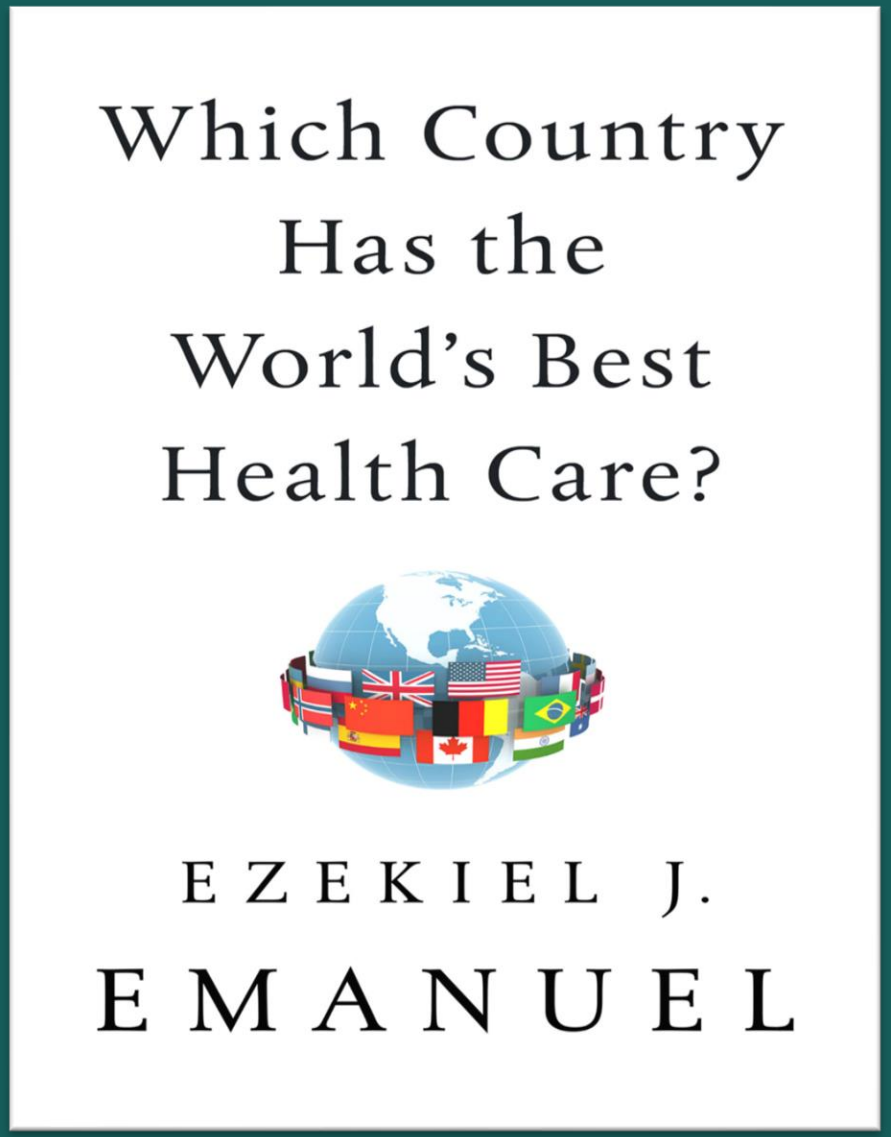
Health Information Exchange (HIE), Interoperability & Health Data Standards

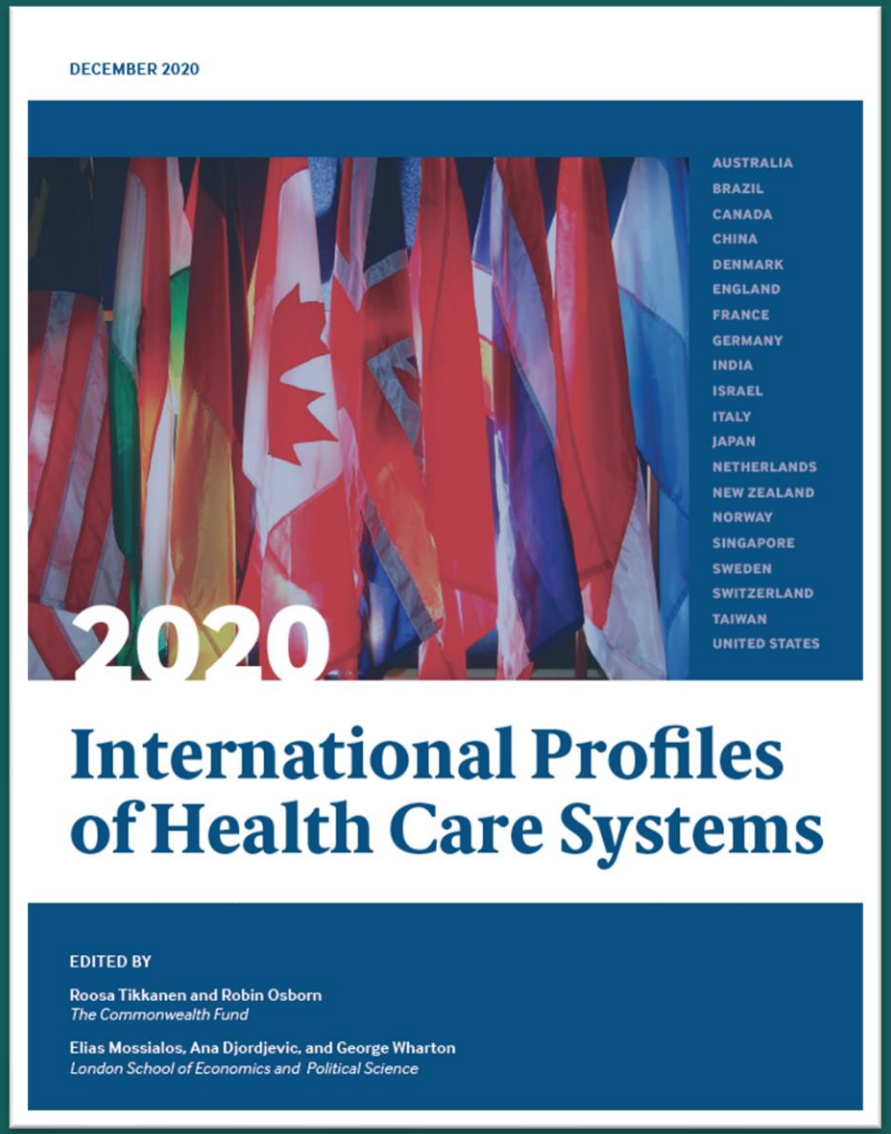
MSc. & PhD. program in Data Science for Healthcare and Clinical Informatics
RADI 601 Health Informatics and Health Information Technology
RADI 607 Theories in Health Informatics and Health Information Technology
22 November 2022 9:00 – 12:00

บุญชัย กิจสนาโยธิน ***M.D., Ph.D.(Health Informatics), FIAHSI, FRCP(T)***
Lecturer: Faculty of Medicine Ramathibodi Hospital , Mahidol University
Manager: Thai health Information Standards Development Center (THIS), HSRI
Chair: Asia eHealth Information Network (AeHIN)

- Health Information Exchange (HIE)
- Interoperability & Health data standards
- Public Policy in Health Informatics and Global Health Informatics
  - Digital Health Governance

Reading Assignment for presentation





- A Thai Informatician and physician at the Thai Health Information Standards Development Center (THIS), Health Systems Research Institute (HSRI), Ministry of Public Health Thailand.
- Senior lecturer at the Department of Clinical Epidemiology & Biostatistics, Faculty of Medicine Ramathibodi Hospital, Mahidol University
- Chair of Asia eHealth Information Network (AeHIN)
- WHO Digital Health Technical Advisory Group (DH TAG)
- Fellow of the International Academy of Health Sciences Informatics (IAHSI), International Medical Informatics Association (IMIA)
- Vice President of the Thai Medical Informatics Association (TMI)
- Worked in a rural public general hospital for 15 years as an internal medicine clinician before receiving PhD in Health Informatics from University of Minnesota, USA in 2008.
- Working areas and research interest
  - National health information standards & Health information exchanges
  - National eHealth/Digital Health, and Health IT adoption.
- kijs0001@gmail.com, www.this.or.th

สำนักพัฒนามาตรฐานระบบข้อมูลสุขภาพไทย

Thai Health Information Standards Development Center

มาตรฐานข้อมูลสุขภาพ ฐานรากระบบสุขภาพดิจิทัลไทย

เกี่ยวกับเรา →

ประกาศ

ประกาศ: ในปีนี้ ประเทศไทยได้เข้าเป็นสมาชิก SNOMED International ซึ่งเป็นหน่วยงานดูแลรหัสมาตรฐานข้อมูลด้านการแพทย์ระดับสากล (SNOMED CT) โดย สมสท. ทำหน้าที่เป็นหน่วยงานกลาง (National Release Center: NRC) ในการเผยแพร่รหัส SNOMED CT

อ่านเพิ่มเติม →

มาตรฐานที่ให้บริการ

TMT

บัญชีข้อมูลยาและรหัสยามาตรฐานของไทย

Thai Medicines Terminology

รายละเอียด ดาวน์โหลด

TMLT

บัญชีรายการและรหัสมาตรฐานการตรวจทางห้องปฏิบัติการทางการแพทย์ไทย

Thai Medical Laboratory Terminology

รายละเอียด ดาวน์โหลด

Delivering SNOMED CT

ระบบมาตรฐานศัพท์ทางการแพทย์สากล

Systematized Nomenclature of Medicine – Clinical Terms

รายละเอียด ดาวน์โหลด

TTMT

บัญชีข้อมูลยาและรหัสยามาตรฐานของไทยสำหรับยาแผนไทย

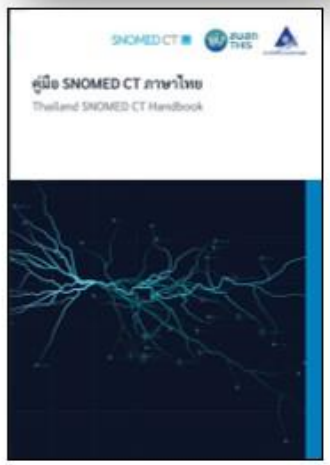
Traditional Thai Medicines Terminology

รายละเอียด ดาวน์โหลด

สมสท THIS

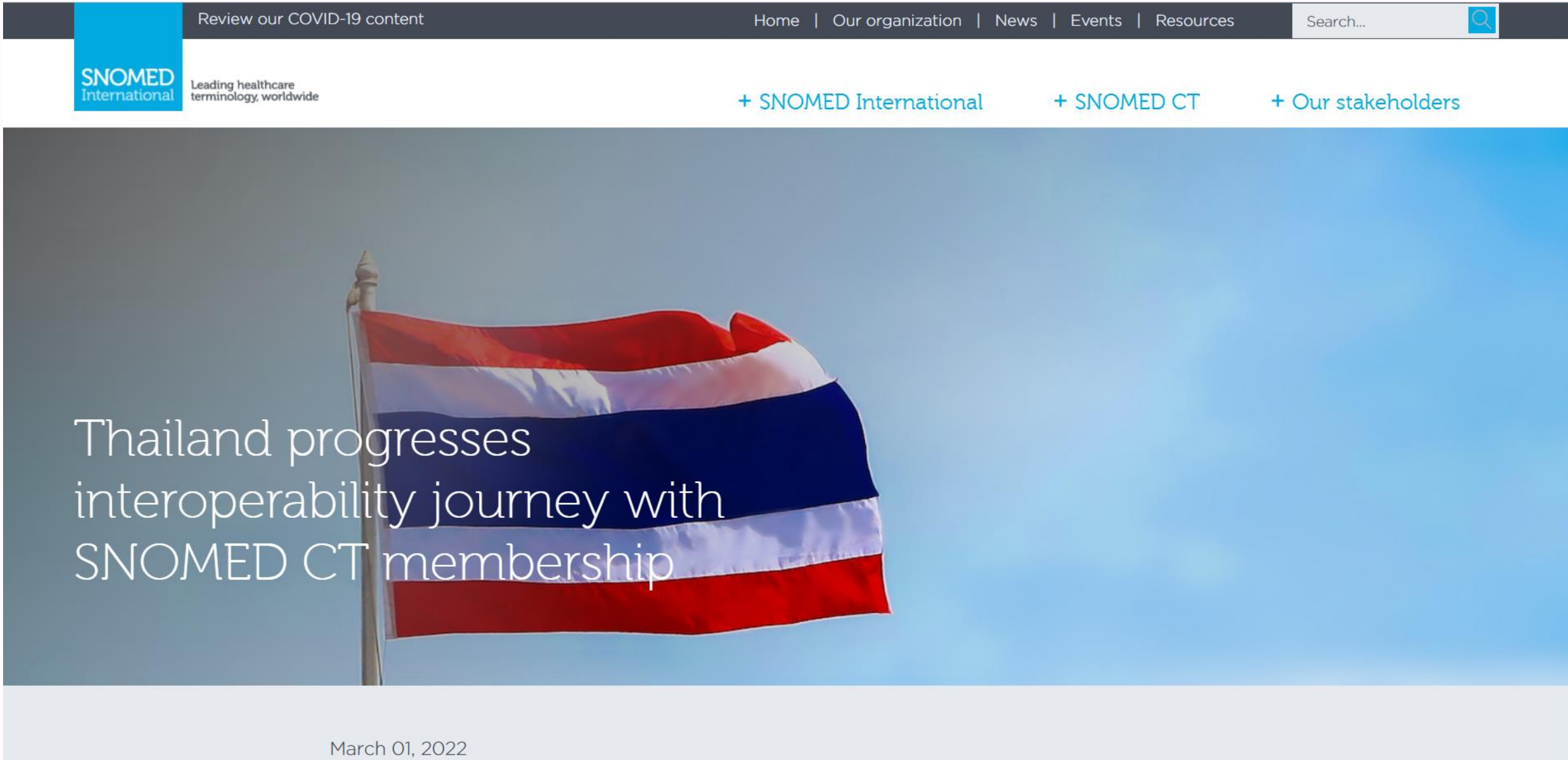
Thai Health Information Standards Development Center (THIS)

สำนักพัฒนามาตรฐานระบบข้อมูลสุขภาพไทย (สมสท.)



ดาวน์โหลดหนังสือ “ฉบับ E-Book” ได้ที่นี่

2022 Thailand became SNOMED CT International member



I believe we have the same dream

https://www.youtube.com/watch?v=gxz9ZVvduGc


forecast
Oakland CA
FRI
SAT
SUN
MON
WED
Cloudy
Cloudy
Rain
Cloudy
58 47
52 41
52 42
52 47
98 78
93 77
Your flight is: ON TIME
58.6
forecast


In Flight Snack Suggestions:
apple
turkey wrap
grapefruit
green beans
Glucose level
Trend
108 mg/dl
m t w t f s s
Margaret
Type 1 Diabetes


Glucose level
Weekly Trend
m t w t f s s
108 mg/dl

Internet of Things (IoT)

Smart Medical Devices

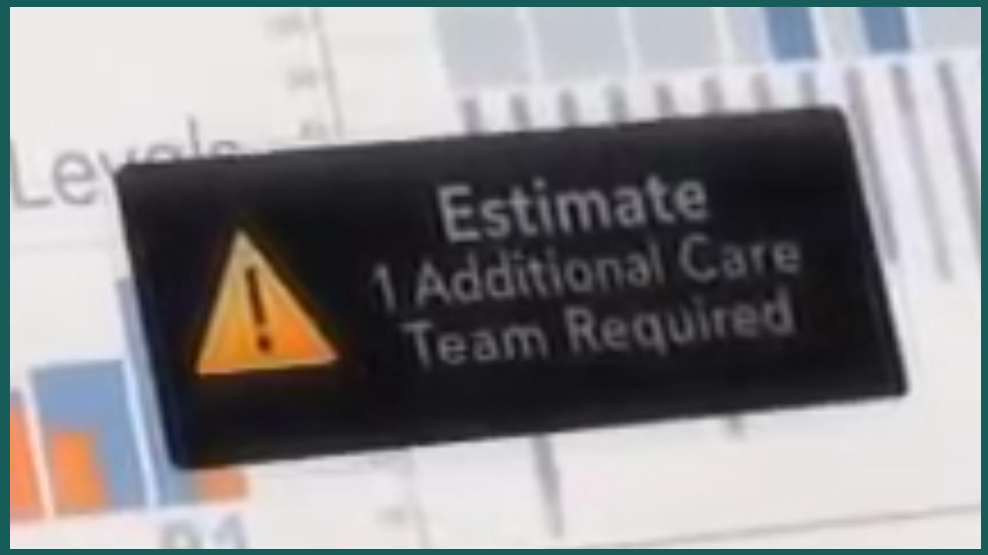

9:17
Thursday, April 29
Food:
your
HEATWAVE ALERT
HIGH ASTHMA RISK
Making healthy choices every day
Tyler
Asthma

Consumers Decision Support Systems

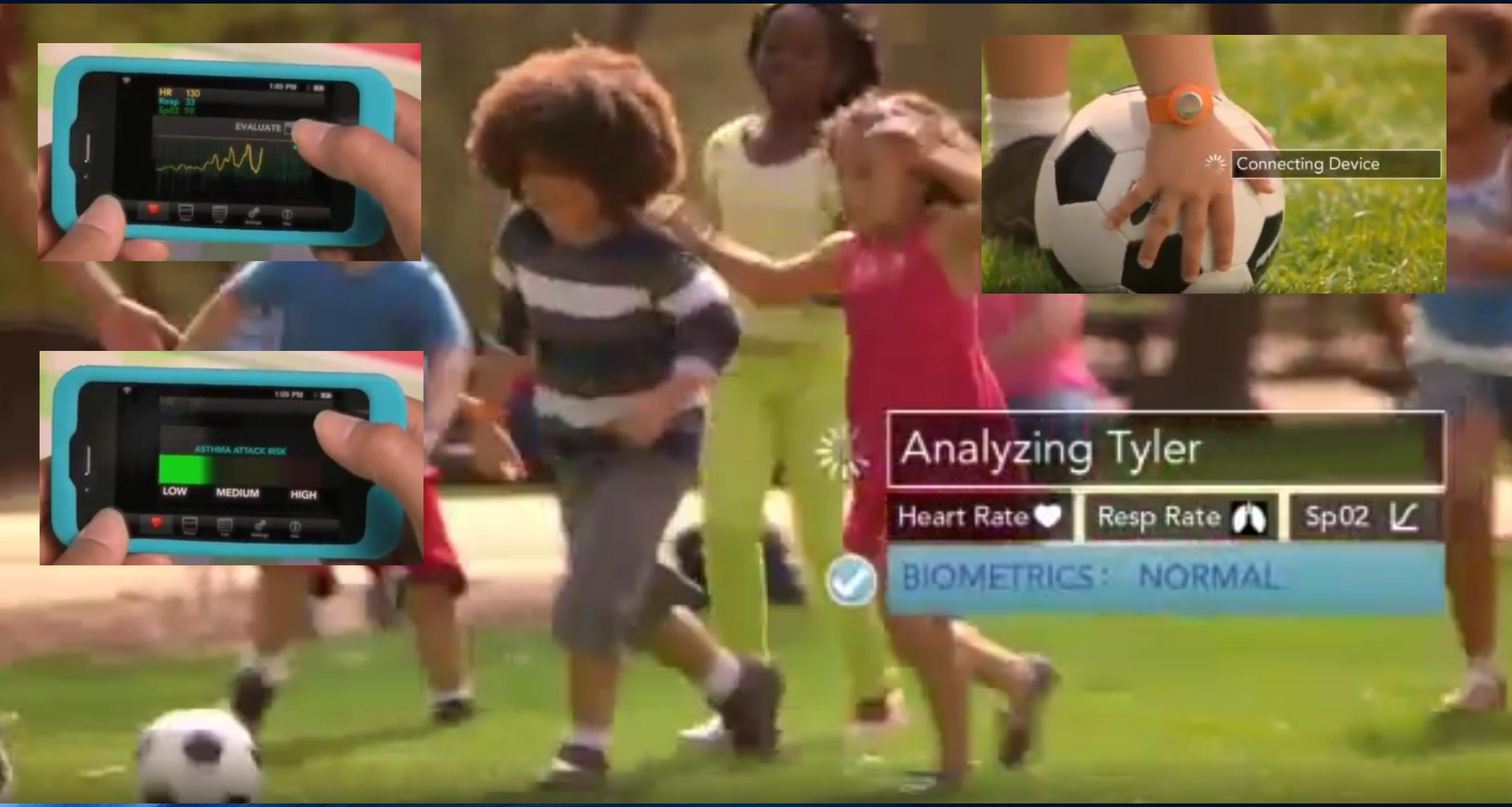
Alerts !


Scanning Environment
Utilization
Resources
Performance
• ER
• Bed
• Surgery
• Staffing
• Supplies
• Systems
• Wait Times
• Care Quality
• Networks
Analyzing Environment
Weather
Resources
RECOMMENDATION GENERATED
Scanning Environment
Public Health
Weather
News
• Outbreaks
• Travel Alerts
• Search Trends
• Temp
• Pollen
• Storms
• Police Activity
• Public Events
• Traffic Alerts

Administrative Decision Support Systems



Recommendation


HR 130
Resp 33
Sp02 99
EVALUATE
Connecting Device
ASTHMA ATTACK RISK
LOW
MEDIUM
HIGH
Analyzing Tyler
Heart Rate
Resp Rate
Sp02
BIOMETRICS : NORMAL

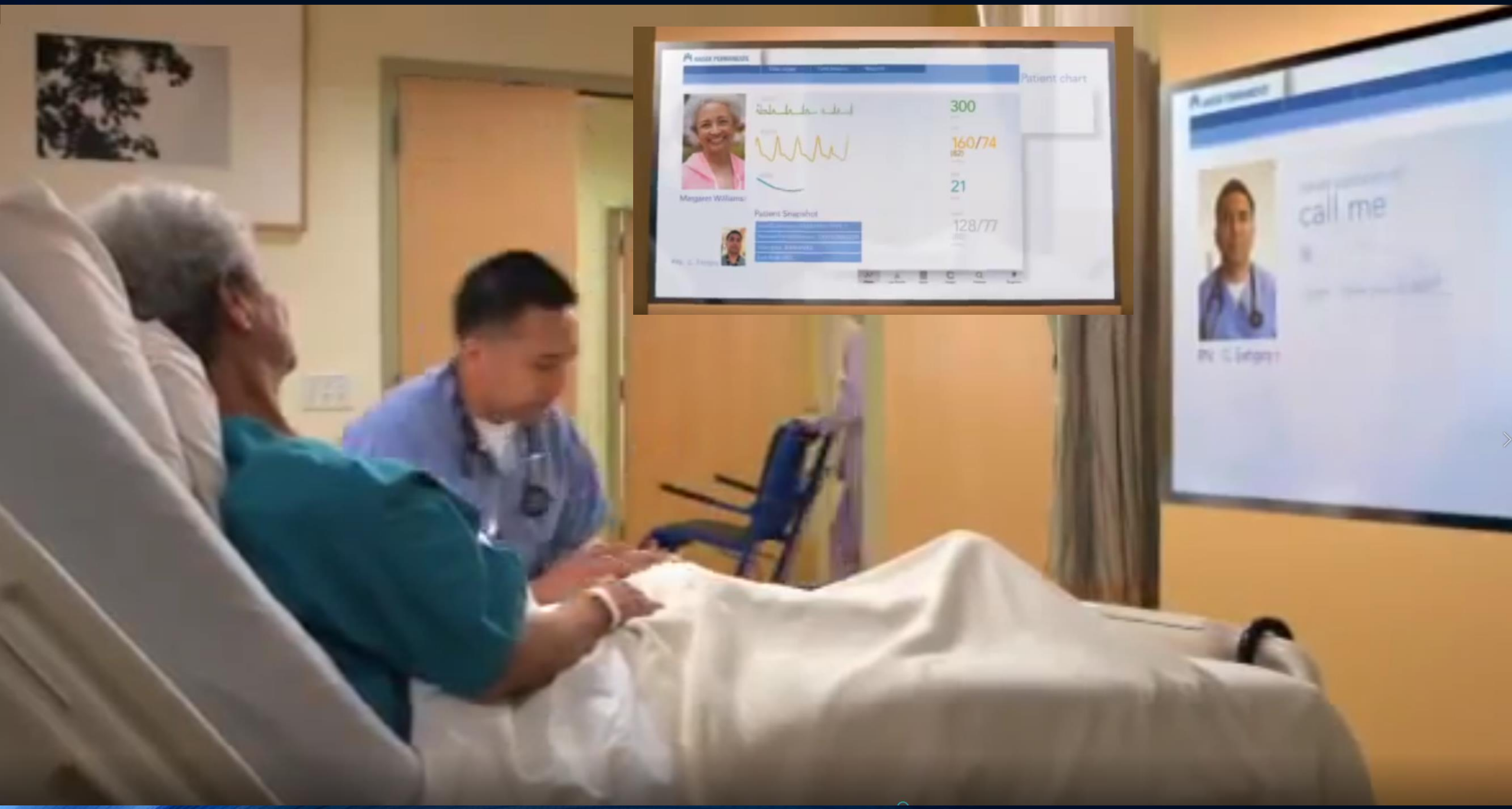
Wearable Health Monitoring

mHealth


Urgent Care Options
Kaiser Permanente
Cooper Hospital
Hills Memorial
Proximity: 7 Miles
Wait Time: 17 Minutes
Medicare Rating:
FM/AM
CD/XM
AUDIO
SEEK SKIP
VOL PUSH
PHONE
MAP
DEST
INFO
ZOOM OUT
CANCEL
PUSH ENTER
Access KP Mobile
Virtual Triage
Recommendation
GO TO URGENT CARE


New Patient
Diagnosis: Dehydration
Age 77
Room 400
Patient
Patient
Patient
Authorize Request
CCC Health Information Exchange
Records
Protocols
Benefits
GEISINGER NOTIFIED
KAISER PERMANENTE NOTIFIED

Remote Identification and Authorization


Patient chart
300
160/74
21
128/77
Patient Snapshot
call me

Connected Electronic Medical Record Systems (EMR)


Margaret Williams
Age 72
Room: 300
Request: IV Pump
Patient
Patient
Patient
Patient
Alert
Locations: IV Pump
CALL ROOM
CV-ICU
PHARMACY
ELEC
Margaret Williams
Request: IV Pump
Patient
Patient
Patient
Patient

Logistic Information Systems

RFID (Radio-Frequency Identification)

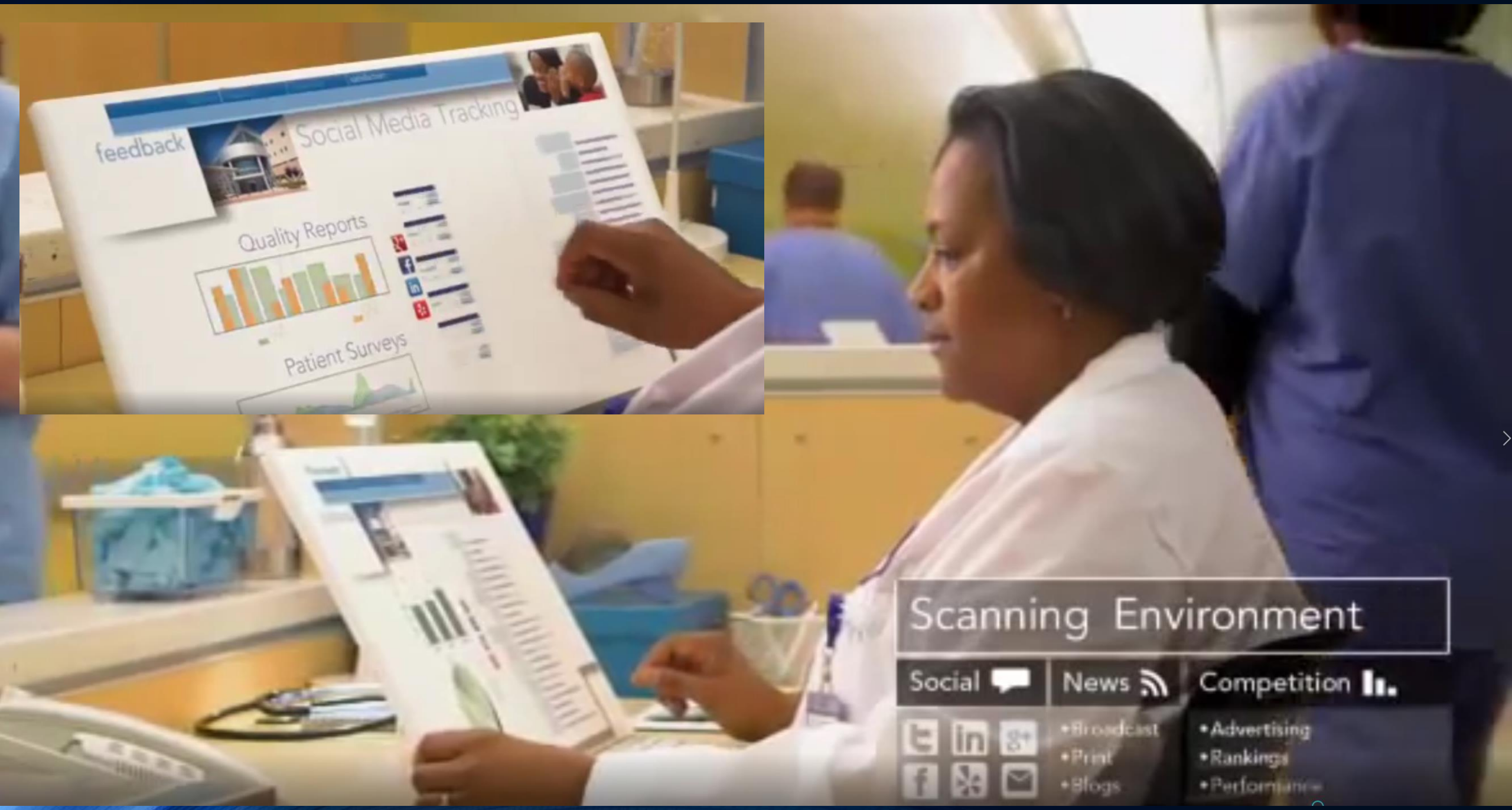
Augmented Reality


Patient chart
300
160/74
21
128/77


Patient Health Record > Margaret Williams
Lab Work
Chart Action
Date
Results
Total Cholesterol 12/01/2009 135
HDL 12/01/2009 55
LDL 12/01/2009 120
Triglycerides 12/01/2009 85
Blood Sugar 12/01/2009 90
Mamogram 08/01/2009 good
Chest X Ray 03/01/2009 good
Stress Test 01/01/2009 good

Telemedicine, Telehealth

Telemonitoring


feedback
Social Media Tracking
Quality Reports
Patient Surveys
Scanning Environment
Social
News
Competition
•Broadcast
•Print
•Blogs
•Advertising
•Rankings

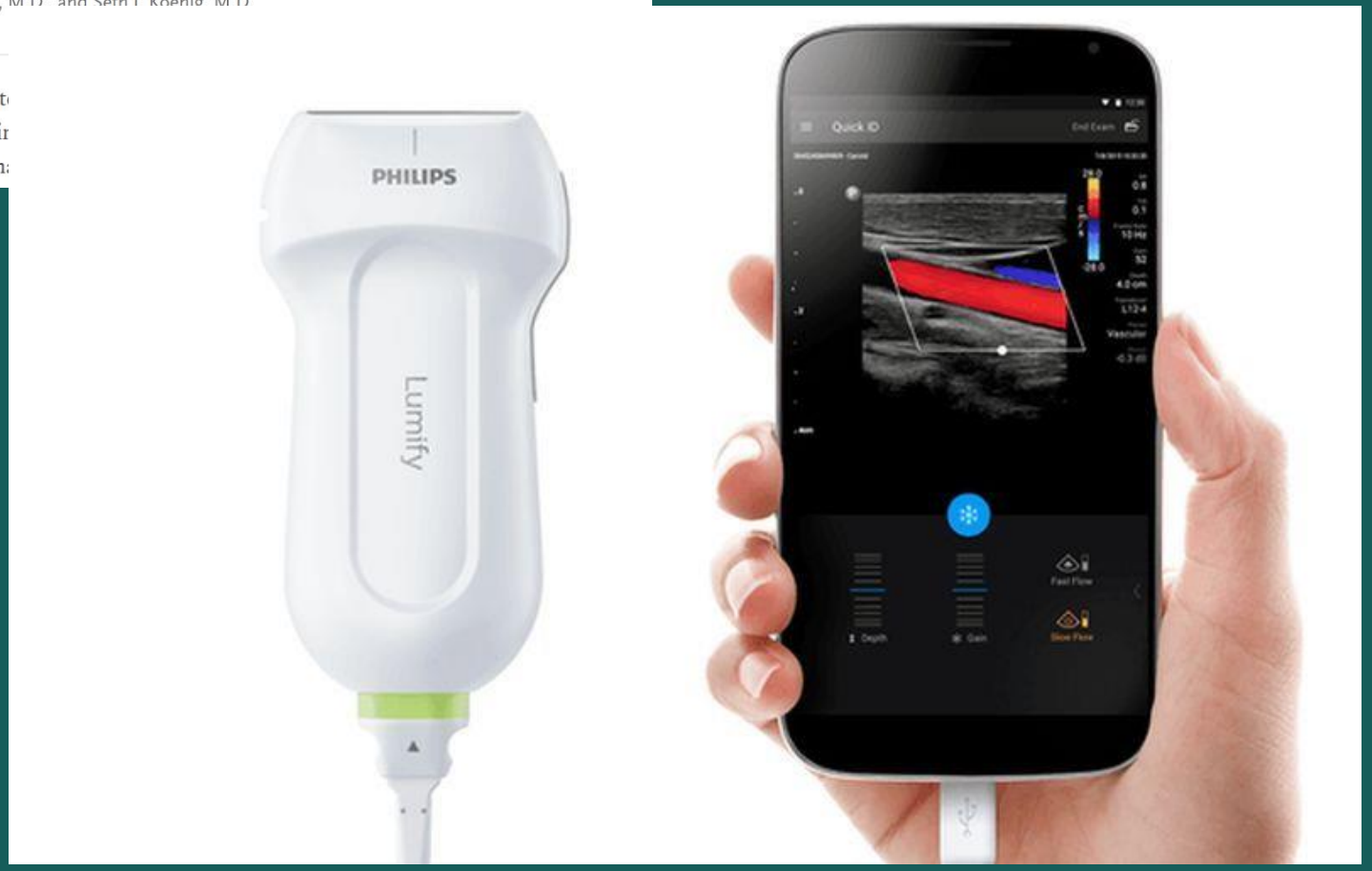
The NEW ENGLAND JOURNAL of MEDICINE

REVIEW ARTICLE FREE PREVIEW

Point-of-Care Ultrasonography

José L. Díaz-Gómez, M.D., Paul H. Mayo, M.D., and Seth J. Koenig, M.D.

POCUS is performed by the treating clinician at the bedside, with immediate int
integration of the imaging results. This review discusses POCUS technology, clir
the complementarity of POCUS and consultative ultrasonography in primary ima



A 60 years old female patient came to Out Patient Clinic (OPD) with severe dizziness at around 10:00 am on 10 March 2018

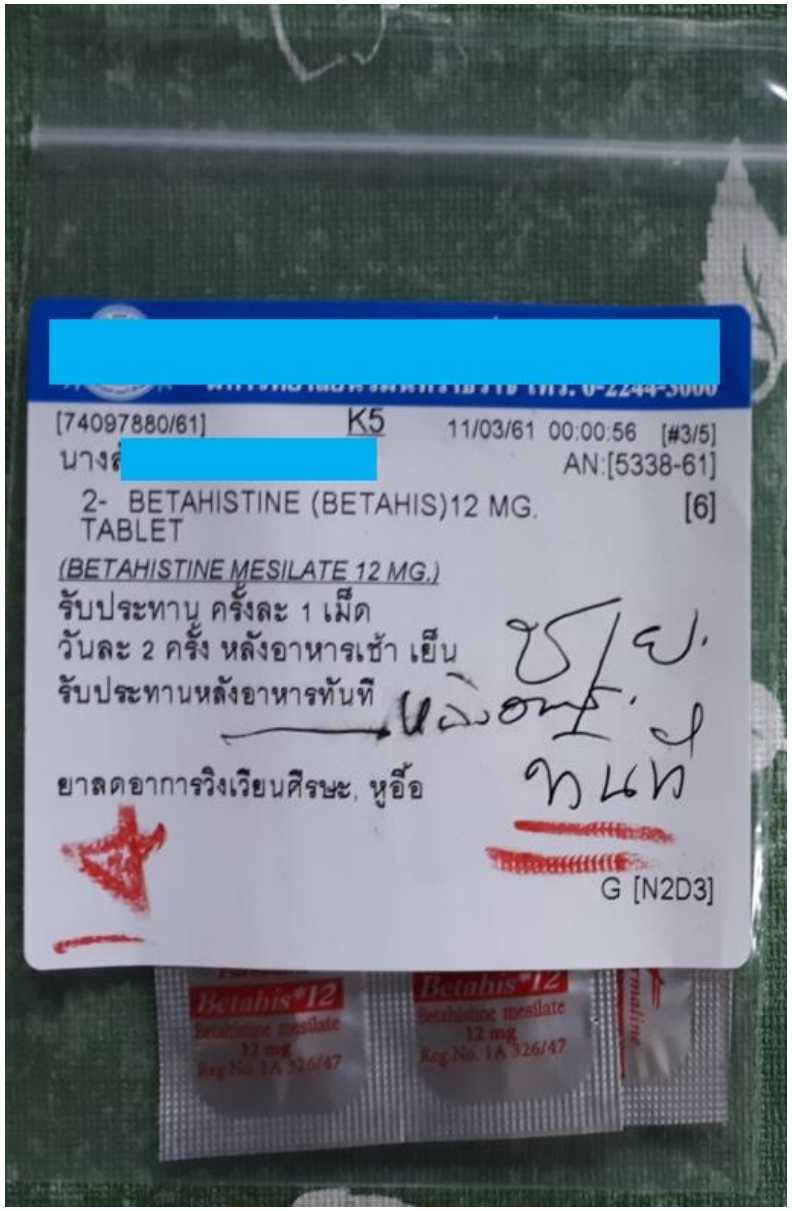
Doctor diagnose: Vertigo

Prescribed: **Merislon 12 mg.** 1 tab. Two times a day Morning-Evening

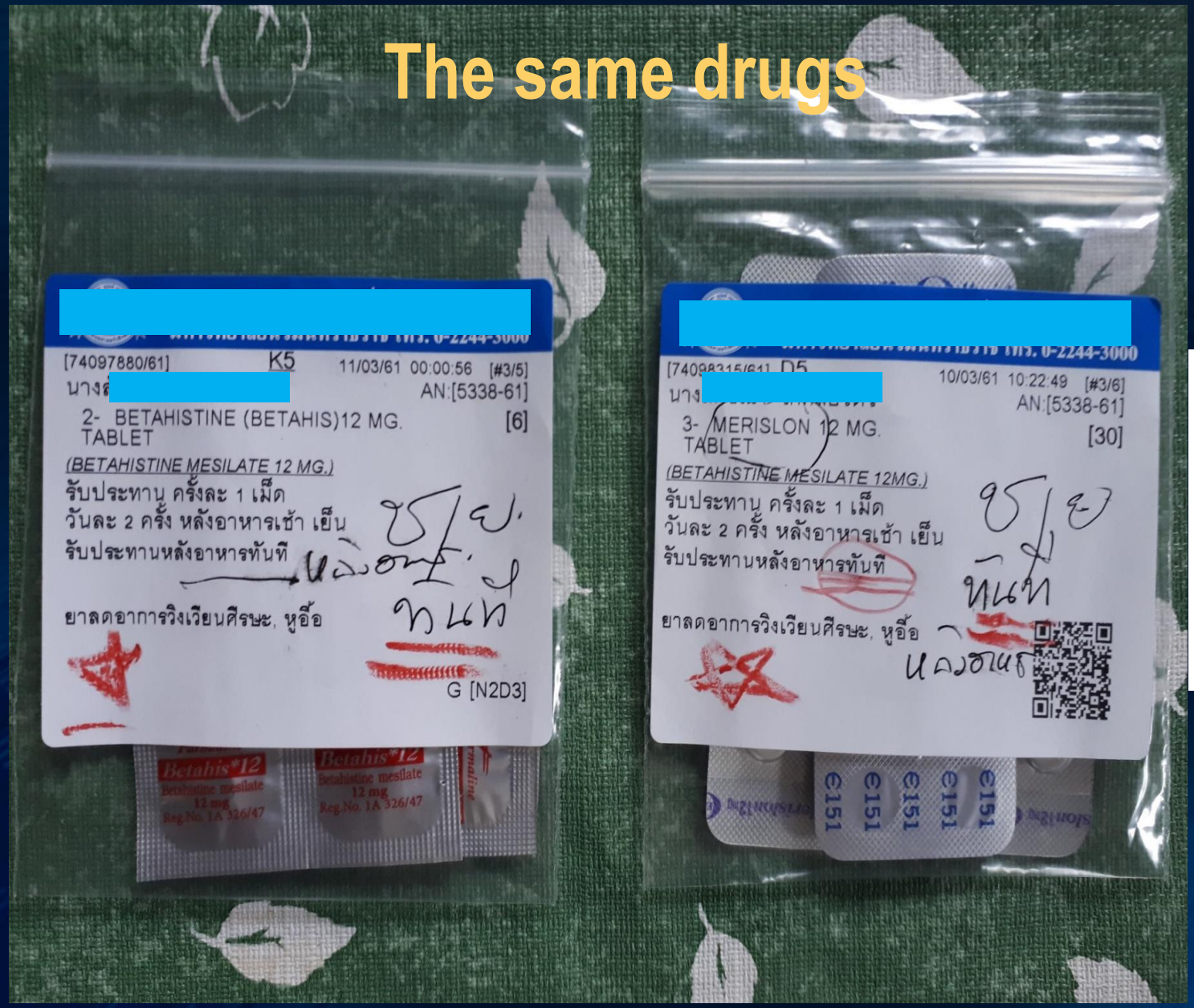
At around 01:00 on 11 March 2018, the patient came to emergency room the same hospital because of severe dizziness and vomiting

ER Dr. diagnose: Vertigo

Prescribed: **Betahistin 12 mg**. 1 Tab. 2 times/day morning-evening



The same drugs



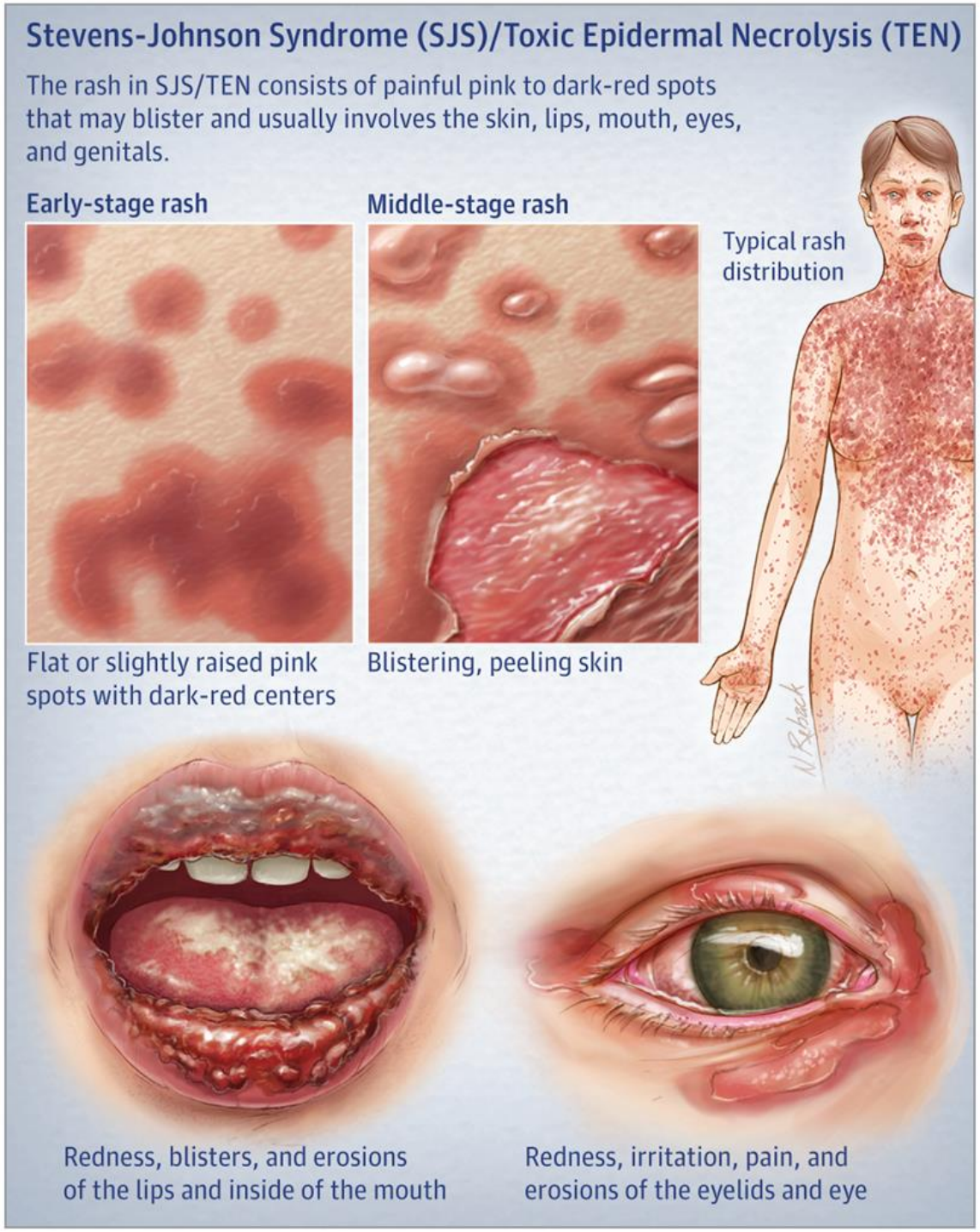
■ Generic Product Use (GPU)

TMTID (GPU)	Fully Specified Name
259452	betahistine mesilate 12 mg tablet, 1 tablet

■ Trade Product Use (TPU)

TMTID (TPU)	Fully Specified Name
259475	BEHISTIN 12 (ฟาร์มาสันต์แล็บบอราตอรี่ส์) (betahistine mesilate 12 mg) tablet, 1 tablet
261921	BETAHIS 12 (บางกอกแล็ป แอนด์ คอสเมติค) (betahistine mesilate 12 mg) tablet, 1 tablet
261966	BETAHISTIN-RATIOPHARM (MERCKLE, GERMANY) (betahistine mesilate 12 mg) tablet, 1 tablet
373799	MERISLON (EISAI, JAPAN) (betahistine mesilate 12 mg) tablet, 1 tablet
373878	MERTIGO (เภสัชกรรมศรีประสิทธิ์) (betahistine mesilate 12 mg) tablet, 1 tablet
1002736	MERISLON (อินเตอร์ไทย ฟาร์มาซูติเคิ้ล แมนูแฟคเจอริ่ง) (betahistine mesilate 12 mg) tablet, 1 tablet

PharmaSafe



Stevens-Johnson syndrome (SJS) and **toxic epidermal necrolysis (TEN)** are caused by a reaction of the body's own immune system. Drug Allergy Allopurinol , Sulfonamide , Vancomycin

Drug-Drug Interactions

Drug-related Alerts

Patient Name: OETEST, BILBO MRN: 3861822

You are ordering: **WARFARIN SODIUM.** Click here to

Cancel Warfarin Sodium

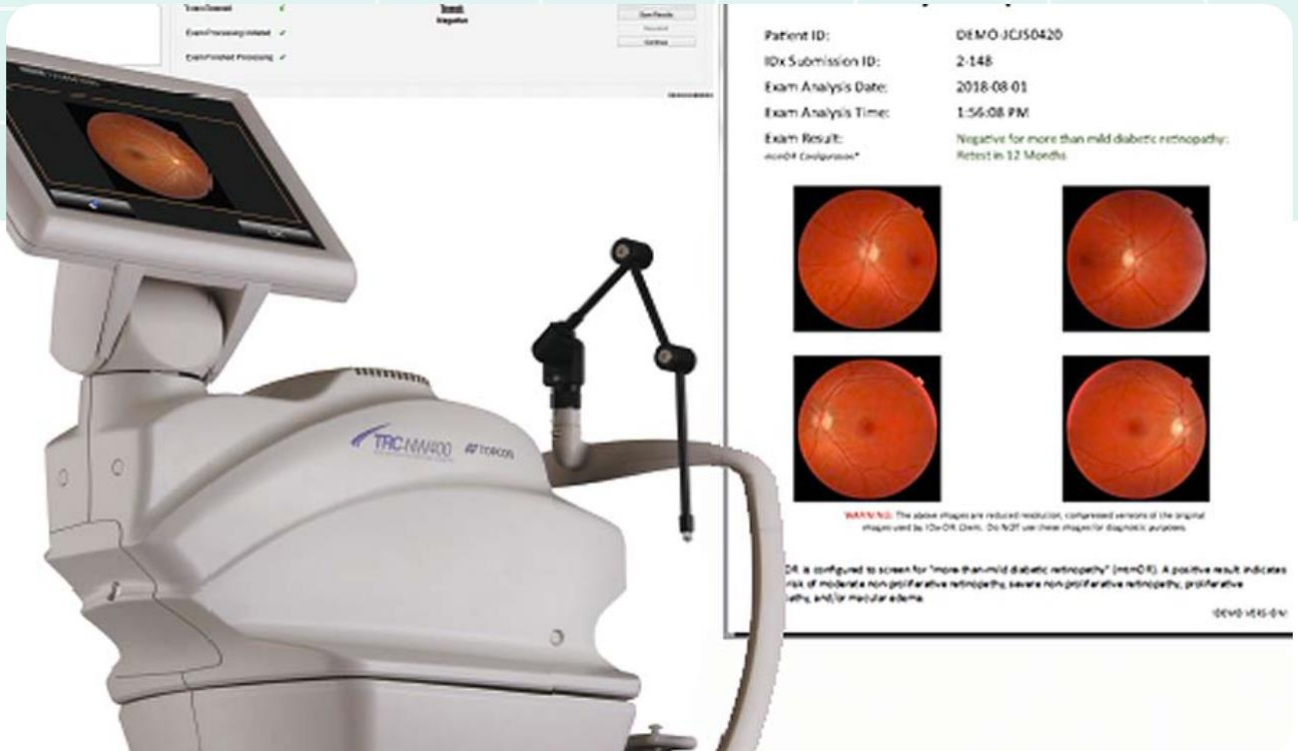
To keep the WARFARIN SODIUM order, you must respond to each of the interaction alerts below.

Drug-drug Interaction Alerts	Action
Patient is currently on: **Fluconazole** PO, 400 MG, QD, Begin day before transplant and continue QD Pt. on Warfarin and Azole Antifungal : Potentiation of warfarin - Recommend to avoid concurrent use but if co-therapy is warranted, Rec. to reduce warfarin dose by 33-50 % and follow pt closely.	○ Discontinue Fluconazole **Reason for override** ☐ Will adjust dose as recommended ☐ Will monitor as recommended ☐ Patient has already tolerated combination ☐ No reasonable alternatives ☐ Other

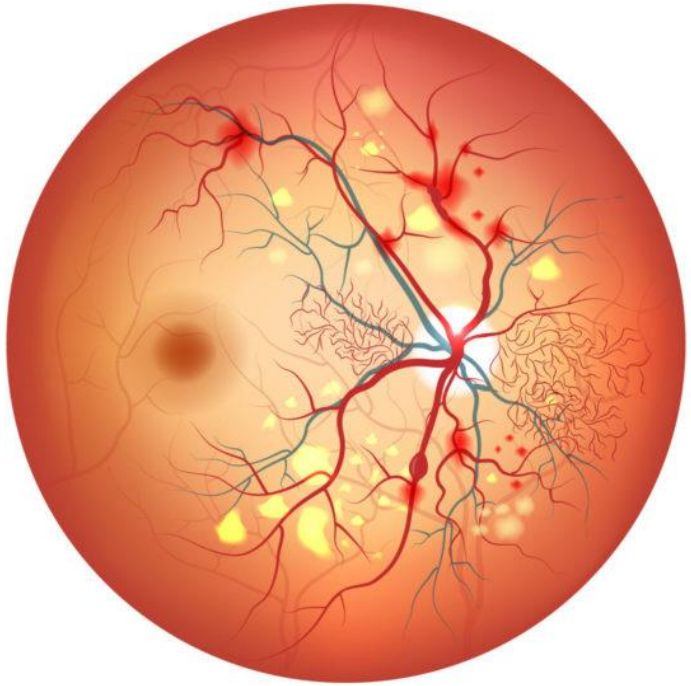
Continue (Keep WARFARIN SODIUM)

Press Releases | April 12, 2018

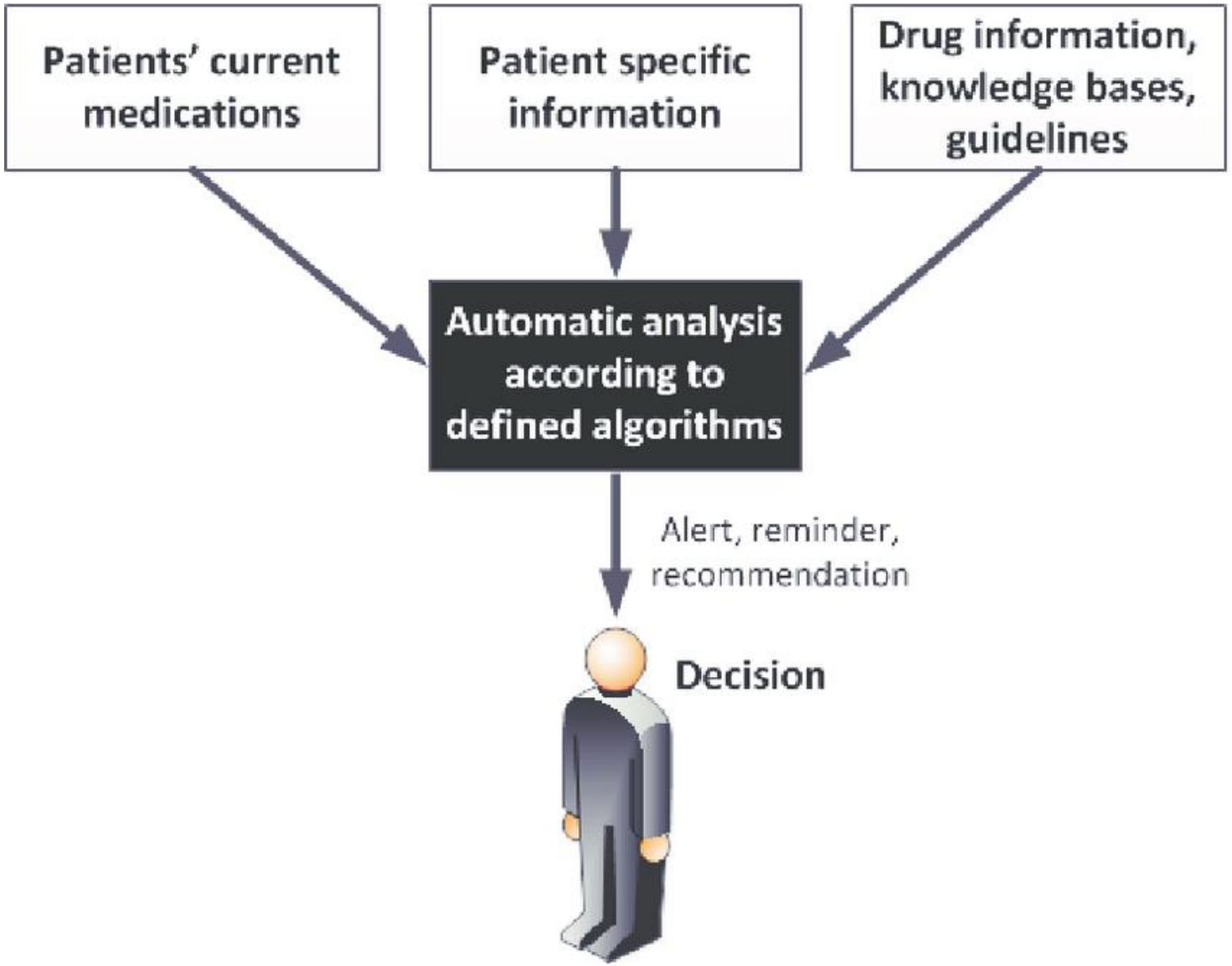
FDA permits marketing of IDx-DR for automated detection of diabetic retinopathy in primary care



DIABETIC RETINOPATHY



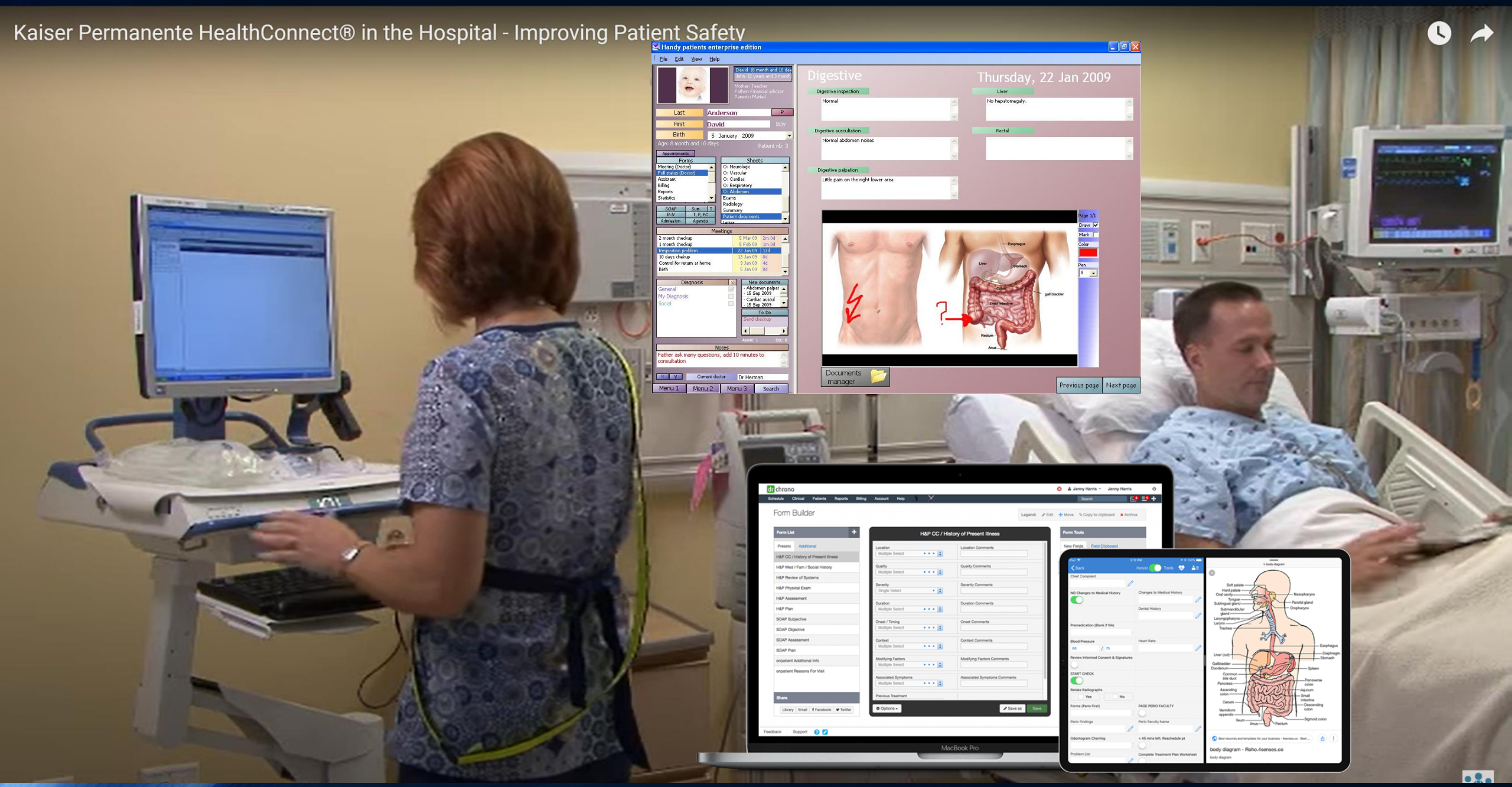
Clinical Decision Support Systems (CDSS)



Principles of clinical decision support systems (CDSS) in the medication management process

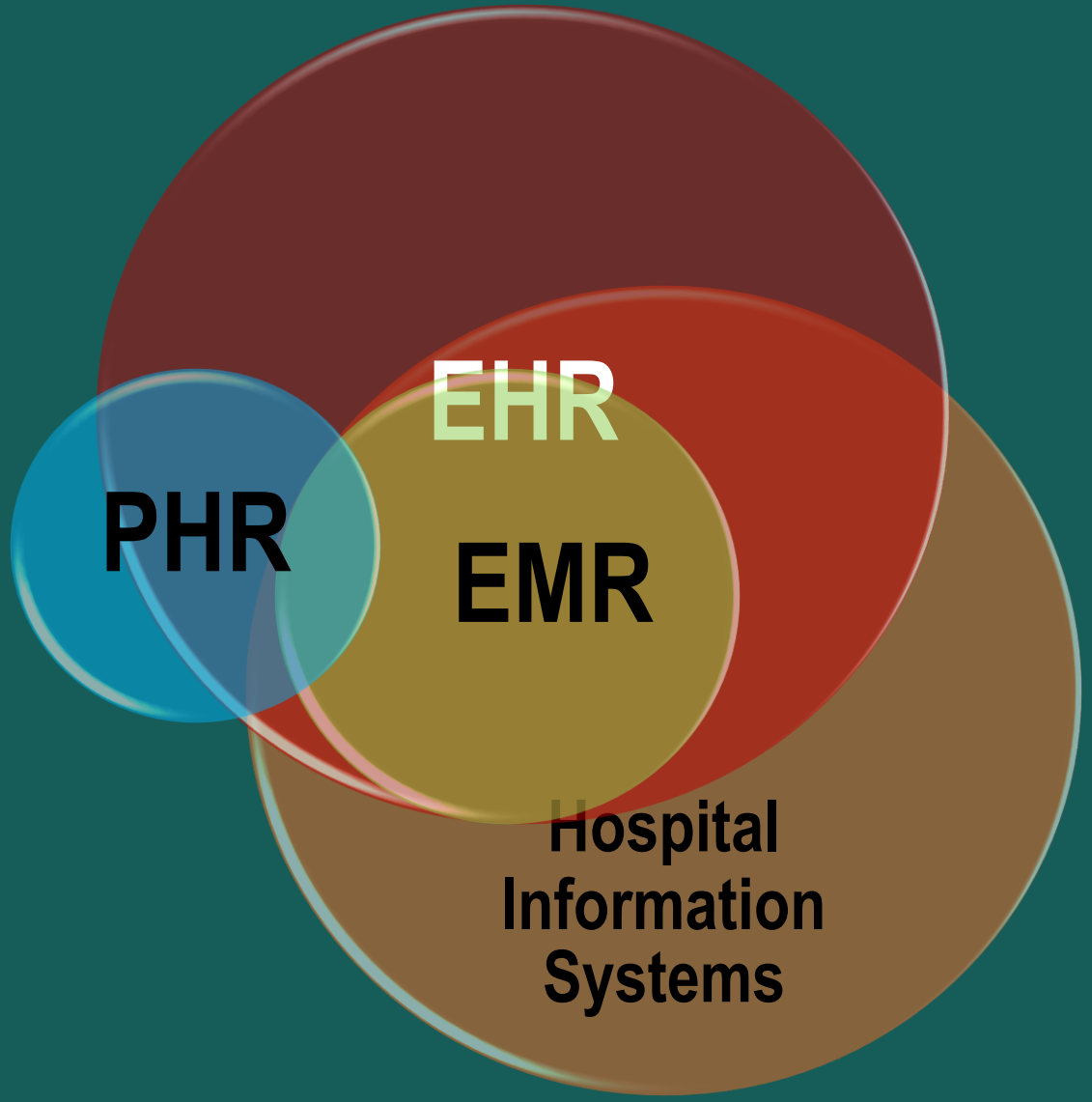
From: https://www.researchgate.net/figure/Principles-of-clinical-decision-support-systems-CDSS-in-the-medication-management_fig3_266265378

Kaiser Permanente HealthConnect® in the Hospital - Improving Patient Safety



Pictures from: ,https://en.wikipedia.org/wiki/Electronic_health_record

HIS – EMR – EHR - PHR relationship



EHR= Electronic Health Record
EMR= Electronic Medical Record
PHR= Personal Health Record
HIS = Hospital Information Systems

Knowledge-based (Evidence-based)

NCBI

PubMed.gov

US National Library of Medicine
National Institutes of Health

Epocrates
Medical
Get
In-App Purchases

Calculate (Medical...
Medical
Get

Omnio: Your personalized, all...
Medical
Get
In-App Purchases

NEJM This Week
Medical
Get

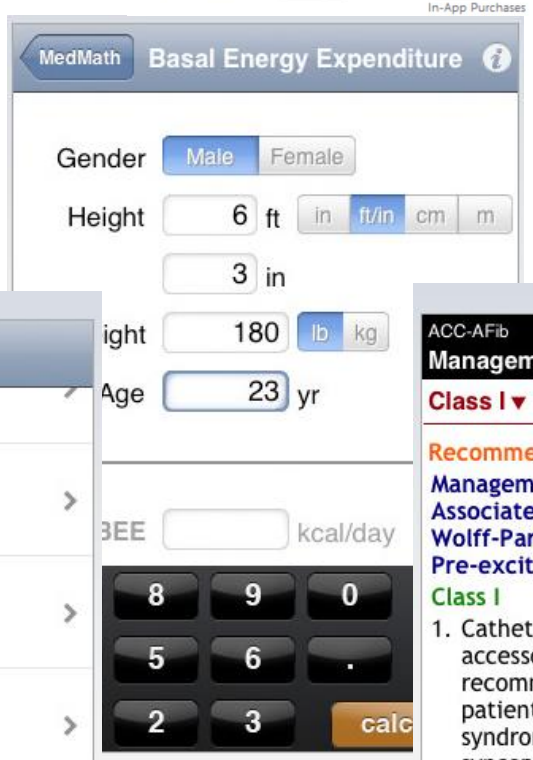
USMLE & ABIM Qbank
Medical
Get

AHRQ ePSS
Medical
Get

Eponyms (for students)
Medical
Get

Epocrates Bugs + Drugs
Medical
Get

Wolters Kluwer
UpToDate®

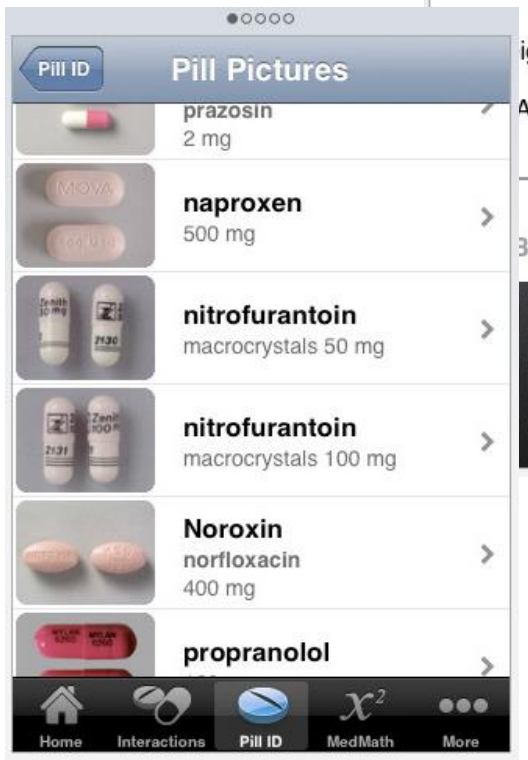


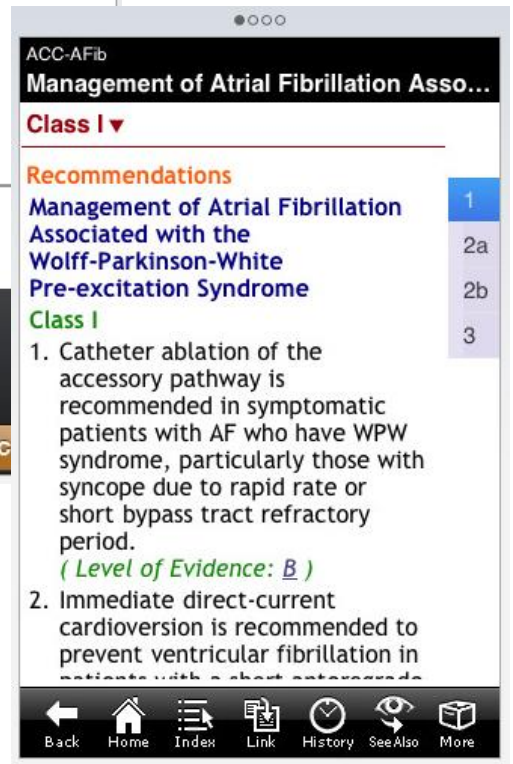
ELSEVIER
Elsevier

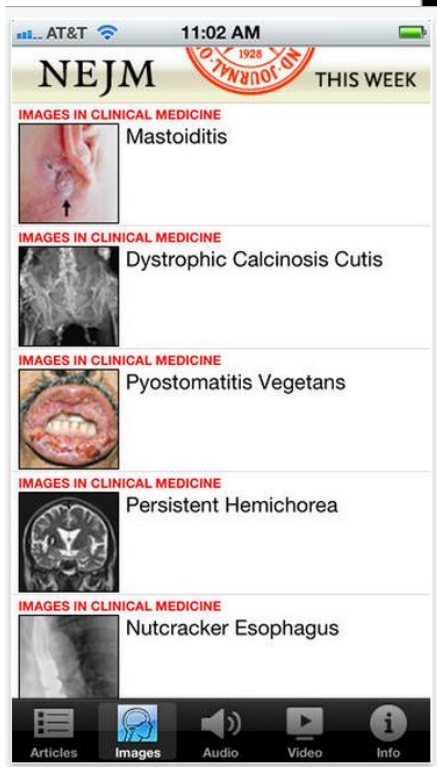
ScienceDirect
Science…

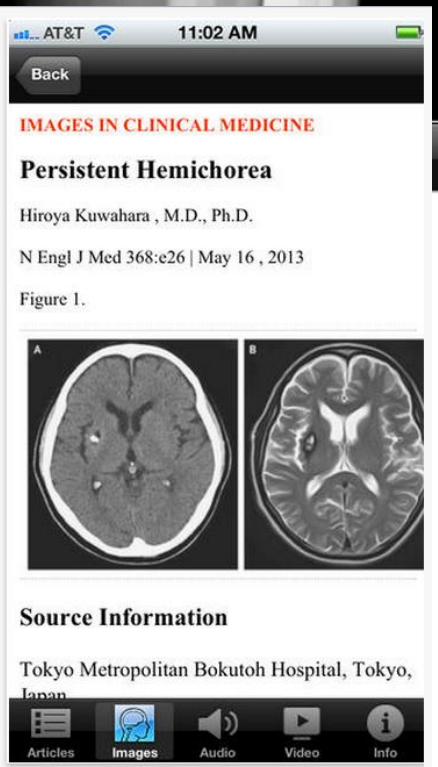
SPRINGER NATURE
Springer Nature

Apress
Apress









Knowledge Retrieval Information Systems

CDSS

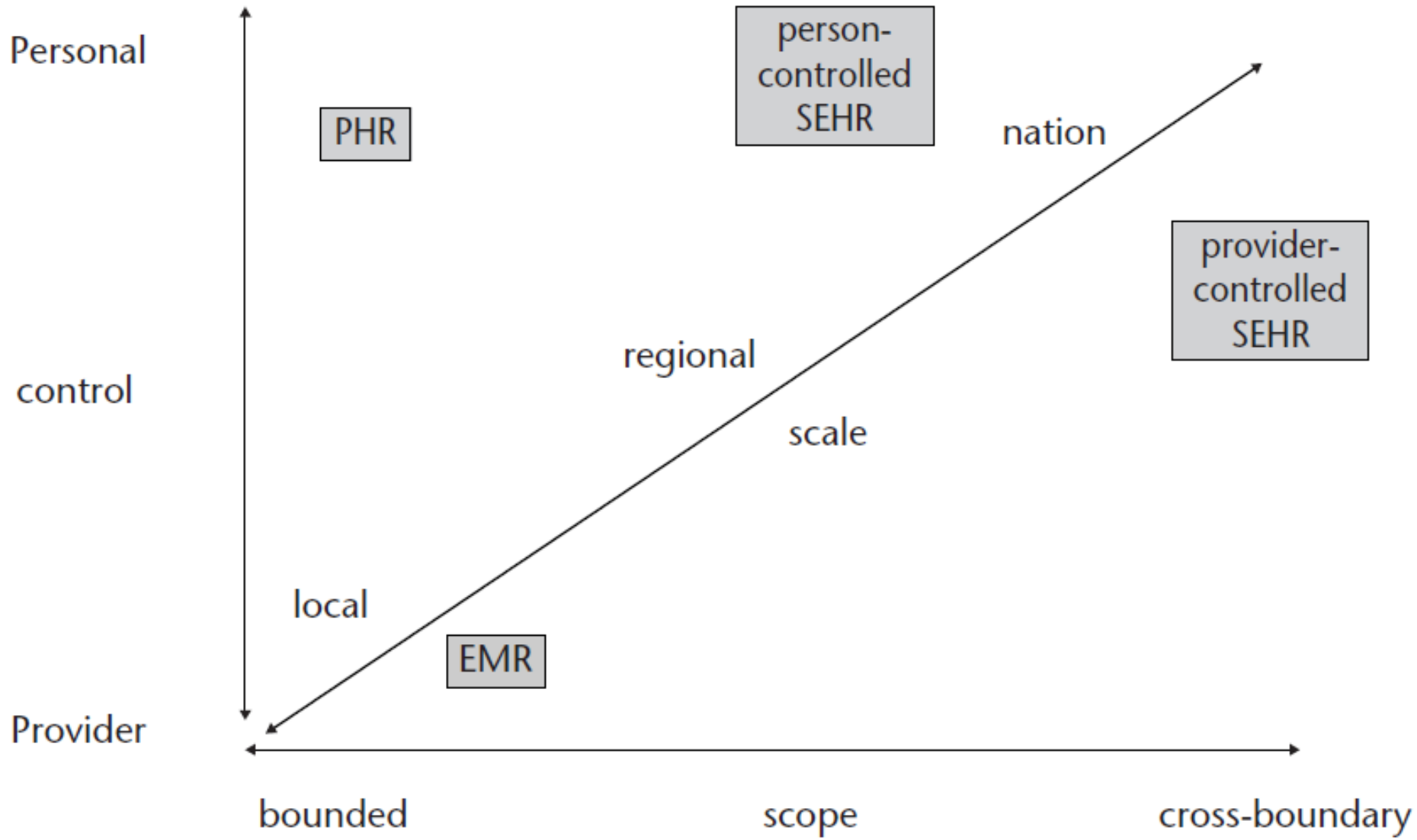
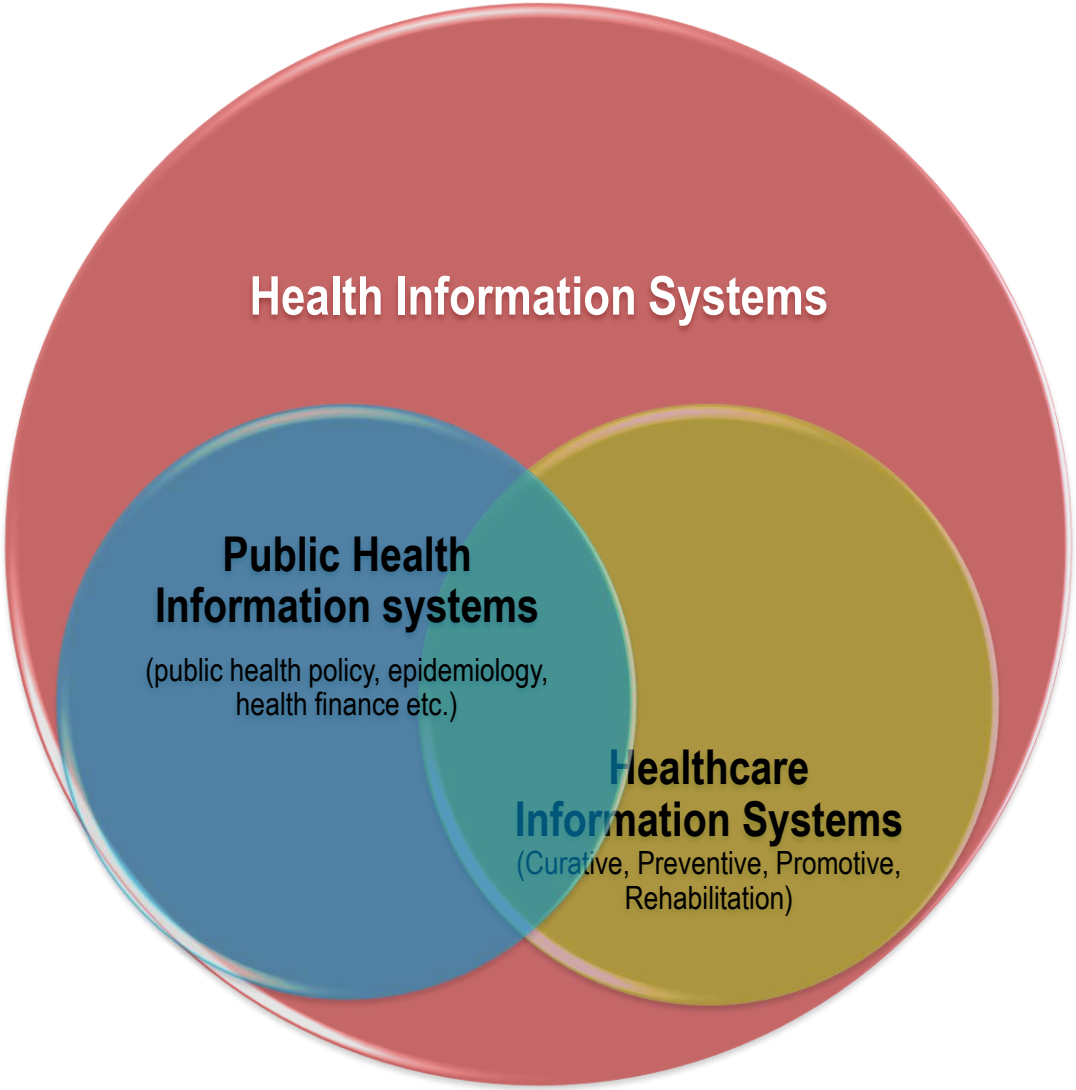
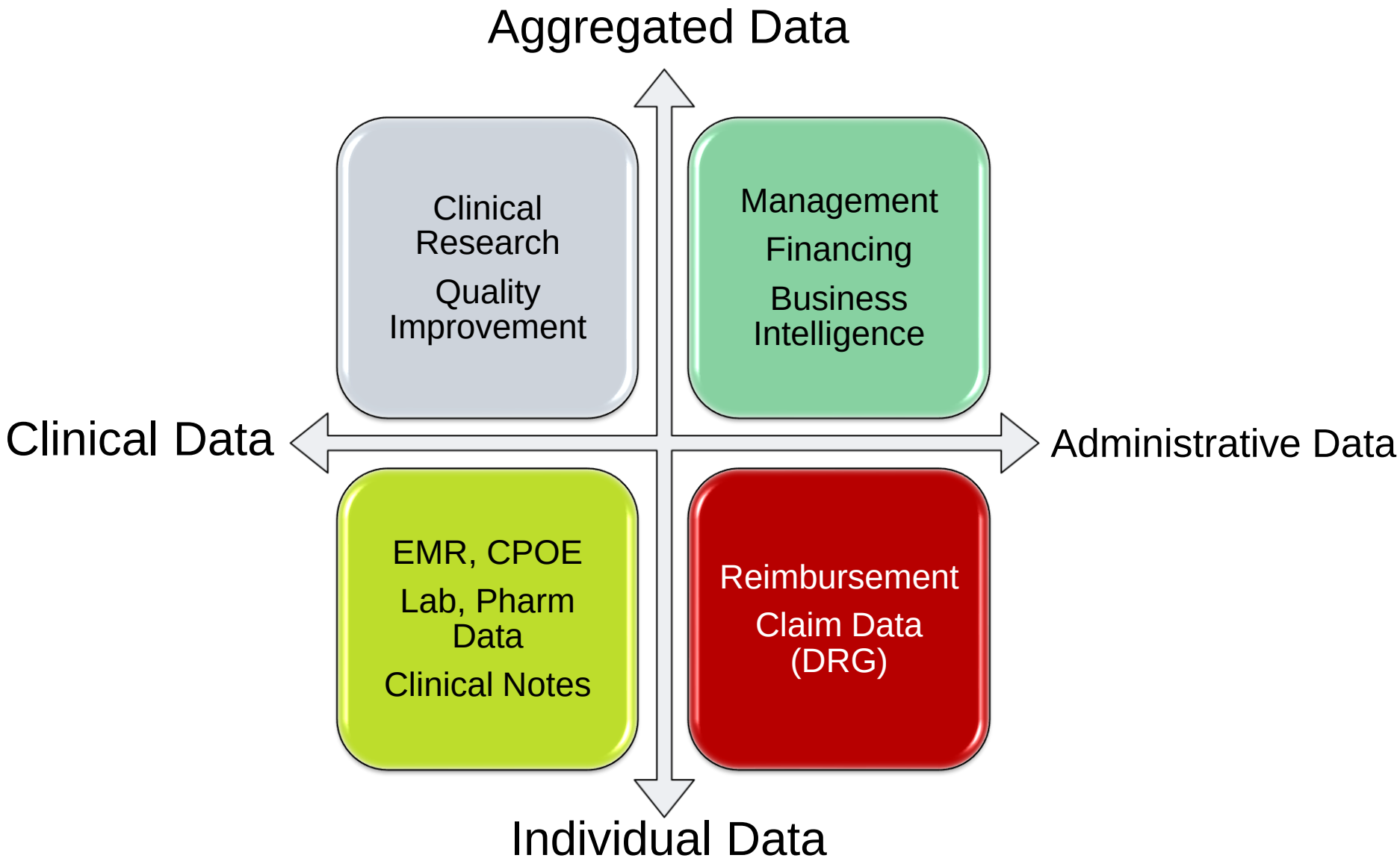


Figure 2.1. Dimensions of EHRs

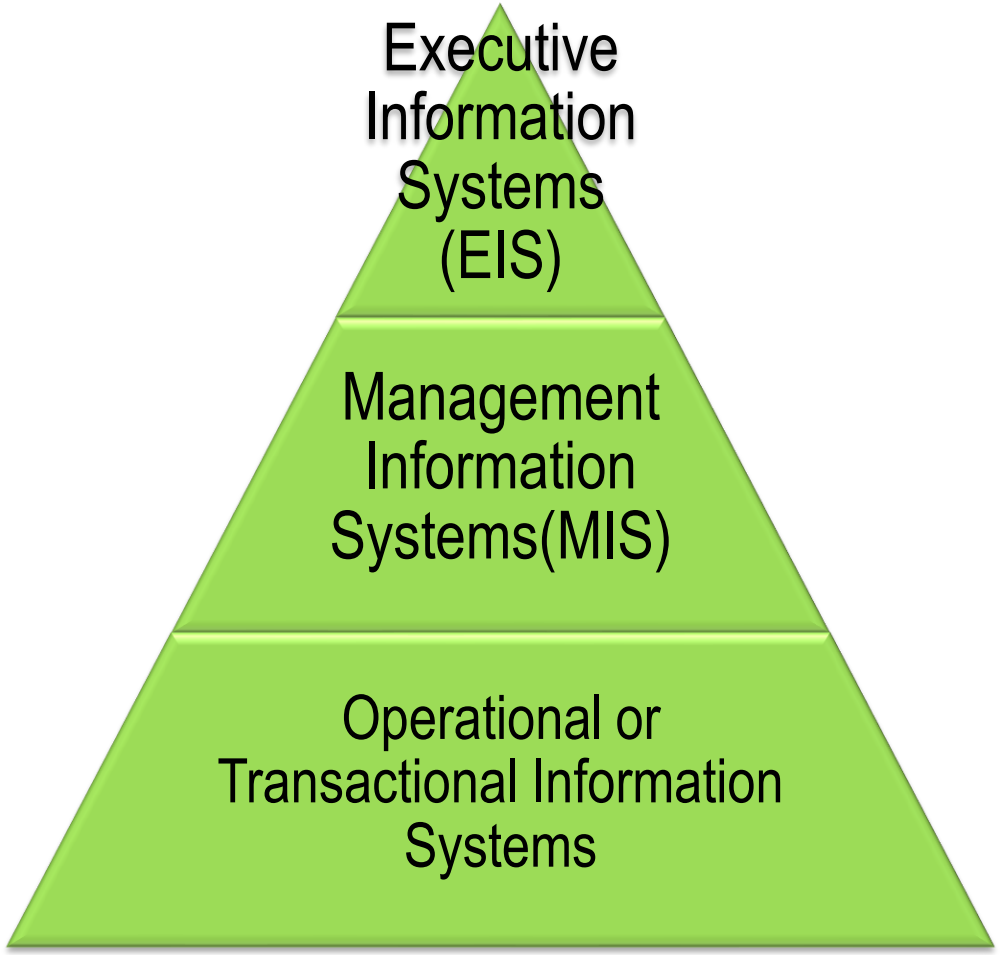
Health Information Systems, Healthcare Information Systems and Public Health Information Systems



Patient Data



Hierarchy of Information systems (Organizational Structure views)



Executive Information Systems (EIS)	Ministerial & Departmental Information System,
Management Information Systems(MIS)	Provincial Health Office MIS, Hospital MIS, Information systems for health and project managers
Operational or Transactional Information Systems	Information at point of services, Health Center IS, Clinical Information systems, Billing

Data Consumer Food chain

Tertiary Consumer

Secondary Consumer

Primary Consumer

Producer

Hawk

Frogs

Insects

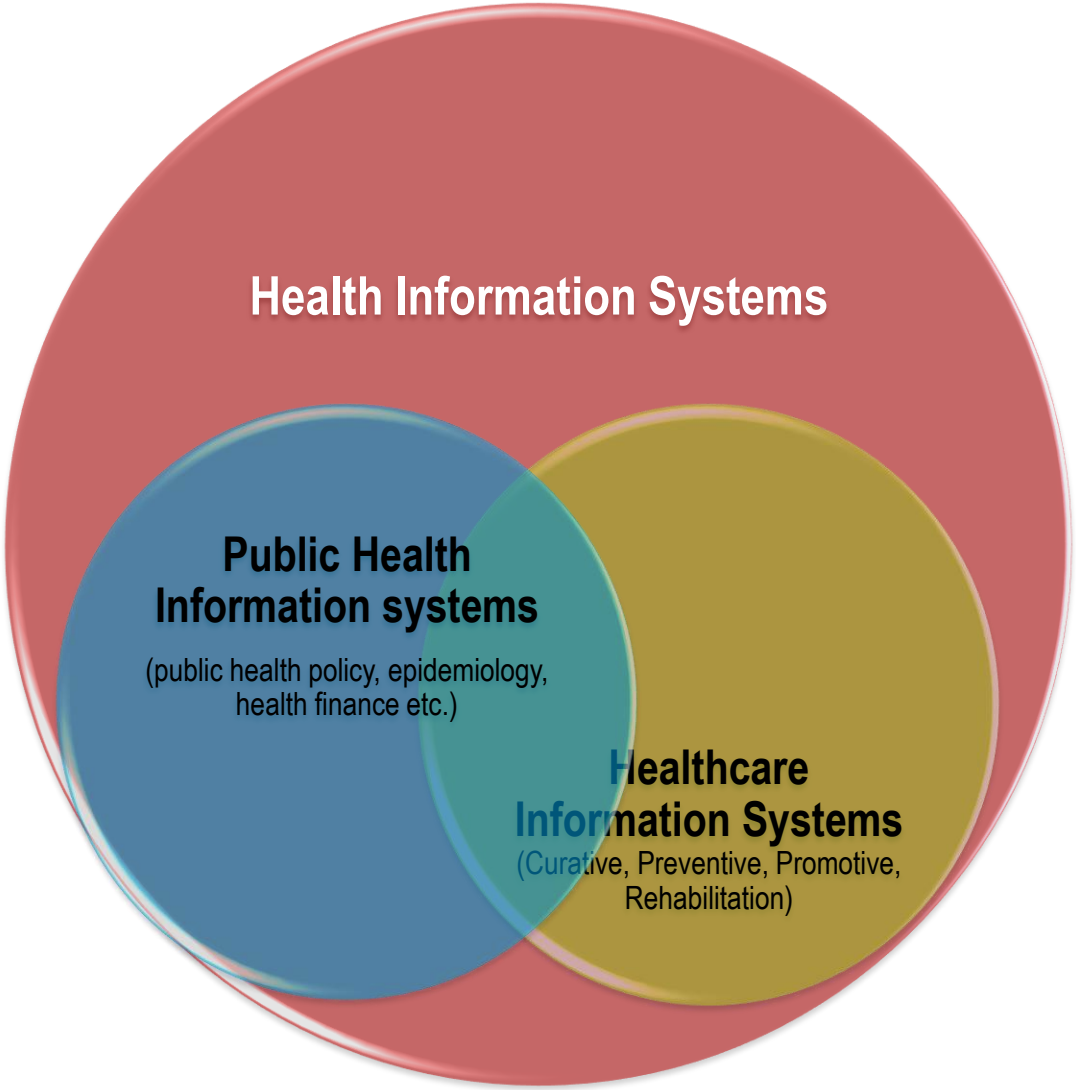
Plants

EIS
Research
M&E
Assessment

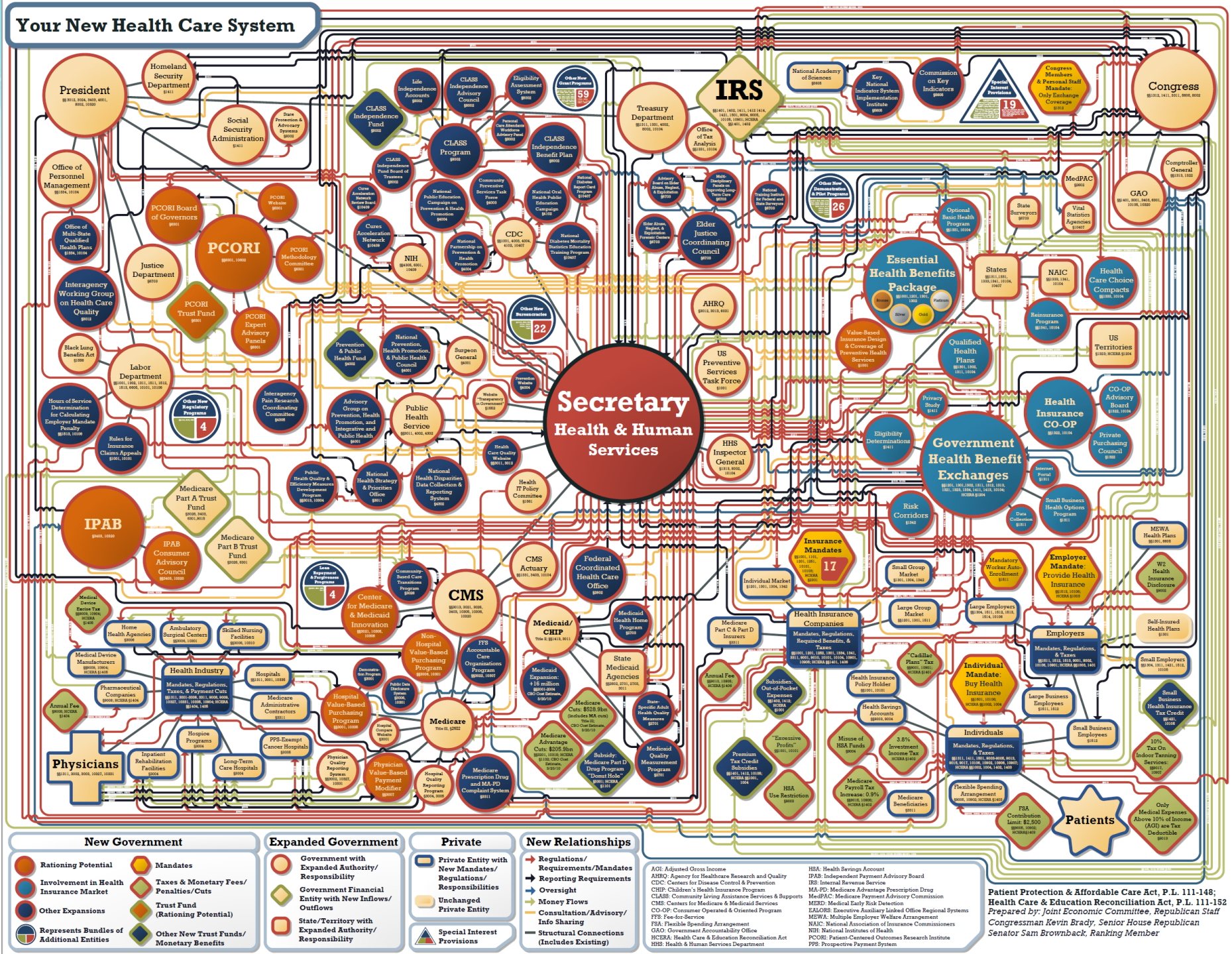
HMIS

Point of Care

Health Information Systems, Healthcare Information Systems and Public Health Information Systems



Why the dream doesn’t come true



Health Systems are Complex

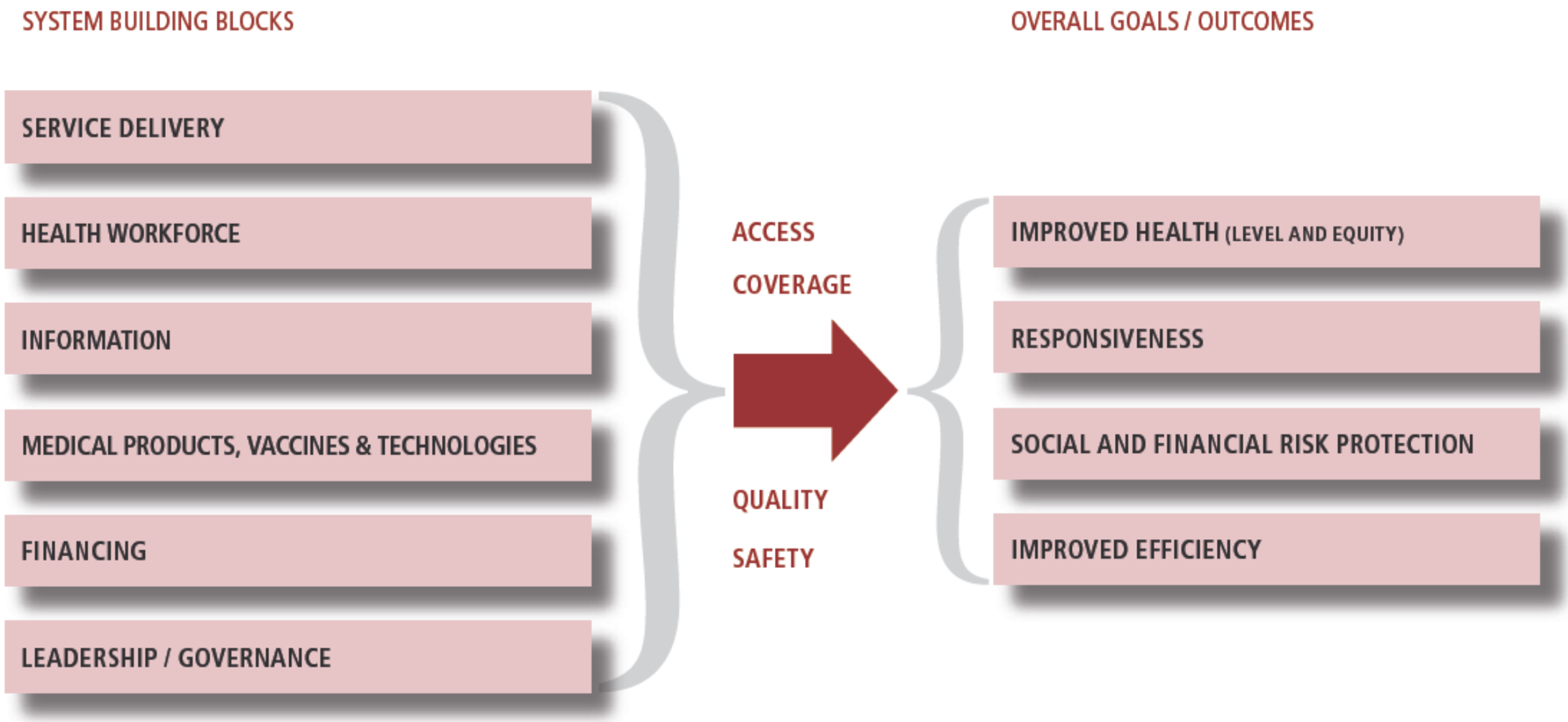
Many stakeholders

Many transactions between stakeholders

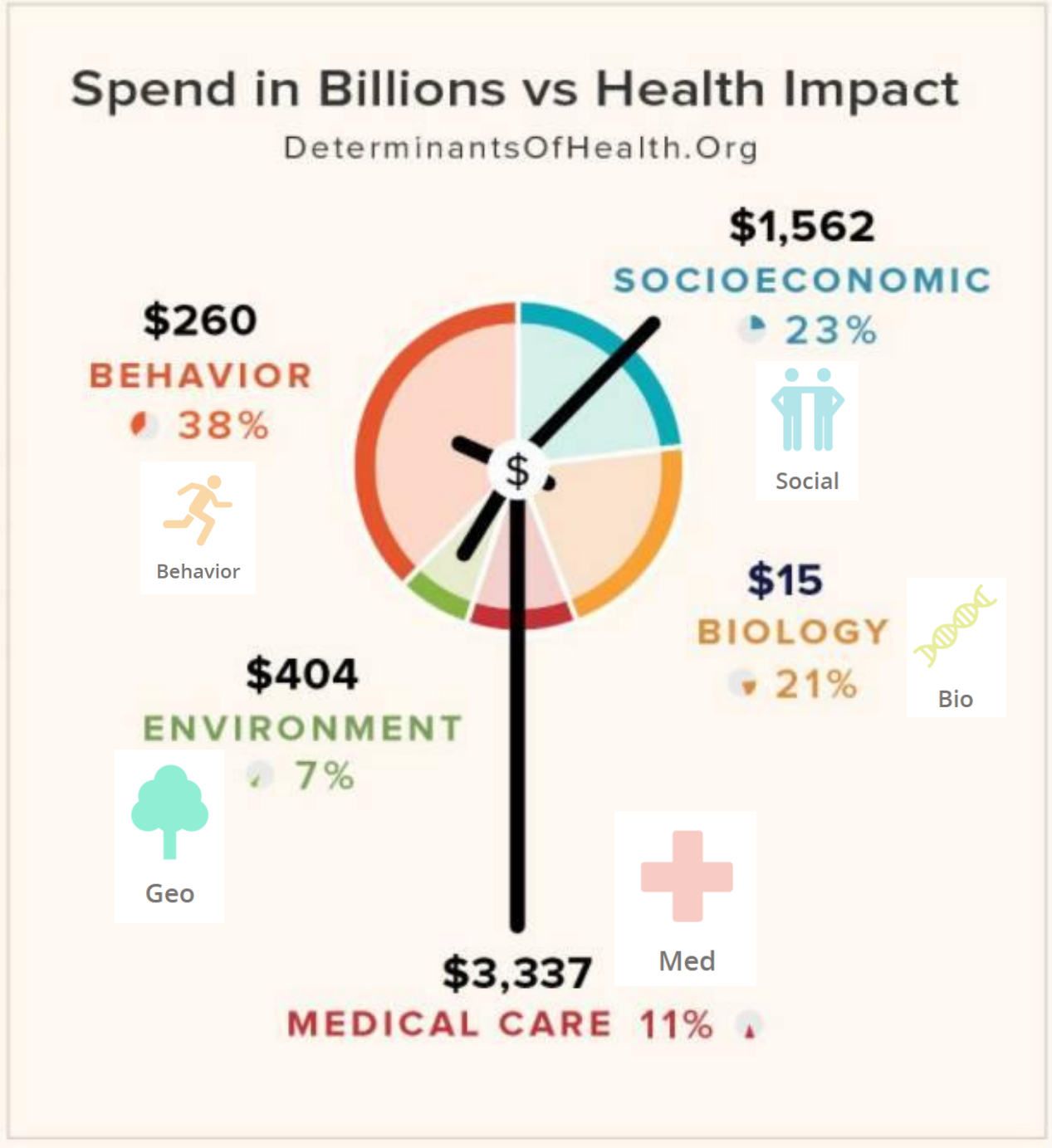
Different rules and contractual arrangements

https://www.jec.senate.gov/public/_cache/files/8e6dbf03-ca4a-44be-9de4-a100c43fb5c8/obamacare-chart-high-resolution.pdf

THE WHO HEALTH SYSTEM FRAMEWORK

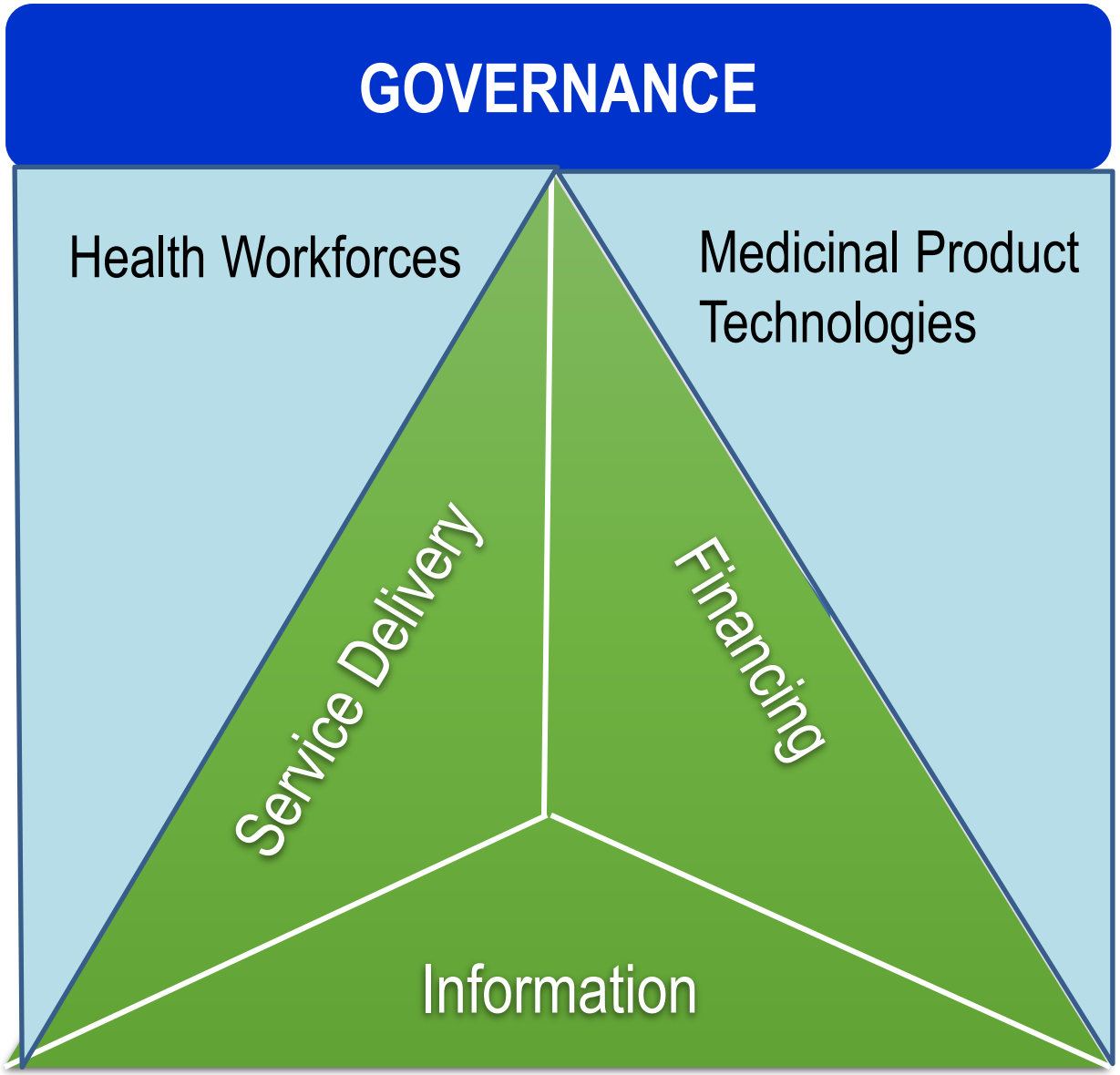


THE SIX BUILDING BLOCKS OF A HEALTH SYSTEM: AIMS AND DESIRABLE ATTRIBUTES



Determinants of Health & National Expenditure on Health (US)

https://www.goinvo.com/vision/determinants-of-health/?fbclid=IwAR1Jn5aH4zV4izWAovj8CzOyxMAad1pgWVfJkGX8qvuuC7xzAy-YmSGD2bM



Designing Health Systems

- **Health care financing**, **health care delivery**, and **health care Information technology** are directly linked.
- The way in which health care professionals and health care organizations are paid creates incentives that have consequences both in the way they act and in the information that they seek."

Health Systems Transformation (US CDC)

- new structures for integrating and coordinating services
- a renewed focus on patient engagement and patient-centered care
- new payment models based on the value of population-based health outcomes rather than the volume of services delivered.

Will “Digital Health” enable Health Systems Transformation?

https://www.cdc.gov/policy/hst/index.html

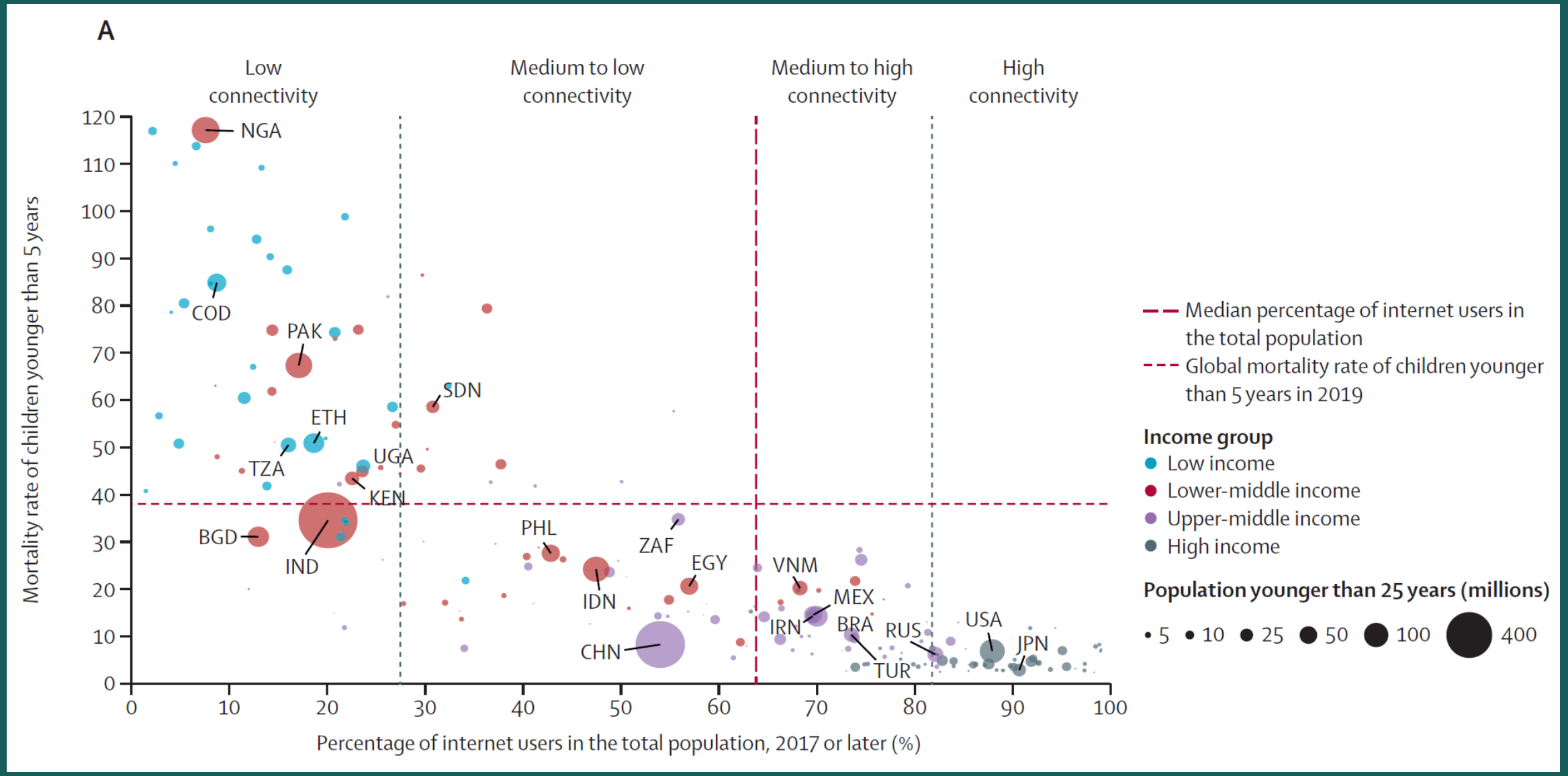
Transformation

Transformation literally means “a change of form.”

The Dramatic Change

Picture credit: https://medium.com/@dhaval.gajaria07/adulting-butterfly-to-caterpillar-af22478ea945
Quote: https://www.modernhealthcare.com/opinion-editorial/transformation-healthcare-imperative-we-just-arent-sure-what-we-want-become

Children 0-5 Yrs mortality and % Internet User in country



The Lancet and Financial Times Commission on Governing Health Futures 2030: Growing Up in a Digital World October 2021 The Lancet 398(10312):1727-1776

Digital Transformations/Ecosystem Increase or Decease Health Equity?

Digital transformations defined as the multifaceted processes of integration of digital technologies and platforms into all areas of life, including health.

The Lancet and Financial Times Commission on Governing Health Futures 2030: Growing Up in a Digital World October 2021 The Lancet 398(10312):1727-1776

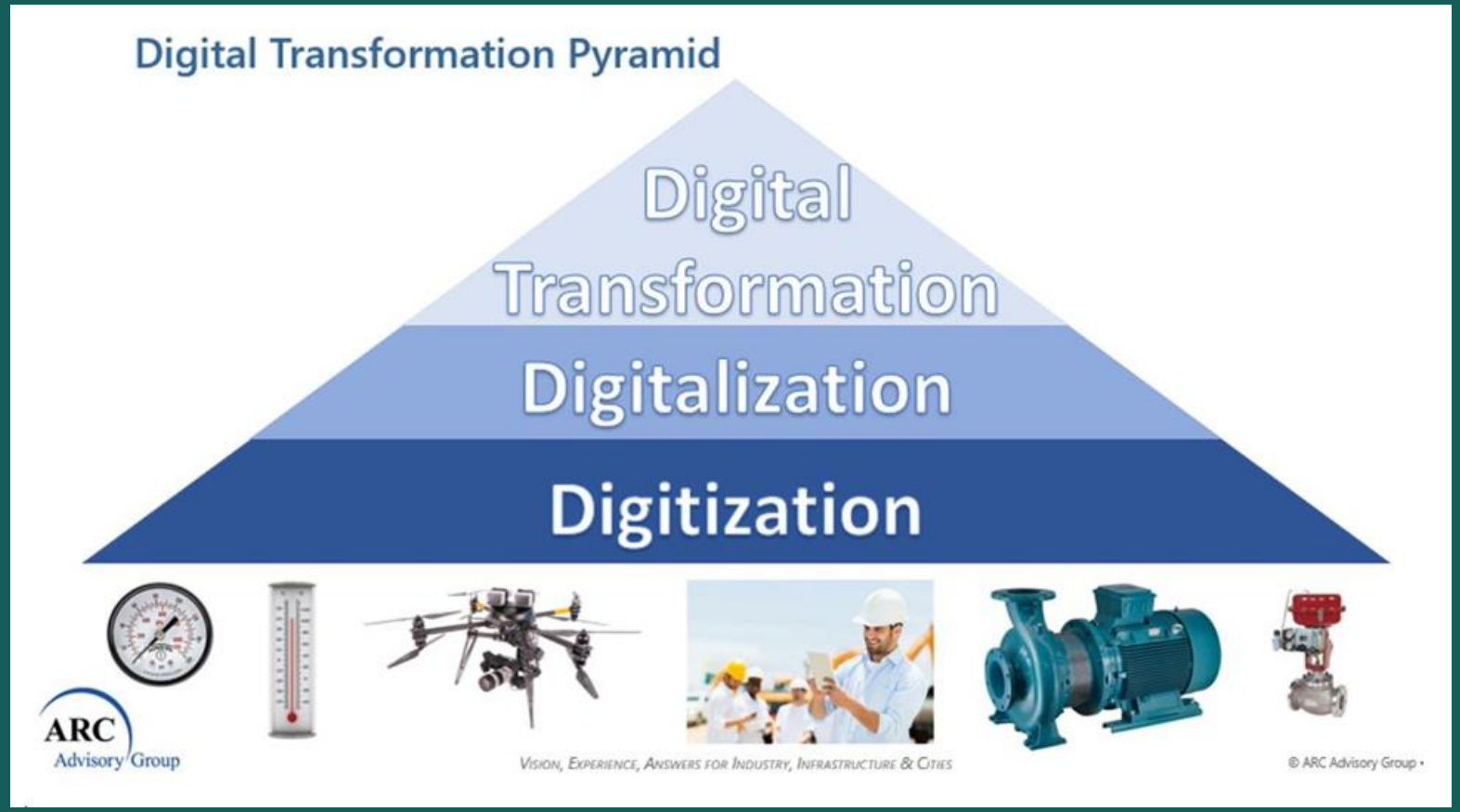
What is Digital Health?

Digital health can be defined as health and healthcare in the context of digital societies

Digital society = The people, organisations and things engaged in persistent digital interactions

Digital transformation = The integration of digital technology into all areas of a firm, government agency or economy in ways that fundamentally change how they operate.

https://www.hisa.org.au/wp-content/uploads/2019/12/What_is_Digital_Health.pdf?x97063



Digital Transformation is really business transformation enabled by digitalization.

Digitalization refers to enabling or improving processes by leveraging digital technologies and digitized data.

Digitization refers to creating a digital representation of physical objects or attributes.

2012 eHealth Components (WHO-ITU Model)

eHealth components

Leadership and governance

Strategy and investment

Services and applications

Standards & interoperability

Infrastructure

Legislation, policy and compliance

Workforce

The Enabling Environment

Leadership and Governance

Strategy and Investment

Services and Applications

Standards and Interoperability

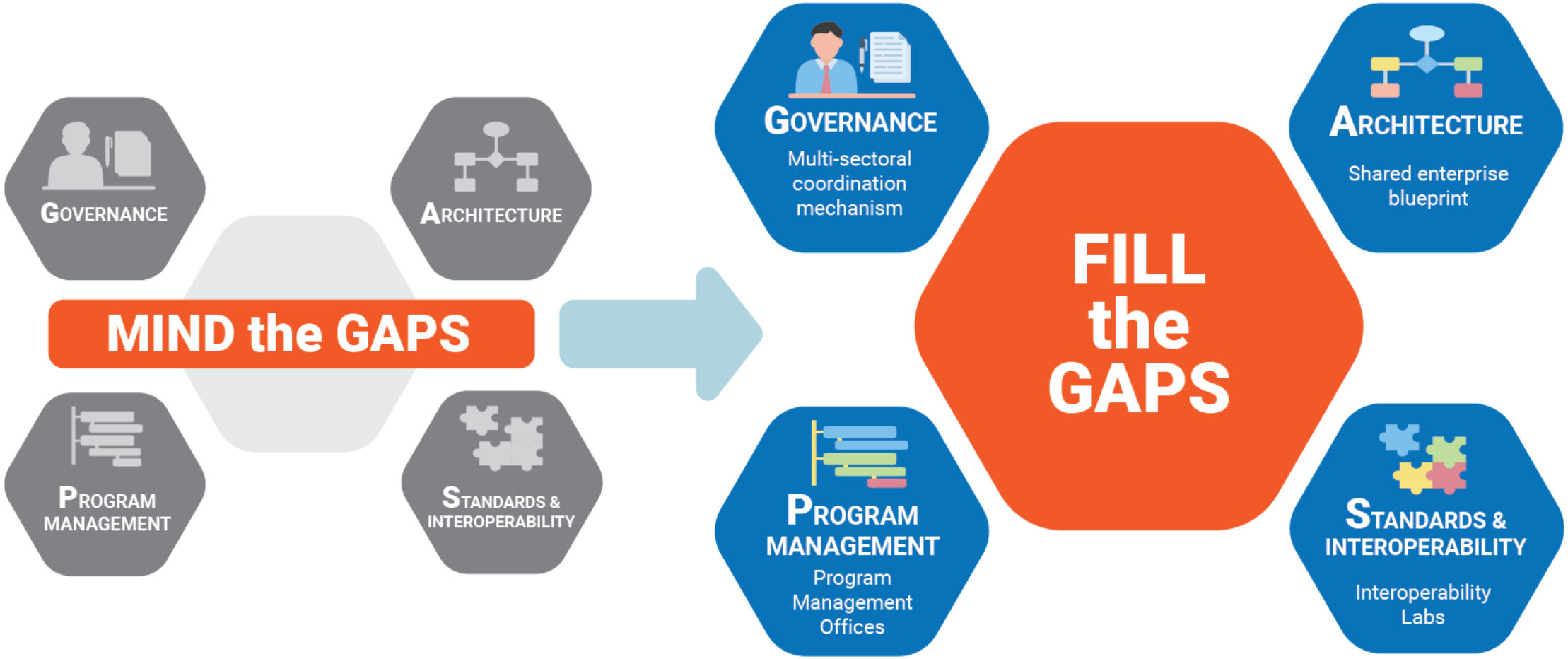
Infrastructure

Legislation, Policy and Compliance

Workforce

Source: National eHealth strategy toolkit

To develop National Digital Health Systems, countries need to work on four important foundation components:



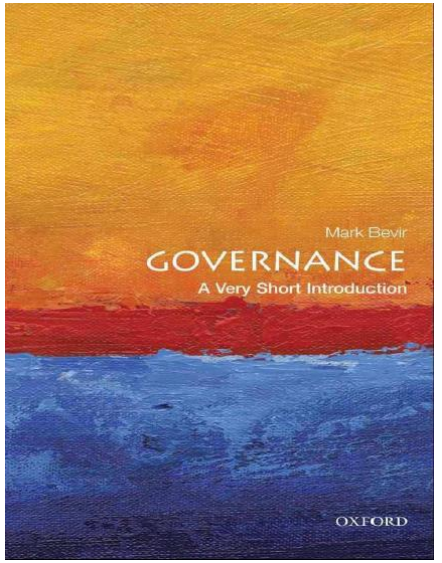
What is Governance?

Putting the I in HealthIT
www.HealthIT.gov

Jodi G. Daniel, JD, MPH
Director, Office of Policy
ONC

Wikipedia Definition

- **Governance** refers to "all processes of governing, whether undertaken by a government, market or network, whether over a family, tribe, formal or informal organization or territory and whether through laws, norms, power or language."[1] It relates to processes and decisions that seek to define actions, grant power and verify performance.
- Can occurs in three broad ways:
  - Public-private partnerships
  - Market mechanisms (may operate under government regulation) OR
  - Governments



[1] Bevir, Mark (2013). *Governance: A very short introduction*. Oxford, UK: Oxford University Press.

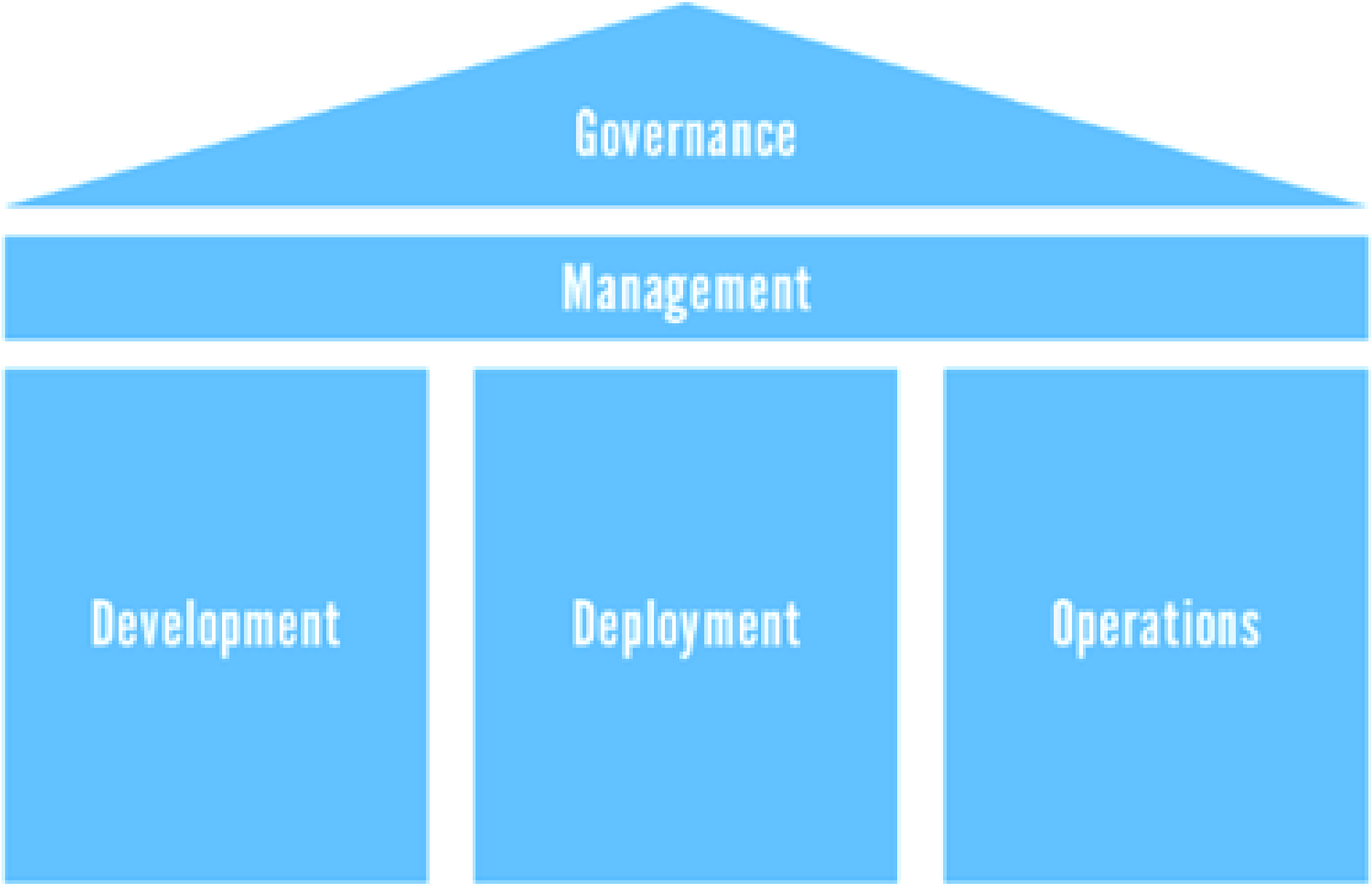


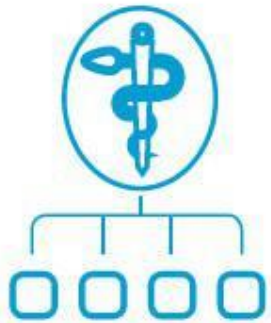
Figure 2.1 Project functions

What is Digital Health Governance?

- Digital Health Governance refer to decision mechanism/process to do (or not to do) digital health program/project/activity. Digital health governance is the process of using powers to direct digital health vision/mission , allocate resources, evaluate risk of to do (or not to do). The process involves and impacts many health system stakeholders both public and private sector.

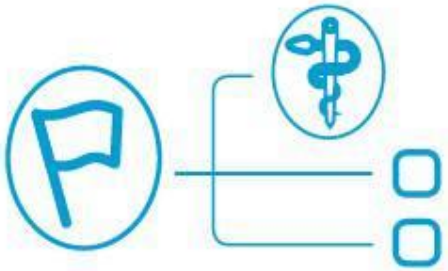
Digital Health Governance versus Digital Health Data Governance

Figure 7 **Three governance models for digital health**



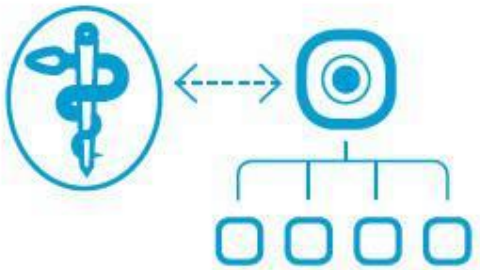
Health ministry mechanism

The MoH drives digital health and mobilizes technical capacity and skills from other ministries, agencies, firms and organizations to deploy digital health systems.



Government-wide digital agency mechanism

The MoH drives digital health, but is a client to a government-wide technology agency that provides ICT infrastructure and capacity.

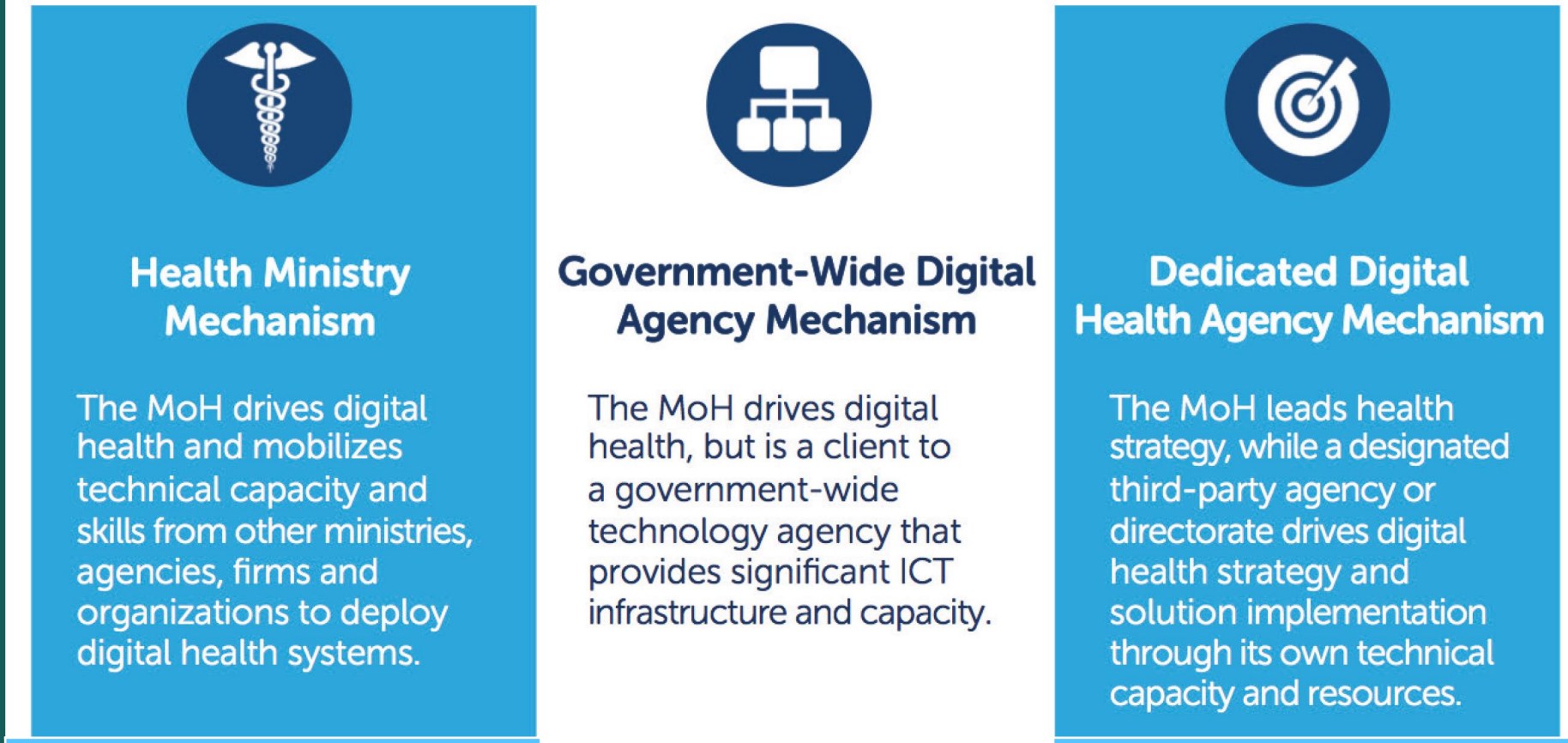


Dedicated digital health agency mechanism

The MoH leads health strategy, while a designated third-party agency or directorate drives digital health strategy and solution implementation through its own technical capacity and resources.

Digital Health Governance Models

Figure 5: Three Governance Mechanisms

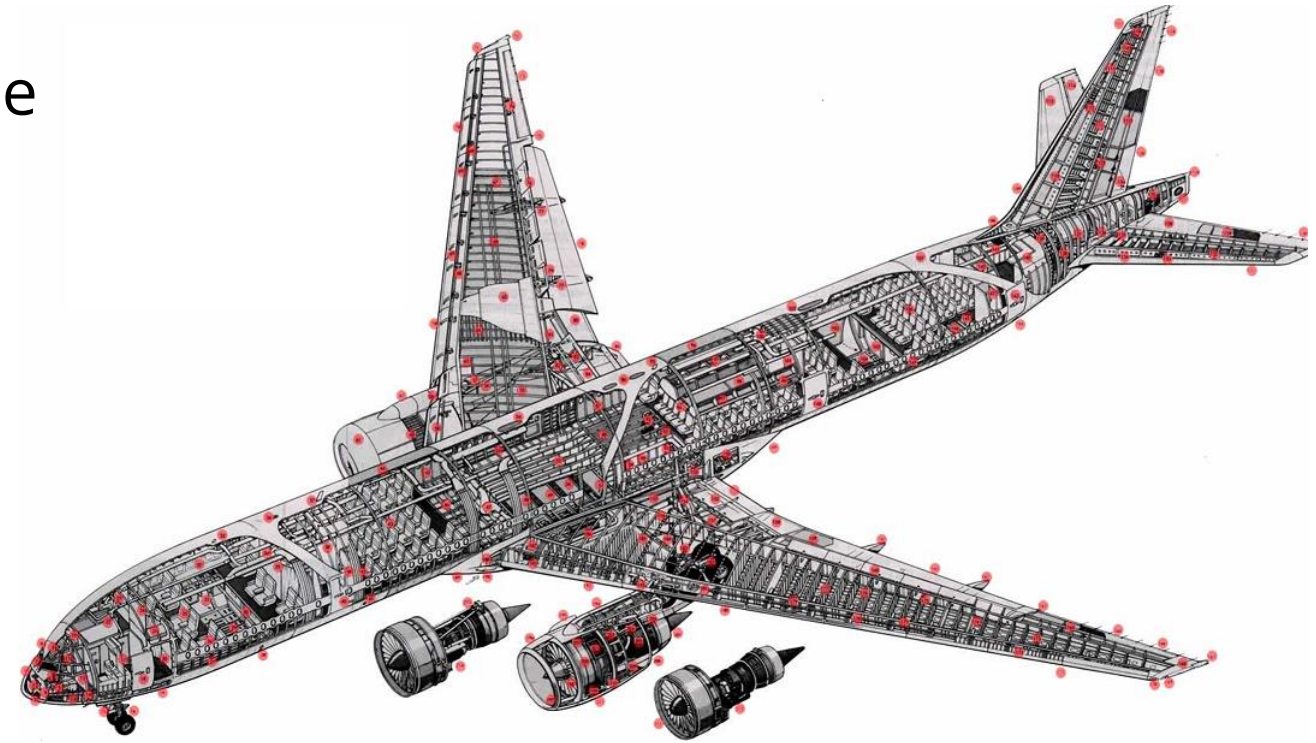


From: Broadband commission (ITU) 2017 Digital Health report

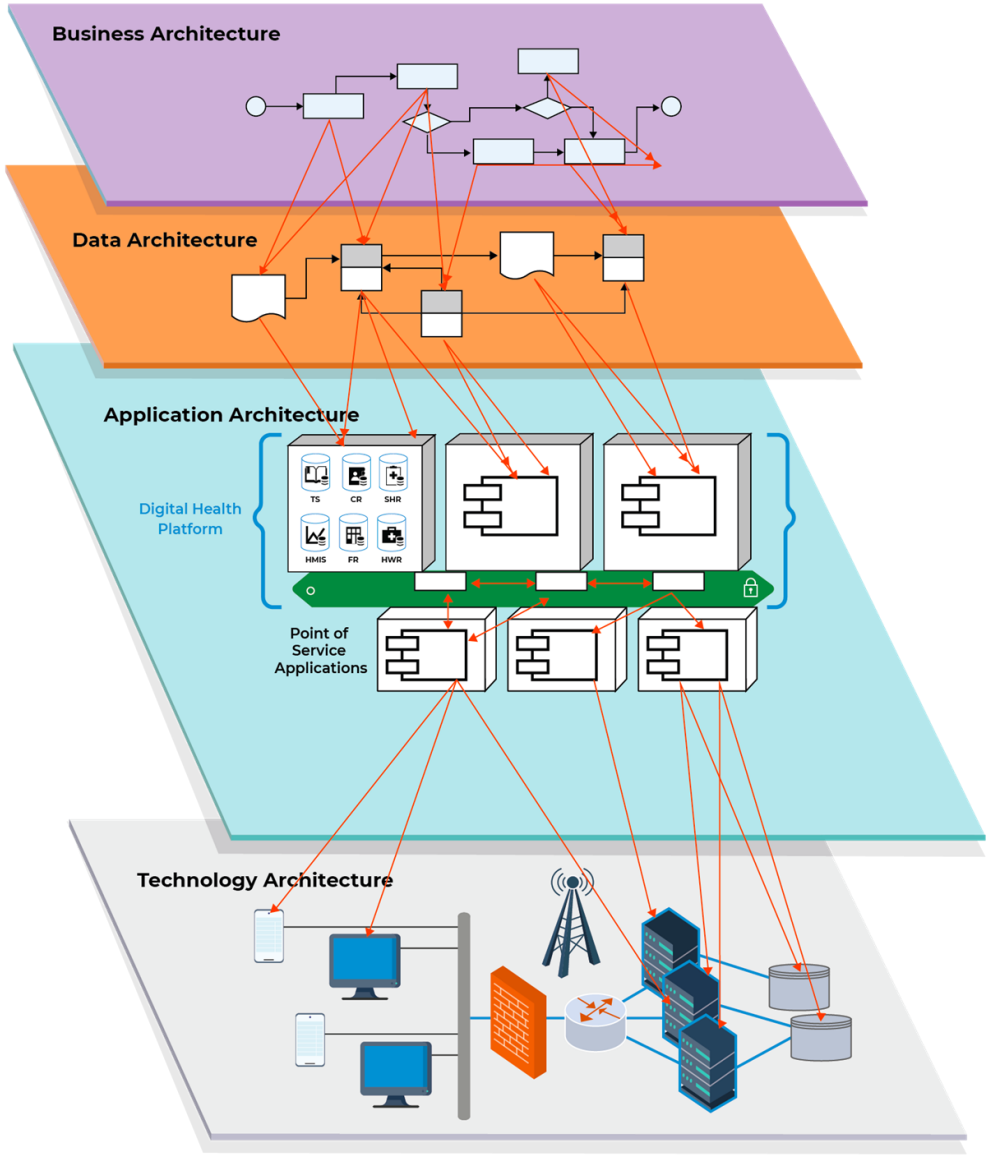
The Enterprise Architecture

An **enterprise architecture** is a comprehensive description of the various parts of a Digital Health system.

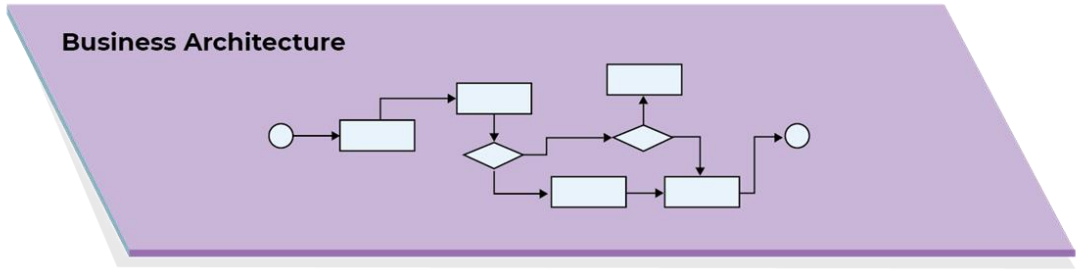
How they fit together, interact, and ultimately align with the goals and business processes of the health system.

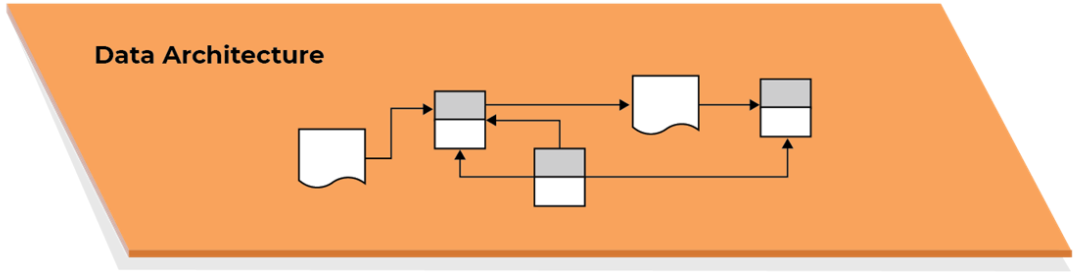


The Enterprise Architecture = Business + Data + Application + Technology



4 views of enterprise architecture





BUSINESS ARCHITECTURE

Describes the health system business processes that identify the components and tech needed in the DHP

It defines:

- Business strategy
- Governance
- Organization
- Key business procedures

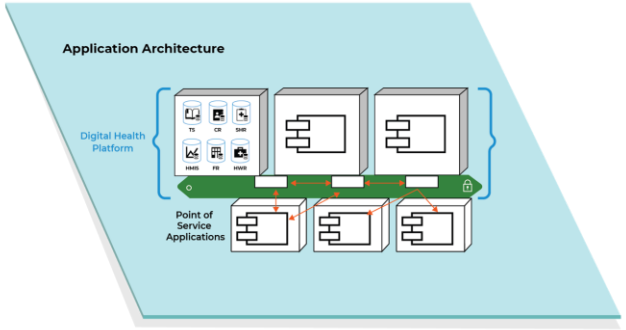
DATA ARCHITECTURE

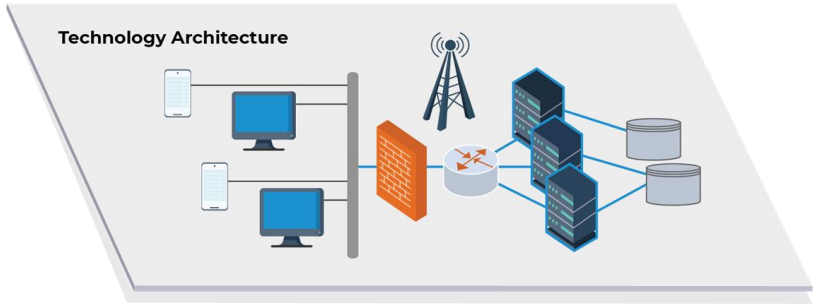
Describes the structure of an organization's:

- Logical and physical data assets
- Data management resources

Describes how the DHP collects or uses different types of data at different moments of health journeys & outlines standards

4 views of enterprise architecture





APPLICATION ARCHITECTURE

Provides a blueprint for:

- Individual software applications to be deployed
- Interactions between software
- How software relates to the core business processes of the organization

TECHNOLOGY ARCHITECTURE

Describes the logical software and hardware components required to support the deployment of business, data, and application services, including:

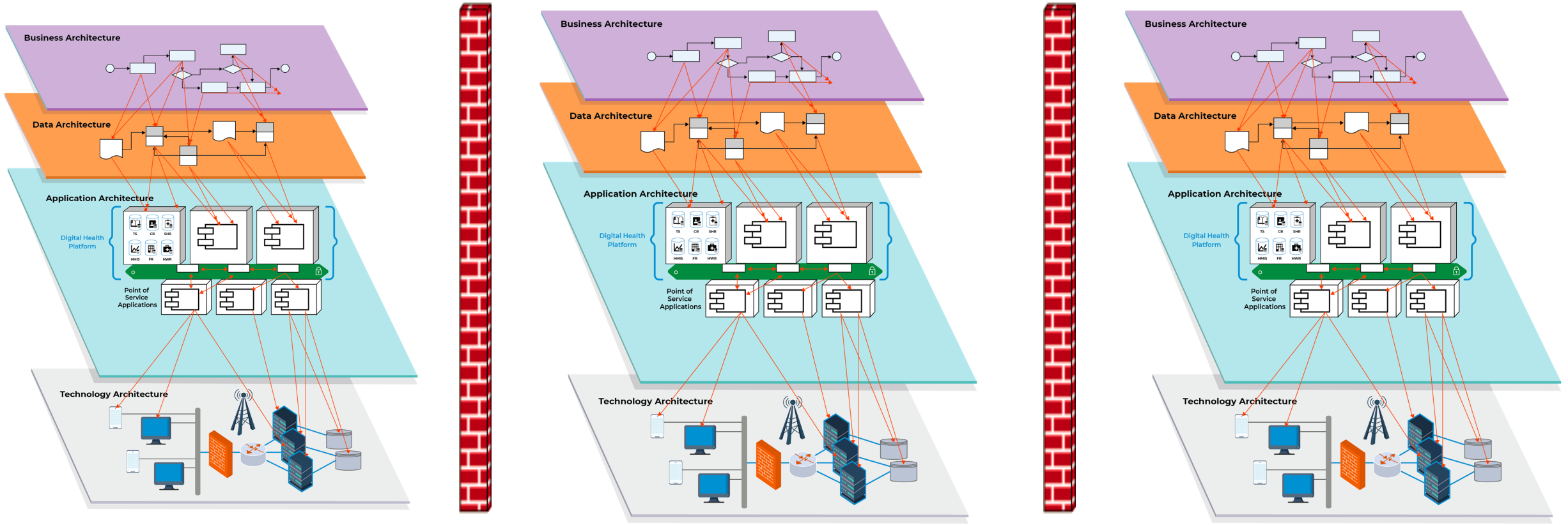
- Information technology infrastructure
- Middleware
- Networks
- Communications
- Processing
- Standards

Why is the Enterprise Architecture important?

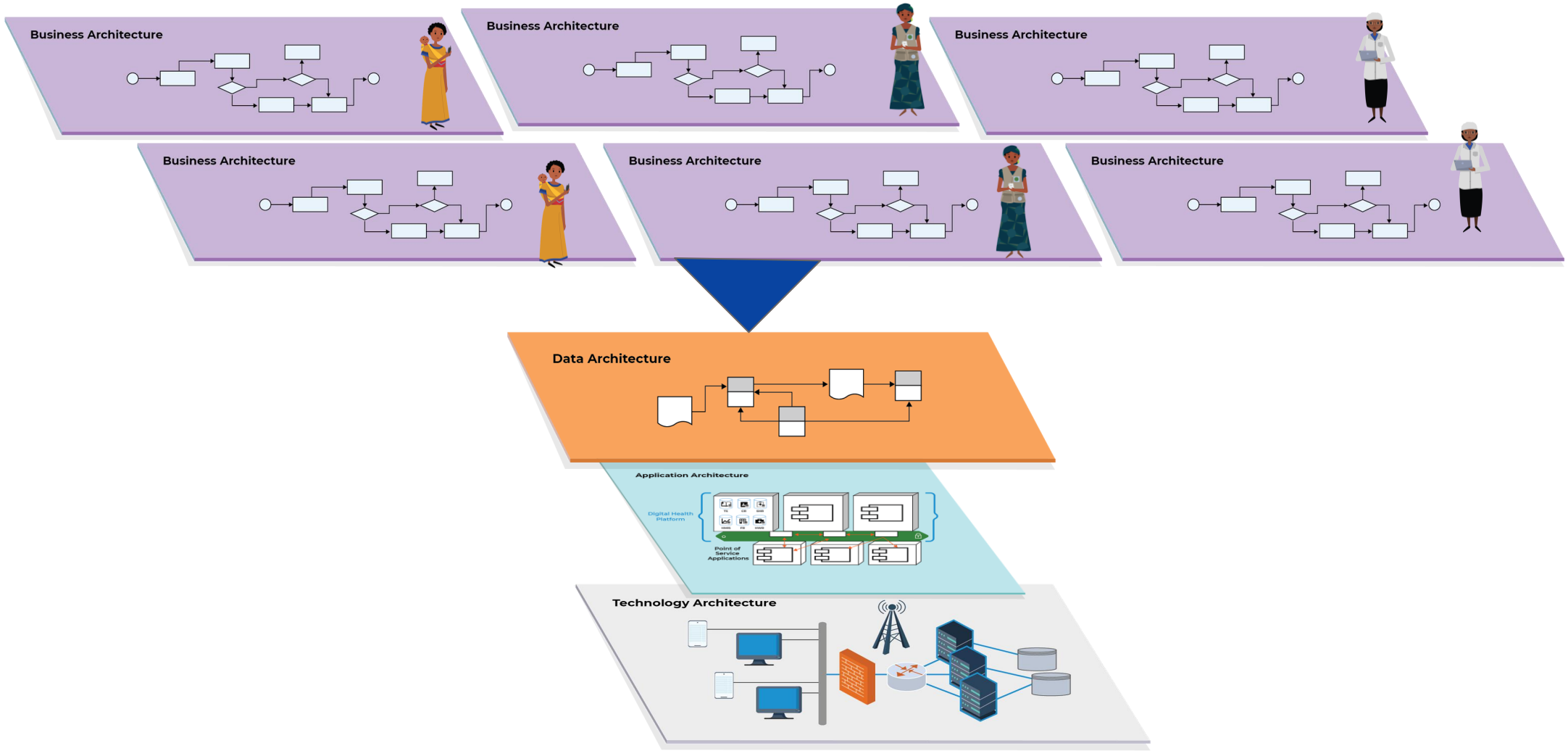
- Avoids fragmentation and inefficiencies
- Supports the agency of Ministry Officials to make national decisions on digital health investments and interventions
- Lowers costs
- Helps centralize systems
- Improves information exchange between systems and people

Visual of 4 Views and Digital Fragmentation

Each of these architectures represents a different digital health intervention. However, they are decentralized which causes fragmentation, inefficiencies, and increased costs.



How it should be: Enterprise Architecture

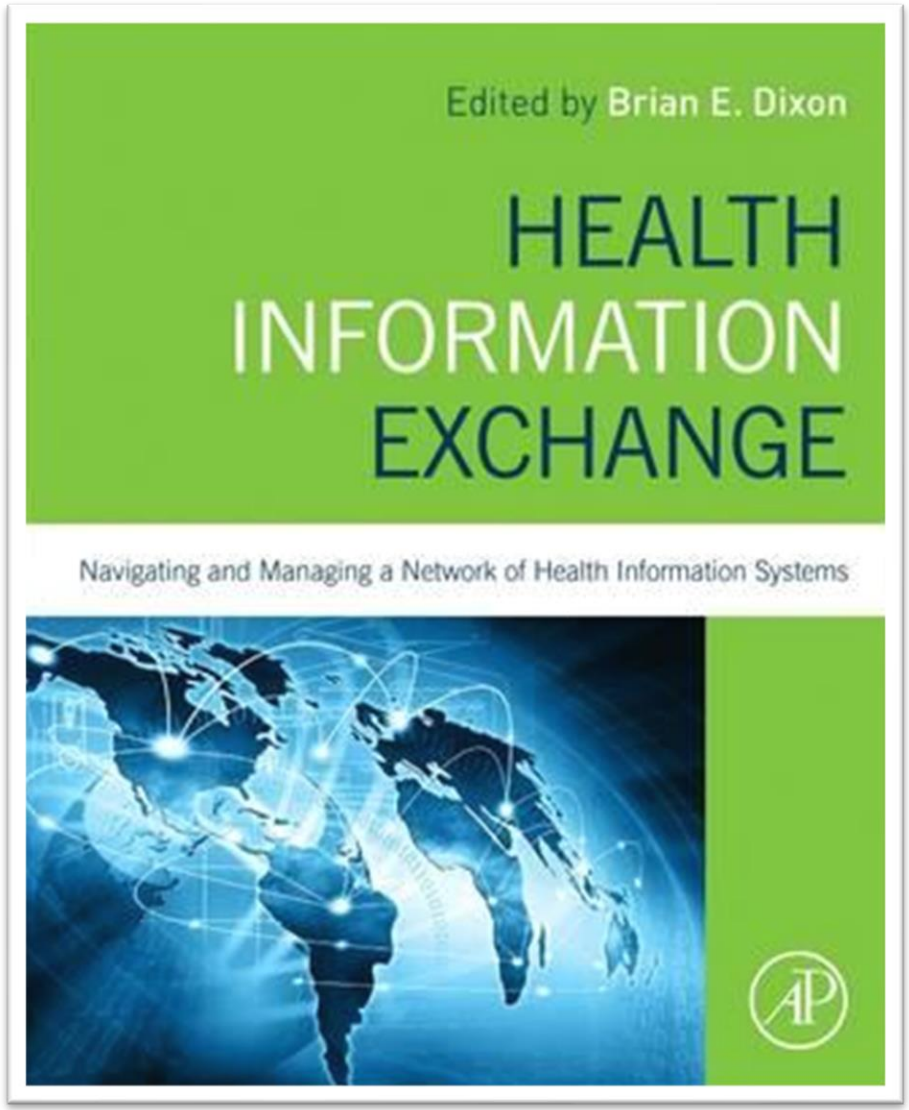


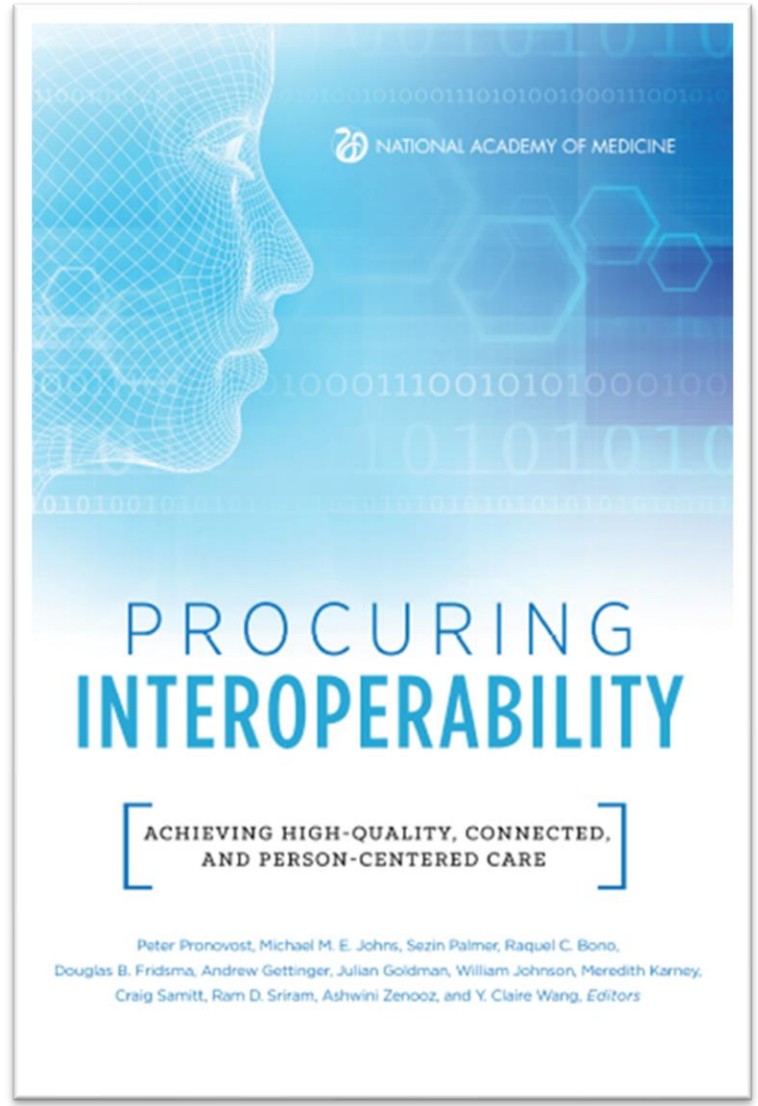
Health Information Exchange (HIE)

Interoperability

Health Data Standards

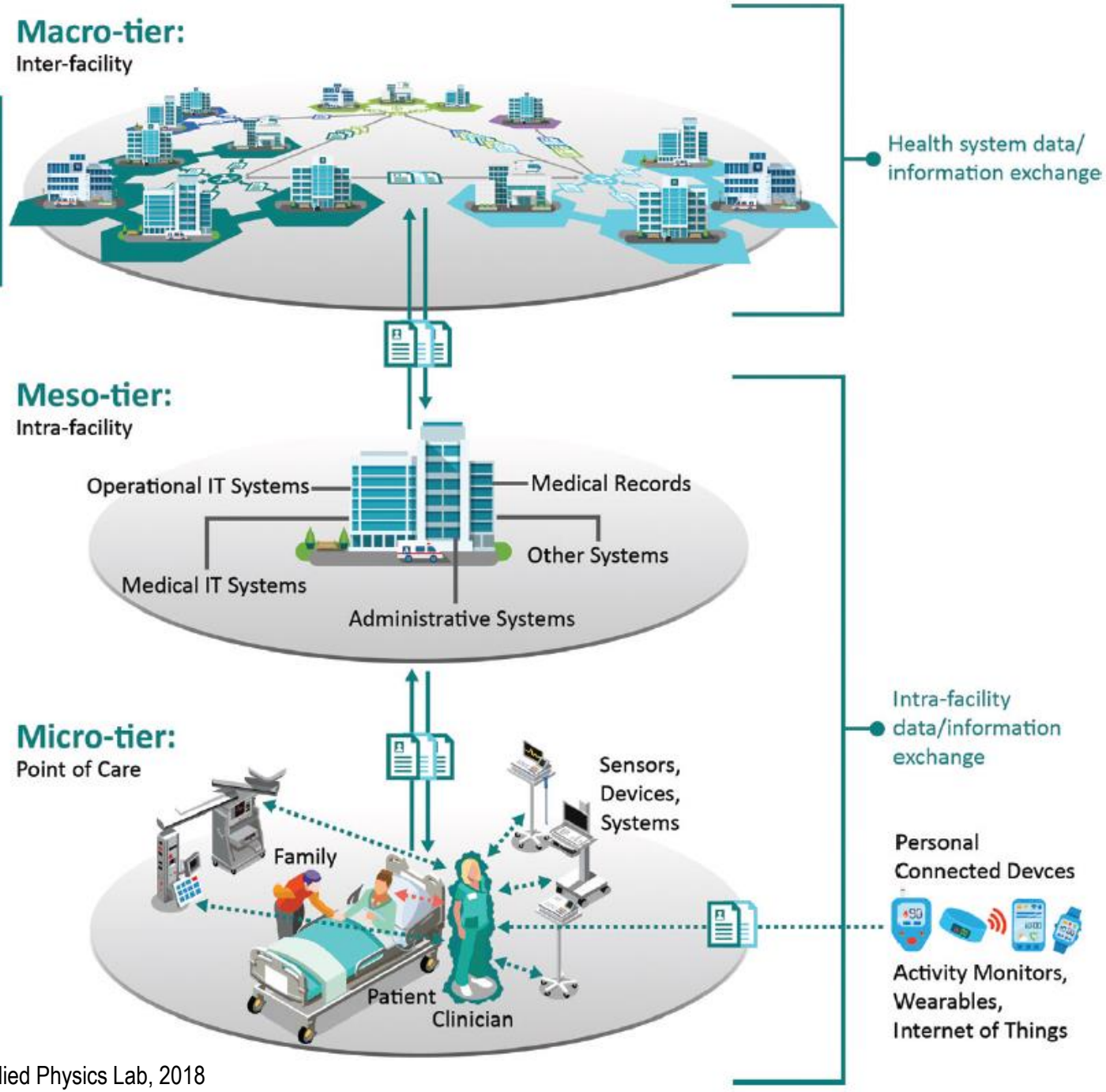
Health Information Exchange (HIE)


Edited by Brian E. Dixon
HEALTH INFORMATION EXCHANGE
Navigating and Managing a Network of Health Information Systems


NATIONAL ACADEMY OF MEDICINE
PROCURING INTEROPERABILITY
ACHIEVING HIGH-QUALITY, CONNECTED, AND PERSON-CENTERED CARE
Peter Pronovost, Michael M. E. Johns, Sezin Palmer, Raquel C. Bono, Douglas B. Fridsma, Andrew Gettinger, Julian Goldman, William Johnson, Meredith Karney, Craig Samitt, Ram D. Sriram, Ashwini Zenooz, and Y. Claire Wang, Editors

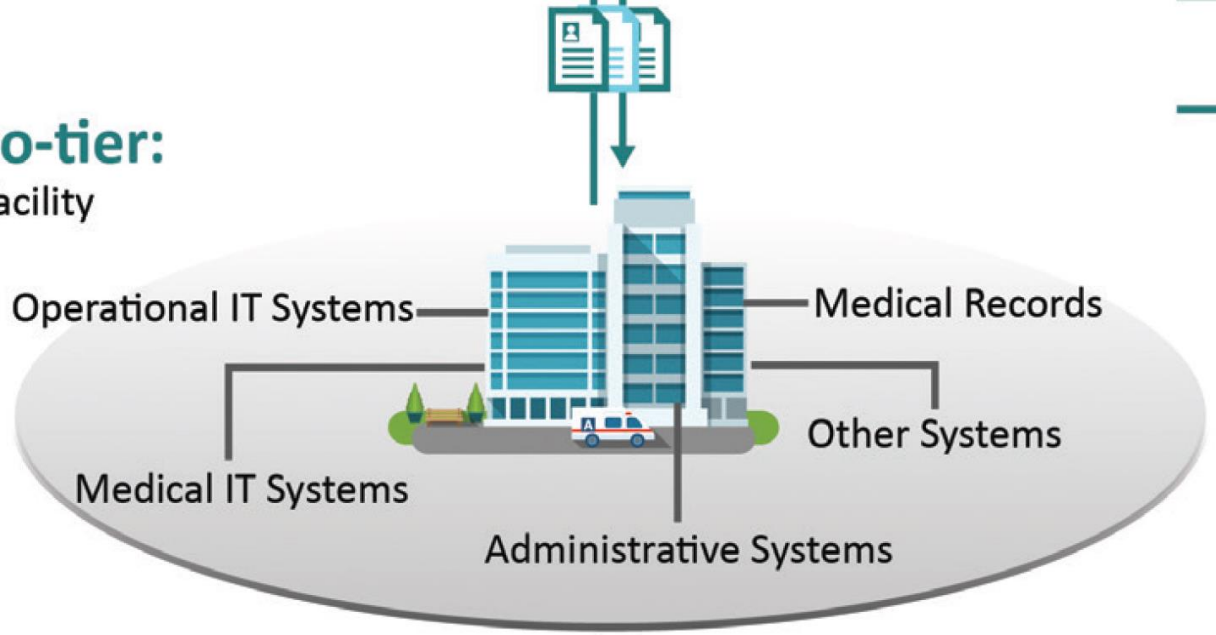
HIE

Health Information Exchange

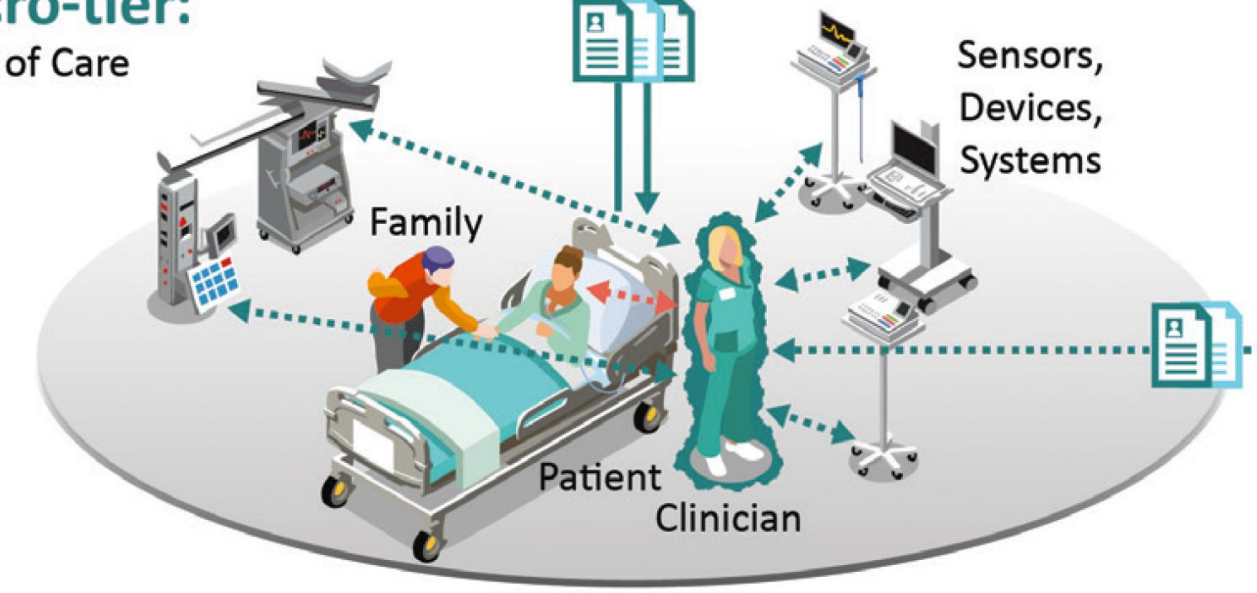


SOURCE: Johns Hopkins University Applied Physics Lab, 2018

Meso-tier:
Intra-facility



Micro-tier:
Point of Care



Intra-facility data/information exchange

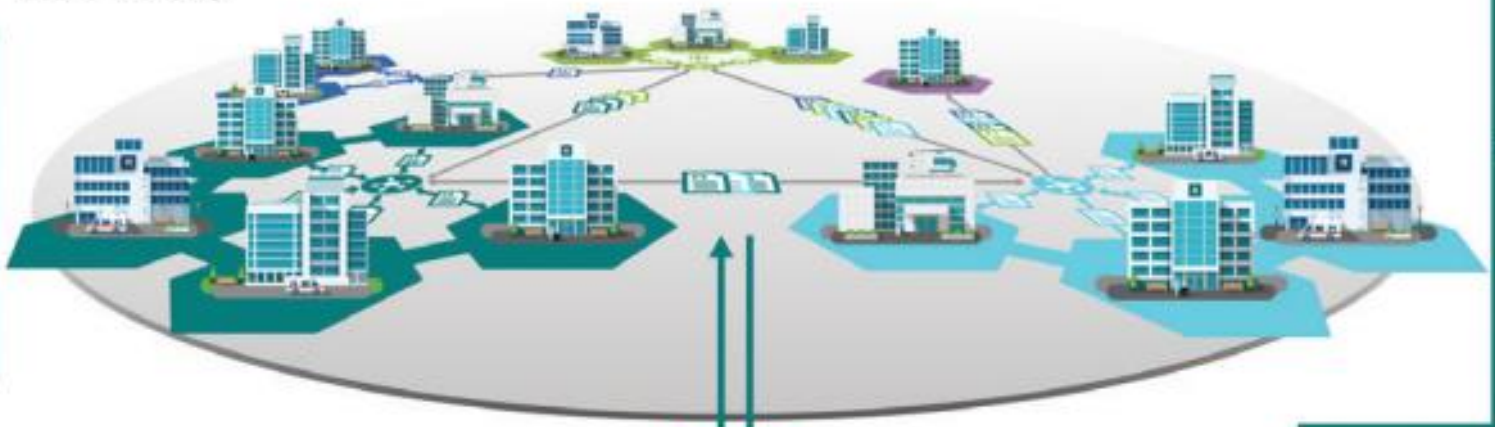
Personal Connected Devces

Activity Monitors, Wearables, Internet of Things

Macro-tier:

Inter-facility

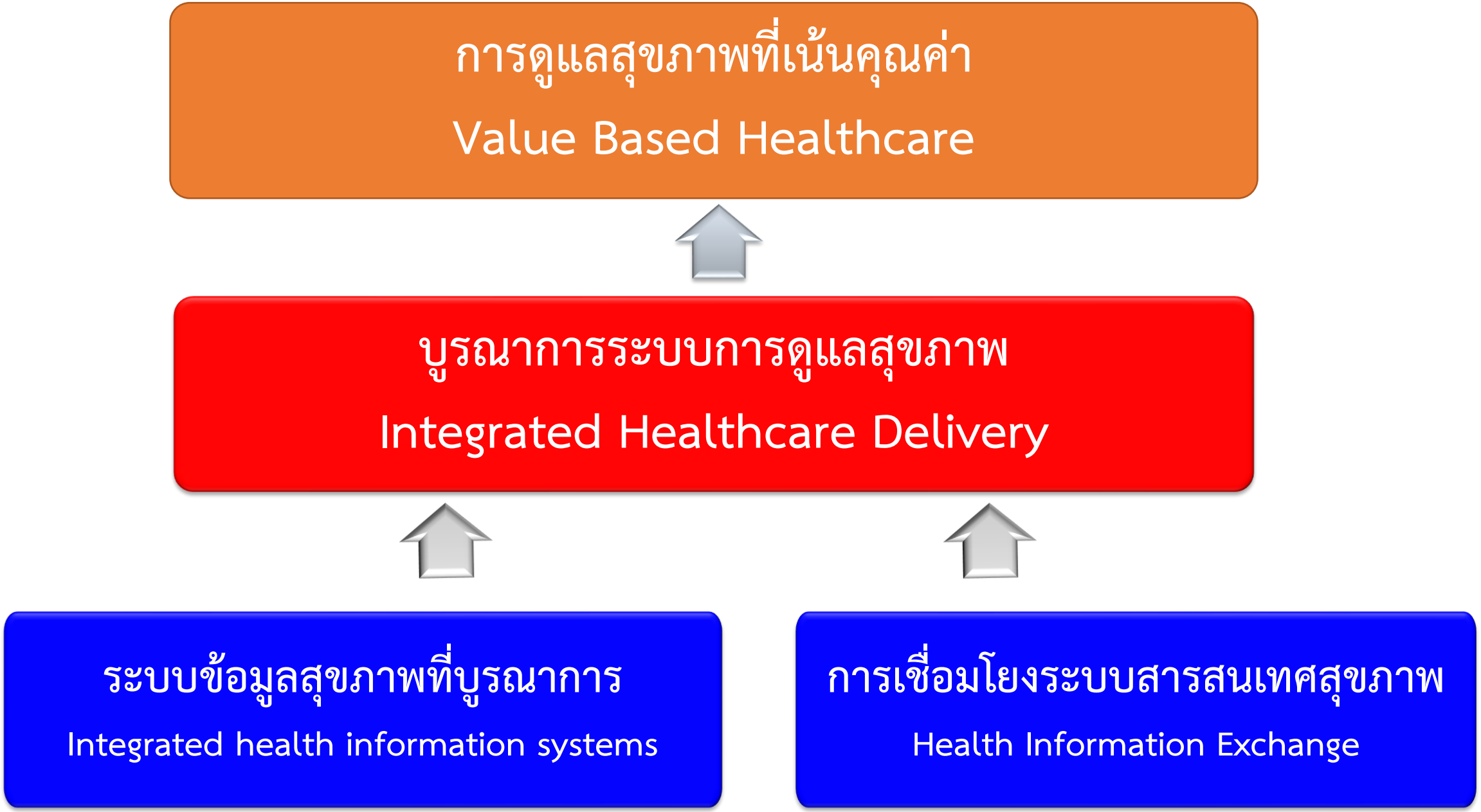
Pharmacy
Public Health
Radiology/labs
Payers
Researchers

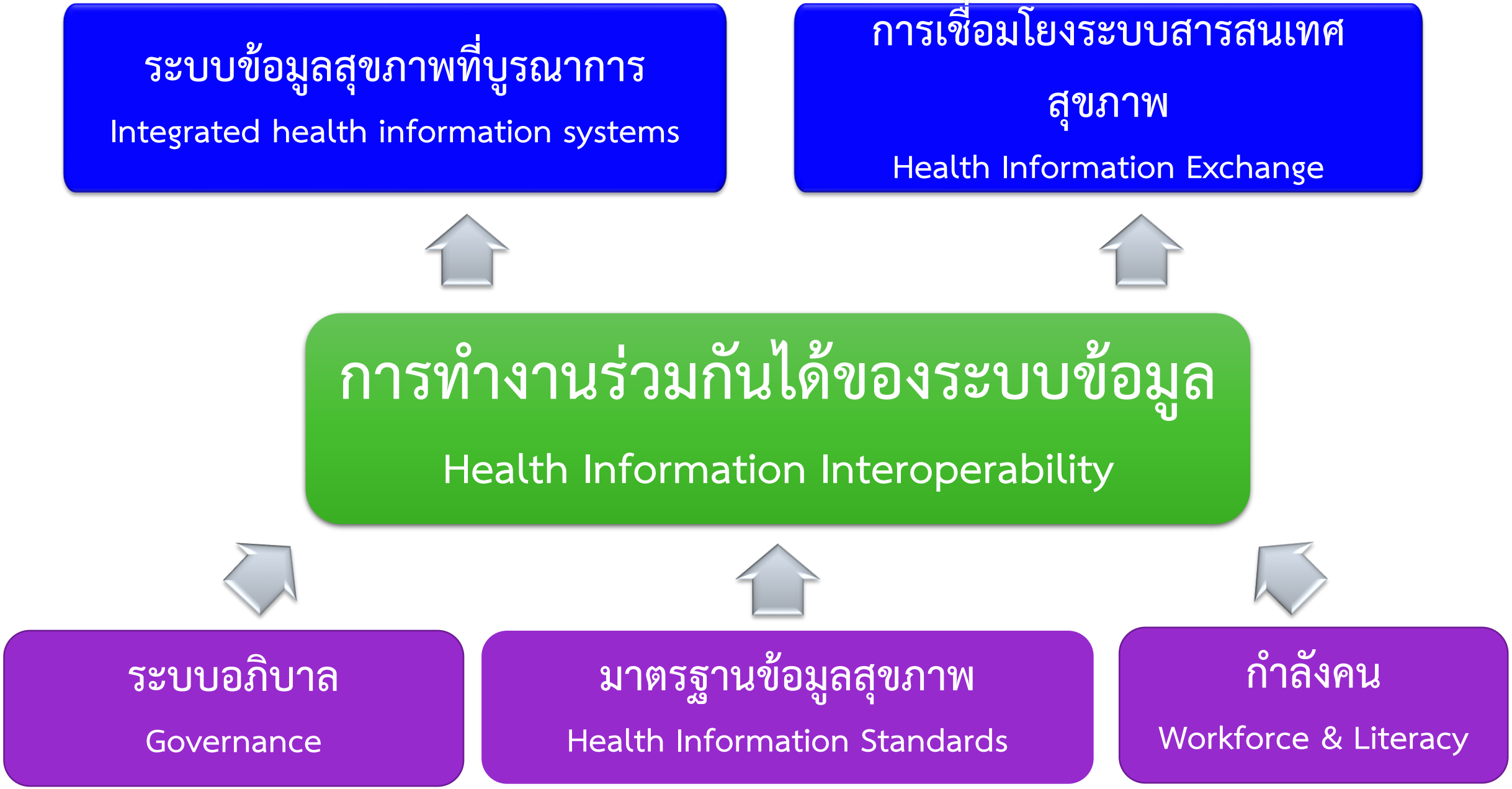


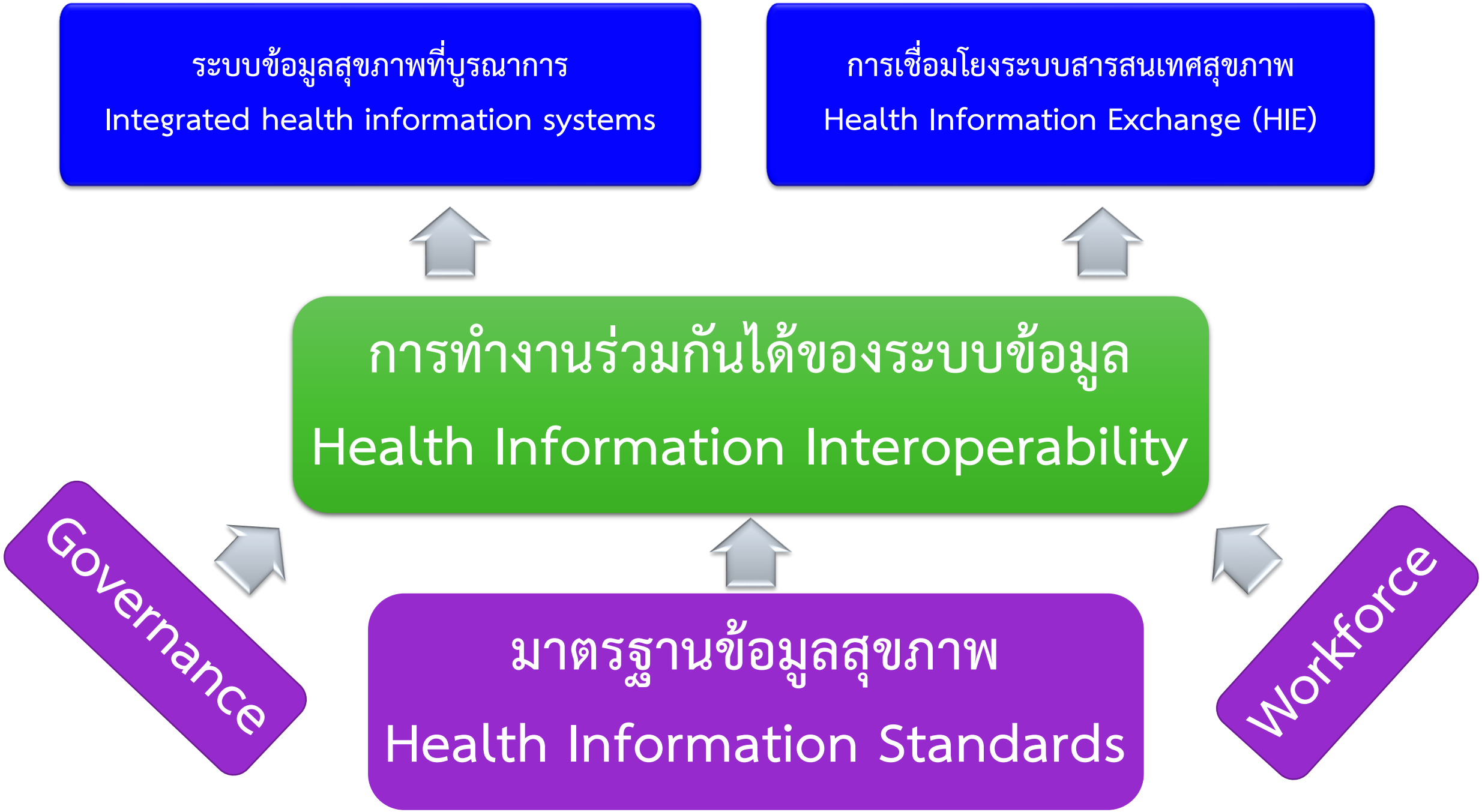
Health system data/
information exchange

Meso-tier:

Intra-facility


การดูแลสุขภาพที่เน้นคุณค่า
Value Based Healthcare
บูรณาการระบบการดูแลสุขภาพ
Integrated Healthcare Delivery
ระบบข้อมูลสุขภาพที่บูรณาการ
Integrated health information systems
การเชื่อมโยงระบบสารสนเทศสุขภาพ
Health Information Exchange


ระบบข้อมูลสุขภาพที่บูรณาการ
Integrated health information systems
การเชื่อมโยงระบบสารสนเทศสุขภาพ
Health Information Exchange
การทำงานร่วมกันได้ของระบบข้อมูล
Health Information Interoperability
ระบบอภิบาล
Governance
มาตรฐานข้อมูลสุขภาพ
Health Information Standards
กำลังคน
Workforce & Literacy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Health Information Interoperability
Governance
มาตรฐานข้อมูลสุขภาพ
Health Information Standards
Workforce

Private hospitals ordered to display medicine prices

Costs must be shown on website or QR-code chart

PUBLISHED : 10 MAY 2019 AT 19:53

Dept of Internal Trade Ministry of Commerce Survey P

Sale price – Buying price

Profit margin

กระทรวงพาณิชย์ออกประกาศคุมเข้มราคายา พบ รพ.เอกชน บางแห่งฟันกำไรสูงถึง 16,566%

Sale price of a drug from 147 private hospitals

TMTID 767041 CALCIUM GLUCONATE (องค์การเภสัชกรรม) (calcium gluconate 0.45 meq/1 mL) solution for injection, 10 mL ampoule

Bath

820

234

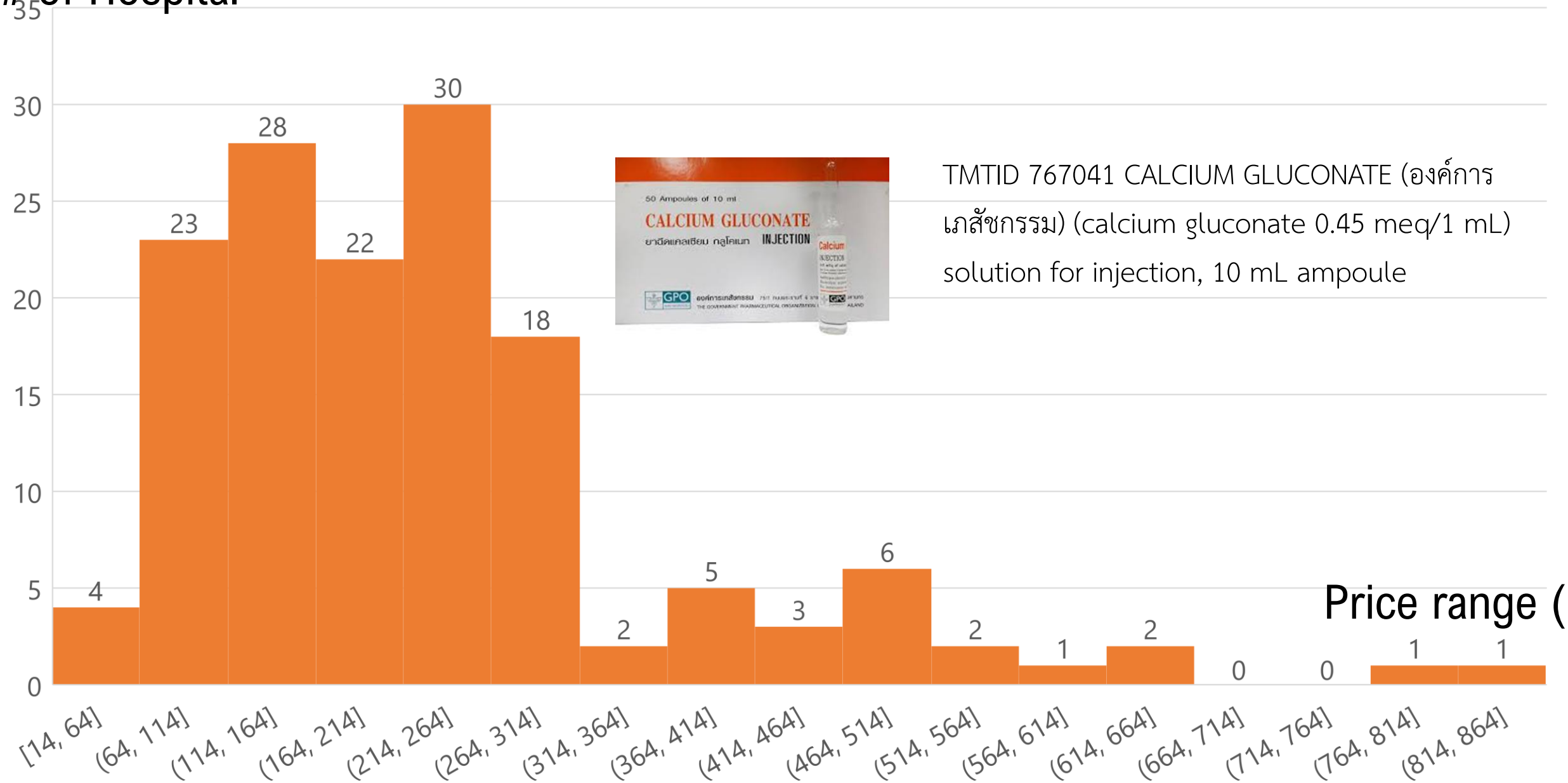
14

900 800 700 600 500 400 300 200 100 0

Hospital1 Hospital3 Hospital7 Hospital11 Hospital13 Hospital15 Hospital18 Hospital22 Hospital26 Hospital28 Hospital29 Hospital35 Hospital37 Hospital39 Hospital42 Hospital46 Hospital49 Hospital52 Hospital54 Hospital57 Hospital61 Hospital64 Hospital68 Hospital71 Hospital72 Hospital77 Hospital74 Hospital82 Hospital88 Hospital85 Hospital90 Hospital95 Hospital96 Hospital100 Hospital105 Hospital106 Hospital109 Hospital111 Hospital118 Hospital115 Hospital121 Hospital124 Hospital131 Hospital128 Hospital125 Hospital134 Hospital140 Hospital142 Hospital145 UCEP

ที่มา: กรมการค้าภายใน กระทรวงพาณิชย์ 2562

Distribution of private hospitals by sale price range



TMTID 767041 CALCIUM GLUCONATE (องค์การเภสัชกรรม) (calcium gluconate 0.45 meq/1 mL) solution for injection, 10 mL ampoule

Objectives | Principles | Mechanism | Implementation

Fair Price

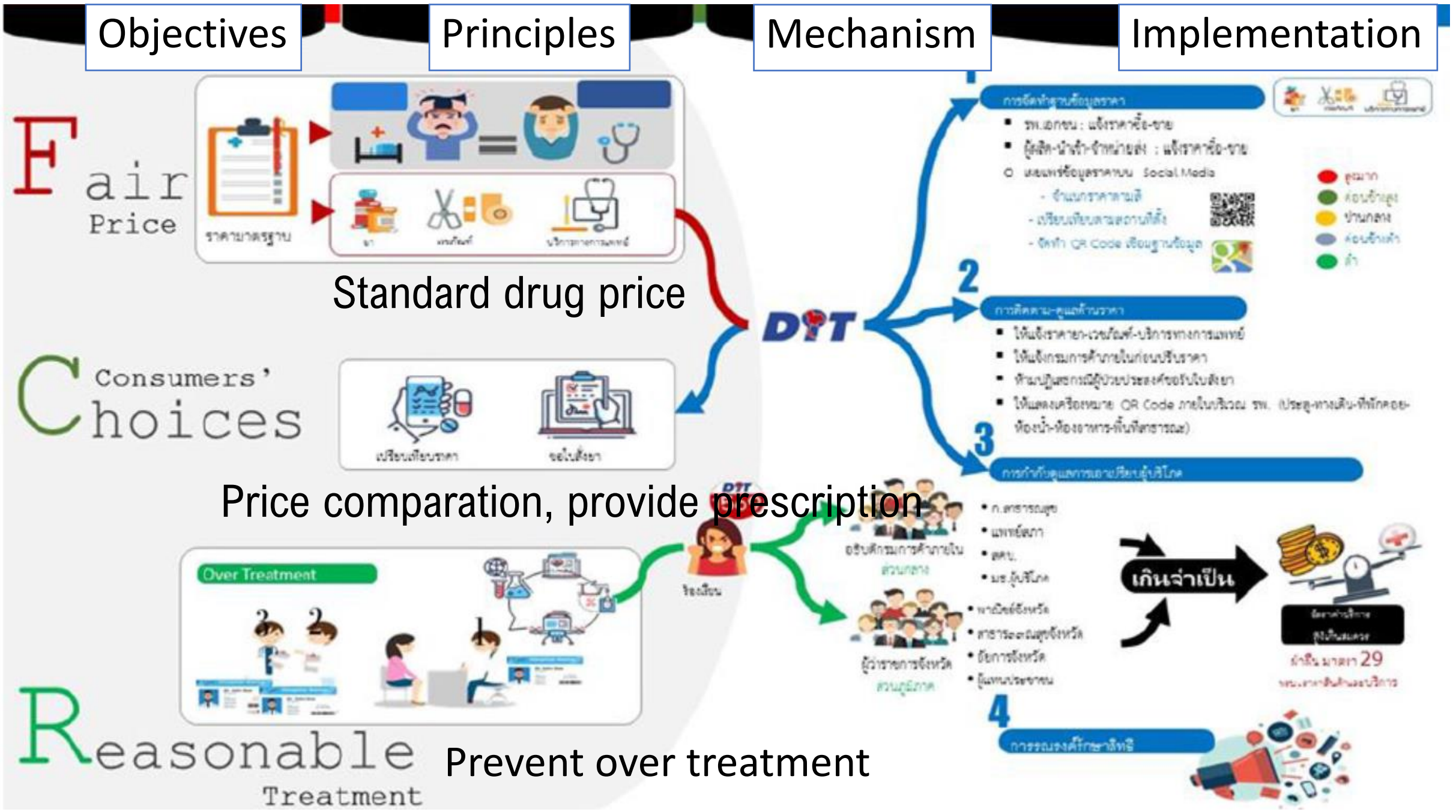
Standard drug price

Consumers' Choices

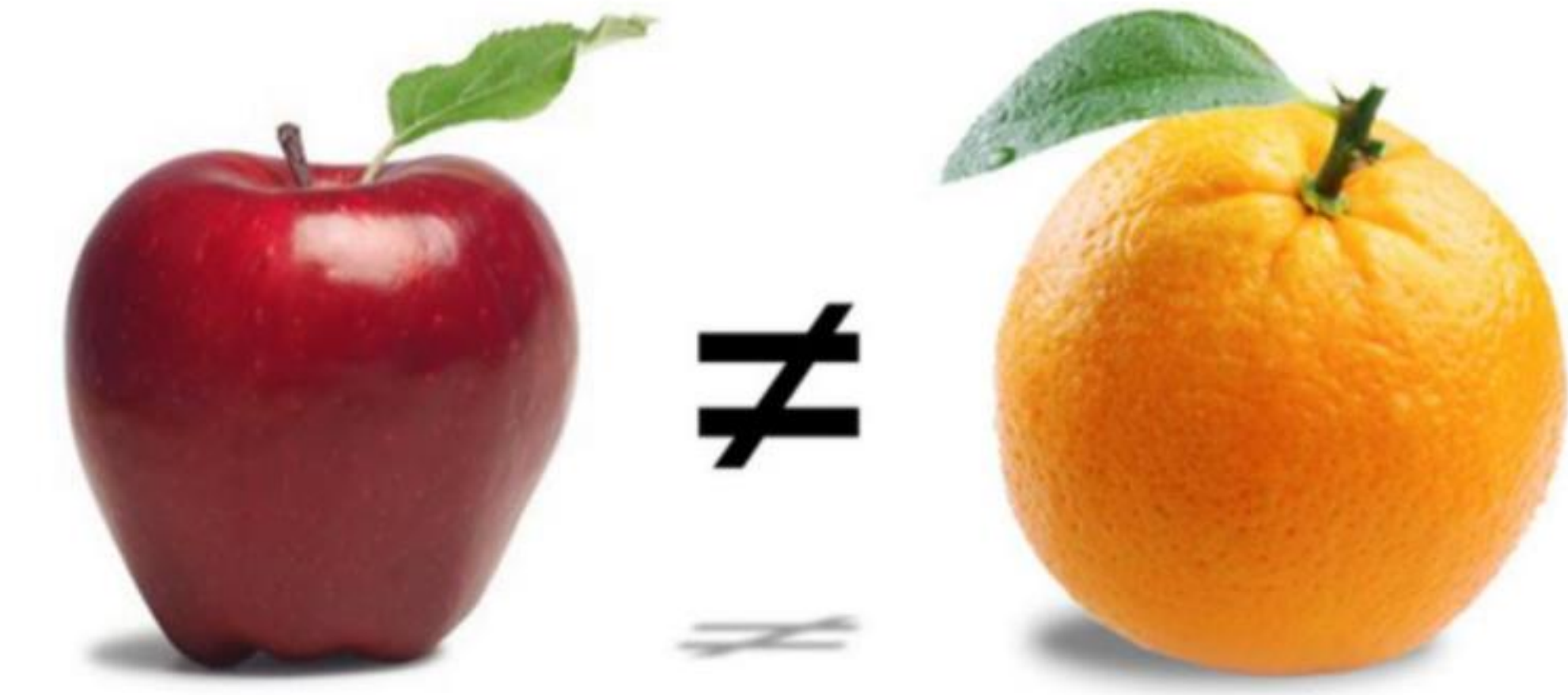
Price comparation, provide prescription

Reasonable Treatment

Prevent over treatment



Apples-to-Apples comparison



Trade Product

Generic Term

GPU
693923 atorvastatin 40 mg film-coated tablet, 1 tablet

(Generic Product Code)

TMT
GPU
TPU

TPU (Trade Product Code)

114955 XARATOR (PFIZER, IRELAND) (atorvastatin 40 mg) film-coated tablet, 1 tablet

114940 LIPITOR (PFIZER, IRELAND) (atorvastatin 40 mg) film-coated tablet, 1 tablet

114929 ATORVASTATIN SANDOZ (LEK PHARMACEUTICALS, SLOVENIA) (atorvastatin 40 mg) film-coated tablet, 1 tablet

114917 ATORSAN (LEK PHARMACEUTICALS, SLOVENIA) (atorvastatin 40 mg) film-coated tablet, 1 tablet

693947 CHLOVAS-40 (มิลลิเมด) (atorvastatin 40 mg) film-coated tablet, 1 tablet

TMT™
Thai Medicines Terminology

DIT กรมการค้าภายใน

ระบบค้นหาและเปรียบเทียบราคายาในโรงพยาบาลเอกชน

DIT กรมการค้าภายใน ระบบค้นหาและเปรียบเทียบราคายาในโรงพยาบาลเอกชน

https://hospitals.dit.go.th/app/drug_price_search.php

โรงพยาบาลต้นทาง: ระบุชื่อโรงพยาบาลต้นทาง (ภาษาไทย)

ชื่อยา: xarator

เช็คราคายา

	ยารักษาโรค Drug (Trade product)	ราคา Price (Bath)	
1	XARATOR (PFIZER, IRELAND) (atorvastatin 10 mg) film-coated tablet, 1 tablet	28.00 - 84.00	มี 11 โรงพยาบาลให้เปรียบเทียบ
2	XARATOR (PFIZER, IRELAND) (atorvastatin 20 mg) film-coated tablet, 1 tablet	30.00 - 117.00	มี 18 โรงพยาบาลให้เปรียบเทียบ
3	XARATOR (PFIZER, IRELAND) (atorvastatin 40 mg) film-coated tablet, 1 tablet	35.00 - 114.00	มี 33 โรงพยาบาลให้เปรียบเทียบ
4	XARATOR (PFIZER PHARMACEUTICALS, PUERTO RICO) (atorvastatin 10 mg) film-coated tablet, 1 tablet	30.00 - 82.00	มี 15 โรงพยาบาลให้เปรียบเทียบ
5	XARATOR (PFIZER PHARMACEUTICALS, PUERTO RICO) (atorvastatin 20 mg) film-coated tablet, 1 tablet	38.00 - 118.00	มี 33 โรงพยาบาลให้เปรียบเทียบ
6	XARATOR (PFIZER PHARMACEUTICALS, PUERTO RICO) (atorvastatin 40 mg) film-coated tablet, 1 tablet	38.00 - 169.00	มี 49 โรงพยาบาลให้เปรียบเทียบ

DIT กรมการค้าภายใน

ระบบค้นหาและเปรียบเทียบราคายาในโรงพยาบาลเอกชน

คำชี้แจง | ค่าธรรมเนียมเปรียบเทียบราคา | คู่มือการใช้งาน

XARATOR (PFIZER, IRELAND) (atorvastatin 40 mg) film-coated tablet, 1 tablet

	โรงพยาบาล Hospital	ราคา (บาท)	
1	นครพัฒน์	35.00 บาท	
2	อ่างทองเวชชการ 2	40.00 บาท	
3	เอกชล	40.00 บาท	
4	โรงพยาบาลมิตรภาพสามัคคี	42.00 บาท	
31	กรุงเทพจันทบุรี	104.00 บาท	
32	โรงพยาบาลพญาไท 2	109.50 บาท	
33	เซลางค์นคร-รามฯ	114.00 บาท	

Thailand e-Government

หน้าแรก | เกี่ยวกับเรา | หน่วยงานภาครัฐ | สารบัญบริการภาครัฐ | องค์ความรู้ภาครัฐ | ข่าวสารภาครัฐ

ขนาดอักษร ก ก ก

เข้าสู่ระบบ | สร้างบัญชีชื่อ

หน้าหลัก > ระบบจัดซื้อจัดจ้างภาครัฐ

ระบบจัดซื้อจัดจ้างภาครัฐ Electronic Governmental Procurement (e-GP) System

ข้อมูลพื้นฐาน

ชื่อบริการ : ระบบจัดซื้อจัดจ้างภาครัฐ
ลิ้งค์บริการ : http://www.gprocurement.go.th/wps/portal/index_EGP
ชื่อหน่วยงาน : กรมบัญชีกลาง
เว็บไซต์ที่เกี่ยวข้อง : https://www.cgd.go.th/

ข้อมูลเบื้องต้น

รูปแบบของระบบ

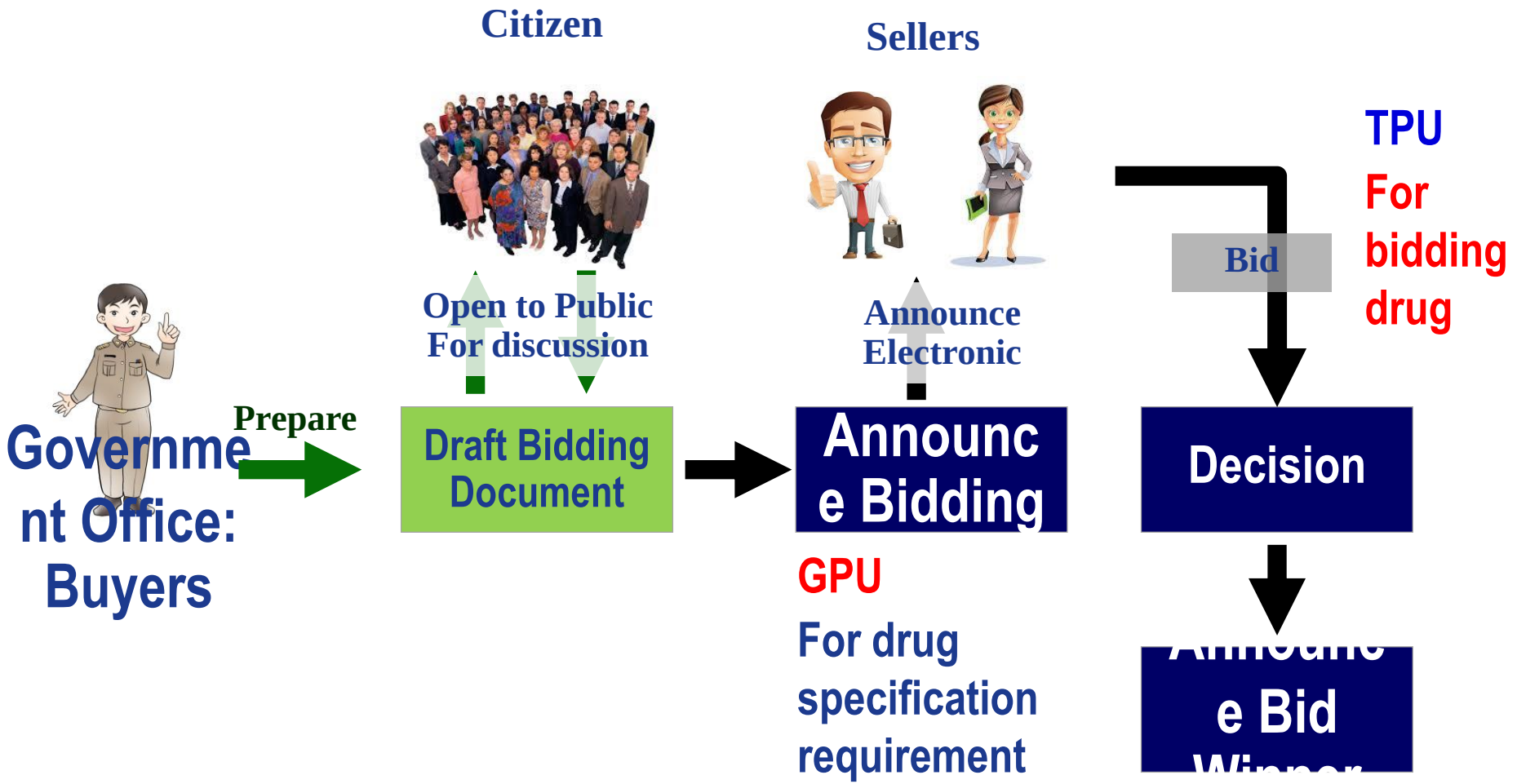
- ให้ข้อมูลบนเว็บไซต์
- มีแบบฟอร์ม/เอกสารให้ดาวน์โหลด
- สืบค้นข้อมูล
- มีระบบสมาชิก
- มีรายการคำถามที่ถามบ่อย (FAQ)

ข้าใช้งาน

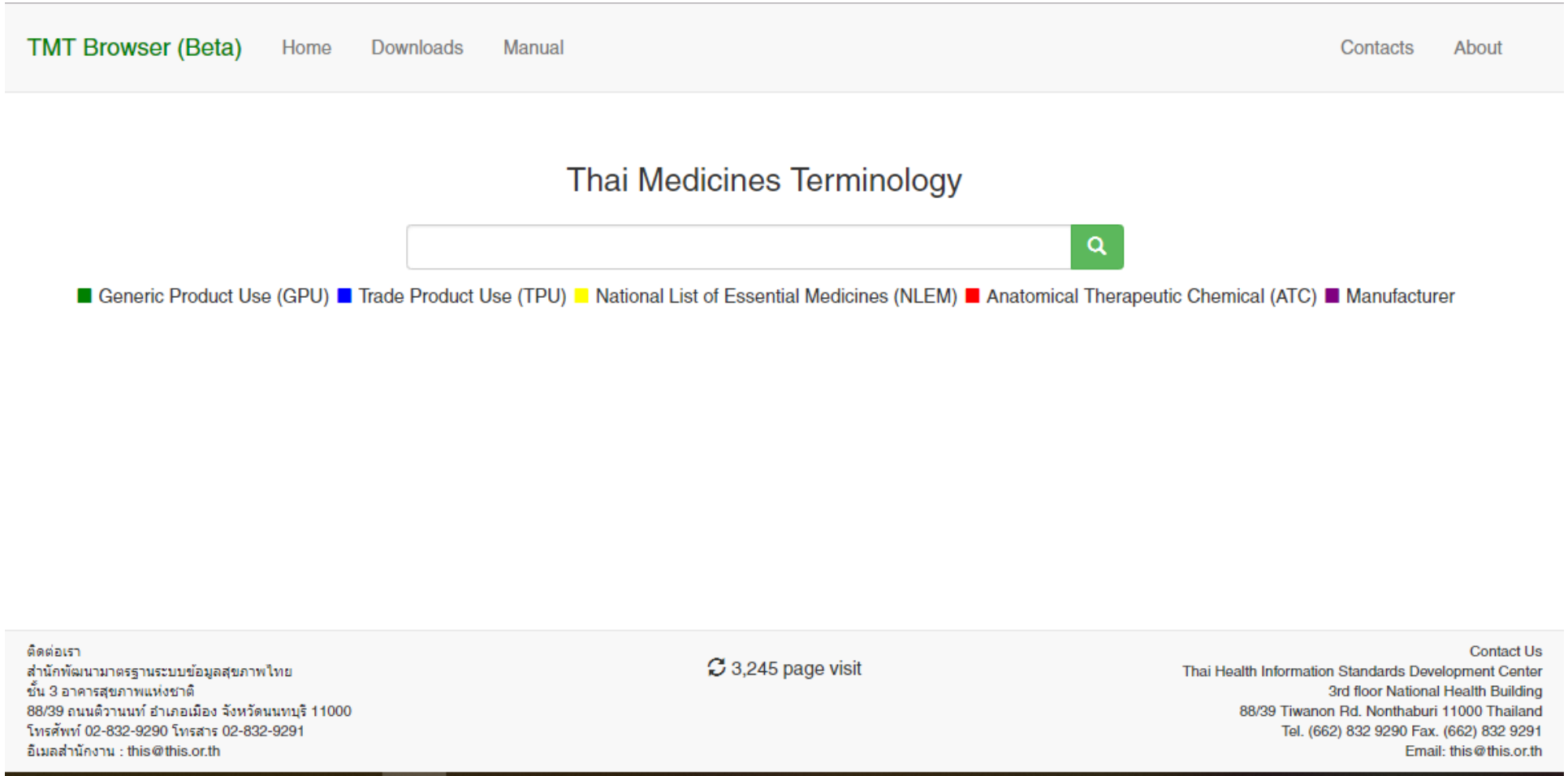
เก็บเป็นบริการที่ติดตาม

https://www.egov.go.th/th/e-government-service/159/

Centralized e-Government Procurement System (eGP) : e-Bidding



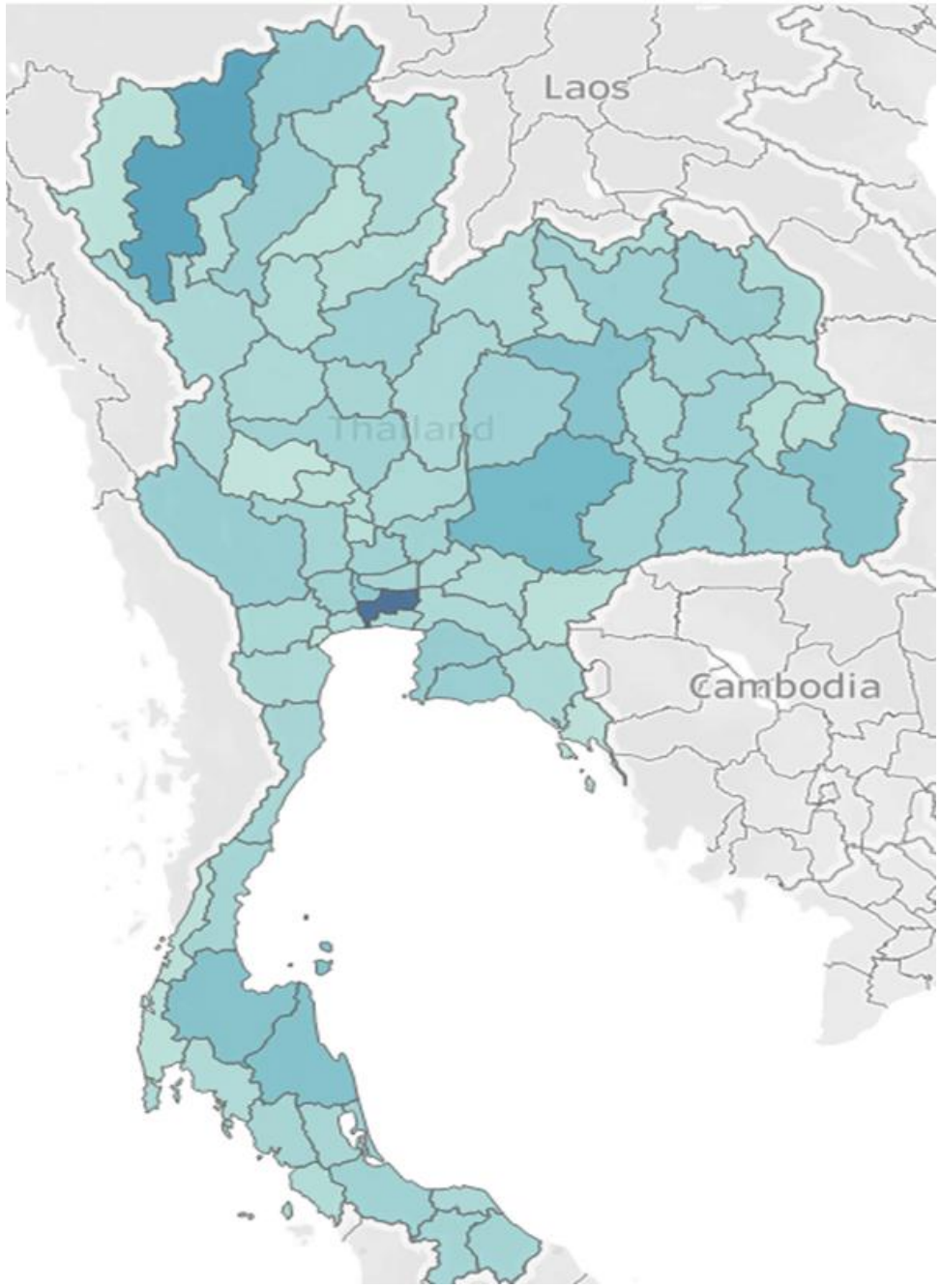
http://tmt.this.or.th



TMTID (GPU)	Fully Specified Name
693923	atorvastatin 40 mg film-coated tablet, 1 tablet

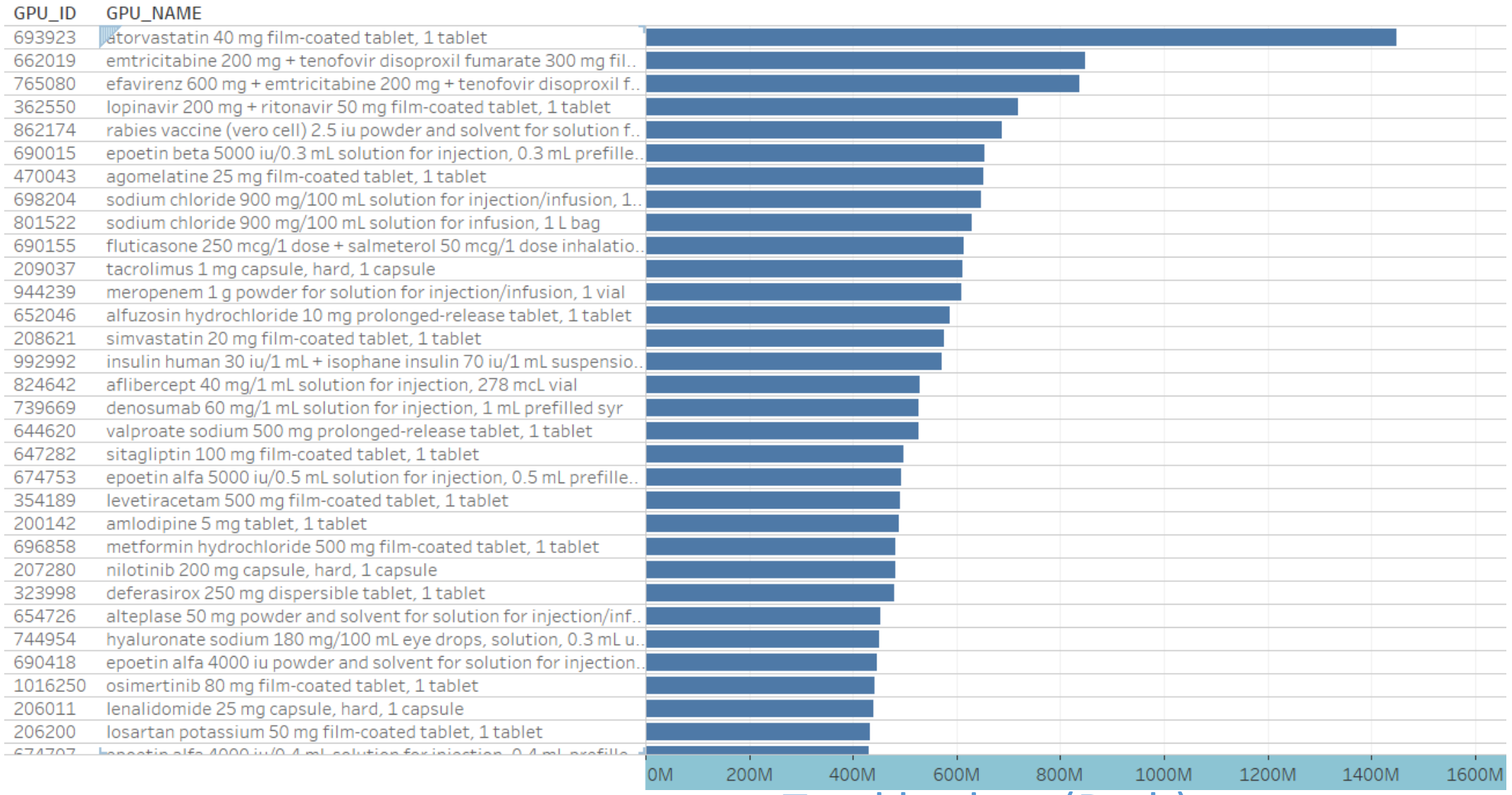
Trade Product Use (TPU)

TMTID (TPU)	Fully Specified Name
114917	ATORSAN (LEK PHARMACEUTICALS, SLOVENIA) (atorvastatin 40 mg) film-coated tablet, 1 tablet
114929	ATORVASTATIN SANDOZ (LEK PHARMACEUTICALS, SLOVENIA) (atorvastatin 40 mg) film-coated tablet, 1 tablet
114938	LIPITOR (GODECKE, GERMANY) (atorvastatin 40 mg) film-coated tablet, 1 tablet
114940	LIPITOR (PFIZER, IRELAND) (atorvastatin 40 mg) film-coated tablet, 1 tablet
114955	XARATOR (PFIZER, IRELAND) (atorvastatin 40 mg) film-coated tablet, 1 tablet
693947	CHLOVAS-40 (มิลลิเมด) (atorvastatin 40 mg) film-coated tablet, 1 tablet
749944	LIPITOR (PFIZER PHARMACEUTICALS, PUERTO RICO) (atorvastatin 40 mg) film-coated tablet, 1 tablet
750009	XARATOR (PFIZER PHARMACEUTICALS, PUERTO RICO) (atorvastatin 40 mg) film-coated tablet, 1 tablet
1044587	ATORVIN 40 (ยูนีซัน) (atorvastatin 40 mg) film-coated tablet, 1 tablet
1132952	LIPOSTAT (สยามเภสัช) (atorvastatin 40 mg) film-coated tablet, 1 tablet
1136004	TOVASTIN 40 (ที.โอ. เคมีคอลส์ (1979) (ปทุมธานี)) (atorvastatin 40 mg) film-coated tablet, 1 tablet

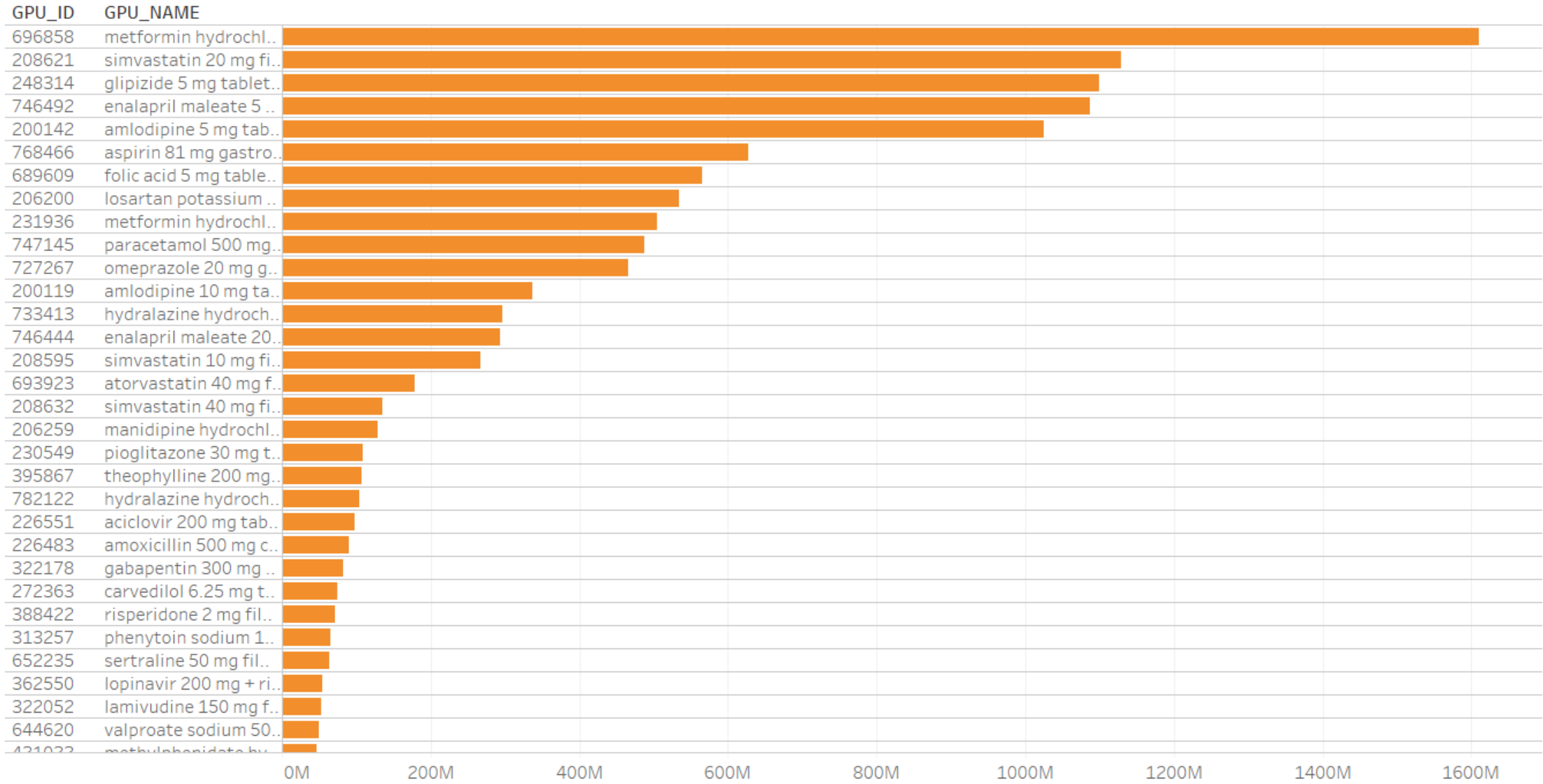


- ✓917,087 transactions per year
- ✓77 provinces in Thailand
- ✓TPU 18,118 items (Trade)
- ✓GPU 5,953 items (Generic)
- ✓1,086 Buyers (Hospitals & institutes)
- ✓577 Merchants (Sellers)
- ✓Total budget **76,971,528,585** Bath

Estimate budget of generic medicine at national level



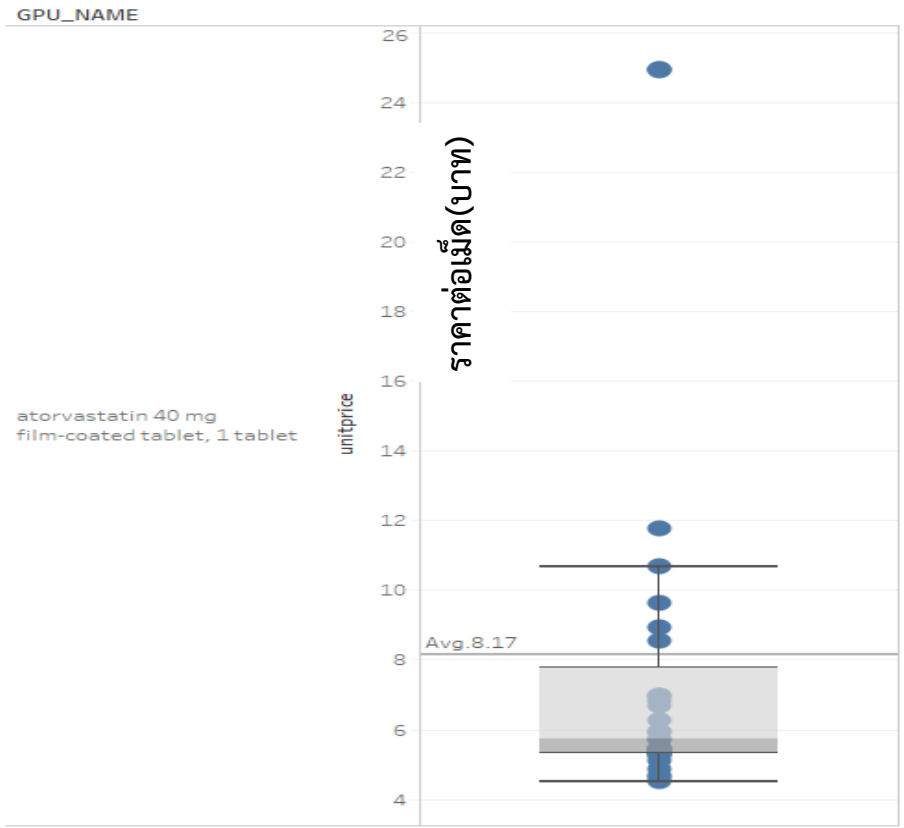
Estimate utilization of generic medicine at national level



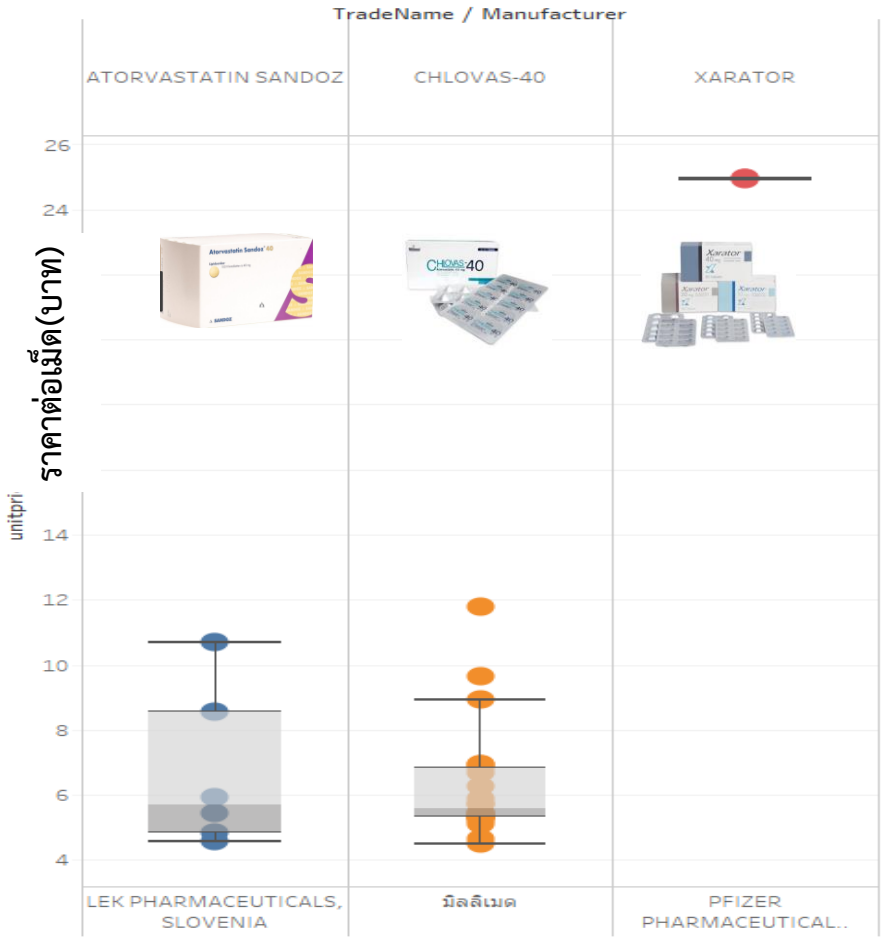
Product procurement price(e-bidding) at the Generic & Brand level

Generic (GPU level)

atorvastatin 40 mg film-coated tablet, 1 tablet - GPU 693923

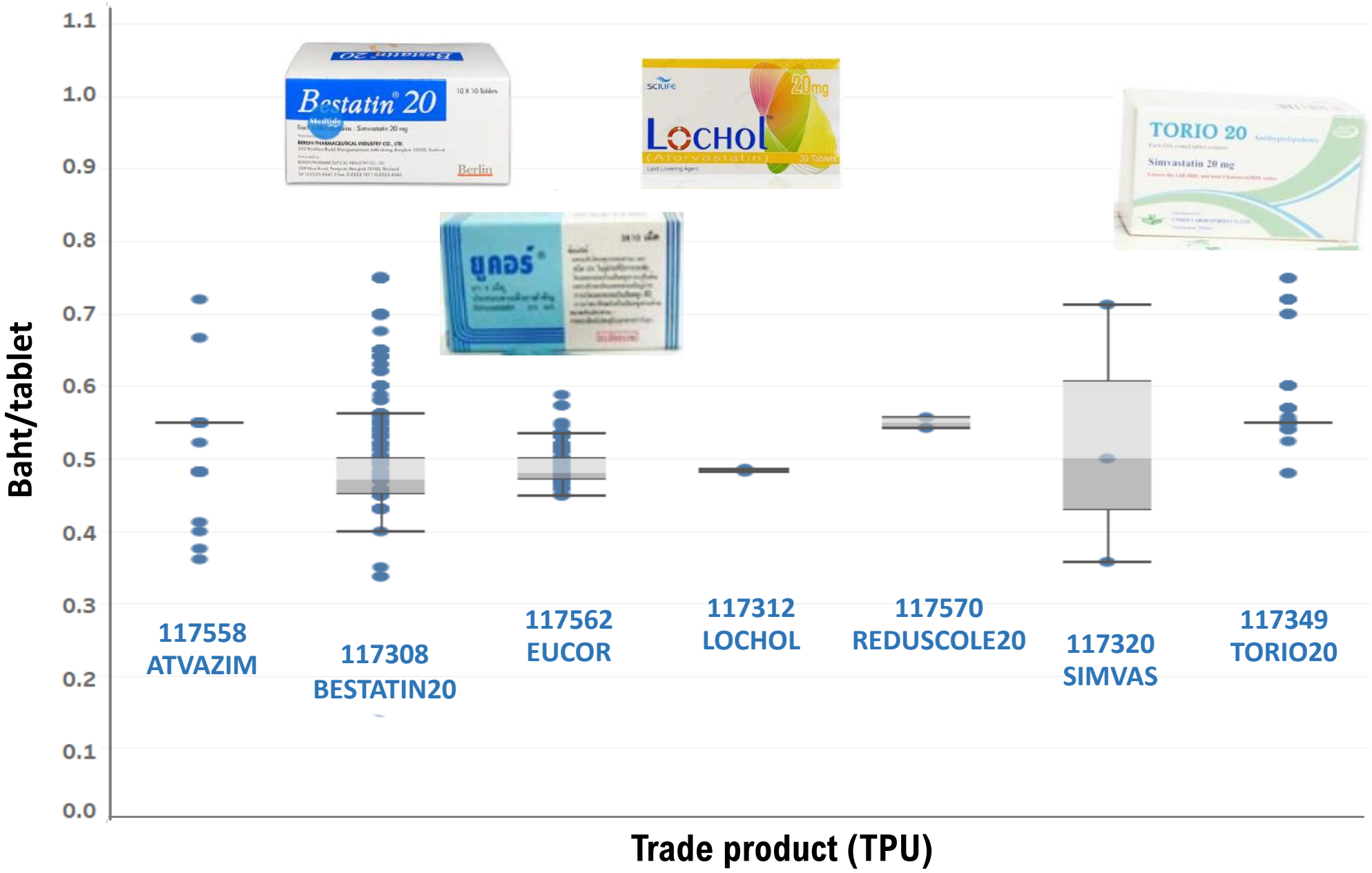


Brand Product (TPU level)



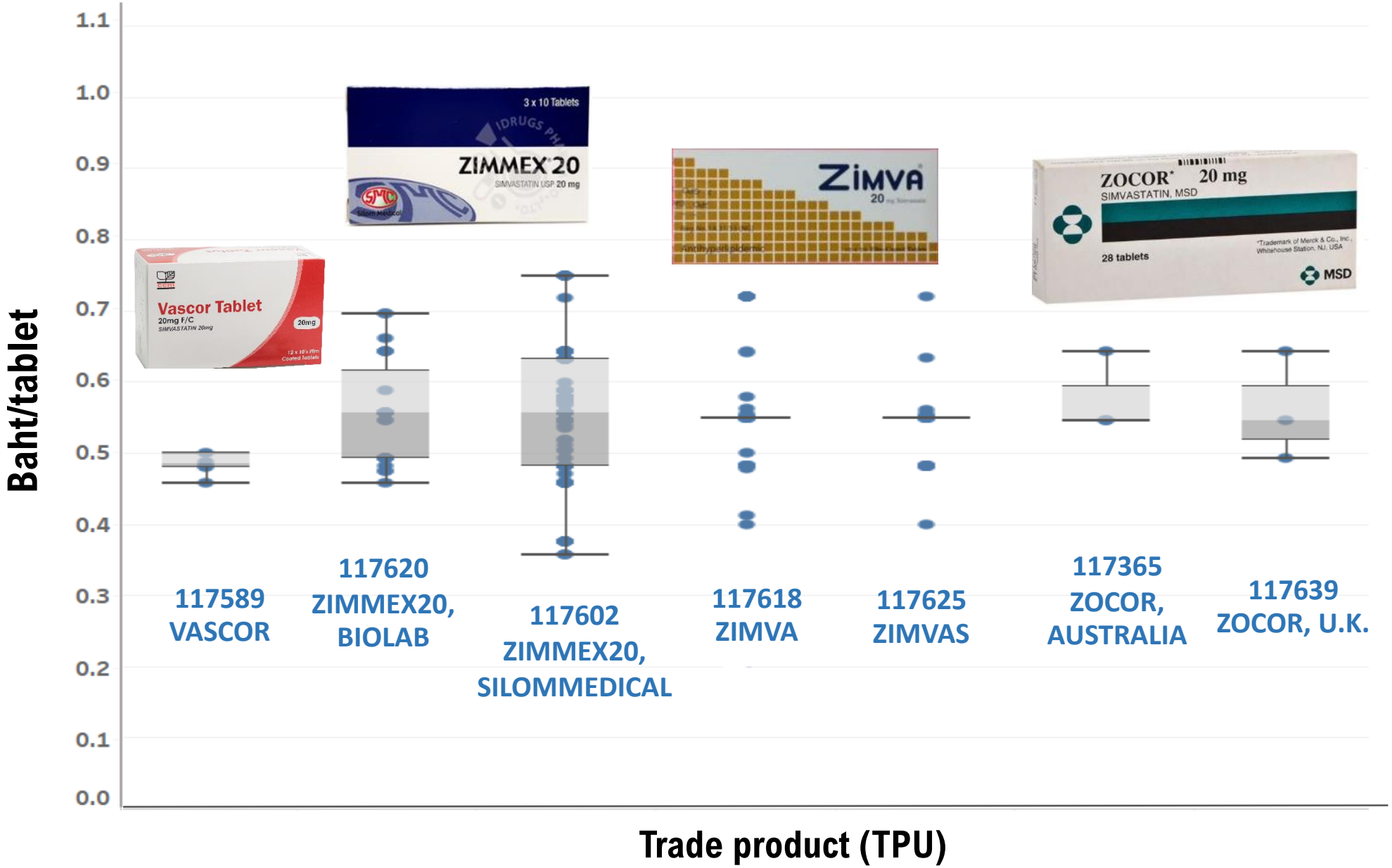
Procure by Specific Method

GPU: 208621 simvastatin film – coated tablet



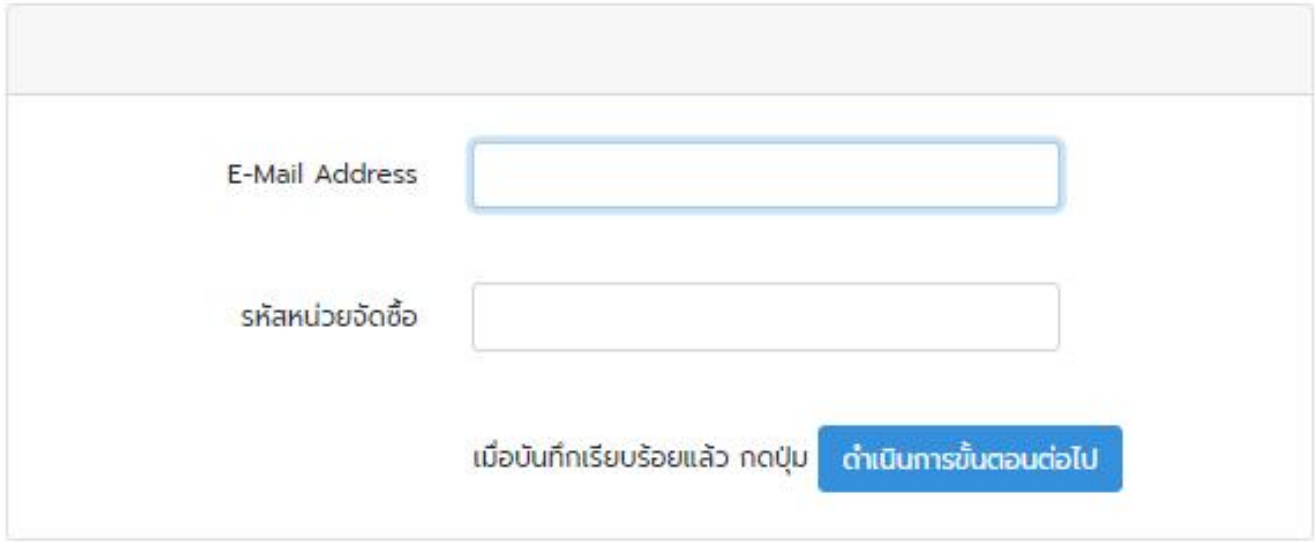
Procure by Specific Method

GPU:208621 simvastatin film – coated tablet



Drug Procument Analysis Reporting System

http://164.115.25.40/PACDSS/login



ข้อมูลจากโรงพยาบาลทั้งหมดกว่า

940

โรงพยาบาล

ข้อมูลการซื้อยาทั้งหมดกว่า

88,303

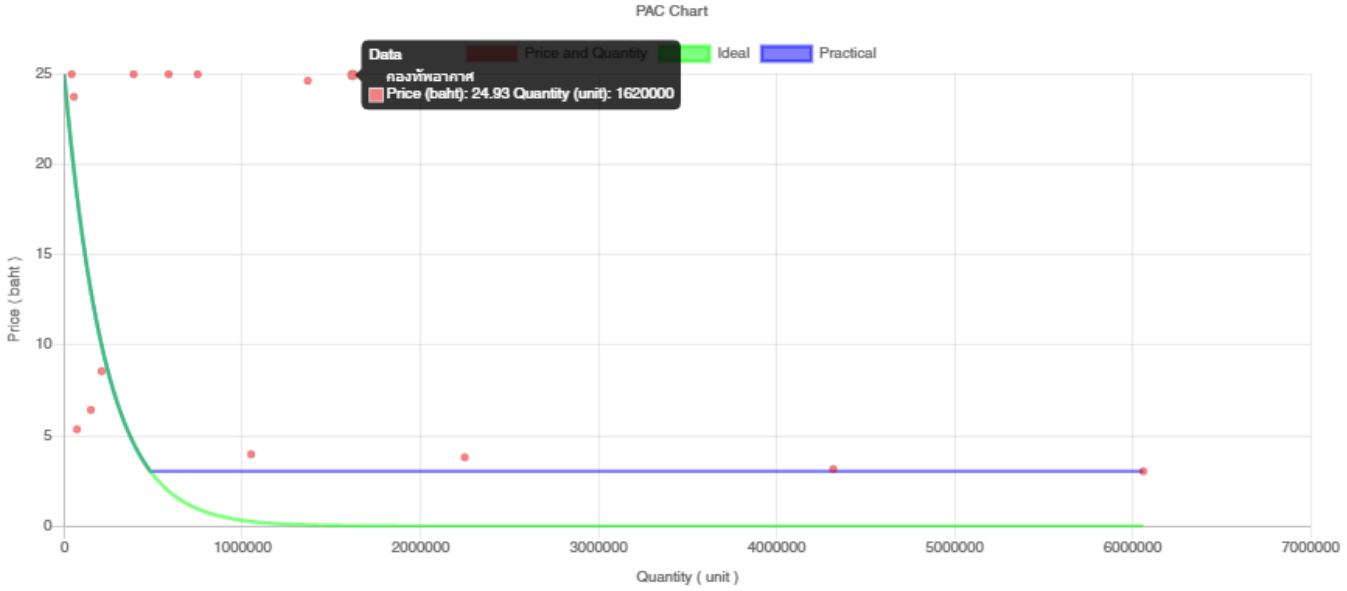
รายการ

ปีงบประมาณ 2562 วิธีการจัดซื้อ ebidding

เลือกยา คำนวณ

- ข้อมูลของปีงบประมาณ 2561 เป็นข้อมูลเฉพาะเดือน พ.ค.-ก.ย. 2561
- ข้อมูลของปีงบประมาณ 2562 เป็นข้อมูลเฉพาะเดือน ต.ค. 2561-มิ.ย. 2562

ชื่อยา: atorvastatin 40 mg film-coated tablet, 1 tablet



ตารางแสดงค่าทางสถิติ (Statistic Information)

ราคา (บาท)	น้อยที่สุด (Min)	3.03	ปริมาณ (หน่วย)	น้อยที่สุด (Min)	42,000.00	PAC (Adjusted)	น้อยที่สุด (Min)	0.00
	มากที่สุด (Max)	24.97		มากที่สุด (Max)	6,061,700.00		มากที่สุด (Max)	129.70
	เฉลี่ย (Average)	14.82		เฉลี่ย (Average)	1,351,722.86		เฉลี่ย (Average)	26.40
Gini			0.75					

ปีงบประมาณ 2562 วิธีการจัดซื้อ เฉพาะเจาะจง

เลือกยา คำนวณ

- ข้อมูลของปีงบประมาณ 2561 เป็นข้อมูลเฉพาะเดือน พ.ค.-ก.ย. 2561
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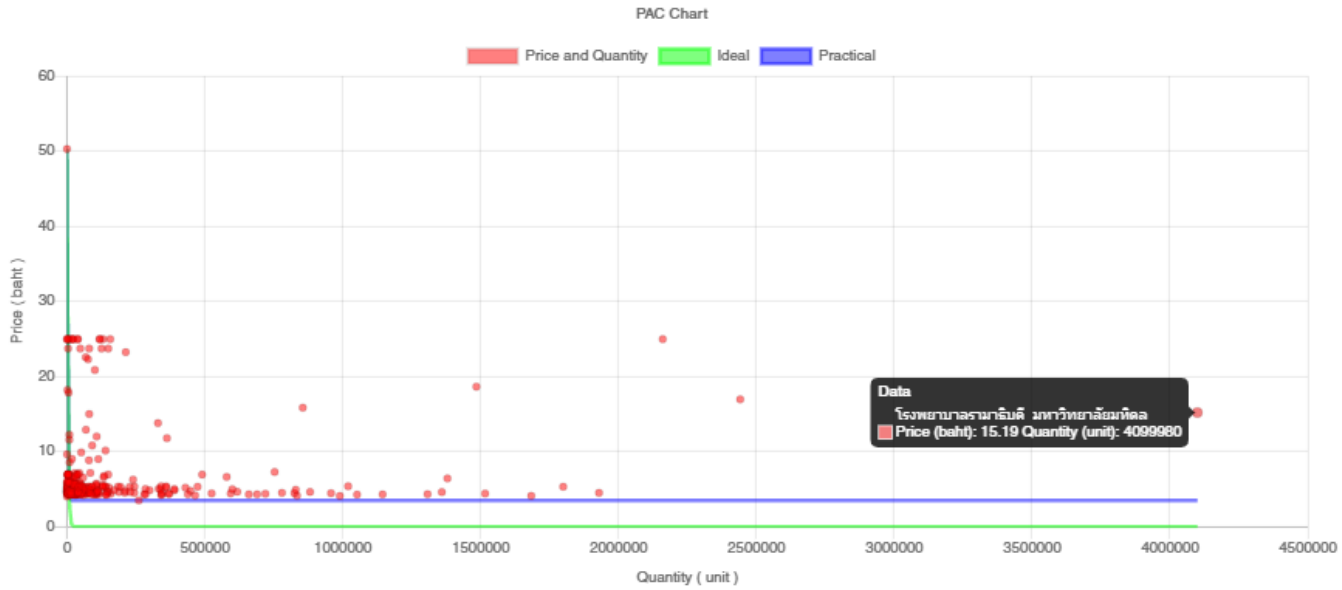
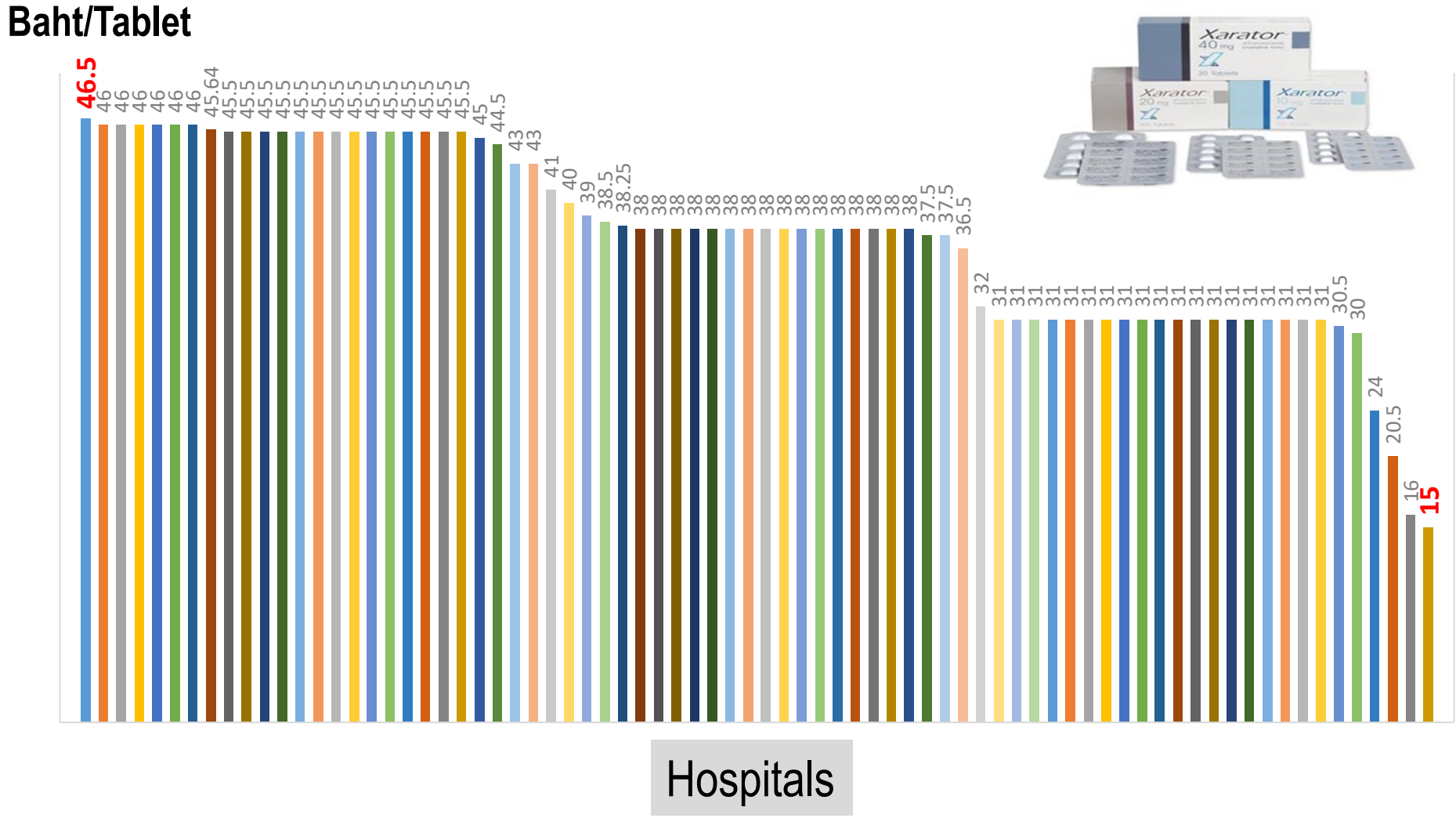
ชื่อยา: atorvastatin 40 mg film-coated tablet, 1 tablet



ตารางแสดงค่าทางสถิติ (Statistic Information)

ราคา (บาท)	น้อยที่สุด (Min)	3.50	ปริมาณ (หน่วย)	น้อยที่สุด (Min)	270.00	PAC (Adjusted)	น้อยที่สุด (Min)	0.00
	มากที่สุด (Max)	50.29		มากที่สุด (Max)	4,099,980.00		มากที่สุด (Max)	32,020.29
	เฉลี่ย (Average)	6.79		เฉลี่ย (Average)	168,564.44		เฉลี่ย (Average)	1,212.26
Gini			0.79					

TMTID(TPU) 114955 XARATOR (Atrovastatin 40 mg filmed-coated tablet)



What is Health Information Exchange (HIE)?

- is defined as the electronic transfer of clinical and/or administrative information across diverse and often competing health care organizations

(Dixon B. editors, Health Information Exchange, Academic Press 2016)

- is the mobilization of health care information electronically across organizations within a region, community or hospital system

- is in essence an interorganizational IS in healthcare

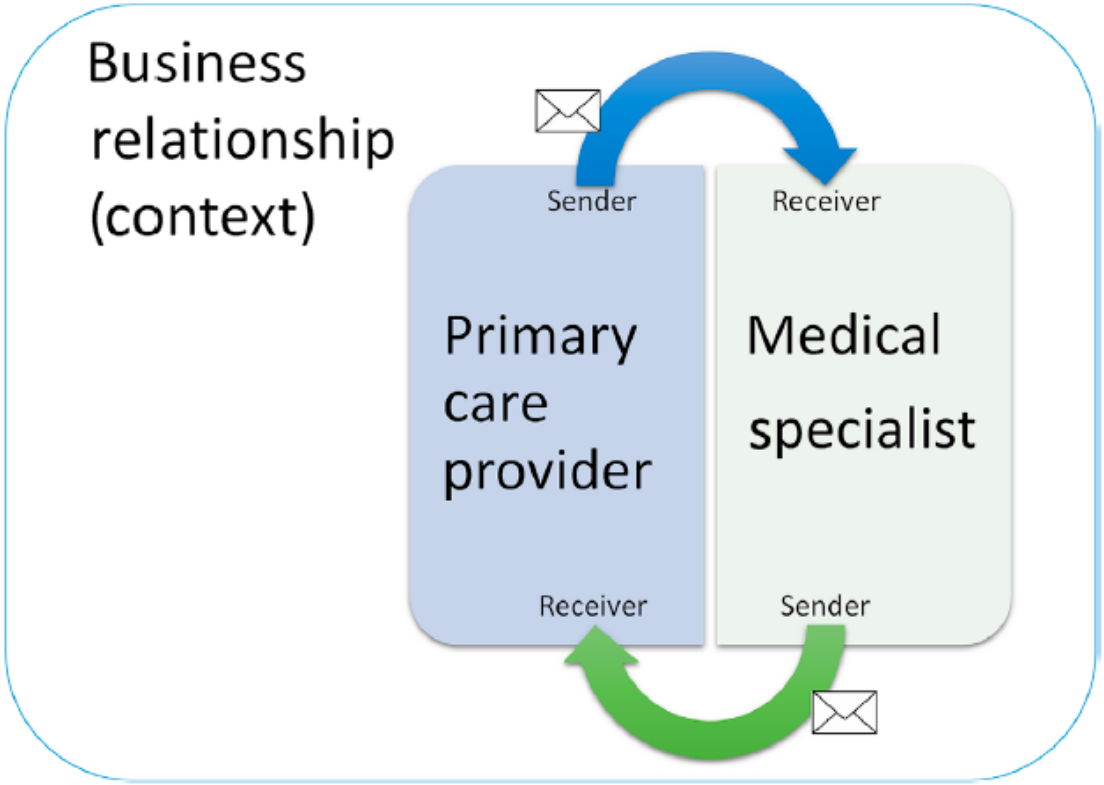
(Zhang P & et al, An Empirical Investigation of Health Information Exchange Success Factors. ICIS 2016 Proc [Internet]. 2016 Dec 11)

HIE can be a Verb or a Noun

HIE *(v)*	HIE *(n)*
HIE refers to **movement of data** or information electronically among stakeholders in the health care sector.	HIE refers to an **organization**, usually a legal corporation, that facilitates information exchange (the verb form) within a network of facilities, community, state, or region.

From: Dixon B. editors, Health Information Exchange, Academic Press 2016

Fundamental Components of HIE



- Health care actors & Relationships
- ICT system
- Transactions or Messages
- Content or Payload

From: Dixon B. editors, Health Information Exchange, Academic Press 2016

Benefit of HIE on Health care delivery

Appropriate and timely sharing of patient information ensure patients receive timely care by:

- Reducing duplicate testing
- Avoiding medication errors
- Avoiding readmissions
- Improving decision making
- Enhancing care coordination

From: https://www.healthit.gov/playbook/health-information-exchange/

Three forms of Health Information Exchange

Directed Exchange

The ability to send and receive secure information electronically between care clinicians to support coordinated care

Query-Based Exchange

The ability for clinicians to find and/or request information on a patient from other clinicians, often used for unplanned care

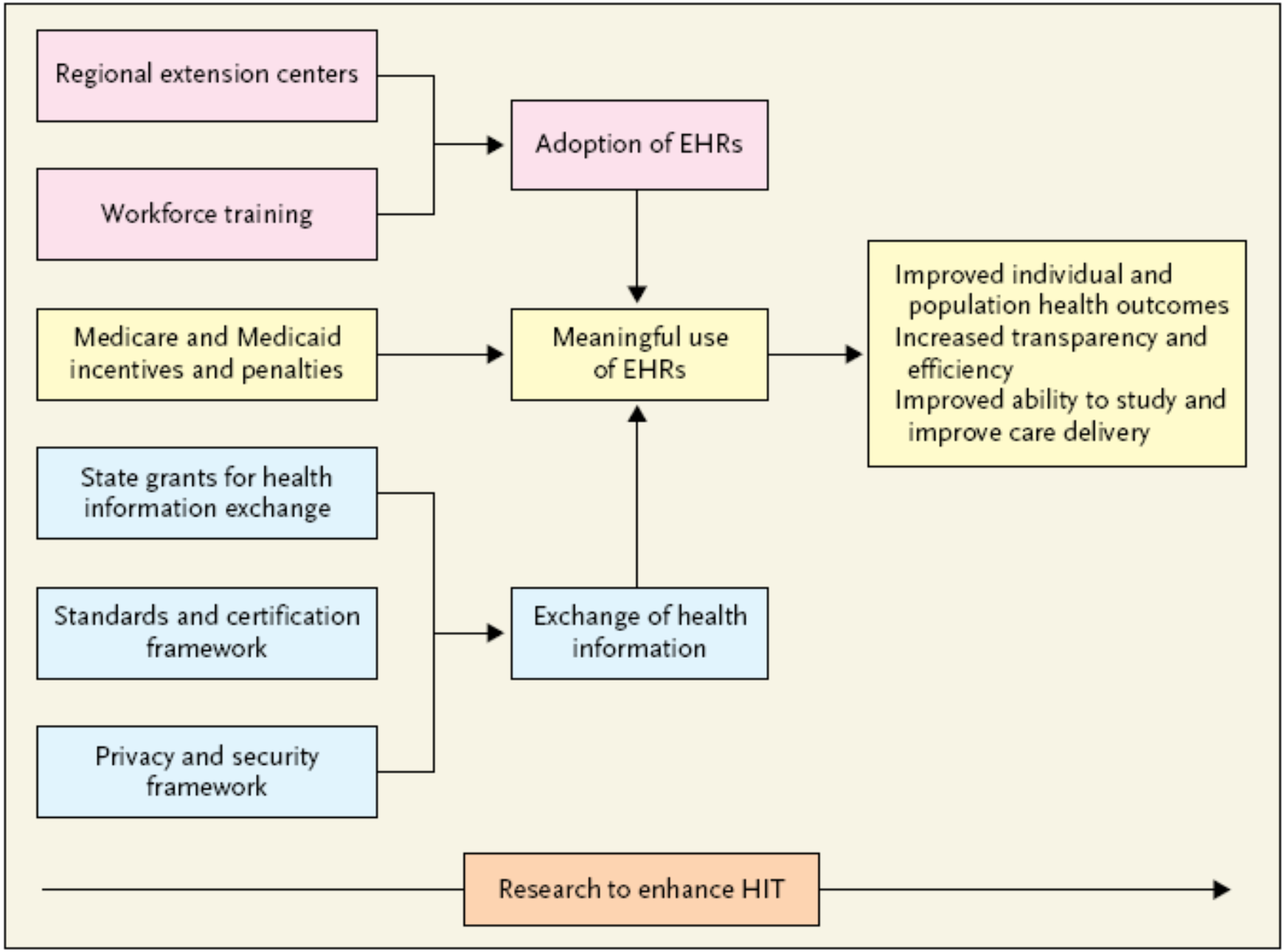
Consumer-Mediated Exchange

The ability for patients to aggregate and control the use of their health information among clinicians

From: https://www.healthit.gov/playbook/health-information-exchange/

Form of Organized HIE (US model)

- **Private HIE** : the US. Veterans Affairs (VA) health system
- **Government-Facilitated HIE** : the US. state governments or other publicly funded organizations primary facilitator of HIE within state boundaries
- **Community-Based HIE**: exchange of data and information among providers and health care organizations that may be marketplace competitors operates within a specific geographic area
- **Vendor-Facilitated HIE :** HIE facilitated by an EHR system vendor e.g. Cerner, Epic



The HITECH Act's Framework for Meaningful Use of Electronic Health Records (EHRs).

The NEW ENGLAND JOURNAL of MEDICINE

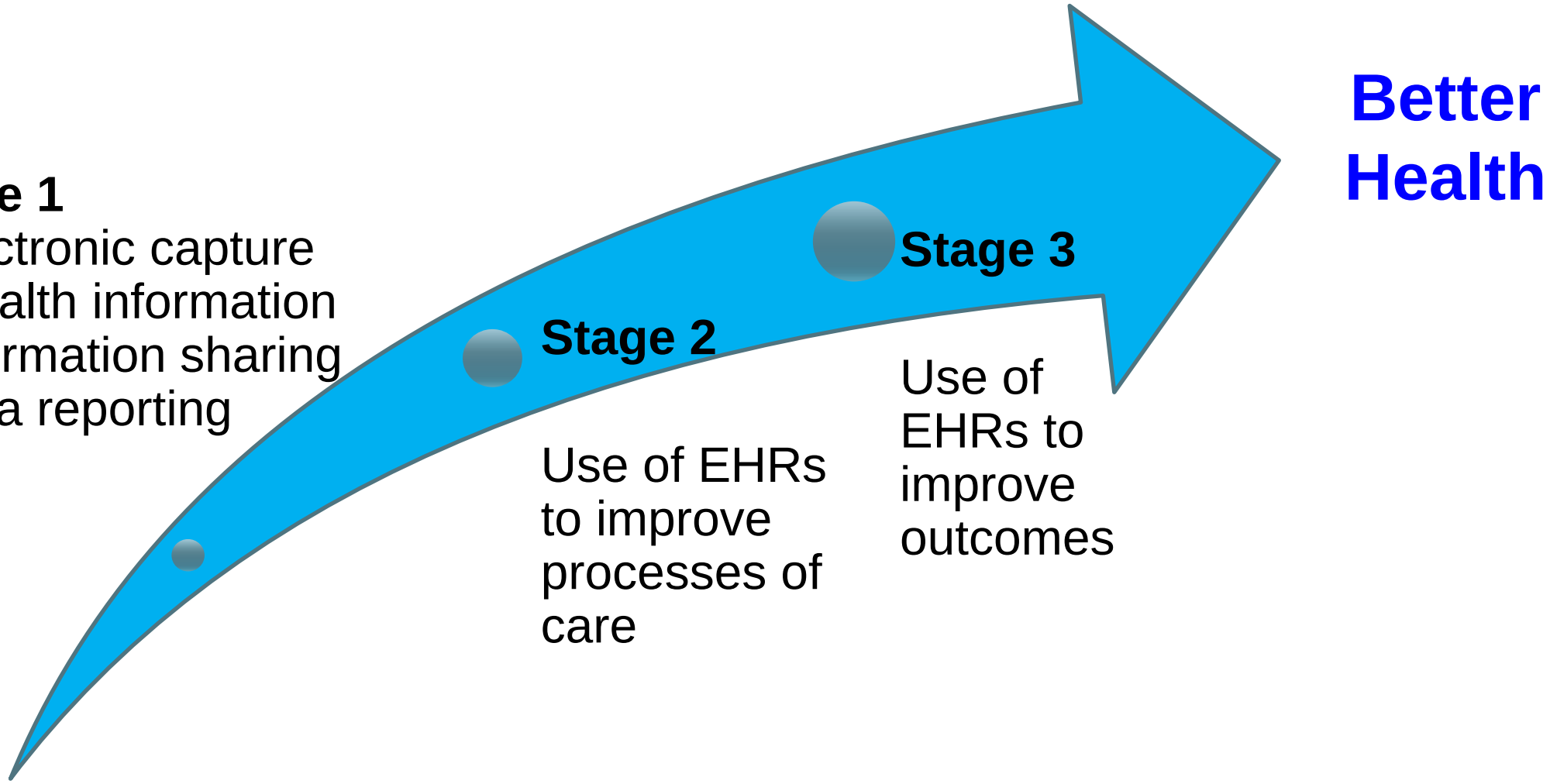
DOI:10.1056/NEJMp0912825
Corpus ID: 205106139

Launching HITECH.

D. Blumenthal

Published 2010

“Meaningful Use” of Health IT



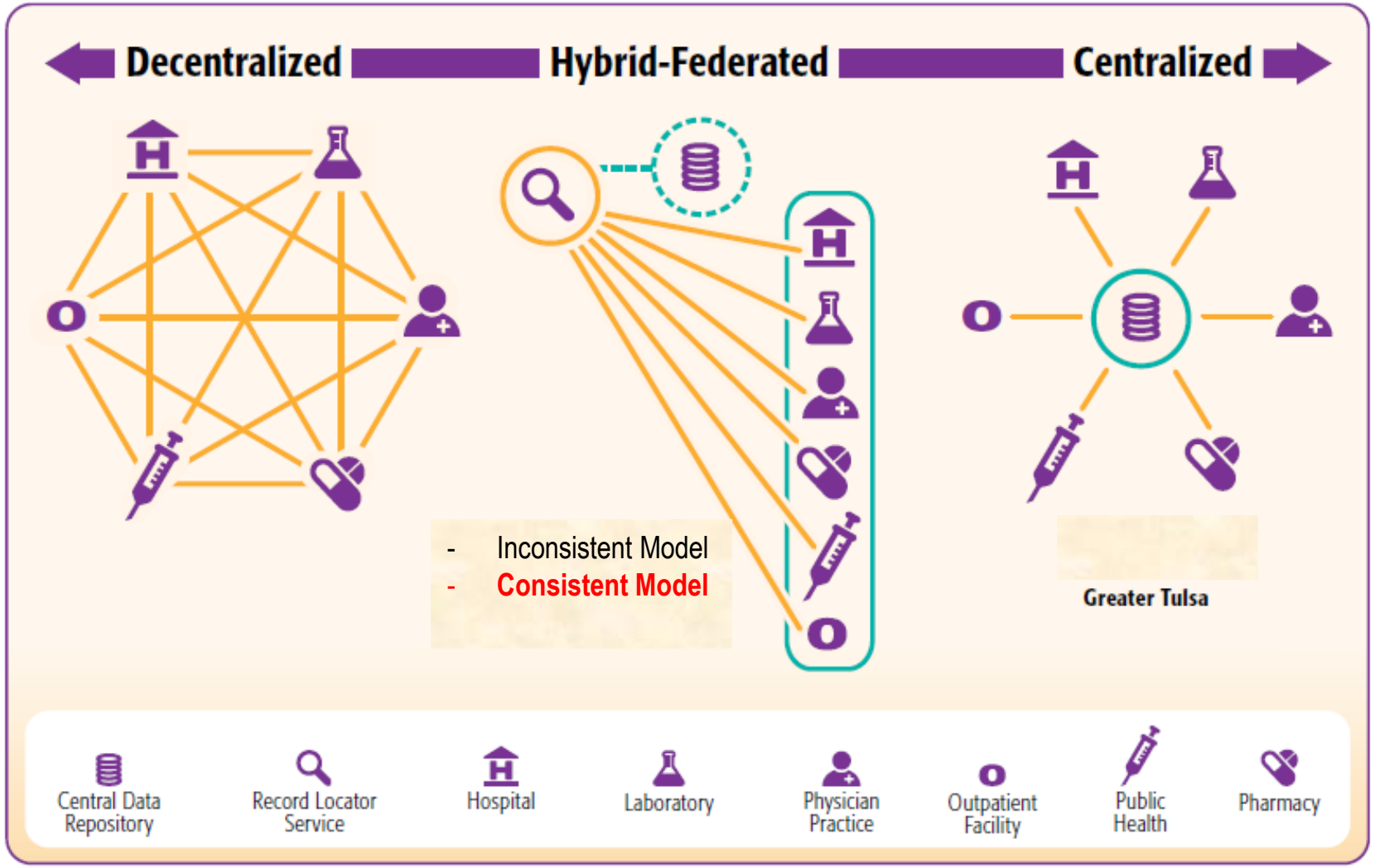
(From Dr.Nawanann’s Slide presentation 2020- NEJM-Blumenthal D, 2010)

Key Health Information Exchange Requirements For Meaningful Use

Requirement	Specifics
Electronic exchange of lab results	Providers receive and use lab results, supplying critical information to make diagnoses, track treatment of chronically ill patients, and assess quality of care
Care and discharge summaries	When a patient is referred to a specialist or discharged from a hospital, care and discharge summaries are shared with the patient's primary care provider to enable the provider to make effective diagnoses, follow up with the patient in a timely and appropriate manner, prescribe appropriate medications, and avoid unnecessary services, so that patient transitions are safer and more effective
Public health reporting	Providers report key events relevant to public health (immunizations delivered, contagious diseases found), supporting improved population health
Quality reporting	Providers measure and share information about the quality of the care they deliver, creating critical feedback loops
Sharing information with patients	Providers share care summaries, reminders, and other key information with patients, improving care coordination and engaging patients in their own care

From:Claudia Williams, Farzad Mostashari, Kory Mertz, Emily Hogin and Parmeeth Atwal. From The Office Of The National Coordinator: The Strategy For Advancing The Exchange Of Health Information. Health Affairs, 31, no.3 (2012):527-536.

Type of HIE Architecture



McCarthy DB & et al Learning from Health Information Exchange Technical Architecture and Implementation in Seven Beacon Communities. EGEMS [Internet]. 2014 May 5 [cited 2017 Jun 25];2(1)

HIE in Thailand - Form

- **Government –facilitated HIE:** Nation wide
  - Ministry of Public Health - Health Data Center (HDC) project
  - Ministry of Digital Economy and Society – GDBi's HIE project
  - National Claim Data Clearing system: Health Information system Standards & Processing Administration (HISPA)

- **Community based HIE**: HIE between primary care clinics and Thai Air Force Hospital

- **Private HIE**: Bangkok Dusit Medical Services (BDMS) hospitals (40+ hospitals)

- **Vendor-facilitated HIE**: HospXP HIS software user network

HIE in Thailand - Architecture

Centralized Architecture

- MoPH reporting system: Health Data Center (**HDC**)
- National Claim Data Clearing system – **HISPA**
- Ministry of Digital Economy and Society – **GDBi's HIE project**
- National Health Reform Commission's **Health Data Integration project**

Unified Health Data Platform

Health Policy/Profiles

Anonymize Data

SDG3

Thailand Health Profiles

Personal Health Record (PHR)

Management

Deidentification

Visualization

เขตสุขภาพ → สสจ. → รพ./หน่วยงาน

เขตสุขภาพ → สสจ. → รพ./หน่วยงาน

Analytics

Business/System Owner

NCCR

Medical Hub (มูลค่า1.4 แสนล้าน/ปี 61)

Big Data for Analysis

Anonymize Data

Data Mining

Data Mart

NDHP

Reimbursement

Deidentification

NHSO | CSMBS | SSS | INSURANCE | Others | FWF

HL7 FHIR

HL7 FHIR

Survey

Individual /Self Care

Hospital Services

MOPH

GOV-HOSP Ex-MOPH

Nursing Home

Private-HOSP

Community Health Activity

Thai

Welfare

Private Insurance

cash

Stateless/ Escape

Expat

Welfare

Private Insurance

cash

FWF

* NCCR=National Chronic Care Registry *

Anant Kanoksilp

Health Information system Standards & Processing Administration (HISPA)

- Thai Health Information Exchange for Healthcare Claim Information
- Standardize healthcare services data, harmonize and provide healthcare services claim data processing and curate (data warehouse) the healthcare services data.

ศมสท THIS

HISPA harmonizes healthcare services process of the country's three major healthcare insurance schemes:

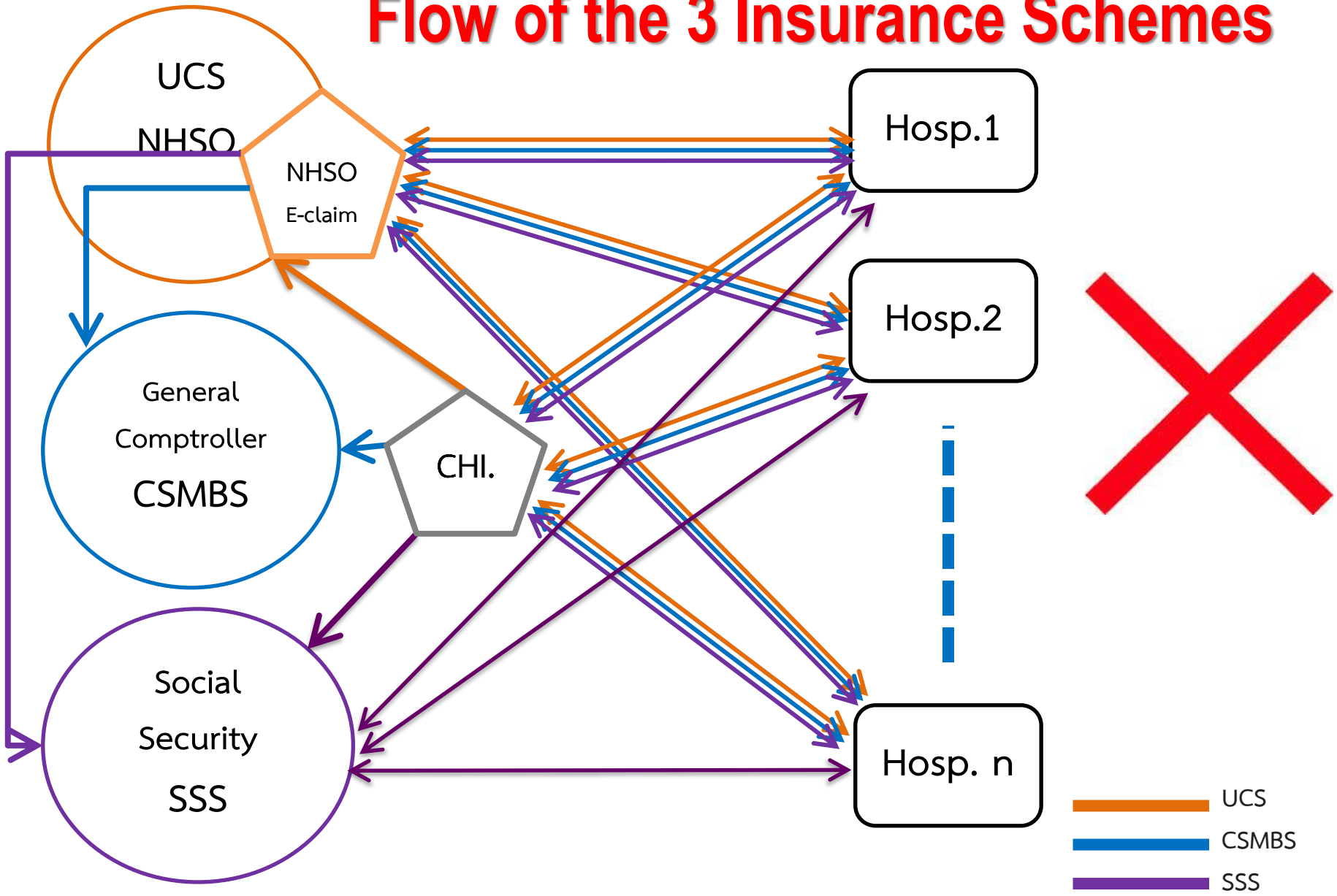
- National Health Security Office's Universal Coverage Scheme (UCS),
- Comptroller General Department's Civil Servant Medical Beneficiary Scheme (CSMBS)
- Social Security Office's Social Security Scheme (SSS).

Thailand Universal Health Coverage

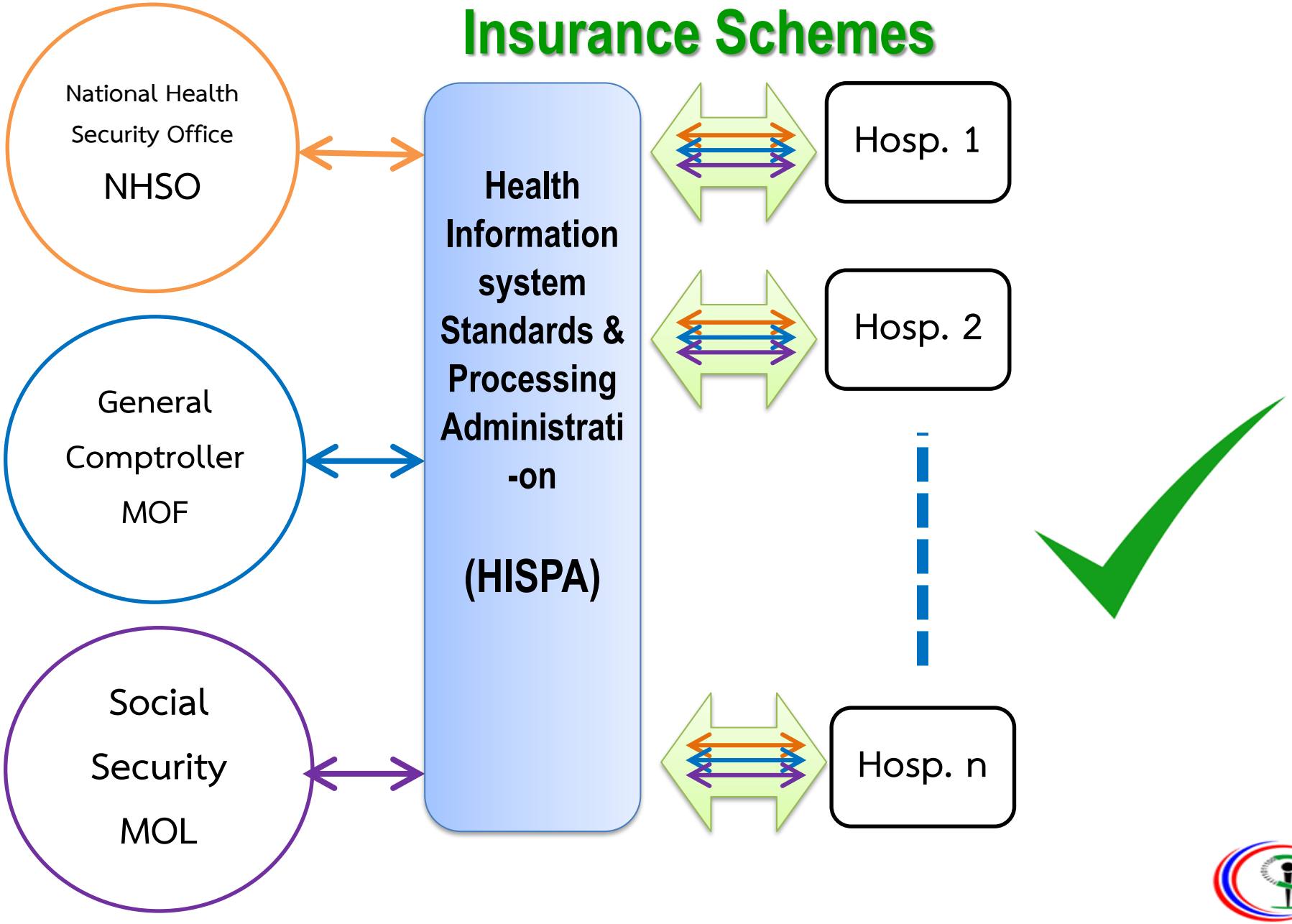
Social health protection schemes have covered all Thai citizen since 2002

Major Schemes	Civil Servants Medical Benefit Scheme (CSMBS)	Social Security Scheme (SSS)	Universal Coverage Scheme (UCS)
Introduced in	1960s	1990s	2002
Target beneficiaries	Government employees & dependents, retirees	Private sector employees	Those not covered by CSMBS nor SSS
Pop Coverage	7% (5 M)	16% (10 M)	75% (48 M)
Funding	Government budget	Payroll contribution, Tripartite	Government budget
Payment to health facilities	Fee-for-service for OP, DRG for IP	Capitation for OP & IP, DRG for Adjusted RW >= 2	Capitation for OP, DRG for IP

Current Reimbursement Information Flow of the 3 Insurance Schemes



Better Reimbursement Information Flow of the 3 Insurance Schemes



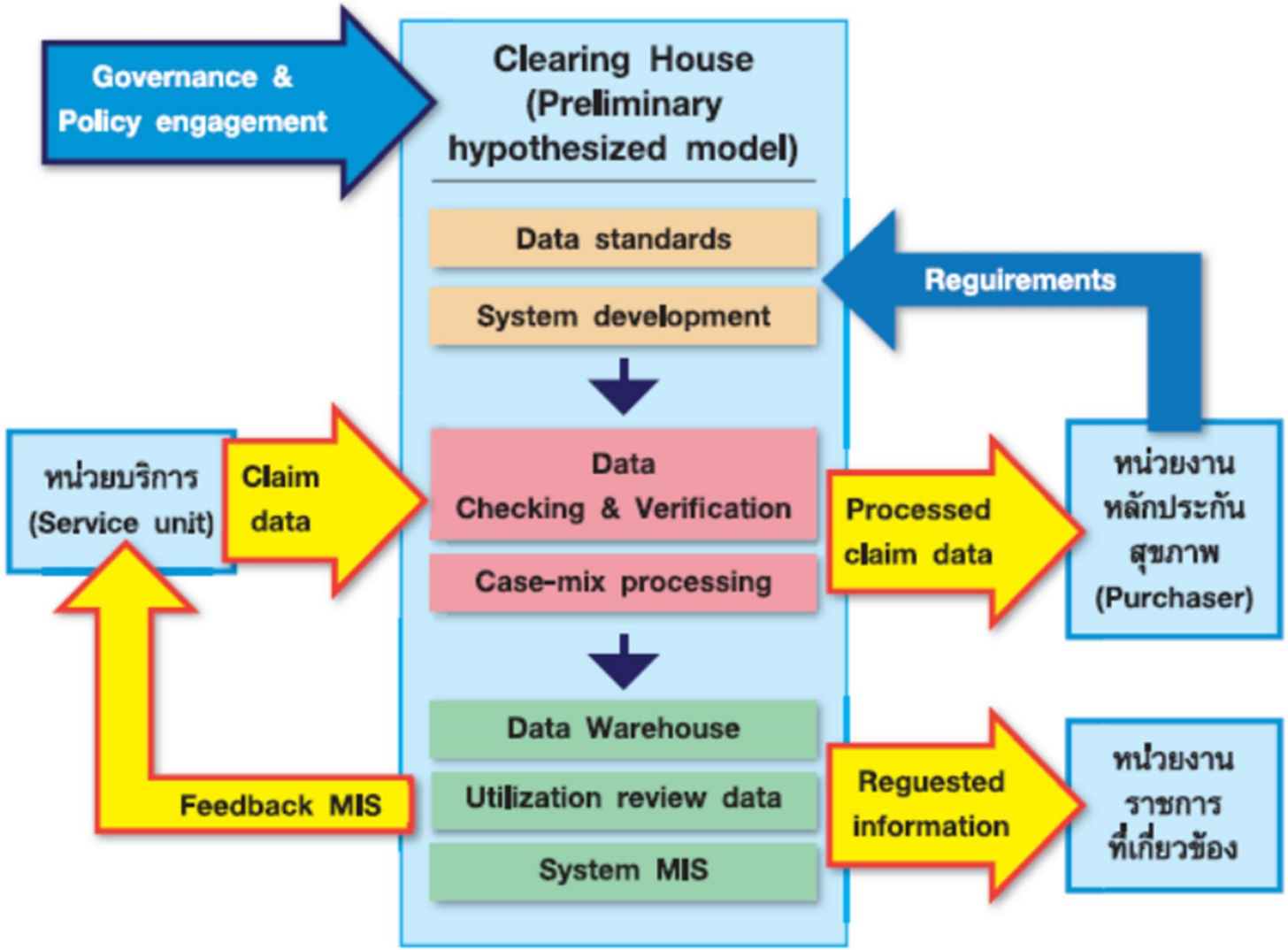
ศมสท THIS

HISPA Functions

HISPA is a Thai public organization (in process of establishment) under Ministry of Public health that will

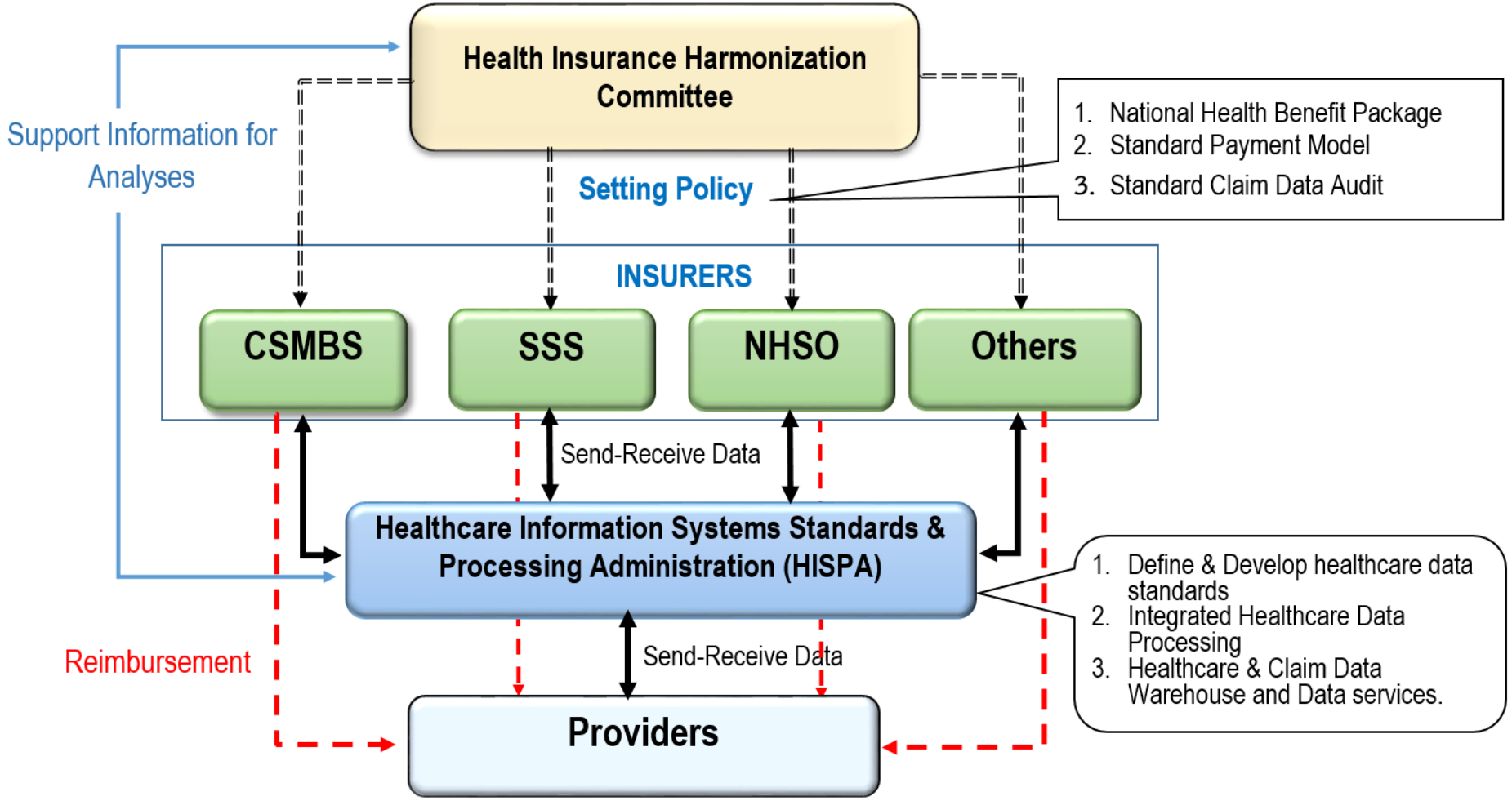
- standardize healthcare services data,
- harmonize and provide healthcare services claim data processing and
- curate the healthcare services data. (data warehouse of healthcare services data).

HISPA Functions

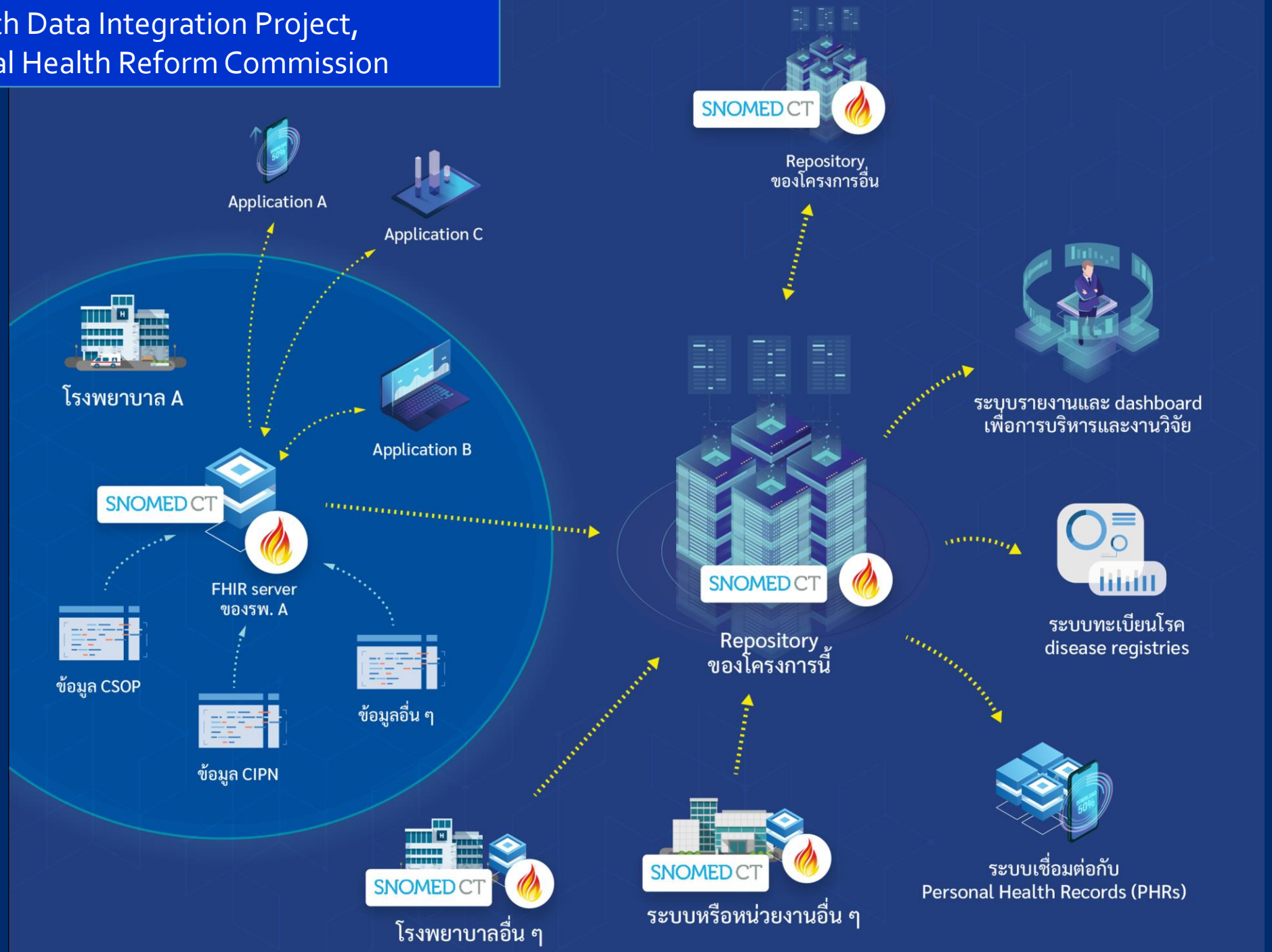


ศมสท THIS

Healthcare Information System Standards and Processing Administration (HISPA)



Health Data Integration Project, National Health Reform Commission



STANDARD

Analytics Services
(Upon request by
Data Controllers)

Data Visualization
and Analytics

Data
Warehouse

ETL

Governance Committees
(Data usage, Data Access,
Backup, Security, Privacy)

Claims

HL7 FHIR

Claims

HL7 FHIR

Claims

HL7 FHIR

Staging DB

Data Catalog

HL7 FHIR

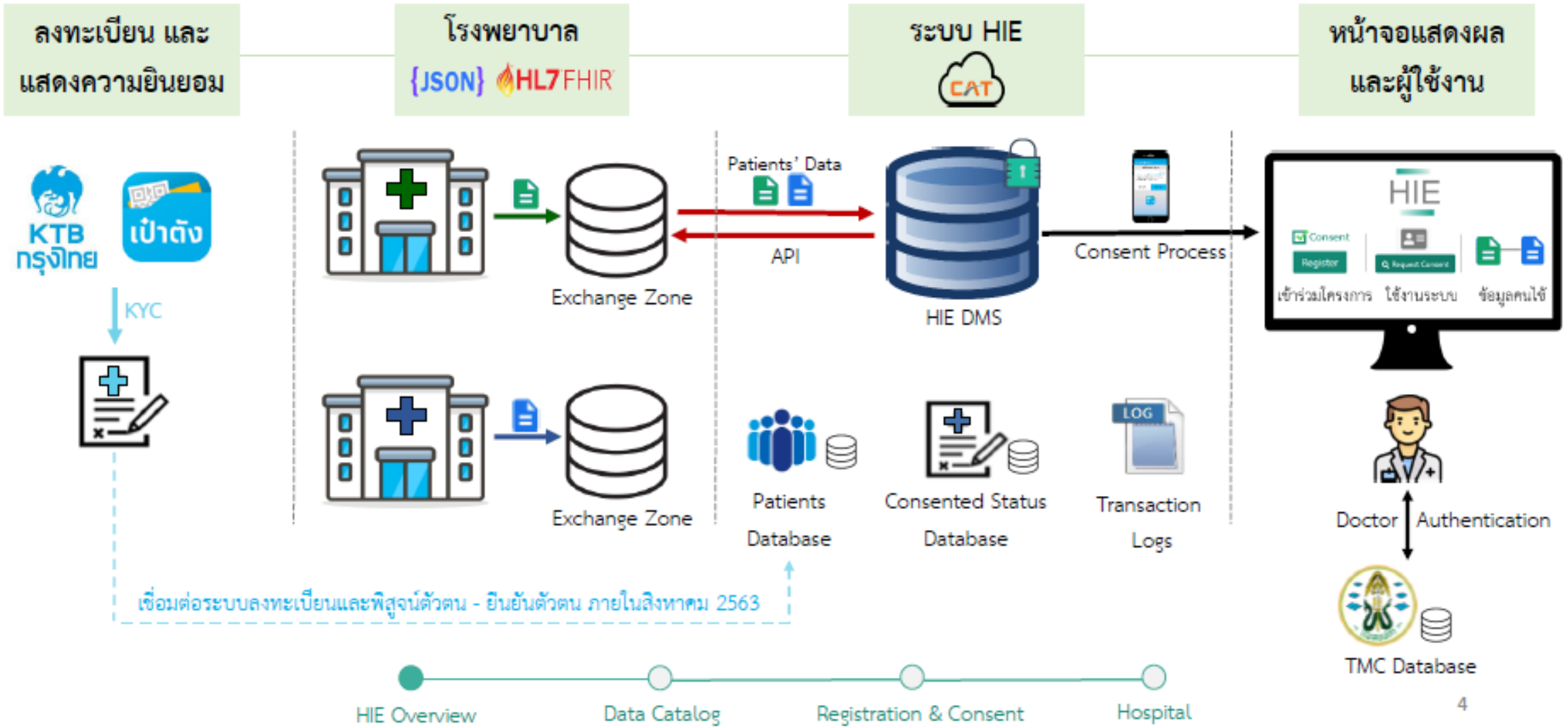
APIs Data Services for

Research communities
Data controllers

Data Integration

เริ่มที่ Covid + a few other diseases ?

HIE project, Ministry of Digital Economy and Society



The Future of Virtual Health and Care

Driving access and equity through inclusive policies

Virtual health and care is the delivery of health and care services remotely through digital means and technologies.

Virtual health and care has grown globally since the COVID-19 pandemic began

76% of **patients** want virtual care visits to be a standard part of their care regimen[1]

83% of **health and care providers** intend to continue using virtual delivery post the COVID-19 pandemic[2]

The global telehealth market is expected to grow at higher rates[3]

PRE-COVID	POST-COVID
14.5%	21.8%

Expected average **compound annual growth** rate of the global telemedicine market between 2019-2025

Six key policy pillars for a virtual health and care policy maturity framework

Governance and regulatory

Provide essential administrative and regulatory structure through strategies, plans, and guidelines.

Policy elements: governance, regulation, licensing, liability, quality assurance

Data and technology

Ensure the flow of data by blending hardware with evolving software and delivery standards.

Policy elements: infrastructure, data governance, interoperability

People and workforce

Equip different stakeholders with the required know-how through trainings, continuing education, skill upgrades, and competency building.

Policy element: digital skills building

Design and processes

Encourage user-friendly solutions by focusing on the individual through research and development and effective use of data in decision making.

Policy elements: human- and equity-centric, innovation, health outcomes

Business models

Supply financing and coverage through different funding sources, sustainable investments, and innovative pricing models.

Policy elements: financing, reimbursement

Partners and stakeholders

Bring together different players in the ecosystem through partnerships and teamwork.

Policy element: collaboration

UNIVERSAL DIGITAL AND TELEHEALTH COVERAGE: UDTHC
Project 2022-2027
National Primary Healthcare Reform Project

Prof. Dr. Sarana Boonbaichaiyapruck

National Broadcasting and Telecommunication Commission (NBTC)
Chairperson

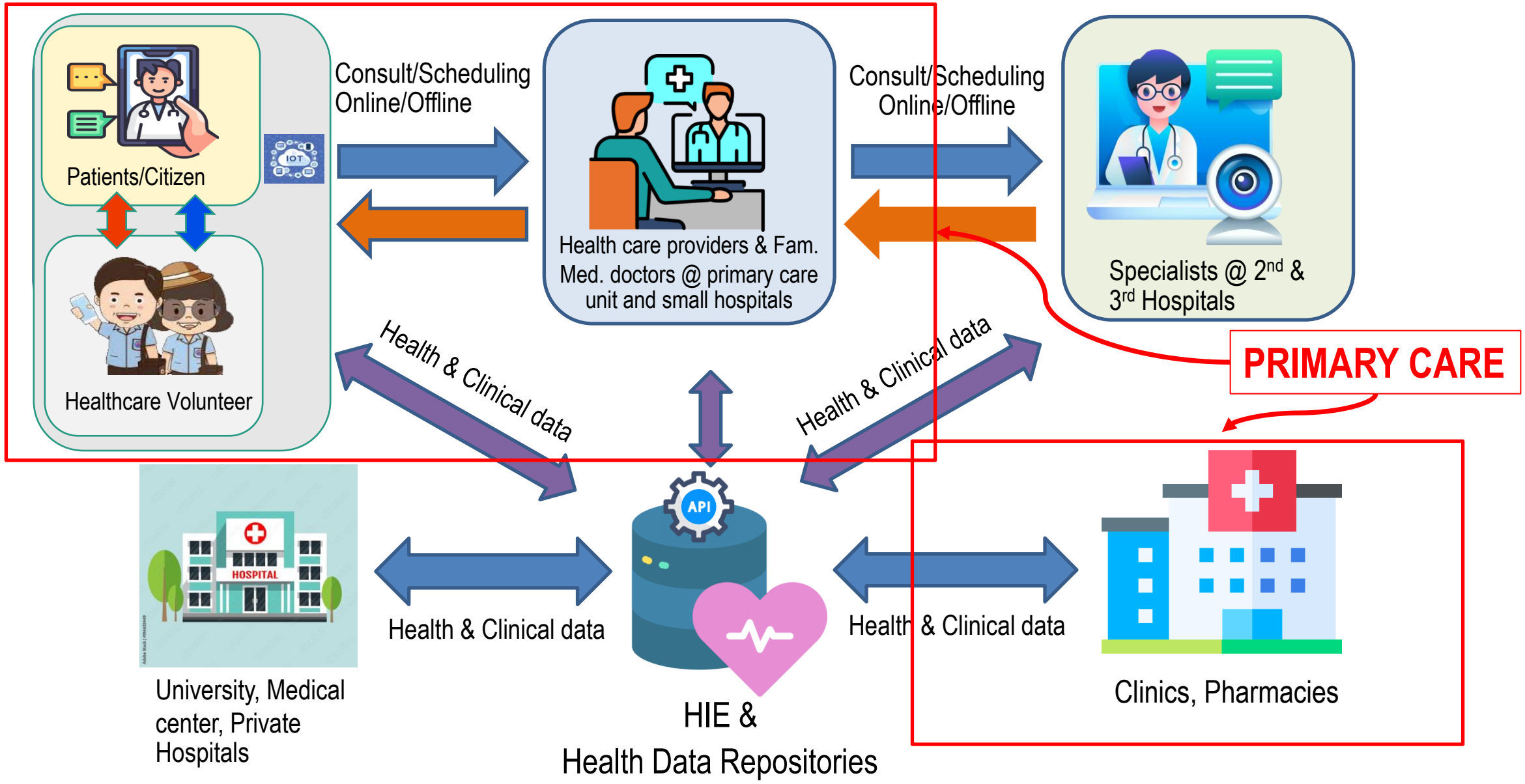
Under
Universal Service Obligation (USO)

Universal Digital and Telehealth Coverage to Support Equitable, Quality, and Efficient Health System

- USO in Thailand was implemented under the Act on Organization to Assign Radio Frequency and to Regulate the Broadcasting and Telecommunications Services (2010) and the Telecommunications Business Act (2001)
- USO aims to resolve the problem of digital divide:
  - Ensuring universal availability of telecommunications network
  - Ensuring accessibility of telecommunications (and social) services among the special need groups and promoting ICT literacy development.
  - Providing affordable telecommunications (and social) services to allow universal and equal access among low-income group.
- USO budget for UNIVERSAL DIGITAL AND TELEHEALTH COVERAGE (UDTHC)

2022	2023	2024	2025	2026
4,000 M฿ (110 M$)	~4,000 M฿	~4,000 M฿	~4,000 M฿	~4,000 M฿

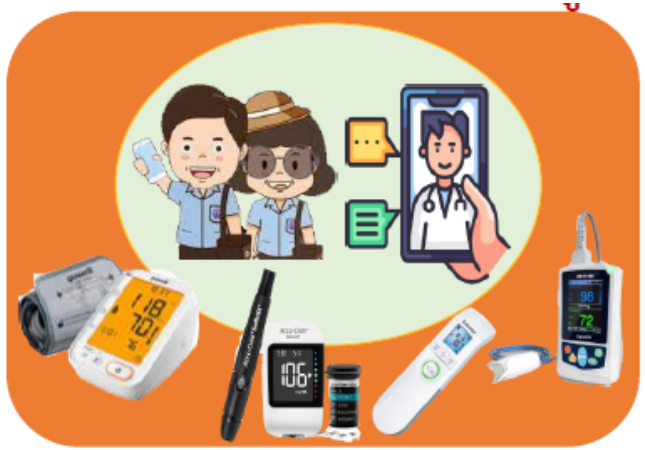
Integrated & Continuity of Care and Health Information Exchanges (HIE)

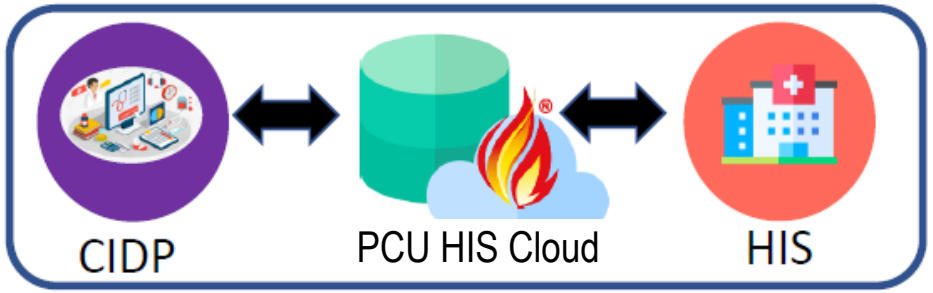


IoT devices

Target Population
Long term-Intermediate care (Home)

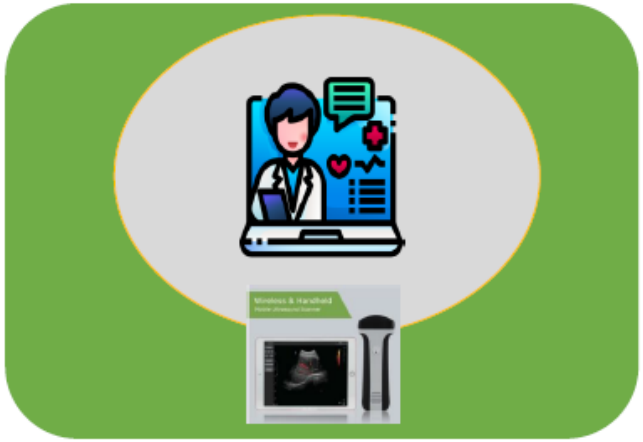
Healthcare Volunteer (Home Visit)





Healthcare professional team (Nurse, Healthcare worker, Pharmacist, Therapist…)
@ Health station and PCU

Family Med Doctor @ PCU and Small Hospitals



CIDP= Center IoT Data Platform
PCU = Primary care unit
HIS = Health Information Systems

Increase Accessibility

TARGET Population

Develop Virtual health care

Telepharmacy

13

Continuity of care with 2nd & 3rd Care providers

15

PAYERS

Insurance Info. systems

Home-based care

1 Home-based IoT

Telemedicine App

2 Patient App / Personal Health Care (PHR)

3 Home visit services

Healthcare workers & Healthcare Volunteers.

Mobile Medical devices

App Primary Care Platform

4 Health Stations in villages

5 Virtual Hospital Platform

Primary care Unit (PCU)

Patient Monitoring Dashboard

Telemedicine App

6 Health Information Exchange (HIE)/Telemed

Secondary/Tertiary Hospitals

Telemedicine App

Specialists

Hospital Information Systems / EMR

14

Data Standard i.e., HL7 Protocol / FHIR (Fast Health Interoperability Resources)

HL7 FHIR

11

Security & Authentication / Trusted Transaction

7 ระบบ Telemedicine (Consult)

Primary Care Cloud HIS for Health centers

8 ERP / ERP (Cloud) for Health centers

9 LABS/PACS/PCP

Health Information Exchange (HIE) – Health Link - Enterprise Service Bus

Data Lake / Big Data

12 National Digital Health Platform (NHDP) : Data Catalog / Personal Health Data and Record / Trusted Transaction / Enterprise Service Orchestration / Service Gateway

BI

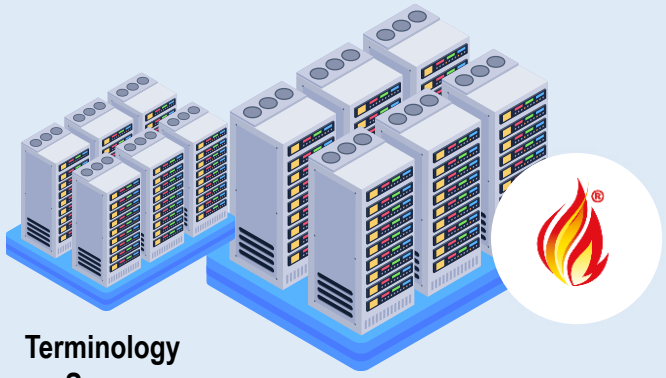
Cloud Infrastructure (cloud ส่วนกลาง, cloud พื้นที่)

Primary care unit HIS on cloud

Open source
Open standard API (FHIR +……)

= FHIR server

= Communicate with FHIR



Terminology Server

PCU HIS (FHIR) Server

Repository @ Provincial / Regional center

Clients @ Primary care unit

Mobile / PHR App PCU HIS on cloud

Other Mobile/ PHR App systems

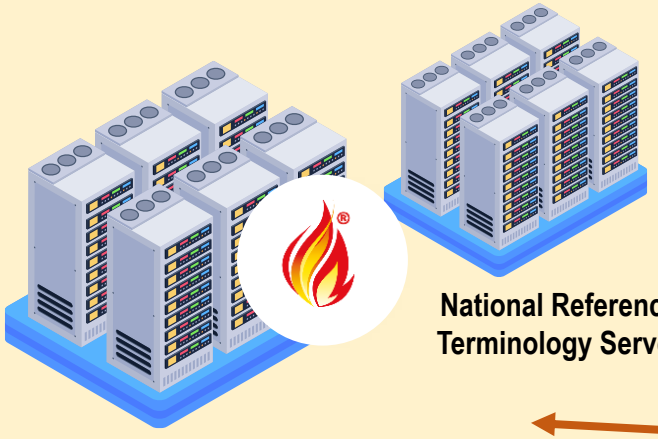
Other PCU HIS at Primary care Unit

2nd , 3rd & Super 3rd Hospitals

Community hospitals.

Ministry of Public Health's (MOPH) Hospitals

PCU HIS on-cloud Server
(FHIR + terminology server)



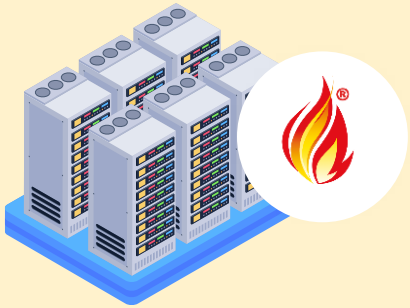
National Reference
Terminology Server

MOPH Repository (Center) &
Patient Discovery Service

Payers, Insurance and other
systems

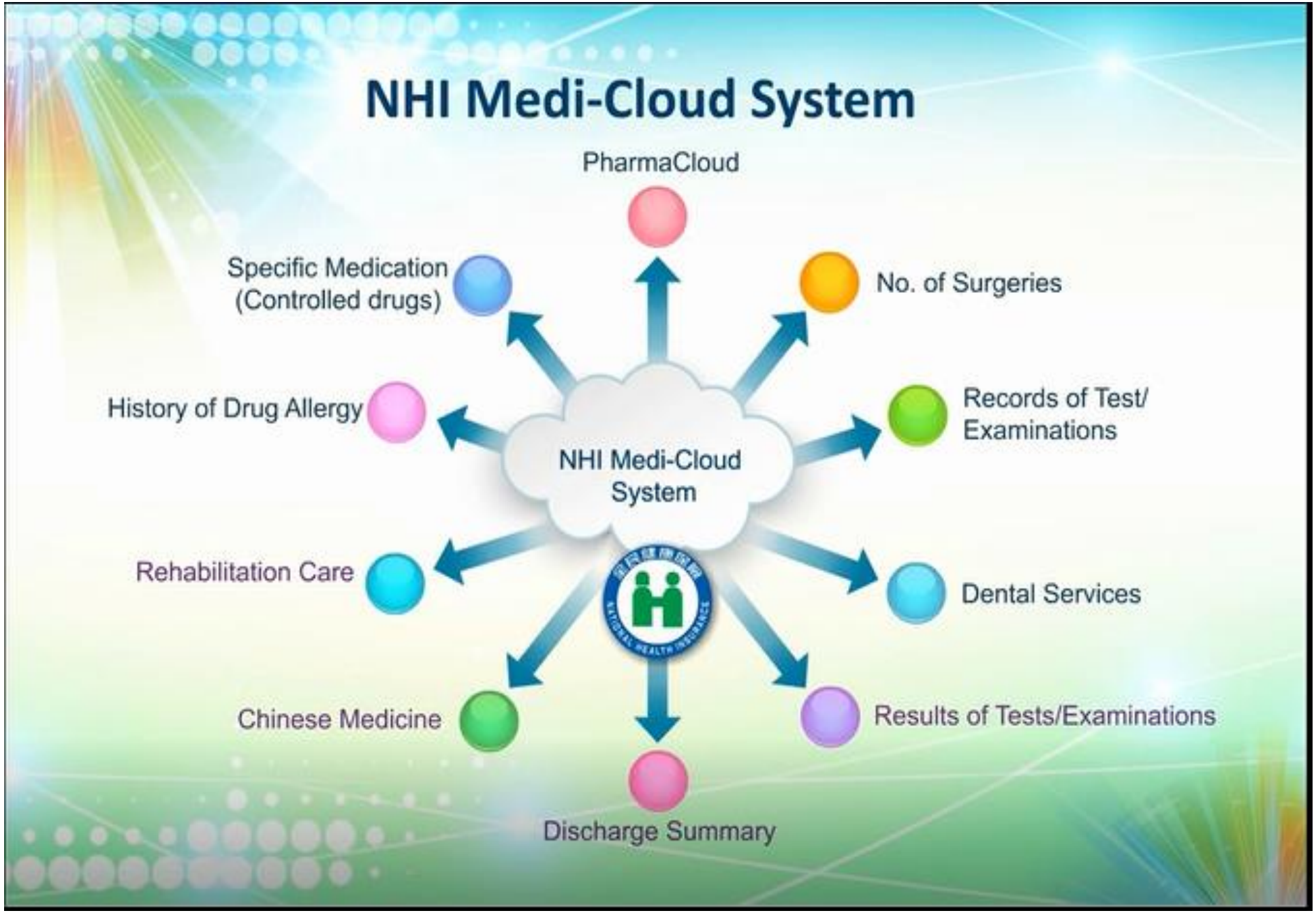
Other Application
systems

Repository @ Provincial &
Regional Center 1



Repository @ Provincial &
Regional Center 2

University, Military and Private
Hospitals System

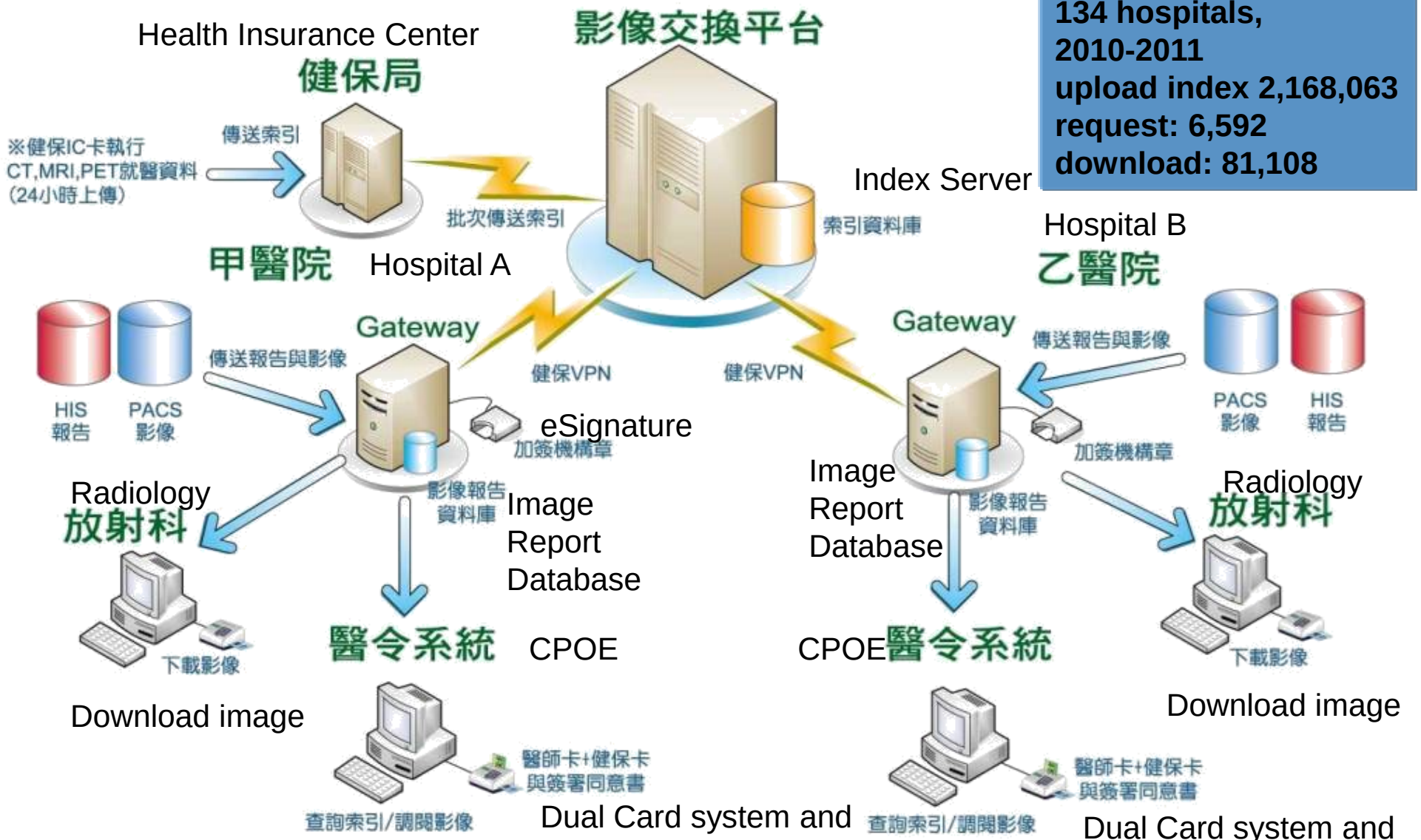


Taiwan

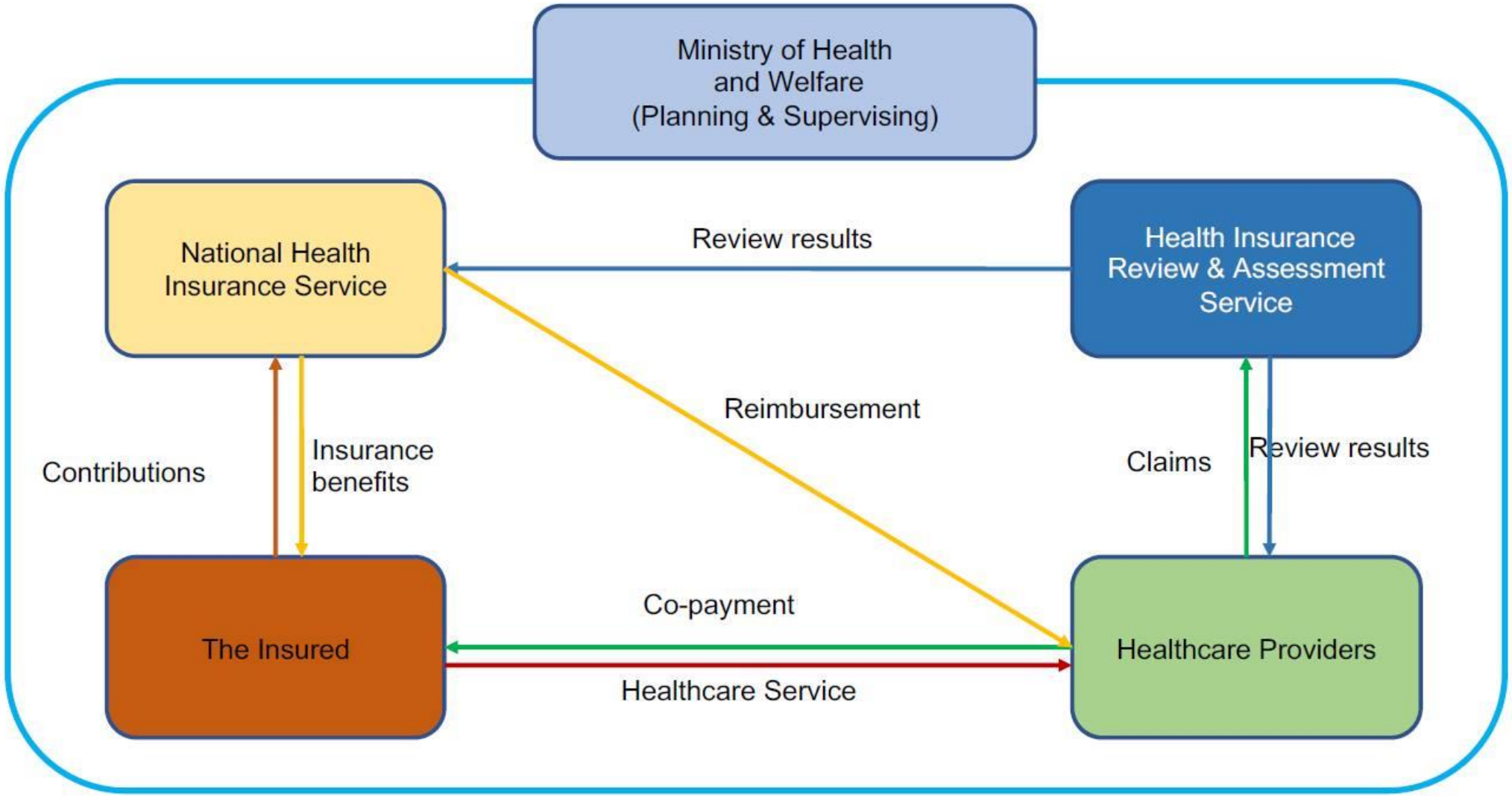
Centralized Architecture

Taiwan EMR Exchange Center – Hybrid Arch.

134 hospitals,
2010-2011
upload index 2,168,063
request: 6,592
download: 81,108

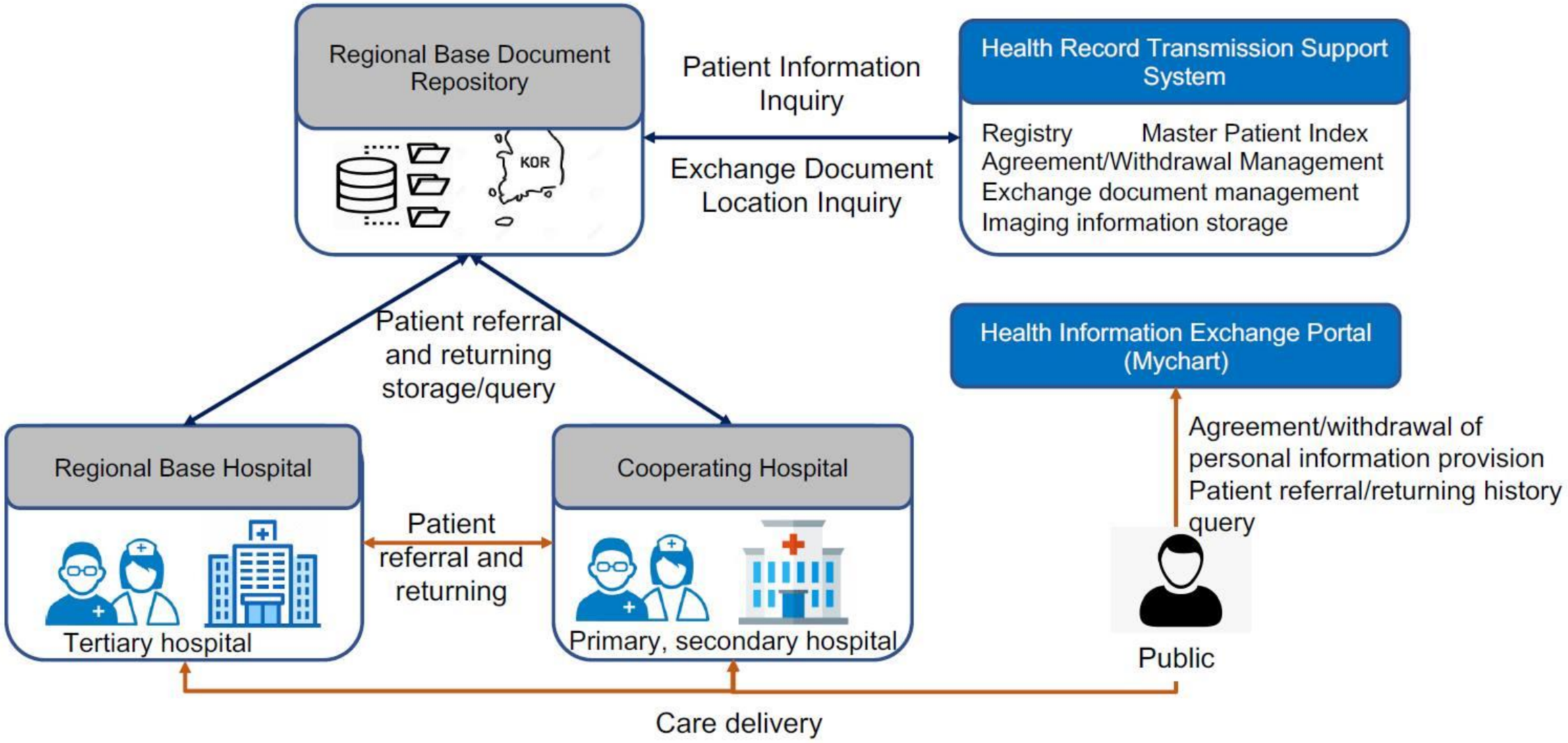


National Health Insurance in South Korea



From:https://www.snomed.org/SNOMED/media/SNOMED/documents/2020_August_Research_Webinar_Park.pdf

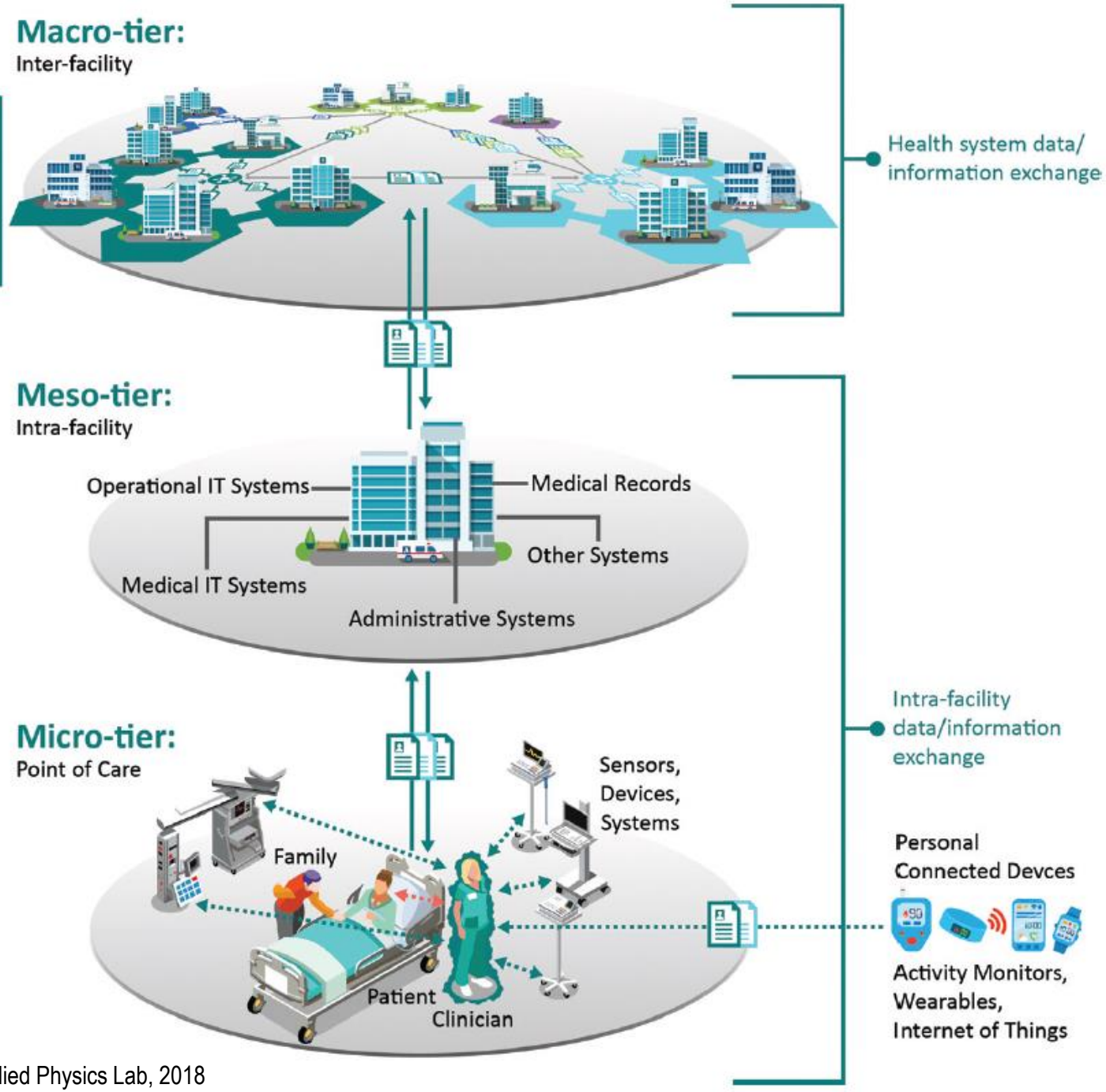
South Korea HIE System Configuration



From:https://www.snomed.org/SNOMED/media/SNOMED/documents/2020_August_Research_Webinar_Park.pdf

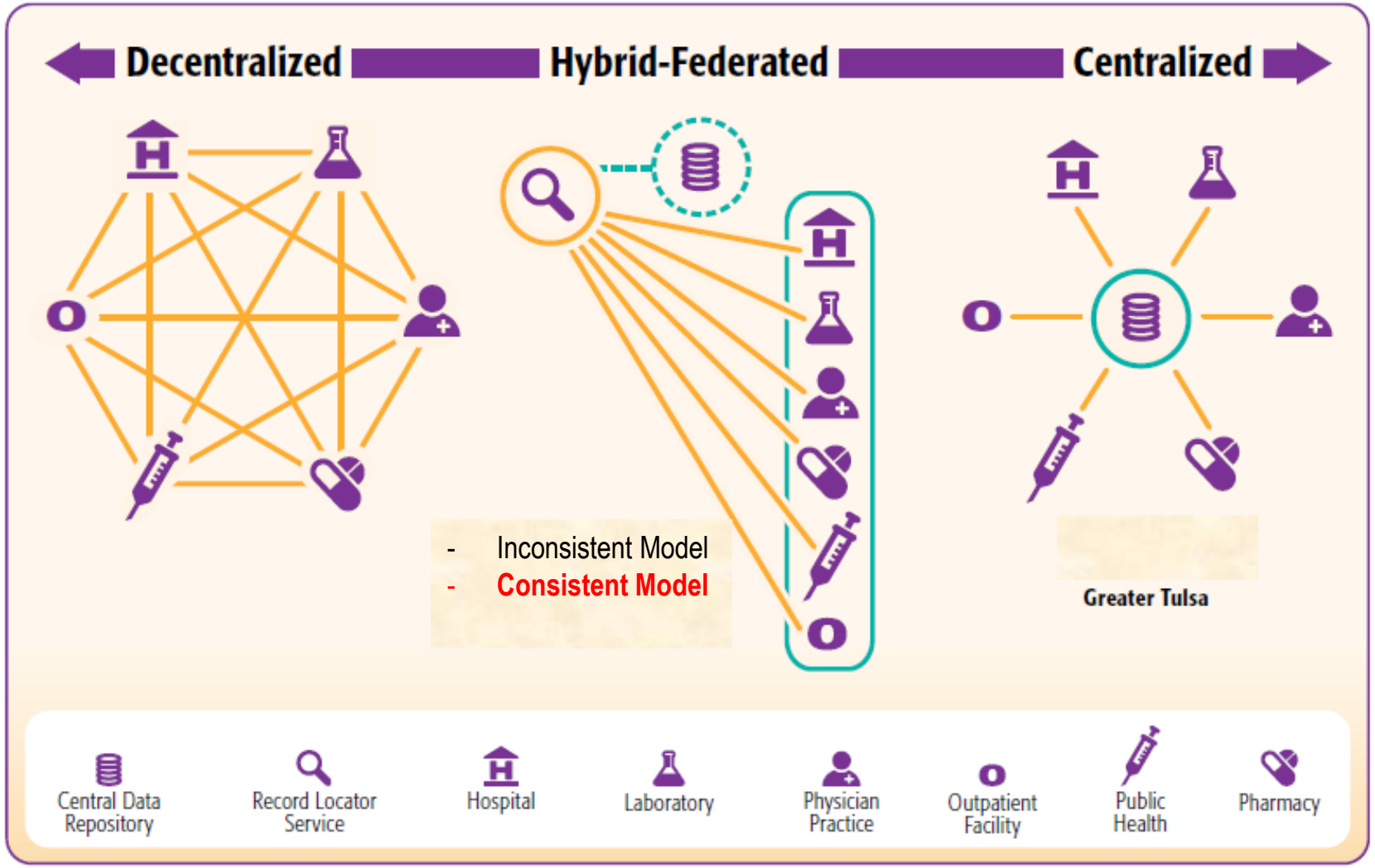
HIE

Health Information Exchange

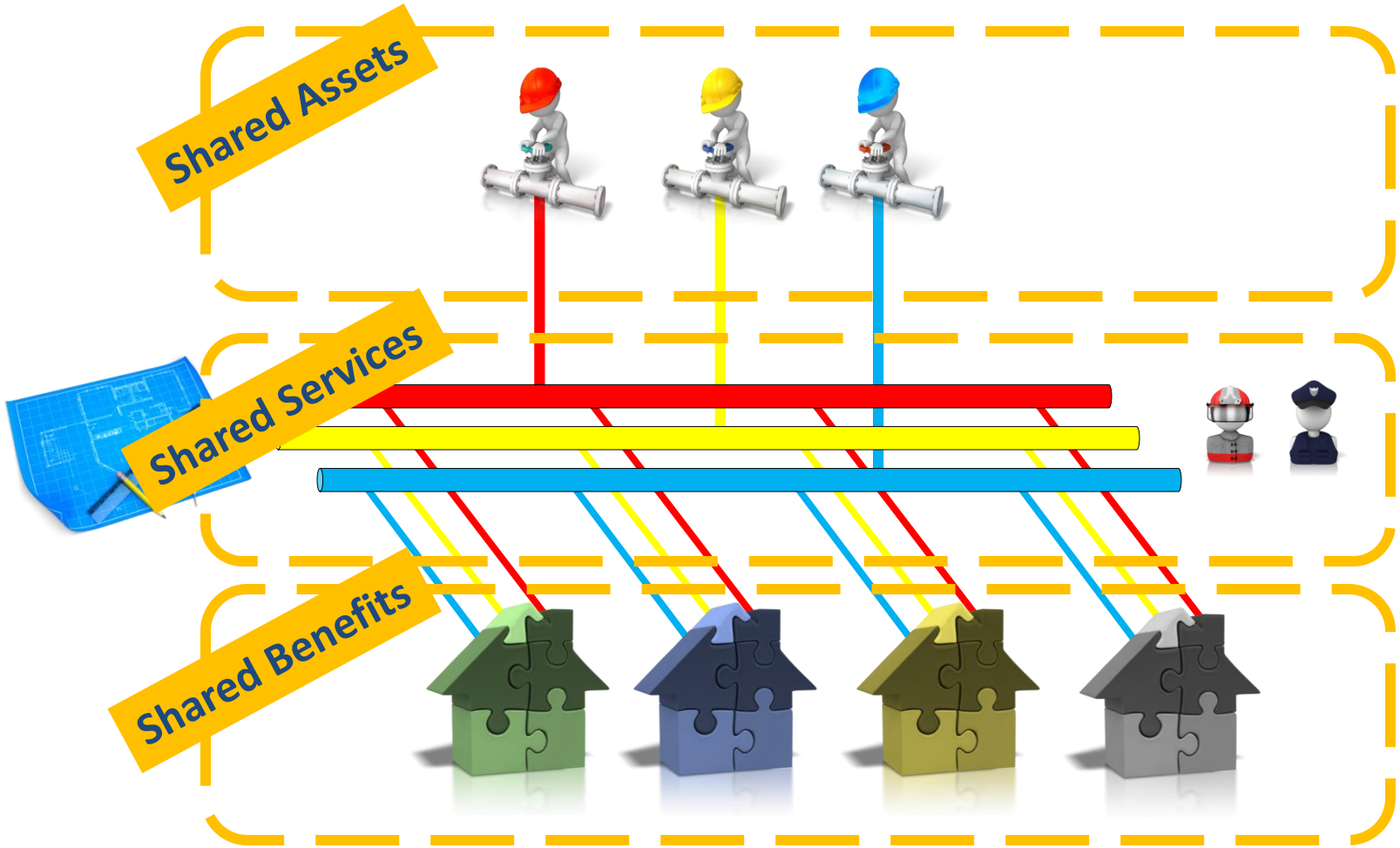


SOURCE: Johns Hopkins University Applied Physics Lab, 2018

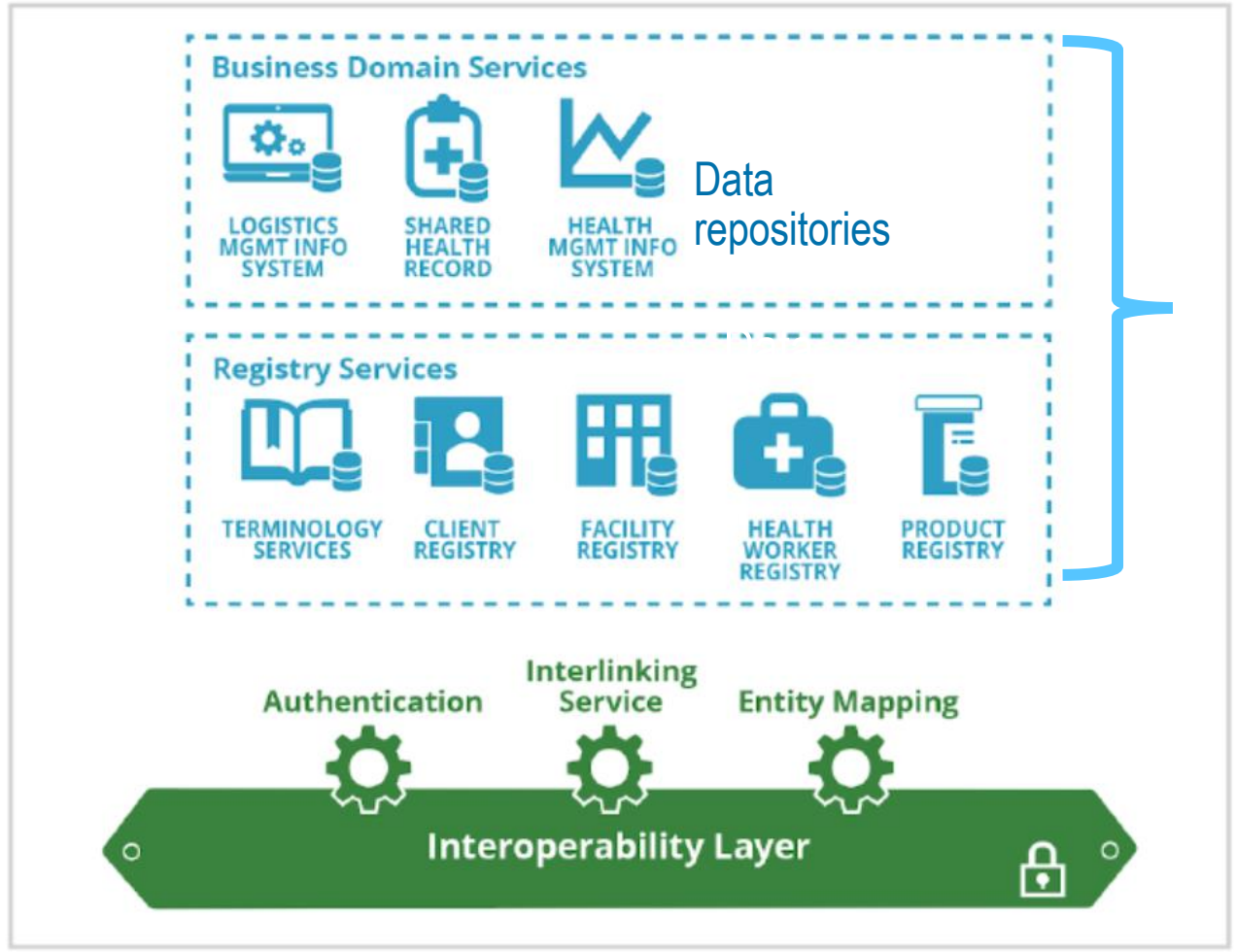
Type of HIE Architecture



McCarthy DB & et al Learning from Health Information Exchange Technical Architecture and Implementation in Seven Beacon Communities. EGEMS [Internet]. 2014 May 5 [cited 2017 Jun 25];2(1)



Architecture of a City


OpenHIE Component Layer
Business Domain Services
LOGISTICS MGMT INFO SYSTEM
SHARED HEALTH RECORD
HEALTH MGMT INFO SYSTEM
Data repositories
Registry Services
TERMINOLOGY SERVICES
CLIENT REGISTRY
FACILITY REGISTRY
HEALTH WORKER REGISTRY
PRODUCT REGISTRY
Shared Assets
Interoperability Services Layer
Authentication
Interlinking Service
Entity Mapping
Interoperability Layer
Shared Services
Point of Service
Mobile System
Electronic Medical Record
Health Mgmt Info System
Lab System
Pharmacy System
Logistics Mgmt Info System
Shared Benefits
OpenHIE 2019-07-01; CC BY 4.0

OpenHIE

Architectural Principles

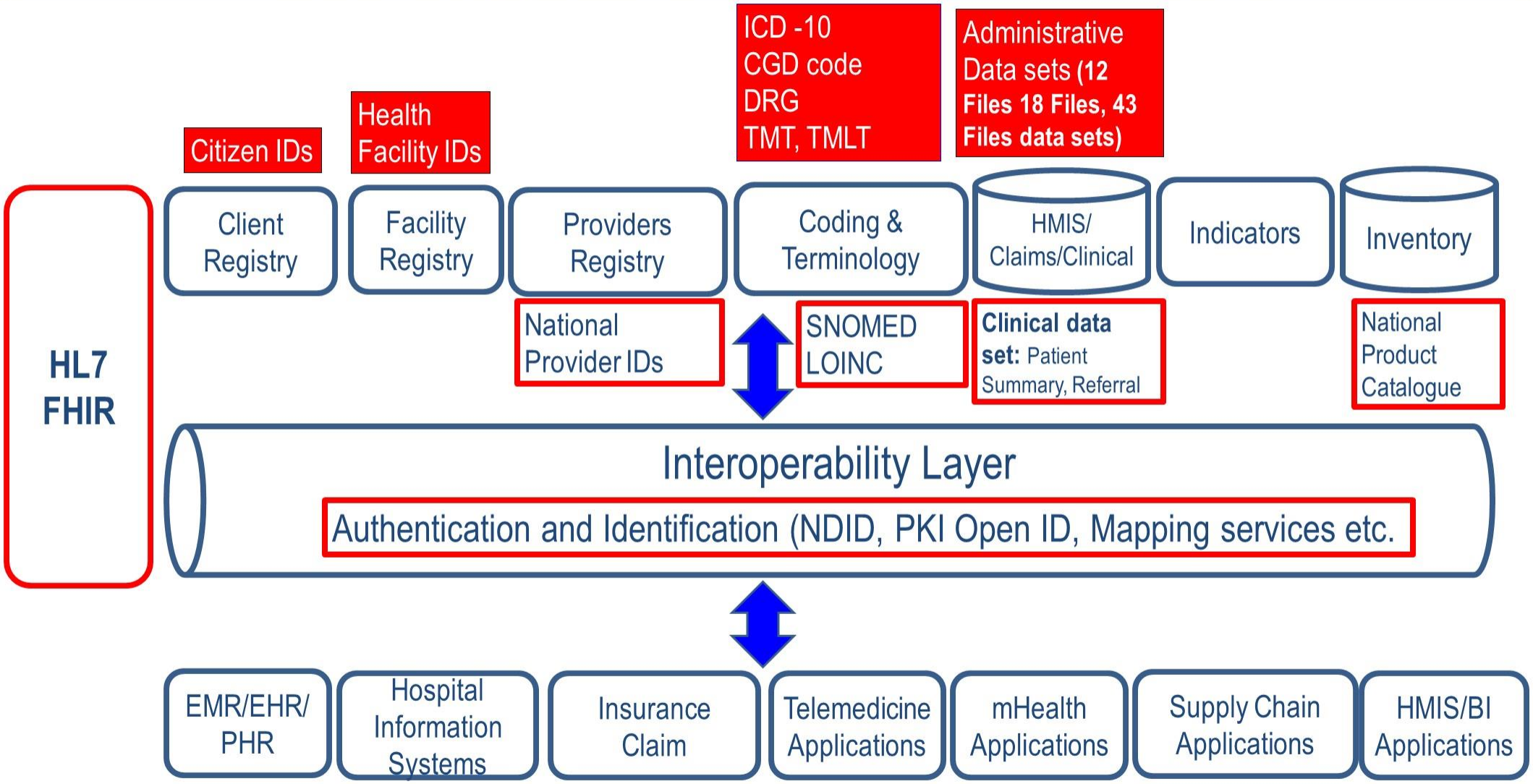
A. "Standards-based“

B. "Adaptable" / "implementable“

C. "Interchangeability" / "Swappable“

https://guides.ohie.org/arch-spec/

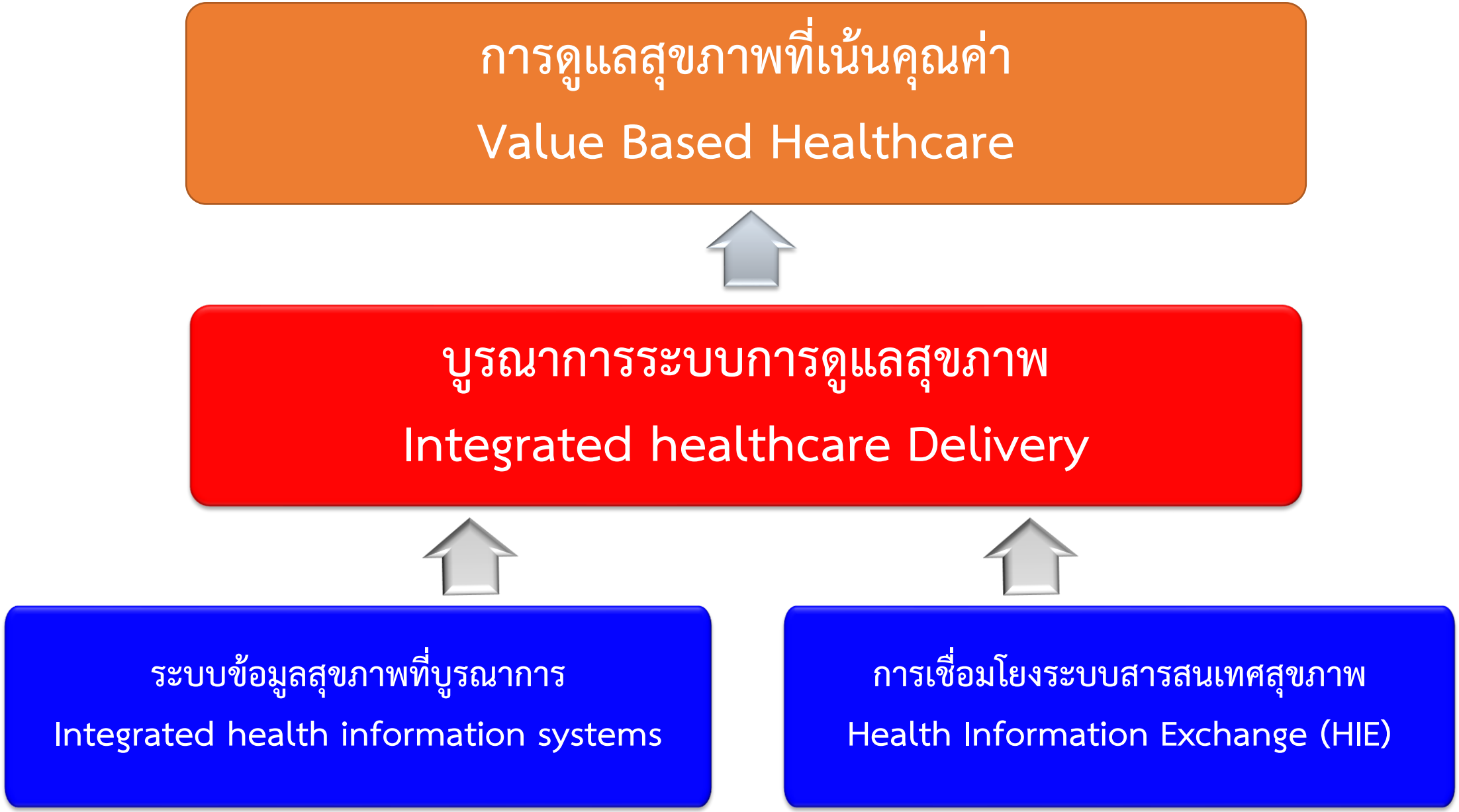
Thailand Approach to Health Data Standards

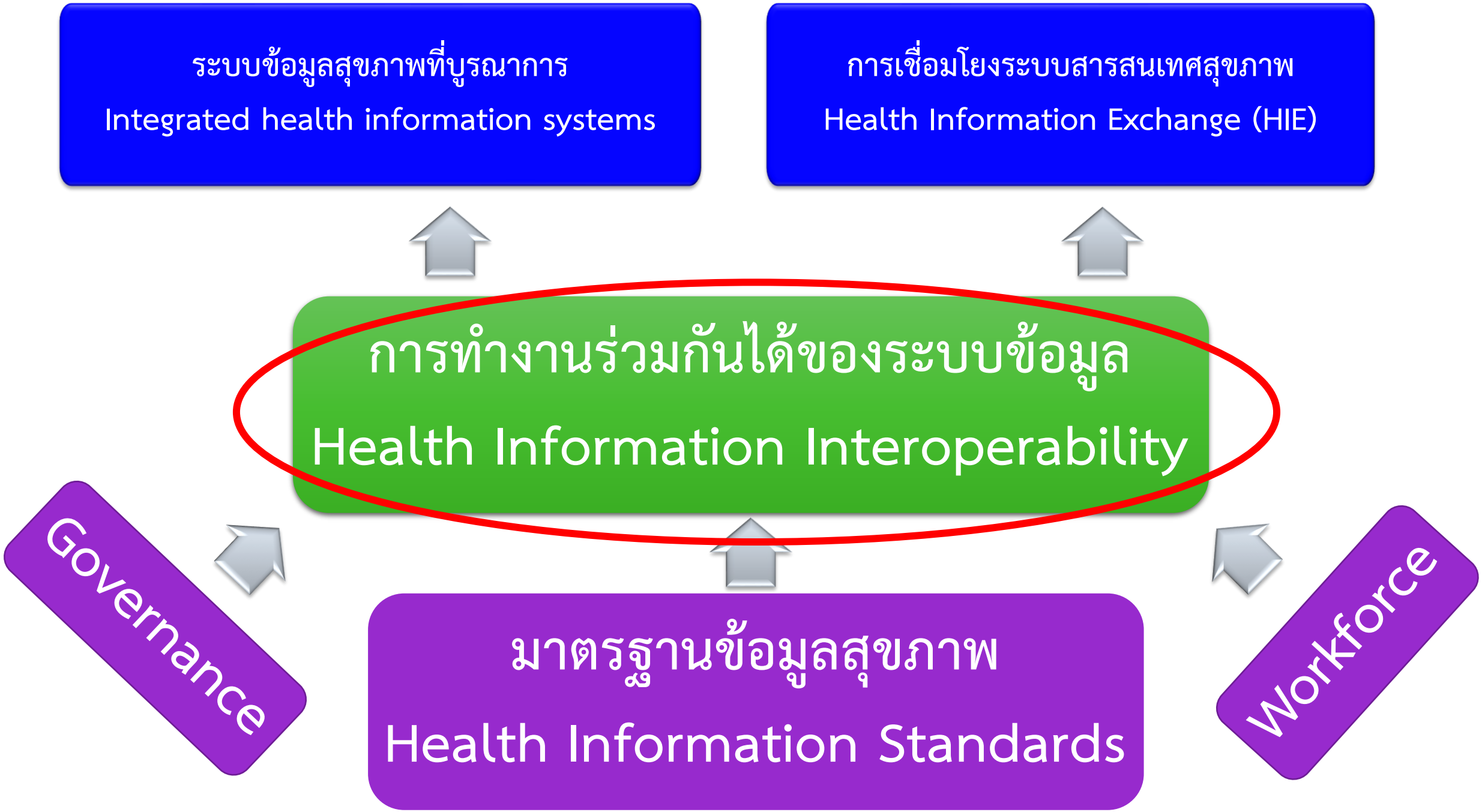


The ■ = implemented standards, The □ = planned standards

CGD = Comptroller General Department, TMT = Thai Medicines Terminology, TMLT = Thai Medical Laboratory Terminology, DRG = Diagnosis Related Group, HMIS = Health Management Information System, FHIR = Fast Health Interoperability Resource, NDID = National Digital ID, PKI = Public Key Infar-structure, BI = Business Intelligence

Interoperability


การดูแลสุขภาพที่เน้นคุณค่า
Value Based Healthcare
บูรณาการระบบการดูแลสุขภาพ
Integrated healthcare Delivery
ระบบข้อมูลสุขภาพที่บูรณาการ
Integrated health information systems
การเชื่อมโยงระบบสารสนเทศสุขภาพ
Health Information Exchange (HIE)


ระบบข้อมูลสุขภาพที่บูรณาการ
Integrated health information systems
การเชื่อมโยงระบบสารสนเทศสุขภาพ
Health Information Exchange (HIE)
การทำงานร่วมกันได้ของระบบข้อมูล
Health Information Interoperability
Governance
มาตรฐานข้อมูลสุขภาพ
Health Information Standards
Workforce

What is Interoperability?

is ability of two or more systems or components to **exchange information** and to **use the information** that has been exchanged.

IEEE standard computer dictionary: a compilation of IEEE standard computer glossaries.1990.

Health IT Interoperability

The US 21st Century Cures Act of 2016 specifically defines an interoperable health IT system as one that

1. enables the **secure exchange** of electronic health information with, and **use** of electronic health information from, other health information technology without special effort on the part of the user
2. allows for **complete access**, exchange, and use of all electronically accessible health information **for authorized use** under applicable State or Federal law; and
3. does **not constitute information blocking** (114th Congress, 2015).

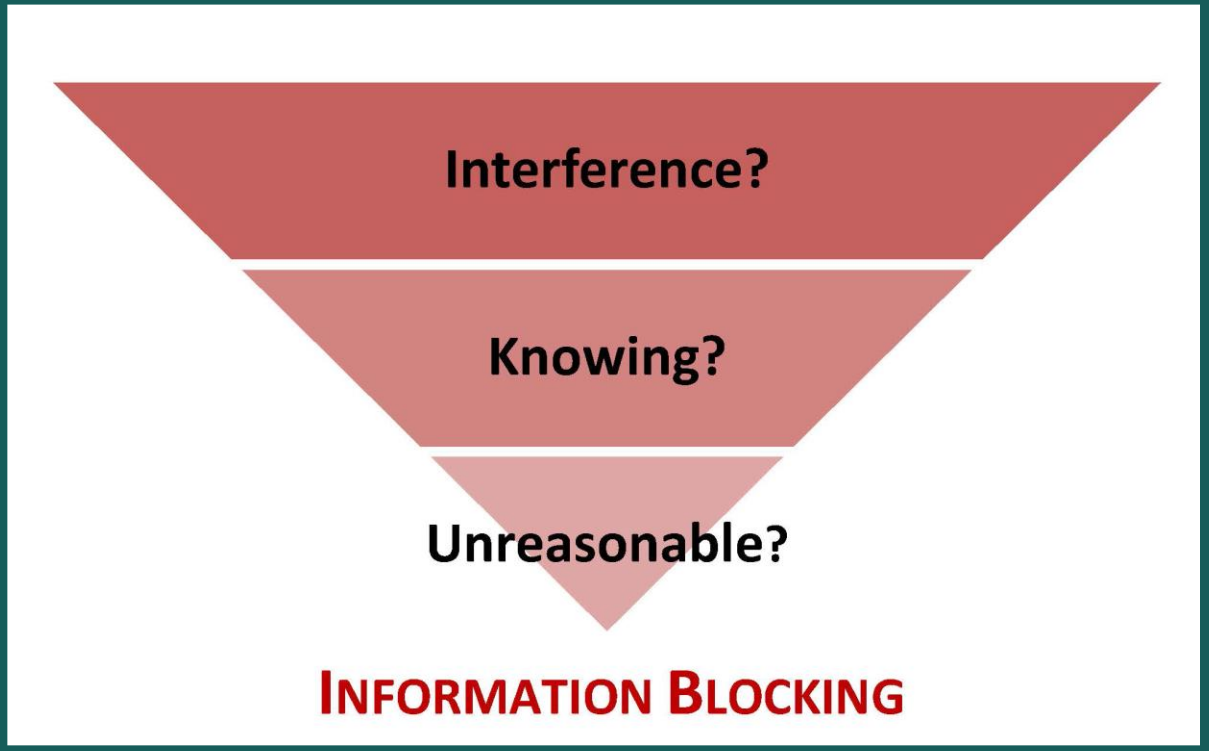
From: https://www.healthit.gov/topic/information-blocking

What is Information Blocking?

- Section 4004 of the 21st Century Cures Act (Cures Act) defines information blocking.
- In general, information blocking **is a practice by a health care provider, health IT developer, health information exchange, or health information network** that, except as required by law or specified by the Secretary of Health and Human Services (HHS) as a reasonable and necessary activity, **is likely to interfere with, prevent, or materially discourage access, exchange, or use of electronic health information (EHI).**

From: https://www.healthit.gov/topic/information-blocking

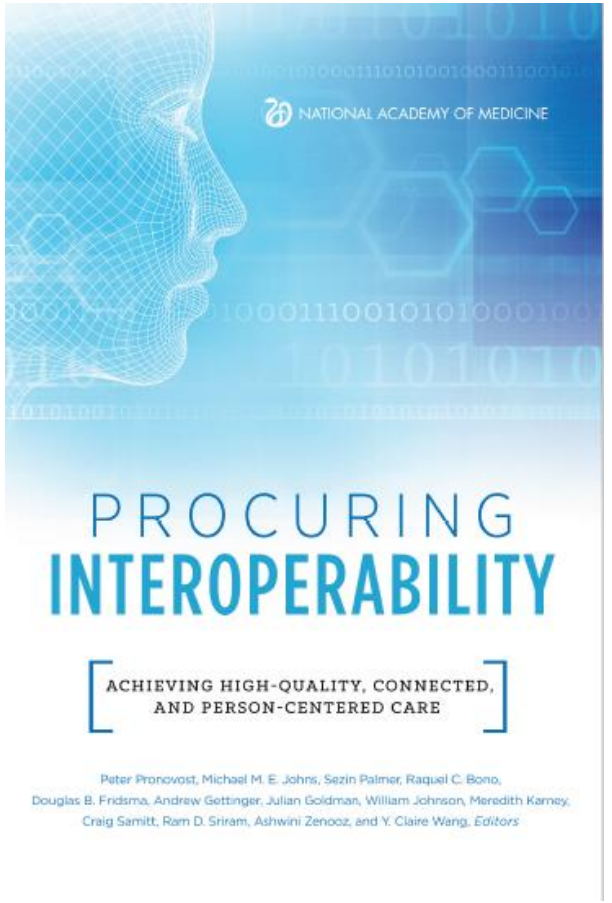
What is Information Blocking?



Information blocking occurs when persons or entities **knowingly** and **unreasonably interfere** with the exchange or use of electronic health information.

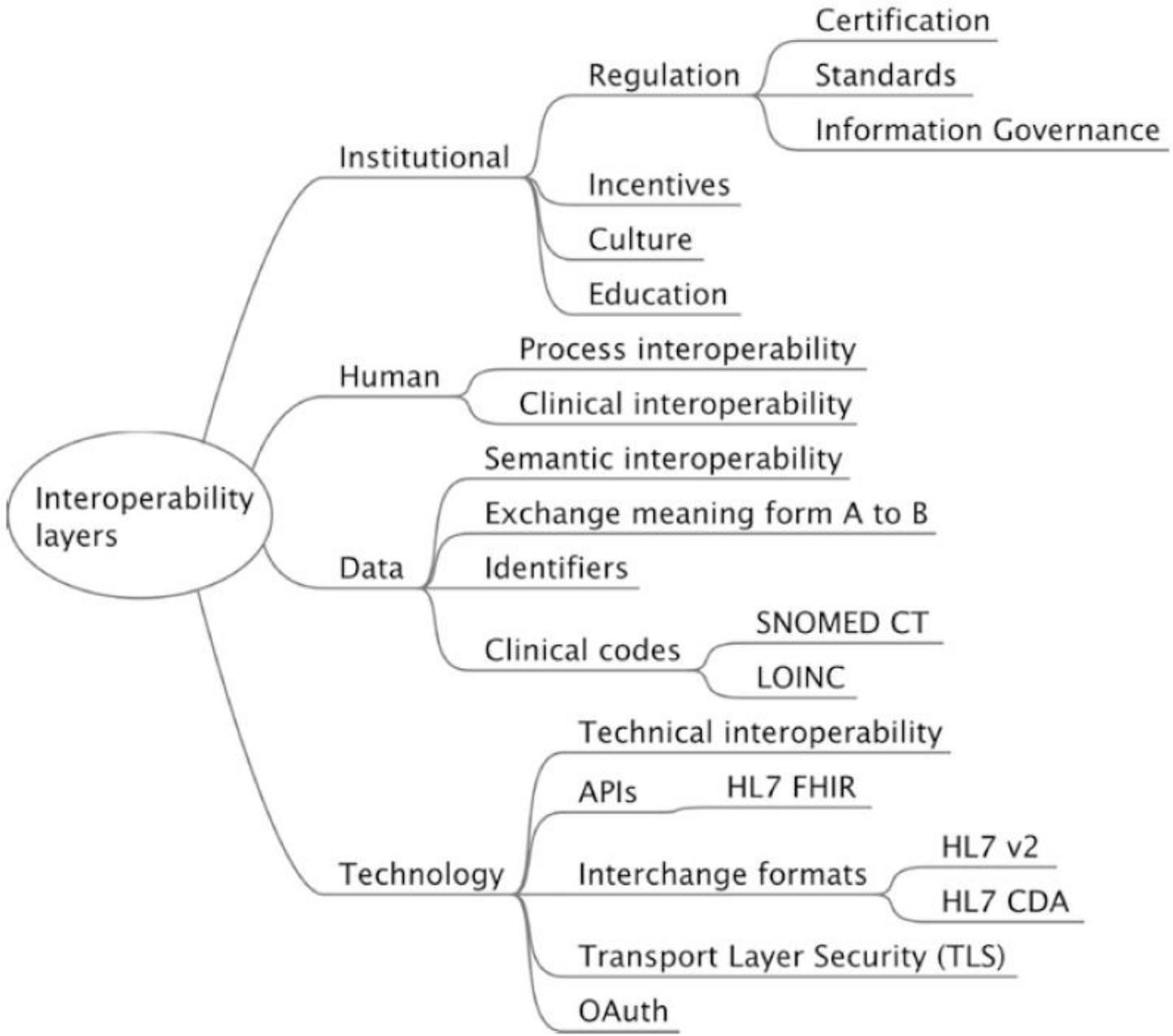
From: Report to Congress on Health Information Blocking 2015 https://www.healthit.gov/sites/default/files/reports/info_blocking_040915.pdf

Interoperability means the ability to share, abstract, or link data from electronic health records, medical equipment, registries, laboratory results, records from prescriptions, and specialist consultations, as well as administrative and claims records, patient portals, even wearable and mobile devices.

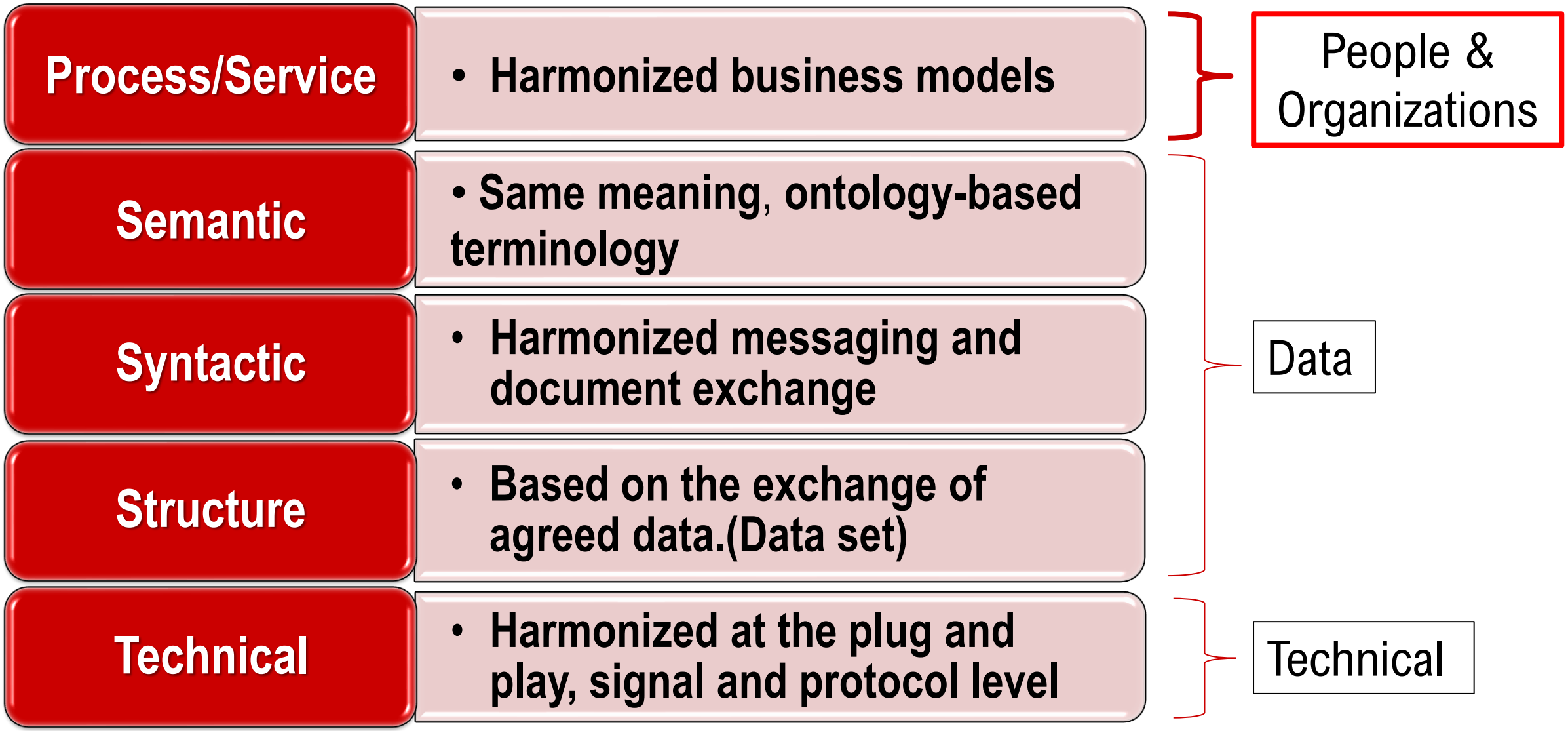


ทำไมการทำให้ระบบข้อมูลสุขภาพทำงานร่วมกันได้ ถึงยาก

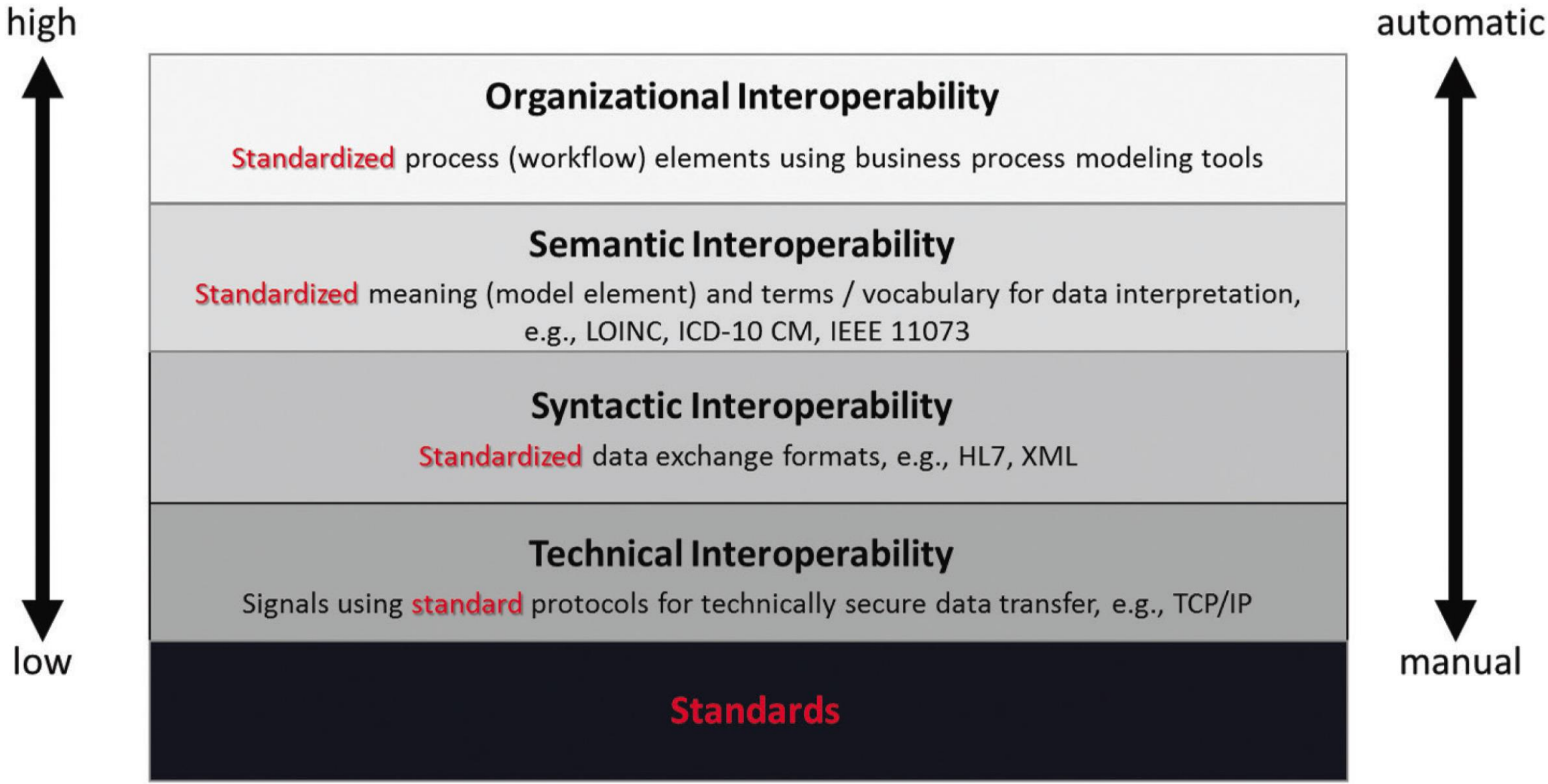
Why Interoperability is Hard?


Interoperability layers
Institutional
Regulation
Certification
Standards
Information Governance
Incentives
Culture
Education
Human
Process interoperability
Clinical interoperability
Data
Semantic interoperability
Exchange meaning form A to B
Identifiers
Clinical codes
SNOMED CT
LOINC
Technology
Technical interoperability
APIs
HL7 FHIR
Interchange formats
HL7 v2
HL7 CDA
Transport Layer Security (TLS)
OAuth

Level of Interoperability



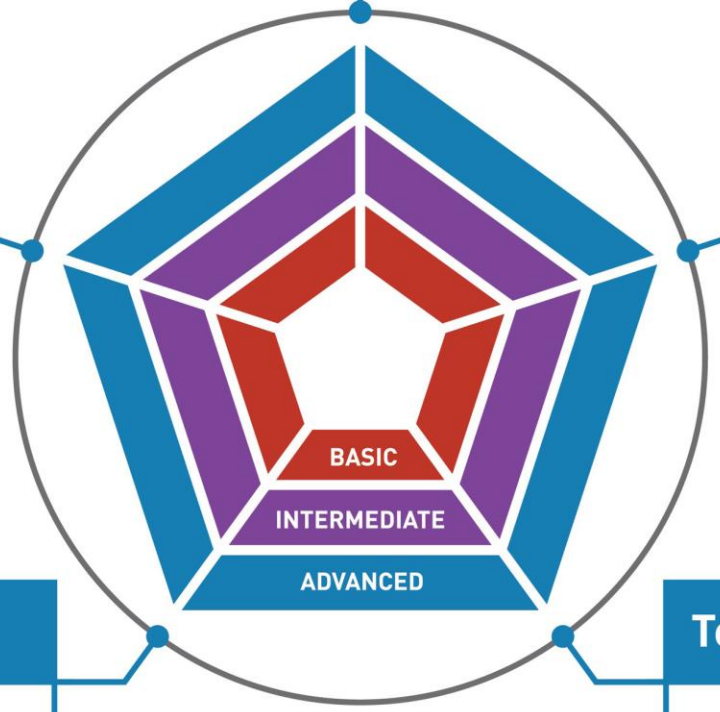
Adapted :1) Benson T: *Principles of Health Interoperability HL7 and SNOMED*. 2nd ed. 2012. Springer; 2012., 2) Bobel B: *Making Hospital IT Interoperable* Hospital Information Technology Europe 2008



SOURCE: Based on Oemig F., and R. Snelick. 2016. Healthcare interoperability standards compliance handbook, Switzerland: Springer.

INTEROPERABILITY MATURATION MODEL

CENTER for MEDICAL INTEROPERABILITY®



Infrastructure

Transport level connectivity including security; technology independent of systems and applications

Contextual / Dynamic

Ability of devices and applications to share data based on the patient and clinical workflow

Syntactic

Use of recognized formats to communicate and exchange information

Orchestration

Extent and sophistication of information exchange including sequence

Terminology / Semantic

Use of recognized vocabularies, nomenclatures, and ontologies, as well as information models

https://medicalinteroperability.org/

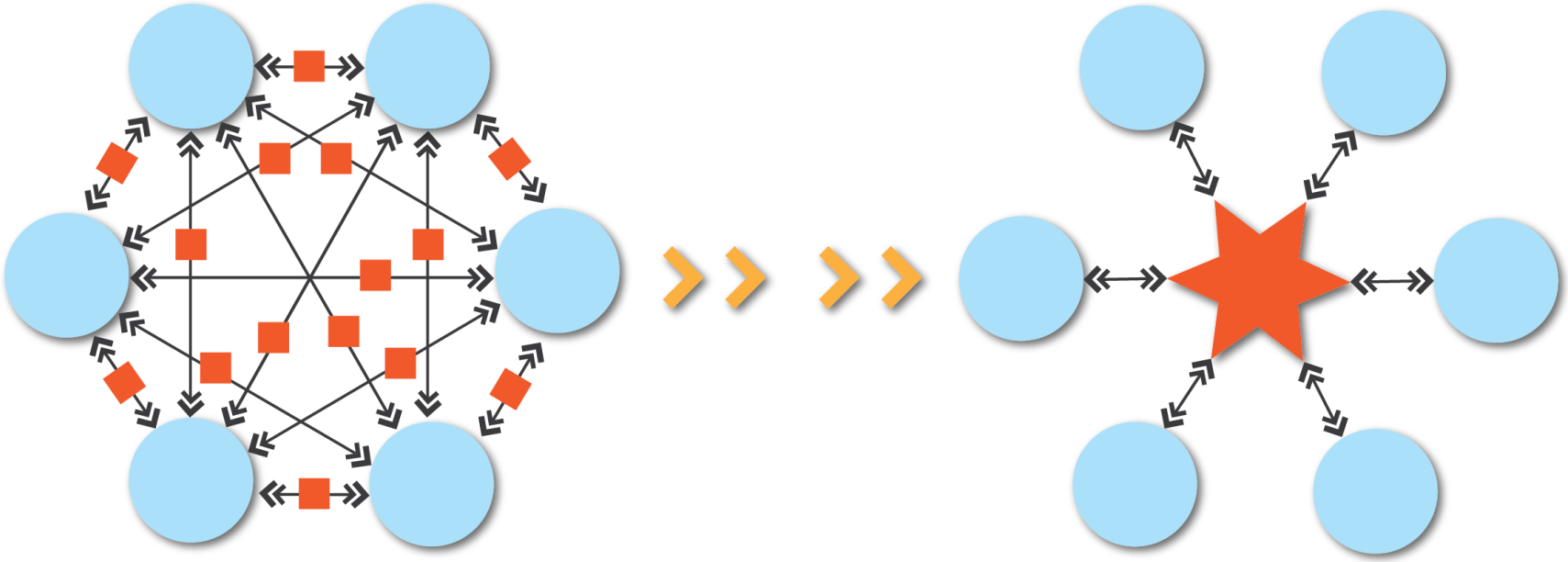
Actual Interoperability challenges are “Institutional Interoperability and Human Interoperability” but **DISGUISE** to be “Data and Technical Interoperability”

Health Data Standards

Why Standard is needed?

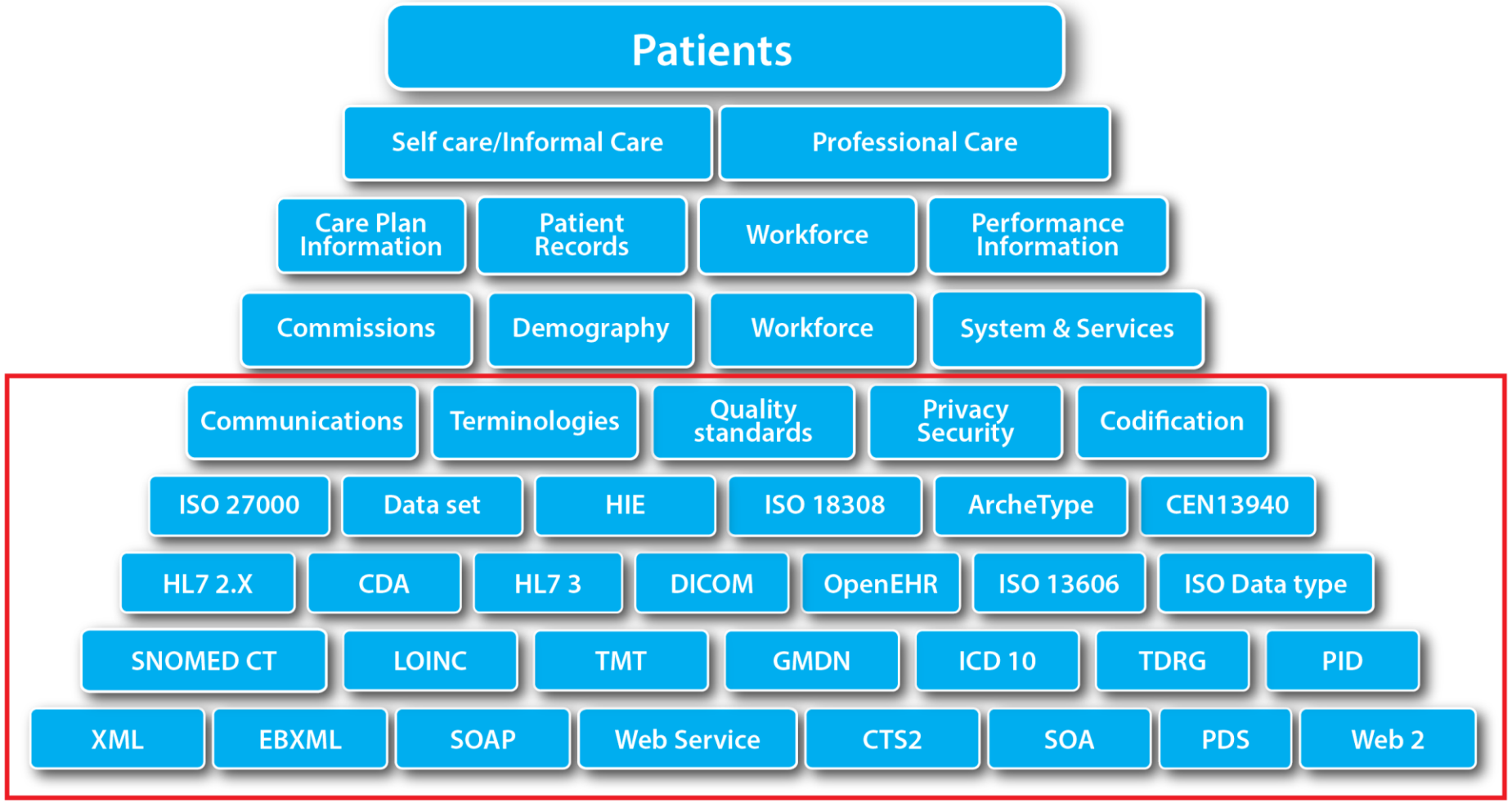
The number of interfaces = $\frac{N^2 - N}{2}$

Linking 6 nodes ->15 interfaces, Linking 100 nodes -> 4,950 interfaces.



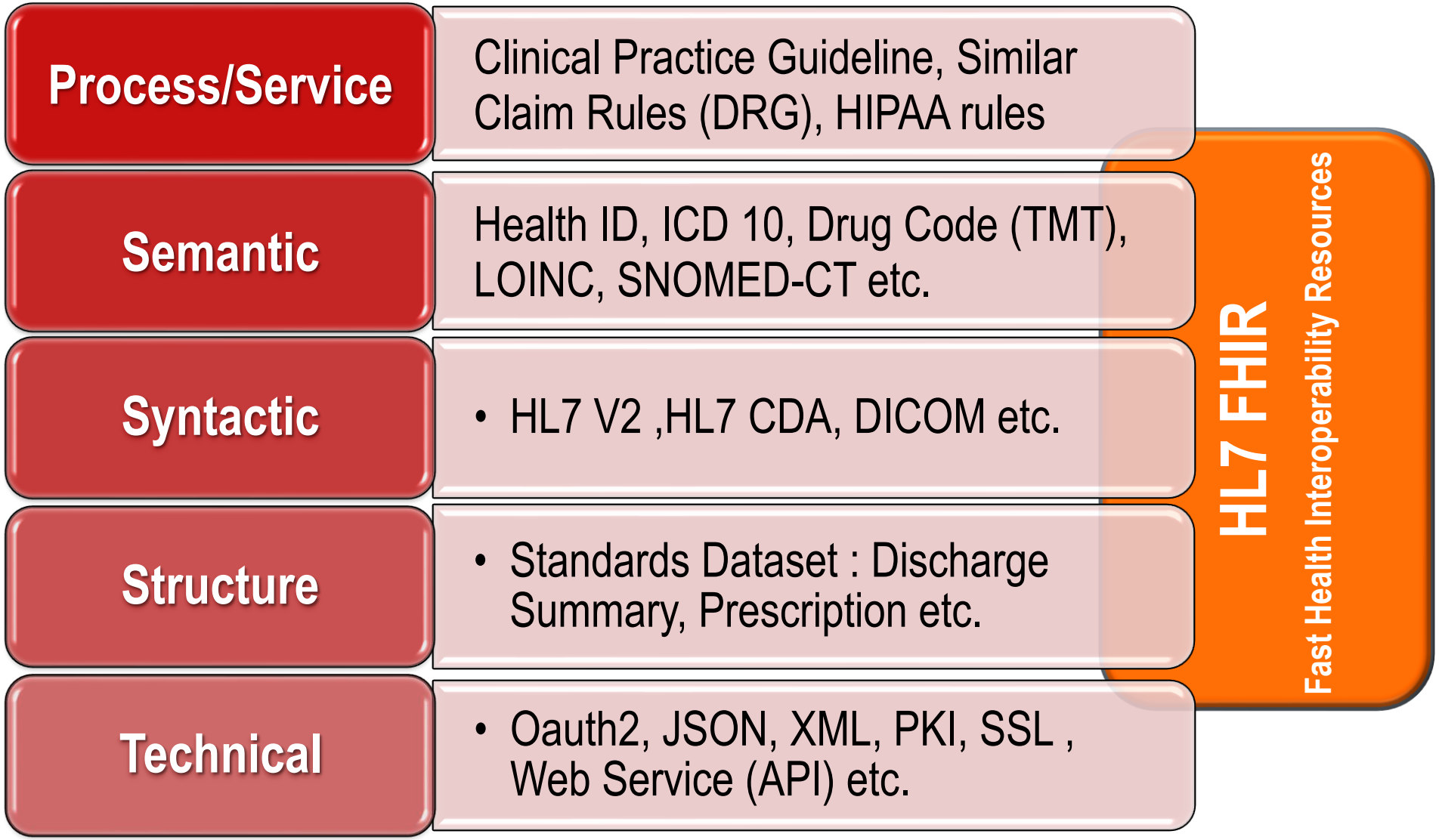
Benson T: *Principles of Health Interoperability HL7 and SNOMED*. 2nd ed. 2012. Springer; 2012.

Landscape of Health Data Standards



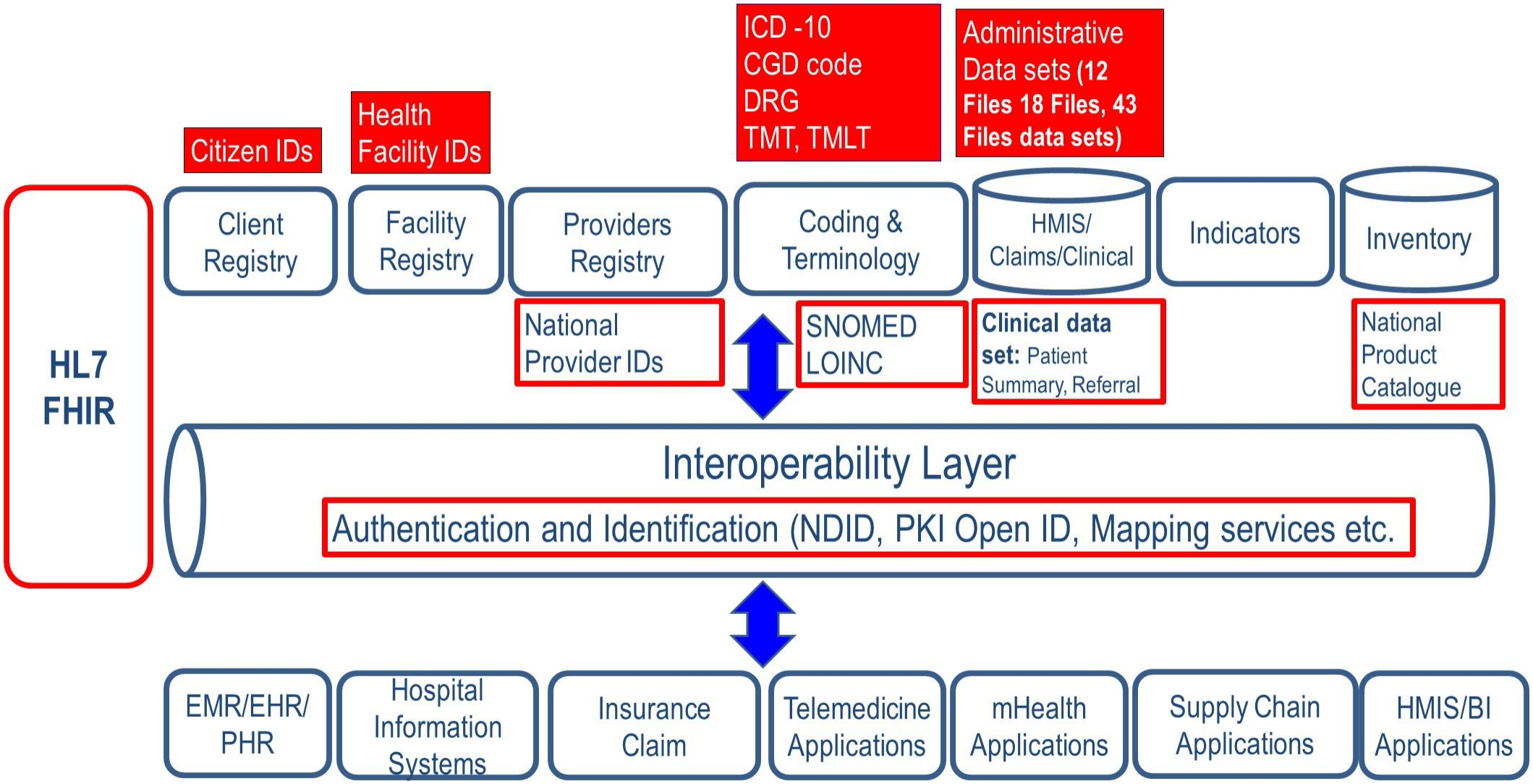
From: Standards – Yesterday, Today and Tomorrow: Integrating the Standards for Healthcare presentation , Ken Lunn, 17 October 2011

Level of Interoperability & Standards



Adapted :1) Benson T: *Principles of Health Interoperability HL7 and SNOMED*. 2nd ed. 2012. Springer; 2012., 2) Bobel B: *Making Hospital IT Interoperable* Hospital Information Technology Europe 2008

Thailand Approach to Health Data Standards



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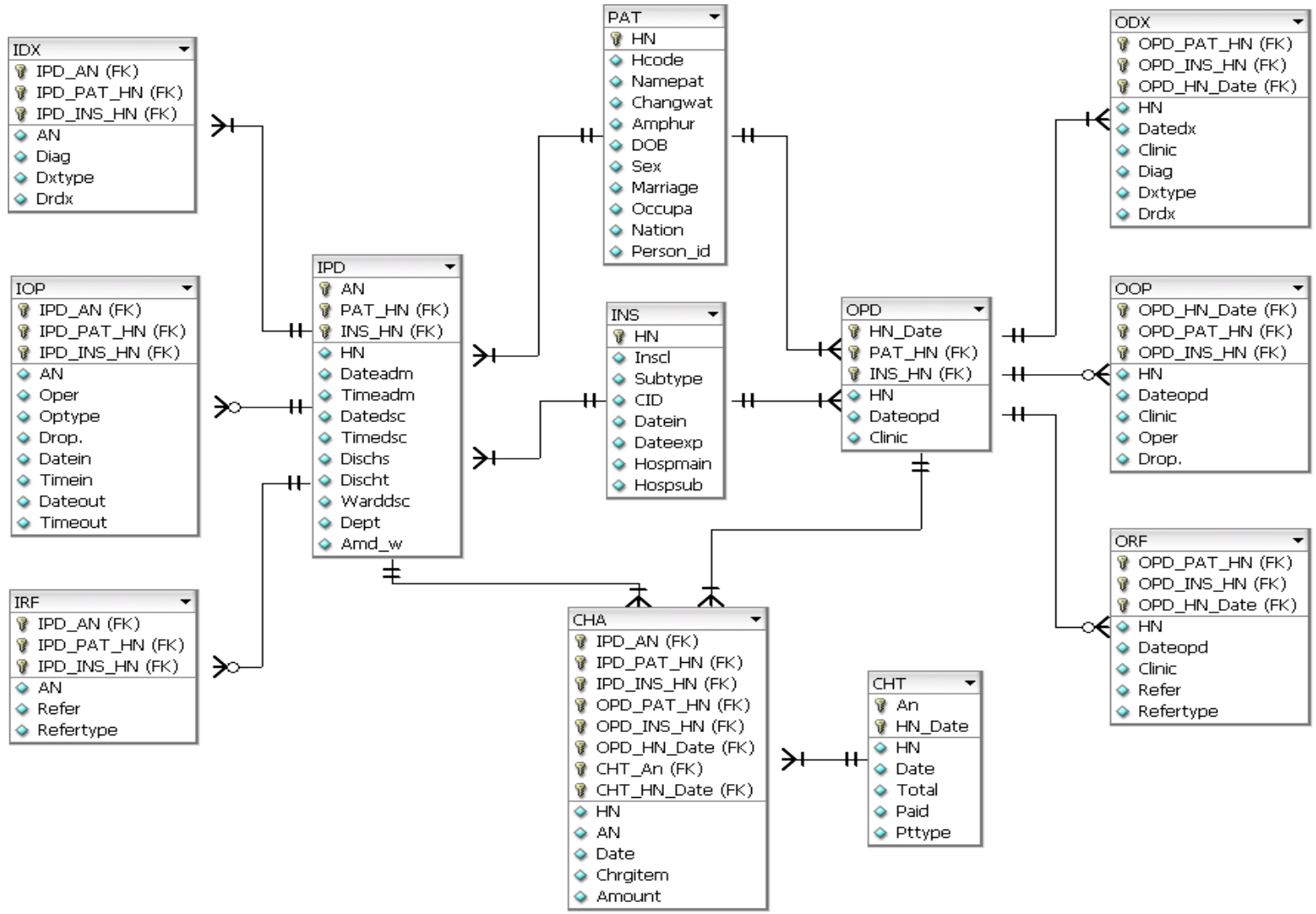
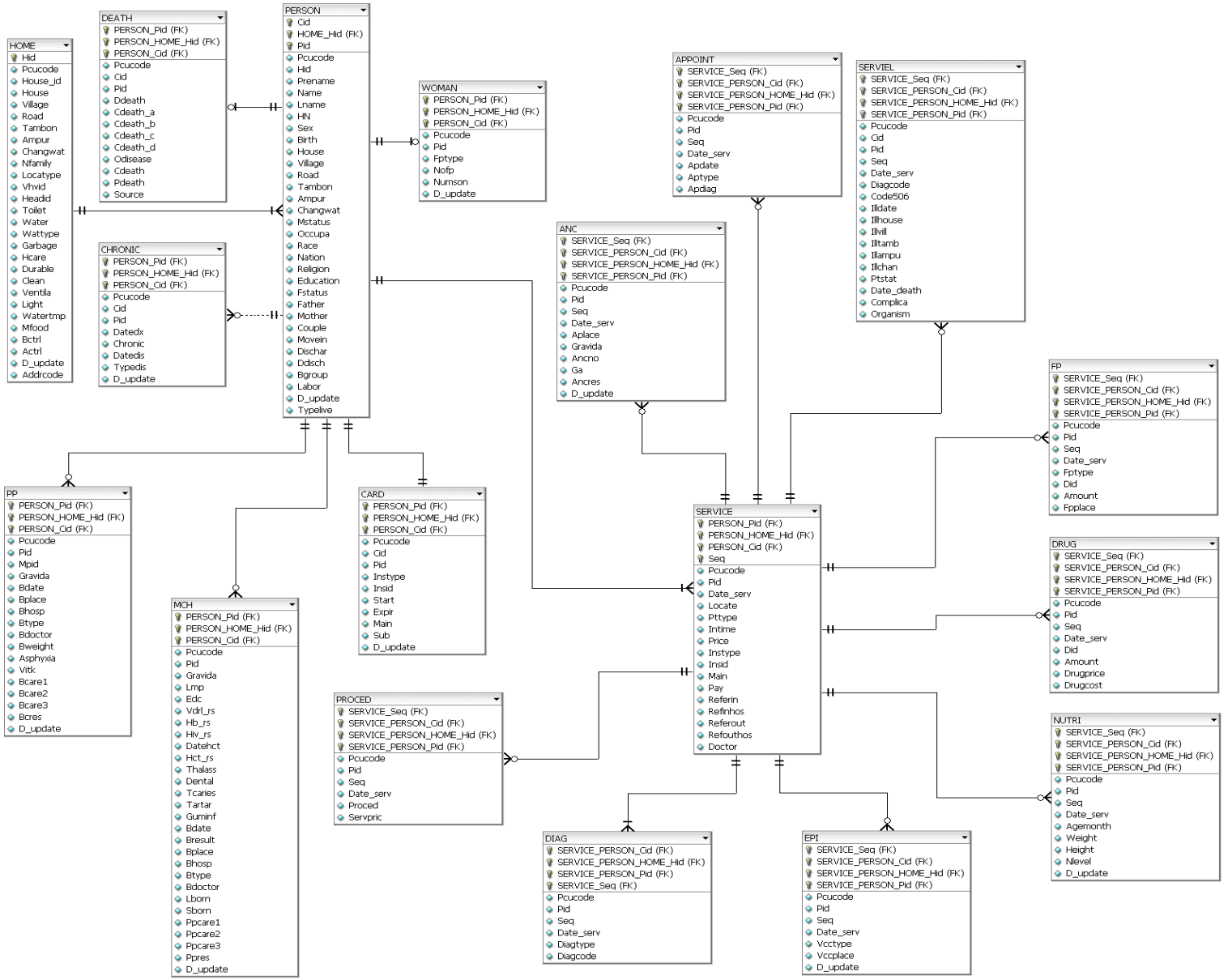
Categories of Health Information Standards

Content Standards
(Standard Data Set)

Standard Data set for health insurance (12 files) 1996



Health Center standard data set (18 files) 2002



Share Health Record (SHR)

- health information that are shared by the heterogeneous information systems of a regional or national health system.
- (only) relevant information that when shared gives a complete view of a patient's medical history.

TABLE 10.1 Common Data Elements Included in a Shared Longitudinal Health Record

Data Type	Description
Structured Data	Clinical observations
	Care summaries
	Allergies
	Prescribed medications
	Laboratory reports
	Immunizations
	Medical histories
	Mental health assessments
	Nutritional assessments
	Action Plans
	Quality of life indicators
Unstructured data	Medical imaging documents (eg, X-rays)
	Narrative text

From: Dixon B. editors, Health Information Exchange, Academic Press 2016

Semantic Standards
(Standards Vocabularies)


บัตรประจำตัว
ประชาชน


3 3099 00341 50 5
6 พ.ค. 2493
7ก.ค.2536
6ก.ค.2542
ที่อยู่ 94 หมู่ที่ 9 ต.โนนไทย
อ.โนนไทย จ.นครราชสีมา


บัตรประจำตัวประชาชน
กรมการปกครอง
กระทรวงมหาดไทย


เลขประจำตัวของผู้ถือบัตร
3 1014 63103 52 5
ชื่อ น.ส.
ชื่อสกุล
เกิดวันที่ 25 มิ.ย. 2504
ที่อยู่ 405 หมู่ ต.ท่าโรงเหล็ก อ.บางปลาม้า
อ.เมืองสุพรรณบุรี จ.สุพรรณบุรี
28 พ.ค. 2540
27 พ.ค. 2546


บัตรประจำตัวประชาชน
กรมการปกครอง
กระทรวงมหาดไทย


ชื่อ
ชื่อสกุล
วันเกิด
อยู่
ต. อำเภอ จ. จังหวัด


สำนักงานทะเบียน
บัตรประจำตัวประชาชน
วันออกบัตร
บัตรหมดอายุ
กระทรวงมหาดไทย


บัตรประจำตัวประชาชน Thai National ID Card
3 8013 00141 07 4
Name Mr Suchat
Last name Thaneerat
Date of Birth 20 Sep. 1962

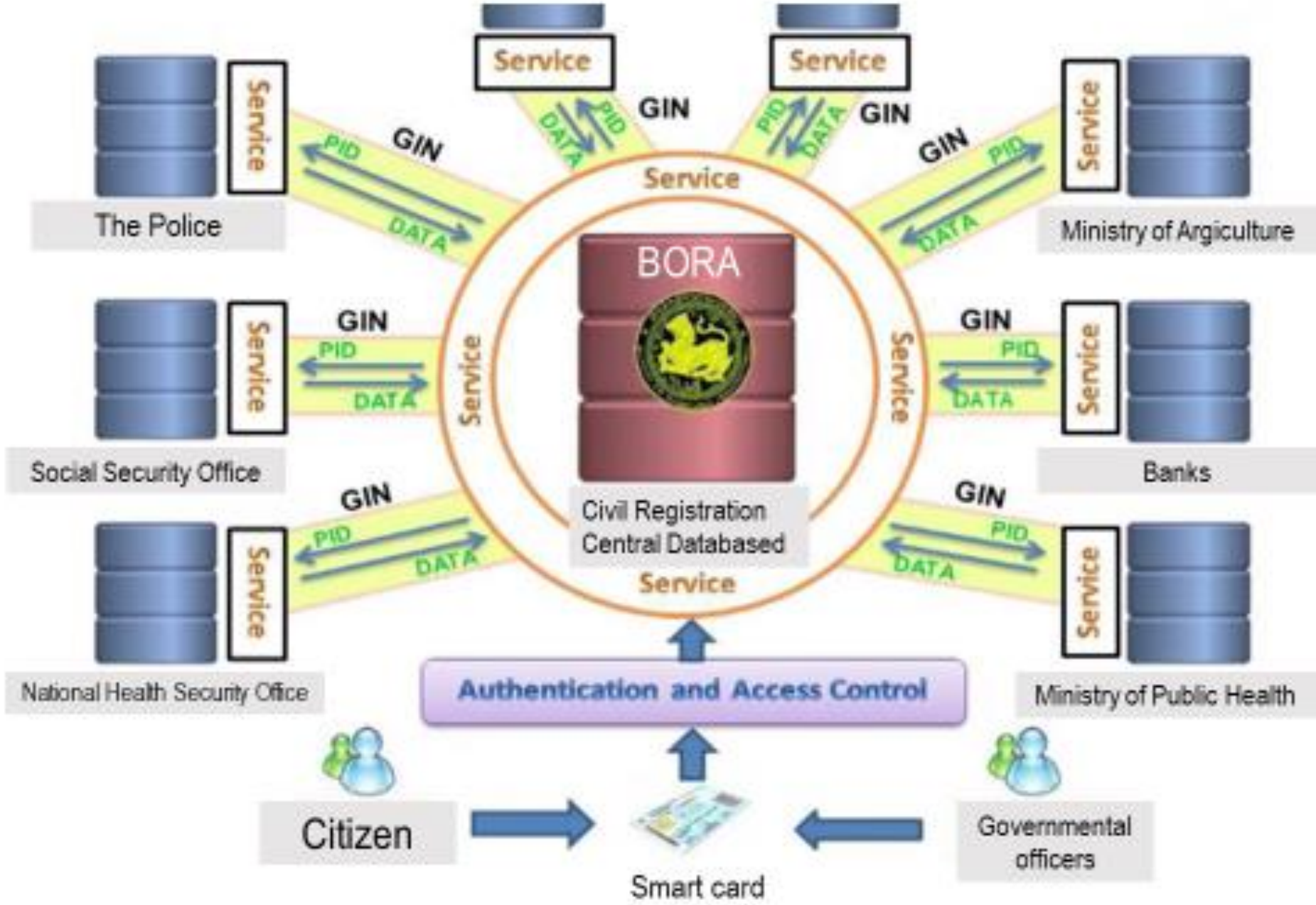

BORA-26-01
THAILAND

From paper records to digital records 1982-1988

"60 Million records over 5 Years"

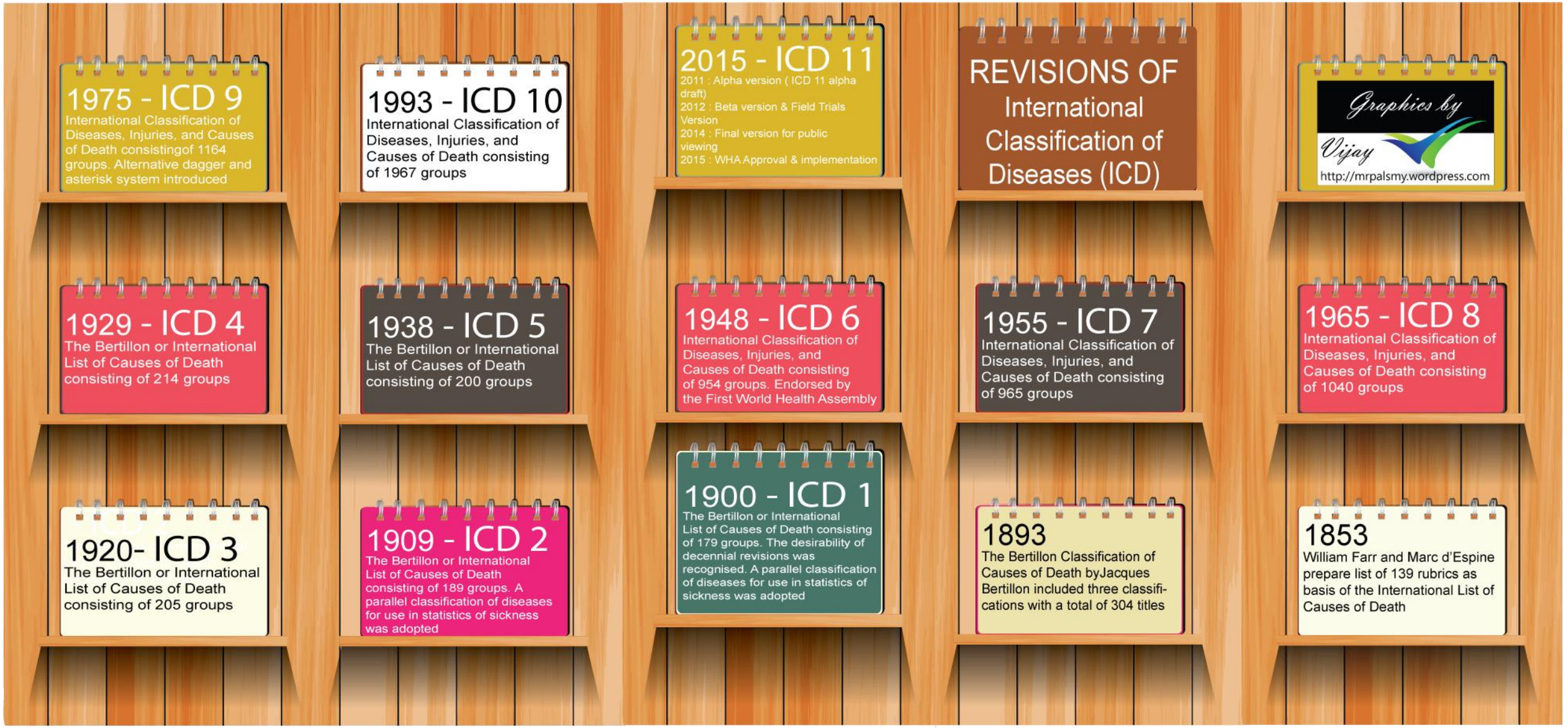
CENTRAL POPULATION DATABASE

Digitizing over 60 million records from paper


Service
Service
GIN
GIN
PID
DATA
PID
DATA
Service
The Police
GIN
PID
DATA
Service
Ministry of Argiculture
GIN
PID
DATA
Service
BORA
Civil Registration
Central Databased
Service
Service
Service
Social Security Office
GIN
PID
DATA
Service
Banks
GIN
PID
DATA
Service
National Health Security Office
GIN
PID
DATA
Service
Ministry of Public Health
GIN
PID
DATA
Authentication and Access Control
Citizen
Smart card
Governmental
officers

Health Facility Registry and Identifier

ID	Facility name
'10710'	โรงพยาบาลสกลนคร
'10674'	โรงพยาบาลเชียงรายประชานุเคราะห์
'10697'	โรงพยาบาลพุทธโสธร
'10667'	โรงพยาบาลบุรีรัมย์
'10660'	โรงพยาบาลพระนครศรีอยุธยา
'10723'	โรงพยาบาลแม่สอด
'10666'	โรงพยาบาลหาราชนครราชสีมา
'10687'	โรงพยาบาลปทุมธานี
'10721'	โรงพยาบาลกำแพงเพชร
'10751'	โรงพยาบาลสุไหงโก-ลก
'10691'	โรงพยาบาลบ้านหมี่
'10688'	โรงพยาบาลเสนา
'12275'	โรงพยาบาลสิรินธร(ภาคตะวันออกเฉียงเหนือ)
'10714'	โรงพยาบาลลำพูน
'10750'	โรงพยาบาลนราธิวาสราชนครินทร์
'10694'	โรงพยาบาลชัยนาทนเรนทร


1975 - ICD 9
International Classification of Diseases, Injuries, and Causes of Death consistingof 1164 groups. Alternative dagger and asterisk system introduced
1993 - ICD 10
International Classification of Diseases, Injuries, and Causes of Death consisting of 1967 groups
2015 - ICD 11
2011 : Alpha version (ICD 11 alpha draft)
2012 : Beta version & Field Trials Version
2014 : Final version for public viewing
2015 : WHA Approval & implementation
REVISIONS OF International Classification of Diseases (ICD)
Graphics by
Vijay
http://mrpalsmy.wordpress.com
1929 - ICD 4
The Bertillon or International List of Causes of Death consisting of 214 groups
1938 - ICD 5
The Bertillon or International List of Causes of Death consisting of 200 groups
1948 - ICD 6
International Classification of Diseases, Injuries, and Causes of Death consisting of 954 groups. Endorsed by the First World Health Assembly
1955 - ICD 7
International Classification of Diseases, Injuries, and Causes of Death consisting of 965 groups
1965 - ICD 8
International Classification of Diseases, Injuries, and Causes of Death consisting of 1040 groups
1920- ICD 3
The Bertillon or International List of Causes of Death consisting of 205 groups
1909 - ICD 2
The Bertillon or International List of Causes of Death consisting of 189 groups. A parallel classification of diseases for use in statistics of sickness was adopted
1900 - ICD 1
The Bertillon or International List of Causes of Death consisting of 179 groups. The desirability of decennial revisions was recognised. A parallel classification of diseases for use in statistics of sickness was adopted
1893
The Bertillon Classification of Causes of Death byJacques Bertillon included three classifi-cations with a total of 304 titles
1853
William Farr and Marc d'Espine prepare list of 139 rubrics as basis of the International List of Causes of Death

What are ICD codes look like?

A09 Diarrhea and gastroenteritis of presumed infectious origin

G40 Epilepsy

G40.3 Generalized idiopathic epilepsy and epileptic syndromes

S70.8 Other superficial injuries of hip and thigh

Granularity

- Different levels of granularity

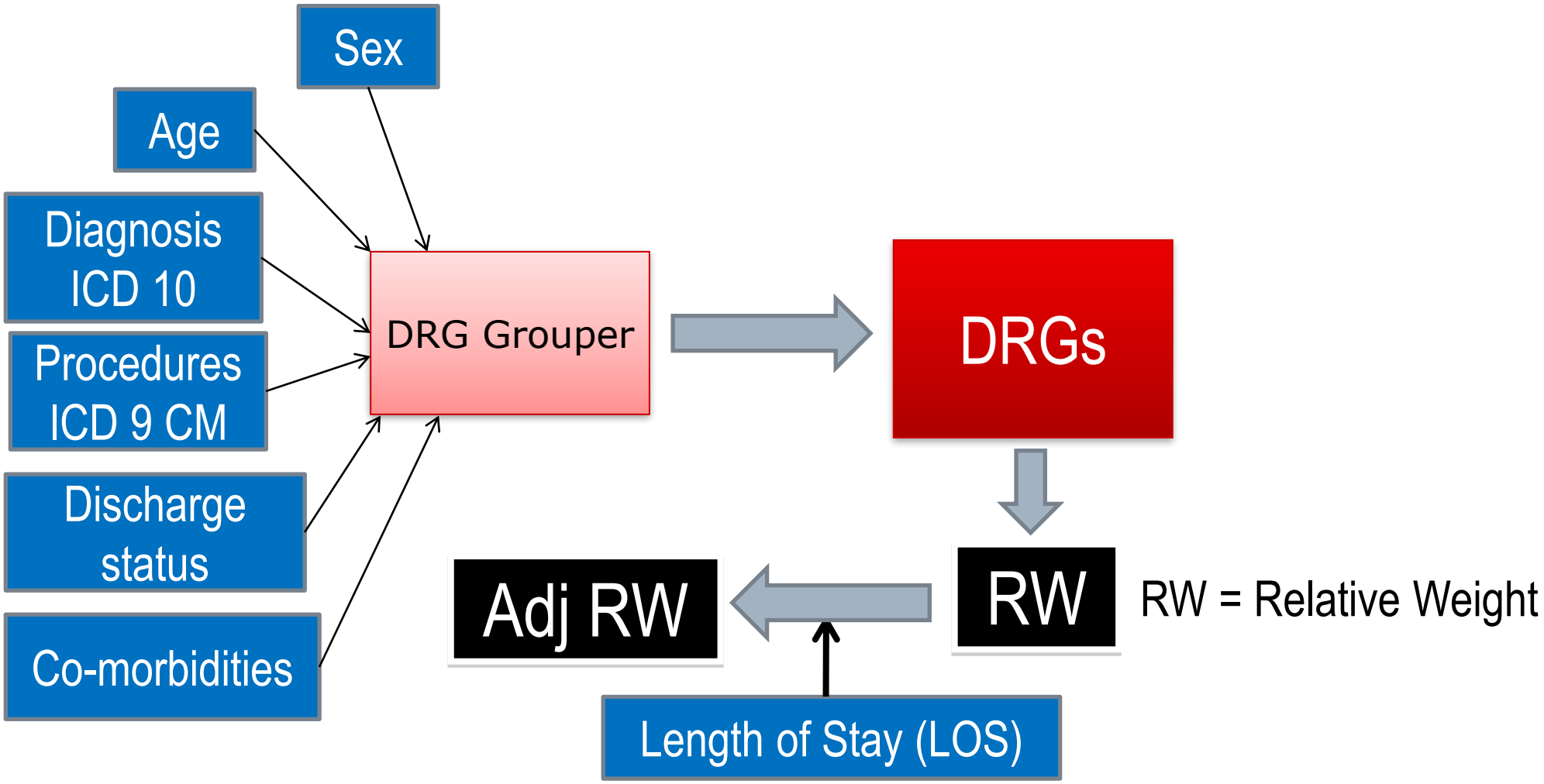
SNOMED CT		ICD-10	
• 26169004	Allergic otitis media	• H65.9	Allergic otitis media
• 29350000	Catarrhal otitis media		Catarrhal otitis media
• 32760002	Exudative otitis media		Exudative otitis media
• 1980003	Seromucinous otitis media		Seromucinous otitis media
• 80327007	Serous otitis media		Serous otitis media
• 78868004	Mucoid otitis media		Mucoid otitis media

- SNOMED CT
  - Each distinct meaning has a different concept identifier
  - Records data at a granular level
  - Allows clinicians to record data at appropriate level of detail
- ICD-10
  - Summarizes and aggregates data into broad categories

What is DRG?

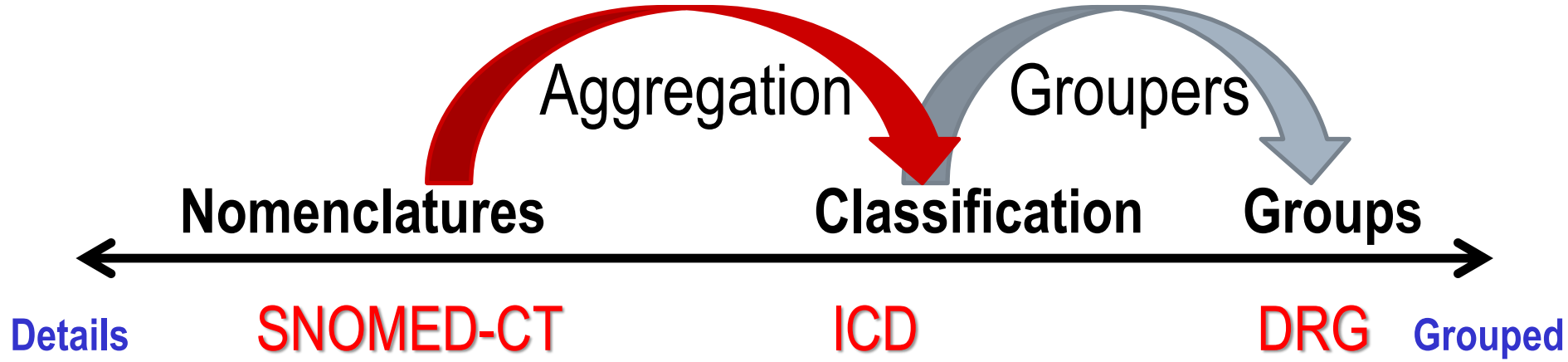
Diagnosis Related Group is a patient classification system for acute inpatients to measure hospital output. Patients in the same DRGs will have the same lengths of stay and the same level of hospital resource uses

How DRGs are calculated?



Continuum of Health Vocabularies

- Nomenclature-Highly detail descriptions (SNOMED-CT)
- Classification-organized aggregation of descriptions into rubric (ICDs)
- Groupings-High level categories of rubrics (DRGs)



TMT (Thai Medicines Terminology)

บัญชีข้อมูลยาและรหัสยามาตรฐานไทย

TMT™
Thai Medicines Terminology

- TMT is Thai national drug codes and descriptions of medicinal products (both generic and trade products) that are used in Thai healthcare systems. The development of TMT follows international standard, SNOMED CT concept model. TMT is a uniquely and unambiguously code and medicina product term.
- TMT cover all human pharmaceutical products used in Thailand healthcare services

TMT (Thai Medicines Terminology)

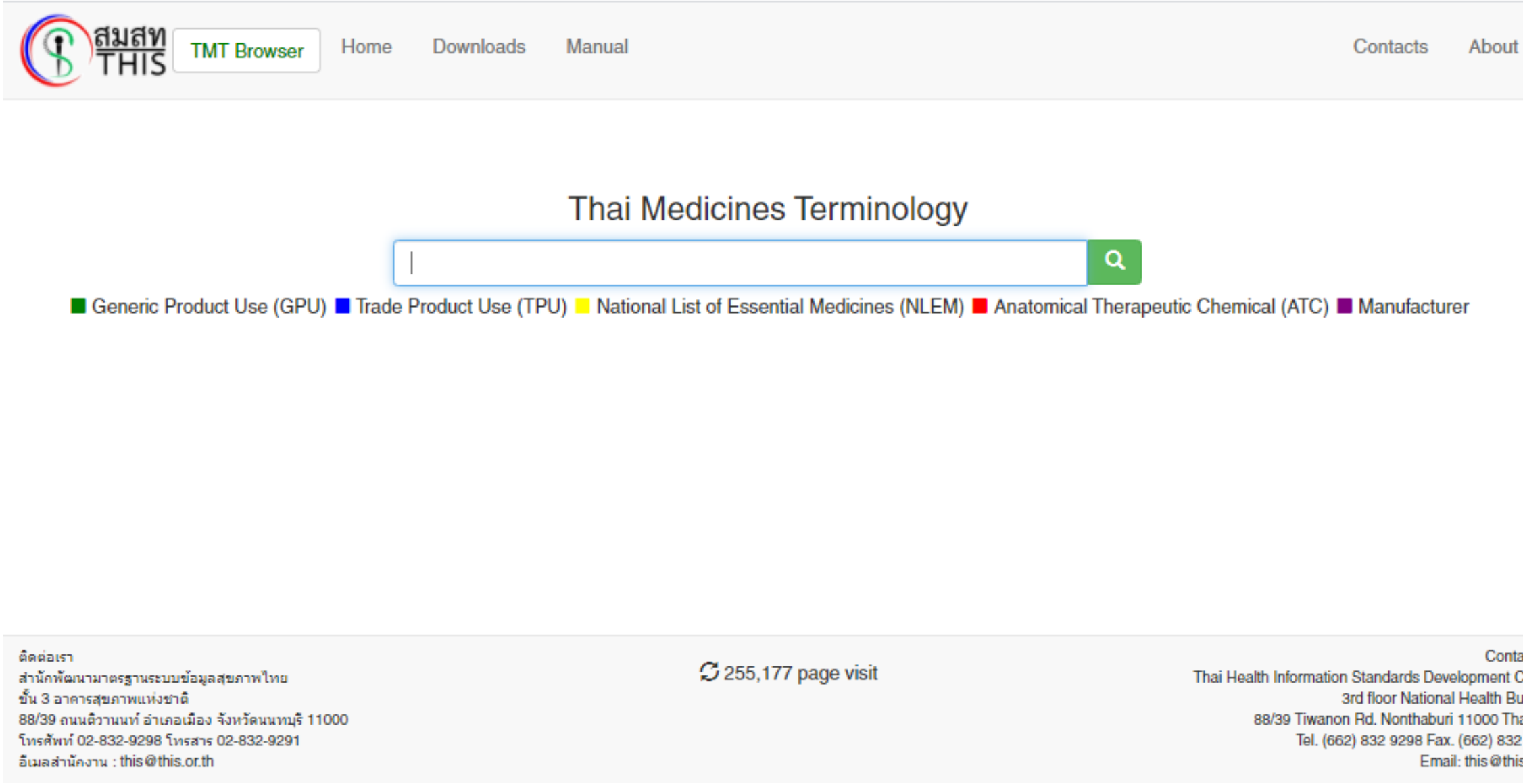
บัญชีข้อมูลยาและรหัสยามาตรฐานไทย

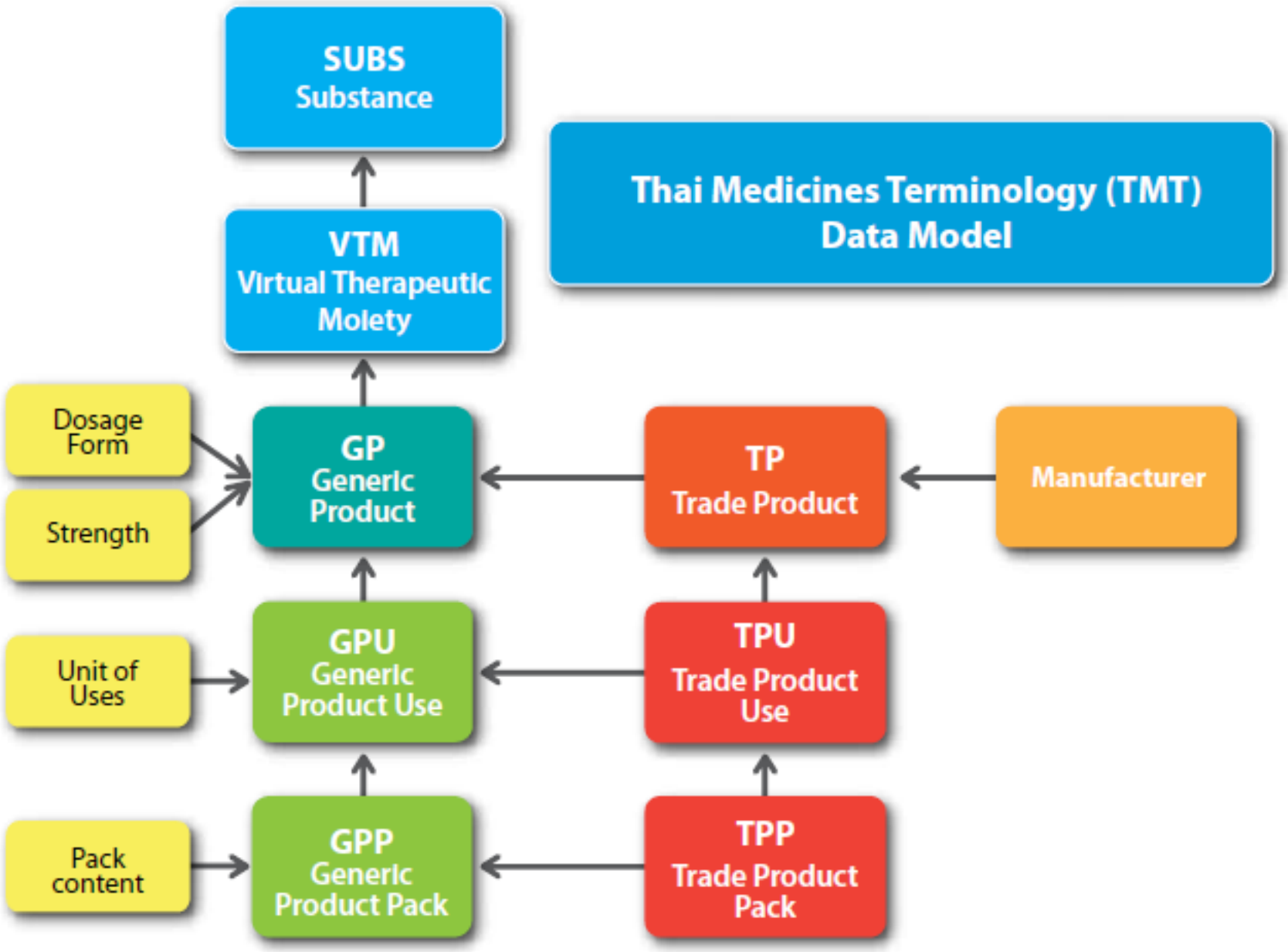
TMT™
Thai Medicines Terminology

- It uses a set of medicinal products property which includes active ingredients (substances), dosage form, strength, unit of use, product package and manufacturer.

- TMT is primarily designed to enable interoperability between applications and computers by providing a set of codes and standard descriptions of medicines.

http://tmt.this.or.th



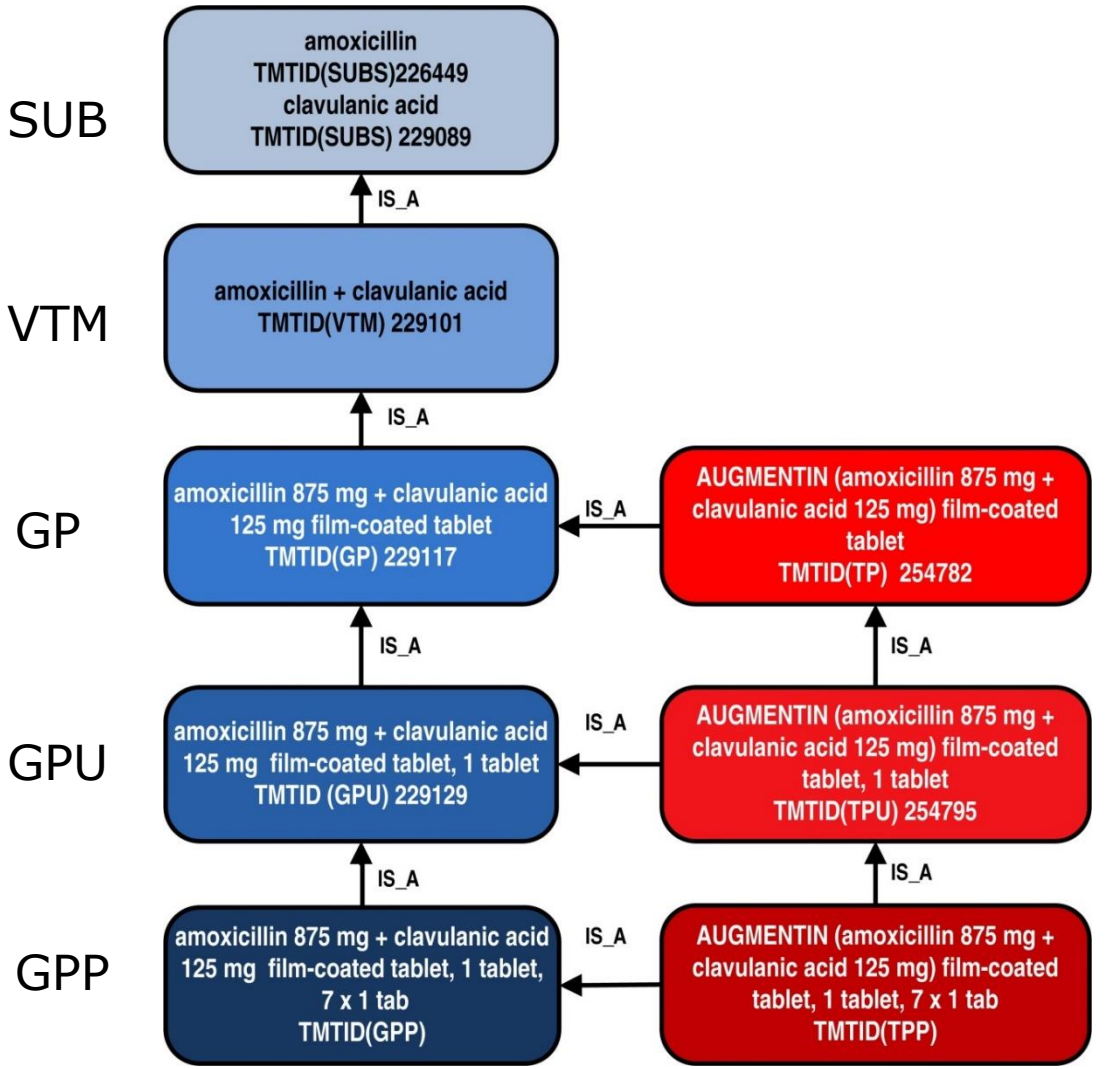


TMT™
Thai Medicines Terminology

TMT (Thai Medicines Terminology)

บัญชีข้อมูลยาและรหัสยามาตรฐานไทย

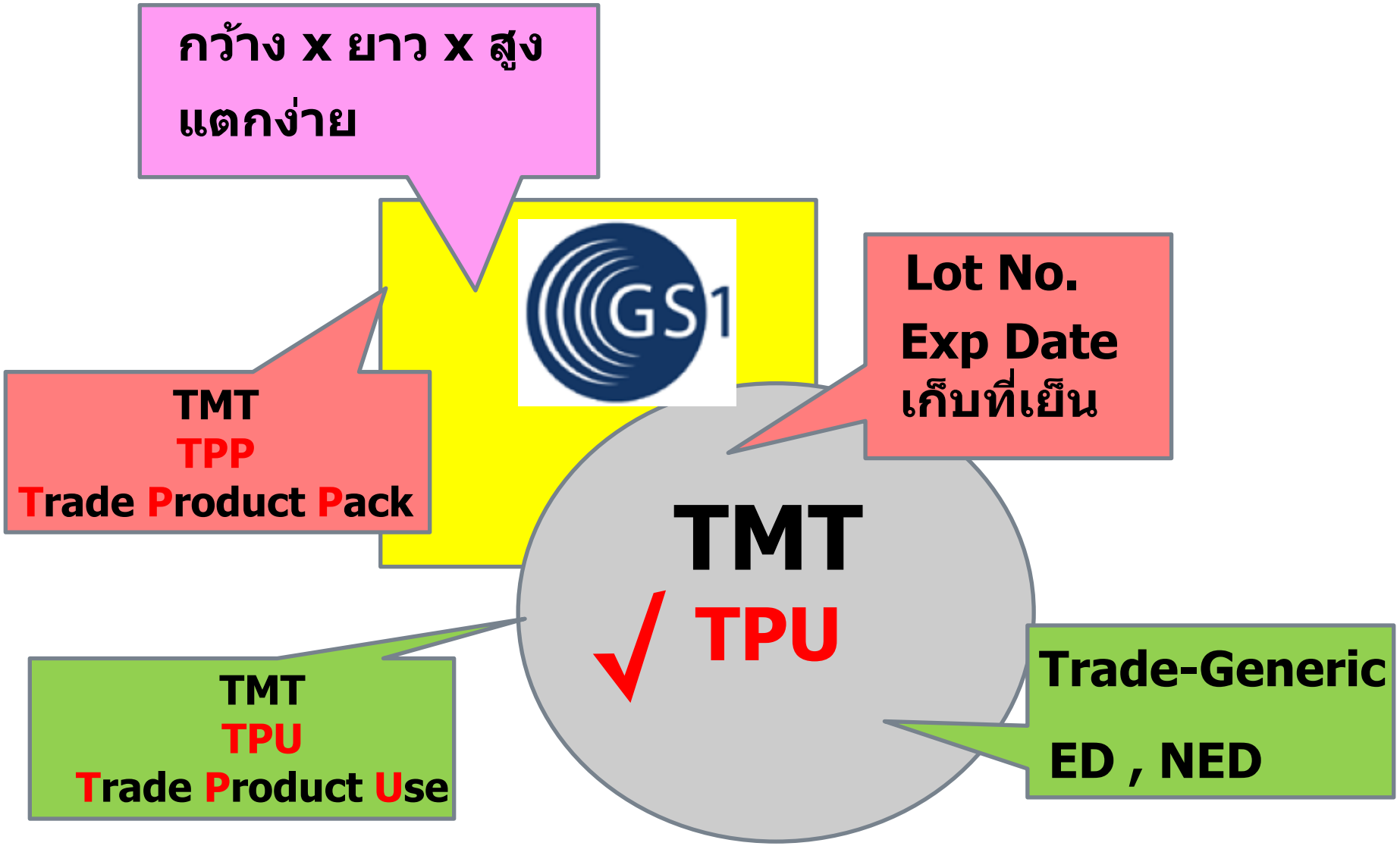
ตัวอย่างผลิตภัณฑ์ และความสัมพันธ์ของรหัสยา



In Scope of TMT

TMT standardize

- Drug Name : WHO INN (International Nonproprietary Name)
- Dosage form : EDQM (European Directorate for the Quality of Medicine & Health Care)
- Strength
- Unit of measure
- Manufacturer


กว้าง x ยาว x สูง
แตกง่าย
GS1
TMT
TPP
Trade Product Pack
Lot No.
Exp Date
เก็บที่เย็น
TMT
√ TPU
TMT
TPU
Trade Product Use
Trade-Generic
ED , NED

Product Barcode ≠ GTIN

ITF-14

GS1-128

INDICATOR DIGIT

The indicator digit denotes the level of packaging for a particular carton.

GS1 COMPANY PREFIX

The GS1 Company Prefix is a 7-10 digit number assigned by GS1 to uniquely identify ownership of a particular brand.

ITEM REFERENCE

For cartons that contain the same item, the item reference is the same as that of the item contained within. A new item reference number is assigned for cartons containing an assortment

CHECK DIGIT

The check digit is calculated using a MOD10 check digit algorithm.

ตัวอย่างสร้างมาตรฐาน TPP เม็ด

TMTID (TPU)	FSN (TPU)	TMTID (TPP)	FSN (TPP)	GTIN	
232556	AIR-X 120 (อาร์.เอ็กซ์. แมนูแฟคเจอริ่ง) (simeticone 120 mg) chewable tablet, 1 tablet	1055296	AIR-X 120 (อาร์.เอ็กซ์. แมนูแฟคเจอริ่ง) (simeticone 120 mg) chewable tablet, 10 tablet, 1 strip		
		1055310	AIR-X 120 (อาร์.เอ็กซ์. แมนูแฟคเจอริ่ง) (simeticone 120 mg) chewable tablet, 500 tablet (50 x 10 tablet strip), 1 box	8852673000311	

TMTID: Trade product pack (TPP)

N	TMTID(TPU	FSN (TPU)	TMTID(TPP	FSN (TPP)	GTIN
376	1043886	OPTIVE FUSION (ALLERG	1047915	OPTIVE FUSION (ALLERGAN PHARMACEUTICALS, IRELAND) (carboxymethylcellulose sodium 5 mg/1 mL + glycerol 9 mg/1 mL + hyaluronate sodium 1 mg/1 mL) e	489700502490
384	1048948	OPTIVE FUSION UD (ALLE	1048969	OPTIVE FUSION UD (ALLERGAN PHARMACEUTICALS, IRELAND) (carboxymethylcellulose sodium 5 mg/1 mL + glycerol 10 mg/1 mL + hyaluronate sodium 1 mg/1 r	489700502506
152	579141	STREPTO (เยนเนอร์ราลดริ	1078421	STREPTO (เยนเนอร์ราลดริ๊กส์เฮ้าส์) (streptomycin 1 g) powder for solution for injection, 5 x 1 g vial, 1 box	853593003796
471	995695	DEPAKINE (SANOFI-AVEN	1071685	DEPAKINE (SANOFI-AVENTIS, SPAIN) (valproate sodium 200 mg) gastro-resistant tablet, 40 tablet, 1 jar	3582910006527
472	995695	DEPAKINE (SANOFI-AVEN	1071709	DEPAKINE (SANOFI-AVENTIS, SPAIN) (valproate sodium 200 mg) gastro-resistant tablet, 40 tablet (1 x 40 tablet jar), 1 box	3582910006527
473	644649	DEPAKINE CHRONO (SAN	1071721	DEPAKINE CHRONO (SANOFI WINTHROP, FRANCE) (valproate sodium 500 mg) prolonged-release tablet, 30 tablet, 1 jar	3582910006534
474	644649	DEPAKINE CHRONO (SAN	1071745	DEPAKINE CHRONO (SANOFI WINTHROP, FRANCE) (valproate sodium 500 mg) prolonged-release tablet, 30 tablet (1 x 30 tablet jar), 1 box	3582910006534
196	664526	CORDARONE (SANOFI W	1097704	CORDARONE (SANOFI WINTHROP, FRANCE) (amiodarone hydrochloride 150 mg/3 mL) concentrate for solution for injection/infusion, 6 x 3 mL ampoule, 1 box	3582910008934
51	309192	DIAMICRON MR (LES LAB	1058473	DIAMICRON MR (LES LABORATOIRES SERVIER, FRANCE) (gliclazide 60 mg) modified-release tablet, 15 tablet, 1 blister	3594452600804
52	309192	DIAMICRON MR (LES LAB	1058494	DIAMICRON MR (LES LABORATOIRES SERVIER, FRANCE) (gliclazide 60 mg) modified-release tablet, 30 tablet (2 x 15 tablet blister), 1 box	3594452600804
93	470707	VASTAREL MR (LES LABOI	1065727	VASTAREL MR (LES LABORATOIRES SERVIER, FRANCE) (trimetazidine dihydrochloride 35 mg) modified-release tablet, 30 tablet, 1 blister	3594455800225
94	470707	VASTAREL MR (LES LABOI	1065743	VASTAREL MR (LES LABORATOIRES SERVIER, FRANCE) (trimetazidine dihydrochloride 35 mg) modified-release tablet, 60 tablet (2 x 30 tablet blister), 1 box	3594455800225
270	945476	BUDENOFALK (LOSAN PH	1056615	BUDENOFALK (LOSAN PHARMA, GERMANY) (budesonide 3 mg) gastro-resistant capsule, hard, 10 capsule, 1 blister	4032717010023
271	945476	BUDENOFALK (LOSAN PH	1056636	BUDENOFALK (LOSAN PHARMA, GERMANY) (budesonide 3 mg) gastro-resistant capsule, hard, 100 capsule (10 x 10 capsule blister), 1 box	4032717010023
163	650039	SPIRIVA (BOEHRINGER IN	1074605	SPIRIVA (BOEHRINGER INGELHEIM PHARMA, GERMANY) (tiotropium 18 mcg) inhalation powder, hard capsule, 10 capsule, 1 blister	4048846003683
164	650039	SPIRIVA (BOEHRINGER IN	1074622	SPIRIVA (BOEHRINGER INGELHEIM PHARMA, GERMANY) (tiotropium 18 mcg) inhalation powder, hard capsule, 30 capsule (3 x 10 capsule blister), 1 box	4048846003683
173	654742	ACTILYSE (BOEHRINGER	1097421	ACTILYSE (BOEHRINGER INGELHEIM PHARMA, GERMANY) (alteplase 50 mg) powder and solvent for solution for injection/infusion, 1 vial, 1 box	4048846005212
5	107106	AGGRENOX (BOEHRINGEI	1055254	AGGRENOX (BOEHRINGER INGELHEIM, GERMANY) (aspirin 25 mg + dipyridamole 200 mg) prolonged-release capsule, hard, 60 capsule, 1 bottle	4048846006646
6	107106	AGGRENOX (BOEHRINGEI	1055277	AGGRENOX (BOEHRINGER INGELHEIM, GERMANY) (aspirin 25 mg + dipyridamole 200 mg) prolonged-release capsule, hard, 60 capsule (1 x 60 capsule bottle), 1	4048846006646
433	107106	AGGRENOX (BOEHRINGEI	1055254	AGGRENOX (BOEHRINGER INGELHEIM, GERMANY) (aspirin 25 mg + dipyridamole 200 mg) prolonged-release capsule, hard, 60 capsule, 1 bottle	4048846006646
434	107106	AGGRENOX (BOEHRINGEI	1055277	AGGRENOX (BOEHRINGER INGELHEIM, GERMANY) (aspirin 25 mg + dipyridamole 200 mg) prolonged-release capsule, hard, 60 capsule (1 x 60 capsule bottle), 1	4048846006646
1	100005	ALGYCON (TAI YU CHEMI	1055334	ALGYCON (TAI YU CHEMICAL & PHARMACEUTICAL, TAIWAN) (alginic acid 200 mg + aluminium hydroxide 30 mg + magnesium carbonate 40 mg) chewable tablet	4710836251441
288	1016779	KLACID MR (ABBVIE, ITAL	1060999	KLACID MR (ABBVIE, ITALY) (clarithromycin 500 mg) modified-release tablet, 7 tablet, 1 blister	8002660027207
289	1016779	KLACID MR (ABBVIE, ITAL	1061019	KLACID MR (ABBVIE, ITALY) (clarithromycin 500 mg) modified-release tablet, 7 tablet (1 x 7 tablet blister), 1 box	8002660027207
415	1053451	SEVORANE (ABBVIE, ITAL	1053479	SEVORANE (ABBVIE, ITALY) (sevoflurane 100 mL/100 mL) inhalation vapour, liquid, 250 mL bottle, 1 box	8054083014340
333	1041729	BERATE (แอดวานซ์ ฟาร์มา	1045501	BERATE (แอดวานซ์ ฟาร์มาซูติคอล แมนูแฟคเจอริ่ง) (betamethasone 100 mg/100 g) cream, 15 g tube, 1 box	8559441331905
320	1040993	NEUPOGEN (AMGEN MANI	1046129	NEUPOGEN (AMGEN MANUFACTURING, U.S.A.) (filgrastim 300 mcg/0.5 mL) solution for injection/infusion, 0.5 mL prefilled syr, 1 box	8715131017057
343	1042191	CANESTEN (ENCUBE ETHI	1046782	CANESTEN (ENCUBE ETHICALS, INDIA) (clotrimazole 1 g/100 g) cream, 10 g tube, 1 box	8850172230109
344	1042209	CANESTEN (ENCUBE ETHI	1046805	CANESTEN (ENCUBE ETHICALS, INDIA) (clotrimazole 1 g/100 g) cream, 20 g tube, 1 box	8850172230208
485	756464	THYROSIT (เภสัชกรรมศรีร	1064925	THYROSIT (เภสัชกรรมศรีประสิทธิ์) (levothyroxine sodium 50 mcg) tablet, 10 tablet, 1 blister	8850239003172
486	756464	THYROSIT (เภสัชกรรมศรีร	1064941	THYROSIT (เภสัชกรรมศรีประสิทธิ์) (levothyroxine sodium 50 mcg) tablet, 500 tablet (50 x 10 tablet blister), 1 box	8850239003172
481	689147	THYROSIT (เภสัชกรรมศรีร	1064885	THYROSIT (เภสัชกรรมศรีประสิทธิ์) (levothyroxine sodium 100 mcg) tablet, 10 tablet, 1 blister	8850239003202
482	689147	THYROSIT (เภสัชกรรมศรีร	1064902	THYROSIT (เภสัชกรรมศรีประสิทธิ์) (levothyroxine sodium 100 mcg) tablet, 500 tablet (50 x 10 tablet blister), 1 box	8850239003202
340	1042039	PROQUAD (MERCK SHARI	1046724	PROQUAD (MERCK SHARP & DOHME, U.S.A.) (measle 1000 tcid50 + mumps 20000 tcid50 + rubella 1000 tcid50 + varicella zoster, live attenuated 10000 pfu) po	8850285182012
83	425069	REMINYL (JANSSEN-CILA	1074148	REMINYL (JANSSEN-CILAG, ITALY) (galantamine 8 mg) prolonged-release capsule, hard, 7 capsule, 1 blister	8850583001220
84	425069	REMINYL (JANSSEN-CILA	1074169	REMINYL (JANSSEN-CILAG, ITALY) (galantamine 8 mg) prolonged-release capsule, hard, 28 capsule (4 x 7 capsule blister), 1 box	8850583001220

500 TPP → 278 GTIN → 199 Thailand GTIN

Syntactic Standards

HL7 v2 Message

Segments

- Segment Name: 3 characters code
- Segment terminator: CR

Delimiters

- Field separator: |
- Component separator: ^
- Repetition separator: ~
- Escape separator: \
- Subcomponent: &

```
MSH|^~\&|DDTEK LAB|ELAB-1|DDTEK OE|BLDG14|200502150930||ORU^R01^ORU_R01|CTRL-9876|P|2.4 CR
PID|||010-11-1111||Estherhaus^Eva^E^^^^L|Smith|19720520|F|||256 Sherwood Forest Dr.^^Baton
Rouge^LA^70809||(225)334-5232|(225)752-1213||||AC010111111||76-B4335^LA^20070520 CR
OBR|1|948642^DDTEK OE|917363^DDTEK LAB|1554-5^GLUCOSE|||200502150730|||||||||020-22-2222^
Levin-Epstein^Anna^^^^MD^^Micro-Managed Health Associates|||||||||F|||||||030-33-3333&
Honeywell&Carson&&&&MD CR
OBX|1|SN|1554-5^GLUCOSE^^^POST 12H CFST:MCNC:PT:SER/PLAS:QN||^175|mg/dl|70_105|H|||F CR
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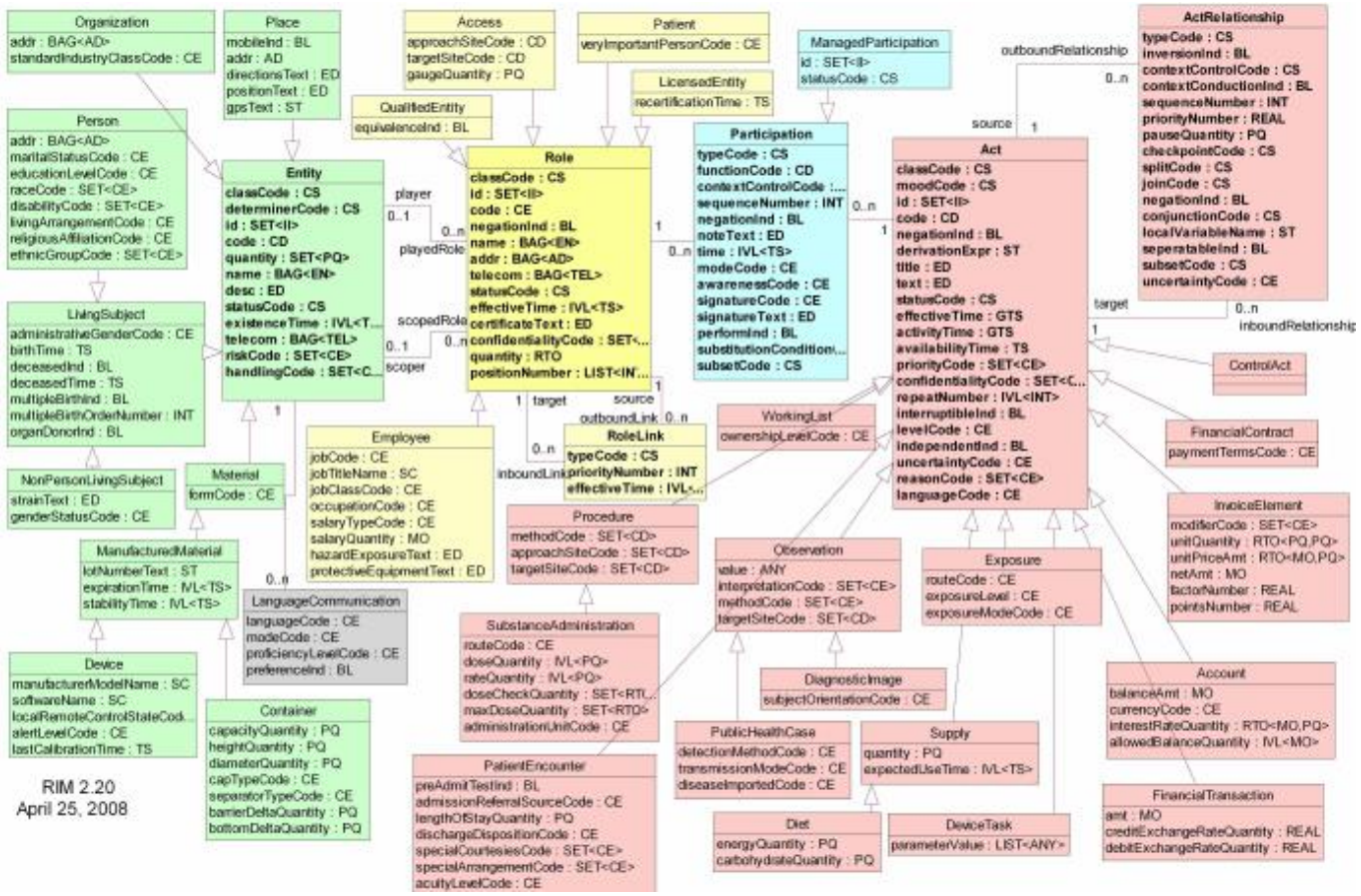
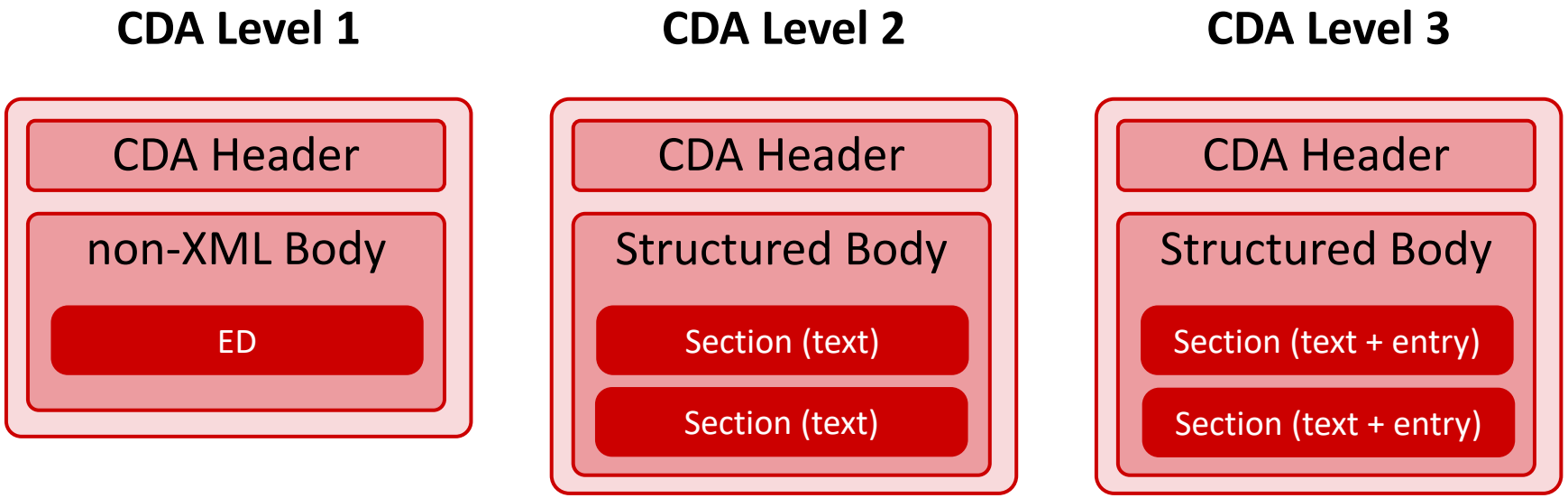
HL7 v3 - Reference Information Model (RIM)



HL7 CDA Level of Interoperability



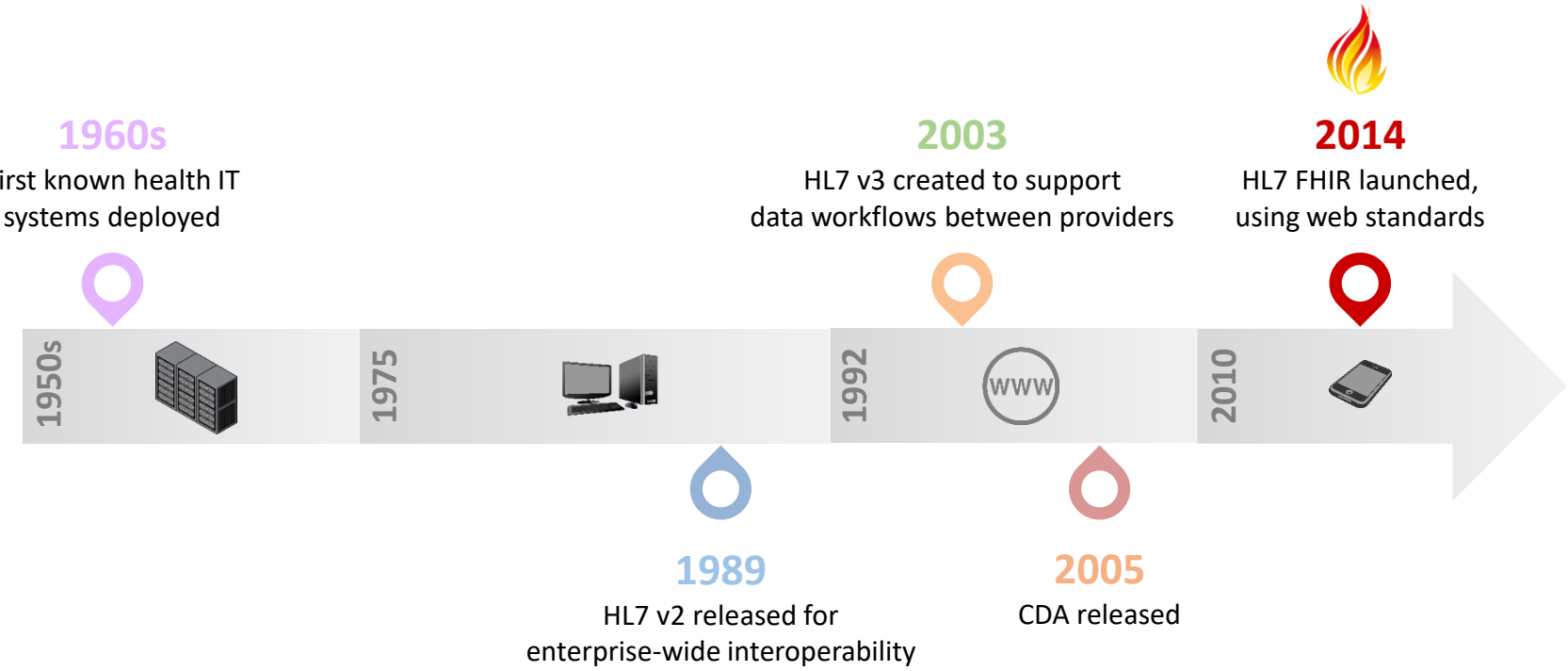
Amazon, Google, IBM Pledge Health Data Standards, Interoperability

Amazon, Google, and IBM joined other technology giants to pledge progress towards the adoption of health data standards, interoperability, and the Triple Aim.

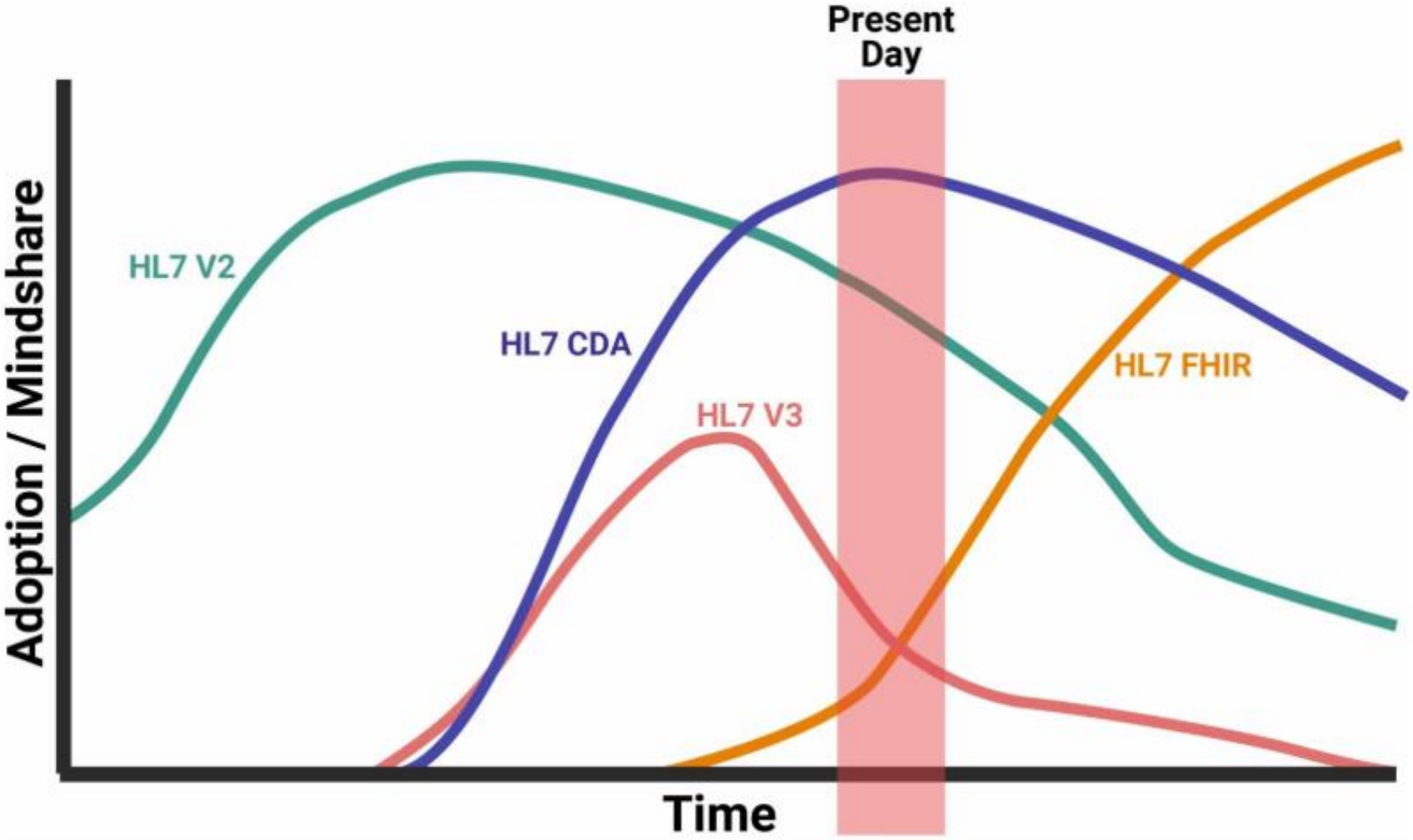
Photo credit: ITI – *(L-R)* : Dean Garfield (ITI) – Alec Chalmers (Amazon) – Mark Dudman (IBM) – Peter Lee (Microsoft) –– Greg Moore (Google)

Google Microsoft amazon IBM ORACLE salesforce

The Story of HL7



adapted from Enovacom: THE CRITICAL NEED FOR INTEROPERABILITY RISES



From:https://www.intersystems.com/fhir/

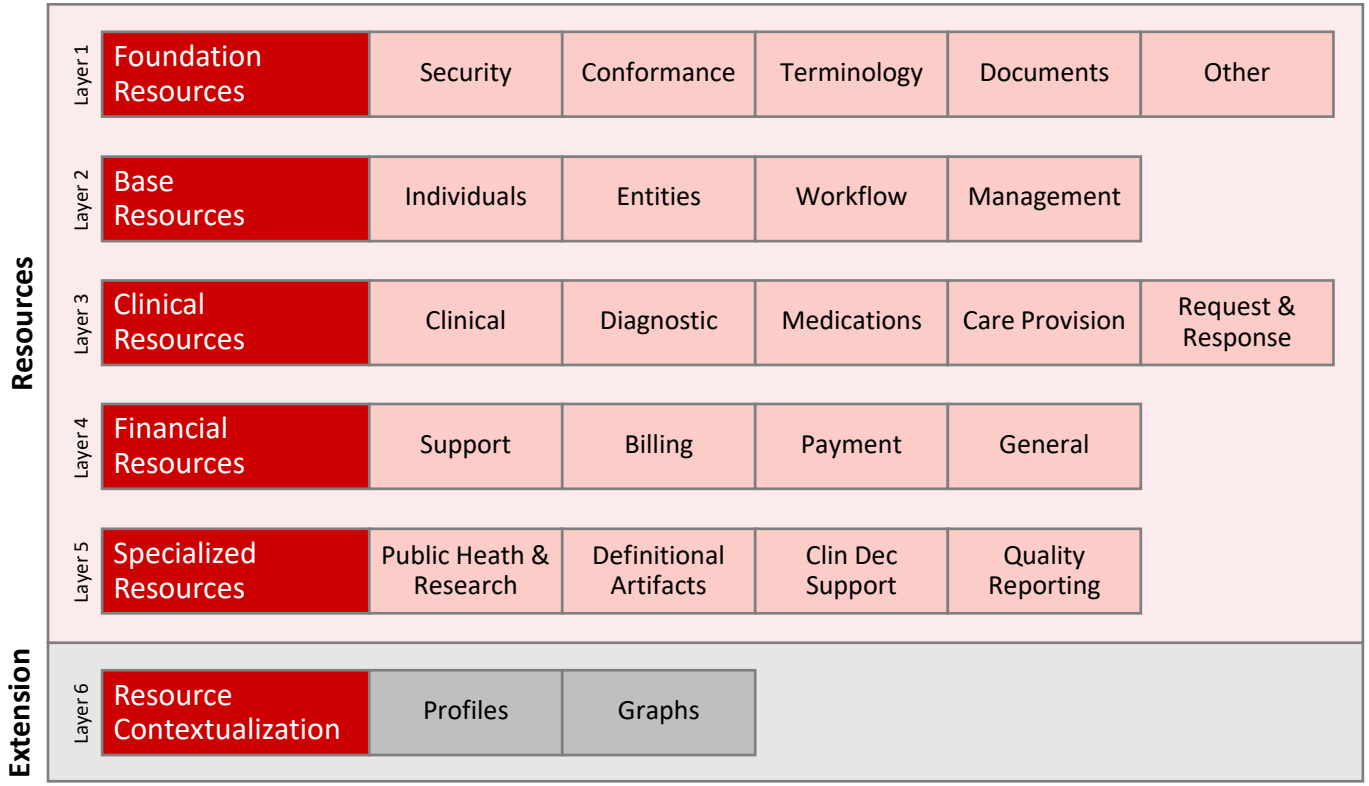
HL7® FHIR®

Mr. Grahame Grieve
Inventor of FHIR

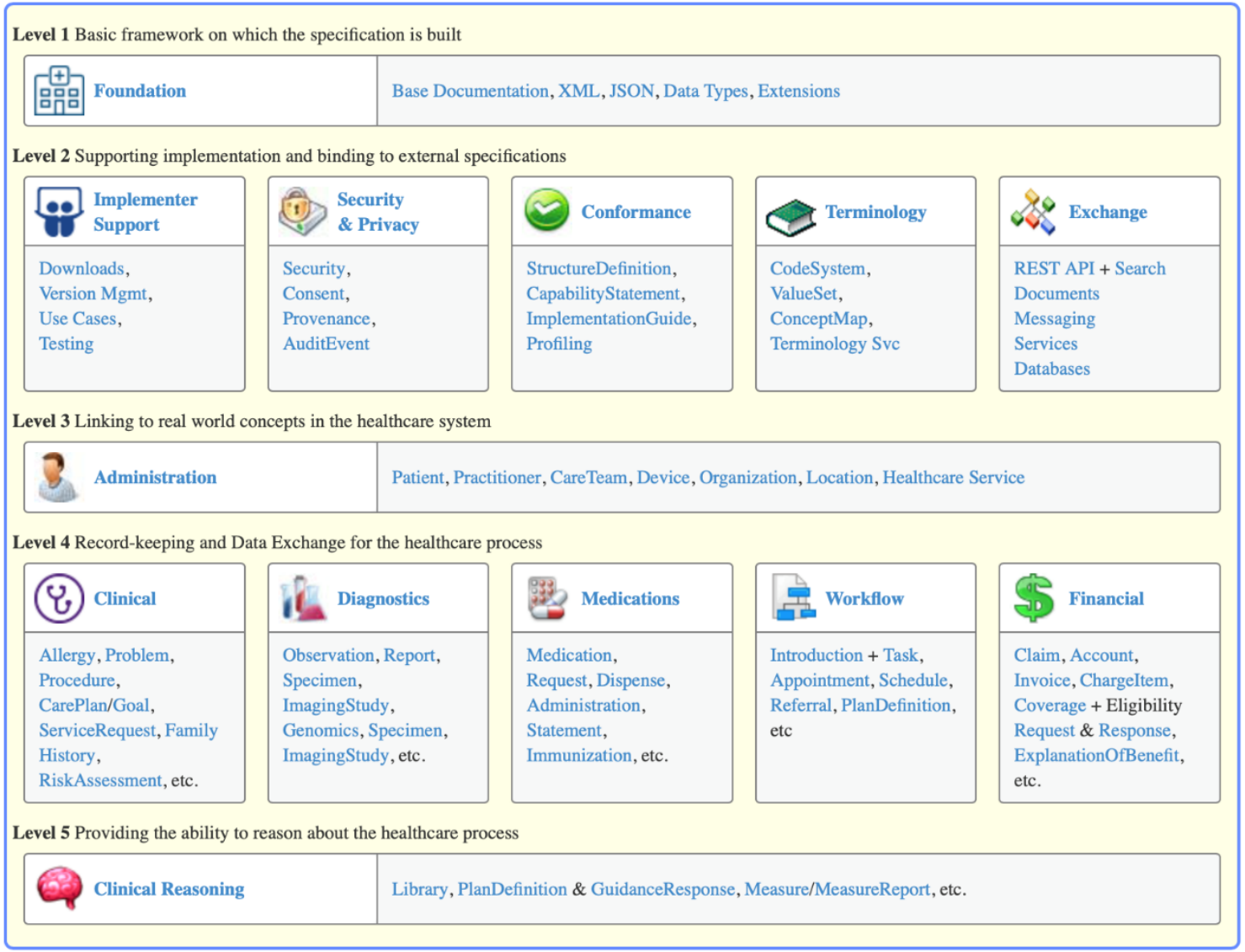
8 Oct 2019 in Thailand

- FHIR, the standard for health Information Exchange
- How to strengthen FHIR community?

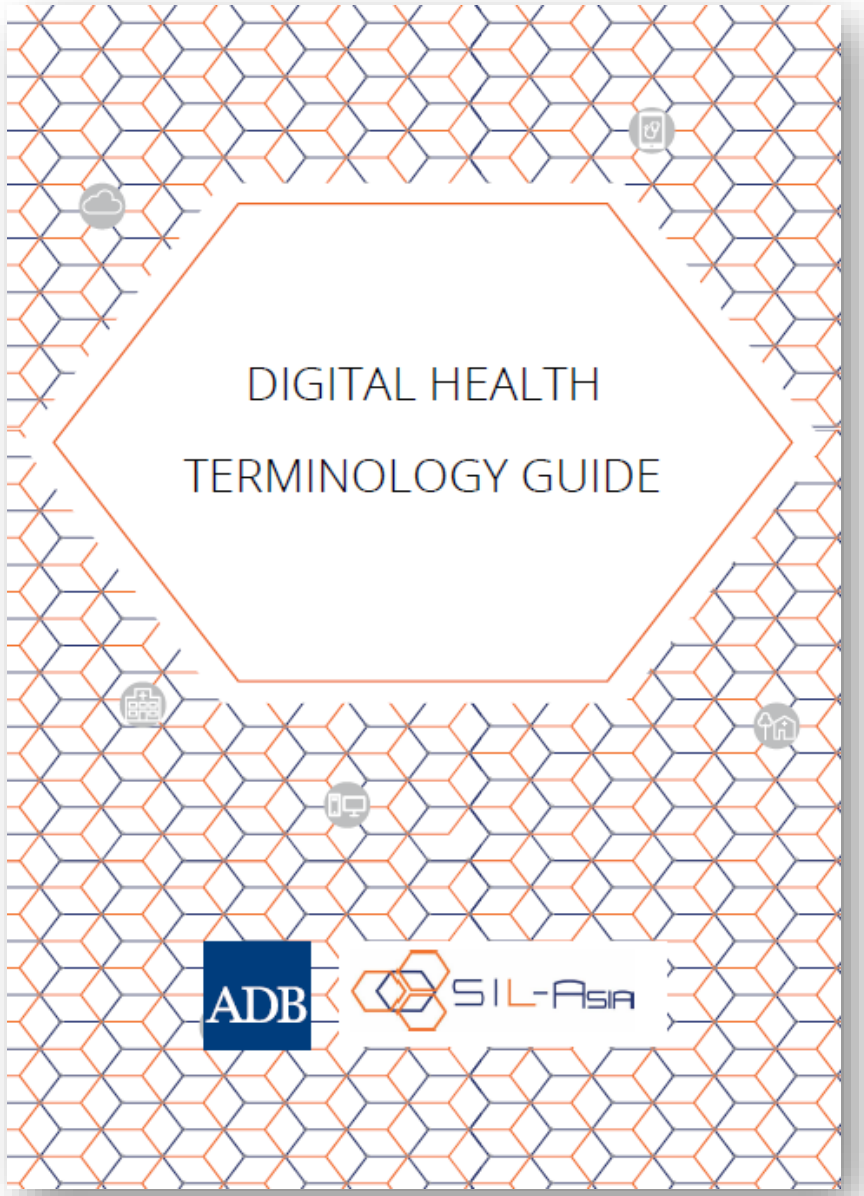
FHIR Composition Framework



FHIR Resources




eHealth in Thailand:
INTEROPERABILITY AND
HEALTH INFORMATION STANDARDS
Boonchai Kijsanayotin MD, PhD, editor
Thai Health Information Standards Development Center (THIS)
Affiliated agency of Health Systems Research Institute (HSRI),
Ministry of Public Health, Thailand.



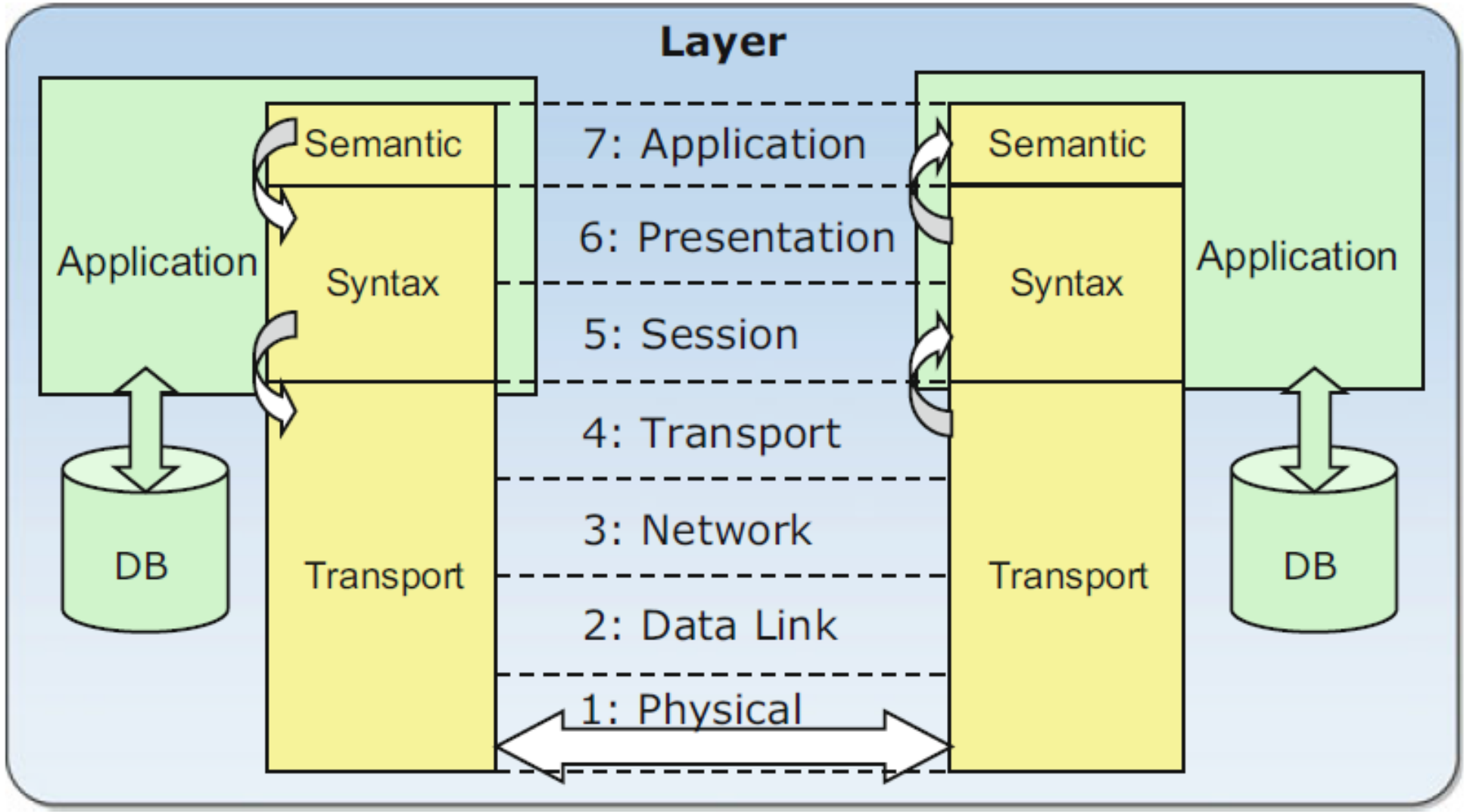
http://sil-asia.org/digital-health-terminology-guide/

Q & A

THANK YOU

ISO/OSI Stacks

ISO = International Standardization Organization
OSI = Open Systems Interconnection model



SOURCE: Based on Oemig F., and R. Snelick. 2016. Healthcare interoperability standards compliance handbook, Switzerland: Springer.