scheme Designator	SRT
851	0008	0104	LO	Code Meaning	Laterality
852	0040	A168	SQ	Concept Code Sequence	+ Sequence +
853	0008	0100	SH	Code Value	T-04080
854	0008	0102	SH	Coding Scheme Designator	SRT
855	0008	0104	LO	Code Meaning	Both breasts
856	0040	A010	CS	Relationship Type	HAS CONCEPT MOD
857	0040	A040	CS	Value Type	CODE
858	0040	A043	SQ	Concept Name Code Sequence	+ Sequence +
859	0008	0100	SH	Code Value	121401
860	0008	0102	SH	Coding Scheme Designator	DCM
861	0008	0104	LO	Code Meaning	Derivation
862	0040	A168	SQ	Concept Code Sequence	+ Sequence +
863	0008	0100	SH	Code Value	112187
864	0008	0102	SH	Coding Scheme Designator	DCM
865	0008	0104	LO	Code Meaning	Unspecified method of calcul...
866	0040	A010	CS	Relationship Type	HAS PROPERTIES
867	0040	A040	CS	Value Type	NUM
868	0040	A043	SQ	Concept Name Code Sequence	+ Sequence +
869	0008	0100	SH	Code Value	R2cn019
870	0008	0102	SH	Coding Scheme Designator	99R2TECH
871	0008	0103	SH	Coding Scheme Version	1.0
872	0008	0104	LO	Code Meaning	Vb:Volume of breast
873	0040	A300	SQ	Measured Value Sequence	+ Sequence +
874	0040	08EA	SQ	Measurement Units Code Sequence	+ Sequence +
875	0008	0100	SH	Code Value	cm3
876	0008	0102	SH	Coding Scheme Designator	UCUM
877	0008	0103	SH	Coding Scheme Version	1.4

	A	B	C	D	E	F	G	H	I
1	Hologic Imaging Biomakers								
2	病歷號：10[redacted] 姓名：WU[redacted]HUA 檢查號：K34[redacted]101 檢查日：20131231 152049								
3									
4	Per Subject	Total							
5	Quantra								
6	Vfg(cm3)	78							
7	Vb(cm3)	1558							
8	Vbd(%)	5							
9	Vfg-score	-0.93							
10	Vbd-score	-1.32							
11	Abd(%)	0							
12	q_abd	1.44							
13	Q_abd	1							
14									
15	Per Image	RCC	RMLO	LCC	LMLO				
16	Quantra								
17	Vfg(cm3)	21	45	18	33				
18	Vb(cm3)	509	780	501	778				
19	Vbd(%)	4	6	4	4				
20	Vfg-score	-1.32	-0.53	-1.48	-0.85				
21	Vbd-score	-1.6	-1.03	-1.84	-1.53				
22	Abd(%)	0	1	0	0				
23	q_abd	1.27	1.62	1.15	1.31				
24	Q_abd	1	2	1	1				
25									
26	Per Breast	R	L						
27	Quantra								
28	Vfg(cm3)	45	33						
29	Vb(cm3)	780	778						
30	Vbd(%)	6	4						
31	Vfg-score	-0.93	-1.16						
32	Vbd-score	-1.32	-1.68						
33	Abd(%)	0	0						
34	q_abd	1.44	1.23						
35	Q_abd	1	1						

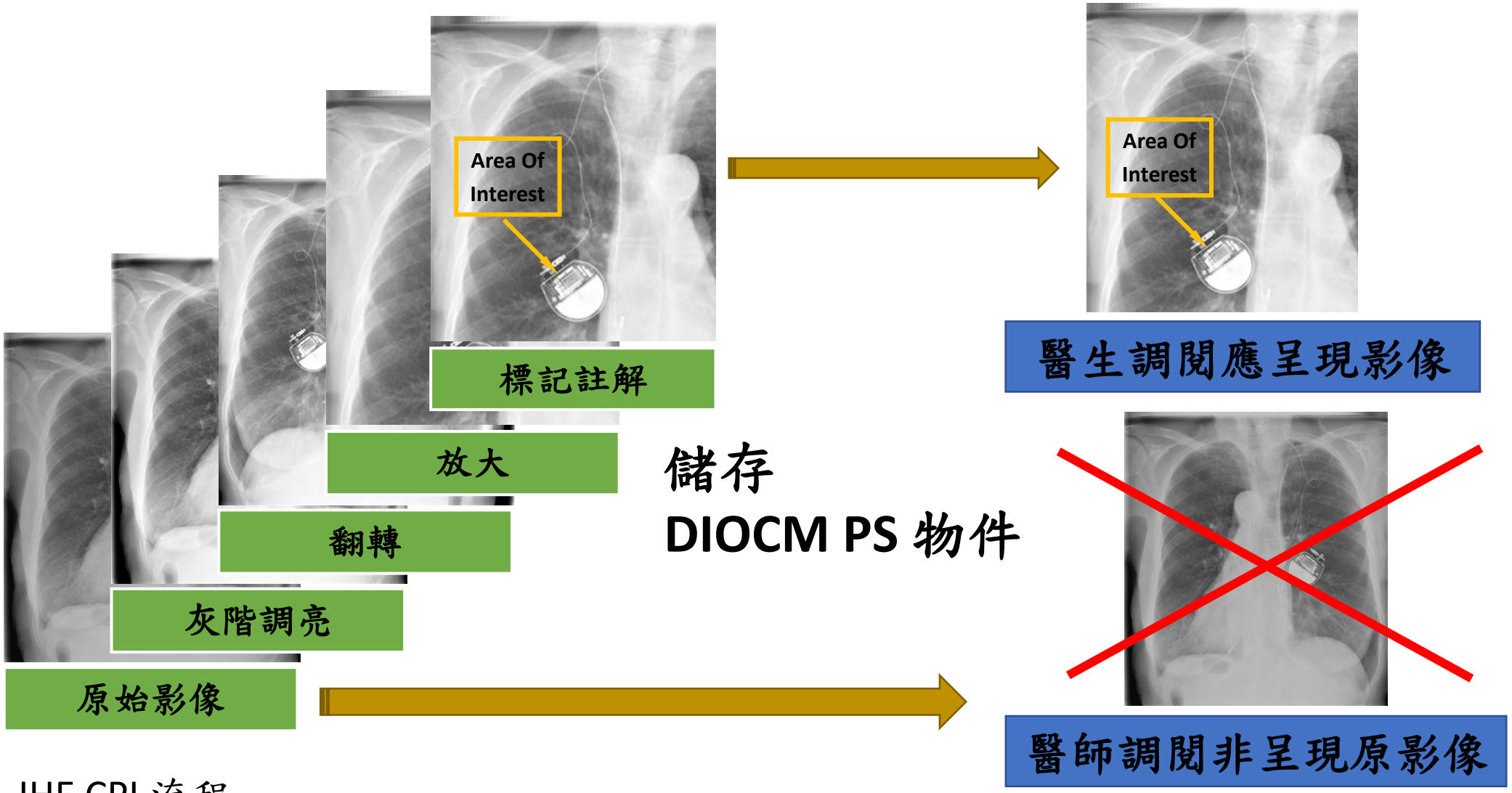
DICOM PS/SR for measurement

DICOM PS (presentation States)

規範探討 – IHE CPI 一致性醫學影像呈現要求

- **IHE Radiology Technical Framework, Volume 1: Integration Profiles**
  - CPI (Consistent Presentation of Images)
    一致性灰階影像呈現之要求
- **在不同系統下影像調整結果可一致呈現**
  - 可將每次影像調整結果儲存，下次可還原調整後結果
  - 或將原始影像與調整結果傳送至另一系統，亦可一致呈現調整後之影像

規範探討 – IHE CPI 一致性醫學影像呈現要求



IHE CPI 流程

規範探討 – DICOM PS標記註解物件規範內容

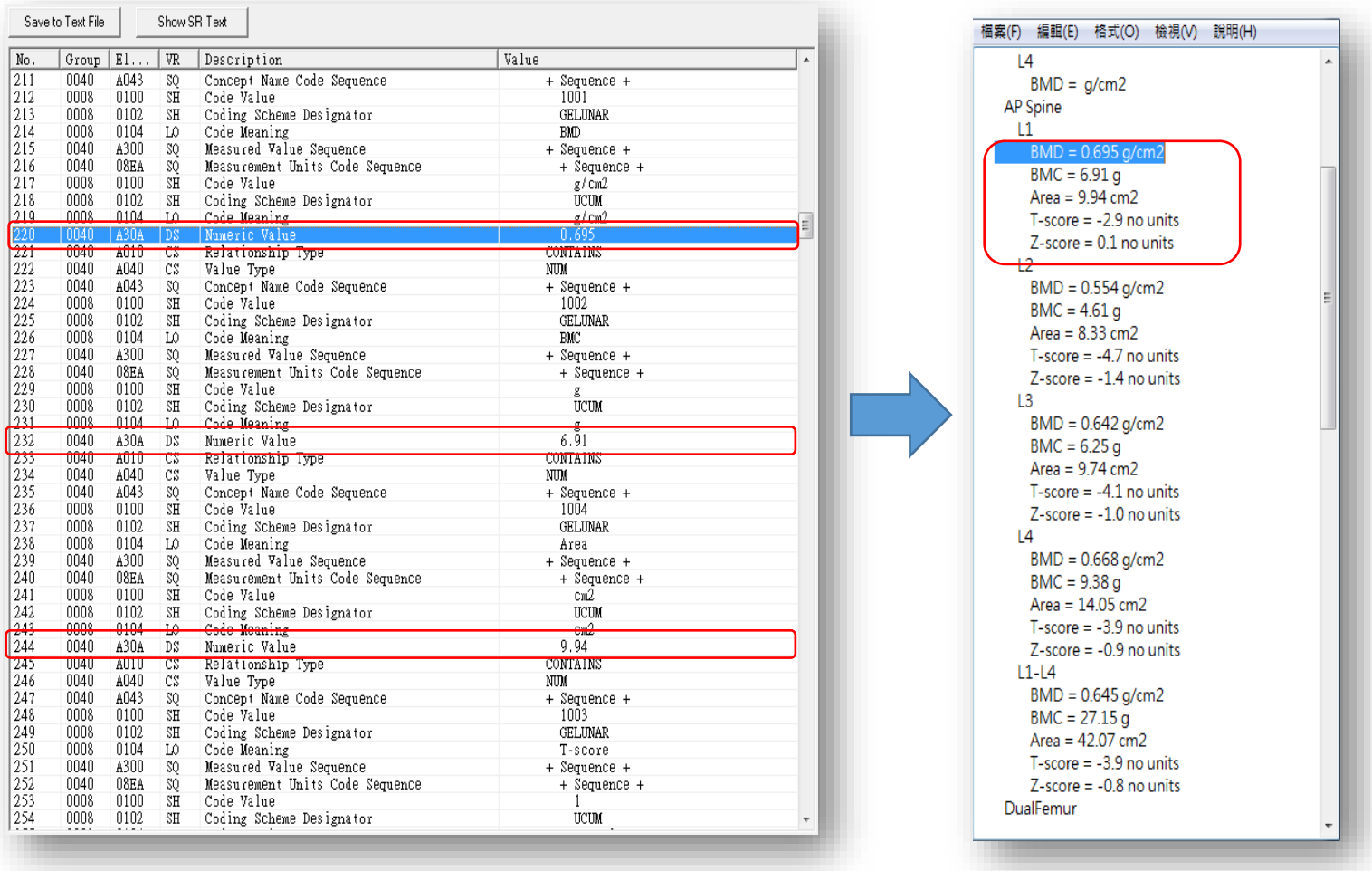
- **依據上述IHE CPI呈現一致性需求，標記註解資訊以DICOM PS(Presentation states)物件儲存**

- **DICOM Part 3 Softcopy Presentation State Information Object Definitions**
  - http://dicom.nema.org/medical/dicom/current/output/chtml/part03/sect_A.33.html#sect_A.33.1
- **規範中C.10.5 Graphic Annotation Module 定義**
  - 圖形註解(Graphic annotation)
    - 點(Point)、折線(Polyline)、內插值曲線(Interpolated)、
    - 圓形(Circle)、橢圓形(Ellipse)
  - 文字註解(Text annotation)
    - 文字粗體、斜體、位置類型
- **定義圖型標記類型、標記方式、文字註解位置**

BMD “Reports”
WHO recommendations

BMD SR

- DICOM SR Report Export

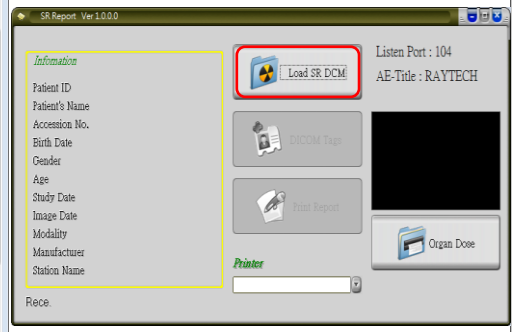


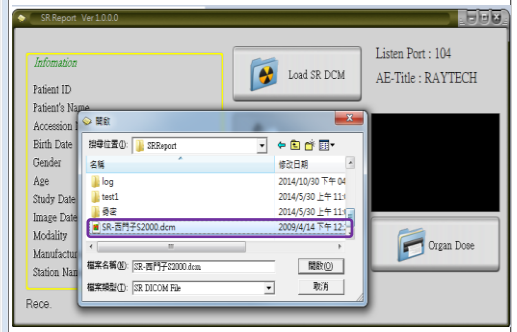
Ultrasound “Reports”

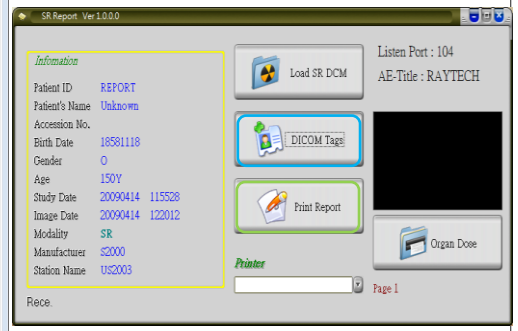
SR-_REPORT_0001.txt - 記事本

檔案(F) 編輯(E) 格式(O) 檢視(V) 說明(H)

Laterality = Left
End Diastole: ICA/CCA = -0.69 no units
Common Carotid Artery
Topographical Modifier = Distal
Doppler Angle Correction = 60 degree of angle
End Diastolic Velocity = 17.6 centimeter per second
Peak Systolic Velocity = 47 centimeter per second
Resistivity Index = 0.63 no units
Systolic to Diastolic Velocity Ratio = 2.67 no units
Internal Carotid Artery
Topographical Modifier = Distal
Doppler Angle Correction = 60 degree of angle
End Diastolic Velocity = -17.6 centimeter per second
Peak Systolic Velocity = -44.4 centimeter per second
Resistivity Index = 0.6 no units
Systolic to Diastolic Velocity Ratio = 2.52 no units
Common Carotid Artery
Topographical Modifier = Mid-longitudinal
Doppler Angle Correction = 60 degree of angle
End Diastolic Velocity = 15.7 centimeter per second
Peak Systolic Velocity = 66.6 centimeter per second
Resistivity Index = 0.76 no units
Systolic to Diastolic Velocity Ratio = 4.24 no units
External Carotid Artery
Topographical Modifier = Mid-longitudinal
Doppler Angle Correction = 60 degree of angle
End Diastolic Velocity = -11.1 centimeter per second
Peak Systolic Velocity = -43.7 centimeter per second
Resistivity Index = 0.75 no units
Systolic to Diastolic Velocity Ratio = 3.94 no units
Internal Carotid Artery
Topographical Modifier = Mid-longitudinal
Doppler Angle Correction = 60 degree of angle
End Diastolic Velocity = -29.4 centimeter per second
Peak Systolic Velocity = -58.7 centimeter per second
Resistivity Index = 0.5 no units
Systolic to Diastolic Velocity Ratio = 2 no units
Vertebral Artery
Topographical Modifier = Mid-longitudinal
Doppler Angle Correction = 60 degree of angle
End Diastolic Velocity = -18.9 centimeter per second
Peak Systolic Velocity = -59.4 centimeter per second
Resistivity Index = 0.68 no units
Systolic to Diastolic Velocity Ratio = 3.14 no units
Volume Flow = 0.007 liters per minute







XXXX醫院

神經內科腦血管超音波(Vascular Ultrasound)報告單

姓　名：Unknown		性別：O	檢查日期：2009/4/14	Duplex No：	
病歷號：REPORT		生日：1858/11/18	報告醫師：	CD 編號：	
		年齡：150Y	開單醫師：	檢查來源：	

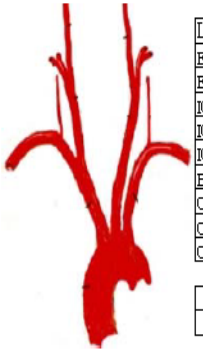
CLINICAL DIAGNOIS：Acute CVA
Hypertension(−), Diabetes(+), Hyperlipidemia(+), Heart disease(−)
Smoking (+), Alcohol (+) , Arrhythmia (+)
CT: Right MCA large-scaled infarction

Carotid Color Duplex

Rt.	P/E
Ophthalmic	/

Lt.	P/E
Ophthalmic	/

Rt.	Diam	P/E	RI	Flow
ECA2		95 / 24	0.75	
ECA1		59 / 15	0.75	
ICA3		93 / 49	0.47	
ICA2		65 / 37	0.43	
ICA1		45 / 24	0.47	
BIF		/		
CCA3		79 / 32	0.59	
CCA2		85 / 32	0.63	
CCA1		89 / 26	0.70	



Lt.	Diam	P/E	RI	Flow
ECA2		44 / 11	0.75	
ECA1		60 / 16	0.74	
ICA3		44 / 18	0.60	
ICA2		59 / 29	0.50	
ICA1		78 / 19	0.76	
BIF		/		
CCA3		47 / 18	0.63	
CCA2		67 / 16	0.76	
CCA1		80 / 27	0.66	

Rt.	P/E
Subclavian	57 / 7

Lt.	P/E
Subclavian	77 / 18

Rt.	Diam	P/E	RI	Flow
VA2	0.27	47 / 20	0.58	60
VA1	0.34	61 / 17	0.72	104

Lt.	Diam	P/E	RI	Flow
VA2	0.18	59 / 19	0.68	7
VA1	0.23	58 / 18	0.70	33

FINDING：
1.Color Duplex：
- Moderate wall thickening and increased intima-media thickness at proximal and distal portion of bilateral CCA.
- Long and short segments of faintly to moderately echogenic, partly calcified homogeneous plaques with smooth surface at right CCA, bilateral bulb and ECA, causing prominent turbulence pattern.
- Dampened diastolic signals at bilateral CCA and ECA arteries with small caliber and short diastolic flow reflux indicate high grade distal stenosis, possibly in the intracranial portion.
- The flow in the vertebral system (R+L = 155ml/min) is within average value. (reference 150-250 ml/min)
- The right vertebral study shows transient reversed flow which are compatible with subclavian steel phenomenon.
- Cardiac arrhythmia is noted.

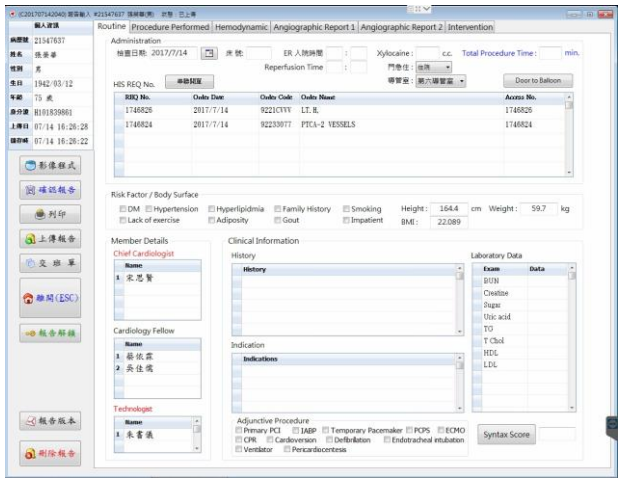
2.Ophthalmic arteries：
- Normal velocity and direction.

Clinical Data Registry

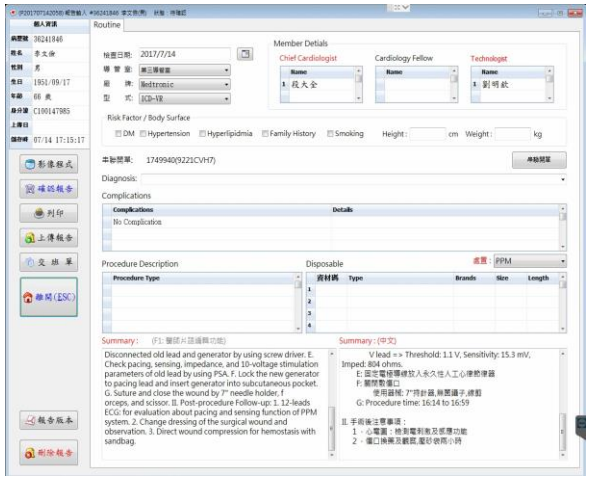
Cathlab “Reports”

各式報告格式

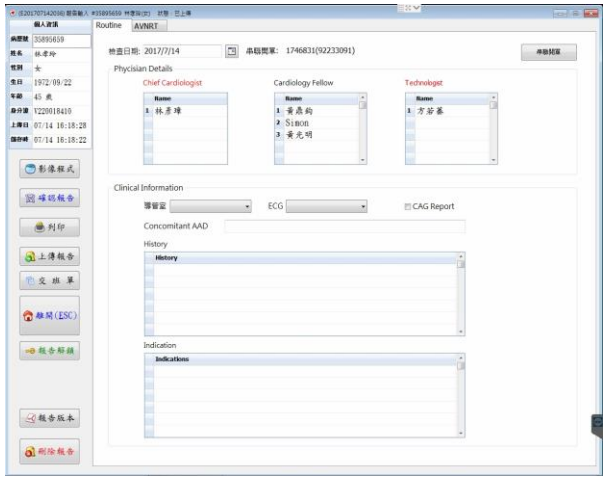
PCI



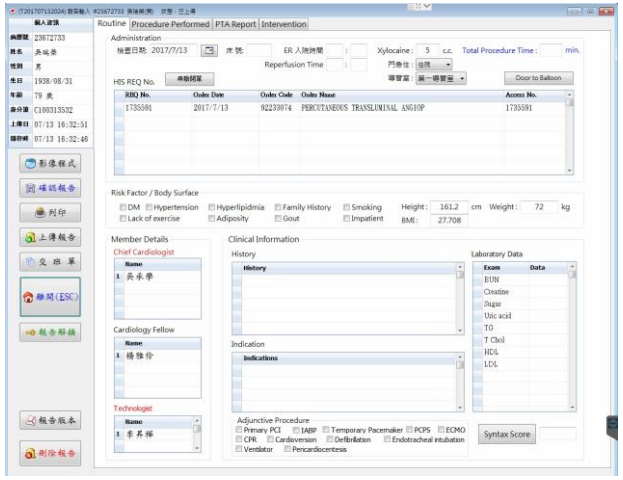
Pacemaker



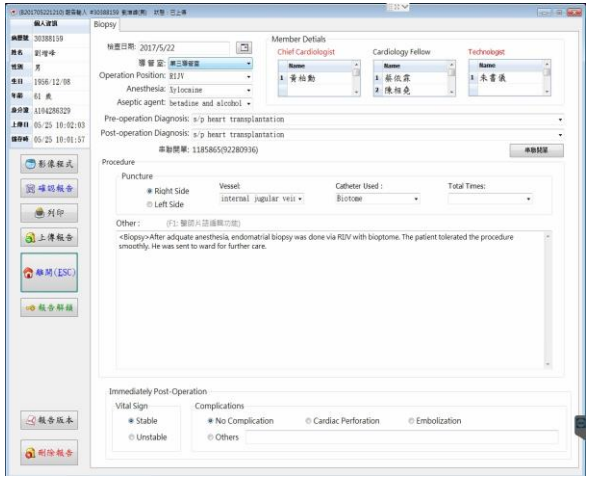
EP



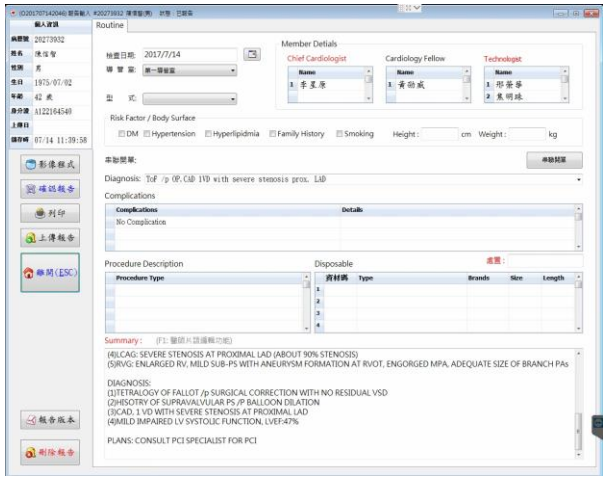
PTA



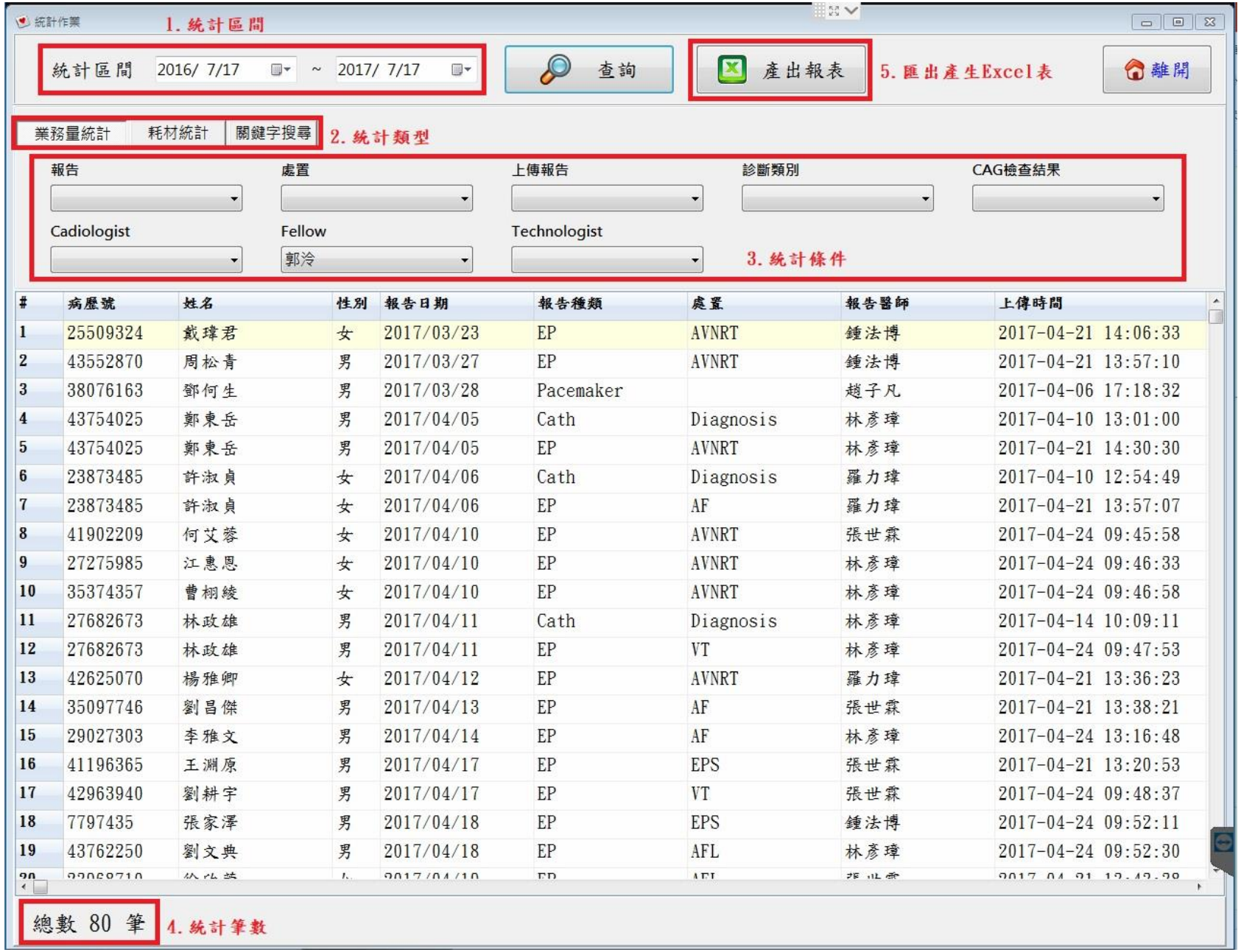
Biopsy



Other

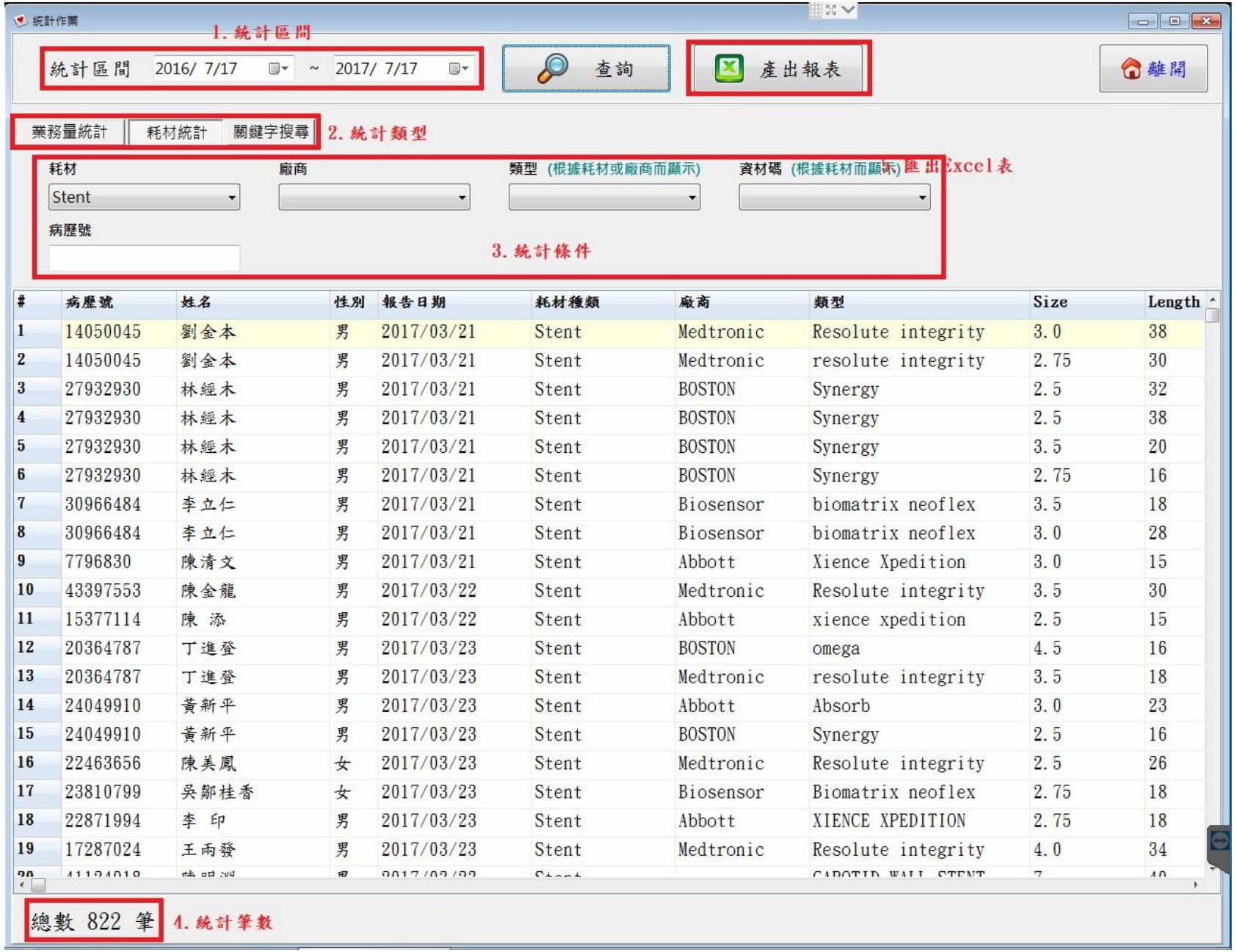


統計-業務量統計



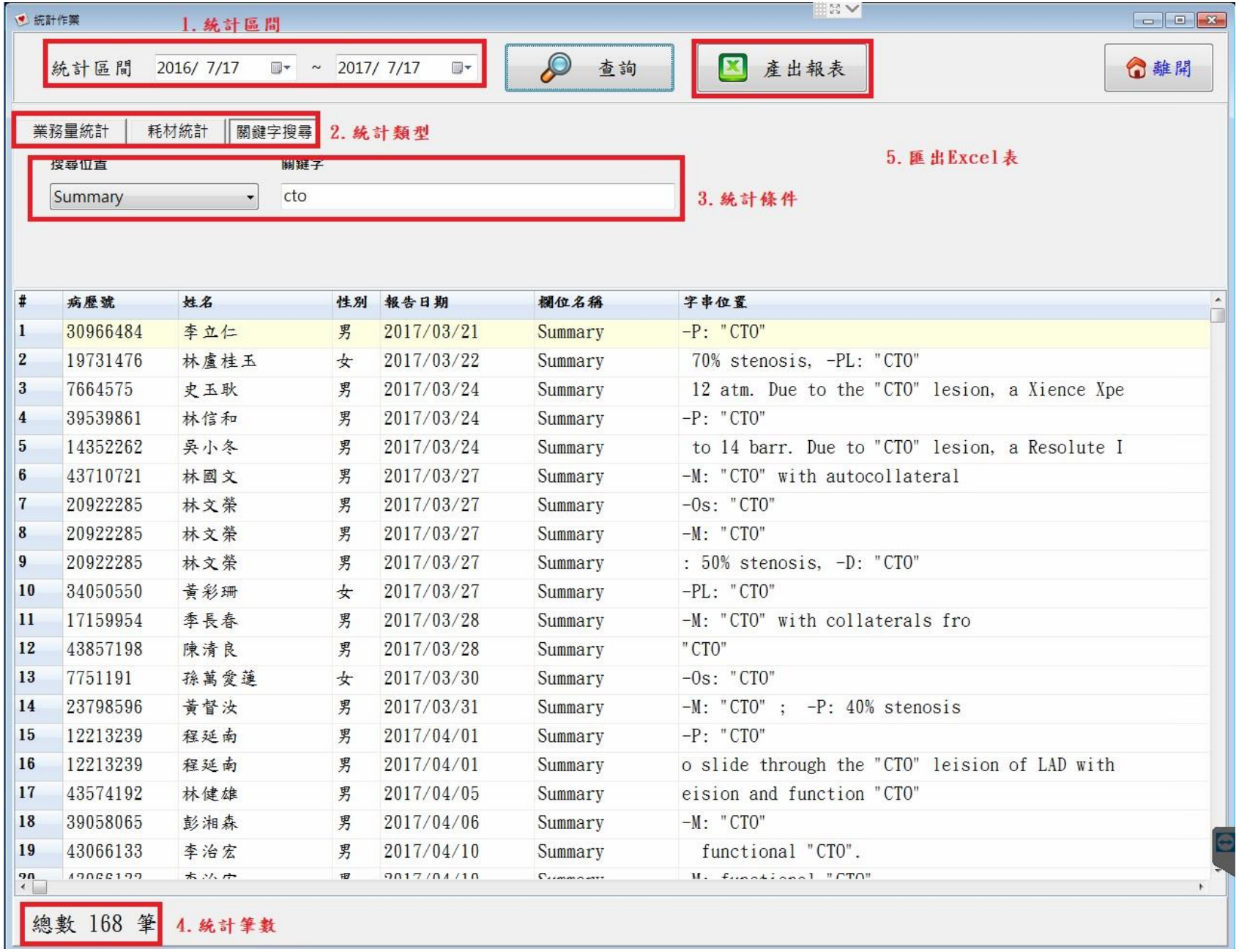
#	病歷號	姓名	性別	報告日期	報告種類	處置	報告醫師	上傳時間
1	25509324	戴瑋君	女	2017/03/23	EP	AVNRT	鍾法博	2017-04-21 14:06:33
2	43552870	周松青	男	2017/03/27	EP	AVNRT	鍾法博	2017-04-21 13:57:10
3	38076163	鄧何生	男	2017/03/28	Pacemaker		趙子凡	2017-04-06 17:18:32
4	43754025	鄭東岳	男	2017/04/05	Cath	Diagnosis	林彥璋	2017-04-10 13:01:00
5	43754025	鄭東岳	男	2017/04/05	EP	AVNRT	林彥璋	2017-04-21 14:30:30
6	23873485	許淑貞	女	2017/04/06	Cath	Diagnosis	羅力瑋	2017-04-10 12:54:49
7	23873485	許淑貞	女	2017/04/06	EP	AF	羅力瑋	2017-04-21 13:57:07
8	41902209	何艾蓉	女	2017/04/10	EP	AVNRT	張世霖	2017-04-24 09:45:58
9	27275985	江惠恩	女	2017/04/10	EP	AVNRT	林彥璋	2017-04-24 09:46:33
10	35374357	曹栩綾	女	2017/04/10	EP	AVNRT	林彥璋	2017-04-24 09:46:58
11	27682673	林政雄	男	2017/04/11	Cath	Diagnosis	林彥璋	2017-04-14 10:09:11
12	27682673	林政雄	男	2017/04/11	EP	VT	林彥璋	2017-04-24 09:47:53
13	42625070	楊雅卿	女	2017/04/12	EP	AVNRT	羅力瑋	2017-04-21 13:36:23
14	35097746	劉昌傑	男	2017/04/13	EP	AF	張世霖	2017-04-21 13:38:21
15	29027303	李雅文	男	2017/04/14	EP	AF	林彥璋	2017-04-24 13:16:48
16	41196365	王淵原	男	2017/04/17	EP	EPS	張世霖	2017-04-21 13:20:53
17	42963940	劉耕宇	男	2017/04/17	EP	VT	張世霖	2017-04-24 09:48:37
18	7797435	張家澤	男	2017/04/18	EP	EPS	鍾法博	2017-04-24 09:52:11
19	43762250	劉文典	男	2017/04/18	EP	AFL	林彥璋	2017-04-24 09:52:30

統計-耗材統計



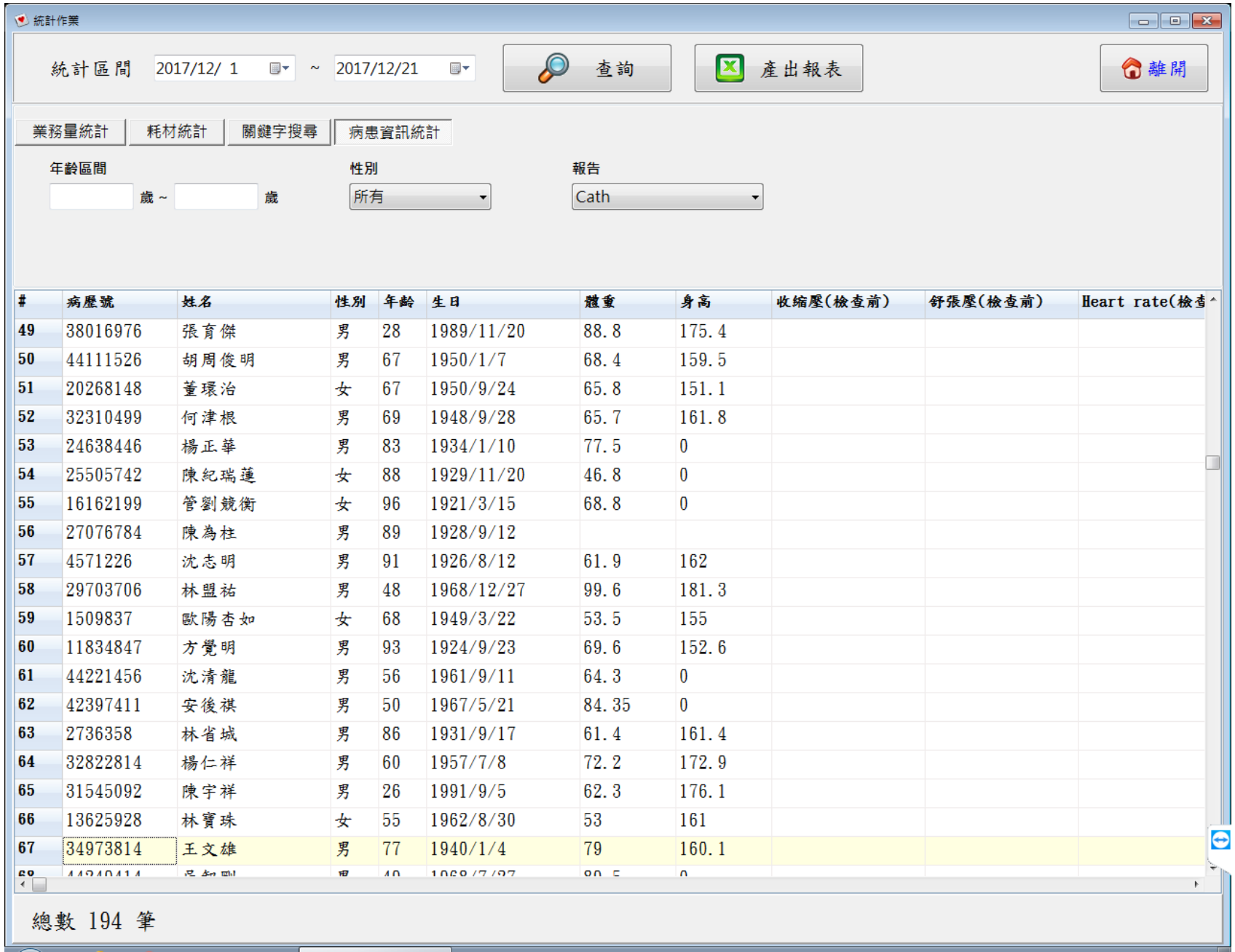
#	病歷號	姓名	性別	報告日期	耗材種類	廠商	類型	Size	Length
1	14050045	劉金本	男	2017/03/21	Stent	Medtronic	Resolute integrity	3.0	38
2	14050045	劉金本	男	2017/03/21	Stent	Medtronic	resolute integrity	2.75	30
3	27932930	林經木	男	2017/03/21	Stent	BOSTON	Synergy	2.5	32
4	27932930	林經木	男	2017/03/21	Stent	BOSTON	Synergy	2.5	38
5	27932930	林經木	男	2017/03/21	Stent	BOSTON	Synergy	3.5	20
6	27932930	林經木	男	2017/03/21	Stent	BOSTON	Synergy	2.75	16
7	30966484	李立仁	男	2017/03/21	Stent	Biosensor	biomatrix neoflex	3.5	18
8	30966484	李立仁	男	2017/03/21	Stent	Biosensor	biomatrix neoflex	3.0	28
9	7796830	陳清文	男	2017/03/21	Stent	Abbott	Xience Xpedition	3.0	15
10	43397553	陳金龍	男	2017/03/22	Stent	Medtronic	Resolute integrity	3.5	30
11	15377114	陳 添	男	2017/03/22	Stent	Abbott	xience xpedition	2.5	15
12	20364787	丁進登	男	2017/03/23	Stent	BOSTON	omega	4.5	16
13	20364787	丁進登	男	2017/03/23	Stent	Medtronic	resolute integrity	3.5	18
14	24049910	黃新平	男	2017/03/23	Stent	Abbott	Absorb	3.0	23
15	24049910	黃新平	男	2017/03/23	Stent	BOSTON	Synergy	2.5	16
16	22463656	陳美鳳	女	2017/03/23	Stent	Medtronic	Resolute integrity	2.5	26
17	23810799	吳鄒桂香	女	2017/03/23	Stent	Biosensor	Biomatrix neoflex	2.75	18
18	22871994	李 印	男	2017/03/23	Stent	Abbott	XIENCE XPEDITION	2.75	18
19	17287024	王雨發	男	2017/03/23	Stent	Medtronic	Resolute integrity	4.0	34

統計-關鍵字搜尋



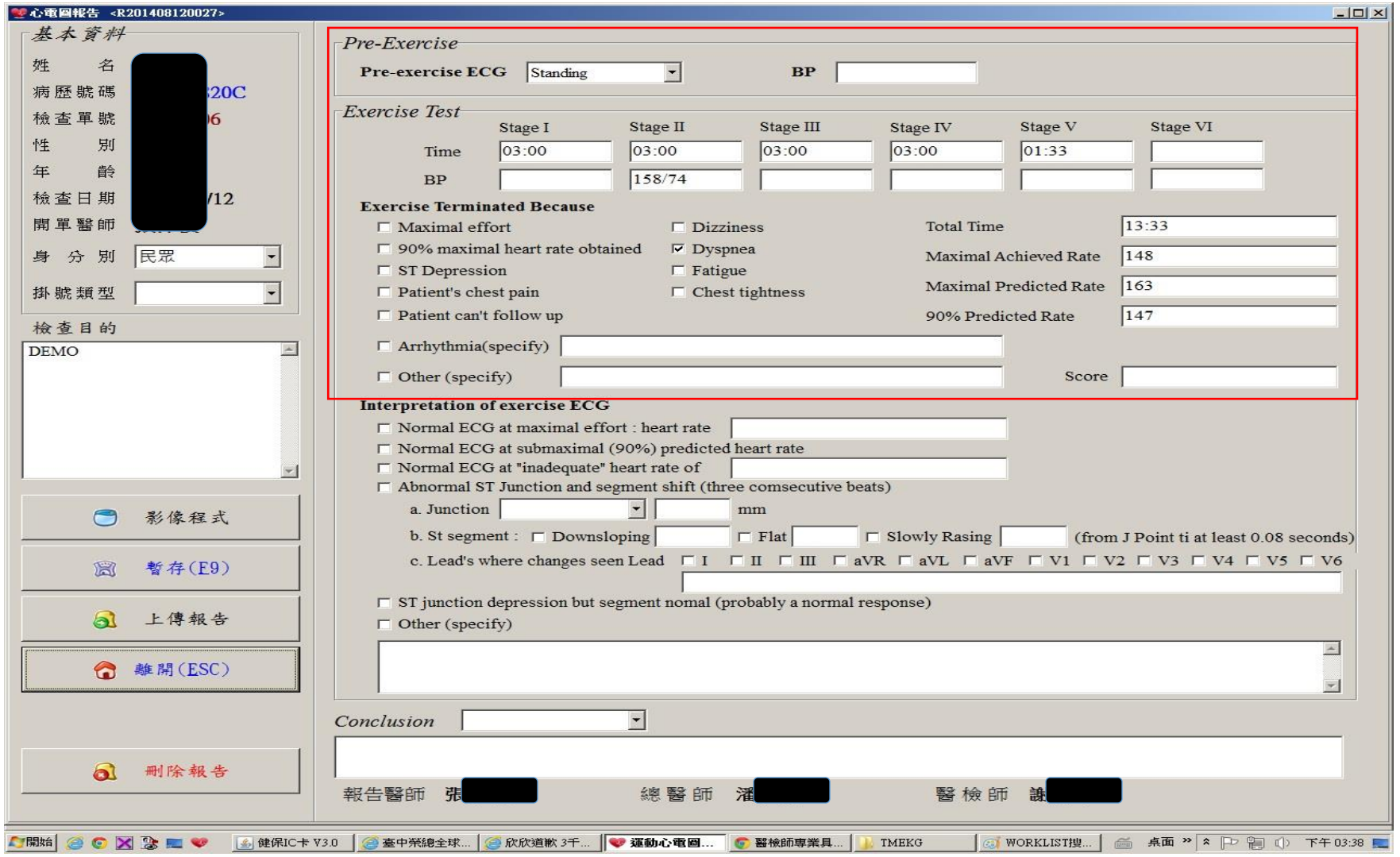
#	病歷號	姓名	性別	報告日期	欄位名稱	字串位置
1	30966484	李立仁	男	2017/03/21	Summary	-P: "CTO"
2	19731476	林盧桂玉	女	2017/03/22	Summary	70% stenosis, -PL: "CTO"
3	7664575	史玉耿	男	2017/03/24	Summary	12 atm. Due to the "CTO" lesion, a Xience Xpe
4	39539861	林信和	男	2017/03/24	Summary	-P: "CTO"
5	14352262	吳小冬	男	2017/03/24	Summary	to 14 barr. Due to "CTO" lesion, a Resolute I
6	43710721	林國文	男	2017/03/27	Summary	-M: "CTO" with autocollateral
7	20922285	林文榮	男	2017/03/27	Summary	-Os: "CTO"
8	20922285	林文榮	男	2017/03/27	Summary	-M: "CTO"
9	20922285	林文榮	男	2017/03/27	Summary	: 50% stenosis, -D: "CTO"
10	34050550	黃彩珊	女	2017/03/27	Summary	-PL: "CTO"
11	17159954	李長春	男	2017/03/28	Summary	-M: "CTO" with collaterals fro
12	43857198	陳清良	男	2017/03/28	Summary	"CTO"
13	7751191	孫萬愛蓮	女	2017/03/30	Summary	-Os: "CTO"
14	23798596	黃督汝	男	2017/03/31	Summary	-M: "CTO" ; -P: 40% stenosis
15	12213239	程延南	男	2017/04/01	Summary	-P: "CTO"
16	12213239	程延南	男	2017/04/01	Summary	o slide through the "CTO" leision of LAD with
17	43574192	林健雄	男	2017/04/05	Summary	eision and function "CTO"
18	39058065	彭湘森	男	2017/04/06	Summary	-M: "CTO"
19	43066133	李治宏	男	2017/04/10	Summary	functional "CTO".

統計-Registry Form



#	病歷號	姓名	性別	年齡	生日	體重	身高	收縮壓(檢查前)	舒張壓(檢查前)	Heart rate(檢查
49	38016976	張育傑	男	28	1989/11/20	88.8	175.4			
50	44111526	胡周俊明	男	67	1950/1/7	68.4	159.5			
51	20268148	董環治	女	67	1950/9/24	65.8	151.1			
52	32310499	何津根	男	69	1948/9/28	65.7	161.8			
53	24638446	楊正華	男	83	1934/1/10	77.5	0			
54	25505742	陳紀瑞蓮	女	88	1929/11/20	46.8	0			
55	16162199	管劉競衡	女	96	1921/3/15	68.8	0			
56	27076784	陳為柱	男	89	1928/9/12					
57	4571226	沈志明	男	91	1926/8/12	61.9	162			
58	29703706	林盟祐	男	48	1968/12/27	99.6	181.3			
59	1509837	歐陽杏如	女	68	1949/3/22	53.5	155			
60	11834847	方覺明	男	93	1924/9/23	69.6	152.6			
61	44221456	沈清龍	男	56	1961/9/11	64.3	0			
62	42397411	安後祺	男	50	1967/5/21	84.35	0			
63	2736358	林省城	男	86	1931/9/17	61.4	161.4			
64	32822814	楊仁祥	男	60	1957/7/8	72.2	172.9			
65	31545092	陳宇祥	男	26	1991/9/5	62.3	176.1			
66	13625928	林寶珠	女	55	1962/8/30	53	161			
67	34973814	王文雄	男	77	1940/1/4	79	160.1			

Exercise ECG “Reports”


心電圖報告 <R201408120027>
基本資料
姓 名
病歷號碼
檢查單號
性 別
年 齡
檢查日期
開單醫師
身 分 別
民眾
掛號類型
檢查目的
DEMO
影像程式
暫存(F9)
上傳報告
離開(ESC)
刪除報告
Pre-Exercise
Pre-exercise ECG
Standing
BP
Exercise Test
Stage I
Stage II
Stage III
Stage IV
Stage V
Stage VI
Time
03:00
03:00
03:00
03:00
01:33
BP
158/74
Exercise Terminated Because
Maximal effort
90% maximal heart rate obtained
ST Depression
Patient's chest pain
Patient can't follow up
Dizziness
Dyspnea
Fatigue
Chest tightness
Total Time
13:33
Maximal Achieved Rate
148
Maximal Predicted Rate
163
90% Predicted Rate
147
Arrhythmia(specify)
Other (specify)
Score
Interpretation of exercise ECG
Normal ECG at maximal effort : heart rate
Normal ECG at submaximal (90%) predicted heart rate
Normal ECG at "inadequate" heart rate of
Abnormal ST Junction and segment shift (three comsecutive beats)
a. Junction
mm
b. St segment :
Downsloping
Flat
Slowly Rasing
(from J Point ti at least 0.08 seconds)
c. Lead's where changes seen Lead
I
II
III
aVR
aVL
aVF
V1
V2
V3
V4
V5
V6
ST junction depression but segment nomal (probably a normal response)
Other (specify)
Conclusion
報告醫師
總醫師
醫檢師
開始
健保IC卡 V3.0
臺中榮總全球...
欣欣道歉 3千...
運動心電圖...
醫檢師專業具...
TMEKG
WORKLIST搜...
桌面
下午 03:38

Breast MRI CAD “Reports”

```
- <value title="Mass" type="composite" columns="2">
    <value title="Assessment Category" type="enumerated">Category 6 - Known biopsy-proven malignancy</value>
  - <value title="Segmentation Finding" type="composite">
      <img title="Location Markers" src="{68758985-2469-11E4-BA11-0023AE63C443}.png" placement="inline"/>
    - <value title="Quadrant Description" type="composite" columns="1">
        <value title="Laterality" type="enumerated">Left</value>
        <value title="Quadrant" type="enumerated">Lower/Inner</value>
      </value>
    - <value title="Diameters" type="composite" columns="1">
        <value title="Principal Axis 1" type="string">3.3 cm</value>
        <value title="Principal Axis 2" type="string">2.1 cm</value>
        <value title="Principal Axis 3" type="string">1.7 cm</value>
      </value>
    - <value title="Distances" type="composite" columns="1">
        <value title="Distance to Nipple" type="string">5.5 cm (Distance modified by user)</value>
        <value title="Distance to Skin" type="string">1.2 cm</value>
        <value title="Distance to Chest Wall" type="string">4.7 cm</value>
      </value>
      <value title="Volume Composition" type="string">Center: 69.71,-46.73,17.78 Total enhancing volume: 2.60 cc Initial Phase (60%,150%,200%): 80.0 % Slow Enhancement 17.0 % Medium Enhancement 2.9 % Rapid Enhancement Delayed Phase (-20%,20%): 56.8 % Persistent Enhancement 38.0 % Plateau Curve 5.3 % Washout Curve</value>
      <value title="Enhancing Volume" type="string">2.60 cc</value>
      <value title="Finding Volume" type="string">3.33 cc</value>
      <value title="Comment" type="string">= Lobulated irregular-margin enhancing grouped nodules or invasive carcinoma in the left lower inner quadrant, between 08-09 O'clock, middle 1/3 in depth, 5.5 cm from nipple; Approximate 3.3cm in assessment. = Associated with duct dilation. = Ipsilateral axillary adenopathy</value>
    </value>
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    <value title="Margin" type="enumerated">Irregular</value>
    <value title="Enhancement" type="enumerated">Heterogeneous</value>
  - <value title="Kinetic Curve Assessment" type="composite">
```


Segmentation Finding

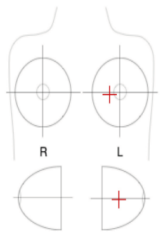


Figure 1: Location Markers

Quadrant Description
Laterality Left
Quadrant Lower/Inner

Diameters
Principal Axis 1 3.3 cm
Principal Axis 2 2.1 cm
Principal Axis 3 1.7 cm

Distances
Distance to Nipple 5.5 cm (Distance modified by user)
Distance to Skin 1.2 cm
Distance to Chest Wall 4.7 cm

Volume Composition
Center: 69.71,-46.73,17.78
Total enhancing volume: 2.60 cc
Initial Phase (60%,150%,200%):
80.0 % Slow Enhancement
17.0 % Medium Enhancement
2.9 % Rapid Enhancement
Delayed Phase (-20%,20%):
56.8 % Persistent Enhancement
38.0 % Plateau Curve

Enhancement Heterogeneous
Kinetic Curve Assessment
Initial Rise Rapid
Delayed Phase Washout

Kinetic Curve Values
Enhancement Curve Values
Voxel:L74.9,A42.2,H17.4 Average 3x3
Time Time in Sec. abs. Value rel. Value
0 0 s 35 AU 0 %
1 106 s 125 AU 260 %
2 165 s 104 AU 199 %
3 225 s 90 AU 159 %
4 285 s 86 AU 148 %
5 345 s 69 AU 100 %

Peak Value
Peak Enhancement:
260 %

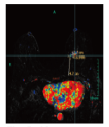


Fig. 2: Mass: Location

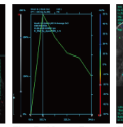


Fig. 3: Mass: Curve

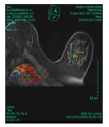


Fig. 4: Mass: Principal Axis 1

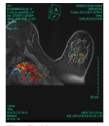


Fig. 5: Mass: Principal Axis 2

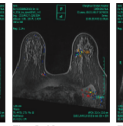


Fig. 6: Mass: Principal Axis 3

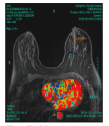
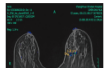
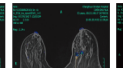
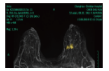


Fig. 7: Mass: Distance To Nipple







FHIR Standard


Fast (to design & implement)
Healthcare
Interoperability
Resources

Emerging standards make “apps” a reality

- FHIR = “Fast Health Interoperability Resources”
- A standard for accessing health care data (“Resources”)
- RESTful API design leverages Internet standards (HTTP, etc.)
- Created by Health Level 7 International (HL7)
- Emerging support by most major HIT providers (e.g., Argonaut Project)
- Meets EHR Certification for MU3

- SMART = “Substitutable Medical Applications and Reusable Technology”
- A SMART App is a Web App
  - HTML5 + JavaScript
  - Typically embedded in EHR
- EHR Data Access is via FHIR
- OAuth2 for security and context passing
- Also supports smart-phone and patient-controlled apps

Mobile Solutions Change the World

Patient Information Verification for Bedside Monitor


下午3:00
下午3:00
12月4日週五
中山App

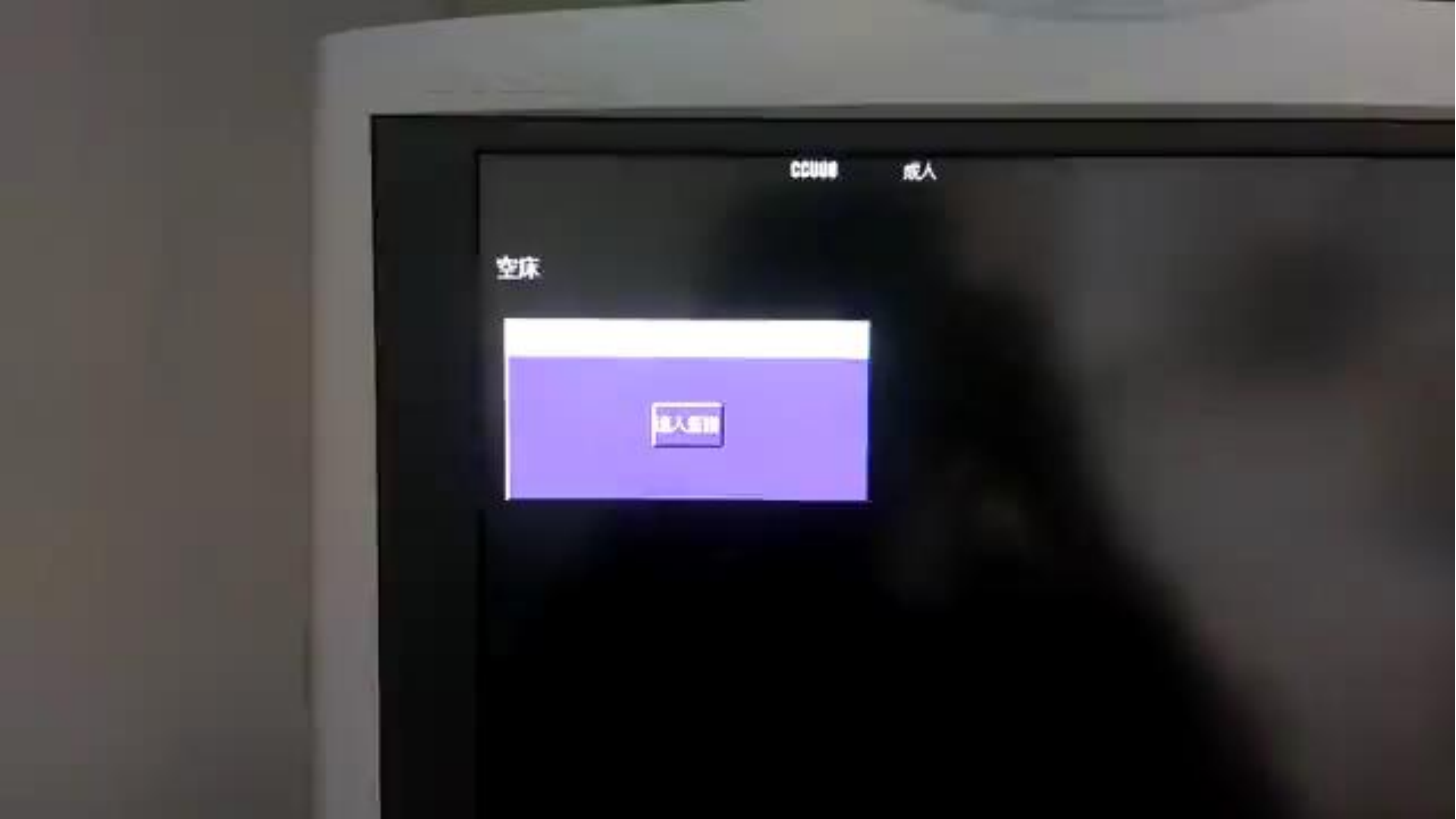

下午3:01
護理人員ID
請掃描護理人員的條碼


下午3:01
病歷號
請掃描病患的條碼
病床位置
請掃描病床的條碼


下午3:01
病歷號
T15120402
病床位置
請掃描病床的條碼


下午3:02
病歷號：
T15120402
患者姓名：
性別：
床號：
3T22-1
生日：
監視器號：
傳送

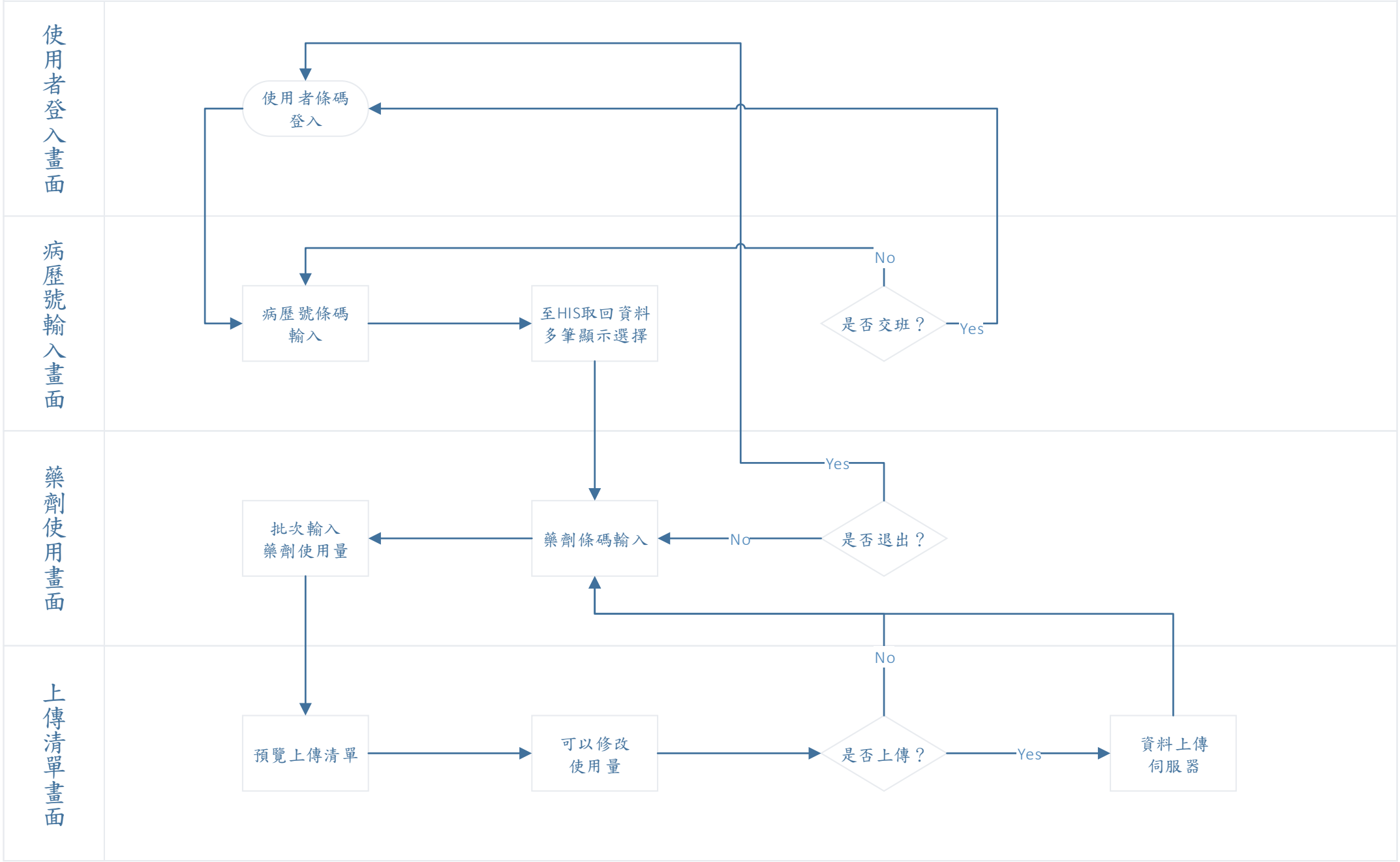

下午3:02
病歷號：
99999999
患者姓名：
測○患者
性別：
男
床號：
3T22-1
生日：
1958/12/21
監視器號：
傳送


CCU08
成人
空床

Patient Information Verification for AIMS

彰化基督教醫院麻醉科SLS系統APP程式流程圖

瑞特資訊系統股份有限公司

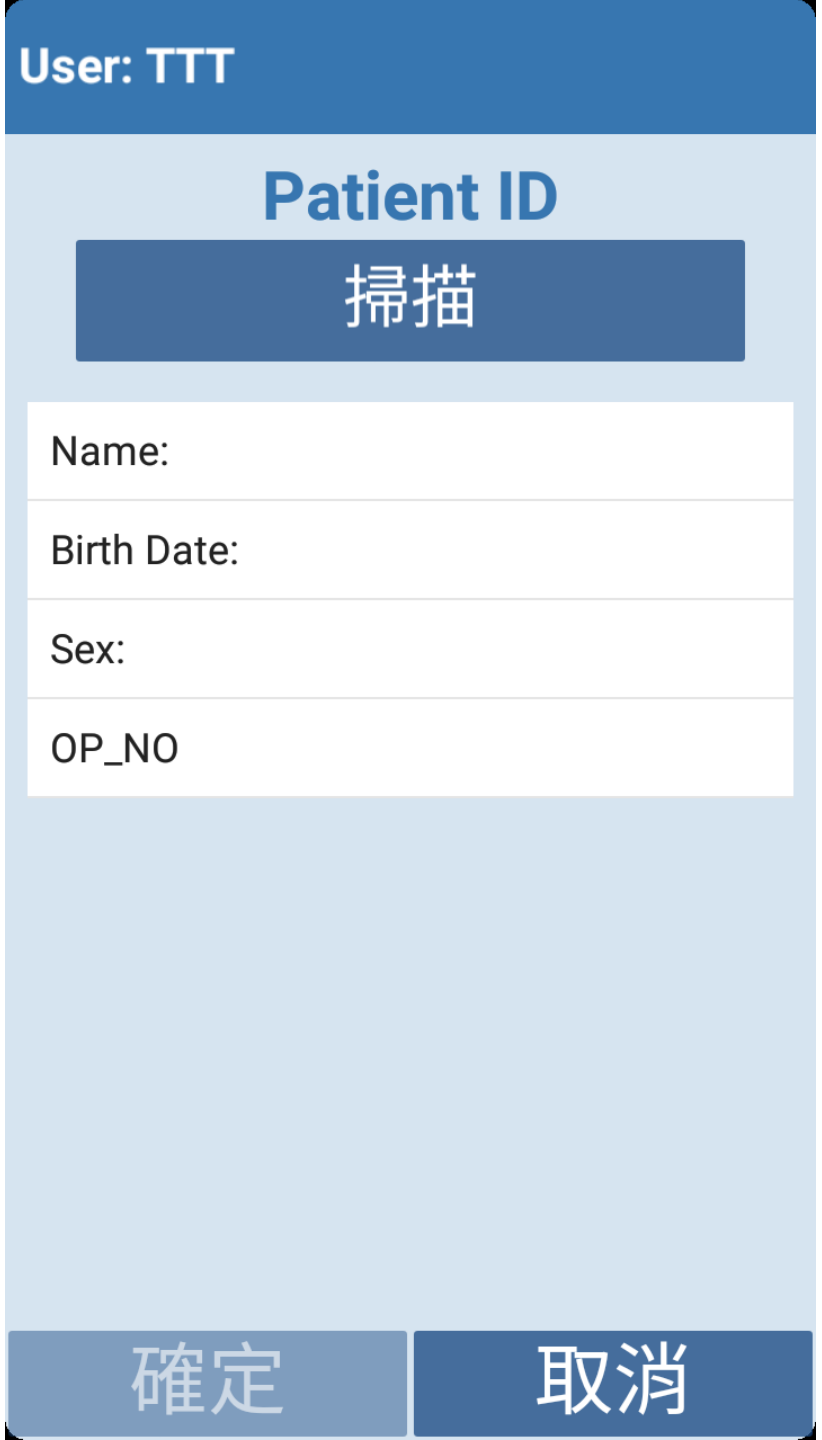


登入畫面

掃描個人識別條碼(QR code)

掃描病患條碼

確認資料無誤後按[確定]



病患資料顯示

利用病歷號串連開刀房開單簽收資料

掃描藥物條碼

條碼上含有麻醉藥物所有重要資訊

輸入注射劑量

會根據濃度計算真實劑量

送出正確數據

提供修改及刪除功能

Point-of-Care Tools for RTMS


呼吸治療管理系統
使用者 ID
密碼
登入


登入者：
RT收案
藥物吸入治療
動態波形顯示
呼吸器使用紀錄
呼吸訓練或復原
登出


回上頁
RT收案 工作清單
新增
87654321
愛麗絲·德·拉·埃克托爾 （女）
生日：1994/03/27
科室：夢遊仙境


回上頁
呼吸器使用紀錄
呼吸器使用紀錄
病歷資料：
病歷號 123
姓名 測試員
年齡 51
性別 男
出生日 1964/10/02
病房
病床
收案資料：
收案號
開單號
開單醫師 ？？？
收案日
收案科別
開始使用日期 2015/9/30 10:23:37
病患來源
呼吸治療分類 侵襲式
使用原因 中樞神經病變
儀器種類 3100A
儀器編號
診斷
理學檢查


回上頁
呼吸紀錄
呼吸器設定
呼吸指數監測
自睜生理指標
檢驗數據
換管紀錄
Type of Ventilatc
Mode of Ventilation
Tidal Volume
FiO2 / PEEP
Pressure level PCV / PSV
Peak Flow / Rate
Sensitivity / Cuff pressu
Ti / I:E ratio
Pressure Limit H / L
Volume Limit ¥ / ¥


回上頁
RT收案 工作清單
新增
87654321
愛麗絲·德·拉·埃克托爾 （女）
生日：1994/03/27
科室：夢遊仙境
請輸入病歷號
下一步
換行
還原
注音
注音


回上頁
呼吸器使用紀錄 工作清單
123
測試員 （男）
生日：1964/10/02
科室：META
12345678
段譽 （男）
生日：1973/03/17
科室：CS
7777777
小龍女 （女）
生日：1998/10/28
科室：AIR


回上頁
RT收案
侵襲式
非侵襲式
意識狀態
不清楚
氣管內管種類
氣管內管內徑
RT收案 確定要送出？
確定
取消
RT收案送出

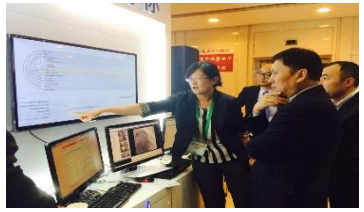

回上頁
RT收案
病歷資料：
病歷號 35215783
姓名 中神通
年齡 74
性別 男
出生日 1940/06/21
病房 03A
病床 2-2
收案資料：
收案號 201504150001
開單號 ABC12345
收案日 2015/04/15
收案科別 AIR
開始使用日期 2015/9/30 10:23:37
病患來源 01.門/急診
呼吸治療分類 侵襲式
使用原因 中樞神經病變
儀器編號 1234
儀器種類 3100A
診斷
體溫 37.1
脈搏 73 次/分
呼吸 次/分

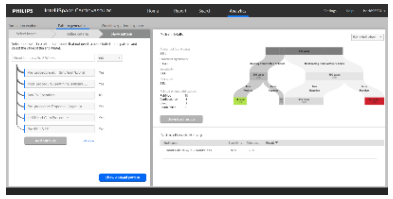
IT Plays a key role

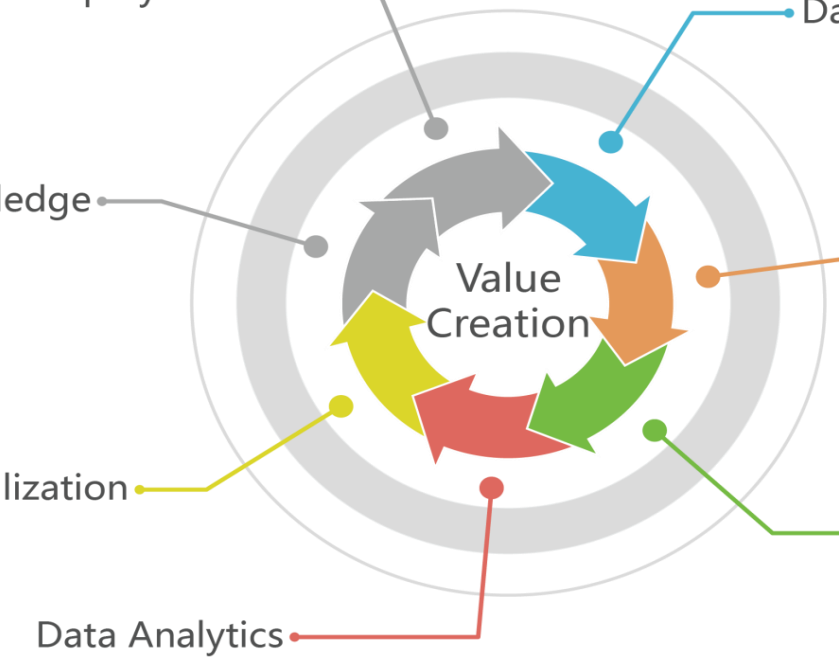
Infrastructural IT Vendor

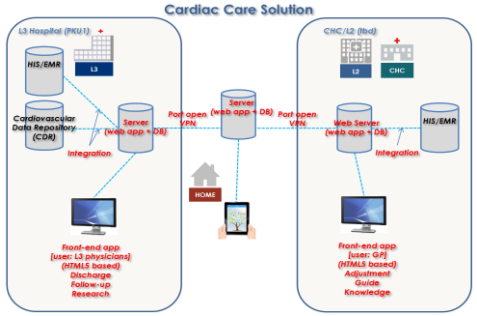
Create Value from Data (across the Health Continuum)

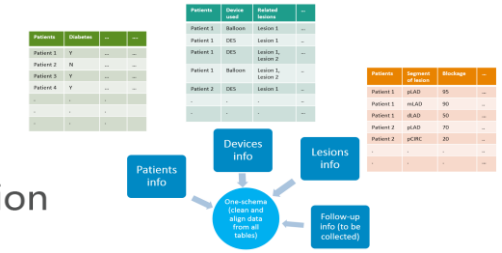
Healthy Living	Prevention	Diagnosis	Treatment	Recovery	Home Care

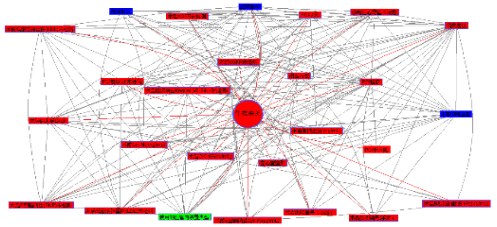






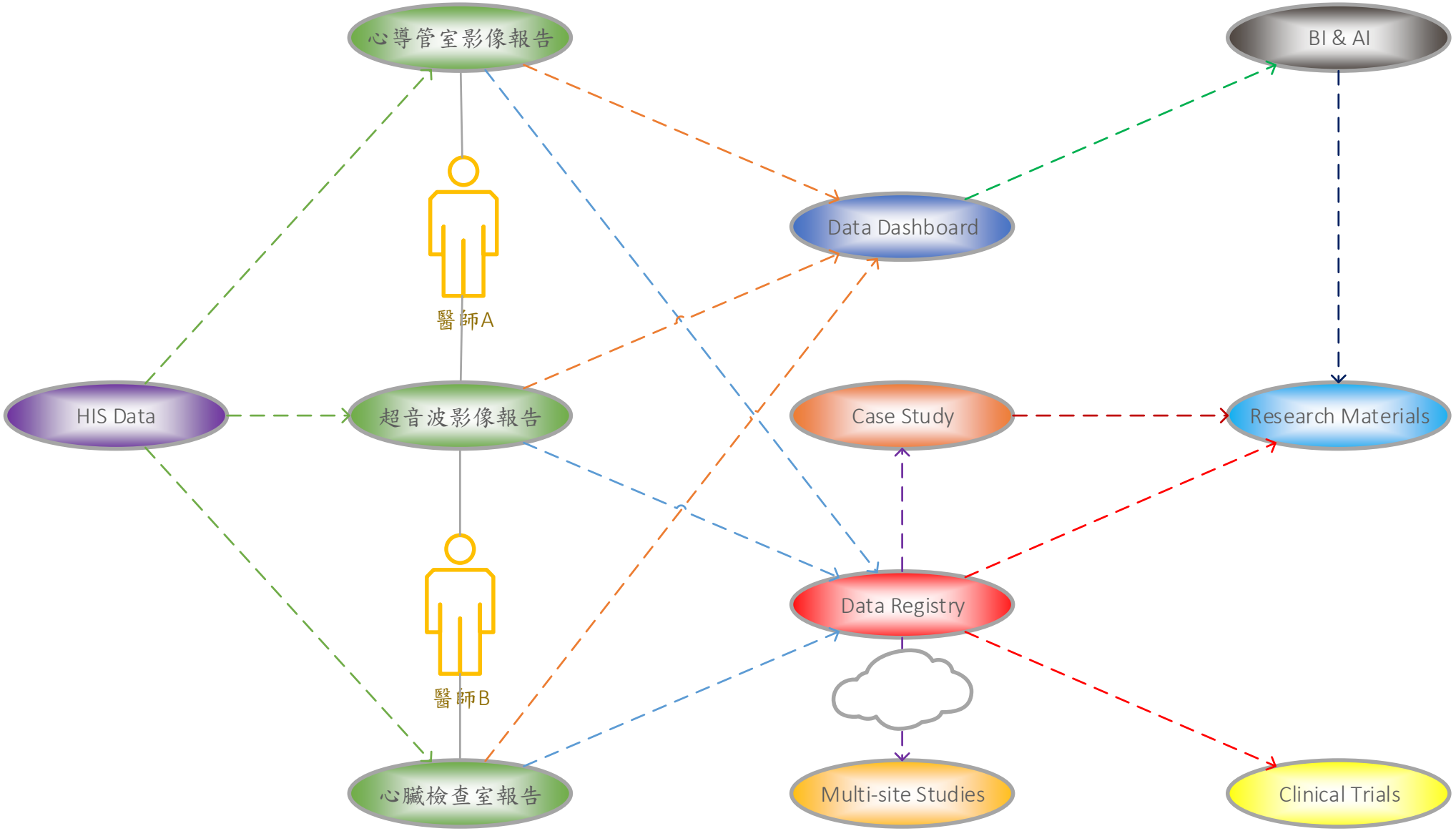






System Architect & Coordinator

台北榮民總醫院心臟內科大數據規劃示意圖



首頁 病患查詢 業務統計

健保及自費量

年 〈 2018 〉 年 查詢

主治醫師: 總醫師: 放射師:

Stent使用總數: 1593

健保 1,011

自費 582

病患 Stent使用總數: 870

只有健保 279

只有自費 149

健保兩支以上 167

自費兩支以上 64

健保+自費

健保清單	
Abbott	307
Biotronic	4
ABBOTT/IREL...	52
BIOTRONIK/S...	2
BOSTON	232
ELIXIR	17
Cook	2
HexaCath	3

自費清單	
Abbott	99
Biotronic	1
ABBOTT/IREL...	14
BOSTON	82
ELIXIR	5
Cook	1
Medtronic	117
Meril	43

Data Visualization

醫療物聯網的生態圈

需要臨床支持及科研服務的醫師、醫療資訊平台商

Qualified Members

Specific Vendor Cash flow-in

藥商、儀器商、研究計畫、臨床需求...

Meaningful Data Output

具有科研價值及臨床意義的資料庫

羊毛出在狗身上，由豬來買單

Believing is Seeing

有堅定信念方能創造未來