Towards EMS Interoperability and Service Innovation

EMS System Technology Innovation

National EMS Forum: Next Generation EMS

Asanee Kawtrakul, Computer Engineering Department, Kasetsart University

29 May 2019 @ Centra by Centara

Issues

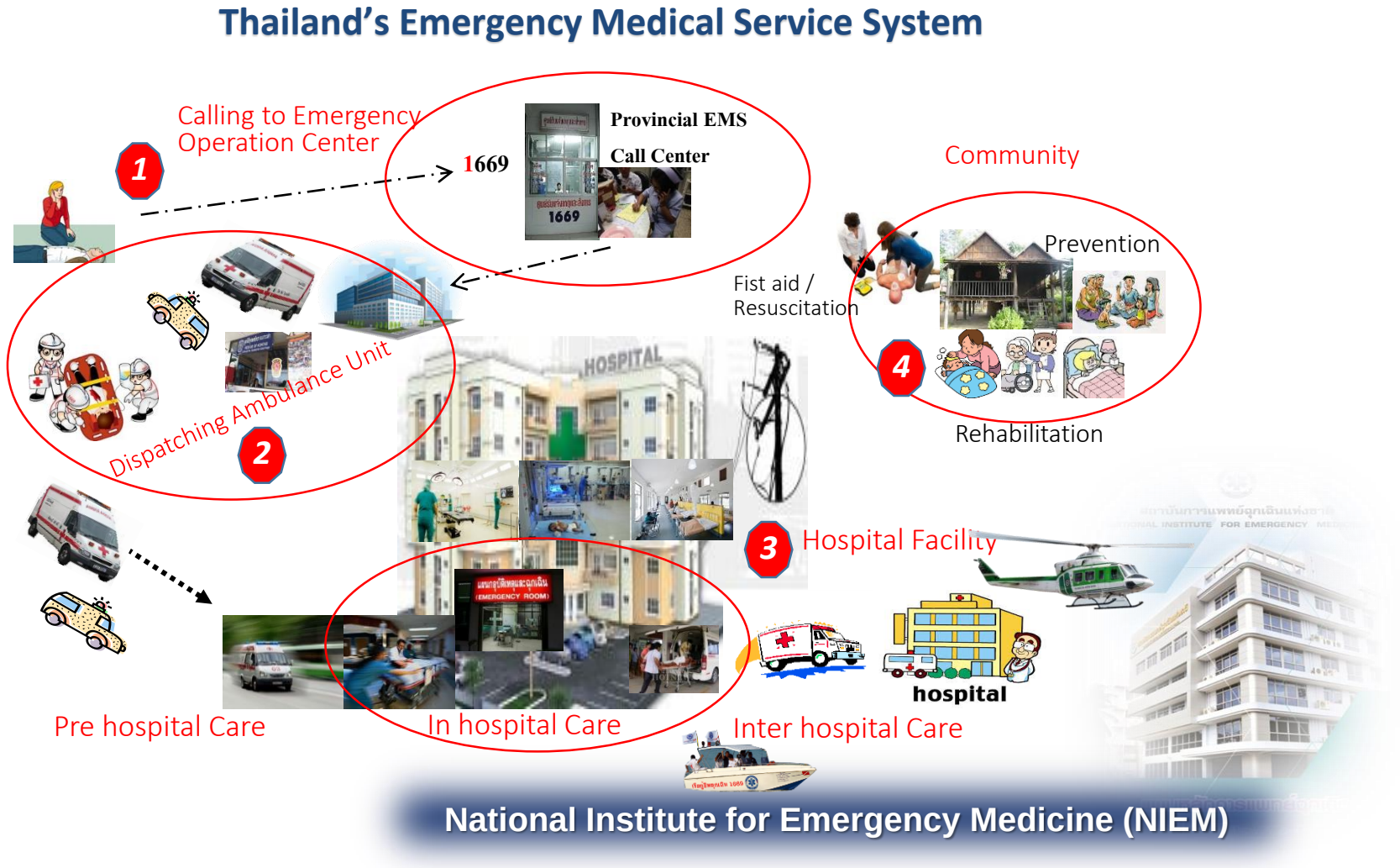
CHALLENGES: Value of Integration: Seamless Service Connectivity for Saving Patient's Life

WHAT: Interoperability

HOW: STANDARDS

Conclusions

Challenges: กลไกการปฏิบัติการการแพทย์ฉุกเฉินในปัจจุบัน



การบูรณาการเชื่อมต่อข้อมูลและระบบสื่อสารจำเป็นต่อปฏิบัติการฉุกเฉินในทุกขั้นตอน

ข้อมูลที่ต้องการ: หลายแหล่ง หลายชนิด หลายรูปแบบ หลายระบบ หลายแอปพลิเคชั่น

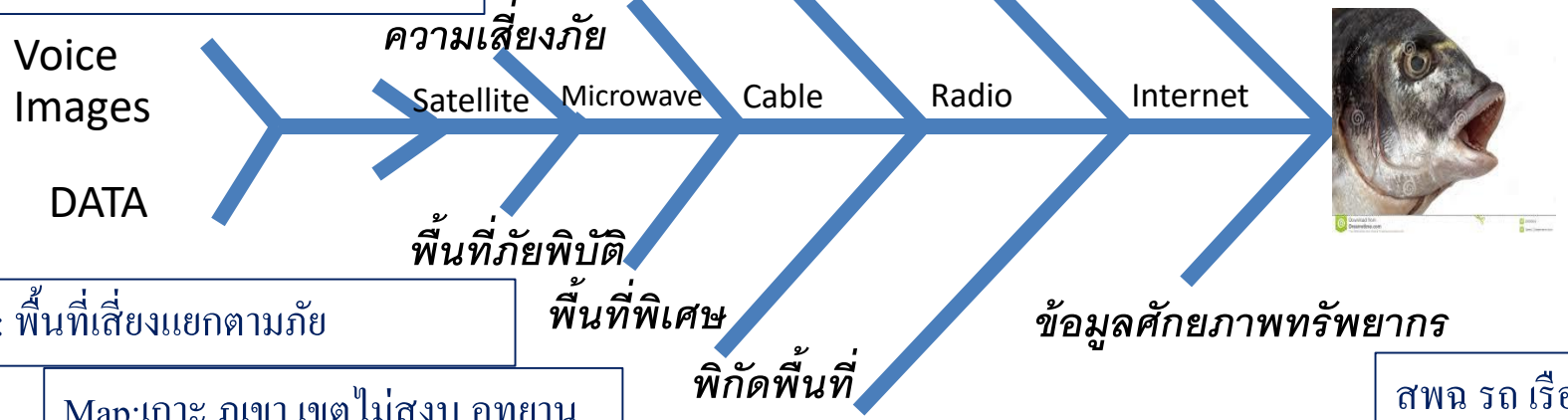
สพฉ กฎหมาย เทคโนโลยี Operator เพื่อระบุพิกัดบุคคล App ต่างๆ

กรมการปกครอง ข้อมูลทะเบียนราษฎร์ เลข๑๓หลัก ข้อมูลบุคคลผ่านApp ต่างๆ

Nectec พิการ โรคเรื้อรัง สูงอายุ เด็ก หญิงมีครรภ์ App

สพฉ OIS PIS DSS MIS APP 1669

ความเสี่ยงชุมชน ความรุนแรงของภัย ความเปราะบาง และศักยภาพ



Spatial Data: พื้นที่เสี่ยงแยกตามภัย

Map:เกาะ ภูเขา เขตไม่สงบ อุทยาน

Spatial Data: ระดับชั้นพื้นที่(Layer) Plot จุดสถานที่ อุปกรณ์ พาหนะ เส้นทาง

EHR, PHR. ข้อมูลสุขภาพ ๔๓ แฟ้ม ข้อมูลสุขภาพผ่านApp ต่างๆ

สพฉ รถ เรือ ฮ. อุปกรณ์ บุคลากร ผู้เชี่ยวชาญ ยา เตียง เลือด ออกซิเจน ขีดความสามารถ

Problems and Solutions

Problems: Digitization of Health care information

- Fragmentation of healthcare systems
- Inability for communication
  - Communication (send, receive, interpret)
  - Nature of data (large and differentiated structures, formats)
  - Lots of data, no knowledge: Prevention, Warning

Solutions:

- Digitization of Health care information
- Must abstract the problem above the system level
- Provide a means for interoperability

Interoperability in EMS and Healthcare

Medical data transfer	among Hospital Information Systems (HIS).
	among Telemedicine Systems.
	among Telemedicine and HIS systems.
Benefits	Save Life, better care, better services
	Tele-consultation among practitioners
	Medical knowledge sharing

Many Types of Healthcare Information Need to be Exchanged

Pharmacy Medication Lists

Government Agencies, Public Health, Research

Lab Test Results

Payers / Financial Systems

Patient

Hospitalization Summaries

Home Health Monitoring Devices

Medical Imaging Results

Doctors Orders and Clinicians Notes

HL7 INTERNATIONAL

What is Interoperability?

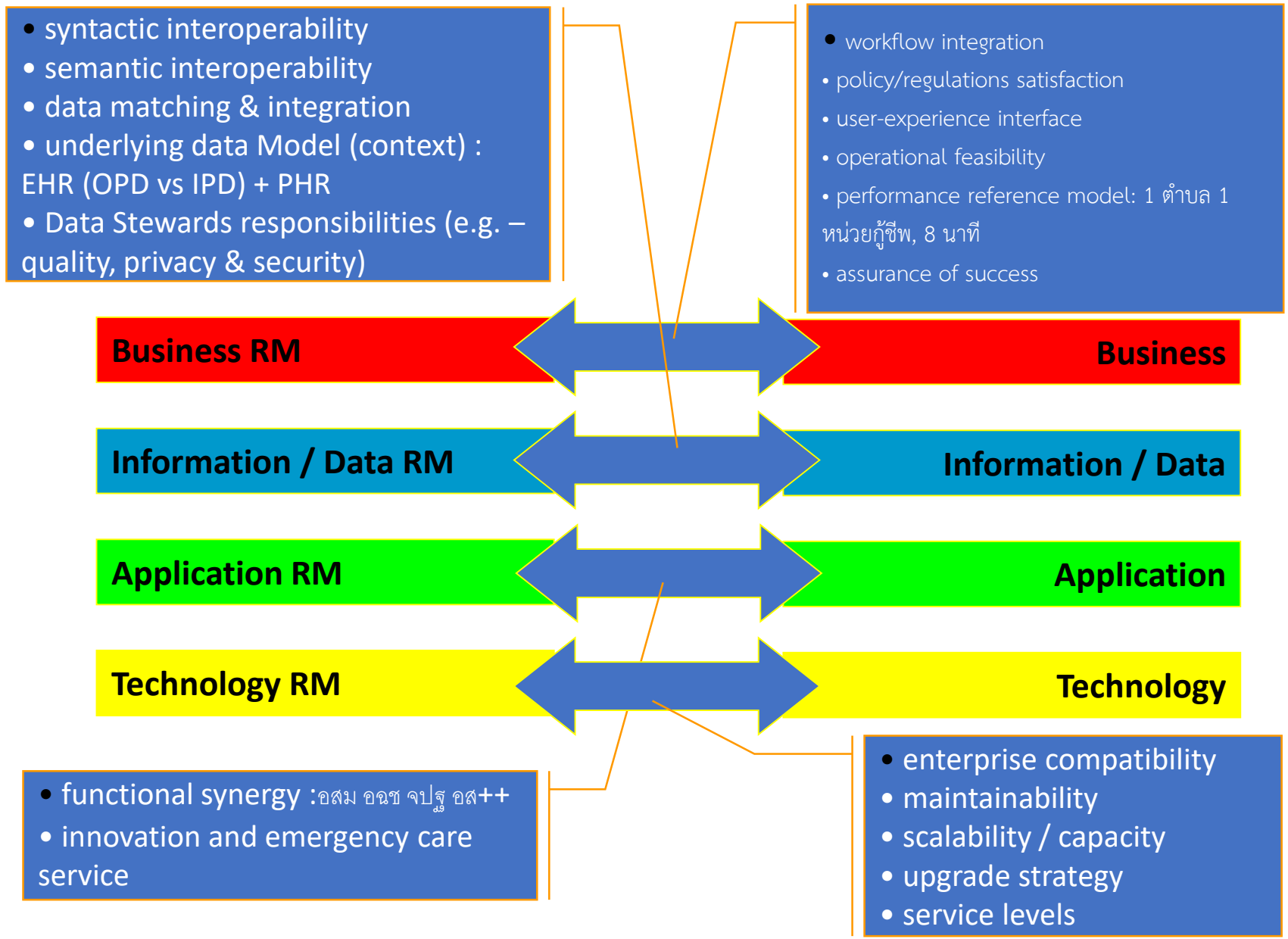
"Ability of two or more systems or components to exchange information and to use the information that has been exchanged."

Source: IEEE Standard Computer Dictionary:

A Compilation of IEEE Standard Computer Glossaries, IEEE, 1990

- Ability to work among multiple versatile systems together.
- How easy to plug different systems into a single systems.
- How much flexible to inter communicate between two systems.

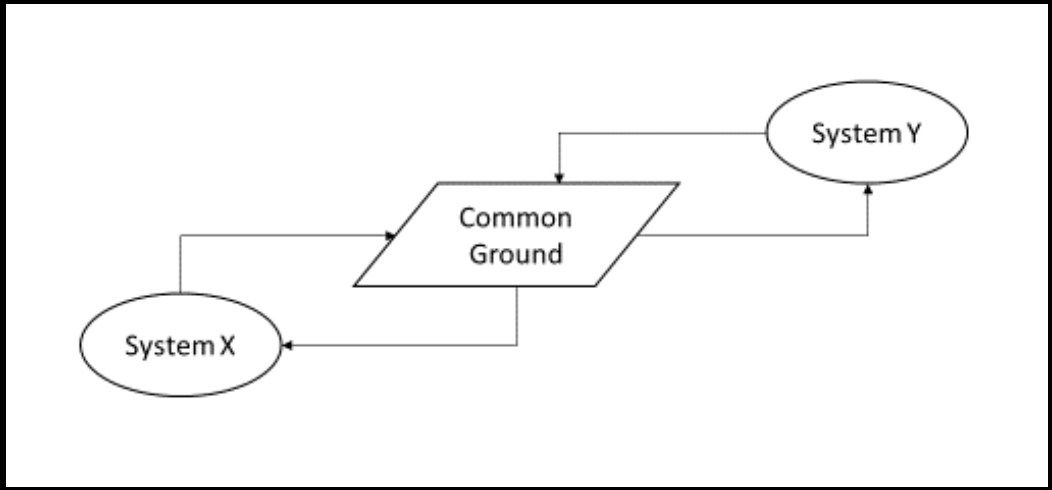
Interoperability through Reference Models (RMs)



WHAT is Interoperability?

Basic requirement:

- Interconnecting systems should be compatible, OR
- A common ground where multiple systems can communicate



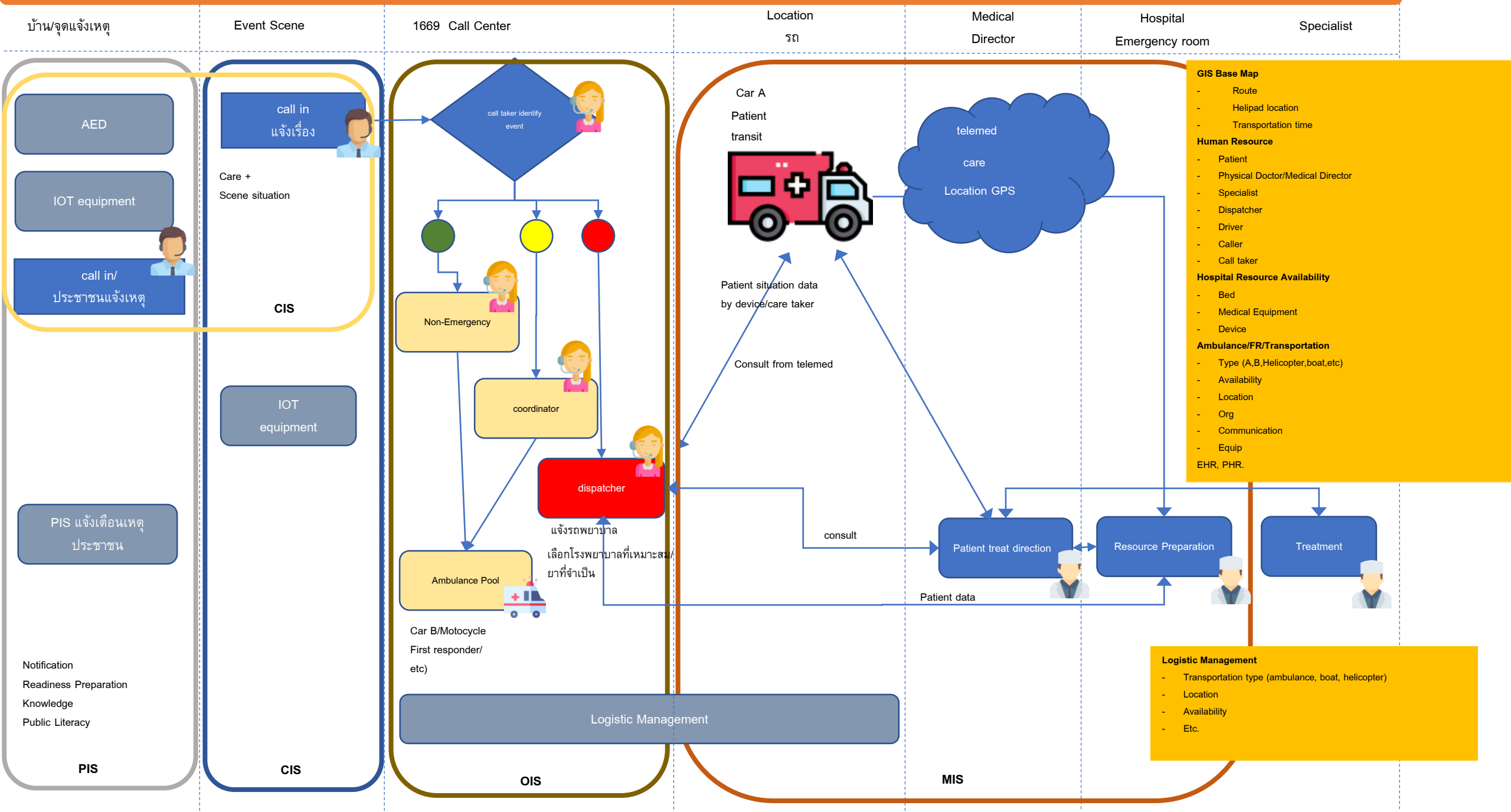
Three Levels of Interoperability

1. foundational
   - allows data exchange from one information technology system to be received by another
   - does not require the ability for the receiving information technology system to interpret the data.
   - System B can “receive” data from System A

2. structural
   - relies on the syntax of the data exchange.
   - ensures that data exchanges between information technology systems can be interpreted at the data field level.
   - system B can “read in” data from system A

3. Semantic
   - ability of two or more systems or elements to exchange information and to **use** the information that has been exchanged
   - relies on both the structuring of the data exchange and the codification of the data including vocabulary so that the receiving information technology systems can interpret the data.
   - system B can “understand” data from system A

Business Reference Model: ITEMS (IT for EMS)



Local Database

Remote Database

Central Sharing Database

Healthcare Data Center (HC)

1

2

Patient (P)

Mobile Device

4

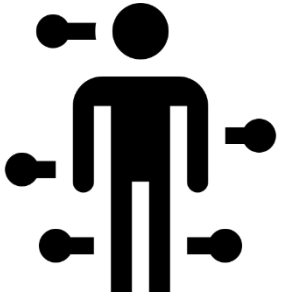
Cloud (C)

3

5

6

Home/Personal Monitoring



Body Sensor

Doctor (D)

Trend Analysis or Doctor Directions

GOOD and FAIR

Governance

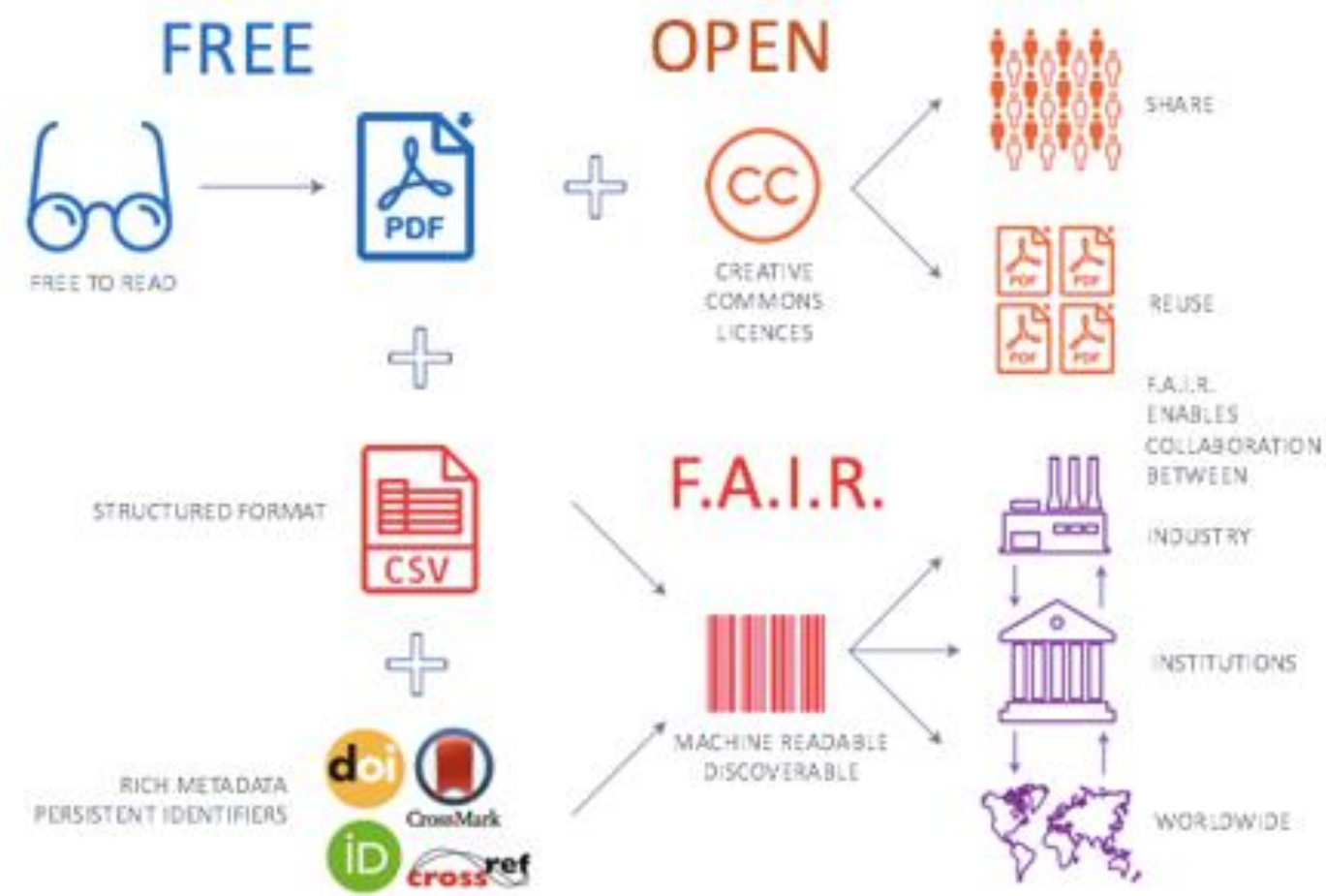
OPEN Data

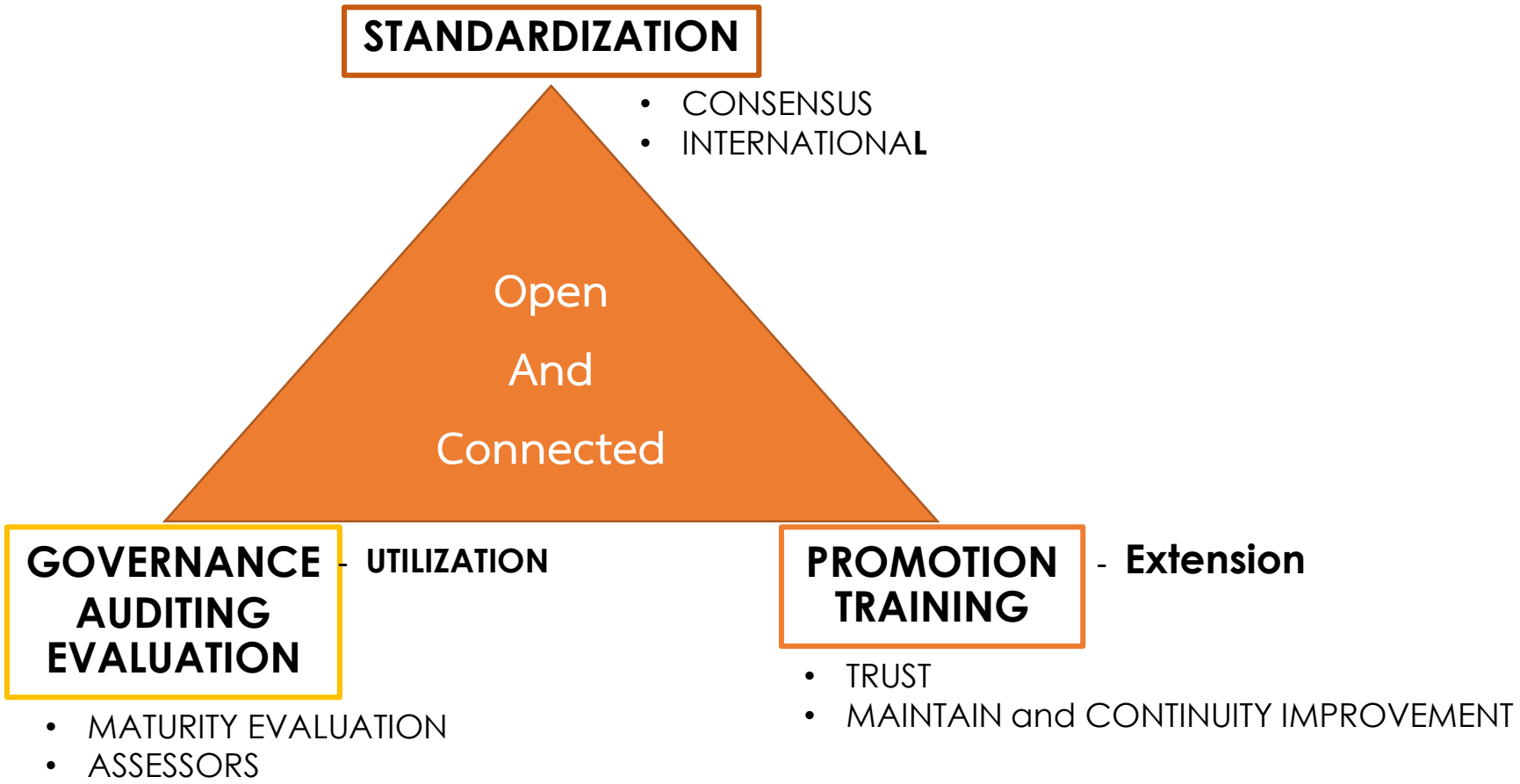
Findability

Accessibility

Interoperability

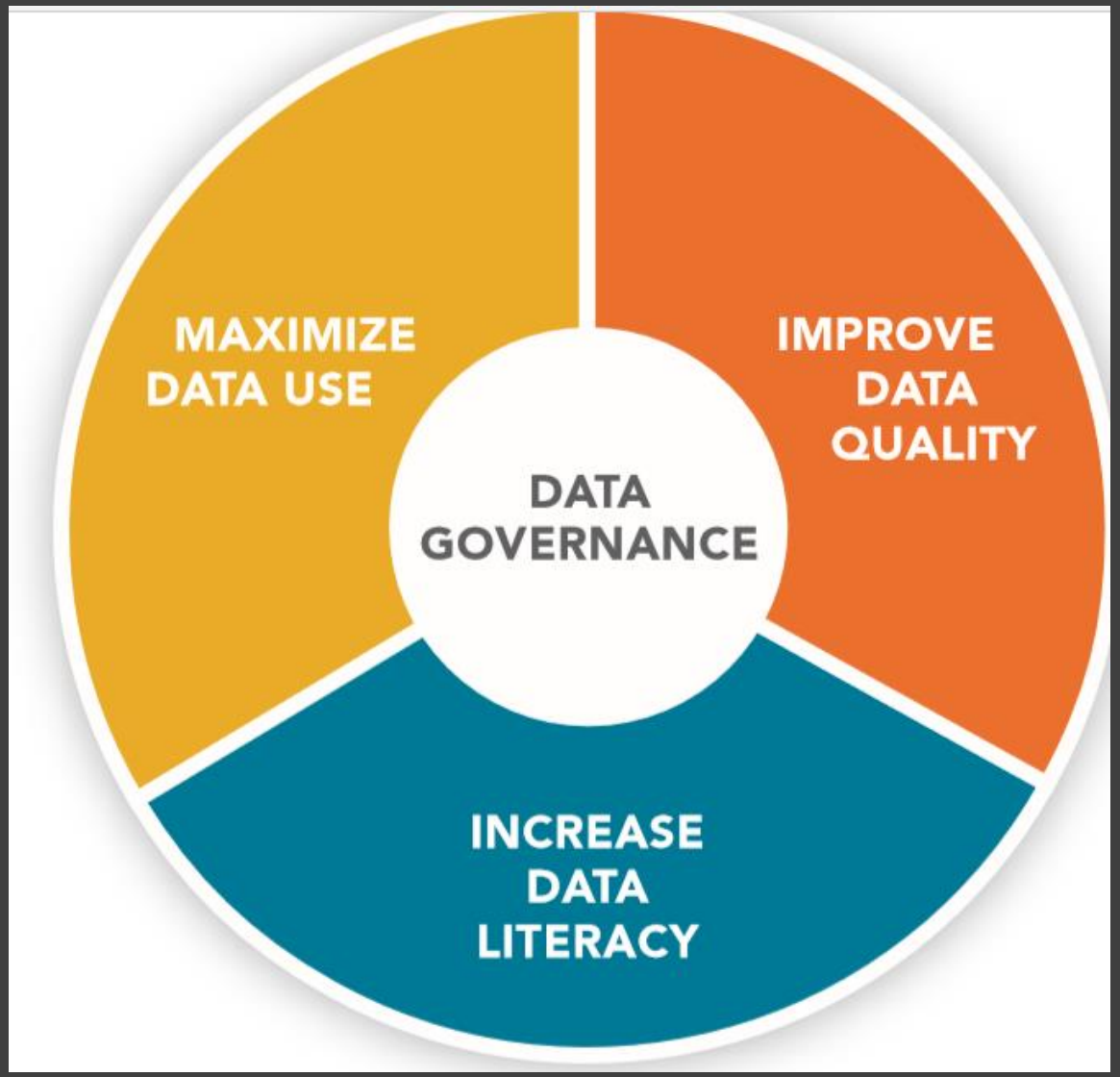
Reproducibility



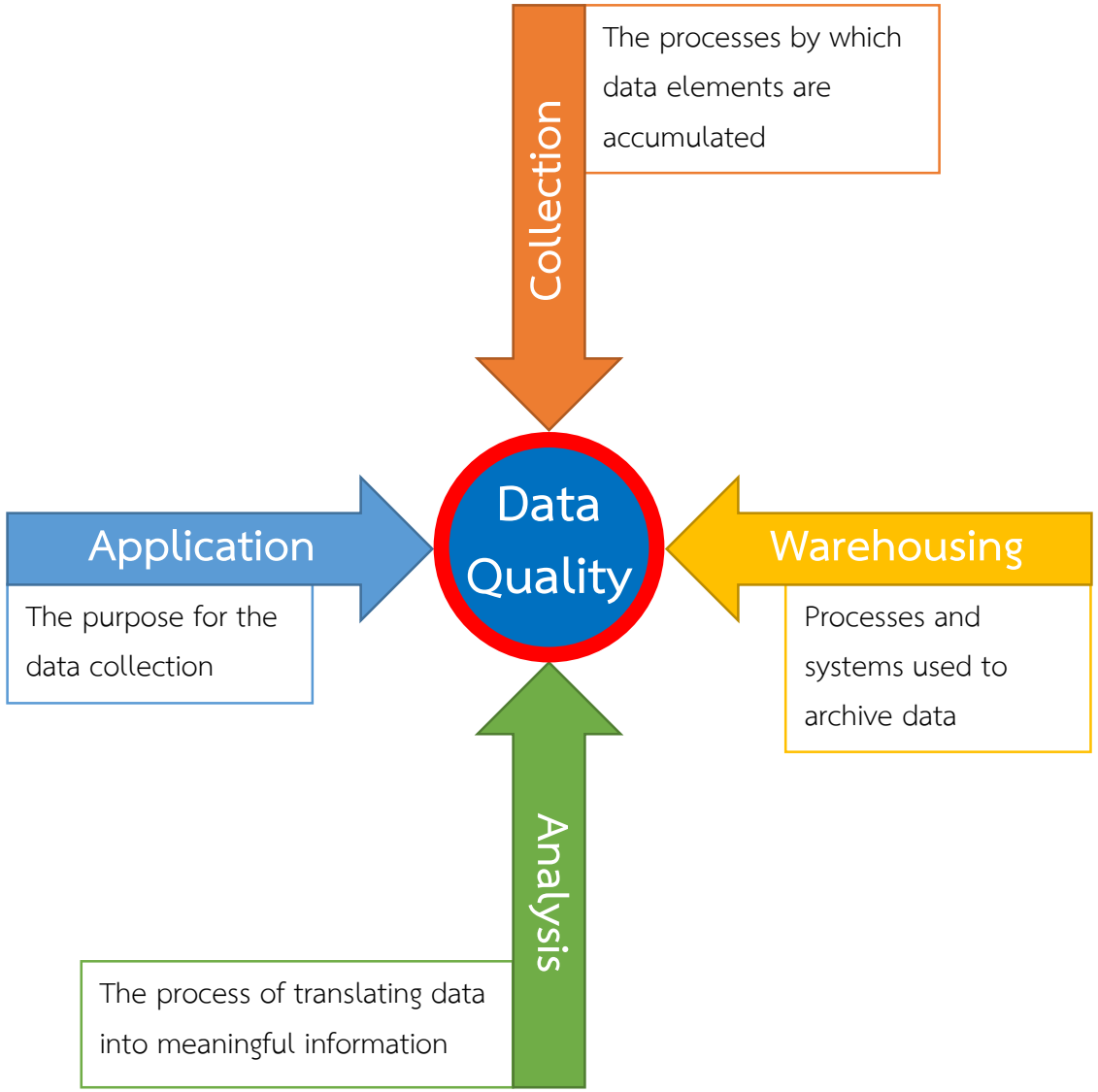

STANDARDIZATION
• CONSENSUS
• INTERNATIONAL
Open
And
Connected
GOVERNANCE
AUDITING
EVALUATION
- UTILIZATION
• MATURITY EVALUATION
• ASSESSORS
PROMOTION
TRAINING
- Extension
• TRUST
• MAINTAIN and CONTINUITY IMPROVEMENT

DATA GOVERNANCE

- Data Quality:
- Data literacy: the ability to derive meaningful information from data. The complexity of data analysis, especially in the context of big data, means that data literacy requires some knowledge of mathematics and statistics.
- Data literacy is the ability to read, understand, create and communicate data as information.



DATA QUALITY



Characteristics of Data Quality	
Accuracy	Accessibility
Comprehensiveness	Consistency
Currency	Definition
Granularity	Precision
Relevancy	Timeliness

How: Standards

Types of information

- patient-specific
  - information generated and used in the care of patients
- knowledge-based
  - the information that comprises the scientific basis of health care
- Core themes
  - standards
  - terminology
  - usability
  - value-chain

Standards

- HL7: **Health Level Seven.** It is an international healthcare standard for medical data exchange between computer systems in healthcare. http://www.hl7.org/

- LOINC: **Logical Observation Identifiers Names and Codes.** These identify the test results or clinical observations uniquely. http://www.loinc.org/

- ICD-10: **International Statistical Classification of Diseases and Related Health Problems.** ICD provides codes to classify diseases and a wide variety of signs, symptoms etc. Every health condition can be assigned to a unique category and given a code. http://www.who.int/classifications/icd/en/

- ICD-10-PCS: **ICD-10 Procedure Coding.** System. This is a system of medical classification used for procedural codes which is developed as a replacement of ICD-9-CM volume 3 (contains inpatient procedures)

- DICOM: **Digital Imaging and Communications in Medicine.** This is a standard for handling, storing, printing, and transmitting information on medical imaging. http://medical.nema.org/

EDXL – Emergency Data Exchange Language

CAP v1.2

Common Alert Protocol

CAP is a message format for exchanging all types of alerts and warnings over many different networks.

DE v2.0

EDXL-Distribution Element

EDXL-DE facilitates the packaging of content and provides a standard set of elements in a header to describe that content in order to facilitate message delivery.

HAVE v1.0

EDXL-Hospital Availability Exchange

EDXL-HAVE allows the communication of the status of a hospital, its services, and its resources.

Includes bed capacity and availability, emergency department status, available services and the status of a hospital's facility and operations.

RM v1.0

EDXL-Resource Messaging

Organizes Emergency Logistics Information in a Standard XML Vocabulary

SitRep v1.0

EDXL-Situation Reporting

Supports reporting on incidents in consistent format

Exchange clear, well-defined information for accurate, well-informed decisions

TEP v1.1

EDXL-Tracking of Emergency Patient/Clients

Supports exchange of emergency patient and tracking information during patient encounter from admission to release

สรุป

- Standards and Protocols not software or hardware. Consensus , Go International Standards for Achieving EMS Interoperability
- Try to implement standards on a fast track
- Promote Digitization: EHR diffusion in rural and underserved areas
- Encourage use of Personal Health Records (PHR)
- Unify public health information sharing architectures: Business Model, Data Reference Model and Information Exchange Model, Technology Reference Model เป็นเครื่องมือสื่อสาร อธิบายกี่ครั้งก็เหมือนเดิม จะปรับปรุง แก้ไข เพิ่มเติม พัฒนาต่อยอด ก็ง่าย
- Data Governance for Medical Information Quality

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