# 精準醫療創新應用實驗室
# Precision Medical Innovation Application Laboratory

## 發展健康大數據與精準健康醫療應用


Chien-Yeh Hsu (徐建業)

Department of
Information Management

國立臺北護理健康大學
National Taipei University of Nursing and Health Sciences

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: (02)2822-7101 轉 1226

# 精準醫療創新應用實驗室-簡介

- 主要研究領域
  - –健康醫療數據分析處理與模型建立+生物醫學訊號分析處理
  - –雲端電子病歷系統及資訊應用
  - –醫學健康資料加值應用雲端分析處理與服務
  - –健康醫療通信與物聯網

- 主要研究成果
  - –人工智慧精準營養飲食管理及資料數位化蒐集平台
  - –跨國際區塊鏈之個人健康檔案交換平台
  - –AI醫療影像分析系統
  - –COVID-19 全球傳染病監測與病例追蹤模型

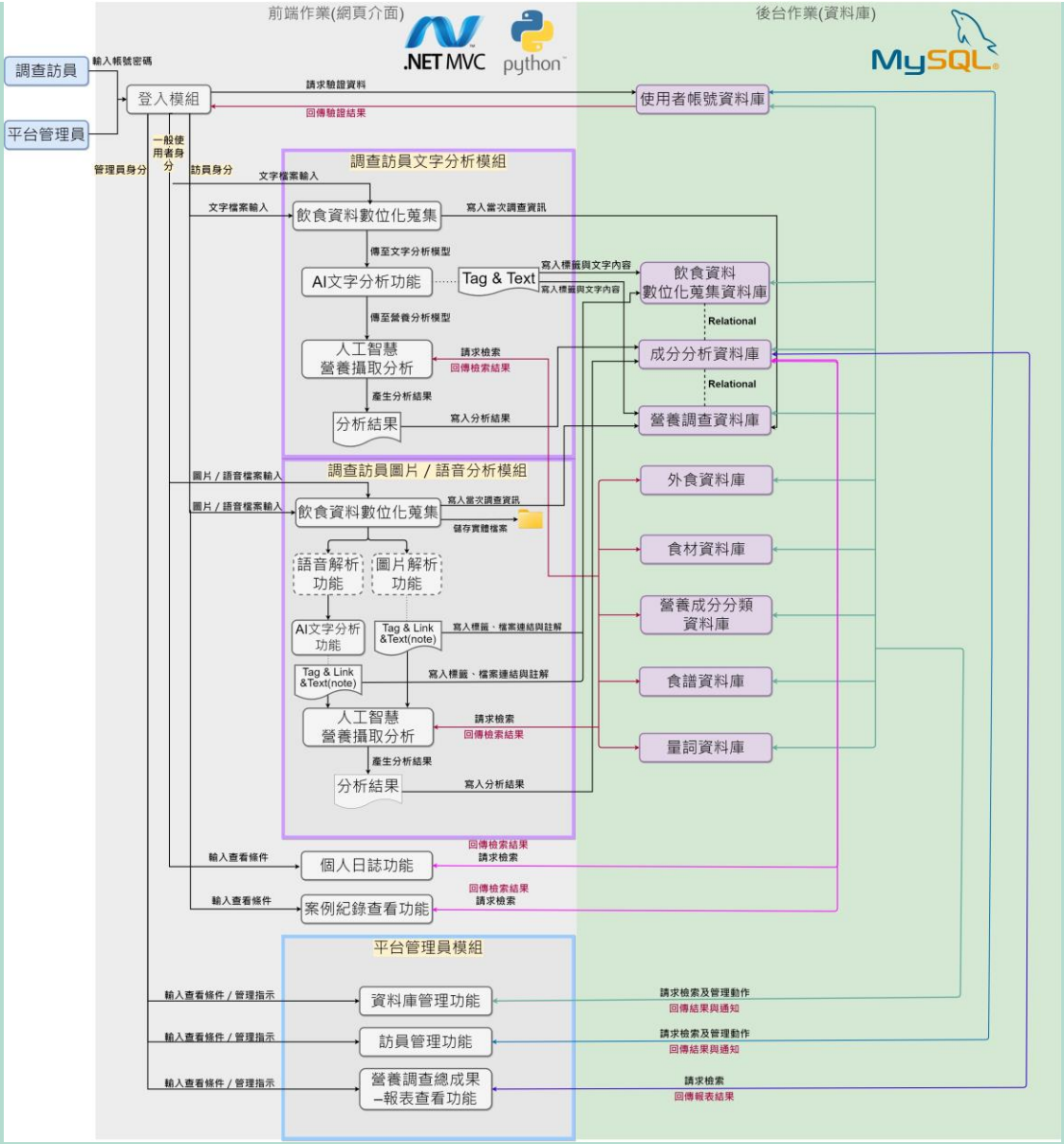
# 精準醫療創新應用實驗室-簡介

- 國際合作研究-研討會及合作
  - –Taiwan held 2017 Asia Health Information Technology Collaboration Workshop
  - –2018 Guidance for Investing in Digital Health and Digital Health Investment Framework Manual
  - –2018 Taiwan-AeHIN Health IT International Collaboration Workshop in BKK and MOU
  - –APAMI 2022 - 12TH Biennial Conference of the Asia Pacific Association for Medical Informatics
  - –2023 Global Conference on Digital Health Policy

# 精準醫療創新應用實驗室-簡介

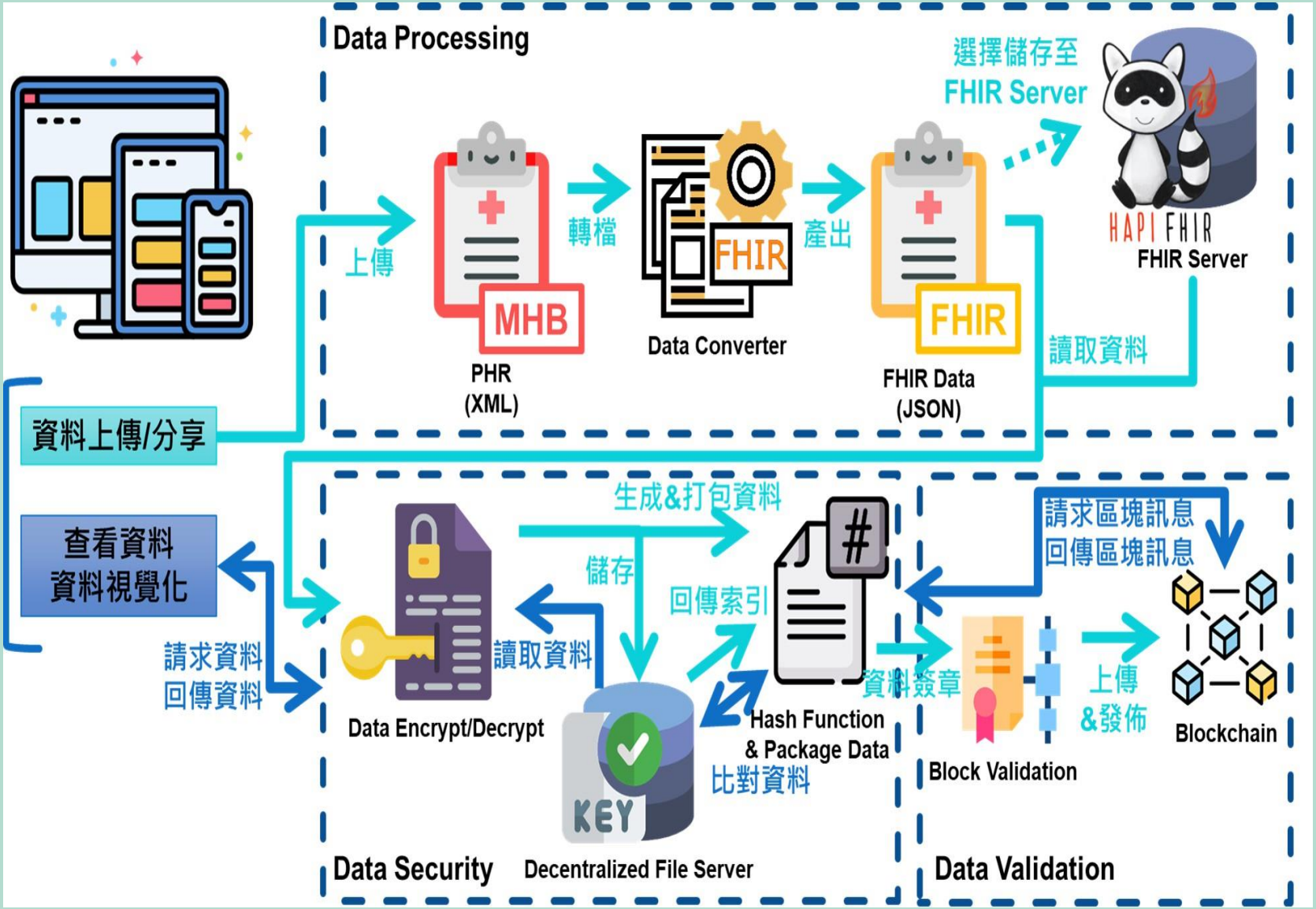
- 國際合作研究-學海築夢
  - –104/7/24~104/8/26
    India Bhopal
    L.N Medical College & J.K. Hospital
  - –105/7/11~105/8/29
    U.S.A State of Maryland
    美國國家衛生院附屬醫學中心 NIH Clinical Center
  - –106/7/24~106/8/26
    Indonesia
    PKU Muhammadiyah Hospital
  - –107/8/4~107/8/30
    Indonesia
    PKU Muhammadiyah Hospital
  - –110/8/1~110/8/31
    Manila, Philippines
    University of the Philippines Manila & Standards And Interoperability Lab (SILAB)
  - –111/7/30~111/8/30
    Manila, Philippines
    University of the Philippines Manila & Standards And Interoperability Lab (SILAB)

# 人工智慧精準營養飲食管理及資料數位化蒐集平台

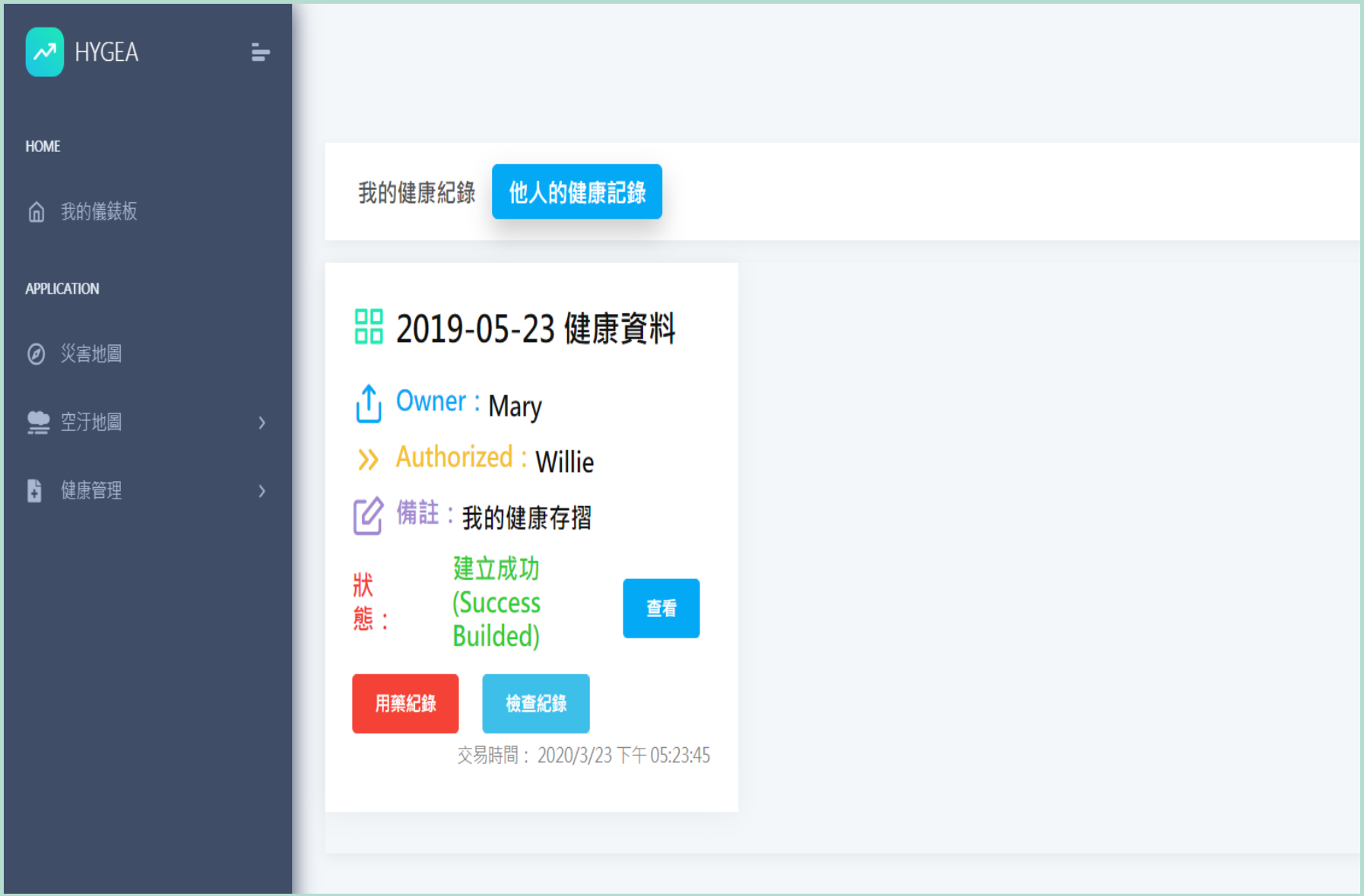


# 人工智慧精準營養飲食管理及資料數位化蒐集平台

# 跨國際區塊鏈之個人健康檔案交換平台



# 跨國際區塊鏈之個人健康檔案交換平台



# 跨國際區塊鏈之個人健康檔案交換平台

JOURNAL OF MEDICAL INTERNET RESEARCH Lee et al

Original Paper

## An Architecture and Management Platform for Blockchain-Based Personal Health Record Exchange: Development and Usability Study

Hsiu-An Lee[1,2,3,4,5], MS; Hsin-Hua Kung[2,3,4,5], BS; Jai Ganesh Udayasankaran[3,4,6], MSc, MBA; Boonchai Kijsanayotin[3,4,7], MSc, MD, PhD; Alvin B Marcelo[3,4,8], MD; Louis R Chao[1], PhD; Chien-Yeh Hsu[2,3,4,5,9], PhD

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[2]Taiwan e-Health Association, Taipei, Taiwan
[3]Asia eHealth Information Network, Hong Kong, Hong Kong
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[5]Department of Information Management, National Taipei University of Nursing and Health Sciences, Taipei, Taiwan
[6]Sri Sathya Sai Central Trust, Prasanthi Nilayam, Puttaparthi, India
[7]Thai Health Information Standards Development Center, Health System Research Institute, Ministry of Public Health, Bangkok, Thailand
[8]University of the Philippines, Manila, Philippines
[9]Taipei Medical University Master Program in Global Health and Development, Taipei, Taiwan

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# 跨國際區塊鏈之個人健康檔案交換平台

sustainability

MDPI

*Article*

## Implement an International Interoperable PHR by FHIR—A Taiwan Innovative Application

Yen-Liang Lee [1,2], Hsiu-An Lee [3,4,5,*], Chien-Yeh Hsu [4,5,6,*], Hsin-Hua Kung [4,5] and Hung-Wen Chiu [1,*]

1 Graduate Institute of Biomedical Informatics, Taipei Medical University, Taipei 110, Taiwan; d610101008@tmu.edu.tw
2 Internet of Things Laboratory, Chunghwa Telecom Laboratories, TaoYuan 326402, Taiwan
3 Department of Computer Science and Information Engineering, Tamkang University, New Taipei 251301, Taiwan
4 Standards and Interoperability Lab, Smart Healthcare Center of Excellence, Taipei 112303, Taiwan; hsinhuakung@gmail.com
5 Department of Information Management, National Taipei University of Nursing and Health Sciences, Taipei 112303, Taiwan
6 Master Program in Global Health and Development, Taipei Medical University, Taipei 110, Taiwan
* Correspondence: billy72325@gmail.com (H.-A.L.); cyhsu@ntunhs.edu.tw (C.-Y.H.); hwchiu@tmu.edu.tw (H.-W.C.)

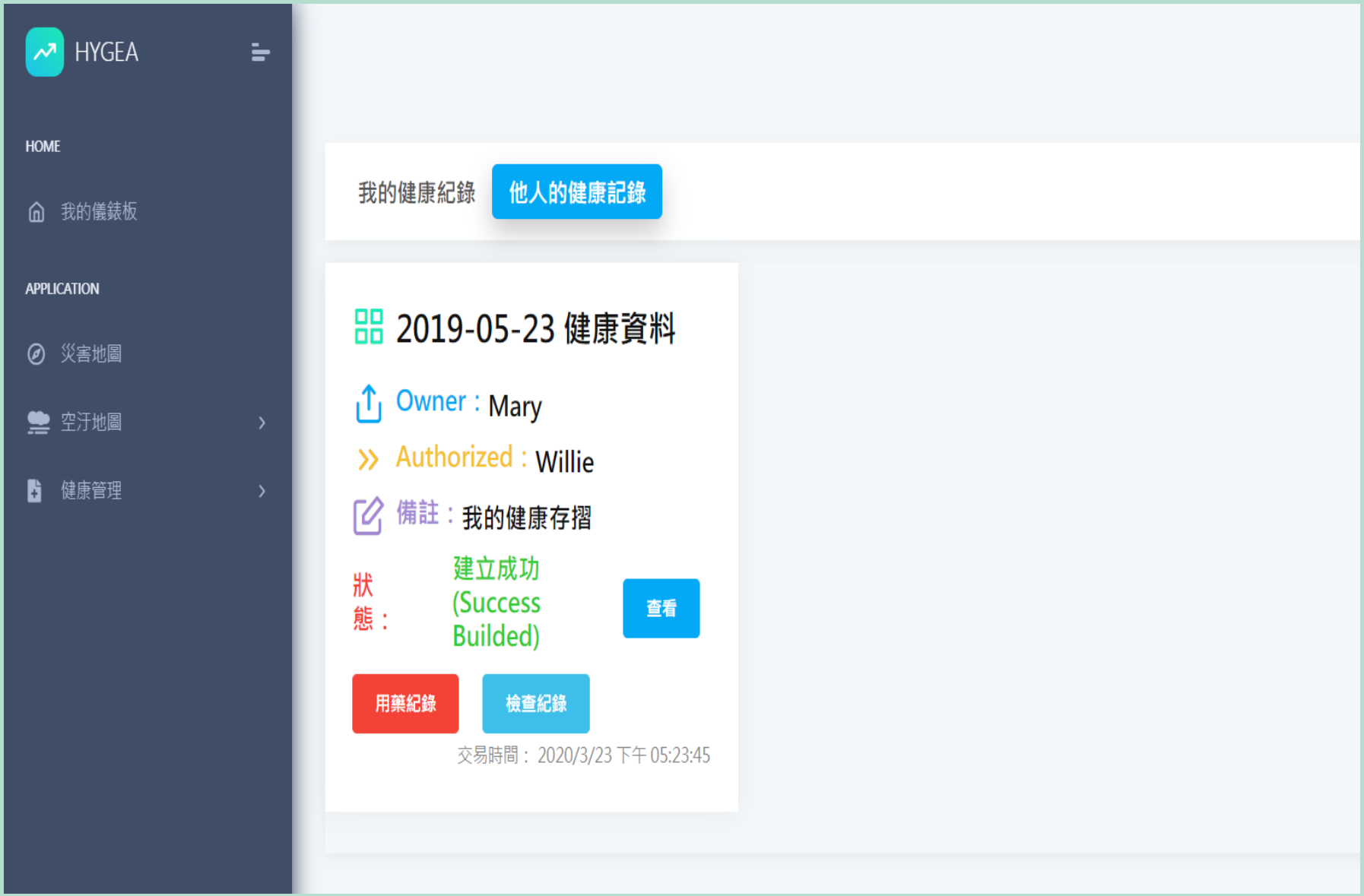
**Abstract:** Personal health records (PHRs) have lots of benefits for things such as health surveillance, epidemiological surveillance, self-control, links to various services, public health and health management, and international surveillance. The implementation of an international standard for interoperability is essential to accessing personal health records. In Taiwan, the nationwide exchange platform for electronic medical records (EMRs) has been in use for many years. The Health Level

# 跨國際區塊鏈之個人健康檔案交換平台

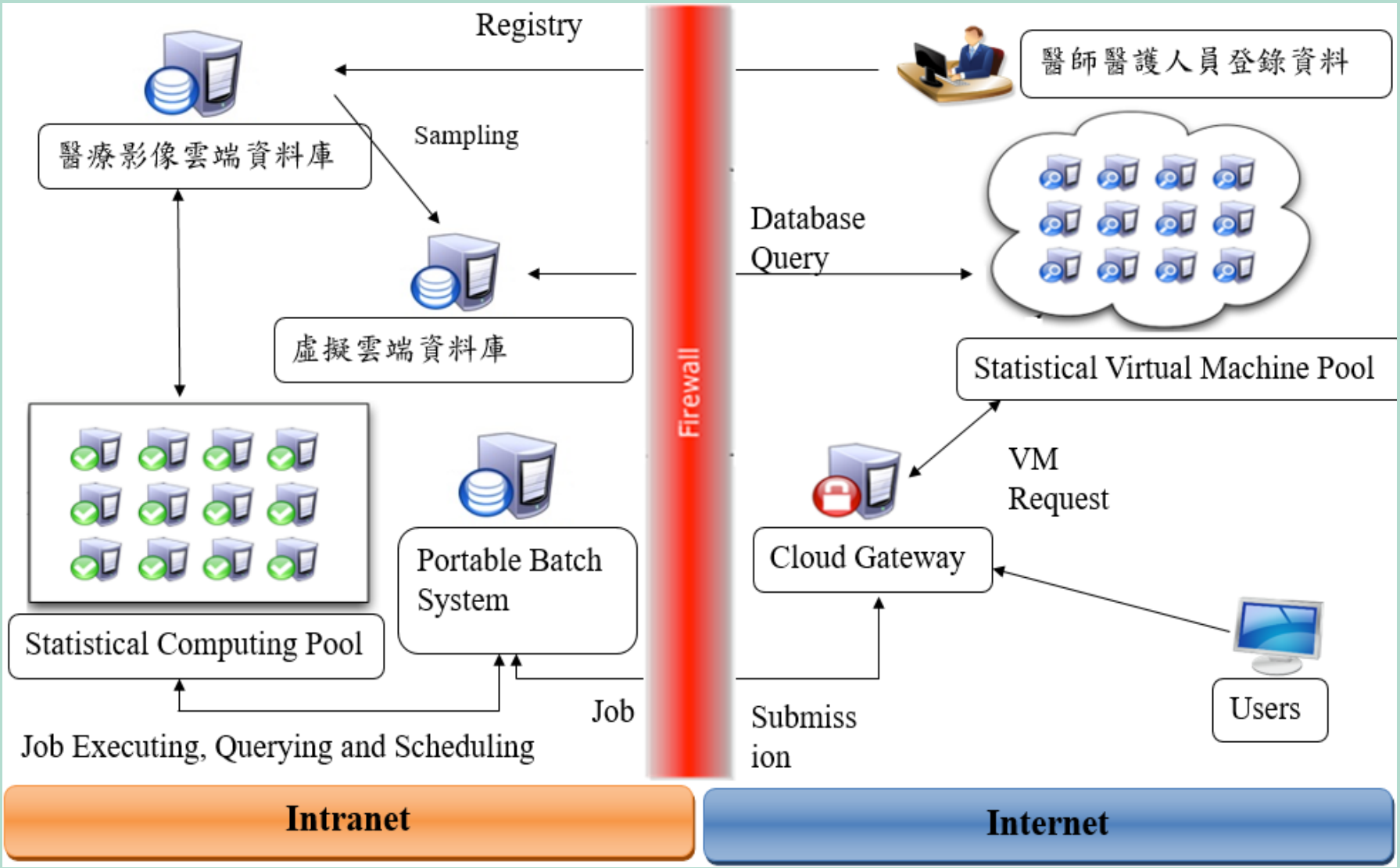
## 榮獲未來科技突破獎
## 2018 FUTURETECH Breakthrough Award

- 以「連結居家、社區、診所以及醫院之區塊鏈導向智慧健康構築方案」為題參展 Blockchain-oriented Smart Health Construction Solution that Connects Home, Community, Clinics and Hospitals
- 2018/12/15 FUTURETECH Breakthrough Award from Ministry of Science and Technology
- 完成以區塊鏈架構達到跨區域之病歷交換Blockchain based cross regional medical record exchange
- EMR data is demonstrated by Taiwan’ s Health bank data book

# 跨國際區塊鏈之個人健康檔案交換平台



# AI醫療影像分析系統


Registry
醫師醫護人員登錄資料
醫療影像雲端資料庫
Sampling
Database
Query
虛擬雲端資料庫
Firewall
Statistical Virtual Machine Pool
VM
Request
Portable Batch
System
Cloud Gateway
Statistical Computing Pool
Users
Job
Submiss
ion
Job Executing, Querying and Scheduling
Intranet
Internet

# AI醫療影像分析系統

System Home About Platform Account

training model

肺纖維化檢測...

請上傳bmp, png, jpg 或 jpeg格式檔案

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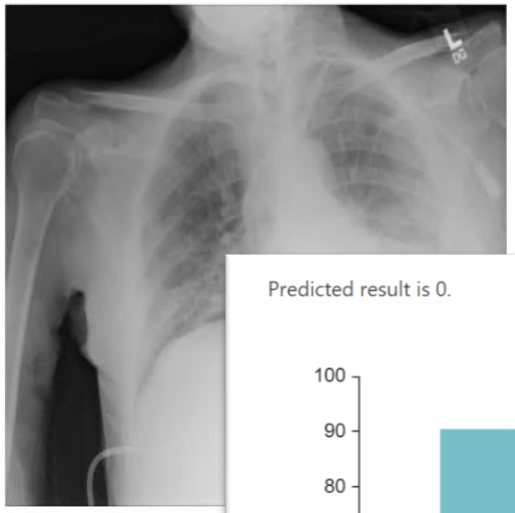

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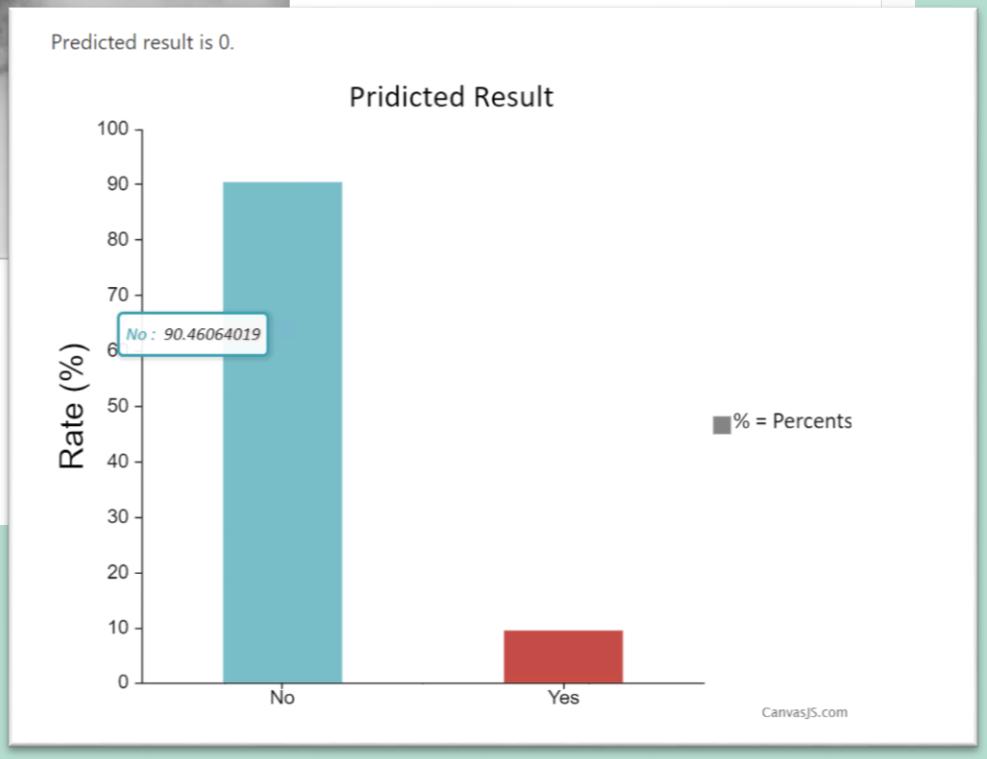
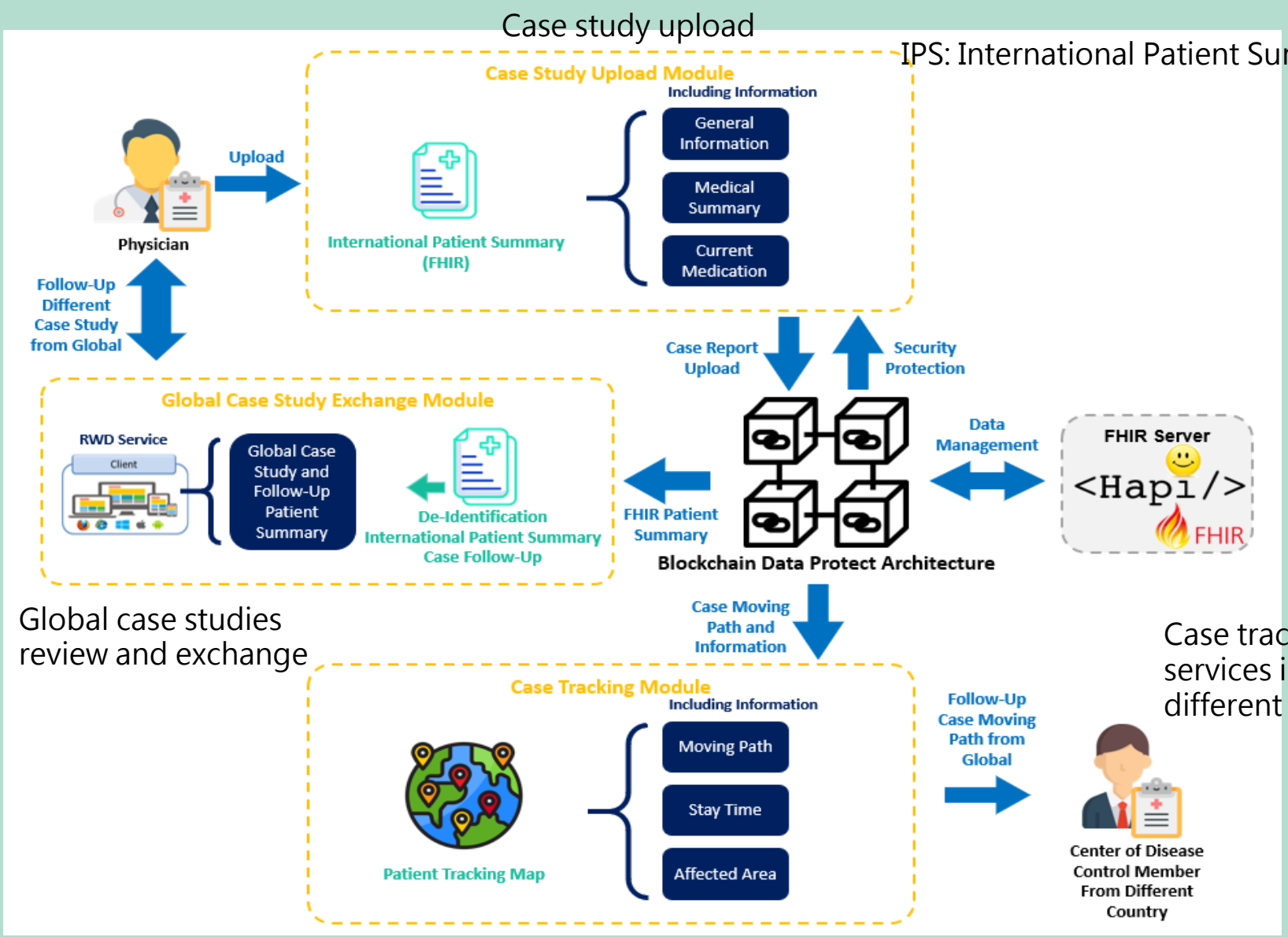
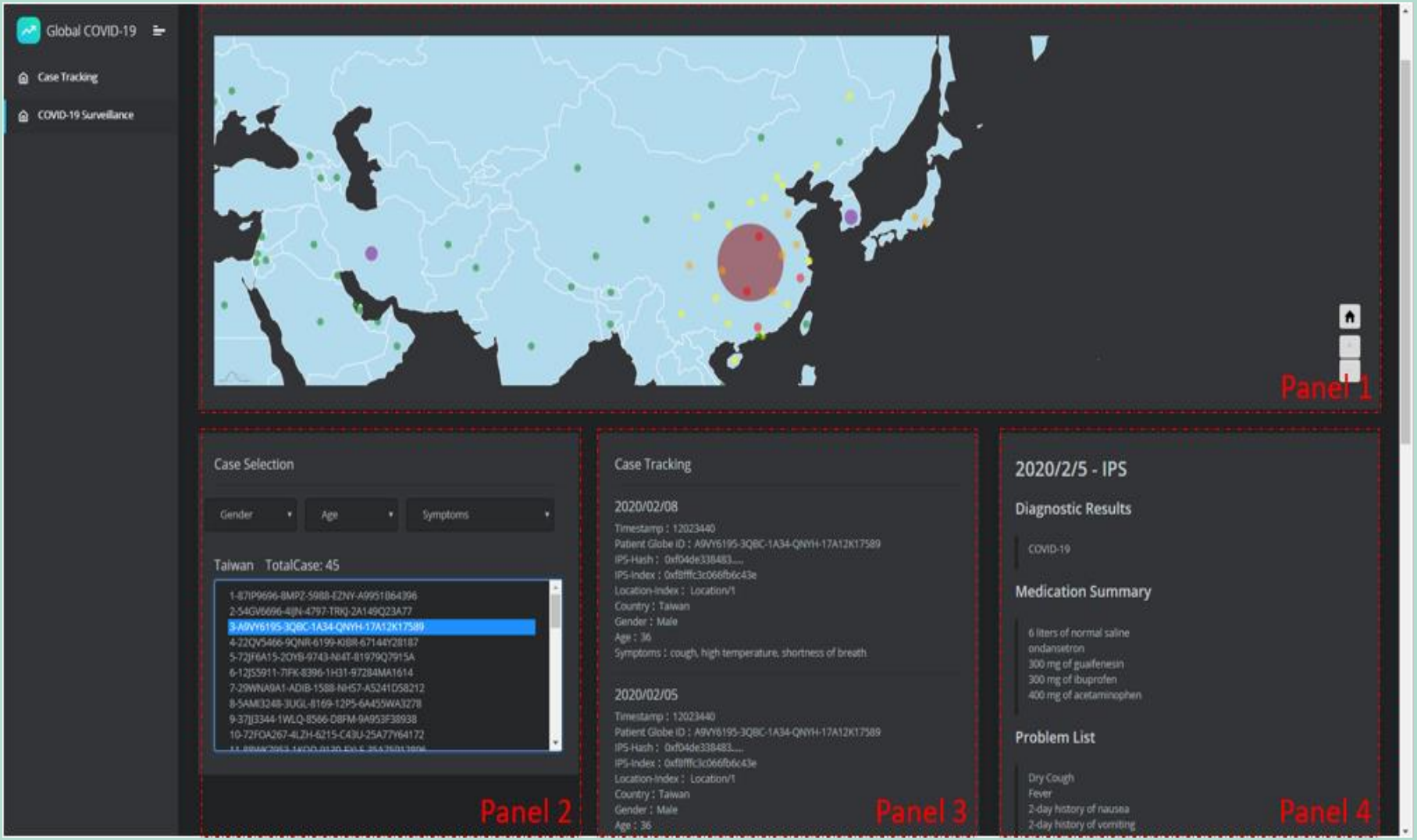


# COVID-19 全球傳染病監測與病例追蹤模型



# COVID-19 全球傳染病監測與病例追蹤模型



# COVID-19 全球傳染病監測與病例追蹤模型



Original Paper

## Global Infectious Disease Surveillance and Case Tracking System for COVID-19: Development Study

Hsiu-An Lee[1,2,3,4,5], MS; Hsin-Hua Kung[2,3,4,5], MS; Yuarn-Jang Lee[6], PhD; Jane C-J Chao[7,8], PhD; Jai Ganesh Udayasankaran[3,4,9], MSc, MBA; Hueng-Chuen Fan[10,11,12], PhD; Kwok-Keung Ng[3,13], BS; Yu-Kang Chang[10,11], PhD; Boonchai Kijsanayotin[3,4,14], MSc, MD, PhD; Alvin B Marcelo[3,4,15], MD; Chien-Yeh Hsu[2,3,4,5,8], PhD

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[3]Asia eHealth Information Network, Hong Kong, Hong Kong
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[9]Sri Sathya Sai Central Trust, Prasanthi Nilayam, Puttaparthi, India
[10]Department of Rehabilitation, Jen-Teh Junior College of Medicine, Nursing and Management, Miaoli, Taiwan
[11]Department of Medical Research, Tung's Taichung Metroharbor Hospital, Taichung, Taiwan
[12]Department of Pediatrics, Tung's Taichung Metroharbor Hospital, Taichung, Taiwan
[13]eHealth Research Institute, Hong Kong, Hong Kong
[14]Thai Health Information Standards Development Center, Health System Research Institute, Ministry of Public Health, Bangkok, Thailand
[15]University of the Philippines, Manila, Philippines

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# Collaboration of Medical Information Sharing and Knowledge Exchange

- Taiwan: Standard and Interoperability Lab - Smart Healthcare center of Excellent Taiwan

SIL-Asia

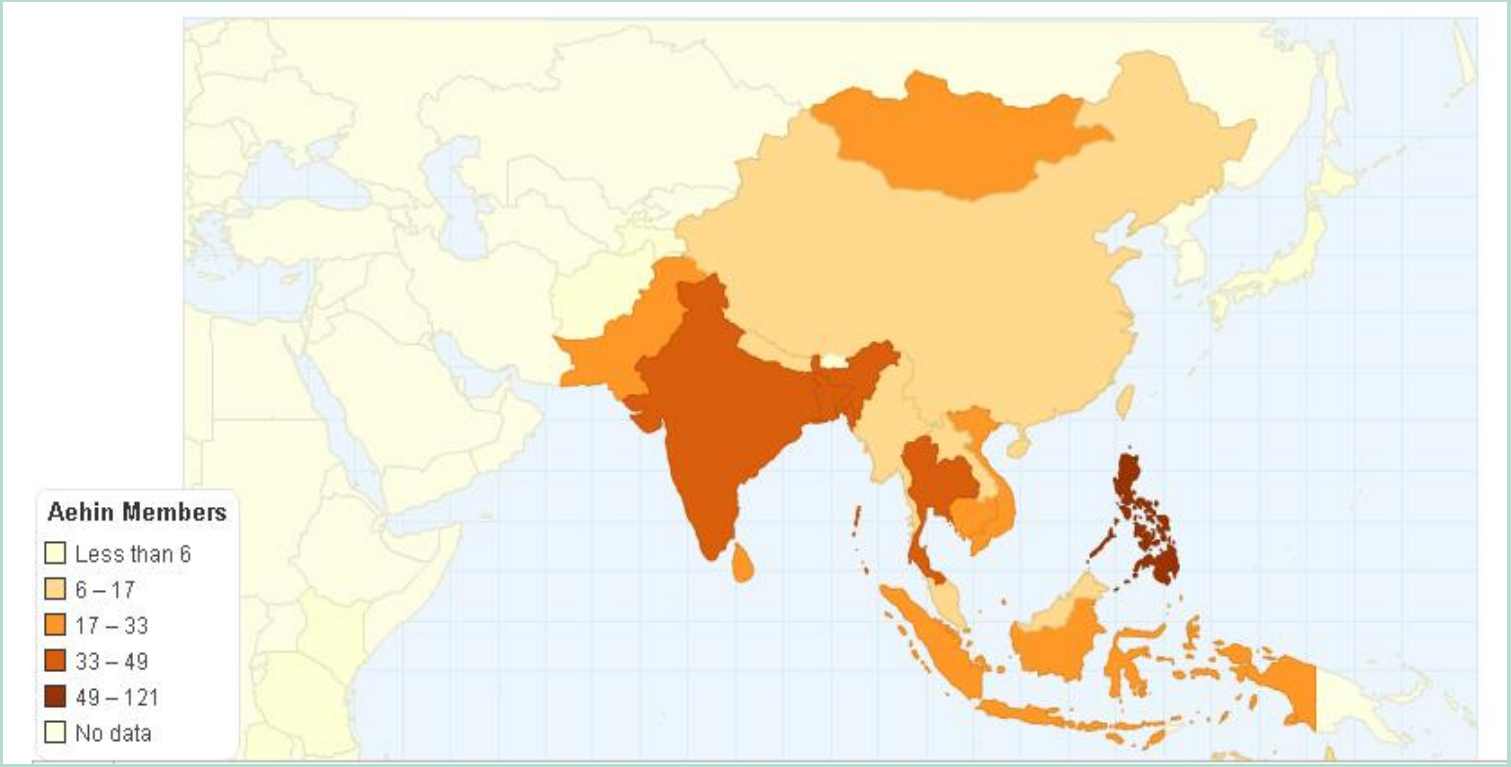
- Asia eHealth Information Network (AeHIN): Standards and Interoperability Lab - Asia Community of Interoperable Labs (COIL)

- University of the Philippines Manila
- Asian Development Bank
- National Taipei University of Nursing and Health Sciences
- Taiwan Electronic Health Association - TEHA

# 亞洲電子健康資訊網絡
# The Asia eHealth Information Network , AeHIN

- 透過區域合作、同儕協助(peer-to-peer assistance)及彼此間的知識共享和學習，將資通訊技術（ICT）應用於健康照護上

- 目前會員國台灣、菲律賓、印度、孟加拉、泰國、斯里蘭卡、印尼、哥倫比亞、蒙古、柬埔寨、巴基斯坦及越南



# 2017 Asia Health Information Technology Collaboration Workshop

## Mind the GAPS and Fill the GAPS

| | Government | Architecture | Programme Management | Standards & Operability |
|---|---|---|---|---|
| One Year Plan | • Information system construction planning<br>• Expand international cooperation<br>• Policy formulation and implementation | • Medical information architecture<br>• Data processing and collection | • Data management center<br>• Health insurance planning and implementation | • Purchase of international standards for information systems (SNOMED, DICOM)<br>• Electronic medical record exchange |
| Three Year Plans | • Complete the health insurance plan<br>• Promote health management | • Information integration is complete<br>• Data center establishment<br>• Define of integration data | • Data processing center<br>• Health insurance implementation | • Definition of International Data Exchange Standards<br>• Integration of regional information and analysis |
| Need of Taiwan? | • Health insurance promotes policy and process<br>• Medical information integration model<br>• My Health Bank book health management model | • Data center integration model<br>• Experience on health insurance data model | • Health insurance promotes policy and implementation<br>• Personal health data collation model | • Electronic medical record field and structure planning<br>• Healthcare Information Architecture |
| Need from outside? | • Regional integration<br>• The policy of Medical mutual collaboration | • Medical Information Exchange Architecture<br>• Data exchange center | • Integration and analysis of health information<br>• Tourism and regional mutual management | • Electronic medical records standard<br>• Health management platform |

# Taiwan held 2017 Asia Health Information Technology Collaboration Workshop

## 2017亞洲健康資訊科技合作工作坊

# Taiwan held 2017 Asia Health Information Technology Collaboration Workshop

## 國際院際合作意向書

**MEMORANDUM OF UNDERSTANDING OF COOPERATION**
**between**
**College of Health Technology, National Taipei University of Nursing and Health Sciences (NTUNHS), Taiwan**
**and**
**Faculty of Medicine, Universitas Gadjah Mada (UGM), Indonesia**

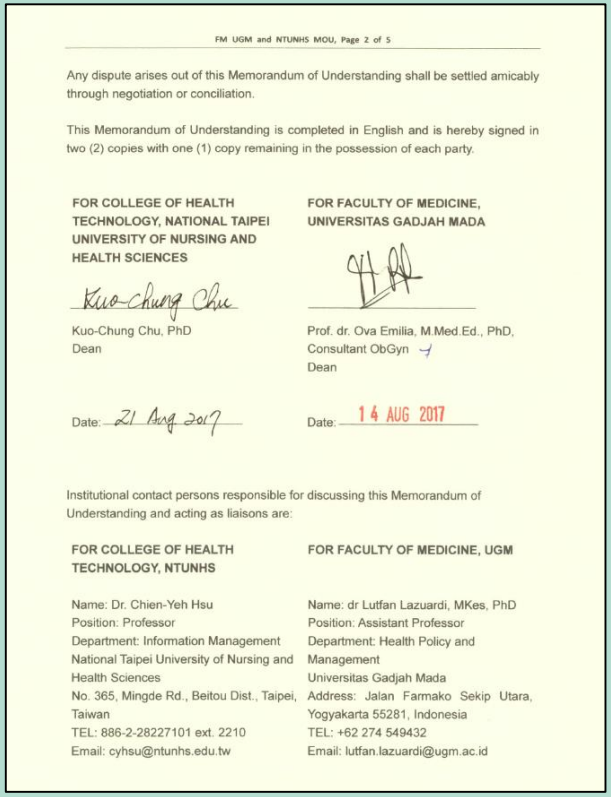
In order to promote cooperation in health science and technology education, educational exchanges and scientific research between **NTUNHS** and **UGM,** the following types of collaboration will be pursued:

- Exchange of students;
- Exchange of visiting research scholars;
- Joint research projects in the field of health sciences and technologies;
- Participation in international conferences, seminars, symposia, workshops and other activities agreed by both parties; and
- Exchange of academic materials and other information.

This Memorandum of Understanding expresses the intentions of the parties and places no financial obligations or supplementary funding commitments on either party. The terms of cooperation for each specific activity contemplated under this Memorandum of Understanding and Cooperation shall be mutually discussed and agreed upon by both parties prior to the initiation of that activity. Each institution shall designate a liaison office to develop and coordinate the specific activities agreed upon.

This Memorandum of Understanding will become effective upon the date of signature by both parties and shall remain valid for a period of five (5) years from the date of the last signature. The understanding may be modified by the written mutual consent of both parties. Either party may terminate it by giving the other party twelve months' written notice, unless an earlier termination is mutually agreed upon.

Each party shall make any public announcement or statement or publish or release any information in relation to any proposed activity or proposed collaboration without the prior written approval of both parties. Each party shall keep confidential any information that it received from the other party which is marked confidential or which a party notifies the other party is confidential.





Any dispute arises out of this Memorandum of Understanding shall be settled amicably through negotiation or conciliation.

This Memorandum of Understanding is completed in English and is hereby signed in two (2) copies with one (1) copy remaining in the possession of each party.

**FOR COLLEGE OF HEALTH TECHNOLOGY, NATIONAL TAIPEI UNIVERSITY OF NURSING AND HEALTH SCIENCES**

Kuo-Chung Chu

Kuo-Chung Chu, PhD
Dean

Date: 21 Aug 2017

**FOR FACULTY OF MEDICINE, UNIVERSITAS GADJAH MADA**

Prof. dr. Ova Emilia, M.Med.Ed., PhD,
Consultant ObGyn
Dean

Date: 14 AUG 2017

Institutional contact persons responsible for discussing this Memorandum of Understanding and acting as liaisons are:

**FOR COLLEGE OF HEALTH TECHNOLOGY, NTUNHS**

Name: Dr. Chien-Yeh Hsu
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**FOR FACULTY OF MEDICINE, UGM**

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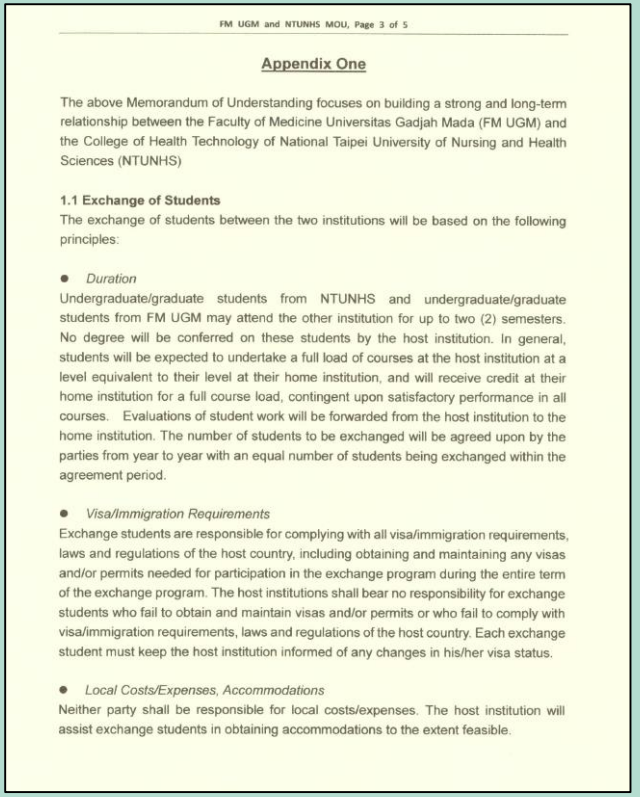




**Appendix One**

The above Memorandum of Understanding focuses on building a strong and long-term relationship between the Faculty of Medicine Universitas Gadjah Mada (FM UGM) and the College of Health Technology of National Taipei University of Nursing and Health Sciences (NTUNHS)

**1.1 Exchange of Students**
The exchange of students between the two institutions will be based on the following principles:

- *Duration*

Undergraduate/graduate students from NTUNHS and undergraduate/graduate students from FM UGM may attend the other institution for up to two (2) semesters. No degree will be conferred on these students by the host institution. In general, students will be expected to undertake a full load of courses at the host institution at a level equivalent to their level at their home institution, and will receive credit at their home institution for a full course load, contingent upon satisfactory performance in all courses. Evaluations of student work will be forwarded from the host institution to the home institution. The number of students to be exchanged will be agreed upon by the parties from year to year with an equal number of students being exchanged within the agreement period.

- *Visa/Immigration Requirements*

Exchange students are responsible for complying with all visa/immigration requirements, laws and regulations of the host country, including obtaining and maintaining any visas and/or permits needed for participation in the exchange program during the entire term of the exchange program. The host institutions shall bear no responsibility for exchange students who fail to obtain and maintain visas and/or permits or who fail to comply with visa/immigration requirements, laws and regulations of the host country. Each exchange student must keep the host institution informed of any changes in his/her visa status.

- *Local Costs/Expenses, Accommodations*

Neither party shall be responsible for local costs/expenses. The host institution will assist exchange students in obtaining accommodations to the extent feasible.

# 2018 Guidance for Investing in Digital Health and Digital Health Investment Framework Manual

## 2018 本團隊與 AeHIN and ADB(亞洲開發銀行) 合作之數位健康科技投資指南

# 2018 Taiwan-AeHIN Health IT International Collaboration Workshop in BKK and MOU

**Memorandum of Understanding**
**Partnership of Taiwan E-health Association with Asia eHealth Information Network (AeHIN)**
**February 2018**

Chair of Taiwan e-Health Association and Chair of AeHIN (Asia eHealth Information Network) acknowledge the opportunity for collaboration and establishing partnership to bring about mutual benefits for both parties on capacity building of eHealth in Asia Pacific region. This partnership will contribute to the peer to peer learning and knowledge transfer between Taiwan e-Health Association and AeHIN country members.

**Proposed activities / program**

Within 3 years after the signed date of this MOU, activities to be achieved, but not limited to, are:

1. Study visit of AeHIN member countries to Taiwan to understand about the lesson learned, challenges and success factors of the My Health Bank and national health insurance implementation in Taiwan.
2. Identifying the AeHIN country members situation on UHC implementation and the capacity to implement personal health record (PHR) based on the administrative data.
3. Signed agreement between both parties regarding three years plan program and activities for knowledge transfer, exchange and pilot activities.

**Signatories**

Hsu, Chien-Yeh
Chair, Taiwan eHealth Association
Date: 30 Jan 2018

Boonchai Kijsanayotin
Chair, Asia eHealth Information Network
Date: 30 Jan 2018.

Witnessed by AeHIN members :

Alvin Marcelo (Philippines)
Anis Fuad (Indonesia)
Aye Aye Sein (Myanmar)
Crispinita Valdez (Philippines)
Fazilah Shaik Allaudin (Malaysia)
Thet Thet Mu (Myanmar)
Wanchana Ponthongmak (Thailand)
Panu Looareesuwan (Thailand)
Lee, Hsiu-An (Taiwan)

# 國際合作 –APAMI 2022 in Taiwan

APAMI 2022 - 12TH Biennial Conference of the Asia Pacific Association for Medical Informatics

2022-10-14~2022-10-16

medical intelligence with interoperability and standards

Organized by Taiwan Association of Medical Informatics

https://apami2022.tw

# 國際合作 –數位健康政策國際系列會議

Global Conference on Digital Health Policy
2023-11-28~2023-11-29

系列一：亞太醫學資訊創新年度高峰會-多元性、公平與包容性

系列二：2023台灣- AeHIN亞洲醫療資訊技術合作研討會-世界衛生組織數位健康策略國際標準與全球互通性

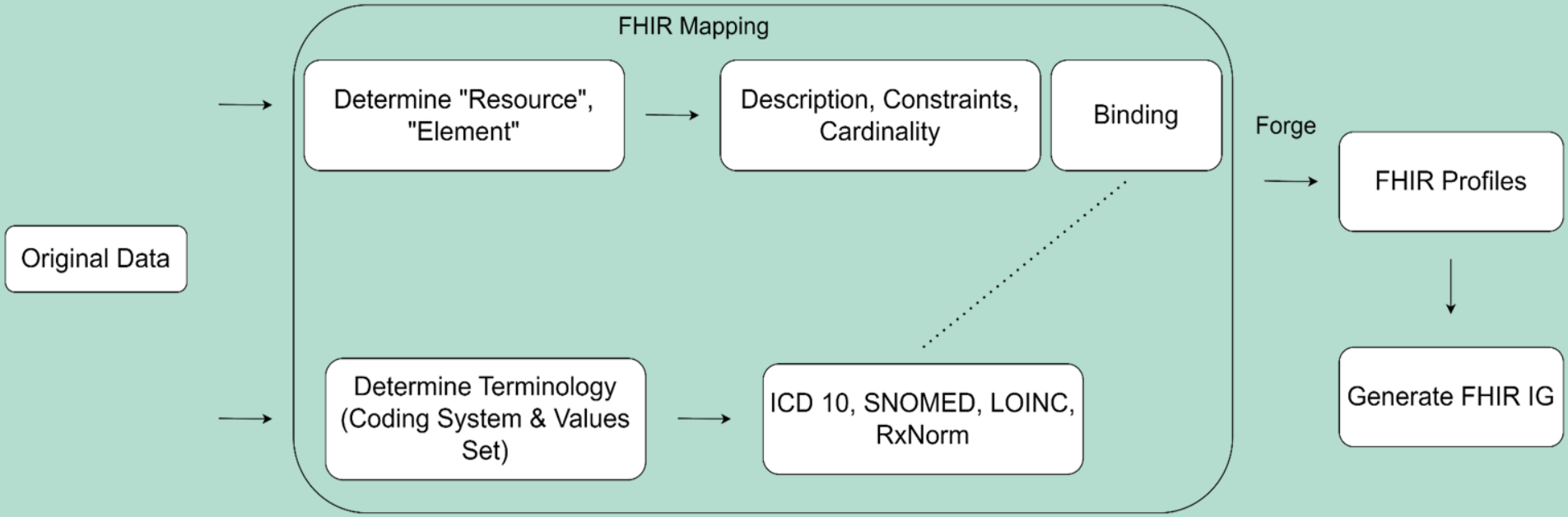
系列三：數位健康生態系、服務提供與數位轉型

https://silcoet.ntunhs.edu.tw/International_Conference

# 國際合作 –學海築夢(111學年度 菲律賓)

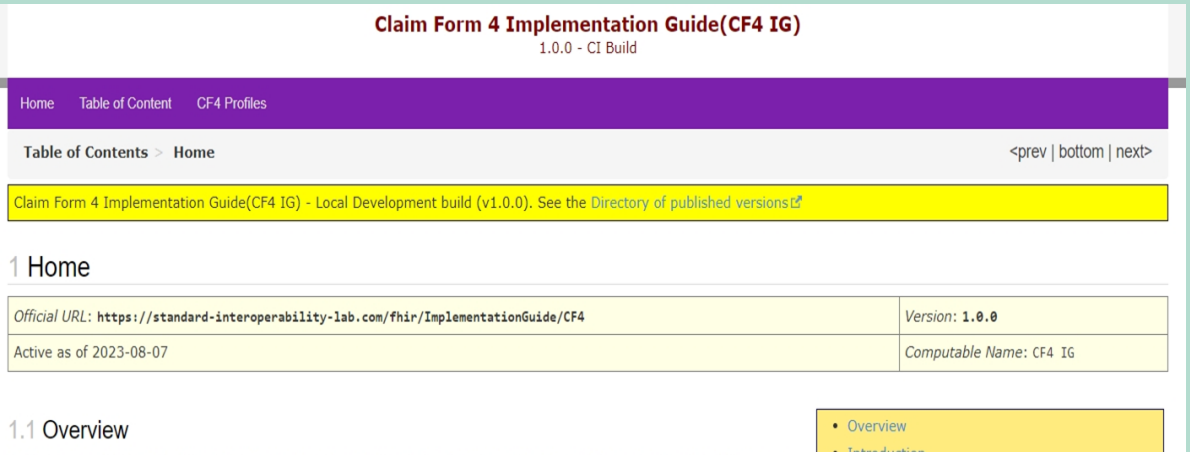
# 國際合作 –學海築夢(111學年度 菲律賓)

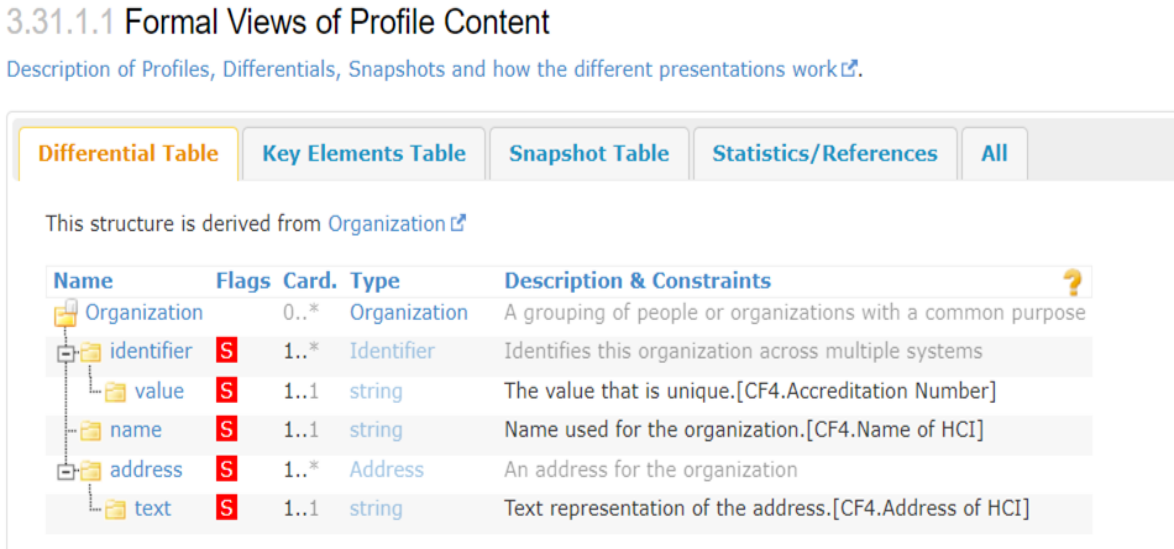
## Create CF4 FHIR Implementation Guide -Flow Chart



# 國際合作 –學海築夢(111學年度 菲律賓)

## Create CF4 FHIR Implementation Guide –Page Display



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## Create CF4 Example

**5. Physical Examination continued (Pertinent Findings per System)**

| | | | | |
|---|---|---|---|---|
| CHEST/LUNGS: | ☑ Essentially normal | ☐ Asymmetrical chest expansion | ☐ Decreased breath sounds | ☐ Wheezes |
| | ☐ Lump/s over breast(s) | ☐ Rales/crackles/rhonchi | ☐ Intercostal rib/clavicular retraction | |
| | Others: | | | |
| CVS: | ☑ Essentially normal | ☐ Displaced apex beat | ☐ Heaves and/or thrills | ☐ Pericardial bulge |
| | ☐ Irregular rhythm | ☐ Muffled heart sounds | ☐ Murmur | |
| | Others: | | | |
| ABDOMEN: | ☑ Essentially normal | ☐ Abdominal rigidity | ☐ Abdomen tenderness | ☐ Hyperactive bowel sounds |
| | ☐ Palpable mass(es) | ☐ Tympanitic/dull abdomen | ☐ Uterine contraction | |
| | Others: | | | |
| GU (IE): | ☑ Essentially normal | ☐ Blood stained in exam finger | ☐ Cervical dilatation | ☐ Presence of abnormal discharge |
| | Others: | | | |
| SKIN/EXTREMITIES: | ☐ Essentially normal | ☐ Clubbing | ☐ Cold clammy skin | ☐ Cyanosis/mottled skin |
| | ☐ Edema/swelling | ☐ Decreased mobility | ☐ Pale nailbeds | ☐ Poor skin turgor |
| | ☐ Rashes/petechiae | ☑ Weak pulses | | |
| | Others: | | | |
| NEURO-EXAM: | ☐ Essentially normal | ☐ Abnormal gait | ☐ Abnormal position sense | ☐ Abnormal/decreased sensation |
| | ☐ Abnormal reflex(es) | ☐ Poor/altered memory | ☑ Poor muscle tone/strength | ☐ Poor coordination |
| | Others: | | | |

**IV. COURSE IN THE WARD (Attach photocopy of laboratory/imaging results)** ☐ Check box if there is/are additional sheet(s).

| Date | DOCTOR'S ORDER/ACTION |
|---|---|
| Apr. 02, 2023 | Blood test : hemoglobin : 13 g/dL |
| Apr. 02, 2023 | Blood test : platelet count : 243,10 $10^9$/L |
| Apr. 02, 2023 | BP 160/80 |
| Apr. 02, 2023 | BP 160/100 |
| Apr. 03, 2023 | BP 155/95 |
| Apr. 03, 2023 | BP 165/85 |
| Apr. 04, 2023 | BP 162/85 |
| Apr. 04, 2023 | BP 168/78 |
| | |
| | |
| | |

SURGICAL PROCEDURE/RVS CODE (Attach photocopy of OR technique):

**V. DRUGS/MEDICINES** ☐ Check box if there is/are additional sheet(s).

| Generic Name | Quantity/Dosage/Route | Total Cost | Generic Name (cont) | Quantity/Dosage/Route (cont) | Total Cost (cont) |
|---|---|---|---|---|---|
| Iosartan | 20 tablets/ 50 mg / oral | 500 | | | |
| Metformin | 20 tablets/500 mg /oral | 600 | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

**VI. OUTCOME OF TREATMENT**

☑ IMPROVED ☐ HAMA ☐ EXPIRED ☐ ABSCONDED ☐ TRANSFERRED Specify reason: _____

**VII. CERTIFICATION OF HEALTH CARE PROFESSIONAL**

Certification of Attending Health Care Professional:

*I certify that the above information given in this form, including all attachments, are true and correct.*

Signature over Printed Name of Attending Health Care Professional

04 (month) 24 (day) 2023 (year) Date Signed

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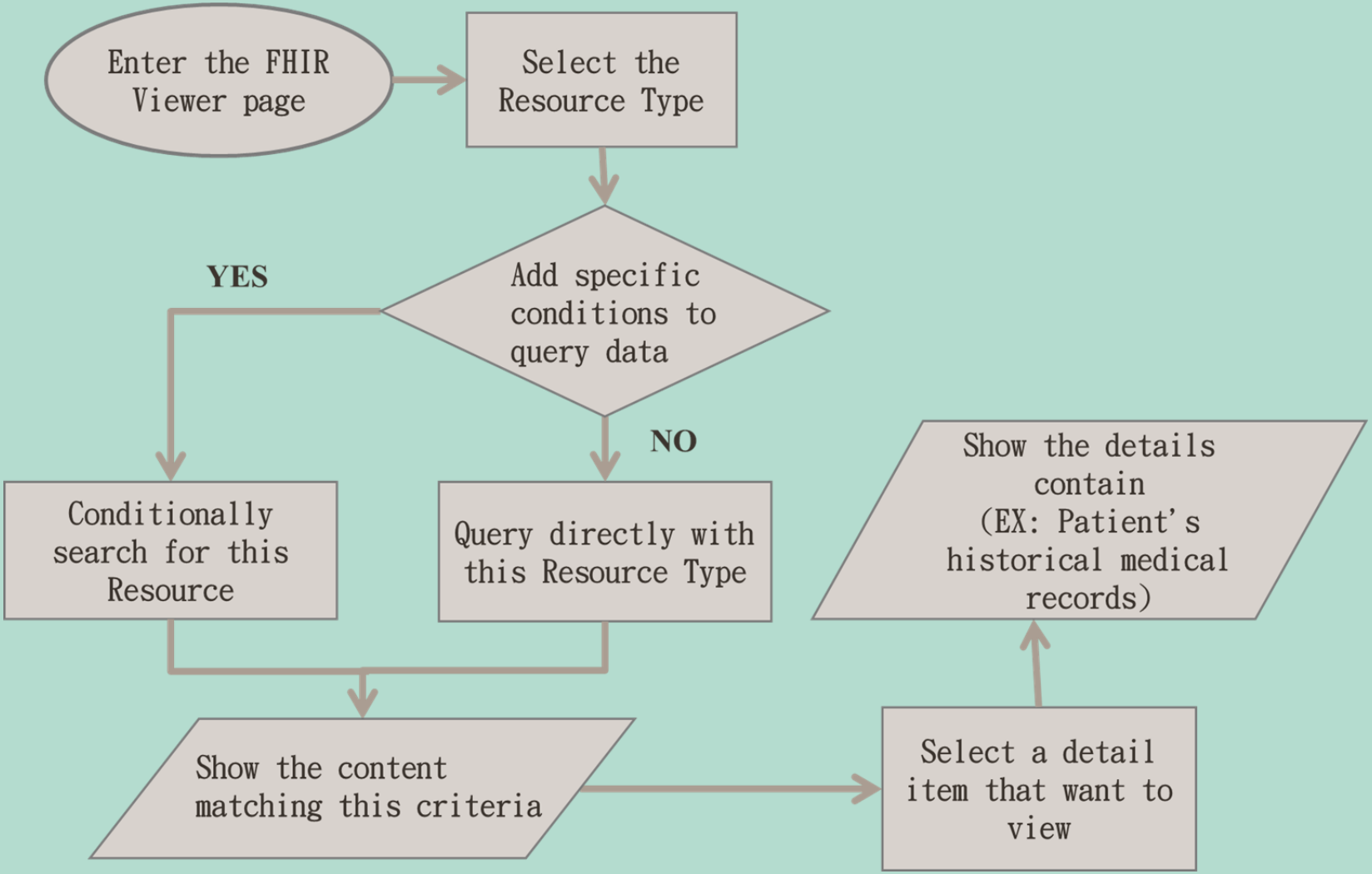
## Example FHIR Application Scenarios -Flow Chart



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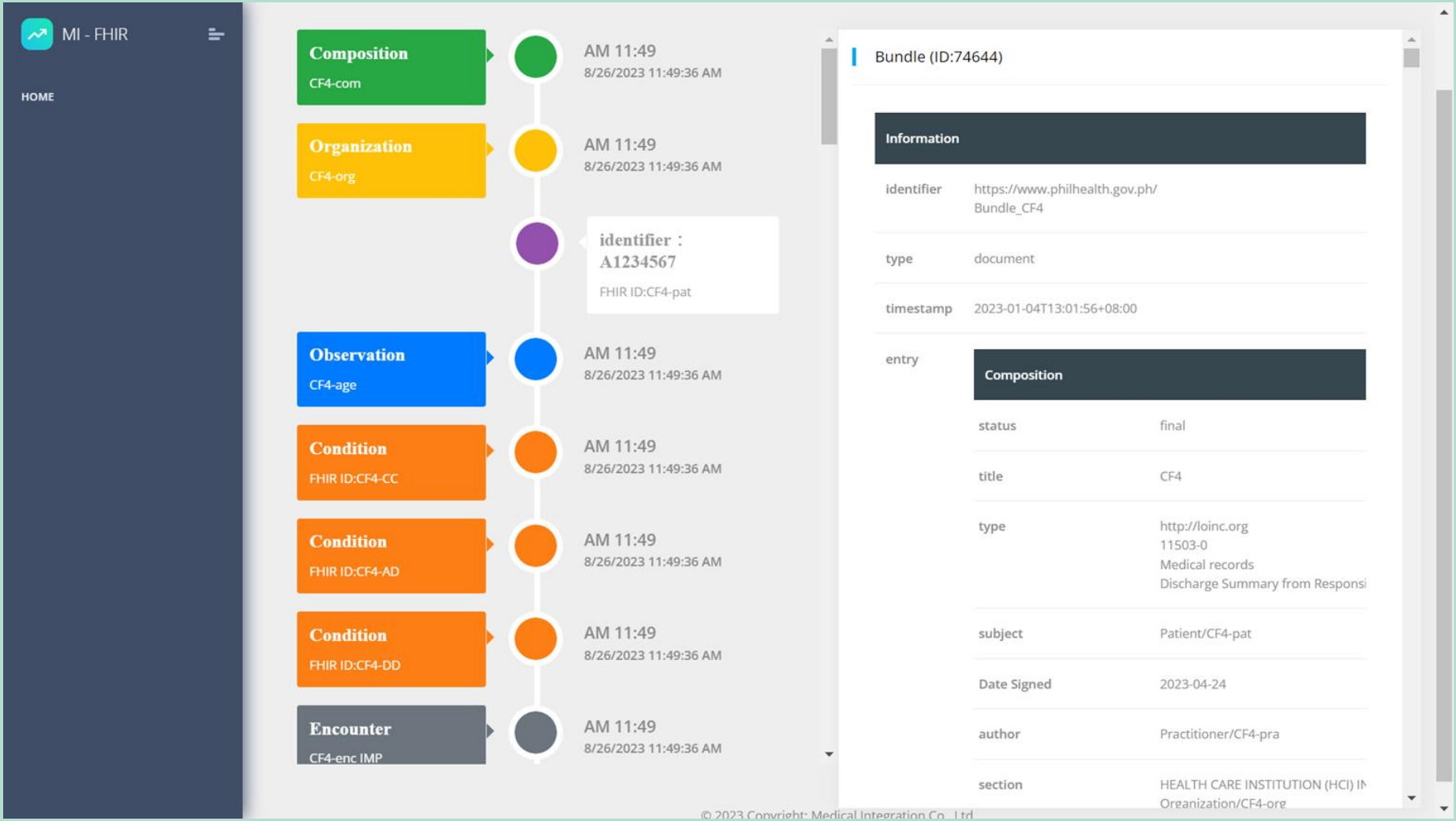
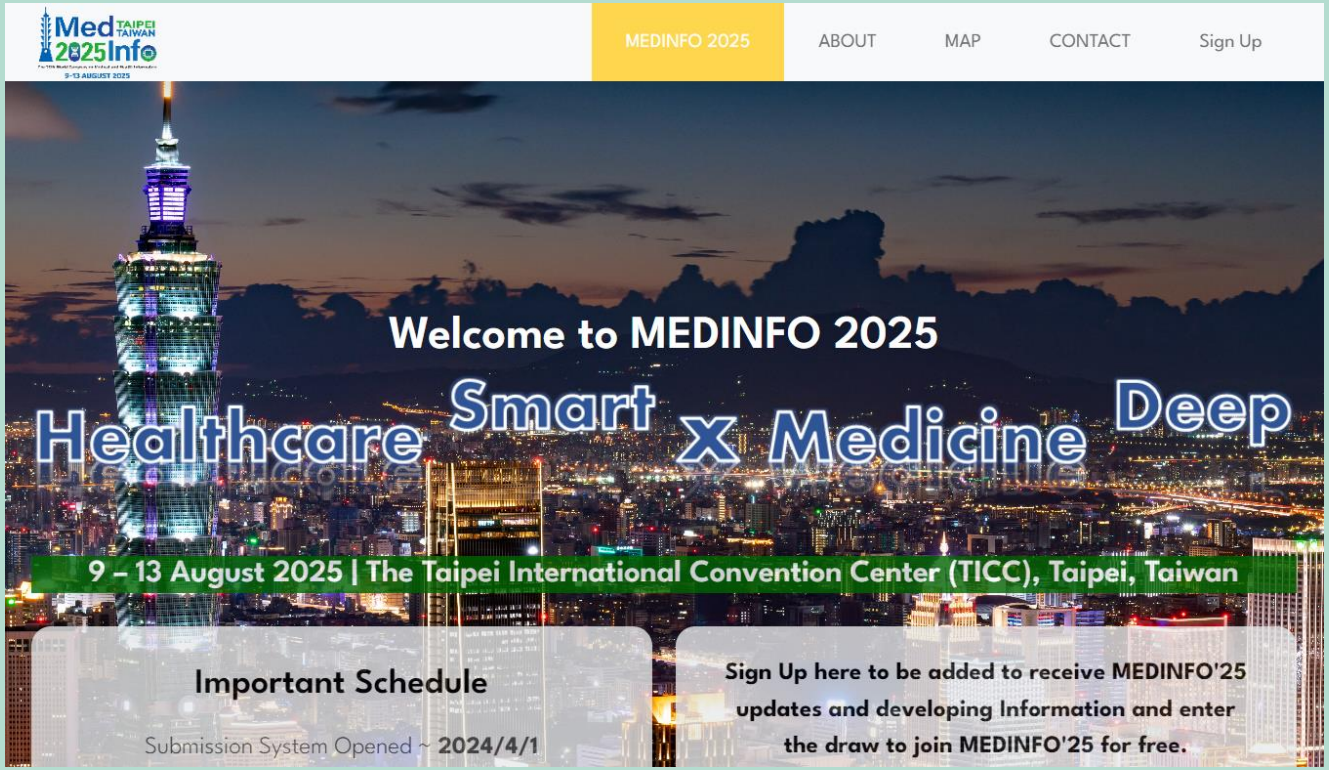
## Example FHIR Application Scenarios -Page Display



# 國際合作 –MedInfo2025

Med TAIPEI TAIWAN 2025 Info
The 20th World Congress on Medical and Health Informatics
9-13 AUGUST 2025

**The Taipei International Convention Center (TICC), Taipei, Taiwan**
**9 – 13 August 2025**




https://medinfo2025.org/#section_1