

Development and use of Next Generation PACS

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Hospital Shopping

Here is a popular words in Korea.

“If you may have problem in your health, get consulting from at least 3 doctors”

Most Koreans believe it commonly.

Cause of affordable public insurance, people do.

Someone says this is one of reasons for MERS spreading out.

Why people keep moving their hospital

**What would be happen if data can be shared with other facility
and be served a patient for improving treatments**


You've got data x3 😊

Since the hospital gets bigger and bigger
Medical groups faced to manage tons of data
Digitalized Evidence, not only in Radiology but also in ALL-ology
But they are not connected and utilized well yet.

**“90% of world’s data generated
over last 2 years”**

In USA, ACO drives the healthcare services
systemically, patient-centric and affordable
using concentrated data sets

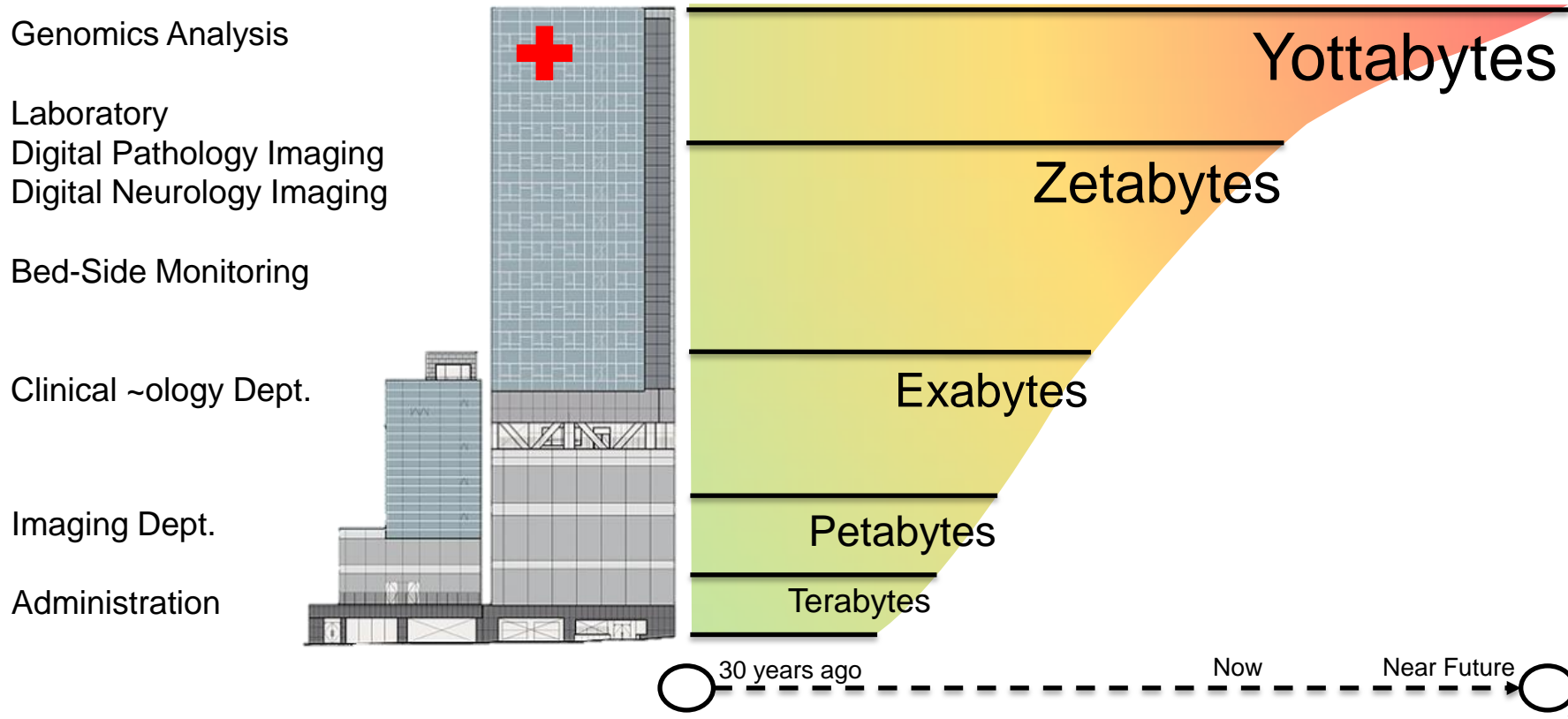
The Data Tsunami (Big Data)

A person is surfing a massive, towering green wave that dominates the scene. The surfer is positioned in the lower center, appearing small against the scale of the wave. The background is a bright, hazy sky, suggesting a coastal or oceanic setting. The overall image conveys a sense of being overwhelmed by a powerful force, which in this context is the 'Data Tsunami'.

Many SOURCES

- Genomics
- Electronic Healthcare Records
- Electronic Medical Records
- Digital Pathology Imaging
- Digital Cardiology Imaging
- Digital Radiology Imaging
- Non-DICOM Contents
- Evidence Documents
- ...

Data Generation Trends





Source : Strategies to Enhance Radiologist Workflow in a Filmless/Paperless Imaging Department.

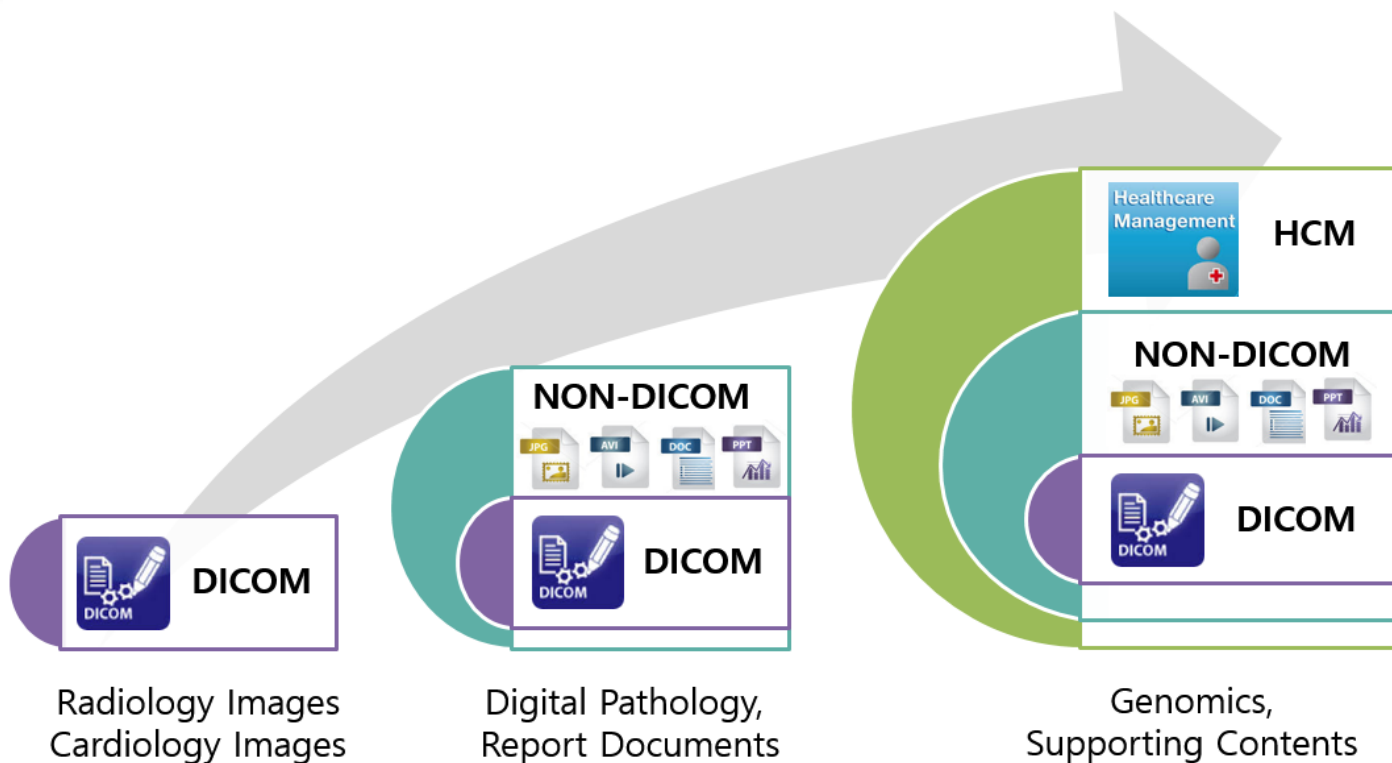
[Bruce I. Reiner and Eliot L. Siegel](#), J Digit Imaging. 2002 Sep; 15(3): 178–190 6

Vendor Neutral Archive

P

C

S



VNA need to handle bellows

- **DICOM Contents**
- **Non-DICOM Contents**

There is a big difference between them

- **Manifests**

ebXML may cover Non-DICOM Object to have manifests under XDS.b

CDA can make up Non-DICOM for including lots of information

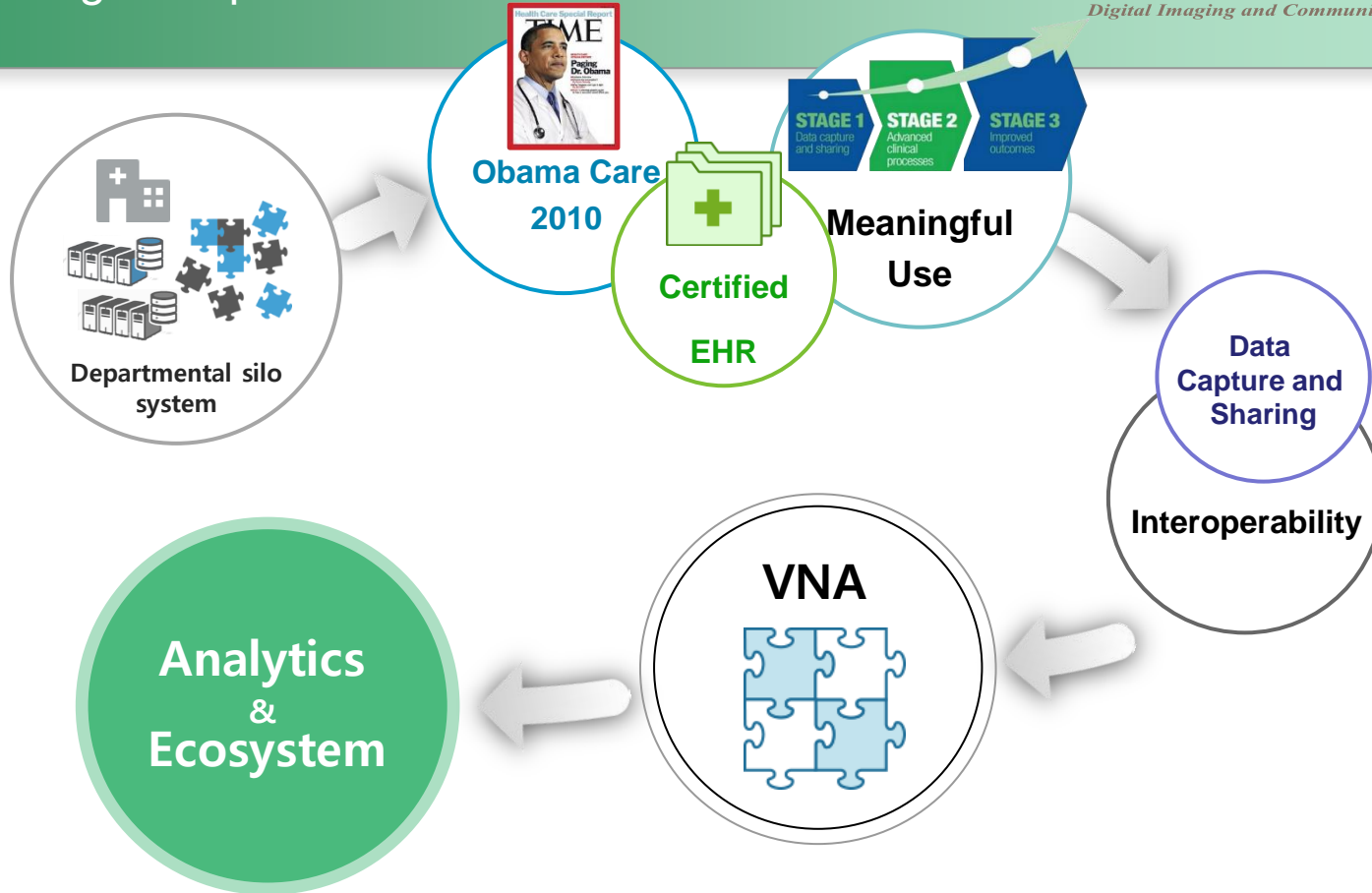
Future VNA need to handle

- **Healthcare Contents**

Obstacles

- **Un-structured / Non-standardized data**
- **Variety formats / Display**
- **Analysis / Statistic / Estimate**

American Large Hospitals' Trends



Cross-Domain Identity
Content Manageable
Auditable Administrative Scalable Independent
Business Continuity
Patient Centric
Statistical Information Life-cycle Manageable
Vendor Neutral
Multiple Institutional
Reconciliatory
Entity Specified

Patient Centric

- **Master Patient Index**
- **DICOM Repository / Non-DICOM Repository**
- **Universal Viewer and Worklist**

Vendor Neutral

- **Standard Interface / Non-Standard Interface**
- **DICOM / HL7v2 / HL7v3 / RESTful Services**
- **CDA Wrapper, Content Converter / Generator**
- **IHE XDS.b / XDS-I.b / XDR**

Independent

- Disaster Recovery
- Archiving, Backups
- Standard Interface / Non-standard Interface
- Web Services, RESTful Services

Content Manageable

- Universal Viewer and worklist
- CDA Wrapper, Content Converter/ Generator, Content Filter
- Bi-directional DICOM Tag Morphing
- IHE XDM / XDS-MS / XDS-SD

Information Life-cycle Manageable

- Backup, Retention Rule Management
- Pre-fetching / Auto-routing
- IHE Image Object Change Management
- Compressions

Reconciliatory

- IHE Scheduled Workflow
- IHE Patient Information Reconciliation
- IHE Image Object Change Management
- IHE Import Reconciliation Workflow

Scalable

- Volume/ Volume Set Management
- NAS/SAN Storage

Cross-Domain Identity Multiple Institutional

- IHE XCA
- IHE XDS,b / XDS-I.b
- IHE MHD / MHD-I
- IHE IUA / XUA / EUA
- eMPI

Entity Specified

- OASIS ebXML / ebRS
- HL7v3 CDA
- HL7 FHIR
- DICOM Native Model

Statistical / Administrative

- Archiving Rule
- Auto-routing Rule / Pre-fetching Rule
- Performance / Turn-Around-Time Statistics

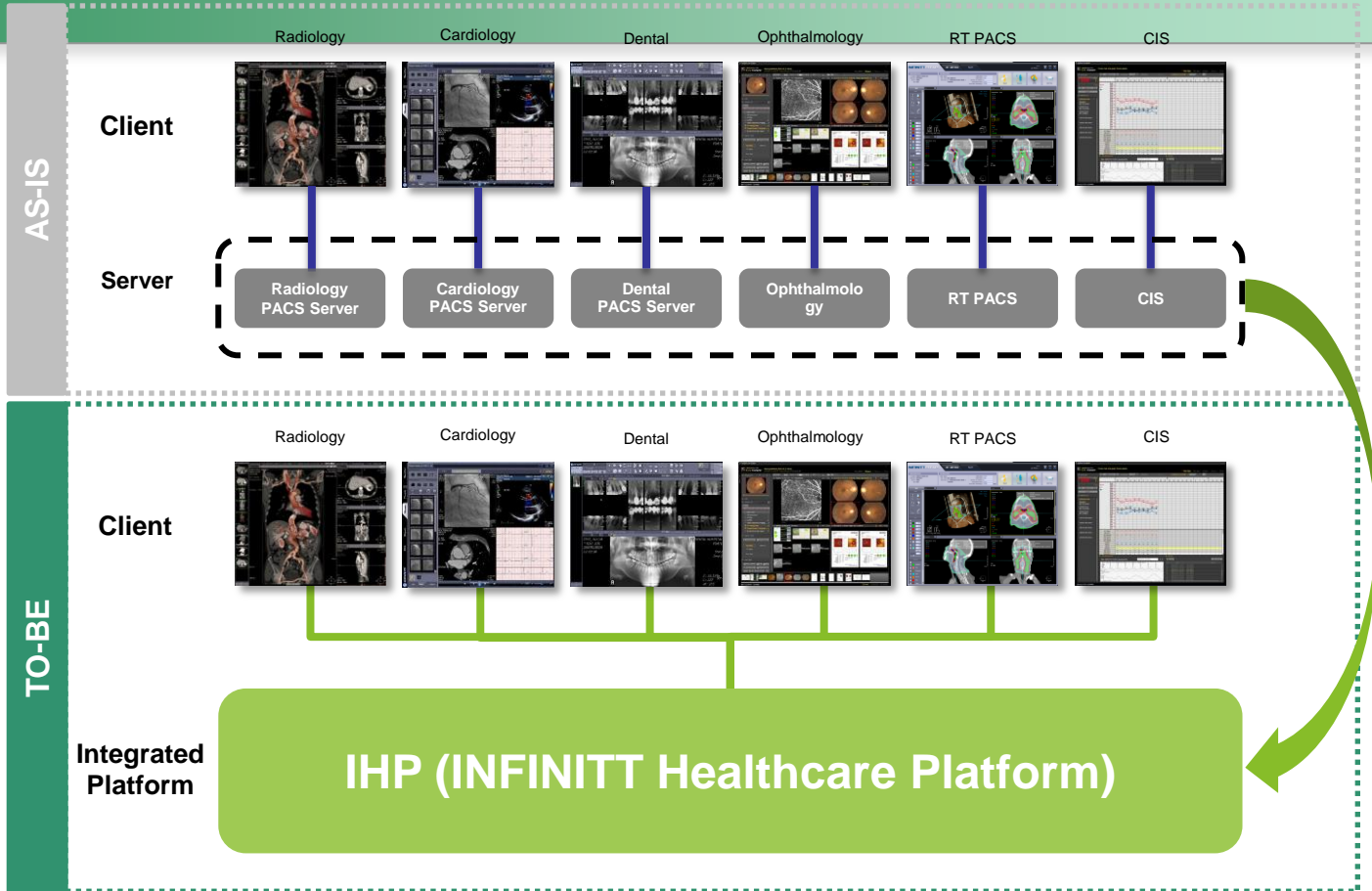
Auditable / Security

- **IHE ATNA Audit Logs**
- **IHE IUA / XUA**
- **TLS**

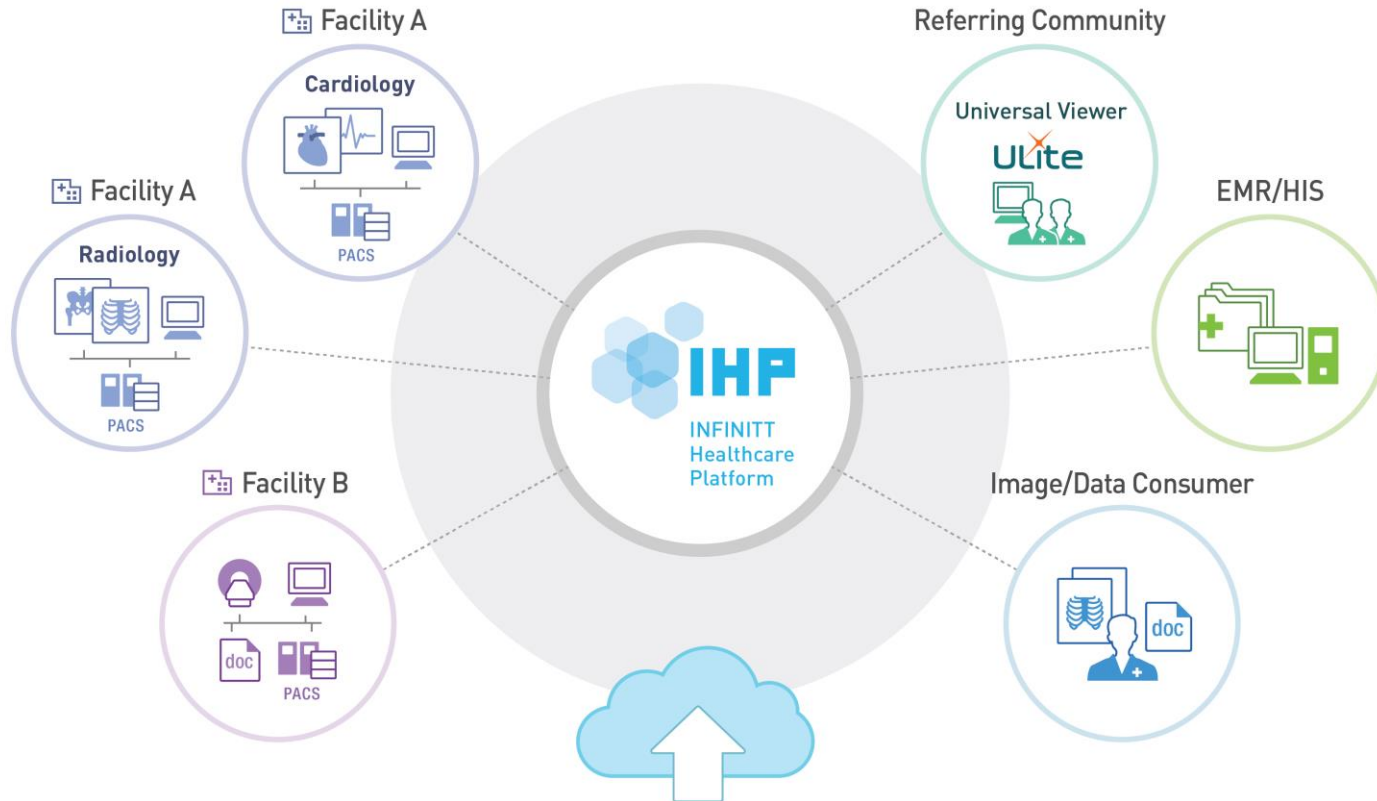
Business Continuity

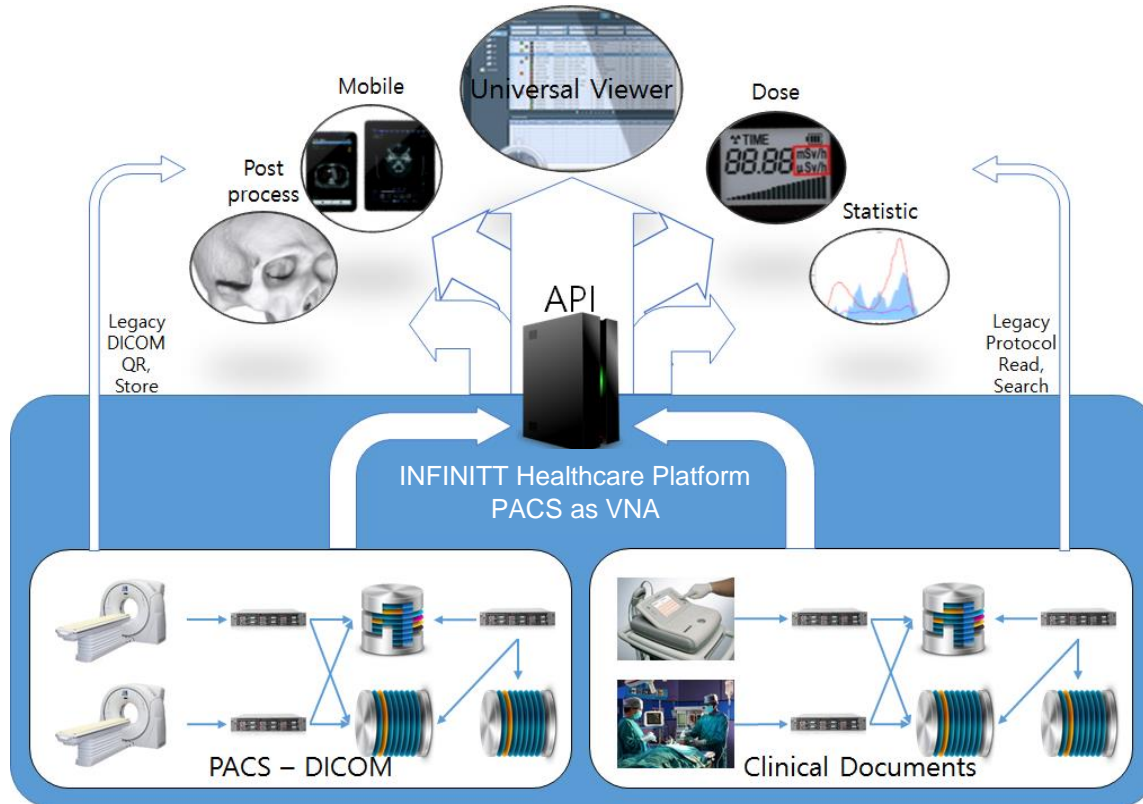
- **Statistical Tool / Dashboards**
- **Population Health outcome**
- **Resource Management**

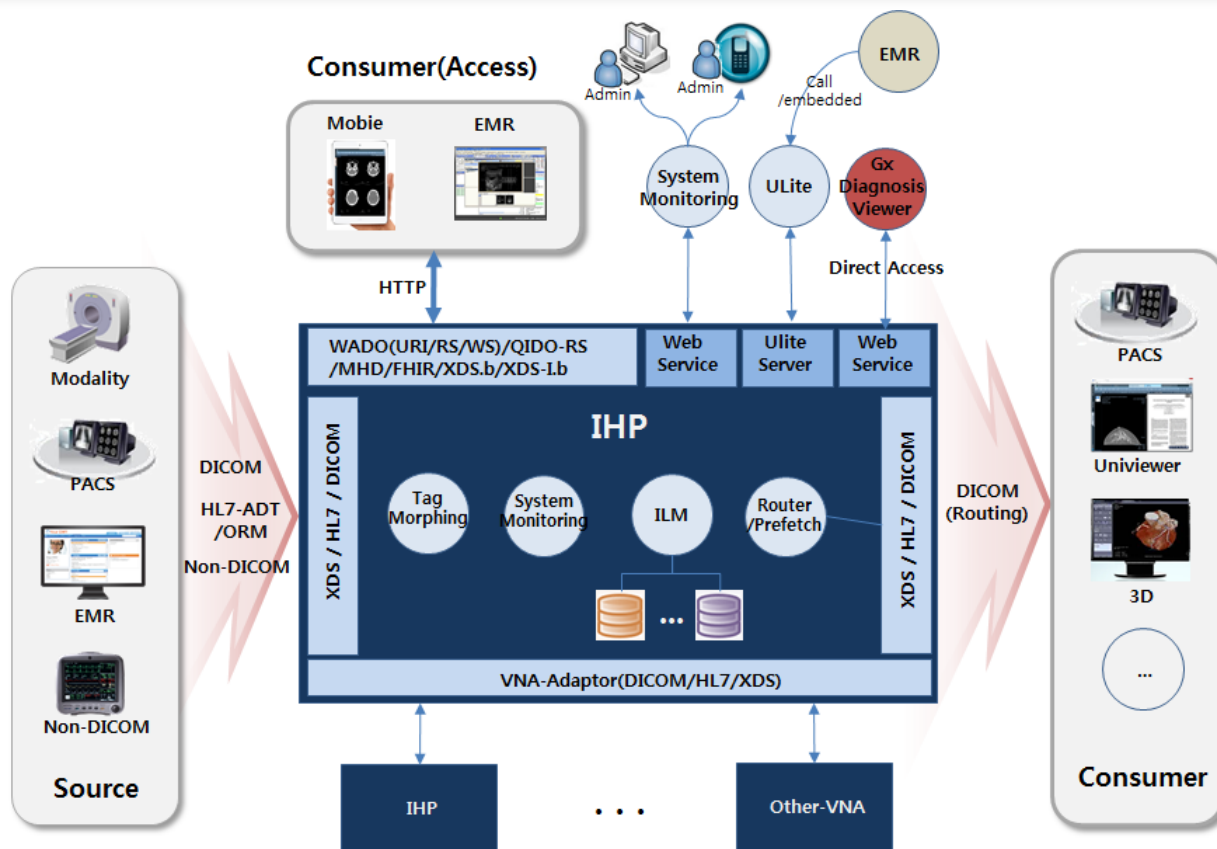
IHP – Domestic Integrated Management



IHP – Cross-Enterprise Interoperable Management







IHE Integrating the Healthcare Enterprise

- Define technical framework for interoperability using standards
- Interoperability is the Key to Health IT
- Government Focused on Interoperability

2001

Security

SEC, CT, ATNA

2004

Radiology Imaging Service

CPI, ARI, SINR, KIN, ED, RID

SWF, PIR, RWF, PSA, PAM, PIX, PDQ, PWP, CHG, PIXv3

2010

Cardiology and Departmental Service

CATH, ECHO, STRESS, MAMMO, ED-CARD, TCE, DEC

REM, PIXv3, NMI, IOCM, PDI

2015

Cross-Community and Web Technology

XCA, MHD, IID





Collect Big Data

- Structured / Unstructured Data
- Sampling

Analyze Big Data

- Time-series research / Estimation
- Data Mining / Logistic Regression / Artificial neural network

Applicable

- Forecasting
- Reduce Risk / Cost
- Treatment Strategy / Business Strategy

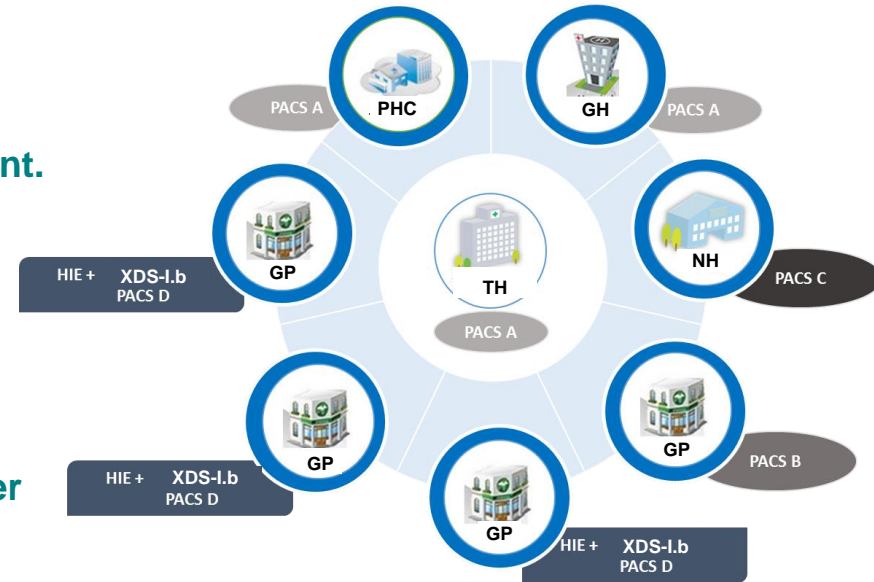
Korean Government Trial – with PACS Imaging Information Exchange Platform (XDS-I.b Adaption)

Validate propriety and estimate ROI of business

- Converge Hospital Workflow and ICT
- Prepare rapid changes in healthcare environment.
- Regards Patient Safety
- Minimize taking radiologic images
- Adopt standard based report templates
- Reduce healthcare costs

Distributed PACS sends DICOM with GPID to Center

- Patient Identification using MPI
- Connect with VPN
- XDS-I.b has been established in Center only
- Center converts DICOMs into KOS + Manifests for XDS.b providing
- GPs access central portal and see others' images using web-based universal viewer



- **Big Data**
- **PACS goes VNA**
- **from Patient Centric to Business Continuity**
- **Integrated / Interoperability**
- **New technologies / skills for management**
- **Analyzing Data for better outcome**

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Thank you for your attention!