AEHIN-TAIWAN SMART CARE AND HEALTH IT COLLABORATION WORKSHOP

I. Country eHealth Exchange

Representatives from Taiwan, Thailand, Philippines, Indonesia, Lao PDR, India, Bhutan, and Cambodia shared their country eHealth status at the AeHIN-Taiwan Smart Care and Health IT Collaboration Workshop.

A. Taiwan (Presentation by Min Huei Hsu, Taipei Medical University)

The presentation was divided into two major topics: Artificial Intelligence in Hospitals and Health Information Technology.

Artificial Intelligence in Hospitals

The presentation on Taiwan's eHealth status focused on its initiative as a country to transform its hospitals from smart and automated to ones highly driven by AI (Artificial Intelligence). This aligns with the declaration of their Ministry of Science and ICT to begin 2019 as the first year of Taiwan's AI era.

To showcase this effort, the presenter introduced the use of their 'Pre-hospital Electrocardiogram (EKG) System,' which makes use of a silicon pad with ten electrodes and incorporates automated interpretation.

Research on the electrocardiogram's capacity for automated interpretation started in the 1970s, and was studied extensively in the 1980s. Finally, in the 1990s, technology reached the level of maturity for commercialization.

Traditionally, this feature was referred to as 'decision-support system.' Now referred to as AI, the system provides complete EKG on the ambulance and refers patients to cardiologists based on the automated interpretation. As a result, only patients at high-risk are sent to the cardiologist.

Health Information Technology

The presentation also gave updates on the use of their NHI Medi-Cloud System and NHI Pharmacloud, which started to incorporate medical imaging as a pre-condition for claiming since last year.

My Health Bank, a cloud-based service for personal healthcare also added new features, which include (1) improved visualization of health data, (2) improved user accessibility, (3) prognosis and evaluation of certain diseases, (4) educational guidelines, and (5) availability of medical data for three years.

One of the issues was the secondary use of personal health information (PHI) for uses outside of direct health care delivery. The court rule is that the government has the right to release health data to its researchers.

To summarize, their National Health Data Center deal with a variety of issues with regard to privacy protection, data ownership, research ethics, and the self-determination of the citizens to opt-out from the secondary use of their PHI.

To address some of these issues at the technical level, a virtual private network (VPN) is applied to the health database. Data are also de-identified before being stored at the data center. Thus, strict regulation is implemented against ransomware attack.

Q&A

1. What are your current projects on AI?
   - Clinical Data
     - Use of national health data (hospital-level clinical data to treat aneurysm, etc)
     - Use of AI for research data (research centers)
     - Evidence-based medicine (simple formatting of the question) - CDC in Taiwan follows the same format to answer questions via social media

   - Medical Imaging
     - Projects on medical images hosted by the Ministry of Health and Welfare
     - Opportunity for AI to be used in research (radiologists to give attention to medical images by taking into account annotations)
     - Issue: Fear of technology taking over their jobs

2. How does Taiwan work on integrating insurance data and prescription data?
   - Before, they only collect only admin data at the insurance level. Clinical data were not collected because you would need a standard.
   - We use a format (XML-based and FHIR-based) from the MoH to collect discharge summary. For lab data, we try to adopt LOINC. For medical image, DICOM.
   - The standard for discharge summary is followed because the provider will not be paid otherwise.
   - However, we are still struggling with how to use the data
   - We are still convincing the insurance to collect lab data and have them integrated with other data.

3. Is data synchronization a batch process?

   - Everyday, providers do ETL (Extract, Transform, Load) for data synchronization and transformation into a standard format
   - Digital signature is also needed for every piece of EMR
   - Allow even private organizations and universities in the community to decide what type of data to open to the researchers

B. Thailand (Presentation by Boonchai Kijsanayotin, Thai Health Information Standards Development Center)

The presentation showed that there are ongoing initiatives in Thailand on each of the seven components of the WHO-ITU National eHealth Strategy Toolkit, namely (1) Leadership and Governance, (2) Strategy and Investment, (3) Services and Application, (4) Standards and Interoperability, (5) Infrastructure, (6) Legislation, Policy and Compliance, and (7) Workforce.

National eHealth Strategy

There are also developments based on the eHealth Strategy Framework (2017 to 2026) released by their Ministry of Public Health:

1. Organization: national eHealth governance mechanism (planning)
2. Infrastructure: last mile internet connection; digital health architecture (planning)
3. Standard: HIE Standard (FHIR); Lab (medical device coding standard); and national digital ID
4. Innovation: MoPH applications (the need for AI, blockchain, cloud computing, big data to be included in proposals); HIE in primary care service (primary healthcare doctor for each citizen and connection from

primary to tertiary care); and health IT start-ups (encouraged by MICT)
5. Legislation: personal information protection law and cyber-security law (on the process of operationalization)
6. Human: health IT short courses training (no sophisticated plan on capacity-building); no PHD yet on health informatics

The development of their master plan to transform siloed systems into a holistic health ecosystem is still in process. This includes integrating citizen data from other ministries.

Digital Transformation

Thailand also released its Digital Transformation Action Plan which includes specific efforts on:
● Digital Health Record: digitizing and integrating data from three health insurance payers
● Personal Health Record: verifying personal identification in online transactions
● Health Information Exchange: exploring the use of HL7-FHIR

Social Health Protection

Since 2002, social health protection schemes have covered all citizens of Thailand by virtue of the Thai Universal Health Coverage. Major schemes in the country include the:

● Civil Servants Medical Benefit Scheme (CSMBS): Government employees, dependents, retirees (paid by the government)
● Social Security Scheme (SSS): Private sector employees (paid via premium contributions)
● Universal Coverage Scheme (UCS): Those not covered by CSMBS nor SSS

In Thailand, social health insurance for the formal sector is paid through premium collection. For the civil servants, insurance is pair totally by the (paid from the general tax).

Health Data Information Flow

For their health data center, individual data are collected at the level of the health center and district health office and submitted to the province. These data are then summarized and provided to the region and to the Ministry of Public Health.

However, issues are also encountered with regard to the responsibility of hosting data with the presence of various stakeholders in the field (providers, payers, the private sector, etc).

Health Data Standards Approach

Thailand's approach to health data standards mainly center on the use of openHIE for interoperability. For their interoperability layer, they plan to implement HL7-FHIR, IHE, CDA, NDID, authentication, mapping services, and others. They also plan to modify LOINC for their lab standards.

Healthcare Information System Standards and Processing

The Healthcare Information System Standards and Processing Administration (HISPA) is a third party provider for standardizing and centralizing healthcare services data. It also aims to provide healthcare services claim data processing and curation (through data warehouse). However, this function is not yet fully realized as they are waiting for the new government (military or non-military) to take shape after the election period.

Q&A

1. How do you plan to modify LOINC?

   ● LOINC will be modified vis-a-vis reimbursement requirements
   ● Thai Medicine Lab Terminology will be created and will be mapped to LOINC and also administrative requirements for the lab
   ● LOINC includes both lab results and order
   ● LOINC is now collaborating with FHIR
   ● Challenge: How to go about it considering that information should also be used for clinical data
   ● Prof Hsu: Modify technology (HL7, LOINC, etc) and localize according to country needs; devote time for mapping to integrate all sorts of data together

2. What are your cybersecurity measures?

   ● There is an argument on how much the government should invest in cybersecurity
   ● Should plan to include various stakeholders (private, academe, etc) and operationalize cybersecurity works
   ● There are two approaches (Thailand chose the former):
     ○ Umbrella law for personal information (health, banking, etc)

to be regulated by ministries; or
- ○ Specific law for sectoral data (personal)

C. Lao PDR (Presentation by Viengthong Chiongwaxiong, Department of Planning and International Cooperation, Ministry of Health Lao PDR)

The first part of the presentation focused on the development of Lao's eHealth strategy. The second part discussed the country's implementation of DHIS2.

National eHealth Strategy

The eHealth Strategy Development in Lao PDR started in 2013 where they had needs assessment guided by the WHO-ITU National eHealth Strategy Toolkit for technical support.

In 2014, they had an agreement with UNICEF and WHO to form an eHealth core team from the Department of Planning and International Cooperation.

After engaging and consulting with various stakeholders, they were able to finalize the draft strategy in 2016. The following year, the five-year plan (2017-2021) was translated and adapted according to the country strategy.

The plan envisages enhanced access to "quality health services that enable all the people of Lao PDR to have healthy and productive lives." The mission is to "develop the ICT environment and solutions that impact the health sector of Lao PDR to improve access and utilization of quality health services."

1. Leadership and Governance: establishment of National DHIS2 core team (by end of 2017) and national eHealth unit (by mid-2019)
2. Strategy and Investment: provide a focal point for coordination with development partners (by end of 2017); capacity-building for scaling innovations (by end of 2018); development of clinical decision-support tools, testing of cellphone-based electronic data capture for health surveys and research (by end of 2018); and commission a study on big data (by end of 2018)
3. Infrastructure: provide sufficient bandwidth to hospitals (by end of 2019), take full advantage of the eGovernment infrastructure and technology providers (until 2021)

4. Legislation and Policy: legal and guidance frameworks to enable eHealth (by end of 2019)
5. Human Resources: capacity-building of the health workforce on eHealth (by end of 2021)
6. Standards and Interoperability: establish an enterprise architecture framework building on the work done for CRVS and DHIS2 (by end of 2017); establish a National Health Data Dictionary (by end of 2018) and maintain and develop it (until 2021)
7. eHealth Solution: national level service delivery system (DHIS 2), local level eHealth system, other supporting systems, promotion, cross sector requirements, and UHC.

DHIS2 Implementation

Through a ministerial decree, Lao PDR has adopted DHIS2 as a national platform for the health information system to collect, consolidate, and report health data. This is in line with its newly approved health information strategy from 2018 to 2025. The governance of the health information system lies under the office of the Department of Planning and International Coordination.

However, some existing programs are still implementing parallel systems for data collection and reporting. Thus, there is a need to disseminate the strategy to more parties. Extensive budget support and strategic budget allocation and mobility from various funds are also needed for the continuous implementation of DHIS2.

With regard to standards and interoperability, technical discussions are ongoing to automate data push from m-supply to DHIS2. Pilot data entry to DHIS2 and testing of offline application data entry by health centers in Luangprabang and Saravan have also been completed. Moving data collection from aggregated monthly report to event or case-based reporting is also in progress.

Despite these achievements, there is limited ownership of programs in terms of managing data quality - data still have to be validated per program. Leadership and financial support are needed for training on the new event capture data entry for provincial and district hospital staff. There is also delayed integration with the monitoring and evaluation system of the National Health Insurance.

On capacity-building, local training is provided at the provincial and national levels. A core team on DHIS2 has also been established at these levels. WiFi connection has been provided to all 148 districts. Cloud production servers and

ground servers have also been set up for backup data and training. To secure data, routine back-up and security maintenance are being performed.

However, there is still limited capacity in terms of using the system for data analysis and reporting, especially at the district level. To date, there is a need for coordination between statistics staff and program staff to verify the accuracy and consistency of data reported in DHIS2 before approval. There is also a need for training on filling-in the registration book for various programs.

While the MoH has set annual funding to support the implementation of DHIS2 in some activities, extensive budget support is still needed for extension of data entry into DHIS2 by health centers. With the gaps assessment conducted by the MoH in terms of infrastructure, 30% of health centers have been provided with computers. There is also a challenge for harmonizing commitments from donors.

For data quality and information dissemination, completeness of report through DHIS2 is now at 95 %. Provinces are also encouraged to make use of the dashboard component of DHIS2 for management and programme purposes. It used the Ministry of Health and various programmes for reporting and monitoring progress. UHC and SDG indicators have also been incorporated in DHIS2.

The use of DHIS2 system to monitor the progress of health program implementation at the central level is lower than in the provincial and district levels. Other challenges include the limited use of health information for decision-making and the prevalence of human errors in data entry and review. There is also a delay in the release of the Annual Health Statistics Report.

Today, MoH is in the second phase of their HIS implementation Roadmap, where their main focus is to promote DHIS2 as a tool for decision-making. Key activities planned include a provincial-wide dashboard and complete integration of TB and HIV into the DHIS2 system among others. Demo on the use of DHIS2 in Lao PDR may be accessed at https://hmis.gov.la/dhis-web-dashboard/

Q&A

1. What is the reason for the delay in the report?
   - Timeliness of data entry is almost at 50%, which is very low.

2. What is the scope of implementation at the national level?
   - Cover of data collection is only for government services. There is a lack of collection from the private sphere, which usually focuses only on the malaria program.
   - Problems are also encountered in infrastructure such as poor

internet connection, etc.

3. Do you also collect aggregated data?
    - Three modules are used in DHIS2 for the collection of data
        - Tracker module
        - Aggregation module (per disease)
        - Integration module

4. Is the offline version available to all districts?
    - Offline application versions are meant for remote area use. So far, it has only been piloted to two places - Luangprabang and Saravan.
    - Online version is widely used in the country. All districts are using it, except the two aforementioned places which use the offline version.

5. How do you integrate the mobile system into DHIS2?
    - Data is collected via mobile.

D. Cambodia (Presentation by Mean Reatanak Sambath, Department of Planning and International Cooperation, Partnership for Better Health)

Cambodia's financing schemes for health insurance include the (1) Health Equity Fund (HEF) managed managed through the Patient Management and Registration System (PMRS) under the Ministry of Health, and the (2) National Social Security Fund (NSSF) for the private sector managed through the Health-Social Protection Information System (H-SPIS) under the Ministry of Labor and Vocational Training.

Patient Management and Registration System

The rationale for PMRS implementation for HEF management is to decrease the workload of hospital staff; improve patient flow and quality of care; provide hospital management data and link it with social health protection; and produce HO2 and other reports. The PMRS is integrated to the hospital workflow as follows:

1. Triage
2. Registration (data collection per patient)

3. Patient care (in-patient or out-patient)
4. Payment
5. Getting drugs

Lessons learned from PMRS implementation centered on the importance of capacity-building, presence of hospital staff at all times, especially during triage, recording of discharge diagnosis, timeliness of patient dossiers, and the need for budget on supplies.

PMRS is used in the whole country for the HEF scheme. New functions include the 39-benefit package, data sharing with ID-poor, and the plan to build a client registry to share data with NSSF.

Q&A

1. Has been a time and motion study conducted for efficiency testing?
   - MoH did an assessment in registries and forms in health centers.
   - Different forms are present at the health center to address the needs of various health programs.

2. Who is funding PMRS?
   - PMRS is paid by the government.

3. How do you deal with your forms?
   - For clinical forms, we use a paper-based system.
   - For claims, we use the PMRS.
   - For the TB program, we use DHIS2.

4. How is the situation on human resources for HMIS development?
   (Context on NGO workers absorbed by governments eventually)
   - There are two types of contracts: (1) permanent and (2) floating.
   - Government now pays 100 % of the staff for PMRS.
   - For PMRS maintenance, it absorbs both staff from the MoH and the NGO.

5. Cambodia has a lot of players. What is the priority?
   - There is prioritization of the poor in the country.
   - Three national institutions are currently involved under the management of the National Committee for Social Health Protection:
     - Ministry of Labor (formal sector)
     - Ministry of Health (poor/informal sector)
     - Ministry of Social Affairs (military)
   - With fragmented systems used for these schemes, the Ministry of Finance wants to merge all three.

E. Indonesia (Presentation by Farida Sibueia, Center of Data and Information, Ministry of Health)

The Indonesian Healthcare System adopts a family approach. It implements eHealth from primary to the secondary level. This includes electronic health systems, telehealth, and telemedicine. It's also designed as a one data integrated system. This deals with the siloed systems (program-based, laboratory, human resources, etc) by using one health data application. However, they are still in the process of integration to enable health information exchange.

Ongoing Digital Health Initiatives

1. Building innovative and conducive ecosystems
   For policy, Indonesia has established and revised relevant regulations on online health services and medical practice. It was also able to create national strategies on ICT application in the health sector, and issued a regulation on the implementation of health electronic systems (digital health).

   For governance, Indonesia is currently structuring its e-government and health system standards. They have established government regulation on the implementation of electronic system and transaction. They have also formed a cybersecurity incident prevention team in the Ministry of Health.

   For human resource, they have increased capacity of human resources and started to focus on cultural development of digital literacy, They have also prepared occupational maps for health informatics workplace, and started an initiative to align the health system and education system.

2. Synthesizing Information and Communication Technology
   Indonesia is in the process of building an online network for healthcare providers. It's also coordinating with related agencies such as the Ministry of Communication and Informatics, National Cyber Agency, and National Crypto Agency.

   It has also adopted certain international standards of health information. It is currently developing strategies and regulations for the implementation of standards and systems interoperability. They are also in the process of building their in-country interoperability lab.

3. Optimizing Limited Health Resources

For healthcare services outside the facilities, Indonesia is exploring the use of mobile applications. It's currently developing research also on digital health innovations to strengthen data and technology literacy.

4. Integrating Healthcare Systems

Indonesia is currently implementing electronic medical record systems (EMRs) in health centers and hospitals. With this regard, they are working on the integration of health center and hospital information systems with other systems from other agencies such as the BPJS (National Health Security), and the Ministry of Home Affairs. It also aims to improve its existing telemedicine and referral information systems.

Action Plan for Digital Health Development

Indonesia's action plan for digital health development is anchored on their vision to achieve "eHealth implementation which can increase the accessibility and sustainability of quality health service for Indonesians." It is also guided by the seven components of the WHO-ITU National eHealth Strategy Toolkit.

Gaps in Digital Health Capacity-building

Gaps in digital health capacity building in Indonesia may be summarized through the following:

1. Lack of adoption in innovation
2. Low awareness and buy-in
3. Lack of legal framework
4. Lack of governance body who can advocate for digital health
5. Lack of digital health training
6. Lack of reference to the national digital health standards
7. Lack of funds

Q&A

1. Do you want to host data under the Ministry of Health? Will there be a discrepancy between the academe and the government?
   - For the information architecture, data and information are hosted under the Ministry of Health.
   - For health services, we collaborate with the Directorate General and universities.

2. In the latest update from the World Health Organization, there will be a new department to be established that will focus on digital health. Will Indonesia adopt one?
   ● The Center for Data and Information may be changed to Directoral for Digital Health (might be a possibility).

3. Is there an interdepartmental dialogue that get things solved in the Ministry of Health?
   ● There is a talk on Palapa Ring infrastructure, a fiber optics solution which will be provided by a telecommunications company. It will be part of the information highway.

4. What are your needs for collaboration with Taiwan?
   ● There are many applications that are not integrated.
   ● In Taiwan, the systems are built under a data platform. That's why standards are important.
   ● Suggestion for collaboration: Collection of data from various health insurance, masters degree for international students on health informatics, etc.

F. Philippines (Presentation by Jose Rafael Marfori, Philippine General Hospital and Philippine Primary Care Studies)

The presentation focused on the implementation side of digital health initiatives. It promoted the concept of person-centered health systems, which put people above technology.

Universal Health Coverage

The newly signed Universal Health Care law was based on research data given to the lawmakers. The discourse on interoperability was centered on people who needs Health Information Systems (HIS). Thus, piloting was done in both rural and urban sites. Nationwide implementation must be based on gaps analysis from pilot sites. At the end of the day, the goal shall be centered on the continuum of care or making service available for all.

People-centered integration of health systems mean that aside from integration health information, the operational coordination of health facilities are also taken into account. For primary care, the common ground for different locations and facilities must be the presence of an electronic health record (EHR). Thus, there is a need for an interoperable EHR that will fit in every facility. To best finance primary care, tracking of patients electronically must be enabled by the EHR.

According to the presenter, universal healthcare law has timelines. For example, it has to be financially integrated in six years. That's why it's important that interoperability has to consider operational realities and not just thematic commitments for adoption of ICTs.

Philippine Primary Care Studies

The Philippine Primary Care Studies (PPCS) is currently funded by the Department of Health and the Philippine Health Insurance Corporation.

The current scenario is that patients go to the primary care provider which then refers them to laboratories, pharmacies, specialists, and other facilities - all of which are not talking to each other.

To address these various interoperability issues, change management must take place. In the slow uptake of governance, the presenter posed the question: what can we do?

To integrate, the presenter stressed the importance of prioritizing and designing different types of integration (location, health facility level, specialty/role, and the sector, etc). Rather than asking what technology is needed, the question shall be shifted to the needs of the users.

For developing HIS, these questions must be asked:

1. Who will benefit from it?
2. Who will use it?
3. Who will buy and implement it? (missing link right now)
4. Who will design and build it?

Right now, the missing link is determining who will finance and implement health information system solutions. With this regard, there is also an opportunity to engage the private sector.

The challenge that must also be addressed also dwell on strengthening offline capabilities of health information system. The aim is to reach every village with scarce resources, especially in terms of electricity and Internet.

In light of the experience of the PPCS program, there is also a need to strengthen the capacity-building for village workers as users of the system. The approach is training of teams, rather than individuals.

In line with this, the framework for designing the front-end interface of the electronic medical record system (EMR) is patterned after the SOAP (Subjective, Objective, Assessment, and Plan) note.

It was also mentioned that systems are fragmented because the governance within organizations are also fragmented. While integration might sometimes be a dilemma between big solutions versus homegrown and open source versus proprietary, it must still center on people's needs. Systems should be seen as a means to achieve patient-centered care.

Q&A

What is the role of start-ups or external partners?

- Forms are program-based. Right now, there is a petition to not use the government's current system because it's simply used for data collection of different programs.
- It's program-focused and heavily influenced by the logical framework, rather than patient-focused, which should address workflows that are natural to end users.

G. Bhutan (Presentation by Peldon, Jigme Dorji Wangchuck National Referral Hospital, Thimphu)

According to Bhutan's constitution, "the state shall provide free access to basic public health services in both modern and traditional medicines." Health service is free to all 20 districts in the country.

Health System Status

Healthcare in Bhutan is three-tiered: (1) Basic Health Units (BHUs); (2) General Hospitals; and (3) Referral Hospitals.

Private healthcare delivery is limited to pharmaceutical retail shops and selective diagnostic centers.

Top three diseases for out-of-country referral are (1) kidney disease, (2) heart disease, and (3) cancer.

Health IT Systems

These are the health information systems presented:

1. A Hospital Information System in Jigme Dorji Wangchuck National Referral Hospital was implemented in 2009. It has 30 modules comprising hospital activities.

2. An Electronic Patient Information System funded by the World Health Organization was also pre-piloted in Paro in 2017. It doesn't have a lab and radiology interface yet.

3. A Laboratory Information System is used to process, store, and manage lab reports. It has also a report component for healthcare providers.

4. A Picture Archiving and Communications System is funded by Osirix for connecting imaging modalities.

5. AN Electronic Bhutan Medical Supplies and Inventory System (eBMSIS) is used to record and mobilize medical items.

6. A District Health Information System 2 (DHIS2) is used for collecting monthly aggregated data on morbidity, mortality, etc.

7. An OPD Appointment System is maintained using google sheet.

8. A National Early Warning, Alert and Response Surveillance Information System (NEWARSIS) is used as a reporting system for public health events and national notifiable diseases.

9. Telemedicine between Gelephu and Umling is done via video conferencing and a telecart device.

10. Two telemedicine projects were also implemented in the country. One is the remote telemedicine project implemented in 14 far-flung areas. It makes use of portable ECG machines. Another is the SAARC telemedicine project for continuing medical education. However, the latter was not used that much by doctors.

Challenges

Health information system challenges in Bhutan include technology changes and lack of infrastructure and connectivity. Integration of siloed systems is also difficult due to lack of data standards and unique patient identifier.

There is also a shortage in the number of health professionals and thus, they have to deal with heavy workload. Technical capacity is limited since some health professionals are computer illiterate.

Current Status

Bhutan has a National eHealth Strategy and Action Plan which envisions an ICT-enabled health system that will support Bhutan's health agenda. The five-year plan illustrates the "use of eHealth solutions to support the provision of better health in communities, provide better person-based care to individuals, empower healthcare providers with their use of technology, and enable the exchange of individual and aggregate data to help health managers take better informed decisions."

Bhutan is also in the process of developing an enterprise architecture blueprint. Currently, they are implementing their electronic Patient Information System (ePIS), a component of the Digital Drukyul Flagship Program supported by the government. The project aims to make all health facilities across Bhutan paperless, and make all patient's health information available in a central repository to be shared with other facilities. It also aims to have a system that can interface with radiology and laboratory equipment.

Q&A

What is the role of donor-based or country investments? What is the success rate for ePIS?

- The previous vendor-based solution was not able to interface with the lab and radiology equipment.
- The preceding open source solution was not able to interface with the lab equipment. For open source maintenance, training for developers can be expensive also.
- ePIS was the one able to interface with the lab

H. India (Presentation by Jai Ganesh, Sri Sathya Sai Central Trust)

The government of India committed to Universal Health Coverage for all citizens. This includes the application of digital health technology in policy formulation and implementation of government initiatives.

Digital Health Vision

The vision is to have an interoperable electronic health record (EHR) for every citizen. This is envisaged to be an integrated platform with free to use software or applications, and free and secure storage data storage. It should also be capable of data aggregation through 'big data and analytics.

The digital health transformation will be achieved with the development of pan-india exchange and telemedicine network. This also includes building of a central health database (Master Patient Index). In summary, it aims to optimize the use of IT for program surveillance and monitoring; capacity building and training; and governance & information dissemination.

Digital Health Standards

EHR standards for patient history, progress notes, vaccination, medications, patient demographics, and diagnostic results were notified in 2016. The National Resource Centre for EHR Standards (NRCeS) was established for the promotion and adoption of standards.

Health Metadata & Data Standards (MDDS) was approved, and a National Identification Number (NIN) was also provided to about 99% government health facilities. SNOMED CT license was recently made available for free for all government entities.

Digital Health Implementation

India is finalizing its National Health Stack (NHS) as a common good to facilitate digital health implementations in the country and to enable an ecosystem for blueprint, the minimum set of services, and set of standards. Recently, India also launched the comprehensive Primary Healthcare application for Health & Wellness Centers (HWCs).

It's also in the process of setting up an Integrated Health Information Platform (IHIP) for interoperable EHRs. The platform aims to enable health information exchange for EHRs, other health data, and others through open standards-based and standards-compliant applications and APIs. It also aims to have a dashboard component to promote informed decision-making.

Guidelines were also prepared on how to institutionalize the implementation of digital health through a single framework for all stakeholders such as governments, private players, insurers, and others. It also provided guidance on how to include digital health as a part of policy. Standards adoption and data security were prioritized in the guidance.

Digital Health Events

India introduced and facilitated the adoption of the Resolution on Digital Health the 71st World Health Assembly in Geneva, Switzerland. This promotes global attention and collaboration to both challenges and opportunities in digital health interventions.

India Ministry of Health and Family Welfare also recently hosted the 4th Summit of Global Digital Health Partnership (GDHP), a global intergovernmental meeting that discussed the impact of digital technologies in health systems and health services delivery.

In the summit, the Joint Declaration on Digital Health for Sustainable Development, known as Delhi Declaration, gathered the commitment of government officials from over 35 countries to accelerate and implement digital health interventions both at the national and sub-national levels by 2030.

National Health Authority

The Pradhan Mantri Jan Arogya Yojana (PM-JAY) financial scheme under the National Health Authority is targeted on reducing the financial burden of the poor and vulnerable groups for hospitalization.

After hospitalization, the patient undergoes beneficiary identification and registration using a software. Pre-authorization request and approval of treatment is then facilitated by the hospital. After treatment and discharge, claim request is submitted for settlement.

The PM-Jay has both online portal (Mera PM-Jay) and mobile application version (Ayushman Bharat) for beneficiaries to check their entitlement and eligibility for treatment under the scheme.

The IT infrastructure includes a (1) Beneficiary Identification System based on demography and biometrics, (2) Hospital Empanelment Module for simple registration process, and (3) Transaction Management System for real-time and secure tracking.

1. How does the biometrics work?
   - It uses a scanner for iris and fingerprint to identify patients.
   - Biometrics is linked with the ID.

2. What is the rule of the federal? How can states work with another? What are the dIfferent scenarios for implementation?
   - Funding comes from the state to the center.
   - Different existing IT systems need to comply with the specifications to enable information exchange.

3. Who finances the scheme?
   - The central government finances.

4. How much do you pay every year for SNOMED?
   - A few million dollars.

II. Community of Interoperable Labs (COIL)

AeHIN's community of practice on standards and interoperability, COIL, was introduced in the workshop.

A. Introduction to COIL (Presentation by Dr Boonchai Kijsanayotin, AeHIN)

The community of interoperable labs (COIL) was borne out of the need to address this interoperability pain point - isolated health information systems.

To address the interoperability pain point, the Asia eHealth Information Network (AeHIN) coordinated and implemented the establishment of a lab that will serve as a sandbox of interoperability tools. The concept of this lab was highly influenced by Mohawk College's 4Ts - testing, tooling, training, and teaming.

This lab later became the Standards and Interoperability Lab - Asia (SIL-Asia) with funding from the Asian Development Bank (ADB). The partnership with ADB enabled the funding of consultants and necessary equipment for the lab.

To host the physical office of the lab, it also formed a partnership with the University of the Philippines Manila - Philippine General Hospital (UPM-PGH) through Dr Alvin Marcelo's management for the physical hosting of the lab. The partnership aimed to contribute to the interoperability efforts within UPM-PGH.

It also partnered with consultants who are also professors at the University of the Philippines Diliman - Department of Computer Science (UPD-DCS) under the technical leadership of Prof. Philip Christian Zuniga.

Initial projects of the lab include the development of a Master Patient Index (MPI) in Myanmar, the establishment of the interoperability lab in Viet Nam, and various hospital interoperability projects in the Philippines, such as the PGH, Navotas City Hospital (NCH), and the Philippine Primary Care Studies (PPCS).

Finally, in the last 6th AeHIN General Meeting in Colombo, Sri Lanka, countries expressed their interest and commitment to become part of the COIL and share experiences in health interoperability. COIL aims to provide the opportunity for support and learning from one another.

While different countries have different needs, COIL aims to promote country ownership but to go about addressing interoperability problems as a community. COIL also aims to be a safe space to test not just solutions but also emerging technologies in the field such as Blockchain, FHIR, IHE, etc.

B. Overview of SIL-Asia (Presentation by Prof Philip Christian Zuniga, SIL-Asia)

SIL-Asia was established by AeHIN through a grant by the Asian Development Bank. The support is in response to countries requesting for technical assistance on how to achieve Interoperability in healthcare.

SIL-Asia is part of the solutions portfolio of AeHIN's Mind the GAPS (Governance, Architecture, Program Management, and Standards) Framework. For the standards and interoperability component, SIL-Asia comes in as a reference model in Asia for the establishment of in-country interoperable labs.

SIL-Asia has been regarded as the third health interoperability lab in the world after the Mohawk College in North America and the Jembi Health Systems in South Africa. During its inception, the technical lab experts have undergone training with Justin Fyfe from the Mohawk College on interoperability, Master Patient Index (MPI), openHIE, and HL7-FHIR.

Interoperability Lab

An interoperability lab is a safe space where private sector, government and the academe can work together to address interoperability issues. For one, it can connect systems (i.e. FHIR – DHIS2 Connection). It can also conduct tests to check whether systems can work together. Another is that it can develop prototypes and tools that demonstrate interoperability (i.e. conduct demo).

To add, an interoperability lab can also ensure standards compliance by becoming a certification body. In the Philippines, the National Telehealth Center has assigned SIL-Asia to certify EMRs who want to connect to the RxBox. It can also provide a sandbox environment to innovators by setting-up a server in the cloud where various digital health applications can be tested.

Lab Services and Activities

This year, SIL-Asia will be actively working with countries namely, Indonesia, Malaysia, Mongolia, Nepal, Philippines, Taipei, Thailand, and Viet Nam.

SIL-Asia's main services can be categorized into:

1. Community
   SIL-Asia is strengthening various communities of practice in standards and interoperability.

   It is set to partner with Indonesia, Thailand, and other countries this year for setting in-country interoperability labs.

   It also aims to contribute in building sub-communities under COIL, such as HL7-FHIR, DHIS2-HISP, and openIMIS.

2. Creation
   SIL-Asia is also focused on building tools and knowledge materials.

   It aims to develop a collection of digital health systems used in Asia, and a sandbox testing server.

   This year, it will also be part of the project on FHIR standards for the WHO ANC (Antenatal Care Protocol).

3. Capacity
   SIL-Asia has been providing capacity-building activities on standards and interoperability with partners.

   Pipeline of events this year includes FHIR Dev Days in Manila or Singapore, FHIR Developers Training, and AeHIN-openIMIS Workshops.

4. Collaboration
   SIL-Asia is also involved in various collaborative activities with partners.

It has ongoing partnerships with experts from HL7-FHIR, IHE, UIO (for DHIS2), and other universities.

It will also start its internship program this year for graduate students on information management from Taipei.

Launching of COIL

The launching of COIL at the 6th AeHIN General Meeting aims to assist countries in their lab set-up by providing capacity-building. COIL also aims to prepare regional proposals to help fund in-country interoperability labs.

The community aims to collect and share artifacts and reference knowledge materials for collaboration on interoperability projects. It is also open to building sub-communities of practice for various digital health technologies.

The first country to set-up an interoperability lab is Viet Nam. The Viet Nam Ministry of Health - Electronic Health Administration (MoH-EHA) has indicated that one of their priorities is to set up an Interoperability Lab with a strong focus on testing.

Specifically, the country is interested in building their capacity on HL7-FHIR. After the inception workshop in Hanoi last October 2017, a series of HL7-FHIR workshops and connectathons were conducted with SIL-Asia from November 2017 to March 2018.

SIL-Asia also worked with them in the evaluation/demonstration of local commune interoperability in April 2018, and in the implementation of their national FHIR Profiles. SIL-Asia also facilitated an on-site lab training for the MoH-EHA at the Asian Development Bank.

COIL Co-creation Framework

SIL-Asia's co-creation framework for helping countries with their lab set-up is divided into three phases:

1. Co-realizing the vision of the lab
2. Co-building the capacity of the lab
3. Co-learning from the lab's experience

C. Setting-up Interoperability Labs (Presentation by Prof Philip Christian Zuniga, SIL-Asia)

The process for setting-up an interoperability lab with SIL-Asia can be outlined

with these steps:

1. Lab set-up request assistance
2. Inception meeting
3. Customization of training plan
4. Capacity development
5. Joint projects

Activities include inception planning, governance workshop, TOR writing, proposal writing, work plan identification, and technology training (standards, architecture, emerging technologies, testing, and sandbox environment).

SIL-Asia's central repository of artefacts and materials will contain country experiences including (1) national standards profile, (2) experience on using particular technologies, (3) training materials, (4) architecture documents, and (5) test protocols.

For standards development, it will follow the 80:20 rule adopted by HL7-FHIR, where 80% of the standards will be common to all, while 20% will be localized. In the context of COIL, 80% of standards may be centralized in the community, while 20% of these standards may be modified by in-country interoperability labs.

D. Regional Joint Proposal (Presentation by Prof Philip Christian Zuniga, SIL-Asia)

The goal is to develop a regional proposal for the establishment of in-country interoperability labs within the next three years. These are the targets:

1. Establish interop labs within the next two years in at least five countries in the Asia Pacific region
2. Conduct capacity development for COIL members
3. Work in projects/prototypes that will show interoperability
4. Develop and maintain a central repository of artefacts (guidelines, prototypes, application, etc)
5. Schedule regional meetings for COIL

As input, country members are encouraged to provide context in answering the question: why do we need interoperability in our countries? Thus, it is important to identify pain points and propose common solutions or projects that can be implemented as a community. An interoperability work plan must be prepared with corresponding budget plan that will detail manpower, operating costs, and equipment.

Target development partners include PATH (Digital Square), USAID (Digital Innovation Ventures), GIZ (openIMIS), WHO, ADB, and the Taiwan government.

For the 2019 SIL-Asia proposal to ADB, most of the activities lined up for the lab involve supporting COIL:

- Capacity Building – SIL-Asia members will travel to countries to schedule capacity building workshops.
  - ADB will support SILA travel, accommodation, per diem
  - Local host will support venue and participation of local team members to workshops
- COIL meeting and workshop – We will be scheduling a COIL meeting in Manila later this year or next year. Funding will be sourced from SILA workshop funds.
- Launch of the COIL Labs for 2020 AeHIN GM

Insights

- Dr Boonchai Kijsanayotin: In the international environment, both standards (IHE and HL7-FHIR) compete and contribute together. Both are useful but depends on how we implement them in the environment. We can be the first regional organization working on standards development and making it work in each country.
- Professor Chien Yeh-Hsu: In Taiwan, we need artefacts to show to potential sponsors. We can combine various standards depending on needs.
- Professor Philip Christian Zuniga: Some countries might not be active in IHE. In Asia, only Malaysia is active. We can bring Jurgen Brandstatter but it will depend on the demand from countries.

III. FHIR Community of Practice

Session on the FHIR Community of Practice (CoP) comprised of an introduction to FHIR, and sharing of experiences from Taiwan and Thailand.

The AeHIN FHIR CoP is a group of people advancing ideas on HL7-FHIR. The community aims to become a support system for HL7-FHIR practice in the region.

A. Introduction to FHIR (Presentation by Prof Philip Christian Zuniga, SIL-Asia)

Health Level Seven International (HL7) is as a standards development body to provide a comprehensive way of integrating health data. HL7 is the seventh layer or referred to as the application layer of the ISO Communication Architecture Model.

Versions

For context, the presentation also explained other versions of HL7:

1. HL7 V2 (Version 2) focused on message exchange. The use of header is not human-readable.
2. HL7 CDA (Clinical Data Architecture) focused on clinical documents exchange. The use of header and body now became human-readable.
3. HL7-FHIR (Fast Healthcare Interoperability Resources) focused on web technologies in sharing documents. The user will be directed to the location of data just by calling via URL (uniform resource locator).

Definition

HL7-FHIR stands for:

- Fast - the standard is fast to model and implement
- Health - the standard is used for health data
- Interoperable - the standard aims for interoperability
- Resources - the standard uses application per resources

HL7-FHIR is a draft standard describing data formats known as resources, and an API that enables exchange of electronic health records. The standards were created by HL7.

Complexity Model and Manifesto

With 150 resources, HL7-FHIR embodies semantic depth yet simple to use. It was designed for actual implementers - health informatics professionals. Through the 80:20 rule, it supports common scenarios in healthcare workflows (80%), and extensions that can be customized by the users (20%). Thus, implementers can modify HL7-FHIR as they use it.

HL7-FHIR is internet-based, meaning it can leverage cross-industry web technologies. It also supports human readability and allows content to be freely available through open source license. It is able to support as well multiple paradigms and architecture.

Use of REST API

HL7-FHIR makes use of Representational State Transfer Application Programming Interface (REST API). This enables the web to be used for shared document editing. A central HL7-FHIR server allows any HL7-FHIR compliant Electronic Medical Record (EMR) share data with one another. Before,

connection is conducted on a point-to-point basis for EMRs.

Accessibility of health data is made possible with the following functions:

- GET - get data from the server (can be accessed via browser; not application dependent)
- POST - submit data to the server
- PUT - update data to the server
- DELETE - delete data from the server

Components and EMR Development

HL7-FHIR is composed of:

- Operation (GET, POST, PUT, DELETE)
- FHIR Resource
- Base URL of the FHIR server
- ID

HL7-FHIR is popular in mobile applications because storage resides in the server. There is no need to store data in the phone since HL7-FHIR just establishes the connection to the server. Thus, HL7-FHIR makes it easy to develop an EMR.

The first thing to do is structure the data model or database schema. FHIR has ready-made resources or data model that can be used and adapted by the user. The only thing that needs to be developed is the interface which can connect to HL7-FHIR.

Resources

A resource is referred to as the building block of HL7-FHIR. FHIR resources modeling include the patient, practitioner, condition, and encounter. They may be combined to form a story. They can be composed of the primitive, composite, or coded data types.

Security

While HL7-FHIR addresses accessibility of data, security must be set up by the user on their own as another layer.

B. Thailand: Health Data Standards and Interoperability (Presentation by Boonchai Kijsanayotin, Thai Health Information Standards Development Center and Prapat Suriyaphol, Siriraj Hospital)

Thailand aims to achieve Health Information Exchange (HIE) in all levels, from the micro-tier (point-of-care) and meso-tier (intra-facility) to the macro-tier (inter-facility), which involves health systems such as, public health, pharmacy, radiology, labs, payers, and researchers.

Levels of interoperability may be classified as technical, structural, syntactic, semantic, and process/service-oriented.

Interoperability Asset of Thailand

Thailand has a national ID system, which represents the registry of its citizens. One national ID card is provided to each citizen. Claim data for reimbursements is also electronic. It follows their minimum data set-14.

This is maintained by the Civil Registration Database and National ID Integration Improvement of Government and Private Digital Services. This integration helped create an online birth registration system and a national birth defect registry.

A welfare card for the poor is also enabled by the ID system through the government social welfare program. This provides free transportation and minimum allowance, among others to its beneficiaries.

To date, about 14 million welfare cards have been provided out of their population of 69 million people.

Thai Drug Terminology Service

Currently, there are 30,000 drug products used in hospitals. The data model adopted by the Thai Medicines Terminology (TMT) Service allows matching of generic drug terms or generic product codes (GPU) with the trade product codes (TPU). TMT may be accessed via http://tmt.this.or.th

The TMT code is composed of an extension item identifier, partition identifier, namespace identifier, and check-digit. With this scenario, TMT standards may be used as standards for the interoperability of healthcare information systems in Thailand, such as the Electronic Government Procurement Systems (eGP).

Part of the New Governmental Procurement Management Act 2017 of Thailand,

the eGP serves as a centralized system for electronic bidding. Buyers from the government office prepares a bidding document which is open to the public for discussion. Bidding announcement is done online specifying the GPU for drug specification requirement. Sellers may then bid drugs by providing the TPU.

The Thai Health Information Standards Development Center (THIS) then submits analysis of data to the Ministry of Finance (MoF). MoF uses the analysis to set the reference price. This has increased transparency because pricing has to go through the system before procurement.

Pain points and gaps show that there is a need to create an interoperability lab in Thailand to learn about HL7-FHIR. For messaging standards, Thailand is currently looking into how HL7-FHIR may be used. For semantic standards, they are looking into who LOINC may be modified (make it less granular) to fit their requirements.

Needs Assessment on FHIR

The proposed SIL-Asia in-country interoperability lab in Thailand will be based at Mahidol University.

The presenter recounted that he never understood HL7 until he encountered FHIR. While data exchange existed, he would want to know how easy it is to scale, considering that the government in Thailand is highly interested in using HL7-FHIR as a standard.

During their needs assessment, they noted that HL7-FHIR is tightly coupled and system-specific. They also think that its is difficult to scale because of lack of tools and documentation, and also the lack of a wider user base, unlike DHIS2.

Thailand would want to use HL7-FHIR not just for the way exchange will be carried out but also in making the content interoperable with one another. To do this, SIL-Asia Thailand plans to onboard the stakeholders at the beginning:

- Government
  - MoPH ICT (infrastructure support)
  - Ministry of Digital
  - Ministry of Science
- Academics
  - University
  - Medical Schools
  - Granting Agencies
- Private Sector and Company
  - HIS Company
  - Healthcare startups
  - Private hospitals
- Partners and Community

- ○ AeHIN
- ○ SILA
- ○ FHIR Community

Insights

- Dr Boonchai Kijsanayotin: Having a mechanism on Master Patient Index (MPI) in each country is important.
- Prof. Philip Christian Zuniga: The in-country lab in Thailand can serve as a sandbox environment, where technologies can be tested before implementing at the national scale.

C. Taiwan: Health Data Standards and Interoperability (Presentation by Chung-Yueh Lien, Medical Image Standards Association of Taiwan)

Since 2001, the Medical Image Standards Association of Taiwan (MISAT) has been promoting Digital Imaging and Communications in Medicine (DICOM). It is also in the same year that the Taiwan Association for Medical Informatics (TAMI)/HL7-Taiwan has started to promote HL7.

In 2004, the Taiwan electronic medical record (EMR) template was released. This was followed by the regulations on the creation and management of the EMR of the medical institution in 2005. In 2010, 108 templates for EMR were released via HL7 CDA R2. Four templates were released via HL7 CDA R2 (Level 3).

Trends for EHR System Development

Before, developing EHR systems tend to be free-style in nature. These are the trends for EHR system development in Taiwan since 2005:

- 2005: Service Oriented Architecture (SOA), HL7-CDA (document-based), IHE (workflow based)
- 2008: Regulation Rule/ Certification Criteria Based
- 2011: Restful Style
- 2014: HL7-FHIR/ Restful DICOM Based
- 2015: HL7 FHIR Design Pattern Based

HL7-based HIS in Taiwan

It is rare to find HL7-based Hospital Information Systems (HIS) in most hospitals in Taiwan. The reason is that before HL7 was introduced in Taiwan, most hospitals had their unique HIS.

In this set-up, all HIS in medical centers are maintained by management information system (MIS). In most healthcare enterprise including regional hospitals, clinics, and others, HIS is either outsourced to vendors who provide highly customized services, or also maintained by MIS.

With heterogeneous systems in HIS, there is no need to exchange messages. Connectivity among systems was made possibly by direct linking to database, (i.e. database view or exchange table).

HL7's Next Step in Taiwan

HL7's next step is to facilitate semantic interoperability of EMRs. This will allow EMR templates for display (HL7 CDA R2) and for machine read (HLA CDA Level 3).

New scenarios and applications that are set to use HL7-FHIR include:

- Data collection for clinical research
- Structured Report Template
  - Mammography Screening Report
  - DICOM SR "Measurement Report" (TID 1500) translation to FHIR
- New Mobile Application
  - Patient Demographics Query for Mobile
  - mHealth Plugathon from IHE-Europe 10-11 April 2019
- Selected interoperability scenarios by MISAT
  - Between patient and healthcare enterprise
  - Biosignal and measurement, prescription
  - Medical imaging via Internet/HTTP protocol

FHIR resources will also be integrated with DICOMWeb.

HL7-FHIR Activities by MISAT

Activities on HL7-FHIR conducted by MISAT last year include:

- JavaScript for DICOM, NYMU
- FHIR Fundamental Training, NYMU
- FHIR advanced Training, CSMU
- FHIR Connecathon Workshop , NYMU
- FHIR & DICOMWeb Demonstration and Exhibit, TZU, JCMIT 2018
- FHIR fundamental Training, VGHTC

IV. AeHIN-openIMIS Community of Practice

Session on the openIMIS Community of Practice (CoP) consisted of an overview of openIMIS, introduction to the AeHIN-openIMIS CoP, and sharing of country plans in Indonesia and the Philippines.

A. openIMIS Overview (Presentation by Kristin Chloe Pascual, Asia eHealth Information Network and Rose Ann Zuniga, Standards and Interoperability Lab-Asia)

openIMIS is the first open source software for the linking of beneficiary, provider and payer data. It is free and adjustable, which means users can download, customize to your needs, and share with the community of users and developers. openIMIS is also aligned and harmonized with the principles for digital development.

openIMIS benefits the management of social health protection system by optimizing process flows, promoting transparency, enhancing financial management, and providing a means for beneficiary identification and tracking.

Support for the Sustainable Development Goals (SDG)

openIMIS is a contribution to advance the Agenda 2030 of Leaving No One Behind. Specifically, it addresses SDG 1 and SDG 3.

More and more countries worldwide aim to achieve Universal Health Coverage (UHC) as well as Universal Social Protection (USP) for their populations.

openIMIS is a tool to make those ambitions a reality. It aims to link health financing schemes into an interoperable digital health system by using open source software

Governance

The openIMIS Initiative promotes the exchange on global level as well as linking the global and local communities to benefit from each other.

The Swiss Agency for Development Cooperation (SDC) and the German Federal Ministry for Economic Cooperation and Development (BMZ) are the initial funders of the initiative.

The initiative is coordinated by the Gesellschaft für Internationale Zusammenarbeit (GIZ). Currently, the openIMIS initiative has two main committees:

1. Developers' Committee
    a. Continuity: SwissTPH and SolDevelo
    b. Re-architecture: BlueSquare
    c. Interoperability: HISP India, Swiss TPH, SolDevelo, Possible Health

2. Implementers' Committee
    a. Communication: FFW
    b. Capacity: SwissTPH and EPOS
    c. Community: AeHIN and Jembi

Background

In 2012, with support from the Swiss Agency for Development Cooperation (SDC), the Swiss Tropical and Public Health Institute (Swiss TPH), Microinsurance Academy and Exact Software developed an Insurance Management Information System (IMIS) to operate community health funds (CHF) in several districts of Tanzania.

In 2014, a mutual health insurance scheme in Cameroon adapted the software.

In 2015, the German Development Cooperation (GDC) started providing assistance to customize IMIS for Nepal's national health insurance scheme.

In 2016, GDC and SDC invested jointly to make IMIS an open source application.

Finally in 2018, openIMIS source code became publicly available.

This year, openIMIS will focus on small releases, knowledge production, and development of the master version.

Features

Features of openIMIS were showcased in a short demo of the software from Rose Ann Sale-Zuniga, SIL-Asia technical expert.

1. Open Source: openIMIS software is free to use as-is but needs to consider:
    a. Licensing agreements
    b. Costs for customization and implementation
    c. Other communities of practice (DHIS2, openMRS, etc)

2. Interoperability: openIMIS addresses a broad variety of health system challenges and helps to solve the data fragmentation puzzle:
   a. It uses compatible formats and interfaces for data exchange (international standard protocols and codes)
   b. It requires services from multiple other popular health sector applications (DHIS2, OpenMRS) and beyond (civil registration systems)

3. Customizable Architecture: openIMIS has a modular and adaptable design. The modules cover the following business processes:
   a. Enrolment and contribution collection
   b. Beneficiary verification
   c. Claims management (submissions and review)
   d. Client feedback
   e. Data analytics and reports

4. Sustainable Community: openIMIS is supported and improved by a vibrant community of practice consisting of implementers, developers, and system designers. Being part of this open community provides easy access to a wealth of resources:
   a. Latest version of the openIMIS tool
   b. Wiki Page (Knowledge Base)
   c. Jira (Request Management)
   d. Implementation Experience from Countries

Current Implementations

Currently, openIMIS is being implemented in Tanzania, Cameroon, Chad, Democratic Republic of the Congo, Nepal, and Tanzania. Future implementations in Rwanda and Malawi are also being planned as of the moment.

B. AeHIN-openIMIS Community of Practice in Asia (Presentation by Kristin Chloe Pascual, Asia eHealth Information Network)

openIMIS Community of Practice in Asia is a regional hub of health education institutions, medical student associations, in-country interoperability labs, and other related networks that actively review, implement, and evaluate openIMIS in various use cases, particularly in the academic setting, to support the application of ICT solutions for social health protection.

Background

The openIMIS initiative aims to contribute to the "gradual inclusion of hitherto excluded populations into social (health) protection schemes by improving the schemes' data and information management capacities through openIMIS." Part of its objectives is to complement ICT infrastructure for Insurance and other finance mechanisms with openIMIS or specific modules.

To achieve its goal, one of the expected outputs of the initiative is the establishment of a Community of Practice (CoP) for openIMIS users in existing networks. Currently being implemented in Tanzania and Nepal, the openIMIS initiative collaborated with the Asia eHealth Information Network (AeHIN) to expand its reach in Asia.

To inform the direction and development of openIMIS, AeHIN will create a regional CoP in Asia that will provide country input on challenges, priorities, and user requirements for the system. These insights are expected to refine knowledge products on ICT solutions for social (health) protection at the global level.

Vision, Mission, and Goals

The openIMIS CoP in Asia aims to contribute to the goal of managing social health insurance and other health protection schemes to achieve universal health coverage (UHC) through openIMIS.

openIMIS CoP in Asia envisions the positioning of openIMIS as a global good that can support the application of concepts and skills on social health protection and health informatics.

To do this, the openIMIS CoP in Asia will adopt the mission of contextualizing capacity-building strategies and supplementary knowledge materials with the reality of concrete country cases.

Scope

The primary use case of the openIMIS CoP in Asia is the application of openIMIS as an Academic learning tool in universities. Health education institutes may benefit from openIMIS by using it to demonstrate core functionalities of a UHC system and business processes of a social health insurance scheme.

The secondary use case of the openIMIS CoP in Asia, which will be done upon request, is the interoperability of openIMIS with multiple health information systems. To introduce openIMIS in the region, it is crucial to demonstrate its interoperability with other systems in the digital health ecosystem of a country.

Target Audience

The target audience of the openIMIS CoP may be segmented into three main categories below. The first two groups are expected to benefit from the first use case (openIMIS as a digital learning tool). The last group, facilitated by SIL-Asia, will be part of the second use case (interoperability of openIMIS in the digital health ecosystem).

1. Health Education Institutes
2. Asian Medical Student Associations
3. In-country Interoperability Labs

Strategy

The regional strategy of AeHIN-openIMIS CoP is outlined into six strategies below:

1. Establishment of Country Hubs
   a. Advocate for the establishment and strengthening of the openIMIS Asia Regional Hub , with a particular focus on the Asian Medical Student Associations and Health Education Institutions
   b. Form a network of faculty members who will advocate the use of openIMIS (for teaching)
   c. Form a network of medical/nursing students who will advocate the use of openIMIS (for learning)
   d. Create further use cases to support countries with little experience in health financing

2. Development of Information, Education, and Communication Materials
   a. Conduct needs assessment on how Health Education Institutions can integrate openIMIS into their curricula
   b. Develop short courses on setting-up and using openIMIS in Health Education Institutions
   c. Prepare training materials on setting-up and using openIMIS in Health Education Institutions

3. Capacity-building and Technology Transfer
   a. Conduct training of trainers workshop/s among country hubs (inception, capacity-building, and completion workshop)
   b. Provide an online meeting and online training platform to demonstrate the application of openIMIS in Asia
   c. Provide an enterprise architecture tool to manage architectural artifacts of openIMIS in Asia
   d. Create separate cloud instances for openIMIS In each country

4. Interoperability Testing (Upon Request)
   a. Test the interoperability of openIMIS with health information systems being used in a country
   b. Integrate the country's preferred health information system with openIMIS

5. Regional Knowledge Sharing and Networking
   a. Conduct knowledge sharing activities to document experiences of openIMIS Asia Regional Hub (best practices, lessons learned, and technical recommendations)
   b. Conduct webinars on the progress of openIMIS Asia Regional Hub
   c. Conduct face-to-face meetings to gather the country hubs of the openIMIS Asia Regional Hub
   d. Promote openIMIS through digital marketing and public relations initiatives in Asia

6. Strengthening of Global Public Goods
   a. Support the openIMIS community in its implementation and capacity development strategy with focus on experiences from Asia
   b. Coordinate with openIMIS Africa Regional Hub to develop global goods
   c. Connect with Health Education Institutions in Europe and Africa on incorporating openIMIS in the academic setting
   d. Document the activities conducted in the openIMIS wiki (wiki.openimis.org)

C. openIMIS Country Hub Philippines (Presentation by Kristin Chloe Pascual, Asia eHealth Information Network on behalf of Alvin Marcelo, University of the Philippines Manila)

openIMIS Country Hub in the Philippines consist of partners from the (1) University of the Philippines Manila, (2) St Luke's Medical Center, and (3) Asian Medical Students Association Philippines.

Gaps

The need for openIMIS in the university sprung various needs such as lack of practical know-how of students on health financing, limited learning tools and real-life scenarios to demonstrate the operational side of social health protection (enrolment, claims submission, reports, etc), and missing link between clinical procedures in medical schools and information systems, particularly on health financing.

Plans

In the Philippines, openIMIS will be used as a tool to learn about health insurance at the clinical skills lab. The plan is to:

1. Identify participating medical and nursing schools
2. Identify participating network of students

3. Customize openIMIS Manual (with faculty guide) for use in the clinical skills lab
    a. Teach specific procedures for medical staff (service is performed to a dummy patient/mannequins)
    b. Computer station for recording medical procedure as service in the system
    c. Use openIMIS as a management information system
4. Provide openIMIS-on-the-cloud to participating schools (for testing and exploration)
5. Train faculty and selected students on how to use openIMIS in the clinical skills lab setting
6. Evaluate openIMIS lab manual with faculty guide

Status

Currently, the openIMIS Country Hub Philippines is preparing a clinical skills lab manual for openIMIS. It has already engaged with select faculty from the University of the Philippines Manila and St Luke's Medical Center. It has also recently partnered with the Asian Students Medical Association Philippines for the openIMIS initiative in the Philippines.

In June or July 2019, the openIMIS Country Hub Philippines will conduct a training of trainers (ToT) workshop with the aforementioned partners. The event will also be a venue for evaluating the openIMIS lab manual and the openIMIS software. Participants from the Institute of Finance and Management in Tanzania are also invited as part of AeHIN's collaboration with them for incorporating openIMIS in the academe.

D. openIMIS Country Hub Indonesia (Presentation by Anis Fuad, University of Gadjah Mada)

The openIMIS Country Hub in Indonesia plans to embed openIMIS into the Master of Public Health (MPH) curriculum at Universitas Gadjah Mada. The two-year MPH program in the university started in 1990. Every year, about 200-300 students are admitted in the program. Currently, it offers ten majors.

Indonesia plans to achieve UHC by 2019. With the latest data in February, 82% of the population are registered in BPJS Kesehatan, Indonesia's national health insurance. MPH students are exposed with BPJS Kesehatan's system through lecture, case studies, seminars, study visits, and internship.

However, given this scenario, MPH students are found to have limited exposure on the practical implementation of health insurance, such as processes for membership enrollment, claims management, fraud detection, and health facilities registration.

To adopt openIMIS in the curriculum, MPH students shall be able to understand the health system and health insurance context through various learning methods, practical use, tutorial, training by example, assignment, and feedback. All MPH students should learn and have competencies on health insurance and health information systems.

Practical health insurance competencies that may be enhanced among MPH students through openIMIS are deemed useful since most of the program's alumni are working in district health offices and healthcare facilities. Specifically, the majors that are most suitable are (1) Health Financing and Insurance and (2) Hospital Information Systems.

MPH Major in Health Financing and Insurance

Under the Health Financing and Health Insurance major, courses that can potentially benefit from openIMIS as a learning tool are: (1) health insurance, (2) managed care, and (3) provider payment mechanism.

Through openIMIS, MPH students majoring in Health Financing and Insurance may get hands-on experience, apart from just learning by theory. As a global good, openIMIS may also receive feedback for further improvement by transferring and sharing knowledge with the national health insurance manager, policy maker, and academic to adopt and develop the technology.

MPH Major in Health informatics/Health Information System Management

Under the Health Information Systems Management major, information technology track may potentially benefit from openIMIS as a learning tool. This includes areas on (1) Surveillance Information Systems, Electronic Health Records, Bioinformatics, and Database and Datawarehouse.

openIMIS may be potentially adopted in this major to understand managed care workflow in correlation with provider (hospital, primary health care) and insurance member, and to develop standard and interoperability of patient data for health services (referral), reporting, claim and reimbursement.

Steps for Implementation

These are the implementation steps for the openIMIS Country Hub Indonesia:

1. Identifying the learning objectives of the relevant courses
2. Develop specific learning and instructional courses based on the openIMIS features

3. Develop scenarios for learning and assignment
4. Collect students experiences on using OpenIMIS
5. Feedback from users during the exercise
6. Disseminate the results to Aehin and BPJS Kesehatan

E. Special Presentation: Health IT Collaboration with BPJS Kesehatan (Presentation by Wahyuddin Bagenda, BPJS Kesehatan)

BPJS Kesehatan is Indonesia's Social Security Administrative Body For Health. It is a state-owned enterprise that started in 2014. It's serving civil servants and retired civil servants, retired police, military, and veteran. BPJS Kesehatan aims to reach 215 Million for financing healthcare services. Currently, there is a financial gap in reaching this goal.

82.64% of the population are members of BPJS Kesehatan. The insurance is accredited in 27, 211 healthcare providers including primary care centers, hospitals, pharmacies, and opticals. Payment for premium collection may be done through its 682, 587 payment centers available across the country, including convenience stores and via online means.

Governance

The Ministry of Health sets the policy for setting provider payment rates and schedule, contribution rates, and benefits package.

BPJS Kesehatan is supervised and regularly audited by the Financial Audit Bureau, the Anti Corruption Committee, and the Public Accountant Office. It is also supervised and monitored by the Social Security Council.

BPJS Kesehatan has core and non-core outsourced applications. Out of its 7,000 staff, 500 are employed as IT staff.

Interconnection Architecture

About 27,000+ healthcare providers, 250,000+ corporations, 520+ offices, 20,000+ government agencies/institutions, and 682,000+ payment channels are currently connected to the BPJS Kesehatan information system. The BPJS mobile platform, Mobile JKN, with 4 million users, is also connected to the system.

The interconnection architecture of the BPJS Kesehatan enables a centralized application and database for both the private and public sector. The interconnection is made possible by web services and API.

Issues and Next Steps

One of the issues that BPJS is facing is that some healthcare providers would rather partner with commercial insurance providers. BPJS premium is too low to be accepted by some healthcare providers. Apart from the challenge in collection ration, they also encounter difficulty in terms of the quality of infrastructure in provincial and district hospitals.

In Indonesia, premium value is decided upon by the government. Minimum payment value varies according to class. Benefits garnered by the classes only have minimal difference. Meanwhile, business premium value depends on the amount of salary. In terms of the processes, verification of claims is still done manually. Management of penalties for delayed claims is also considered an issue.

Today, BPJS is in the process of finishing the pilot implementation of eClaims for hospitals. Soon, healthcare providers will also be required to have bank accounts to enable direct payment from BPJS. As part of its strategy to reach their financial goals, BPJS Kesehatan endeavors to create money from data. Thus, all data are stored. The newly released policy also allows pharmacies to use the data.