



DIGITAL HEALTH CONVERGENCE MEETING TOOL KIT

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ABBREVIATIONS

ADB	Asian Development Bank
AeHIN	Asia eHealth Information Network
CCD	continuity of care document
CCR	continuity of care record
CDA	Clinical Document Architecture
COBIT	Control Objectives for Information and Related Technologies
CRVS	civil registration and vital statistics
DHIS	District Health Information System
GAPS	governance, architecture, program management, standards and interoperability
GDPM	General Department of Preventive Medicine
GIS	geographic information system
HEAT	health equity assessment tool kit
HIE	health information exchange
HIS	health information system
HL7	Health Level Seven International
HMIS	health management information system
ICD	International Classification of Diseases
ICT	information and communication technology
IT	information technology
ITU	International Telecommunication Union
LOINC	Logical Observation Identifiers Names and Codes
M&E	monitoring and evaluation
MOH	Ministry of Health
MPI	master patient index
NGO	nongovernment organization
OpenHIE	Open Health Information Exchange
PHMIS	public health management information system
PIMS	patient information management system
RHIS	routine health information system
SDG	Sustainable Development Goal
SNOMED CT	Systematized Nomenclature of Medicine-Clinical Terms
TMT	Thai Medicine Terminology
TOGAF	The Open Group Architecture Framework
UNAIDS	Joint United Nations Programme on HIV/AIDS
UNICEF	United Nations Children's Fund
WHO	World Health Organization

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ABOUT THE TOOL KIT

Do you want to understand how your country uses information and communication technology in the health system, and plan for your country's future digital health needs?

This tool kit is for you. It provides

- a practical framework for structuring digital health road maps,
- a guide to running a digital health convergence workshop, and
- insights from previous country convergence workshops.

This tool kit comprises information on how to create a shared vision for digital health through a national digital health strategy, focused on maximizing the value of resources. It supports efforts to introduce digital health solutions that make health systems interoperable and less fragmented, i.e., enabling different parts of the health system to connect with each other to provide equitable access to health care services and offer each and every patient continuity of care.

Section I is an introduction to digital health, WHO-ITU National eHealth Strategy Tool kit and the AeHIN Mind the GAPS* Framework, which are used for conducting a convergence workshop. Section II details the process for convening a convergence workshop. This is where national implementers, stakeholders and international digital health experts can come together to share experiences and outline national digital health needs, align them with available resources, and closely collaborate with development partners for resource mobilization. The process is designed to be general and universal in many respects and, therefore, flexible enough for adaptation to country needs. Section III describes country experiences of running convergence workshops for digital health information systems strengthening in Bhutan, Indonesia, Myanmar, Nepal, Timor-Leste, and Viet Nam.

The tool kit is intended for digital health implementers working in or with ministries of health at various levels of the health system, and stakeholders from other ministries, development partners, nongovernment organizations, and academia to expand their understanding of digital health. It is aimed at policy makers, health care personnel, health care providers, and health information administrators. Other stakeholders and agencies can use the tool kit as a source of background information when working on a country's health information system.

* Governance, architecture, program management, and standards and interoperability.

I. HEALTH INFORMATION SYSTEMS STRENGTHENING IN COUNTRIES

A. Introduction to Digital Health

Digital health (also known as eHealth) is the application of information and communication technology (ICT) solutions in the health system. Digital health systems must be interlinked if they are to ensure reliable and robust communications between health centers, laboratories, clinics, and medical offices, and the wider telecommunication infrastructure. They should include reliable and user-friendly devices; integration of ICT and information management skills into the training of health workers, content that reflects local languages and culture, and surveillance systems for health risks and emergencies. The use of ICT in health supports the collection of health data, which can be analyzed and interpreted for decision-making purposes. However, a lack of health information system (HIS) policies for health information system, vertically structured and siloed health programs, and fragmented HISs are typical constraints in less-developed countries.¹

When countries try to introduce digital health solutions, it is common to run into difficulties that start with understanding what digital health solutions are needed, and how they can be best implemented to support countries to overcome their health-related challenges. This is particularly acute in resource-constrained settings. A shared vision is essential to overcoming these difficulties, building capacity in digital health, and setting plans of action.

Digital health can be defined as a broad range of informatics applications for facilitating the management and delivery of health care, including dissemination of health-related information, storage and exchange of clinical data, interprofessional communication, computer-based support of patient-provider interaction, education, health service management, health communities, and telemedicine, among other functions. Digital health encompasses mobile health (mHealth) which involves the provision of health services and information via mobile technologies.² Digital health is also related to electronically connecting up the points of care so that health information can be shared securely.³

B. Health Information Systems

An HIS is any system that captures, stores, manages, or transmits information related to the health of individuals or the activities of organizations that work within the health sector. HIS provides support for

¹ Health in Asia and the Pacific. 2008, World Health Organization - Western Pacific & South-East Asia. http://www.wpro.who.int/health_research/documents/Health_in_Asia_and_the_Pacific/en/.

² eHealth. World Health Organization <http://www.who.int/ehealth/en/>; Digital health in TB care and control. World Health Organization <http://www.who.int/tb/areas-of-work/digital-health/faq/en/>.

³ What is digital health? Australian Digital Health Agency; www.digitalhealth.gov.au/get-started-with-digital-health/what-is-digital-health.

decision making, and consists of four functions related to data: generation, compilation, analysis and synthesis, and communication and use. It incorporates systems for routine information, disease surveillance, laboratory information, patient administration, and human resource management. In fact, the HIS is an integrated effort to collect, process, report, and use health information and knowledge to influence policy and decision making, program action, individual and public health outcomes, and research.⁴

An HIS cannot successfully function without the commitment of different sectors and agencies. Moreover, evidence-based decision making on health policy and resource mobilization needs reliable information from different sectors and agencies such as the ministry of health (MOH), national statistics agencies, and international organizations working on health.⁵

When properly implemented, digital health solutions within a health system enable different technology systems and software applications to work together, so that systems for disparate providers can communicate, share data, and exchange information while protecting privacy and confidentiality.

C. Health Information Systems in Low- and Middle-Income Countries

Before low-income and middle-income countries attempt to establish an HIS, it is first necessary to strengthen the overall informatics infrastructure. ICT has been changing in many sectors such as education, economic, banking, and rural development. There are ICT-enabled programs in health care, but in general the sector has been slow to adapt. To attain better health, effective health information architecture is needed. However, limited financial resources, lack of technical infrastructure, and an insufficient health care workforce are common challenges in developing countries.⁶ In addition, lack of acceptance, inadequate information communication, and suboptimal process guidance are also commonly found challenges.⁷ Standards to achieve interoperability are not yet fully implemented in developing countries.⁸

D. Tools Used in a Digital Health Convergence Workshop

In realizing a vision for digital health, various components have to be in place. The national digital strategy tool kit and the governance, architecture, program management, and standards and interoperability (GAPS) framework from the Asia eHealth Information Network (AeHIN) (Box 1) can be used to identify that vision, assess the current state of play, and operationalize action plans to achieve stated targets. This tool kit and framework are the main tools used in running a digital health convergence workshop.

⁴ Health Information Systems (HIS). Pacific Health Information Network <http://phinnetwork.org/resources/health-information-systems-his/>.

⁵ Haux R. Health information systems - past, present, future. *International Journal of Medical Informatics*, 2006 Mar-Apr;75(3-4):268-81. www.ncbi.nlm.nih.gov/pubmed/16169771

⁶ Are e-Health Programs Effective in Developing Countries? Evidence-Informed Policy Network (EVIPNet) July 2012. http://www.cdbph.org/documents/Rapid_Response_Effectiveness_of_e_health_programs_in_LMIC_july2012.pdf.

⁷ Fulgencio H. E-Health for Developing Countries: A Theoretical Model Grounded on Literature. *E-Systems for the 21st Century: Concept, Developments, and Applications*. Eds. Kadry S, El Hami A. Apple Academic Press, 2014.

⁸ Muchangi Mugo D. Determinants of Electronic Health in Developing Countries *International Journal of Arts and Commerce* 2014;3(3).

Box 1: Asia eHealth Information Network^a

The Asia eHealth Information Network (AeHIN) is a network of digital health professionals set up to promote better use of information and communication technology (ICT) to achieve better health through peer-to-peer assistance, and knowledge sharing and learning, through a regional approach for greater country-level impacts across South and Southeast Asia.

AeHIN maintains that better health can be achieved by strengthening evidence-based policies and health systems through better-quality health information systems (HIS) and civil registration and vital statistics. AeHIN further asserts the role of digital health as an enabler to improve the flow of information through electronic means, to support the delivery of quality and equitable health care services and management of health systems.

To achieve this, AeHIN works in four strategic areas to

- enhance leadership, sustainable governance, and monitoring and evaluation;
- increase peer assistance and knowledge exchange and sharing through effective networking;
- promote standards and interoperability within and across countries; and
- build capacity for digital health, HIS, and civil registration and vital statistics in countries and in the region.

AeHIN promotes four core principles for guiding its activities:

- Work toward country ownership and leadership.
- Emphasize strategic reuse of digital health and HIS investments.
- Implement open standards to promote interoperability.
- Promote openness through an open systems environment.

^a About Us. Asia eHealth Information Network. <http://www.aehin.org/>.

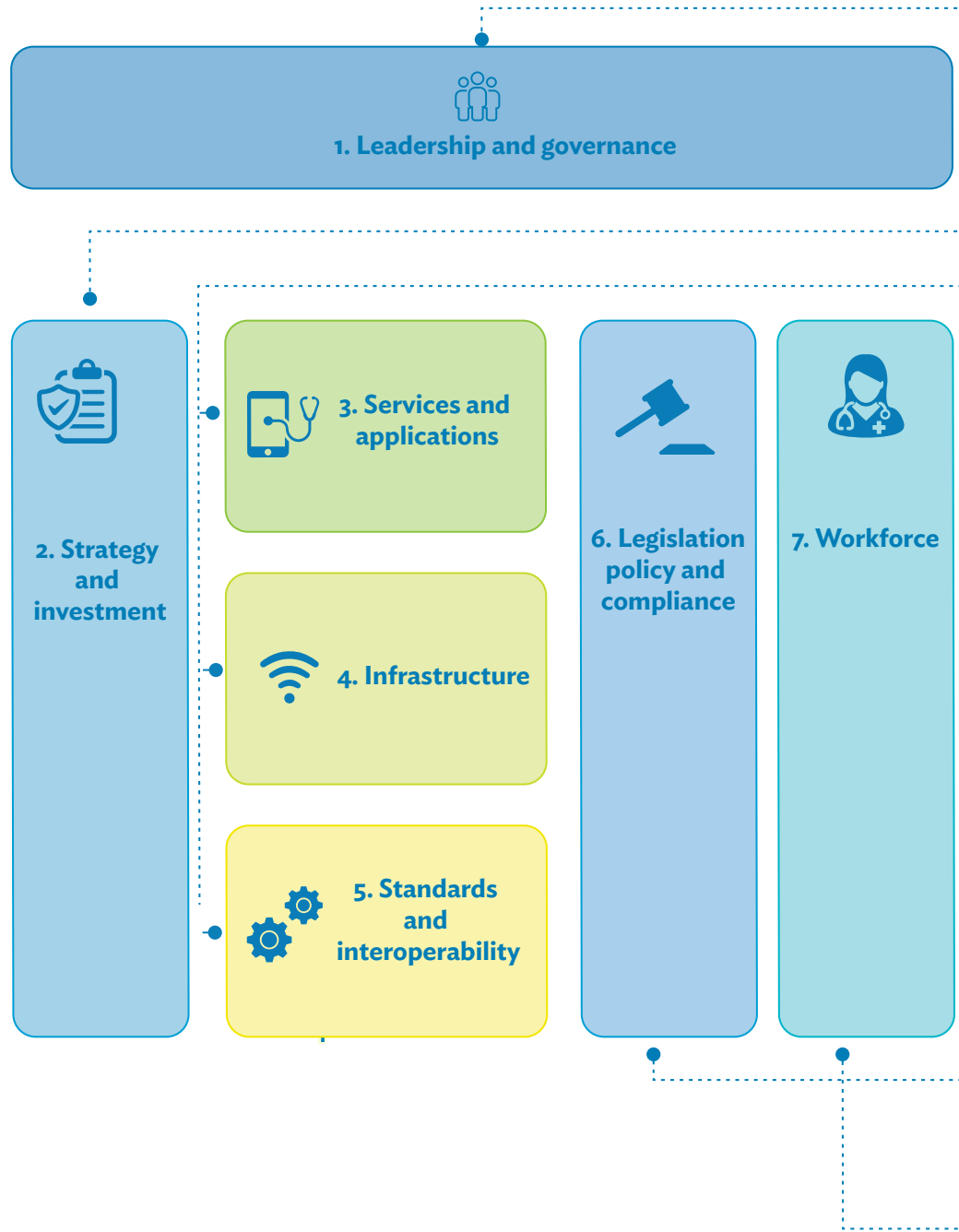
Source: Authors.

E. National eHealth Strategy Tool kit

Incorporating ICT is considered as a priority for health systems development. Collaboration between the health and ICT sectors, and between public and private sectors, is critical. With that in mind, the National eHealth Strategy tool kit, published by the World Health Organization (WHO) and the International Telecommunication Union (ITU) in 2012, is intended for countries to adapt and employ digital health and to develop national digital health strategies.⁹ There are seven components to a national digital health environment, each of which must be strengthened through a digital health strategy (Figure 1).

⁹ National eHealth Strategy Tool kit 2012. World Health Organization and International Telecommunication Union. Geneva, 2012. www.itu.int/dms_pub/itu-d/opb/str/D-STR-E_HEALTH.05-2012-PDF-E.pdf

Figure 1: WHO-ITU National eHealth Strategy Tool kit Components



1

Objectives

Direct and coordinate national, state, regional, and local digital health activities towards the delivery of a national digital health environment

Common components

- o Program management
- o Stakeholder engagement
- o Strategic architecture
- o Clinical safety
- o Management and operation
- o Monitoring and evaluation, and policy oversight

Recommended outputs

- o Leadership and governance bodies and mechanisms
- o Roles and responsibilities
- o Relationships between these governance bodies and mechanisms

2

Objectives

Develop, operate, and sustain the national digital health environment

Common components

- o Strategy and planning
- o Funding
- o Investment management

Recommended outputs

Description of the digital health strategy and investment components required to support the development and operation of the national digital health environment

3

Objectives

Identify the digital health service and application components required to address the health system goals

Common components

- o Individual electronic health information
- o Health care communications and collaboration
- o Health care service delivery tools
- o Health information and knowledge
- o Health care management and administration

Recommended outputs

Description of the digital health service and application components required to deliver the digital health outcomes described by the initial digital health vision

4

Objectives

- o Identify the digital health infrastructure to support the sharing of structured and meaningful health information across geographical and health sector boundaries
- o Support new and improved ways of delivering health care services and information

Common components

- o High-speed data connectivity
- o Computing infrastructure
- o Identification and authentication service
- o Directory service
- o Health-care provider systems
- o Individual electronic health record repositories
- o Health information datasets

Recommended outputs

Description of the digital health infrastructure components required to support the digital health service and application components identified

5

Objectives

Identify standards and interoperability components required to enable the consistent and accurate collection and exchange of health information across geographical and health sector boundaries

Common components

- o Data structure standards
- o Common terminologies
- o Messaging standards
- o Secure messaging standards
- o Software accreditation standards

Recommended outputs

- o Component supports digital health service and application components
- o Digital health infrastructure components
- o Broader changes to health information flows required to deliver the digital health outcomes described in the initial digital health vision

6

Objectives

Identify the digital health legislation, policy, and compliance components that are required to support the development and operation of the national digital health environment

Common components

- o Legislation
- o Policy
- o Digital health specific policy
- o Compliance

Recommended outputs

Description of the digital health legislation, policy, and compliance components required to develop and operate the national digital health environment

7

Objectives

Identify the digital health workforce components required to design, develop, operate, and support the national digital health environment

Common components

- o Health workforce
- o Health information and communication technology workforce

Recommended outputs

Description of the digital health workforce components required to develop, operate, and support the national digital health environment

F. The Asia eHealth Information Network's Governance, Architecture, Program Management, and Standards and Interoperability Framework

AeHIN has proposed a framework called Mind the GAPS. Countries must mind their governance, architecture, program management, and standards and interoperability (GAPS). The rationale behind the GAPS framework is that a national HIS is complex, and requires a governance framework to bring the components of the system together. The governance mechanism, in turn, empowers architecture, which acts as a blueprint for a progressively stronger HIS. The right people with sufficient capacity are needed to strengthen HIS based on the blueprint. Without proper standards, health data cannot be exchanged. With standards, health systems will be interoperable within the defined architecture.

Once countries are aware of their GAPS, the next step is to fill those GAPS. To do this, countries must decide

- how to create a governance framework,
- how to choose architecture,
- how to manage the program, and
- how to select standards.

Then, the country can prioritize which gaps should be filled in the near future, whom to assign to fill the gaps, and how to obtain the resources within the country and elsewhere. Detailed descriptions of the components of the GAPS framework are described in the following section.

1. Governance

Leadership and governance of national digital health systems play an important role for a country to achieve interoperability through health data standards.¹⁰ Governance systems set the parameters under which management and administrative systems will operate. There are numerous examples of ICT governance frameworks (Table 1), and countries, such as the Philippines, have adapted them for use in their health system (Figure 2).

Health ICT governance covers

- (i) the data requirements of specific health programs,
- (ii) the effective use of ICT to achieve the goals set, and
- (iii) how to monitor and evaluate the information technology performance in the program.

¹⁰ "ADB. 2018. *Transforming Health Systems through Good Digital Health Governance*. Manila." <https://www.adb.org/sites/default/files/publication/401976/sdwp-051-transforming-health-systems.pdf>.

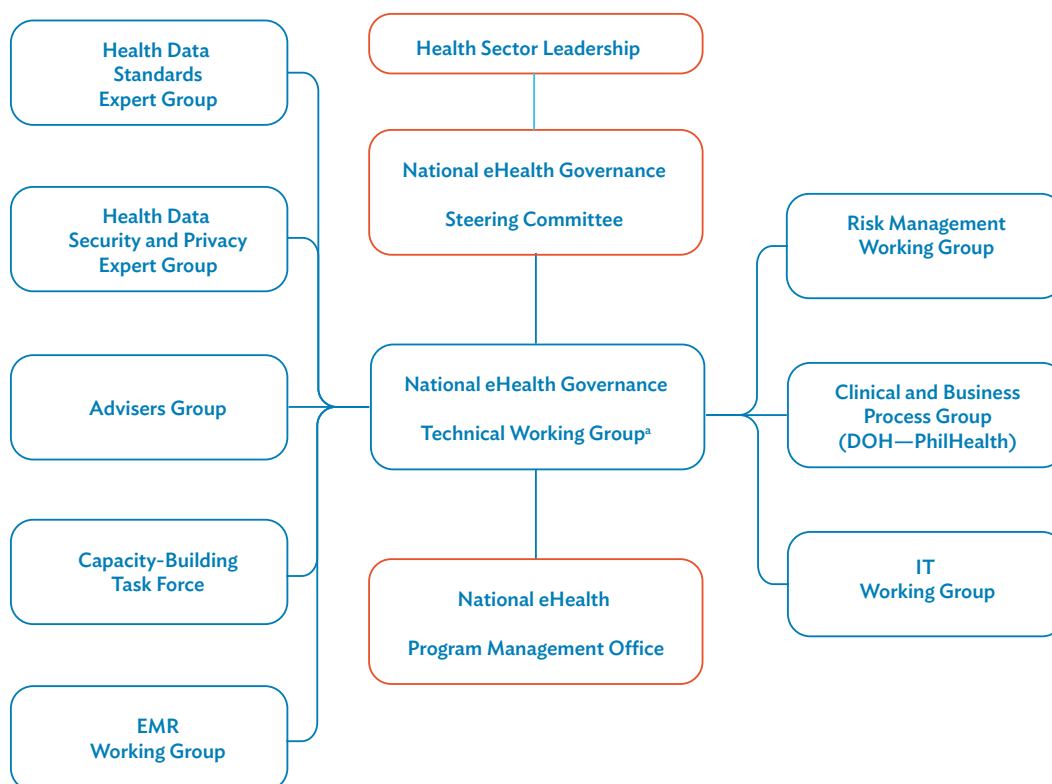
Table 1: Examples of Information and Communication Technology Governance Frameworks

Name	Description
ISO 38500 (Corporate Governance of Information Technology) ^a	<ul style="list-style-type: none"> Guiding principles for members of governing bodies of organizations on the effective, efficient, and acceptable use of information technology (IT) within their organization Applicable to all organizations, including public and private companies, government entities, and not-for-profit organizations
COBIT5 (Control Objectives for Information and Related-Technology) ^b	<ul style="list-style-type: none"> Business framework for the governance and management of enterprise IT Generic and useful for enterprises of all sizes, whether commercial, not-for-profit or in the public sector

^a ISO/IEC 38500:2015. Information technology -- Governance of IT for the organization. International Standards Organization, 2015. www.iso.org/standard/62816.html.

^b What is COBIT 5? ISACA. <https://cobitonline.isaca.org/about>.

Source: Authors.

Figure 2: Philippine eHealth Governance Framework

DOH = Department of Health, EMR = electronic medical record, IT = information technology, PhilHealth = Philippine Health Insurance Corporation

^a The technical working group has been designated as the enterprise architecture board by the Steering Committee (Jul 203, 2014)

Source: ehealth.gov.ph.

2. Architecture

The health care sector faces a lack of interoperability between information systems as they have different business procedures and ICT architecture. The solution to that problem is enterprise architecture. This is a tool that aligns an organization's business-process with applications and ICT through enterprise architecture models. It offers a big picture about how business functions and ICT work combine within a framework. As a result, enterprise architecture enhances the managerial decision-making capability, and enables the organization to better understand information technology (IT) capabilities by aligning business functionalities with relevant IT resources.¹¹

Enterprise architecture provides an approach and outcome to enable the organization to better understand what is there today, what is needed for tomorrow, and how to get there. It will help the country to decide which investments should be made (Table 2 and Figure 3).¹²

Table 2: Examples of Enterprise Architecture

Name	Description
TOGAF ^a	Enables organizations to effectively address critical business needs by ensuring that everyone speaks the same language; avoiding lock-in to proprietary solutions by standardizing on open methods for enterprise architecture; saving time and money, utilizing resources more effectively and achieving demonstrable return on investment
OpenHIE ^b	Supports interoperability by creating a framework that maximally leverages health information standards, enables flexible implementation by country partners, and supports interchangeability of individual components

HIE = health information exchange, TOGAF = The Open Group Architecture Framework.

^a TOGAF®, an Open Group standard. The Open Group. <http://www.opengroup.org/subjectareas/enterprise/togaf>

^b Architecture Framework. OpenHIE. <https://ohie.org/architecture/>

Source: Authors.

3. Program Management

Program management is the application of knowledge, skills, tools, and techniques to meet program requirements (Table 3). Organizations with mature program management are far more successful than those without it.¹³

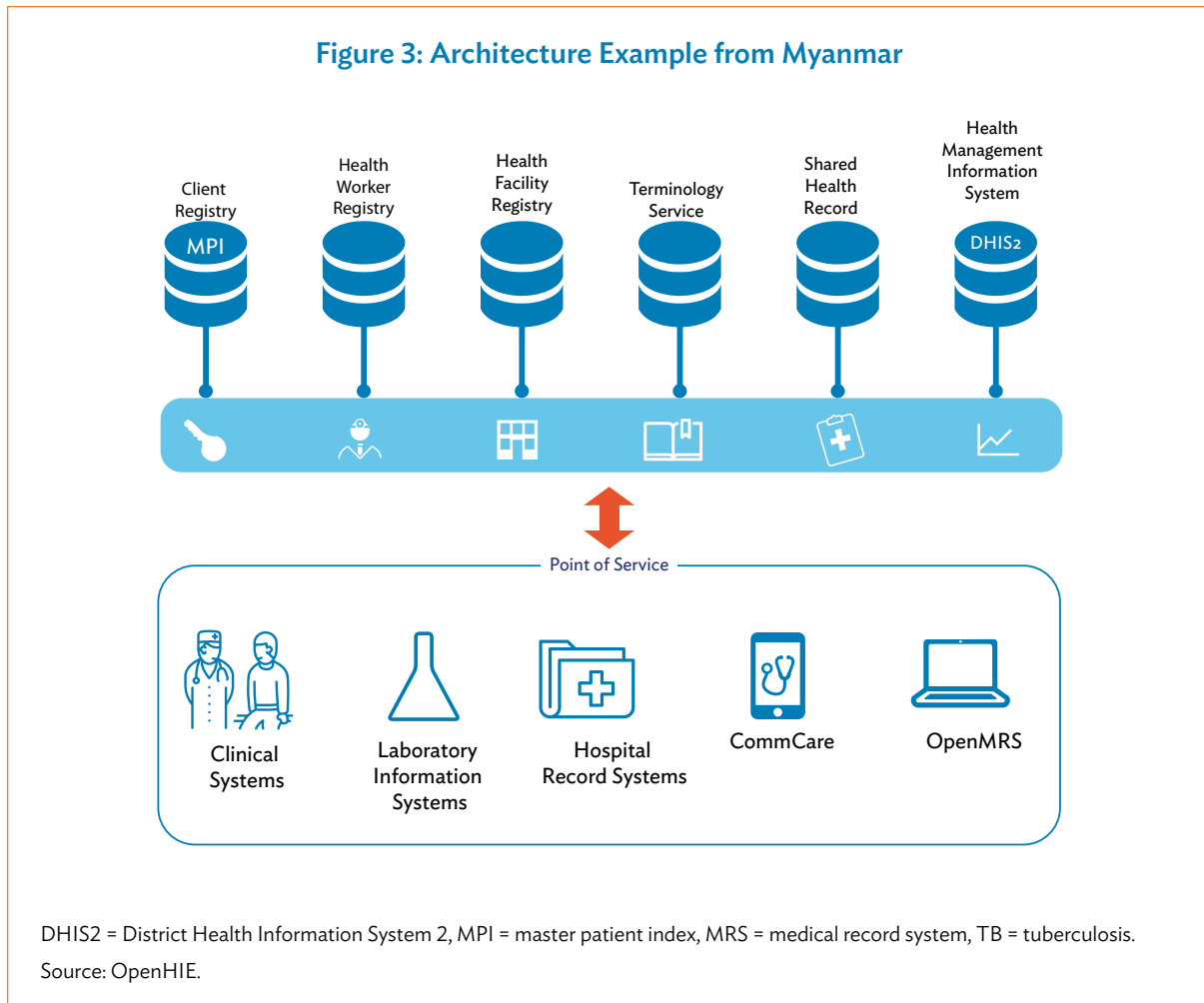
Governments and regulatory agencies play a significant role in health program management. To enable the health service providers to get the most out of the investment, the programs should be efficiently and optimally managed. Program managers should pay attention to human resources, facilities, and technology to be used to sustain health services.

Health care program managers, who have to navigate activities that span across departments in the ministry and to align results with health outcomes goals, should have a skill set in program management. The success of any program depends on thorough planning and efficient management. In addition, program coordination,

¹¹ Sajid M, Ahsan K. Role Of Enterprise Architecture in Healthcare Organizations and Knowledge-Based Medical Diagnosis System. *Journal of Information Systems and Technology Management*, 2016;13(2):181-192. <http://www.scielo.br/pdf/jistm/v13n2/1807-1775-jistm-13-2-0181.pdf>.

¹² What is Enterprise Architecture? Healthcare Information and Management Systems Society, 2011. https://s3.amazonaws.com/rdcms-himss/files/production/public/HIMSSorg/Content/files/MEPI/EA_FAQ.pdf.

¹³ Program Management. Institute of Program Management. www.pmi.org/learning/featured-topics/program.



such as planning, monitoring, and control of all aspects of the programs to achieve the goal, is one of the main tasks of the program manager.

Table 3: Example of Program Management

Name	Description
PMBOK ^a	<ul style="list-style-type: none"> (i) Entire collection of processes, best practices, terminologies, and guidelines that are accepted as standards within the project management industry (ii) Provides guidelines, rules, and characteristics for project, program, and portfolio management

^a PMBOK® Guide and Standards. Institute of Program Management. www.pmi.org/pmbok-guide-standards.

PMBOK = Project Management Body of Knowledge.

Source: Authors.

4. Standards and interoperability

Standards in health care are quintessential to create electronic health records, and exchange health data among health care providers. From a broader perspective, standards are needed to achieve interoperability, enabling data sharing in health care.

Interoperability describes the extent to which systems and devices can exchange data, and interpret that shared data. In health care, interoperability is the ability of different IT systems and software applications to communicate, exchange data, and use the information that has been exchanged.

There are three types of interoperability pertinent to health: technical, syntactic, and semantic interoperability (Table 4). The interoperability standards needed in specific countries vary according to a country's vision of HIS. Before adopting any international standards, stakeholders involved in the process need to be informed and consulted.

Typically, the MOH should lead the development and adoption of health data standards. Later, the benefits of the standards should be shared with all the stakeholders before adopting or developing any standards. Adopting standards can be expensive with member fees, and sometimes countries select to develop the standards of their own, such as Thailand's Thai Medicine Terminology (Box 2).

Box 2: Thai Medicine Terminology

Thailand studied five medicine terminologies: Australian Medicines Terminology in Australia; the Dictionary of Medicines and Devices in the United Kingdom; the National Drug Code, and RxNorm in the United States; the Hong Kong Medication Terminology Table in Hong Kong, China; and the Singapore Drug Dictionary in Singapore.

The Thai Health Information Standards Development Center then developed the national drug coding system, the Thai Medicine Terminology (TMT).^a The concept-based terminology model is applied for TMT development. The TMT is designed for reimbursement and administrative purposes, and can be used in multiple dimensions such as drug inventory and logistics, drug prescription and dispensing, and drug interaction.

^a Thai Medicine Terminology. Thai Health Information Standards Development Center. <http://this.or.th/tmt.php>.

Source: Authors.

Table 4: Categories of Health Information Standards

Category	Examples	Description
Content exchange standards (standard data set)	Continuity of Care Document (CCD)	CCD, an implementation guide for sharing Continuity of Care Record (CCR) patient summary data using HL7 Version 3. Clinical Document Architecture (CDA), Release 2, is a set of templates representing the typical sections of a summary record, and expresses these templates as constraints on CDA. These same templates can then be reused in other CDA document types, establishing interoperability. ^a
Semantic standard (standard vocabularies)	International Classification of Diseases (ICD)	ICD is the standard diagnostic tool for epidemiological, health management, and clinical purposes, including the analysis of the general health situation of population groups. ^b
	Logical Observation Identifiers Names and Codes (LOINC)	The LOINC database provides a set of universal names and identity codes for identifying laboratory and clinical test results in the context of existing HL7, ASTM E1238 (Standard Specification for Transferring Clinical Observations Between Independent Computer Systems), and CEN/TC 251 (European Committee for Standardization Technical Committee) observation report messages. LOINC codes are intended to identify the test result or clinical observation. Other fields in the message can transmit the identity of the source laboratory and special details about the sample. ^c
	Systematized Nomenclature of Medicine–Clinical Terms (SNOMED CT)	SNOMED CT is the most comprehensive, multilingual clinical health care terminology in the world, and enables consistent representation of clinical content in electronic health records. It can be mapped to other international standards. ^d
Messaging standard	Health Level Seven International (HL7)	HL7 refers to a set of international standards for transfer of clinical and administrative data between software applications used by various health care providers. ^e
	Fast Healthcare Interoperability Resources (FHIR)	FHIR is a draft standard describing data formats and elements (known as "resources") and an application programming interface (API) for exchanging electronic health records. The standard was created by the Health Level Seven International (HL7) health-care standards organization. FHIR provides an alternative to document-centric approaches by directly exposing discrete data elements as services. For example, basic elements of healthcare like patients, admissions, diagnostic reports and medications can each be retrieved and manipulated via their own resource URLs.
Security and privacy standards	International Organization for Standardization (ISO) 27799:2008 Information security management in health using ISO/IEC 27002	ISO 27799:2008 specifies a set of detailed controls for managing health information security, and provides health information security best practice guidelines. By implementing this international standard, health care organizations and other custodians of health information will be able to ensure a minimum requisite level of security that is appropriate to their organizational circumstances and that will maintain the confidentiality, integrity, and availability of personal health information. ^f

^a HL7/ASTM Implementation Guide for CDA® R2 –Continuity of Care Document (CCD®) Release 1. Health Level Seven® International http://www.hl7.org/implement/standards/product_brief.cfm?product_id=6.

^b Classifications. World Health Organization. <http://www.who.int/classifications/icd/en/>

^c What is LOINC? <https://loinc.org/faq/basics/>.

^d What is SNOMED CT? SNOMED International. <https://www.snomed.org/snomed-ct/what-is-snomed-ct>.

^e About HL7. Health Level Seven® International. <http://www.hl7.org/about/index.cfm?ref=nav>.

^f Galan Manso C, Rekleitis E, Papazafeiropoulos F, et al. Information security and privacy standards for SMEs. European Union Agency for Network and Information Security, 2015; A www.enisa.europa.eu.

II. CONVERGENCE WORKSHOP GUIDELINES

This chapter outlines the components that can be utilized to conduct a convergence workshop. The convergence approach brings together a country's health information users and producers to effectively strengthen its HIS. It is intended for government officials from different ministries, digital health professionals in countries, and technical experts committed to the successful implementation and strengthening of the HIS. Coordinated support from United Nations agencies, international organizations, and international and local nongovernment organizations (NGOs), and collaboration among ministries plays a crucial role in conducting the workshop.

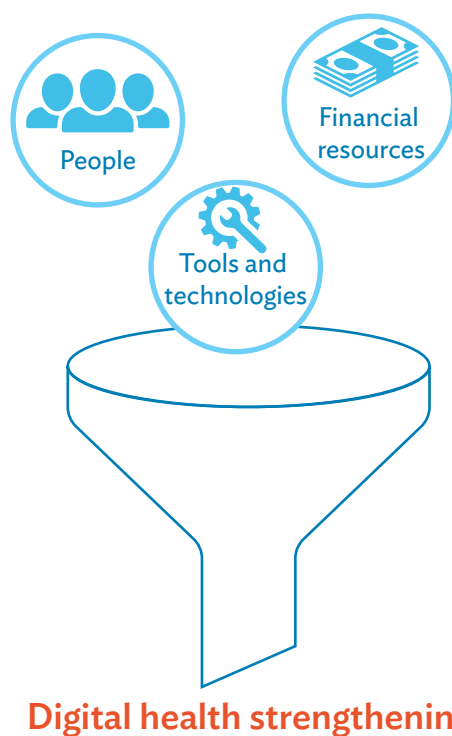
A. What is a Convergence Workshop?

A convergence workshop in the context of this tool kit means the process of gathering all stakeholders and creating an environment where participants from different backgrounds come together and learn more about new concepts, tools, or solutions available in health care to achieve quality of care with digital health. It can also be described as an act of converging people, resources, tools, and technologies available for respective country to help strengthen a digital health vision (Figure 4).

B. Why is there a Need for Convergence Workshop?

In general, HISs are often uncoordinated and fragmented, which can affect data quality. A comprehensive HIS is needed, which improves health care quality, and decision making for health sector planning, taking into consideration current activities, available resources, major health problems, and the digital health vision of the country concerned. The Asian Development Bank (ADB) and other development partners, such as AeHIN, WHO, and the United Nations Children's Fund (UNICEF), collaborated on convening digital health strengthening workshops in-country, and proposed the convergence workshop design based on country-specific needs. Between 2015 and 2017, six convergence workshops were conducted in Bhutan, Indonesia, Myanmar, Nepal, Timor-Leste, and Viet Nam.

The convergence workshop comes as a fundamental event to identify mechanisms to strengthen HIS in the country. The health sector is not solely responsible for the health of people: issues such as transport, agriculture, housing, trade, and foreign policy also impact health. Improving population health requires the engagement of all sectors of government. In this regard, applying a convergence approach in health systems strengthening will play a central role in addressing key issues across sectors. In addition, bringing together stakeholders from different sectors will allow them to work toward a common goal.

Figure 4: Convergence Approach

Source: Authors.

The convergence workshops, a symbol of commitment for action, can help the country to

- review current and planned health information systems and digital health solutions;
- sensitize stakeholders on the importance of digital health governance, policy, enterprise architecture frameworks, standardization and interoperability, capacity development and program management, and how these relate to the national digital health strategy;
- identify gaps and agree on next steps to implement an interoperable and standards-driven digital health architecture;
- identify priorities, key action plans, and investments toward developing more cost-effective, sustainable, and interoperable digital health solutions to improve health service delivery; and
- operationalize action plans and investments set during the workshop by the stakeholders involved, and ensure that ICT health governance and interoperability requirements are identified.

C. What are the Benefits of a Convergence Workshop?

1. Multisectoral and cross-ministry collaboration

The convergence process will allow individual stakeholders to collaborate, especially engaging with stakeholders from different ministries and departments. In other words, the convergence approach is a process of interaction among different stakeholders, including policy makers, implementers, development partners, technical experts, and users to achieve shared vision of the country's digital health development plans.

2. Alignment of resources, core stakeholders, and coordinated care, investments, and initiatives on a national scale.

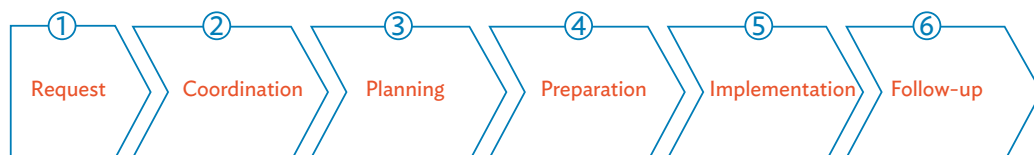
The convergence workshop aims to strengthen the current digital health activities, leverage HIS investments, and share what works and what does not, mobilize the development partners, and, more importantly, create a sense of ownership and commitment from stakeholders.

The convergence workshop offers all stakeholders the opportunity to see the big picture and address any redundancies. There is a requirement for coordinated and integrated health system that enables different health IT systems to communicate and exchange meaningful information.

D. How to Conduct a Convergence Workshop

The convergence workshop process may differ, but Figure 5 represents six stages that usually take place in conducting the convergence workshop—request, coordination, planning, preparation, implementation, and follow-up stages.

Figure 5: Stages in Convening a Digital Health Convergence Workshop



Source: Authors.

1. Request

The convergence workshop process normally starts with the request from digital health champions from the country, or under the initiative of development partners either at the AeHIN General Meeting or by email communication. Upon receipt of the request from the country or individual from country, the core group meets virtually or physically to reflect on who is to be involved, what resources are available, when is the best time, and to ensure that the workshop is designed in alignment with country needs.

2. Coordination

Strengthening digital health requires knowledge and expertise across several fields, and thus needs a core strategy team with different expertise from different agencies. Different development partners with a shared interest work together to achieve the overarching purpose in digital health. ADB, AeHIN, WHO, UNICEF, and other partners act as a core team to address specific issues. The core group also estimates the required financial resources, prepares for necessary technical assistance, and coordinates with partners. The group makes the best use of the organizations' resources, including technical expertise, financial support, or policy support for the country. Senior health sector government representative involvement in the core group plays a pivotal role in the overall success. That coordination among the core group and with the respective government will ensure that all interests and activities from different partners are aligned.

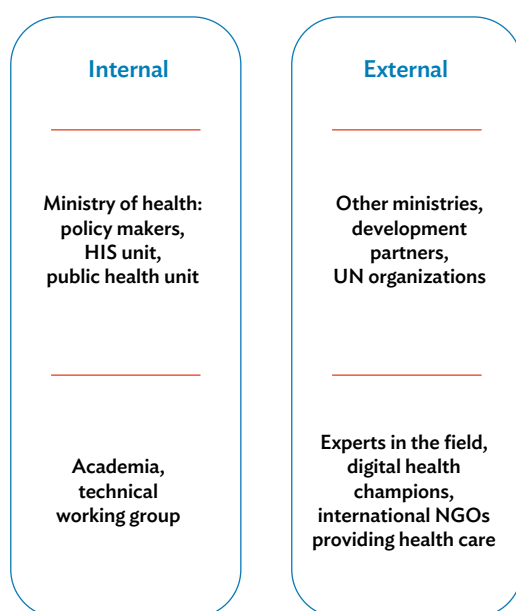
3. Planning

One of the responsibilities of the core group in conducting the workshop is to plan and help design the workshop outline. During the process, the lead ministry and digital health champions in the country and the lead organizer decide on what digital HIS activities to focus on, which programs to highlight, and which tools to advocate in advance. It is important to engage stakeholders from the beginning, throughout the workshop, and during the follow-up actions stage.

a. Stakeholders

There will be different stakeholders with different values and understanding of HIS in the country. They need to collaborate to achieve the overall objective of strengthening the HIS (Figure 6).

Figure 6: Internal and External Stakeholders



HIS = health information system, NGO = nongovernment organization, UN = United Nations.

Source: Authors.

Potential stakeholders include the following:

- (i) departments in MOH and technical working groups, other related ministries;
- (ii) development partners;
- (iii) international NGOs;
- (iv) experts in related fields; and
- (v) end users.

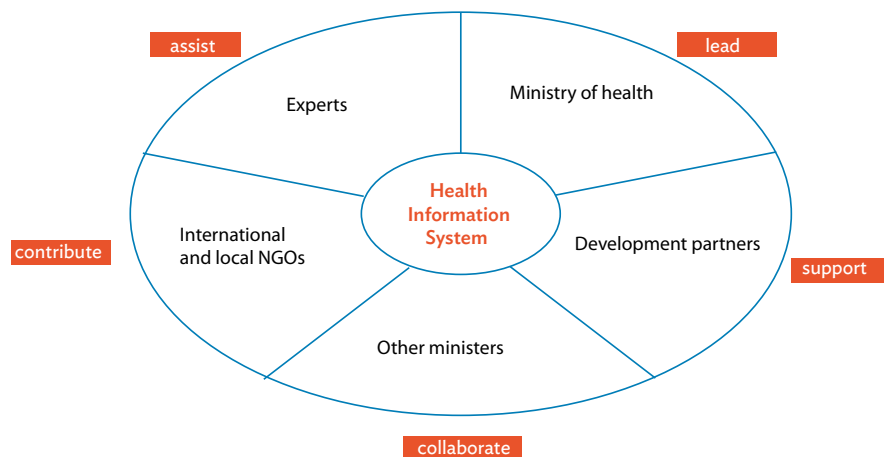
Communicating with digital health champions in the respective country is crucial at this stage. The core group has to consult with them and find out who are the key influencers, stakeholders, and champions in the country, and what information is needed for the success of HIS strengthening.

b. Stakeholder Engagement

Government commitment is critical and routine engagement with various stakeholders is needed. By gathering all the stakeholders, policy makers can set and define the country's HIS direction, program managers can share their experience and needs related to their programs, and development partners can identify and propose their support as required by the country. Coordination among stakeholders is key in implementation as they have distinct roles (Figure 7). Representatives from various ministries as well as other stakeholders such as donors, United Nations organizations, and international and national NGOs, should be part of the workshop. Lack of policy maker's commitment is one of the challenges, and ensuring that they are on board with the planned activities is of vital importance.

Since digital health activities require a multidisciplinary approach, it is essential to include all stakeholders from related department and ministries, including planning, finance, and clinical personnel. Teams involved may vary depending on the country's specific vision. Participants identified have different roles such as leadership, support, contribution, and assistance in strengthening the HIS in the country.

Figure 7: Roles of Stakeholders



NGO = nongovernment organizations.

Source: Authors.

Table 5: Stakeholders and Their Roles

Stakeholder	Roles
Policy makers	<ul style="list-style-type: none"> • Set the overall direction and objectives for the HIS. • Ensure alignment with country health plan. • Provide political commitment to the HIS. • Ensure that required resources are accessible. • Coordinate with other ministries involved in the process.
Directors (health information system, health management information system, eHealth unit, health systems strengthening unit)	<ul style="list-style-type: none"> • Provide support to the implementation group. • Ensure that the progress is aligned with the planned activities. • Collaborate with other stakeholders involved. • Report progress to policy makers.
Ministry of information and communications technology	<ul style="list-style-type: none"> • Provide background information on the setting and capabilities of current programs. • Provide necessary input to the proposed programs. • Ensure that proposed programs are within reach.
Legal	<ul style="list-style-type: none"> • Provide legal input and ensure the legal compliance to the planned activities. • Provide the necessary guidance.
Program managers	<ul style="list-style-type: none"> • Identify the requirements of the proposed programs.
Development partners	<ul style="list-style-type: none"> • Support the requirements.

HIS = health information system.

Source: Authors.

4. Preparation

a. Recognition of digital health vision

Regular meetings with in-country counterparts and the organizing core group will be instituted, and the goals should be in line with the country's vision. A general goal and overall objectives of what the workshop seeks to accomplish will be set based on the vision. Overall objectives related to the key expected outcomes should be agreed upon, including specific requests from the country.

It is very important to understand the needs of stakeholders and think of whether they are familiar with proposed topics. If the topics are too technical or the presenters use a lot of jargon, participants will lose interest.

b. Agenda development

The information contained in this tool kit is intended to be used as a suggested guideline. This format can be modified to meet the country's specific needs. Once the overall goal and objectives are set, the agenda will be developed. This should start with thinking of the country's background on health, current HIS if applicable, available tools and applications, and expected outcomes. The agenda will vary according to

- country requirements,
- stakeholders' requests,
- resource availability,
- duration,
- expected outcomes, and
- limitations.

The meeting agenda has to align with the country's vision for digital health and its HIS needs. The agenda design has to be flexible and should set clear expectations for the meeting. In addition, main stakeholders should be briefed about the content to avoid veering off-track, and to get everyone on the same path. Once the agenda is set, it should be shared with the team along with background materials. Leaders for each topic can then be identified. The agenda can later be modified as needed. In general, the agenda includes

- brief the participants on HIS,
- share activities with regards to digital health activities in the region,
- learn more from technical experts on their respective fields,
- identify GAPS and find ways to fill the GAPS,
- develop a framework for clear action plans with commitment from all stakeholders, and
- discuss future collaboration and coordination for digital HIS implementation and strengthening.

Table 6 is an exemplar of suggested generic agenda for a 4-day workshop that uses WHO-ITU eHealth components (Table 7) and the GAPS framework (Table 8). The country can either use WHO-ITU seven eHealth components or AeHIN's GAPS framework, or both.

Table 6: Suggested Convergence Workshop Program

Time	Activity	Notes
Day 1, morning	Courtesy call with MOH personnel	
Day 1, afternoon	Site visit to primary/secondary health center, HIS unit, data center	The lead stakeholder will coordinate with the sites. Approval from MOH will be required, and MOH should inform the responsible personnel from the site in advance.
Day 2, morning	Welcome remarks by host country representative	
	Participant introduction	
	Overview of host country HIS/digital health vision	
	Overview of HIS/digital health-related activities in host country	
	Introduction to digital health	
Day 2, afternoon	Related digital health topics discussed by a team of technical experts (part 1) <ul style="list-style-type: none"> • digital health strategy • enterprise architecture • standards and interoperability • digital health tools and applications • CRVS and unique identifiers • digital health investment • shared health records • governance 	Speakers from ADB, AeHIN, WHO, UNICEF
	Group work on seven digital health components/ GAPS framework	
	Group presentations and discussions	

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Table 6: continued

Time	Activity	Notes
Day 3, morning	Recap of previous day's discussions	
	Related digital health topics discussed by a team of technical experts (part 2) <ul style="list-style-type: none"> • digital health strategy • enterprise architecture • standards and interoperability • digital health tools and applications • CRVS and unique identifiers • digital health investment • shared health records • governance 	Speakers from ADB, AeHIN, WHO, UNICEF
	HIS/digital health-related activities in host country	
Day 3, afternoon	Group work on seven digital health components/ GAPS framework	
	Group presentations and discussions	
	Summary and next steps	
	Workshop summary and closing session	
Day 4, morning/ afternoon	Discussion among core group with country team on detailed action plans based on group work	
	Debrief for related organizations and plans for next virtual meeting among core group to operationalize the action plans	

ADB = Asian Development Bank, AeHIN = Asia eHealth Information Network; CRVS = civil registration and vital statistics; GAPS = governance, architecture, program management, and standards and interoperability; HIE = health information exchange; HIS = health information system; MOH = ministry of health; UNICEF = United Nations Children's Fund; WHO = World Health Organization.

Source: Authors.

5. Implementation

a. Convene workshop

Key stakeholders and MOH, in collaboration with development partners, will coordinate the workshop. The workshop will proceed as follows:

Part 1: Have the development partners and experts, who come to assist the workshop meet the right person, such as, minister, director general, and director from MOH. The objectives are to explain the workshop, and convey key messages and work plan.

Part 2: Have site visits, such as to health centers, hospitals, and HIS and health management information system (HMIS) units so that development partners and technical experts know more about the country's existing digital health system. They will have the opportunity to interview staff, learn about the challenges they face, and their expectations. The findings will be considered when identifying the action plans.

Part 3: Introduce the participants through presentations.

Part 4: Explore the current digital health activities and available technologies in the country. This will mostly be done by national participants from hospitals, public health programs, data centers, and other program managers from health-related international NGOs.

Part 5: Breakout group sessions will identify gaps in the country. Stakeholders, especially policy makers, need to know current capabilities and deficiencies in the system. An ideal group setting is composed of representatives from different ministries, departments, development partners, and international NGOs. The moderator/facilitator should inform the national participants to go to specific breakout sessions based on their current position. Given the available activities and technologies in the country, the appropriate programs can be identified to improve the country's HIS.

Part 6: Draw up action plans based on findings from the field visit, country's program, and group work. The action plans should be agreed and accepted by the MOH and other development partners to align with available resources and country needs.

Table 7: Digital Health Components and Sample Priority Activities

Digital Health Components	Examples of Priority Activities
Leadership, governance, and multisector engagement	<ul style="list-style-type: none"> • Project coordination • Reference groups • Functional architecture <p>Example from conducted workshop: Form and convene a multisectoral digital health steering committee and technical working group.</p>
Strategy and investment	<ul style="list-style-type: none"> • National, state, regional, and local digital health strategy and planning bodies and mechanisms • National, state, regional, and local digital health and health information and communication technology (ICT) funding mechanisms and incentive schemes • Digital health investment and business case development <p>Example from conducted workshop: Develop detailed and costed digital health action plan.</p>
Services and applications	<ul style="list-style-type: none"> • Electronic health record, electronic medical record, and personal health record • Health care provider and service directories • Health care provider knowledge sources <p>Example from conducted workshop: Scale up, operate, maintain, and enhance systems.</p>
Infrastructure	<ul style="list-style-type: none"> • Mobile coverage • National, state, regional, and local computing infrastructure • Unique identifiers for health care organizations, providers, and individuals <p>Example from conducted workshop: Coordinate with key line agencies for internet/cellular and electric power improvements.</p>
Standards and interoperability	<ul style="list-style-type: none"> • Medical terminology standards • Privacy and confidentiality • Interoperability <p>Example from conducted workshop: Develop core health data sets and standards.</p>

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Table 7: continued

Digital Health Components	Examples of Priority Activities
Legislation, policy, and compliance	<ul style="list-style-type: none"> • Non-health sector policy (e.g., broader industry and economic development, and utilization of existing eGovernment infrastructure) • Policies on medical jurisdiction, liability for digital health services (e.g., telemedicine), safety, data integrity, and quality of care • Development of national digital health standards and other interoperability requirements <p>Example from conducted workshop: Develop national digital health regulatory framework.</p>
Workforce	<ul style="list-style-type: none"> • Digital health skills and competencies that health workers require • Education and training (development, integration, or changes to existing curricula) required to develop a digital health-ready health workforce • Priority segments of the nation's health workforce • Implications for workforce change and adoption <p>Example from conducted workshop: Improve information and communications technology literacy.</p>

Source: Authors.

Table 8: Governance, Architecture, Program Management, and Standards and Interoperability Framework and Sample Action Plans

Governance, Architecture, Program Management, and Standards and Interoperability Framework	Action Plans
Governance	Apply an IT governance framework.
Architecture	Recruit an experienced enterprise architect to advise MOH.
Program	Coordinate program managers around the shared health enterprise architecture to achieve interoperability.
Standards and interoperability	Prioritize the selection of a health enterprise architecture.

IT = information technology, MOH = Ministry of Health.

Source: Authors.

b. Activity prioritization

The respective groups will share findings and recommendations with the rest of the participants during the workshop. Those recommendations, along with findings from the site visits, play an important role when drafting the action plans for the country. Quick actions will be identified and demonstrated in areas that are most needed in the country. The proposed short-term, medium-term, and long-term action plans will have to be agreed upon by government departments. The meeting summary, recommendations, and next action plans will be disseminated among key stakeholders. If some action plans need endorsement from respective governments, they will be taken care of by the main organizers from the governments.

6. Follow-Up

The final part in convening convergence workshop is to follow up and to operationalize identified action plans.

1. Workshop evaluation. Participants will be invited to complete the workshop evaluation. The results will be kept within the organization team so as to adjust/improve for the next workshop.

2. Workshop summary. The summary of proceedings will be shared with the MOH (the key stakeholder) and the organizing team and MOH agree on the next steps.

3. Post-workshop. Follow-up with the MOH and bringing the core group together after the workshop are as important as convening the actual workshop. Without follow-up actions or next steps, the key findings and recommendations will be to no avail. The challenges start once all key stakeholders plan to realize the recommendations and operationalize the action plans. Close collaboration between MOH and development partners contributes to moving forward with country digital health systems strengthening.

It is important to receive the endorsement from key policy makers for the priority actions. Later, there will be a need to leverage the existing digital health solutions and tools instead of reinventing the wheel. Coordination among key stakeholders alone is key, as is resource mobilization for specific priorities.

III. COUNTRY EXPERIENCES

This section presents an overview of previous convergence workshops held in the region.

A. Myanmar

Workshop on Health Information Systems (HIS) Strengthening in Myanmar (Nay Pyi Taw)	
Date	19–20 August, 2015
Background	Myanmar has laid down its first national ICT Master Plan (2006–2010) to build fundamentals for e-Myanmar. ^{a,b} The Health Information Systems Strengthening in Myanmar workshop was organized by AeHIN, with support from ADB, UNICEF and WHO, together with other development partners. The workshop offered government officials and health professions an opportunity to identify mechanisms to strengthen the country’s HIS. Participants were able to recognize tools for HIS that are feasible and successful to achieve UHC.
Objectives	<ul style="list-style-type: none">• To review the current HIS status, priorities, and barriers and discuss potential steps to be taken toward developing and implementing a comprehensive HIS road map.• Understand current and planned government and development partner investments in HIS.• Increase understanding on IT governance, standards and interoperability in health information.• Share, learn, and prepare to implement capacity building strategies, standardized processes, tools and techniques, and ready-to-use IT solutions toward achieving UHC; and• To discuss the most appropriate mechanisms to achieve standardization in health care.
Participants	National <ul style="list-style-type: none">• Ministry of Health and Sports• University of Public Health• Central Statistical Organization• Ministry of Communications and Information Technology• United Nations Office for Project Services• Japan International Cooperation Agency• International Center for AIDS Care and Treatment Programs• Joint United Nations Programme on HIV/AIDS (UNAIDS)• Marie Stopes International Myanmar International• ADB• AeHIN• University of Oslo• WHO• UNICEF

^a http://www.digitalhealthap.com/wp-content/uploads/2017/01/Mar8_AM_AyeAyeSein_Leave-No-One-Behind_03082017.pdf.

^b http://www.searo.who.int/entity/health_situation_trends/events/03_Myanmar_Country_Experience_Strategic_Area_4.pdf?ua=1.

Source: Authors.

Myanmar: State of Play

Health management information system (HMIS)

Two components of a HMIS, public health management information system (PHMIS) and hospital information system, were being implemented. In Myanmar, PHMIS, which is used to improve public health for a range of services provided by basic health staff, was reviewed and revised in 2003–2004 and 2010–2011. In addition, the current version was introduced in January 2012. Five records and registers are maintained in the system: clinic register, field record, population and annual record, births register, and deaths register. The English version of data dictionary for health services indicators for all townships is available and the Burmese version is available for all staff.

Assessment. The Health Metrics Network¹⁴ conducted a HIS assessment in 2006, and reviewed it again by using Assessment tool version 4 in 2009.

Health Information System (HIS) Strategic Plan. A Five-Year Strategic Plan (2011–2015) for Health Information Systems was published with this vision: “A simple, effective and systematic health information system established at all levels of health care delivery for the strengthening of health system.”¹⁵

District Health Information System 2 (DHIS 2).¹⁶ With technical support from University of Oslo, District Health Information System 2 (DHIS 2) implementation started at five pilot townships in 2014–2015. In terms of capacity building, the central level staff from MOH, statisticians from the University of Public Health, the Institute of Medicine 1 and 2, and the Department of Medical Sciences at central, state, and regional levels are being trained for DHIS 2. Staff from pilot sites were also trained.

International Statistical Classification of Diseases and Related Health Problems 10 (ICD-10). The International Statistical Classification of Diseases and Related Health Problems (ICD-10), a medical classification list by WHO, is also being implemented and used in Myanmar.¹⁷ Annual public health and hospital statistics are being published, and medical doctors are being trained in the ICD-10 as well.¹⁸

Shared Experiences from Asia eHealth Information Network Partners

Asia eHealth Information Network. AeHIN was introduced during the workshop, as were capacity building programs focused on governance (COBIT 5),¹⁹ architecture (TOGAF),²⁰ standards (HL7),²¹ health data (DHIS 2),²² and general eHealth (AeHIN Academy) in the region.

¹⁴ http://www.who.int/healthinfo/country_monitoring_evaluation/documentation/en/.

¹⁵ http://www.nationalplanningcycles.org/sites/default/files/country_docs/Myanmar/his_strategic_plan_2011-2015_1.pdf.

¹⁶ <https://www.dhis2.org/>.

¹⁷ <http://www.who.int/classifications/icd/en/>; <http://apps.who.int/gho/data/view.whofic.MMR-icd?lang=en>.

¹⁸ <http://mohs.gov.mm/content/publication/list?category=Annual%20Public%20Health%20Statistics&pagenumber=1&pagesize=4>.

¹⁹ <http://www.isaca.org/cobit/pages/default.aspx>.

²⁰ <http://www.opengroup.org/subjectareas/enterprise/togaf>.

²¹ <http://www.hl7.org/>.

²² <https://www.dhis2.org/>.

iCTen! WHO-ADB-AeHIN's 10-point iCTen! guide on ICT for universal health coverage was also shared at the meeting:

1. Know your baseline.
2. Get everyone on board and bring your best team.
3. Adopt, adapt, or develop tools.
4. Commit to UHC, commit to integrated ICT systems.
5. Invest in unique identity schemes and link CRVS and UHC.
6. Build institutional readiness and a skilled workforce.
7. Keep data safe and secure.
8. Get concrete: have an implementation plan with quick successes.
9. Plan for sustainable financing mechanisms from the start.
10. Define success, measure progress based on monitoring and evaluation (M&E) criteria.²³

Scaling and sustaining health information systems and eHealth investments. Based on Myanmar HIS and e-Health vision, the detailed road map to maximize digital health priority actions and investments to improve health and tips for monitoring and evaluation, were introduced. Three keys to HIS and eHealth success were highlighted: start with the users not the solutions, adhere to standards and guidelines and aim for interoperable and flexible solutions, and learn from the success and failure of others.

Health enterprise architecture. To make and manage smart digital health investments to improve population health outcomes, the health enterprise architecture concept was introduced to participants. An overview was given of the enterprise architecture on what it is, why is it important, and how it is implemented: the enterprise architecture is operationalized by sharing assets and services.

Interoperability and standards. Information is one of the essential six building blocks of a health system. Effective integrated HIS requires different information systems to be interoperable. Health information standards provide a common language, enabling interoperability between systems and/or devices. The concepts of interoperability and the need for health standards were shared during the workshop.

Civil registration and vital statistics. Unique identifiers are requisite to facilitate the development of longitudinal medical records and allow users of services to be tracked across health care sectors and other social services. It can help support service provision and programmatic planning and realize the value of technology, especially in addressing silos and vertical systems. Several business cases were shared, and the concept of master client registry and index was introduced.

Recommended Actions Based on World Health Organization–International Telecommunications Union National eHealth Strategy Tool kit

Strategy and investment

- strengthen roles and responsibilities;
- conduct assessment of existing investments, plans, partners contributions, and resource needs;
- set up a HIS task force to make a list of technical assistance needs;
- have a government-led implementation plan with coordinated partner support; and
- bring HIS priorities to attention of Myanmar health sector coordination committee.

²³ https://prezi.com/chhy0exok_ey/icten/?utm_campaign=share&utm_medium=copy.

Services and applications, standards and interoperability

- establish a master patient index register, and
- conduct a stakeholders' consultation.

Infrastructure

- align with the country's e-government strategy,
- be a big customer of mobile network operators, and
- collaborate across programs; rationalize the hardware platform.

Legislation, policy, and compliance

- have a health information sharing policy, and a memorandum of understanding for data sharing across ministries and UN organizations;
- adopt unique patient identifiers in the health sector for data sharing and data collection; and
- ensure collaboration across ministries and private organizations to achieve one complete digital health Infrastructure.

Workforce

- invest more in HIS workforce capacity building;
- ensure collaboration with related ministries and organizations;
- share knowledge with peers;
- form a HIS steering committee led by the Ministry of Health and Sports with the ministries responsible for ICT and telecommunication (Ministry of Information and Communications Technology), the Ministry of Electricity and Energy, the Ministry of National Planning and Economic Development, the United Nations Development Programme, and the HIS working committee;
- build institutional readiness and workforce by using AeHIN as a platform.

B. Bhutan

Bhutan eHealth Action Plan Workshop: Weaving Health and Happiness with ICT (Paro)

Date	21–23 June 2016
Background	Bhutan's health vision, The Nation with the Best Health aspires to improve the health domain and its indicators of gross national happiness to enhance the happiness of the people of Bhutan. The workshop set the stage for the development of a national digital health vision and action plan that will respond to health and development goals and an implementation road map that will reflect the country's priorities in digital health. It further established a plan to monitor the implementation and management of associated risks, promote and facilitate horizontal cooperation among stakeholders for the development of the digital health agenda in the country.

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Table: continued

Bhutan eHealth Action Plan Workshop: Weaving Health and Happiness with ICT (Paro)	
Objectives	<ul style="list-style-type: none"> • Review current and planned HIS and digital health solutions and synthesize lessons learned and best practices. • Identify priorities, key actions, and investments toward developing more cost-effective, sustainable, and interoperable digital health solutions to improve health service delivery and a more resilient health system. • Inform stakeholders of the importance of digital health governance, policy, enterprise architecture framework, standardization and interoperability, capacity development, and program management, and how these relate to the national eHealth strategy.
Participants	<p>National</p> <ul style="list-style-type: none"> • MOH • Ministry of Finance • Ministry Information and Communications • Gross National Happiness Commission <p>International</p> <ul style="list-style-type: none"> • ADB • ADB • AeHIN • eHealth solution implementers – DHIS 2, OpenMRS • UNICEF • WHO

Source: Authors.

Bhutan: State of Play

Bhutan e-government master plan. The Ministry of Information and Communications has embarked on the development of Bhutan's first e-government master plan, building on the existing ICT policies and strategies. It was developed and endorsed by the Cabinet on 27 June, 2014.²⁴

E-Government interoperability framework. The e-Government interoperability framework sets standards and guidelines that government agencies must adopt to enable better sharing and collaboration within government agencies. It allows diverse government application systems to seamlessly exchange data and use the data that has been exchanged meaningfully, with support of standardized technologies, data, and applications.²⁵

Telemedicine. Telehealth remains very much relevant for Bhutan as the government, along with development partners, has already made investments and remains committed to its telemedicine program. Use of videoconferencing is limited, and telephone consultations for advice/guidance and second opinion via social media (Facebook, WeChat) constitute the most widely practiced form of telemedicine. There are issues with electricity supply and internet access, and these basic requirements for telemedicine need to be addressed to ensure widespread utilization. While clinicians in the field could benefit from the information systems that are already in place, these are not yet readily available and accessible at the point of care.

Electronic patient information system. An electronic patient information system, the longitudinal collection containing health information of an individual patient, is being successfully implemented and operational

²⁴ http://www.moic.gov.bt/wp-content/uploads/2016/05/bhutan_e_gov_master_plan_14953.pdf.

²⁵ https://www.dit.gov.bt/sites/default/files/e_gif_summary_with_forward_pdf_53582.pdf.

across district hospitals. It aims to have health information readily available and accessed by all health care providers attending to the patient and support of efficient processes for health care delivery. It will be implemented step-wise, from pilot stage, to being scaled nationwide.²⁶

Traditional medicine patient information management system. An online traditional medicine patient information management system (PIMS) has been developed in Dzongkha (the Bhutanese language) with six modules to support activities such as recording of patient information and generating medical reports. The traditional medicine PIMS helps to collect patient information and share medical information electronically, expedite clinical communication, and reduce error in recording and reporting. Currently, this system is used in 20 traditional medicine units across the country. Challenges include integration with other system such as the country's HMIS to provide data for reporting, and low ICT literacy among the traditional medicine practitioners which leads to frequent incorrect usage of application.²⁷

Emergency response service and health advice. Emergency response service and health advice was deployed using the application. A vehicle tracking system has been installed in 106 ambulances, using AVAYA Contact Center Solution,²⁸ The Fleet Management System and Access Management System for automotive telematics for real-time tracking, route monitoring, and alerts are also in use.

Tracking systems for maternal child health, HIV, and water and sanitation programs.²⁹ A project management team was formed to oversee the progress of tracking systems for maternal child health HIV and water and sanitation. Internet connectivity, availability of resources, and limited ICT capacity to maintain and expand the system challenge its potential to strengthen the interface between providers and beneficiaries; track at-risk pregnant mothers; children and HIV patients; and conduct data analysis.

National Early Warning, Alert & Response Surveillance Information System. Web-based reporting and short messaging service reporting for weekly reporting, immediate reporting of deaths, and event reporting have been implemented for health workers to report and manage surveillance data in Bhutan.³⁰

Hospital information system. The hospital information system was implemented in December 2012 and revived in September 2015. It is mandatory for all doctors to use HIS. A shortage of doctors and heavy workload, browser compatibility issues, and limited computer literacy are challenges found in the system.

Shared experiences from Asia eHealth Information Network Partners

Capacity building in eHealth: an overview. Capacity building is needed to successfully implement and sustain the HIS. Specific capacity gaps and needs should be identified, and transformed into clear goals for each roles and responsibilities. Different components need different skill sets in eHealth capacity building.

Importance of a digital health strategy: scaling and sustaining HIS and digital health investments. Based on Bhutan's HIS and e-Health Vision, the Bhutan Health Information & eHealth Strategy should build up local capacity to fully utilize the technology and carefully match existing resources with the pace of implementation to allow for a sustained and incremental approach.

²⁶ <https://github.com/ePISBhutan>.

²⁷ <http://www.nitm.edu.bt/index.php/development-of-traditional-medical-services>.

²⁸ <https://www.avaya.com/en/product/avaya-aura-contact-center/>.

²⁹ <https://drukhmis.gov.bt/dhis/dhis-web-commons/security/login.action>.

³⁰ <http://www.rcdc.gov.bt/web/>.

Health information exchange. The National Health Information Exchange Network can be described as bidirectional sharing of patient health-related information among providers and other authorized health care professionals. It provides a standardized, secure, and confidential way to link information systems together for authorized users to share reliable health-related information. The components in HIE includes data storage, master patient index (MPI), record locator service, authentication, authorization, security policies, auditing and logging, standards, scope of services, knowledge of workflow, and portals for access.

Integrating the Sustainable Development Goals with the national monitoring and evaluation platform.

The challenge in sustaining national M&E platforms and sources and health information systems is not technical. The primary challenge is to design and facilitate individual and institutional behavior change. It can be overcome through sufficient political commitment and leadership; data completeness, disaggregation, timeliness, quality, sharing, analysis, and use; building institutional capacity at all levels, engaging multiple stakeholders and sectors; practicing standardization, access, sharing, security, and confidentiality; and providing a supportive policy and regulatory environment and good health information governance.

Social media in health. Using social media widens the potential patient base, empowers patients to take control of their health, and is convenient for both doctors as well as patients in terms of time and effort. Challenges using social media in health include security, privacy and confidentiality of personal health information, compliance with regulatory and medico-legal implications, ethical considerations, and reimbursement for online services.³¹

Shared health records standards and interoperability in health information systems. Information should be comprehensive, integrated and of good quality, and should be able to be exchanged between providers and authorized agencies. It should be available to the right person at the right time and at the right place. To achieve this, the different health information systems, both inside and outside of organization, must be interoperable. To provide essential health care services, the information that needs to be shared are: (i) who receives the services, (ii) who provides the service, (iii) where it is provided, and (iv) what type of services are provided. The HIS needs standardized ways to identify people, organizations, and types of medical services. The HIS needs standard methods and processes to ensure that the same meaning of medical concepts are interpreted the same way by different applications. Interoperability and health data standards are important to have comprehensive and integrated health information. Health IT services and applications have to be able to exchange the information that are meaningful to users.

Strengthening routine health information systems: strategic directions. Routine health information systems (RHIS) refers to any data collection conducted regularly with an interval of less than 1 year in health facilities and in the community. Data are collected by health workers at health facilities or in communities, and eventually also feeds information to national and global levels. RHIS can be strengthened through participation in complex, multistakeholder RHIS initiatives to promote well-structured, standardized, and integrated RHIS at all levels of the health system; organize capacity building for countries, teams, and individuals; identify and exploit leverage points in system design and implementation; and establish advocacy and knowledge management networks to promote best practices and tools around the organization of RHIS.

Role of unique identity in digital health. To track personal health information, a unique patient identifier and connectivity across multiple database is needed. Connectivity can be achieved by leveraging digital health infrastructure. The unique identity can be achieved by employing one or more of the three factors of identification: biometrics, wallet identities (such as cards), or shared secrets. Using one-factor authentication

³¹ *Should Healthcare Organizations Use Social Media? A Global Update.* {Tysons Corner}, (March) 2012 Computer Sciences Corporation.

based on simple card or stronger authentication is necessary. The identity will be meaningless but a unique number with the purpose of differentiating from other identities and should not contain any other information.

Operationalizing identity management for health purposes is found in the functionality of the health information exchange, using a demographic database called a client registry, also sometimes called an enterprise master patient index. Client registry, a cross-referencing database with national scope, is to relate local keys to a “golden” key: identity that is associated with patient’s demographic record and is used for health purposes only. It is often only used internally within the digital health infrastructure for indexing purposes and the client registry stores the identity.

Data management and use of geographic information systems. To effectively use geographic information systems (GIS) in health care, it is necessary to find the priorities identified by decision makers; identify the geographic dimension behind the public health priority; implement the data management chain; work at geo-enabling the HIS by promoting and supporting the establishment of the different registries and use of these registries across the all data management chain; and finally, choosing the most appropriate GIS technology. Continuous training must be provided to embed it into good data management practices and sustain GIS capacity.

Recommended Actions Based on World Health Organization–International Telecommunication Union National eHealth Strategy Tool kit

Leadership and governance

- formalize eHealth technical working group with terms of reference,
- establish a special group to work on issues,
- use the role of the Bhutan Medical and Health Council,
- establish a gateway to ensure consultation with stakeholders, and
- meet the need for digital health program at the MOH.

Strategy and investment

- develop a high-level strategic document linking vision and mission (SDGs and national goals),
- have a detailed eHealth action plan based on WHO-ITU eHealth strategy tool kit,
- ensure there are shared priority and centralizing resources in making a business case for eHealth,
- package and prioritize key strategic investments to gain more efficiency and to attract resources, and
- remember that ICT investments are capital intensive; therefore there is a need for a cost realistic plan.

Legislation and policy

- Work on unique identifiers, information retention, and eHealth and information sharing

Infrastructure, standards and interoperability and services and applications

- core data set, and
- standards that are enforced and incentivized.

Workforce

- review and recommend to Royal Civil Service Commission and the Ministry of Information and Communications on parent agency role – reconsider mobility policy;

- involve ICT professionals (ICT should take the lead in designing and developing digital health programs);
- have an incentive schemes for health workers to use digital health (continuing medical education);
- customize training programs; and
- ensure real-time use of data for program management and evidence-based decision making.

C. Indonesia

Joint Mission to Review Issues and Developing Action Plans for Strengthening HIS, eHealth and CRVS in Indonesia (Jakarta, Indonesia)

Date	7–11 November 2016
Background	The MOH planned this mission with WHO Country Office and a team of development partners to identify specific technical assistance to support on-going efforts to strengthen M&E, HIS, and CRVS systems. It was a follow-up action to the MA4Health and fourth AeHIN General Meeting held in Bali (2015) to support HIS, digital health, M&E, and CRVS strengthening in the country.
Objectives	<ul style="list-style-type: none"> • To understand the status of the national HIS and CRVS systems in Indonesia, including the use of eHealth solutions • To identify gaps and recommendations to support the MOH with next steps. • To review and make recommendations focusing on: <ul style="list-style-type: none"> » architecture design of the national HIS; » data quality improvement, data management, data analysis, and data use for health policy and planning; » HIS/CRVS implementation on achieving UHC and strengthening national health system; and » interoperability and use of DHIS 2 and related platforms.
Participants	<p>National</p> <ul style="list-style-type: none"> • MOH • WHO Country Office <p>International</p> <ul style="list-style-type: none"> • ADB • AeHIN • Thai Health Information Standards Development Center • UNICEF East Asia & Pacific Regional Office • WHO

Source: Authors.

Indonesia: State of Play

Indonesia has adapted WHO-ITU National eHealth Strategy Tool kit and used eHealth components (leadership and governance, strategy and investment, services and applications, standards and interoperability, infrastructure, legislation, policy, and compliance and workforce) in its digital health strategy.

Assessment of Health Information System capacity. The objectives were to assess the current HIS implementation and mapping in Indonesia, and make recommendation based on the HIS assessment. The tools used were COBIT 5 at National level, COBIT 4 at district level, Health Metric Network, gap analysis, and strengths, weaknesses, opportunities, and threats analysis.

Community Health Centre Information System. The Community Health Centre (Puskesmas) Information System consists of reporting and recording, survey, cross sector report and operational report. Through Puskesmas, the government can provide health care and run the program for public health at the same time. Basic data consists of health center identification, working areas, resources, and targets.

Indonesia One Data Portal.³² The President of Indonesia initiated a new One Data Policy in addition to the promotion of multisectoral engagement through the eGovernment program to address ICT and data regulations and policies. The MOH is a pilot sector in the One Data Policy initiative. Compliance with relevant health information policies is mixed.

Civil registration and vital statistics in Indonesia. Birth and death registration coverage is relatively low in Indonesia. Determining and medically certifying the cause of death and deriving accurate mortality statistics are complicated and difficult.

Data management, quality, analysis, and use. The MOH routinely promotes the use of a data quality self-assessment, but the impacts are not fully understood. There is a disconnect and lack of understanding between data collection and analysis and use, especially at the subnational level (district and provincial) as well as in linkages between data sources and national M&E and health SDGs.

Shared experiences from Asia eHealth Information Network Partners

Measurement and accountability for health and iCTen! principles and practices. With the goal of all low- and middle-income countries having the necessary information to improve health and health services, and achieve national and global health-related SDGs, Measurement and Accountability for Health's five-point call to action were shared. Potential priorities and actions were discussed.

Recommended Actions Based on World Health Organization–International Telecommunication Union National eHealth Strategy Tool kit

Leadership and governance

- Strengthen the HIS governance structure; and
- Implement COBIT5, the formal HIS/eHealth governance framework, key performance indicators, and health information management structure.

Strategy and investment

- Develop a detailed, costed HIS/eHealth action plan interlinking all of the assessment and planning documents into a better-informed and comprehensive eHealth strategy and HIS road map; and
- Identify technical assistance priority work packages for external support.

Infrastructure

- Build on the shared work plan as pilot of the One Data Policy to maximize information exchange and expand coverage.

³² <http://data.go.id/tentang/>.

Standards and interoperability

- conduct a business process mapping of current and planned work/data flows, and review all existing systems and solutions as well the draft health information architecture document, and operationalize as soon as possible;
- support Pusdatin (Data and Information System Center) to develop a standards development committee to identify and adopt a required set of data (classification, terminologies, security, privacy, and confidentiality) and messaging (data exchange) standards; and
- establish, maintain, and update the core set of registries (client, facility, health workforce, and villages) needed to ensure data compatibility across information systems.

Services and applications

- conduct a full eHealth systems and applications review,
- assist Pusdatin with dissemination of standards and technical specification requirements to vendors so that developers can certify their solutions as compliant, and
- access networking and connectivity infrastructure needed to support the available services and applications.

Legislation, policy, and compliance

- review all relevant sector decrees, policies, and guidelines for health information and ICT to inform new health information policy; and
- enforce the use of the above mentioned registries in any health information system in the country through a policy as well as the establishment and implementation of a HIS compliance classification.

Workforce

- maximize centers of excellence models in place, and tap into Ministry of Education modules for teaching and learning platforms;
- develop a program management office function in Pusdatin to oversee all ICT projects;
- call on AeHIN to provide technical support to make HIS and eHealth scalable and sustainable using certified governance, enterprise architecture, ICT program management, and optimization procedures; and
- call on AEHIN to help organize human capacity strengthening workshop, training, and study tours on digital health architecture, interoperability standards, and universal health coverage information systems.

Civil registration and vital statistics

- implement a CRVS strategy, including detailed business process mapping to explore opportunities for greater efficiency and better quality data;
- use the digitization of CRVS guidebook;
- link national identifiers with BPJS (Badan Penyelenggara Jaminan Sosial – Social Insurance Administration Organization) identity, medical record identity into an MPI leading to client registry with national scope;
- strengthen use of ICD-10 for morbidity and mortality coding and statistics with expansion of use of full ICD-10 in hospitals and implementation of the Startup Mortality List at Puskesmas facilities; and
- potentially implement ICD-11 pilot testing.

D. Viet Nam

Convergence Workshop to Strengthen Health Information Systems for Preventive Medicine in Viet Nam (Ha Noi)

Date	14–15 February, 2017
Background	The General Department of Preventive Medicine (GDPM) with support from ADB hosted the Convergence Workshop to Strengthen Health Information Systems for Preventive Medicine in Viet Nam. The Results for Malaria Elimination and Communicable Diseases Control (RECAP) project aims to address countries' needs to strengthen health systems for malaria elimination and other communicable diseases control. One of the project's outputs supports strengthening HIS with the objective to advise countries on how to improve the integration of vertical diseases information systems in routine reporting, reduce data entry burden for health workers, improve data flow efficiencies, and establish person-centric HMIS. This support is in line with Viet Nam's MOH-approved Plan for Information Technology Application and Development in 2016–2020, which aims to create a standards-based, integrated, and interoperable digital health enterprise architecture and with GDPM's Circular 54, which recommends online reporting into a communicable diseases reporting system for notifiable diseases.
Objectives	<ul style="list-style-type: none"> • Bring data-generating departments, data source units, and data users together to take stock of the existing GDPM HIS, the workflows and data reporting responsibilities, as described in Circular 54, and • Discuss how the current system could be upgraded and improved, by leveraging ICT as laid out in the Plan for Information Technology Application and Development in 2016–2020
Participants	National <ul style="list-style-type: none"> • MOH GDPM • International • ADB • AeHIN • UNICEF

Source: Authors.

Viet Nam: State of Play

General Department of Preventive Medicine Health Information System. The MOH-IT team provided an overview about the HIS scenario in Viet Nam, covering the various categories of users in the health system and the requirements from the government with the introduction of the HIS master plan. The GDPM team also provided their health information systems blueprint in preventive medicine.

Shared experiences from Asia eHealth Information Network Partners

IT governance and enterprise architecture for national eHealth programs. Interoperability is needed to improve patient care, logistics management, clinical research, and public health and yet it is difficult to achieve. Different stakeholders are involved in the health sector, and IT governance and enterprise architecture are needed to successfully govern and ensure that the needs are being addressed. The Philippines example, where COBIT 5 was adopted, was shared. Information on the enterprise architecture concept, to determine how an organization can most effectively achieve its current and future objectives, was also shared.

Interoperability story: measles. The use case for measles immunization system was demonstrated, showcasing the importance of continuum of care and near real-time data for decision making at patient and population levels. The session also showed how GDPM can connect the existing systems by utilizing

standards and interoperability. The use case showed how data collected at different points and times transverse the system, and how interoperability benefits disease detection, monitoring, and health outcomes.

Unique health identifiers as a tool for interoperability. Possession of personal official identity is critical to an individual's access to government services, social and economic programs, and the exercise of his or her rights as a citizen. Linking civil registration with the national identity systems is the foundation of a secure legal identity for every person. Within the health system, unique identifier is key to ensuring that information about any one person can be shared securely and confidentially, both internally and beyond. Being able to identify an individual uniquely is essential in both the delivery and administration of health care. For health system implementers, the benefits of adopting a unique identifier for individuals are reduced administrative workload and costs, faster access to critical health information, and increased efficiency in the exchange of electronic data.

Application of geographic information systems in digital health information systems. GIS is being used to model the spatial distribution of the vector niche; identify the population at risk of being infected; evaluate population movements; locate, control, and monitor identified cases; and manage localized outbreaks. Geo-enabling HIS not only allows for a powerful use of GIS to support geographically based decision making, but also contributes to improving data consistency across health programs and, therefore, a more systemic approach to solving public health problems. National health systems need to define interoperability standards to support the continuum of care.

Recommended Actions Based on World Health Organization–International Telecommunications Union National eHealth Strategy Tool kit

Governance

- Activate a steering committee to provide overall direction for the development of an ICT governance framework, and
- Create an MPI and establish interoperability lab to support implementations.

Architecture, standards and interoperability

- Conduct a comprehensive information system and registry landscape analysis,
- Prepare the business case for interoperability of information systems,
- Develop a blueprint for enterprise architecture for ICT-based health services,
- Develop data standards policy, and
- Develop data-sharing policy.

Infrastructure, workforce

- Develop a master plan for capacity development;
- Develop a short course in ICT training; define roles, responsibilities, and competencies required; and
- Conduct stocktaking of registries.

Finance

- Develop a master plan for the financing of ICT health programs;
- Cost the HIS/digital health blueprint, including cost of ownership; and
- Leverage the private sector and development partners to finance the master plan.

E. Timor-Leste

HIS, Digital Health, CRVS Technical Support Mission (Dili)	
Date	24–28 April 2017
Background	The National Strategic Plan for Monitoring & Evaluation (2015–2020) is being implemented along with a related HMIS strategic plan developed in 2016 (still in draft form). It is timely now to explore the current state of the HIS and capacity to implement priority actions outlined within these existing documents, as well as discuss best steps for operationalizing strategies, and consider potential new investments in digital health.
Objectives	<ul style="list-style-type: none"> • To take stock of HIS/digital health investments such as DHIS 2. • Discuss operationalization of the HMIS National Strategic Plan and an overall HIS architecture, prioritizing activities for short- and long-term implementation. • Explore the strengthening of existing links between HIS and CRVS.
Participants	<p>National</p> <ul style="list-style-type: none"> • Ministeriu Saude - MOH (Administration and Finance Department, Health Management Information, Hospitals) • WHO Country Office • UNFPA • Embassy of Australia • World Bank • United States Agency for International Development <p>International</p> <ul style="list-style-type: none"> • WHO • UNICEF • AeHIN

Source: Authors.

Timor-Leste: State of Play

Timor-Leste Health Information System: District Health Information System 2. The MOH, Timor-Leste adopted the DHIS 2 based on recommendations from assessments, the National Health Sector Strategic Plan (2011–2030), extensive reviews of literature, and consultations and discussions within the MOH for the efficient management of health data from health post level upwards. The system collects and transmits data through all HMIS data formats, including morbidity and mortality data from the peripheral level (health post, community health center) in five municipalities to the central level.

Civil registration and vital statistics. The Division of Civil Registry and Notary under the Ministry of Justice is responsible for civil registration. A comprehensive assessment of the vital statistics system in Timor-Leste was conducted in 2011 by using the assessment tool of WHO and the University of Queensland. The challenges in CRVS are:

- inadequate legal coverage,
- inadequate coverage for birth and death registration,
- low completeness of birth registration,
- inadequate infrastructure for civil registration,
- poor quality of medical certification of cause of death,

- non-availability of guidelines, and
- inadequate capacity for International Classification of Diseases mortality coding.

Logistics management information system. There is a plan to test the logistics management information system for vaccines, focusing on the status of vaccines at the facility and their usage.

Status of Sustainable Development Goals health indicators in Timor-Leste. Key achievements in the last few decades include political commitment for health; human resources for health (7.1 doctors per 10 000 population); primary health care the Saude na Familia; reduction of malaria incidence to less than 1 per 1000 population; and reduction in maternal and infant mortality. The adoption of SDGs in Timor-Leste, SDG Working Group, and operationalization of SDGs were discussed.

Shared experiences from Asia eHealth Information Network Partners

Health Equity Assessment Tool kit. The Health Equity Assessment Tool kit (HEAT), to identify differences in health indicators between different population subgroups, was shared. HEAT is the software to facilitate analysis, interpretation, and reporting intra-country inequalities. These inequalities can be assessed using disaggregated data and 15 summary measures. It can serve as the basis for the design and reorientation of rights-based, gender-responsive, and equitable health systems.³³

Master patient index. Across multiple databases of person-centric information, it is necessary to identify the patient. The MPI demographic database is needed to enable the HIE.

Civil Registration and Vital Statistics Digitization Guidebook. The international ICT team recommends using the Civil Registration and Vital Statistics Digitization Guidebook to support planning and governance, maximizing opportunities and mitigating the risk of CRVS digitization. It is an online resource that provides step-by-step guidance for countries to plan, analyze, design, and implement digitized systems and automated processes for CRVS.³⁴

Governance, Architecture, Program Management, and Standards and Interoperability Framework. AeHIN's GAPS framework has been shared. ICT applications in health care need to be governed by the highest accountable officials. ICT in health care needs a clear blueprint, so that all stakeholders in a country will know how they can contribute to the structure as a whole rather than silos. In addition, it is necessary to build the capacity of key sectors (clinical, IT, and administration) to work together to make it work seamlessly. ICT in health care works are best if standards are adopted and reused by all stakeholders.

Recommended Actions Based on World Health Organization–International Telecommunications Union National eHealth Strategy Tool kit

Leadership and governance

- strengthen the role of the working group to provide better oversight and management of:
 - » the National Health Sector Strategic Plan Support Project monitoring (and health SDG reporting),
 - » the implementation of M&E and HMIS strategies, and
 - » development of HIS/eHealth architecture;

³³ http://www.who.int/gho/health_equity/assessment_toolkit/.

³⁴ <http://www.crvs-dgb.org/en/#what-is-the-guidebook>

- implement COBIT 5, the formal HIS and eHealth governance framework, key performance indicators, and health information management structure.

Strategy and investment

- Identify technical assistance priority work packages for external support, particularly in resource mobilization in capacity building (e.g., establishing linkages with Instituto Nacional De Saúde to adopt HIS training program).

Infrastructure

- develop a memorandum of understanding with the Ministry of Communications and Technology to develop a long-term hosting service arrangement (potential use of data center and/or maintenance of cloud-based hosting services); and
- have better maintenance of hardware investments ensuring systems updates, security patches, and software licensing.

Standards and interoperability

- develop a health information architecture, and operationalize as soon as possible;
- establish, maintain, and update the core set of registries with unique identity schemes (client, facility, health workforce, and villages) needed to ensure data compatibility across information systems; and
- develop a standards development committee to identify and adopt a required set of data (classification, terminologies, security, privacy, and confidentiality) and messaging (data exchange) standards.

Services and applications

- revisit the 2012/13 ICT assessment, and conduct a new digital health systems and applications review;
- prioritize a use case for electronic information exchange (i) linking Saúde na Família application with DHIS 2; (ii) Ministry of Interior CRVS system with DHIS 2; or (iii) mSupply with DHIS 2; and
- require MOH programs to develop data collection and reporting modules in DHIS 2 or ensure that data linkages are functioning with existing systems are being used.

Legislation, policy and compliance

- review all relevant sector decrees, policies, and guidelines for health information and ICT to inform new health information policy; and
- review current recommendations and implement best practices.

Workforce

- develop a retention scheme for key M&E and HMIS officers at all levels;
- invest more in health information capacity building, particularly at subnational level;
- review health information staff roles and responsibilities, and create an array of data quality assurance, data management, and analysis roles;
- join AeHIN to build skills and knowledge exchange with other countries; and
- develop an eHealth program management office function in MOH to oversee all ICT projects.

Data management, quality, analysis, and use

- support better data management and analysis practices and geo-enabling of the HIS, and possibly join the AeHIN GIS lab; and
- implement HEAT+ for equity analysis.

Civil registration and vital statistics

- implement a CRVS strategy, including efficiency and better-quality data to flow (births and deaths notification, cause of death determination, and linkages with HMIS);
- use the Digitization of CRVS Guidebook; and
- support the implementation of ICD-10 Start-Up Mortality List (SMoL) pilot testing, and strengthening the use of ICD for morbidity and mortality coding and statistics.

F. Nepal

Nepal National e-Health/HMIS Convergence Mission and eHealth Action Planning Workshop (Kathmandu)	
Date	24–27 July 2017
Background	The Nepal National e-Health/HMIS Convergence Mission and eHealth Action Planning Workshop was held in Kathmandu on 24–28 July 2017. The meeting was organized by the MOH in the collaboration with development partners.
Objectives	<ul style="list-style-type: none"> • Review details of the new eHealth strategy and implementation plans, and make recommendations and initiate follow-up actions for strengthening eHealth and the national HIS. • Discuss current and planned health information systems and e-Health solutions, and synthesize lessons learned and best practices. • Sensitize stakeholders on the importance of e-Health governance, policy, enterprise architecture framework, standardization and interoperability, capacity development, and program management, and how these relate to the national eHealth strategy. • Identify priorities, key actions, and investments toward developing and managing more cost-effective, sustainable, and interoperable digital solutions to improve health service delivery and a more resilient health system.
Participants	<p>National</p> <ul style="list-style-type: none"> • MOH • Ministry of Information and Communications • Department of Information Technology • Department of Civil Registration • National ID Management Center • Nepal Police • Institute of Medicine • Kathmandu University <p>International</p> <ul style="list-style-type: none"> • ADB • AeHIN • Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) • Department for International Development • UNICEF • United Nations Population Fund • United States Agency for International Development • WHO

Nepal: State of Play

Nepal's eHealth Strategy looks at outcomes in four major areas: health clients, health workers, health managers, and population. The digital health initiatives mentioned below fall within four areas from the outcomes of eHealth Strategy. Challenges include lack of interoperability, different software by different hospitals, and the need for one integrated system.

Routine information systems. Routine information systems are HMIS,³⁵ the Early Warning and Reporting System,³⁶ the Maternal and Perinatal Death Surveillance and Response System, and the Insurance Management Information System.³⁷

Management information systems. Management information systems are the Logistics Management Information System,³⁸ the Transaction Accounting and Budget Control System,³⁹ the Health Infrastructure Information System,⁴⁰ and the Human Resource Development Information System.⁴¹

Telemedicine. The MOH's "Hello Health"

Other digital interventions. Digital data collection, CRVS, national identity.

Service delivery. In hospitals: Bahmni, MiDas; in primary care: Vial-to-Child,⁴² Electronic Immunization Recording System,⁴³ eTB Register,⁴⁴ NCASC - Antiretroviral Dispensing Tool, and mobile phone-based reminders.

Shared experiences from Asia eHealth Information Network Partners

Establishment of Open Health Information Exchange. Open Health Information Exchange (OpenHIE), an architectural framework for standards-based interoperable digital health, was shared. The data sharing at the point of service delivery; namely, who (provider registry) did what (terminology service) to whom (patient registry), when (shared health record), where (facility registry) how (health information exchange), and "will anyone know?" were explored.

National health identity: a tool for interoperability.

A national health identifier is a "golden key" for the health sector, which can act as a cross-referenced index of any other keys associated with the person. Identification is a key to interoperability: the linkages cannot be created without a patient identification number, health facility number, and health workforce identifier. The health sector can start with a national health identifier, which can be either linked to the health system (national health identity) or exist in parallel. The findings of a mapping exercise of existing identifiers in the health sector and beyond were also shared.

³⁵ <http://dohs.gov.np/information-systems/health-management-information-section/>.

³⁶ <http://www.edcd.gov.np/public/uploads/attachments/1473142047.pdf>.

³⁷ https://www.swisstph.ch/fileadmin/user_upload/SwissTPH/Documents/Institute/SCIH/Fact_sheet_IMIS_v3.5_8Dec2015.pdf.

³⁸ <http://dohslmd.gov.np/>.

³⁹ <http://nhsp.org.np/transaction-accounting-and-budget-control-system-tabucs-3/>.

⁴⁰ <http://nhsp.org.np/health-infrastructure-information-system-version-3-2/>.

⁴¹ <http://nhsp.org.np/human-resource-information-system-assessment-2/>.

⁴² <http://vaxtrac.com/2014/12/08/piecing-together-the-nepali-project/>.

⁴³ http://www.searo.who.int/nepal/documents/nip_bulletin_march_2016.pdf?ua=1.

⁴⁴ <http://etbregister.nepalntp.gov.np/>.

Facility registry, health workforce registry, and client registry. Due to limited resources, the total number of both health workforce and facilities in the country are unknown. The database for number and types of health personnel in both public and private health workforce, the number of private and public health facility registries, and their location and capacity are needed. There should be a database link between Medical Council of Nepal and MOH for health workforce registry.

Legal issues in digital health. Legal aspects for eHealth are quite new, and to digitize health system, it is important to understand the legal implications. There is a need for the new legislation on service delivery, and the challenge is that the law will take 10 to 15 years to enact. Technology-specific legislation should not be the focus, and action and impact should be considered. The MOH has to convince the government on the need for the law, and should start with policies, and move forward.

Standards and interoperability: client registry and data sharing. The detailed client registry and data sharing were discussed. On a health identity card, two or three features may not be sufficient enough to identify a person. The design of the card has to be finalized, and to kick start the process, it was suggested to use the data from election and later link this identity with licenses and certificates. Challenges include different people with the same name, leading to confusion, and lack of competent technical support. It is also necessary to have one responsible person for data. Coordination and cooperation between authorities is key, and the need for a clear policy and guidelines on legal issues about data privacy should be considered.

Recommended Actions Based on World Health Organization–International Telecommunications Union National eHealth Strategy Tool kit

Leadership and governance

- form and convene a multisectoral eHealth steering committee and technical working group,
- strengthen the eHealth Unit,
- operationalize the eHealth strategy, and
- engage partners.

Strategy and investment

- develop a detailed and costed eHealth action plan,
- engage line Ministries in the strategy,
- prioritize activities,
- mobilize and share resources, and
- increase strategic investments and public–private partnerships in eHealth.

Services and applications

- scale up, operate, maintain, enhance systems,
- link systems using health information exchange, and
- ensure quality of services and data.

Standards and interoperability

- create a standards working group,
- align to government architecture,

- develop core health data sets and standards, and
- establish client, facility and health workforce registries.

Infrastructure

- coordinate with key line agencies for internet, cellular, and electric power improvements;
- share infrastructure for multiple programs;
- have legislation, policy, and compliance;
- strengthen eHealth legislation, regulation, and policy directives; and
- develop a national eHealth regulatory framework.

Legislation, policy, and compliance

- strengthen eHealth legislation, regulation, and policy directives; and
- develop a national eHealth regulatory framework.

Workforce

- improve IT literacy,
- establish an eHealth workforce training program,
- collaborate with academia,
- involve users during eHealth development, and
- improve M&E and better use of data.

IV. LOOKING FORWARD

A convergence workshop addresses gaps and outlines a country's digital HIS vision. It consolidates actions plans that all stakeholders can offer, and facilitates them to work together to achieve interoperable health systems.

The convergence workshops conducted in respective countries show an increasing trend for HIS strengthening in the region: countries have already drafted or have HIS strategy to provide better health care. Nonetheless, the adoption of health data standards, infrastructure, workforce, and ICT literacy varies from one country to another.

Good information on the performance of the health system and the effectiveness of specific interventions is required to put scarce resources to the best use. There are significant risks inherent in large-scale IT investments in HIS for developing countries because of the nascent state of local capability in these countries. Therefore, it is important to focus on strategies and initiatives that can establish solid foundations upon which to build an increasingly sophisticated digital health HIS over time.

Next steps include developing a digital HIS investment plan. ADB's Guidance for Investing in Digital Health document can support this process.

V. ADDITIONAL RECOMMENDATIONS

- Adopt a governance mechanism for health systems;
- Develop HIS to support user decision making;
- Strengthen HIS by involving different stakeholders;
- Ensure high level commitment;
- Define interoperability in respective country context;
- Drive consensus adoption of a minimum set of indicators;
- Adopt health data standards; and
- Determine the common, essential information needs across countries.

Other relevant ADB publications

Building Capacity for Geo-Enabling Health Information Systems: Supporting Equitable Health Services and Well-Being for All. Manila, Asian Development Bank, 2018.

<https://www.adb.org/publications/building-capacity-geo-enabling-health-information-systems>

Digital Health Infrastructure: the Backbone of Surveillance for Malaria Elimination. Manila, Asian Development Bank, 2016.

<https://www.adb.org/sites/default/files/publication/210856/digital-health-infrastructure.pdf>

The Geography of Universal Health Coverage. Manila, Asian Development Bank, 2016.

<https://www.adb.org/publications/geography-universal-health-coverage>

On the Road to Universal Health Coverage: Every Person Matters. Manila, Asian Development Bank, 2016.

<https://www.adb.org/sites/default/files/publication/183512/uhc-every-person-matters.pdf>

Universal Health Coverage by Design: ICT-enabled Solutions are the Future of Equitable, Quality Health Care and Resilient Health Systems. Manila, Asian Development Bank, 2015.

<https://www.adb.org/publications/universal-health-coverage-by-design>

Transforming Health Systems Through Good Digital Health Governance. Manila, Asian Development Bank, 2018.

<https://www.adb.org/sites/default/files/publication/401976/sdwp-051-transforming-health-systems.pdf>

Digital Health Convergence Meeting Tool Kit

This tool kit comprises information on how to create a shared vision for digital health through a national strategy, focused on maximizing the value of resources. It supports efforts to introduce digital health solutions that make systems interoperable and less fragmented, and thus provide equitable access to health care services and offer every patient continuity of care. This tool kit provides a practical framework for structuring digital health road maps, a guide to running a digital health convergence workshop, and insights from previous country convergence workshops.

About the Asian Development Bank

ADB is committed to achieving a prosperous, inclusive, resilient, and sustainable Asia and the Pacific, while sustaining its efforts to eradicate extreme poverty. Established in 1966, it is owned by 67 members—48 from the region. Its main instruments for helping its developing member countries are policy dialogue, loans, equity investments, guarantees, grants, and technical assistance.

