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GLOBAL GOODS GUIDEBOOK

VERSION 3.0

Digital Square is a PATH-led initiative funded by the United States Agency for International Development (USAID), the Bill & Melinda Gates Foundation, and a consortium of other partners. For more information about Digital Square, please visit www.digitalsquare.org.

This guidebook is made possible by the generous support of the American people through USAID. The contents of this guidebook are the responsibility of PATH and do not necessarily reflect the views of USAID or the U.S. Government.

Suggested citation: *Digital Square Global Goods Guidebook, Third Edition*. Seattle: PATH; 2022.

Endorsements

The Principles of Donor Alignment for Digital Health describe the importance of aligning around scalable, sustainable, accessible, interoperable, and evidence-based digital public goods for health that meet country priorities. By better coordinating the development of digital public goods for health, such as those presented in this guidebook, stakeholders can play a crucial role in moving the global health sector from a past era of funding characterized by pilots and other proof-of-concept demonstrations, to a future guided by investments in country-led and country-managed digital health strategies and systems that can be independently operated, expanded, and sustained by host governments and local partners over time.

This guidebook is endorsed by:

About Digital Square

Since its inception in 2016, Digital Square at PATH has worked with ministries of health to align adaptable, interoperable digital technologies with local health needs. Digital Square brings partners together to improve how the global community designs, uses, and pays for digital health tools and approaches to advance health equity through digital transformation.

The Digital Square initiative grew out of lessons learned during the 2014-2016 Ebola outbreak in West Africa, where the uncoordinated use of digital tools complicated response efforts. The COVID-19 pandemic has heightened the need for digital tools to support the collection and use of health data, and it has underscored the importance of coordination in the digital health sector.

Digital Square provides a mechanism to foster alignment and coordination among investors, implementers, and innovators to reinforce one another in hearing, understanding, and supporting country priorities. Digital Square's resources, coalitions, and its portfolio of digital health global goods support large-scale, high-quality, sustainable implementations of digital health interventions.

For more information about Digital Square, visit digitalsquare.org.

Table of Contents

This table of contents is arranged by the World Health Organization's Classification of Digital Health Interventions v1.0 system categories.

Introduction

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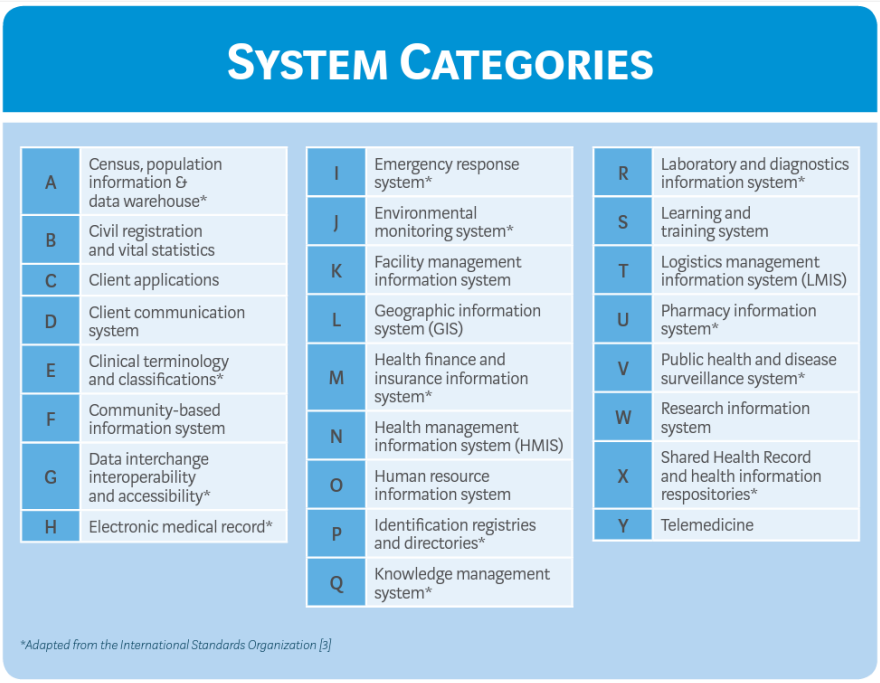
About the Guidebook

This guidebook serves as a reference of 35 digital health global goods. It is a living document, updated regularly, and designed to work in tandem with the World Health Organization's (WHO's) Classification of Digital Health Interventions v1.0. While the WHO framework describes three interlocking areas—the health system challenge, the digital health intervention, and the system category—this guidebook is organized based on the system categories (Figure 1).

Figure 1. Digital health technology system categories as classified by the World Health Organization



Source: World Health Organization Classification of Digital Health Interventions v1.0

Where do I begin?

For the most efficient use of this guidebook, consult the WHO classification to determine the priority health system challenge and the digital health intervention or functionality best suited to address it given the local context. Then use the WHO system category to locate the appropriate tool in the guidebook's table of contents.

About this edition

As with the prior edition of this guidebook, this third edition focuses on software global goods that are approved for investments through Digital Square. The guidebook begins with an overview of the global goods ecosystem, including practical information about the procurement and implementation of global goods and clarification about a related category known as digital public goods. Following this is a detailed description of how the guidebook can be used by people with varying digital health roles and levels of experience. Next are the global good entries, which consist of separate overviews of each global good. This year, the entries include information about COVID-19 response.

The guidebook's appendix has sections on Open Health Information Exchange (OpenHIE), Digital Square's Global Good Maturity Model, and WHO's SMART Guidelines.

The information about specific global goods was provided by global goods developers and has not been validated by Digital Square.

A note on COVID-19

Throughout the pandemic, Digital Square has promoted the rapid adaptation of digital health global goods for COVID-19 response. Our work has focused on ensuring that implementers have access to mature, interoperable tools that can be deployed and scaled quickly.

This past year saw further development and refinement of digital tools to support pandemic use cases, such as case management and contact tracing. The introduction of COVID-19 vaccines has also led to an increased need for digital health tools to support the vaccine supply chain and accurately track vaccine administration. Global goods adaptations have been made to support these changing needs and can be found in the global good entries in this guidebook.

Overview

What are global goods?

Digital Square defines global goods as digital health tools that are adaptable to different countries and contexts to help address key health system challenges. Global goods can take several shapes and forms, often work in conjunction with other global goods, and can fulfill many of the technology needs of a health system. Some of these characteristics are drawn from the Principles for Digital Development.

The advancement of global goods is crucial for saving lives and improving health around the world because these free and open source digital health tools can be used across different countries and health program verticals, cutting down on fragmentation and duplication to accelerate scale and health impact. For example, a global good used for HIV case management can also be used to manage care for malaria or tuberculosis.

There are three types of global goods:

- **Software**—A software tool that is free, open source, and used to manage, analyze, or transmit health-related data, with proven utility in several settings.
- **Service**—A software as a service tool that is used to manage, transmit, or analyze health-related data. This type of tool can be freely accessed and adheres to open data principles.
- **Content**—A resource, toolkit, or data standard that is available under an open license and that is used to improve or analyze health data management processes.

What are the benefits of global goods?

Since global goods are open source tools, there are multiple benefits to their use:

- Many developers can contribute to a global good, thereby reducing the risk of vendor lock-in; a situation in which customers are unable to switch providers/developers without a substantial cost.
- Source code is freely available and modifiable, creating more opportunities for collaboration across organizations and health programs areas.
- The cost of new feature development and software maintenance is more likely to be shared across users and supporters of global goods, freeing up resources for adaptation and implementation.
- Software development best practices in requirements gathering and user acceptance testing have already been undertaken, so resources can be focused elsewhere.
- Interoperability leads to improved data analysis and synthesis, enhanced support for continuity of care as clients engage at multiple points of service across the health care system, and reduced costs for data acquisition and management.

Many of the global goods represented in this guidebook already support interoperability standards, in particular the standards identified in the OpenHIE architecture described in the appendix.

How are global goods both similar to and different from digital public goods for health?

Digital public goods (DPGs) are open source software, open data, open artificial intelligence (AI) models, open standards, and open content that adhere to privacy and other applicable laws and best practices, do no harm by design, and help attain the Sustainable Development Goals (SDGs).

Digital Square global goods have a close relationship to DPGs in that they overlap with many aspects of the DPG Standard. However, the difference stems from the fact that Digital Square global goods are specific to the health domain and have a drive towards strengthening the maturity, interoperability, and shelf readiness of global goods.

DPGs are similar to global goods, with different but overlapping standards. Digital Square is closely coordinating with the Digital Public Goods Alliance (DPGA), a multi-stakeholder initiative co-hosted by the United Nations Children's Fund (UNICEF), the Government of Norway, the United Nations Development Programme (UNDP) and the technical leads at the WHO Clearinghouse,[1] [2] to align the approval processes for Digital Square global goods and DPGs.

While these alignment efforts are underway, several points have been agreed upon:

- The definition of DPGs. The United Nations Secretary-General defines DPGs as open source software, open data, open artificial intelligence models, open standards, and open content that adhere to privacy and other applicable laws and best practices, do no harm, and help attain the SDGs.
- This definition is operationalized through a nine-indicator open standard that projects must meet. The DPG Standard does not assess the scale, funding sources, country deployments, or other indicators of a “mature” global good.
- Within the context of health, software global goods are considered a mature subset of DPGs. Digital Square and the DPGA are working to align processes so that health-related software global goods approved through Digital Square also meet the DPG Standard.
- Both Digital Square global goods and DPGs must be open source.
- Neither Digital Square nor the WHO Clearinghouse certify global

[1] In 2019, the Digital Public Goods Alliance was launched as a multi-stakeholder initiative to accelerate the attainment of the sustainable development goals in low- and middle-income countries by facilitating the discovery, development, use of and investment in digital public goods.

[2] In 2020, the WHO launched the WHO Clearinghouse as a digital platform to connect Government health institutions with digital health solutions that have been vetted and meet criteria for specific use case.

goods. The DPGA reviews digital solutions against the DPG Standard and approves them as DPGs.

- While the majority of Digital Square global goods will meet the standards required for approval as a DPG, there are two reasons why not all DPGs will be Digital Square global goods:
    - Digital Square exclusively evaluates solutions relevant to the health sector whereas DPGs are sector agnostic.
    - Digital Square facilitates a peer review process that assesses maturity and aligns and weighs in on “awarding” the title of Digital Square global good. In contrast, DPGs have no maturity requirement.
- Digital Square, WHO, and the DPGA will be piloting the application of combined standards for DPGs and global goods to identify and assess promising short-listed projects of high relevance for immunization delivery management as part of the Community of Practice for Digital Health convened by the DPGA and co-chaired by UNICEF.
- In future iterations of this guidebook, Digital Square will note which global goods are DPGs and which use cases have been approved through the WHO Clearinghouse. The DPG Registry will also note which DPGs are Digital Square global goods. Digital Square, the DPGA, and the WHO Clearinghouse will continue to cross-reference respective “approvals” of global goods.

The goal of this alignment and collaboration is to better empower country governments, donors, and digital tool implementers with a clear understanding of which DPGs are evaluated and recommended by technical expert entities.

Digital Square, the DPGA, and WHO are fully aligned in the belief that digital health solutions and services are critical for creating a more equitable world. By aligning efforts, we are better able to increase the discovery, adoption, and support of high-quality digital tools that are optimally positioned to ensure better health outcomes for all.

The figure below shows examples of requests from various entities for greater sharing and use of digital health interventions.

Figure 2. Requests for greater sharing and use of digital health interventions.

How does the World Health Organization classification of health systems apply to global goods?

WHO's Classification of Digital Health Interventions v1.0 categorizes the different ways in which digital and mobile technologies are being used to support health system needs.

Interventions

A digital health intervention represents a discrete area of functionality of a technology to achieve health sector objectives. These interventions are intended for different users, including clients, healthcare providers, health system or resource managers, and those involved in data services.

Examples of digital health interventions include "Transmit targeted alerts and reminders to client(s)" and "Manage inventory and distribution of health commodities."

System categories

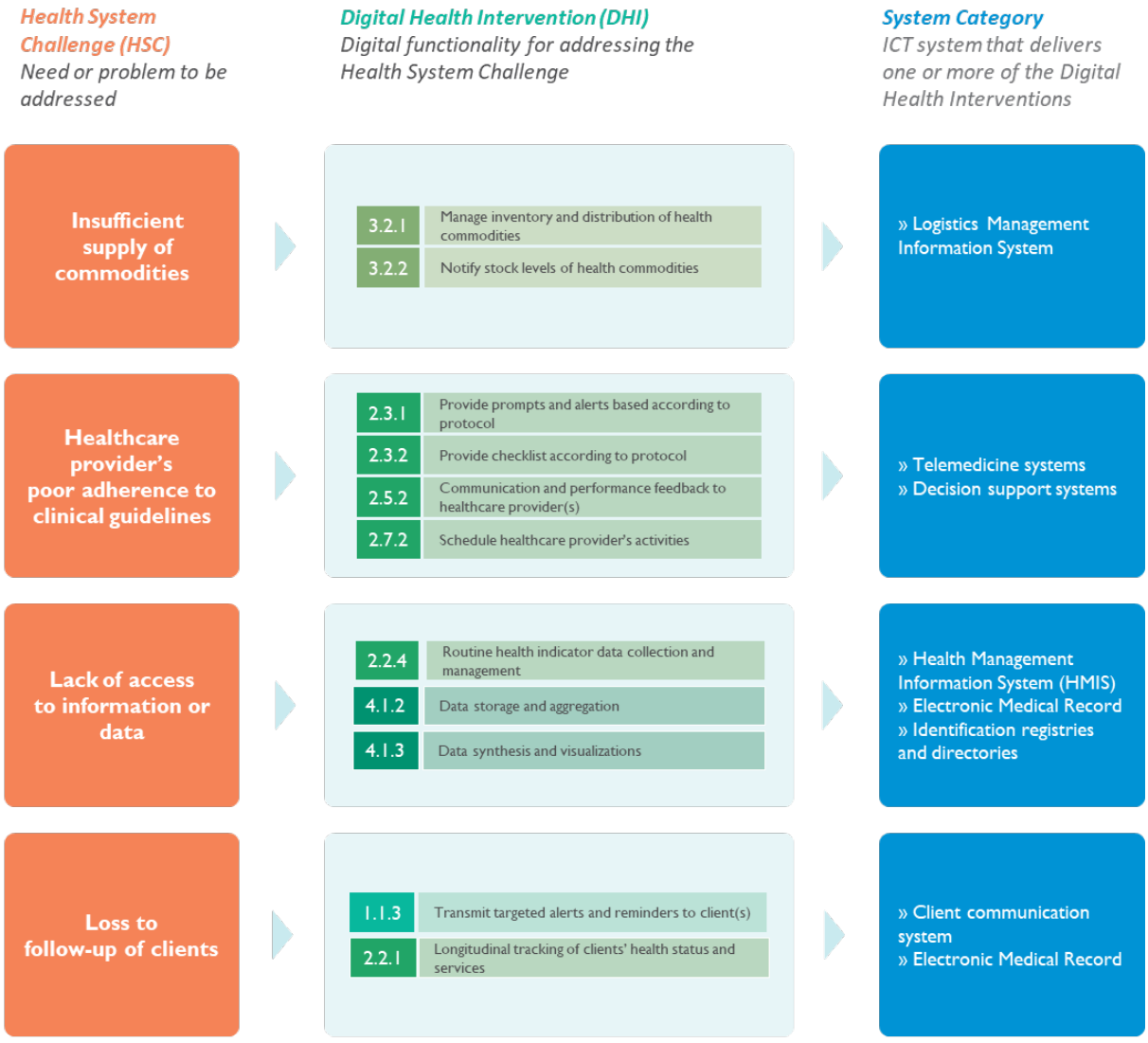
Software solutions in digital health are not limited to clinical information systems. Rather, they can be tailored to the needs of different domains, or categories, within a health system—such as health information systems, supply chains, program monitoring and evaluation, disease surveillance, and health insurance.

Examples of software solutions designed for system categories and taken from Digital Square's portfolio of global goods include: OpenLMIS, a logistics management information system (LMIS); and Bahmni, an open source electronic medical record (EMR).

Figure 3 depicts a potential scenario for addressing multiple health

system challenges. In this model, the challenges are addressed with targeted interventions that are, in turn, grouped by system category—the organizing principle for the solutions in this guidebook.

Figure 3. Example of a mapping across health system challenges, digital health interventions, and system categories.



Source: World Health Organization Classification of Digital Health Interventions v1.0

How does Digital Square categorize global goods?

This guidebook describes global goods that have been successfully implemented to address various health system challenges. The tools are categorized according to scale and type (Figure 4).

Figure 4. Digital Square global goods categories.

Global scale:
Emergent | Established

Tool type:
Applications | Infrastructure

Global scale

- An **emergent** global good is a digital health tool that is a good candidate for multi-national deployment. It may require additional investment to adapt to individual country's needs and priorities.
- An **established** global good is a digital health tool that has already been deployed in multiple countries and is readily adaptable to a country's context without significant software developer support.

Tool type

- An **application** component is a digital health tool that is primarily is designed for use by clients of the health system or by health workers.[1]
- An **infrastructure** component is a digital health tool that is designed to facilitate the exchange and interoperability of data between applications.

A mature, established global good is free and open source, supported by a strong community, funded by multiple sources, designed to be interoperable, and deployed at scale across multiple countries over an extended period of time, with demonstrated effectiveness. In short, a mature global good is an emergent standard application.

To support the review of a tool's maturity and to help identify areas of investment for global goods, Digital Square developed a Global Good Maturity Model for digital health tools (see appendix). The model was developed through engagement with the digital health community, in particular the Digital Health & Interoperability Working Group.

For more information on global goods, please see Digital Square's wiki.

How does a digital health tool become a Digital Square global good?

Digital Square identifies global goods through our Open Application Process (OAP). Digital Square's OAP provides an iterative process that gives applicants the opportunity to find collaborators and provide and receive feedback from peers. Each solicitation in the OAP is referred to as a Notice. Notices are delineated by particular thematic or program-focused areas.

An important aspect of the Notice(s) is that the review of applications is

done by a Peer Review Committee (PRC), while the investment selections are made by an Investment Review Committee (IRC).

Digital Square's PRC comprises a diverse set of the foremost leaders and thinkers in digital health technology, including from country governments, donor organizations, implementing organizations, technology vendors, and other constituencies. The PRC plays a critical role in assessing the technical and programmatic appropriateness of submitted concept notes and applications. The PRC provides feedback to the Digital Square Board to prioritize investments in high-quality digital health products and services. Read more on our wiki.

Accordingly, the tools and approaches submitted to Notices are validated as global goods through a consensus approach of the broader public and digital health community represented by the PRC. For a tool to be identified as a global good it must have a successful outcome in an active Digital Square Notice.

Prior to applying for Digital Square approval, developers are advised to ensure it meets the definition of a global good (see page 7) and undertake a self-evaluation of its maturity using the Global Good Maturity Model (see appendix).

How do I procure global goods?

Because global goods are open source, their code can be accessed free of charge; however, governments and health systems will undoubtedly incur costs to procure services to configure, extend, or model the tool within an existing architecture. There may also be costs associated with aligning the tool to existing and emerging national and local policies and strategies, and costs to ensure the ongoing operation and maintenance of the tools in operation (as with any software system).

How do I implement global goods?

Implementation of a global good often differs from that of commercial or proprietary software, in that multiple organizations may be responsible for software development and support.

There are many roles involved in implementing a digital health intervention, as outlined below. Implementation service providers often cover several of these roles or may partner with local teams and other groups to achieve the desired outcome. Pairing with local teams also ensures knowledge transfer and local capacity strengthening for long-term sustainability in a particular context.

The following is a non-exhaustive list of implementation roles and responsibilities:

- The **solutions architect** and analyst team are generally responsible forworking with the client to unpack the business vision and map it to the technical intervention. They, or in tandem with a team, are often responsible for outlining the “definition of success” of a project and clearly articulating how to measure completeness or success of the implementation.

- **Development teams** make any required software code changes identified through the analysis phase of the project, as they contextualize the software to the local environment. Many global goods, by nature, are designed in a manner to lessen the need forsoftware developers and allow customization through configurations.
- The **implementation team** may handle a mix of the above roles but is often composed of people with knowledge of the configuration options and how the global good operates. This team is responsible for deploying the tool and ensuring it works as required and as specified for the project.
- The **training and support services team** trains and supports staff and end users to use the software. This team is generally engaged beyond the initial rollout and is pivotal in building local capacity for ongoing use of the software.

Should I hire an implementation service provider?

An implementation service provider will generally cover all or many of the roles described above and guide clients through several considerations, such as:

- **Location of deployment.** Software can be deployedfrom a virtual server, the cloud, or on-site at a national data center or ministry of health server. This decision may be influenced by legislation and policy, capital and recurrent costs, and connectivity. Client teams, such as the purchasers/health program leaders and/or those at ministerial and government level, should provide input and guidance in the review of legislation or policies that may limit choices, and weigh the capital costs (e.g.,server hardware) versus the recurrent costs (e.g., monthly cloud service hosting charges) to determine which model is most cost-effective. In addition, physical infrastructure requirements—such as adequate, reliable electricity supply and or network connectivity—must be considered when determining if it is better to deploy centrally or if locally deployed servers are needed.
- **Server size.** This decision is based on the expected load of the deployment, which includes the estimated number of concurrent users, system-managed data, and network traffic.
- **Technical support.** Open source tools and even some proprietary ones may not have a dedicated help desk team providing technical support; therefore, intervention designs must consider how to provide this service. One approach is to deploy a help desk. This is often a two-tiered model, with the first tier consisting of help desk representatives who serve as the primary points of contact for users. These representatives generally handle bug reports, identify appropriate training materials, and help with administrative tasks such as password resets. They elevate higher-level concerns to the second tier of representatives at the implementer or developer's office.
- **Software adaptation.** Digital health softwaretools should be adapted to meet the needs of a particular context. The implementation service provider can assist with the requirements gathering process to understand users' needs and necessary customization.
- **Software developers.** A global good may require additional software development, depending on the complexity of local requirements and

requested modifications. More established global goods have a marketplace of regional developers and consulting firms that can be hired to provide these types of services. For less-established global goods, health programs can consider filling this role internally or sourcing a local information and communications technology partner.

- **Intervention validation.** Digital Health interventions interact with sensitive and important health information. As such, it is imperative that the tools are trusted and can “prove” that they function the way they are intended and provide reliable, repeatable, and predictable results/functionality. Global trends are moving toward the need for stronger validation of tool design and that quality assurance measures be in place for tools. Implementers should support showcasing the tools' ability to meet these standards, create implementation validation frameworks for tools to demonstrate how they meet the implementation need, and determine whether the local context requires a legal and/or compliance quality assurance plan.

Guidebook User Categories

The following pages describe how this guidebook can be used by people with varying digital health roles and levels of experience.

- **Novice:** A person who is new to digital health and interested in learning more about digital health tools and planning, perhaps to support a digital health intervention.
- **Designer:** A person who is working on a national health information system and wants to learn about digital health tools before strategies and priorities are set.
- **Evaluator:** A person who is reviewing one or more proposals for a digital health intervention and wants to learn about planning for investments in digital health.
- **Integrator:** A person who is looking to bring several sources of health information together and wants to learn best practices in digital health deployment and sustainability.
- **Donor:** A person who is curating investment in health outcomes and supporting technical direction and tooling.

For each role, we provide a number of useful resources. These resources are not exhaustive and will be updated with each new publication of the guidebook.

Novice

Questions	Resources
Where can I find definitions for common digital health terminology?	The Asia eHealth information network (AeHIN) Terminology Guide has definitions for common digital health terminology. Use this resource to look up unfamiliar terms in thisguidebook.
Where can I learn more about a digital health tool deployed in a country?	In this guidebook, each global good entry has a geographic reach section. Review the list of countries where the tool has been deployed. In addition, WHO global technology registry platform, the Digital Health Atlas aims to strengthen the value and impact of digital health interventions, improve coordination, and facilitate institutionalization and scale. Use the Atlas to review and catalog a country's implemented digital health tools.
Where can I find an overview of digital health?	MEASURE Evaluation, working collaboratively with the Global Evaluation and Monitoring Network for Health (GEMNet-Health), developed a free, short course for health information system professionals, the Health Informatics for Low-and Middle-Income Countries course. Take this course to become familiar with the most commonly found concerns and tools in digital health. This course is hosted on the Digital Square learning platform.
I'm planning a digital health intervention. What are the key considerations that I should know?	K4Health created a mHealth Planning Guide that includes resources for planning digital health interventions. Read the guide to understand key considerations. This course is hosted on the Digital Square learning platform.

Designer

Questions	Resources
What types of tools are available to help address health system challenge?	The WHO Classification of Digital Health Interventions v1.0 categorizes the different ways in which digital and mobile technologies are being used to support health system needs. Locate the digital health intervention that corresponds to the health system challenge and select the system category that delivers the digital health intervention. In this guidebook, find the tools relevant to the system category and discover which tools can support the intervention. MEASURE Evaluation's Health Information Systems Strengthening Resource Center includes many national health information system strategy plans. Find a country's strategic plan and learn how it is addressing health system challenges. Overseen by the WHO, the Digital Health Atlas is a global technology registry platform. Use the Atlas to identify a country's digital health tools.
How do I scale a digital health intervention?	The WHO MAPS Toolkit details the various stages of scaling a digital health intervention. Review the toolkit to learn how to scale a digital health intervention. Use this guidebook to see which, if any, global goods already have evidence of national scale implementations for the relevant system category.
How do I monitor health impact and estimate costs?	The Asian Development Bank's Digital Health Impact Framework provides a structure for monitoring the impact of digital health interventions. This guidebook provides information on software tools. When making cost estimates of the tools in this guidebook, consider the hardware and human resource costs of using free and open source tools and look at the pricing models for those tools that are also offered as a service. In addition, the WHO *Digital Implementation Investment Guide (DIIG): Integrating Digital Interventions into Health Programmes* was published recently and provides guidance for countries developing an implementation plan for digital health and covers a range of topics that support understanding cost and impact.
How do I ensure my intervention is sustainable?	Released by the Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung (BMZ), the Digital Health Ecosystem for African Countries provides an action-oriented framework for digital infrastructureand services based on a well-founded health policy context. Use this framework to ensure interventions are sustainable.

Evaluator

Questions	Resources
How do I know if a proposed solution is right for my context?	Developed by the USAID Maternal and Child Survival Program and partners, The Digital Health Investment Review Tool provides high-level guidance based on widely accepted best practices. Use the tool to support strategic investments in the use of digital technologies.
How can I ensure that a digital health intervention maximizes impact?	The Asian Development Bank has released Guidance for Investing in Digital Health, which is designed to help governments consider the interests of all stakeholders when planning investments in digital health. It includes a digital health impact framework. Use the guidance and accompanying digital health impact framework to assess cost, benefit, and timescales.

Integrator

Questions	Resources
How does my digital health intervention fit within a national strategy?	Developed by the WHO and International Telecommunications Union (ITU), the National eHealth Strategy Toolkit helps align digital health interventions with a national health strategy. Additionally, MEASURE Evaluation has collected a catalogue of national health information strategies. Search the catalogue to find a specific national strategy.
How do I determine an appropriate architecture for bringing systems together?	The MEASURE Evaluation Health Information Systems (HIS) Interoperability Maturity Model Mapping Tool identifies the major components of health information system interoperability. Use the maturity model and accompanying Toolkit to identify an appropriate architecture for bringing systems together.
How do I know if a solution is interoperable?	All of the global goods in this guidebook are interoperable. Read the interoperability section in each entry to learn more. The appendix includes an overview of the interoperability OpenHIE architectural framework. Study the framework to understand the extent to which systems and devices can exchange and interpret shared data. Review the Digital Health Atlas for details on specific digital health interventions. Integrating the Health Enterprise (IHE) provides conformance testing for its interoperability profiles and has a product registry of tools and technologies that have undergone conformance testing against various IHE profiles and the results of the testing, i.e., the tool's interoperability test status.

Donor

Questions	Resources
How does Digital Square invest in global goods?	Digital Square's investments follow detailed governance processes that leverage a PRC, Board, and IRC. As the institution hosting Digital Square, PATH is the prime recipient of Digital Square awards (see grant and contract basics for an introduction to vernacular). Therefore, Digital Square investments in global goods is provided through subawards from PATH (e.g., subagreements or subcontracts for grant or contract type funding, respectively). Due to the collaborative nature of engagement with subawardees, PATH frequently employs a cost-reimbursement payment model to allow for more significant modification over the term of thesubaward, if required.
What are approved Digital Square global goods?	Approved Digital Square global goods must first be submitted via applications, including for specific work packages, in response to a Notice on Digital Square's website. These include applications for specific work packages in response to a Notice. Digital Square's PRC and IRC review the applications. The Digital Square Board approves the applications, or partial application work packages. An "Approved Digital Square Global Good" is not a formally vetted global good but a tool that has been approved through the Notice and PRC review. Digital Square currently curates a range of global goods which cover nearly all of WHO's Digital Health Intervention Classifications, also noting that many global goods are adaptable to support multiple interventions.
What is the Digital Square procurement process?	Digital Square works with funders to pursue appropriate, competitive procurement processes to facilitate investment in global goods. Upon funder or Board selection of successful applicant(s), Digital Square notifies selected applicant(s) to begin the subaward process.

Global Good Entries

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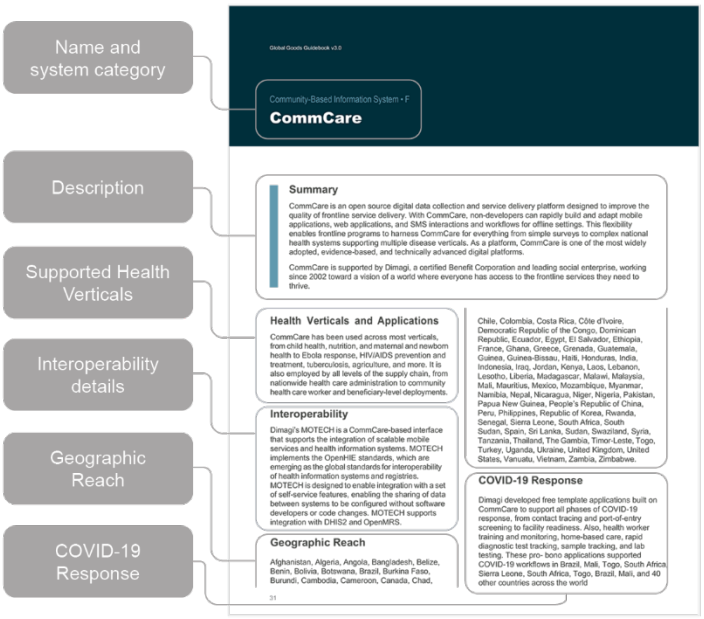
Global Good Entries

The following section consists of global good entries, organized by system categories from the World Health Organization's Classification of Digital Health Interventions v1.0. These entries are intended to provide a brief overview of relevant Digital Square-supported global goods and serve as a starting point for stakeholders and decision-makers interested in the adaptation and adoption of these global goods.

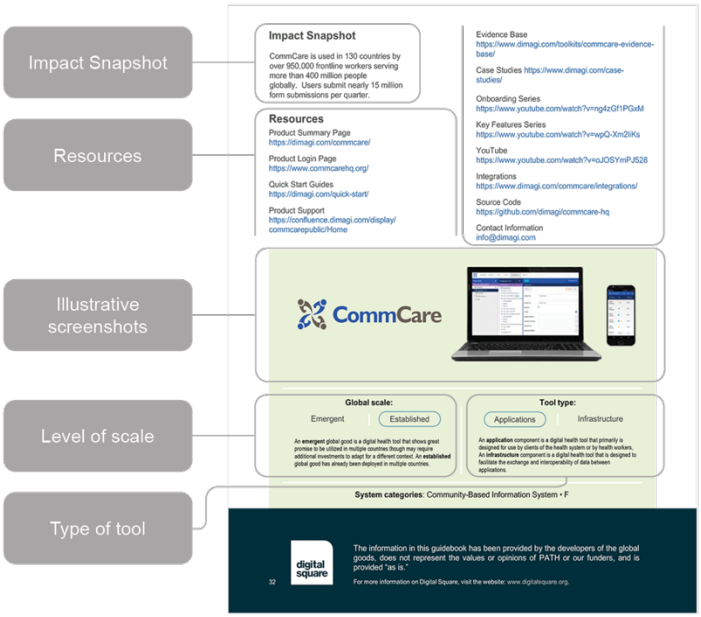
SYSTEM CATEGORIES

B	Civil registration and vital statistics					
	OpenCRVS					
E	Clinical terminology and classifications					
	Open Concept Lab					
F	Community based information systems					
	CommCare	Community Health Toolkit	ODK-X			
G	Data interchange interoperability and accessibility					
	OpenHIM	Instant OpenHIE	OpenFn			
H	Electronic medical record					
	Bahmni	Everwell	OpenCHS	OpenMRS	OpenSRP	Tamanu
J	Environmental monitoring system					
	PlanWise					
K	Facility management information system					
	Global Open Facility Registry					
M	Health finance and insurance information system					
	openIMIS					
N	Health management information system (HMIS)					
	DHIS2	The Global Healthsites Mapping Project				
O	Human resources information system					
	iHRIS					
P	Identification registries and directories					
	Open Client Registry (OpenCR)	PCMT	Pharmadex	SantéMPI		
Q	Knowledge management system					
	Digital Health Atlas					
R	Laboratory and diagnostics information system					
	Child Growth Monitor	OpenELIS Global	OpenLabConnect			
T	Logistics management information system (LMIS)					
	OpenBoxes	OpenLMIS				
V	Public health and disease surveillance system					
	mHero	Reveal	SORMAS			
X	Shared health record and health information repository					
	Hapi FHIR					

Each entry includes key information about the global good that is relevant for a wide range of stakeholders and decision-makers.



- **Name and System Category**
  Name of the global good and relevant WHO System Category
- **Description**
  High-level overview of the global good and its intended purpose.
- **Supported Health Verticals**
  Relevant health verticals supported by the global good and/or how it may be applied across health verticals.
- **Interoperability details**
  Details of the interoperability standards or other interoperability mechanisms used by the global good.
- **Geographic reach**
  Countries or regions where the global good has been implemented and/or where development of the global good occurs.
- **COVID-19 Response**
  Adaptations undertaken by the global good to support the fight against the pandemic.



- **Impact Snapshot**
  Health and health systems impact of the global good through deployment and implementation
- **Resources**
  Resources related to the global good, including additional information, code repositories, and technical documentation.
- **Illustrative screenshots**
  Screenshots designed to give Guidebook readers an idea of how the system appears once implemented.
- **Global Scale**
  Indication of whether the global good is new or emergent, or whether it has been successfully scaled or adopted in multiple countries.
- **Tool type**
  Indication of whether the global good is an application or an infrastructure component.

Civil Registration and Vital Statistics • B

OpenCRVS

Summary

OpenCRVS is an open source digital public good to help achieve universal civil registration and evidence-based decision-making in all country contexts. OpenCRVS has been designed specially to meet the needs and capabilities of low-resource settings.

Health Verticals and Applications

OpenCRVS is a rights-based civil registration and vital statistics (CRVS) software product that is highly configurable to meet the needs of specific country contexts. Core functionalities and use cases include:

Birth and death registration: OpenCRVS integrates with existing health systems to share data on births and deaths. Current use cases include

- Receive birth and death notifications from a health system.
- Provide the denominator for health programs (e.g., vaccination) based on an accurate view of the number of births.
- Generate a disaggregated view of births and deaths by age, sex, location, and—for deaths—the cause

Digital ID: OpenCRVS integrates with foundational ID systems, including national identification (NID) schemes. In Bangladesh, OpenCRVS is integrated with the NID system and successfully validates the NID of parents/family members, and auto-populates fields related to the individual.

Current use cases include:

- Birth registration: OpenCRVS shares biographic details of each birth registration with the ID system and receives a unique ID in response.
- Death registration: OpenCRVS shares details of each death registration with the ID system to deactivate the ID.

Communication. OpenCRVS works with a short message service app to notify applicants via text of the processing status of a birth/death registration certificate, including when it is ready to be collected.

Data management and reporting: To ensure that civil registration can be used for evidence-based decision-making, OpenCRVS provides a real-time data dashboard that allows civil registration managers to monitor key performance indicators, offers audit and deduplication capabilities, providing targeted support to improve services. It also provides for the export of civil registration data that a national statistics office can use to produce accurate and timely vital statistics. It also records audit and deduplication.

Interoperability

OpenCRVS is designed to be interoperable and uses the open health information mediator (OpenHIM) interoperability layer to enable an OpenHIE-compliant and Fast Healthcare Interoperability Resources (FHIR) standards–based data exchange.

Geographic Reach

Bangladesh, Niue

COVID-19 Response

The United Nations Legal Identity Agenda Task Force published COVID-19 guidelines that call for countries to categorize CRVS as an essential service. The guidelines include a number of recommendations that support operational continuity and the continued production of vital statistics during the COVID-19 pandemic. The recommendations recognize that "pandemics are the best time to fully embrace and implement online registration."

- Integration with health systems to minimize effort by health workers in notifying births and deaths from facilities or using community health applications.
- Remote declaration of births and deaths using the OpenCRVS mobile application.
- Real-time data reporting and dashboard on the details and characteristics of births and deaths.
- Integration with ID systems to facilitate trusted validation of remote notifications.

Resources

Website
https://www.opencrvs.org/

Documentation
https://documentation.opencrvs.org/opencrvs-core/

Source Code
https://github.com/opencrvs/opencrvs-core

Contact Information
Edward Duffus, ed@newlegacy.digital

OPEN CRVS

Global scale:

Emergent | Established

An **emergent** global good is a digital health tool that shows great promise to be utilized in multiple countries though may require additional investments to adapt for a different context. An **established** global good has already been deployed in multiple countries.

Tool type:

Applications | Infrastructure

An **application** component is a digital health tool that primarily is designed for use by clients of the health system or by health workers, An **infrastructure** component is a digital health tool that is designed to facilitate the exchange and interoperability of data between applications.

System categories: Civil Registration and Vital Statistics • B

Clinical Terminology and Classifications • E

Open Concept Lab

Summary

The Open Concept Lab (OCL) is an open source terminology management system to help collaboratively manage, publish, and use metadata in the cloud alongside the global community. Imagine GitHub for indicators, terminology, and metadata—a one- stop shop to access international standards, create and publish your own definitions, or browse country and global indicators with mappings to diagnoses, procedures, and other data definitions used to calculate them. OCL is distributed under the Mozilla Public License version 2.0 with a health care disclaimer.

Health Verticals and Applications

With investment, OCL will directly facilitate:

- Digital publication of high-priority nationally endorsed health data standards mapped to international reference vocabularies. Early endorsed standards typically include Health Management Information System indicators, disease classifications, drugs and supplies lists, and insurance claims.
- Digital publication of high-priority nationally endorsed health data standards mapped to international reference vocabularies. Early endorsed standards typically include Health Management Information System indicators, disease classifications, drugs and supplies lists, and insurance claims.
- Modeling and publication of data element definitions from data collection instruments used within the health system mapped to international reference vocabularies.
- Harmonization and reconciliation of data collection and reporting requirements across programs, partners, and tools facilitated by an electronic tool that highlights duplicates and close matches.
- Electronic management, publication, and distribution of information standards to the health system in various formats. This allows for expansion into other domains.
- Making published information standards available as a foundational service within a national digital health architecture, allowing for integrations and metadata subscriptions.
- Mapping and translating between data representations to automate data exchange.

Interoperability

OCL consists of an application programming interface (API) core, the OCL Terminology Server, and a web user interface, the OCL TermBrowser, to streamline searching, browsing, and managing terminology resources. OCL has also implemented OpenHIM to support custom presentations and metadata synchronization between information systems. OCL is cloud-hosted on Amazon Web Services. In addition, OCL includes support for the Integrating the Healthcare Enterprise, Sharing Valuesets, Codes, and Maps profile, which is a Fast Healthcare Interoperability Resources (FHIR)-based profile for use cases associated with terminology management.

COVID-19 Response

OCL is the primary distributor of the Columbia International eHealth Laboratory (CIEL) interface terminology COVID-19 Starter Set.

The OCL team is developing a reference instance of OCL for use as a terminology service with data elements in the World Health Organization Digital Documentation of COVID-19 Certificates core dataset and mappings to code systems.

Impact Snapshot

OCL is the primary distributor for the CIEL interface terminology, which is used in more than 50 countries, largely by the OpenMRS community. OCL has been used to publish Ethiopia's National Health Data Dictionary and its National Classification of Diseases, including mappings to International Classification of Diseases 10 (ICD-10).

Geographic Reach

Global.

Resources

Website
https://openconceptlab.org/

Wiki
https://docs.openconceptlab.org/

Source Code
https://github.com/OpenConceptLab

Contact Information
Jonathan Payne, jon@openconceptlab.org

OCL

Global scale:

Emergent | Established

An **emergent** global good is a digital health tool that shows great promise to be utilized in multiple countries though may require additional investments to adapt for a different context. An **established** global good has already been deployed in multiple countries.

Tool type:

Applications | Infrastructure

An **application** component is a digital health tool that primarily is designed for use by clients of the health system or by health workers, An **infrastructure** component is a digital health tool that is designed to facilitate the exchange and interoperability of data between applications.

System categories: Clinical Terminology and Classifications • E

Community-Based Information System • F

CommCare

Summary

CommCare is an open source digital data collection and service delivery platform designed to improve the quality of frontline service delivery. With CommCare, non-developers can rapidly build and adapt mobile applications, web applications, and short message service (SMS) interactions and workflows for offline settings. This flexibility enables frontline programs to harness CommCare for everything from simple surveys to complex national health systems supporting multiple disease verticals. As a platform, CommCare is one of the most widely adopted, evidence-based, and technically advanced digital platforms.

CommCare is supported by Dimagi, a certified Benefit Corporation and leading social enterprise, working since 2002 toward a vision of a world where everyone has access to the frontline services they need to thrive.

Health Verticals and Applications

CommCare has been used across most verticals, from child health, nutrition, and maternal and newborn health to Ebola response, HIV/AIDS prevention and treatment, tuberculosis, agriculture, and more. It is also employed by all levels of the supply chain, from nationwide health care administration to community health care worker and beneficiary-level deployments.

Interoperability

Dimagi's MOTECH is a CommCare-based interface that supports the integration of scalable mobile services and health information systems. MOTECH implements the OpenHIE standards, which are emerging as the global standards for interoperability of health information systems and registries. MOTECH is designed to enable integration with a set of self-service features, enabling the sharing of data between systems to be configured without software developers or code changes. MOTECH supports integration with District Health Information Software 2 (DHIS2) and OpenMRS.

Geographic Reach

Afghanistan, Algeria, Angola, Bangladesh, Belize, Benin, Bolivia, Botswana, Brazil, Burkina Faso, Burundi, Cambodia, Cameroon, Canada, Chad, Chile, Colombia, Costa Rica, Côte d'Ivoire, Democratic Republic of the Congo, Dominican Republic, Ecuador, Egypt, El Salvador, Ethiopia, France, Ghana, Greece, Grenada, Guatemala, Guinea, Guinea-Bissau, Haiti, Honduras, India, Indonesia, Iraq, Jordan, Kenya, Laos, Lebanon, Lesotho, Liberia, Madagascar, Malawi, Malaysia, Mali, Mauritius, Mexico, Mozambique, Myanmar, Namibia, Nepal, Nicaragua, Niger, Nigeria, Pakistan,Papua New Guinea, People's Republic of China, Peru, Philippines, Republic of Korea, Rwanda, Senegal, Sierra Leone, South Africa, South Sudan, Spain, Sri Lanka, Sudan, Swaziland, Syria, Tanzania, Thailand, The Gambia, Timor-Leste, Togo, Turkey, Uganda, Ukraine, United Kingdom, United States, Vanuatu, Vietnam, Zambia, Zimbabwe.

COVID-19 Response

Dimagi developed free template applications built on CommCare to support all phases of COVID-19 response, from contact tracing and port-of-entry screening to facility readiness. Also, health worker training and monitoring, home-based care, rapid diagnostic test tracking, sample tracking, and lab testing. These pro- bono applications supported COVID-19 workflows in Brazil, Mali, Togo, South Africa, Sierra Leone, South Africa, Togo, Brazil, Mali, and 40 other countries across the world

Impact Snapshot

CommCare is used in 130 countries by over 950,000 frontline workers serving more than 400 million people globally. Users submit nearly 15 million form submissions per quarter.

Resources

Product Summary Page
https://dimagi.com/commcare/

Product Login Page
https://www.commcarehq.org/

Quick Start Guides
https://dimagi.com/quick-start/

Product Support
https://confluence.dimagi.com/display/commcarepublic/Home

Evidence Base
https://www.dimagi.com/toolkits/commcare-evidence-base/

Case Studies https://www.dimagi.com/case-studies/

Onboarding Series
https://www.youtube.com/watch?v=ng4zGf1PGxM

Key Features Series
https://www.youtube.com/watch?v=wpQ-Xm2liKs

YouTube
https://www.youtube.com/watch?v=oJOSYmPJ528

Integrations
https://www.dimagi.com/commcare/integrations/

Source Code
https://github.com/dimagi/commcare-hq

Contact Information
info@dimagi.com

CommCare

Global scale:

Emergent | **Established**

An **emergent** global good is a digital health tool that shows great promise to be utilized in multiple countries though may require additional investments to adapt for a different context. An **established** global good has already been deployed in multiple countries.

Tool type:

Applications | Infrastructure

An **application** component is a digital health tool that primarily is designed for use by clients of the health system or by health workers, An **infrastructure** component is a digital health tool that is designed to facilitate the exchange and interoperability of data between applications.

System categories: Community-Based Information System • F

Community-Based Information System • F

Community Health Toolkit

Summary

The Community Health Toolkit (CHT) is a collection of open source technologies, open access design, technical and implementer resources, and a community of practice for digitally supported health care delivery. It is designed to support community health systems and teams delivering care in the hardest-to-reach communities. The CHT is co-created by the community as an open source project. Medic, a US 501(c)(3) public charity, serves as the technical lead and initial steward—building and supporting the CHT as a global public good and facilitating contributions from others.

Health Verticals and Applications

The CHT supports an exceptional range of community health service areas, including care coordination for comprehensive reproductive, maternal, newborn, and child health (RMNCH) services; early childhood development and nutrition; HIV, tuberculosis, and other infectious diseases, including COVID-19; and noncommunicable diseases. The CHT's Core Framework provides a foundation on which custom CHT applications are built and offers five highly configurable areas of functionality: messaging, task and schedule management, decision support and care guides, longitudinal patient profiles, and analytics. The software supports users at all levels of the community health system, including patients, community health workers (CHWs), CHW supervisors, nurses, health facility staff, program staff, researchers, and policymakers. In so doing, the CHT helps deliver care in reimagined health systems—where care begins at home, services are delivered through proactive visits, and health workers are supported with offline-first algorithms, connections to health facility teams, and data-driven performance management.

Interoperability

The CHT is designed for community health systems that improve the quality, coverage, speed, and equity of primary health care. Given this mandate, building community health apps that share data with the broader digital health ecosystem is a powerful opportunity to integrate care from the patient's doorstep to frontline facilities and beyond. Specifically, the software is designed to complement stand-alone apps that run on the health workers' phones and to support more complex back-end integrations through a REST API and using OpenHIE standards. Data from CHT applications can integrate with the broader health system through integrations with software such as OpenMRS, DHIS2, and RapidPro.

Geographic Reach

The CHT is used in more than 15 countries. The largest CHT-supported networks are in Kenya, Nepal, and Uganda. The CHT also supports community health networks and health systems in Burundi, Democratic Republic of the Congo, Ghana, India, Indonesia, Malawi, Mali, Niger, South Africa, Tanzania, Togo, and Zimbabwe.

COVID-19 Response

The CHT has adopted multiple direct and indirect use cases related to the prevention and treatment of COVID-19, including adaptations to enable primary care, education, testing, and treatment.

Impact Snapshot

The CHT supports more than 41,000 CHWs and caregivers in more than15 countries with over 50 specific partners. In these deployments, health workers use the CHT to coordinate community-based care at the last mile. The CHT has supported over 18.8 million caring activities year-

Resources

Website
https://communityhealthtoolkit.org/

Documentation
https://docs.communityhealthtoolkit.org/

Product Features
https://communityhealthtoolkit.org/features/

YouTube
https://www.youtube.com/channel/UC181IppaxJy9MhnIGkcUpKg

Introduction Video
https://www.youtube.com/watch?v=7_2hL7VxuRA

Demo
https://www.youtube.com/watch?v=fKvgWEaaAGA

Impact Stories
https://medic.org/stories/

GitHub
https://github.com/medic/cht-core

Contact Information
Jacquline Edwards, Interim CEO of Medic
jacquline@medic.org

Samuel Mbuthia, Head of Community at Medic, samuel@medic.org

Kelly Hagler, Communications Manager, kelly@medic.org

CHT

Global scale:

Emergent | **Established**

An **emergent** global good is a digital health tool that shows great promise to be utilized in multiple countries though may require additional investments to adapt for a different context. An **established** global good has already been deployed in multiple countries.

Tool

Application | Infrastructure

An **application** component is a digital health tool that primarily is designed for use by clients of the health system or by health workers, An **infrastructure** component is a digital health tool that is designed to facilitate the exchange and interoperability of data between applications.

System categories: Community-Based Information System

Community-Based Information System • F

ODK-X

Summary

The ODK-X suite lets teams build custom apps to gather, manage, and visualize data just as well in the field as in the office. In ODK-X, developers and data managers can create data management applications consisting of survey forms and Javascript-based apps. The result is a fully customizable user interface to gather, manage, and visualize data on an Android device.

Health Verticals and Applications

ODK-X has been used to manage a variety of verticals, including malaria, HIV, and vaccination. Applications have included cold chain management, longitudinal patient tracking, and geographic data collection. Custom web views and data visualizations, as well as complex workflows, are common in ODK-X applications.

Interoperability

The ODK-X suite allows the use of external programs on Android devices. With the REST application programming interface on the server, the ODK-X suite can integrate with a number of other health information systems, such as DHIS2, OpenHIE, and OpenMRS. ODK-X is also designed to integrate with existing user login systems so that user and group permissions can be easily extended to the mobile device using an organization's preexisting users (e.g., DHIS2, OpenLMIS, Microsoft's active directory style accounts, and Lightweight Directory Access Protocol).

Geographic Coverage

By 2020, implementation had taken place around the world in more than 100 countries, with health deployments in countries such as Australia, Bahamas (International Federation of Red Cross and Red Crescent Societies), deployments in countries such as Australia, Bahamas (International Federation of Red Cross and Red Crescent Societies), Bangladesh, Bolivia, Chile, Colombia, Democratic Republic of the Congo, Ecuador, Ethiopia (PATH), Fiji (World Mosquito Program), Haiti (UNEPI and World Health Organization), Honduras, India, Indonesia, Kenya (University of Washington HOPE Study), New Caledonia, Pakistan, Panama, Peru, Sri Lanka, Uganda, Vanuatu, Venezuela, Vietnam, and Zambia (PATH).

COVID-19 Response

ODK-X developed a vaccine cold chain information system using the ODK-X frameworks to help countries track and improve their vaccine cold chain equipment used to store vaccines (e.g., COVID-19 vaccines) for Gavi, the Vaccine Alliance and WHO. During COVID-19 shutdowns, Red Cross used ODK-X to track beneficiaries and distribute money and goods to vulnerable populations affected by COVID-19 in several countries.

Impact Snapshot

Uganda is using ODK-X to track and update facility and vaccine cold chain information countrywide.

Resources

Website https://odk-x.org/

GitHub https://github.com/odk-x

Documentation and Demos
https://docs.odk-x.org/

User Forum
https://forum.odk-x.org/

Contact Information
Caroline Krafft, cgkrafft@stkate.edu

Jeff Beorse, jeff@beorse.net

Waylon Brunette, wrb@cs.uw.edu

Global scale:

Emergent | Established

An **emergent** global good is a digital health tool that shows great promise to be utilized in multiple countries though may require additional investments to adapt for a different context. An **established** global good has already been deployed in multiple countries.

Tool type:

Applications | Infrastructure

An **application** component is a digital health tool that primarily is designed for use by clients of the health system or by health workers, An **infrastructure** component is a digital health tool that is designed to facilitate the exchange and interoperability of data between applications.

System categories: Community-based information system • F

Data Interchange Interoperability and Accessibility • G

OpenHIM

Summary

The Open Health Information Mediator (OpenHIM) is an open-source middleware component designed to ease interoperability between disparate information systems. It provides secure communications and data governance as well as support for routing, orchestrating, and translating requests as they flow between systems.

Health Verticals and Applications

Some examples of common workflows that OpenHIM can support are:

- Saving a patient's clinical encounter to a shared health record so that authorized health care providers can access key clinical data to inform better care.
- Retrieving relevant information about patients and care plans for authorized health care providers.
- Receiving aggregate reporting information from a client system and sending it to an aggregate data store.
- Managing health facilities.
- Managing patient demographics and identity to allow the tracking of a patient's activity within and across health care organizations and the continuum of care.

Interoperability

The OpenHIM functions as an interoperability layer, providing a single point of entry into the services of a health information exchange (HIE). It receives transactions from client systems and coordinates interactions between different components of an HIE by routing requests to the correct orchestrator or registry.

It also provides a centralized set of common functions (such as security, auditing, logging) to simplify data exchange. In addition, the OpenHIM's customizable mediator framework provides for additional mediation functions for transactions within an HIE, supporting and simplifying custom business logic and the use of health data standards such as Fast Healthcare Interoperability Resources (FHIR) required by client systems to interact with the HIE. This makes it easier and faster for point-of-service applications to connect to the HIE.

Geographic Reach

Bangladesh, Barbados, Ethiopia, Indonesia, Kenya, Lesotho, Liberia, Malawi, Mozambique, Rwanda, South Africa, Tanzania, Uganda, Zimbabwe.

COVID-19 Response

OpenHIM is adapted to support COVID-19 data exchange within an HIE, through a set of mediators covering COVID-19 case reporting aligned with WHO standards and submission of laboratory results, supporting ingestion of case reports and laboratory data, and persistence to both an FHIR data repository and DHIS2.

OpenHIM is adapted to support COVID-19 vaccination tracking within an HIE through a set of custom mediators supporting ingestion of patient and immunization data, persistence to an FHIR data repository, and interfacing with a Client Registry.

Impact Snapshot

OpenHIM is used at scale in the MomConnect maternal health care system in South Africa, rolled out in more than 95 percent of public health clinics in the country, with over 3 million registrations since 2015. OpenHIM is also used to support mobile malaria surveillance in South Africa and as a core component of the OpenCRVS (civil registration and vital statistics) system.

Resources

OpenHIM Website
http://openhim.org

Documentation
http://openhim.org/docs/introduction/about

YouTube
https://www.youtube.com/channel/UCz3UpAGDJbKG7KkorgMGfEA

Source Code
https://github.com/jembi/openhim-core-js

Contact Information
Daniel Futerman, daniel.futerman@jembi.org

OpenHIM

Global scale:

Emergent | Established

An **emergent** global good is a digital health tool that shows great promise to be utilized in multiple countries though may require additional investments to adapt for a different context. An **established** global good has already been deployed in multiple countries.

Tool type:

Applications | Infrastructure

An **application** component is a digital health tool that primarily is designed for use by clients of the health system or by health workers, An **infrastructure** component is a digital health tool that is designed to facilitate the exchange and interoperability of data between applications.

System categories: Data Interchange Interoperability and Accessibility • G

Data Interchange Interoperability and Accessibility • G

Instant OpenHIE

Summary

Instant OpenHIE aims to reduce the costs and skills required for software developers to rapidly deploy an Open Health Information Exchange architecture for quicker initial solution testing and a starting point for faster production implementation and customization. Instant OpenHIE provides a simple way for technical persons to install and see a complex system working against a real-world use case, allowing them to illustrate how interoperability can help solve health challenges and demonstrate how an interoperability architecture could be created using open source tools and standards.

Health Verticals and Applications

Instant OpenHIE provides an easy way to set up, explore, and develop with the OpenHIE architecture. It allows packages to be added that support multiple different use cases and workflows specified by OpenHIE. Each package contains scripts to stand up and configure applications that support the various workflows. The fundamental concept of Instant OpenHIE is that it can be extended to support additional use cases and workflows. At maturity, Instant OpenHIE activities provide portable, launchable versions of multiple OpenHIE components to facilitate:

- Demonstrable reference products—those that align with the OpenHIE community's vision for low resource contexts.
- Rapid software development of mediators and point-of-service systems by making it possible to launch several applications easily so the developer can focus on other tasks.
- Reproducible, version-controlled infrastructure for user-contributed tests of the OpenHIE architecture profiles, workflows, and use cases.
- Production-ready containers and adaptable components that are deployable in any context.
- Extensibility so that anyone may create Instant OpenHIE packages and plug them into the existing Instant OpenHIE functionality.

Interoperability

Instant OpenHIE aims to illustrate how interoperability can work to solve various health challenges, providing a set of packages that can be configured to set up health information exchange (HIE) components for particular use cases and workflows. One of the core components of Instant OpenHIE is the interoperability layer, which enables interoperability and data exchange within an HIE as well as providing a single point of entry into the HIE. The Open Health Information Mediator (OpenHIM) (an open source middleware component designed to ease interoperability between disparate information systems) is used as a reference technology and forms part of the Instant OpenHIE core package.

Geographic Coverage

Initial efforts have focused on creating a core prototypical HIE using open standards and open source software to help developers set up and demo an HIE based on the OpenHIE architecture. At maturity, Instant OpenHIE aims to provide deployment options that can be used in production.

COVID-19 Response

Instant OpenHIE is adapted to include COVID-19 surveillance and immunization tracking package.

That extends off the core Instant OpenHIE solution, with scripts to set up a containerized set of components and configuration scripts enabling the demonstration of patient and COVID-19 immunization tracking within an HIE and case reporting aligned with WHO standards and submission of laboratory results within an HIE.

Impact Snapshot

Instant OpenHIE supports operationalizing the OpenHIE specification and testing framework, demonstrating key interoperability and data exchange workflows in action.

Resources

Website
https://openhie.github.io/instant/

Wiki
https://wiki.ohie.org/display/resources/Instant+OpenHIE

Technical Architecture
https://docs.google.com/document/d/1a-TP20OjKvwn3mMu8U8sncvbvO9ellnQOoNrjZ6u2Fc/edit

Youtube
https://www.youtube.com/playlist?list=PLCJmZyUJwf2VFvoL7sCS2CSkZ6akEr0Pr

Source Code
https://github.com/openhie/instant

Contact Information
Daniel Futerman, daniel.futerman@jembi.org

Instant OpenHIE

Global scale:

Emergent | Established

An **emergent** global good is a digital health tool that shows great promise to be utilized in multiple countries though may require additional investments to adapt for a different context. An **established** global good has already been deployed in multiple countries.

Tool type:

Applications | Infrastructure

An **application** component is a digital health tool that primarily is designed for use by clients of the health system or by health workers, An **infrastructure** component is a digital health tool that is designed to facilitate the exchange and interoperability of data between applications.

System categories: Data Interchange Interoperability and Accessibility • G

Data Interchange Interoperability and Accessibility • G

OpenFn

Summary

OpenFn is an integration Platform as a Service (iPaaS) and a suite of open source extract, transform, and load, data-integration, and interoperability tools used to automate workflows and the exchange of information across and within systems in a secure, stable, and scalable manner.

Health Verticals and Applications

Organizations worldwide use OpenFn to integrate health information and automate service delivery applications. OpenFn solutions strengthen existing health digital systems through automated data integration, data cleaning, and reporting pipelines.

OpenFn has been implemented by governments and nongovernmental organizations to:

- Synchronize data between mobile phones and a central management information system so community health workers have up-to-date access to patient data.
- Pay individuals via mobile money (e.g., M-PESA) transactions when certain conditions are met in a management or human resources system.
- Send referrals and sensitive case data between service providers that use distinct systems.
- Receive community health worker visit data in real time from a mobile app and load it into DHIS2.
- Reformat patient data to adhere to standards (e.g., Health Level Seven Fast Healthcare Interoperability Resources [HL7 FHIR]) before automatically loading it into a health information mediator.
- Automate data cleaning and duplicate-checking processes in reporting pipelines.
- Sync financial systems with program management systems.
- Send SMS messages to field workers, automatically detecting and notifying them of critical changes to various systems or processes.
- Summarize and aggregate monitoring data to automatically report across key health indicators.

Interoperability

OpenFn (the iPaaS), OpenFn/core, OpenFn/microservice, and more than 60 open source adaptors maintained by OpenFn can be used locally or on the cloud, and as stand-alone solutions or as modules in other applications. Together the interoperability suite provides organizations with the tools they need to connect with any application or database, adhere to any data standard, and automate any routine digital process. These tools range from lightweight Node.js apps to robust and highly fault-tolerant enterprise applications running on the Erlang VM. The tools are typically used in their hosted forms on the cloud or deployed with Docker and/or Kubernetes.

Geographic Coverage

Afghanistan, Bangladesh, Bolivia, Brazil, Cambodia, Chile, Democratic Republic of the Congo, Ecuador, Ethiopia, Finland, Guatemala, Guinea, Haiti, India, Indonesia, Kenya, Liberia, Madagascar, Mali, Myanmar, Nepal, Nicaragua, Nigeria, Norway, Paraguay, Peru, Philippines, Senegal, Somalia, South Africa, Sri Lanka, Switzerland, Tanzania, Thailand, Uganda, United States, Vietnam, Zimbabwe.

COVID-19 Response

For COVID-19 response, OpenFn implementations are adjusted to connect online and offline community health worker tools with cloud-based health information systems, facilitating better disease surveillance. For COVID-19 vaccine support, OpenFn implementations are configured to connect vaccine eligibility, request, and delivery data across systems and to facilitate the transfer of vaccine-related supply chain data between systems.

Impact Snapshot

As of November 2021, OpenFn receives and processes 2.4 million messages (requests from external systems) every year. In addition, it runs more than a thousand different jobs (integration scripts) 2.6 million times every year. Also, it has more than 60 adaptors for the most used tools across the ICT4D sector and is used by more than 40 governments and nongovernmental organizations across 38 countries.

Website
https://www.openfn.org

Documentation
https://docs.openfn.org

Blog
https://docs.openfn.org/blog

Demo (by OpenFn)
https://youtu.be/v7BUXBFpPoc

Demo (by Digital Impact Alliance [DIAL])
https://www.youtube.com/watch?v=Iy4ChEKcQzQ&list=PL1pD3-abjHJ2fNDk0g3A0jrowIVwTZyhR

Source Code
https://github.com/OpenFn

Contact Information
admin@openfn.org

OpenFn

Global scale:

Emergent | Established

An **emergent** global good is a digital health tool that shows great promise to be utilized in multiple countries though may require additional investments to adapt for a different context. An **established** global good has already been deployed in multiple countries.

Tool type:

Applications | Infrastructure

An **application** component is a digital health tool that primarily is designed for use by clients of the health system or by health workers, An **infrastructure** component is a digital health tool that is designed to facilitate the exchange and interoperability of data between applications.

System categories: Data Interchange Interoperability and Accessibility • G

Electronic Medical Records • H

Bahmni

Summary

Bahmni is an easy-to-use hospital information system and electronic medical record (EMR) system developed in the global south to meet the needs of low-resource environments. Bahmni is a distribution of the Open Medical Record System (OpenMRS) medical record platform, with a user interface built from the ground up. It also supports Odoo (formerly open enterprise resource planning [OpenERP]), open electronic-level laboratory information system (OpenELIS), and dcm4chee (an image manager), providing an integrated, robust solution that manages patient information in a flexible fashion throughout the care cycle, including registration, various points of care, investigations, laboratory orders and results management, picture archiving and communication systems, and billing.

Health Verticals and Applications

Primary care, tuberculosis, HIV, multidrug-resistant tuberculosis, reconstructive surgery, neurosurgical care, community health.

Interoperability

In a health information exchange (HIE) architecture, Bahmni can run at many hospitals and clinics (or in the cloud, accessed by community health workers, or in a vertical program). These installations are integrated via the HIE, sharing data via the master patient index and shared health record. Bahmni can also synchronize data from the various registries (terminology, facility, provider). An example is in Bangladesh, where Bahmni serves as the reference client application, demonstrating integration with the Shared Health HIE.

Geographic Reach

Armenia, Bangladesh, Belarus, Cambodia, Cameroon, Ethiopia, Georgia, Ghana, Haiti, India, Indonesia, Jordan, Kazakhstan, Kenya, Kyrgyzstan, Lesotho, Myanmar, Nepal, Pakistan, Papua New Guinea, Peru, Philippines, Sierra Leone, South Africa, South Sudan, Tanzania, Uganda, Zambia.

COVID-19 Response

Bahmni has added COVID-19 concepts mapped to Columbia International eHealth Laboratory (CIEL) and SNOMED Clinical Terms. This comprehensive resource enables the consistent representation of clinical content in electronic health records.

Bahmni has introduced a new COVID-19 program with program status where patients can enroll during a patient encounter and new COVID-19 forms to collect COVID-19- related data. Similarly, Bahmni supports COVID-19 vaccine introduction by adding a COVID-19 Vaccination form with editable functionality to add second dosage details and any side effects reported after vaccination and the ability to generate a COVID-19 Vaccination Certificate with print and preview functions.

Impact Snapshot

Bahmni has been implemented in South Sudan to support HIV client management, viral load tracking, and appointment management. Bahmni has also been implemented in Kenya to support end-to-end patient workflows in an orthopedic health facility. This system supports billing functionalities, accounting, and warehouse management. Bahmni is being implemented in remote regions of Ghana to support mobile telepsychiatry patient workflows.

Resources

Website
https://www.bahmni.org/

Blog
https://medium.com/bahmni-blog

Demo
https://bahmni.atlassian.net/wiki/x/CwGyAw

GitHub
https://github.com/bahmni

Wiki
https://bahmni.atlassian.net/wiki/spaces/BAH/overview

Feature Guide
https://bahmni.atlassian.net/wiki/x/F4DxAQ

Implementers Guide
https://bahmni.atlassian.net/wiki/x/CYAk

User Guide
https://bahmni.atlassian.net/wiki/x/AoDoAQ

YouTube
https://www.youtube.com/channel/UC6hTFy77jJ0dxhKeiA-Uy3A

Source Code
https://github.com/bahmni

Contact Information
contact@bahmni.org

Bahmni™

Global scale:

Emergent | Established

An **emergent** global good is a digital health tool that shows great promise to be utilized in multiple countries though may require additional investments to adapt for a different context. An **established** global good has already been deployed in multiple countries.

Tool type:

Applications | Infrastructure

An **application** component is a digital health tool that primarily is designed for use by clients of the health system or by health workers, An **infrastructure** component is a digital health tool that is designed to facilitate the exchange and interoperability of data between applications.

System categories: Electronic Medical Records • H

Electronic Medical Records • H

Everwell Health Solutions

Summary

The Everwell Hub is an open source platform that supports real-time, end-to-end case management for public health diseases. Founded in 2015, Everwell Health Solutions private limited company spin-out from Microsoft Research to champion innovations in public health. Based on initial work, Everwell Hub was developed as an open-source module-based platform to digitize the patient journey.

Health Verticals and Applications

The Everwell Hub supports treatment recovery and program management of healthcare domains such as COVID-19, tuberculosis (TB), HIV, mental health, and beyond. Government decision-makers, healthcare workers, and patients use this digitized platform to support the best possible healthcare. In addition, the Everwell Hub team customizes each deployment per partner's needs for partnerships and deployments, providing a personal experience for partners.

The TB case management platform has the following primary features:

- Enables end-to-end management of TB patients, starting from symptomatic to long-term post-treatment follow-up.
- Patient management functions such as Patient transfer function and system assisted deduplication which help in improved tracking and record-keeping
- Integration with other applications for Supply Chain Management System & Lab Information System Management functions (LISM).
- Integration with the public financial management system (PFMS) enables the transfer of benefits directly to patients' bank accounts.
- Generate various automated outputs used extensively for program reviews at all program levels.
- Extensive reports and dashboard views based on the latest data allow tracking and assessing responses.
- Integrated with a cafeteria of Digital Adherence Technologies.
- Automated/manually initiated patient communication via SMS and WhatsApp from the Mobile App.
- Intelligent task lists for staff enabling timely patient follow-up and prioritizing patients.

Interoperability

The Hub aligns with data standards and is interoperable with external applications as a platform. The following table briefly describes the different design principles adopted by Everwell to optimize the performance, usability, and scalability of the current interoperable, shelf-ready platform.

Geographic Reach

Bangladesh, Kenya, Eswatini, Ethiopia, Haiti, India, Kyrgyzstan, Mozambique, Myanmar, Namibia, Nigeria, Philippines, South Africa, Tanzania, Uganda, Ukraine, Vietnam.

COVID-19 Response

Everwell Hub modified its core platform to digitize the recovery journey of COVID patients, which is similar to TB. The Hub also developed, alongside PATH, a digital oxygen dashboard to monitor current and predict future oxygen consumption and production.

Everwell encourages the uptake of 99DOTs that helped virtual engagement before COVID-19 and has doubled down on innovations that bring doctors and patients together in virtual formats.

Impact Snapshot

Everwell's products and solutions support over 2.6 million new cases annually, including 1 in 5 of every newly diagnosed active TB case, and host over 18 million digital case records. And facilitated over $100 million of benefits direction to patients through banking infrastructure.

Everwell has also been translated into over ten languages, deployed in over 15 countries on three continents, and used by over 50,000 healthcare workers.

Resources

Website
https://www.everwell.org/

Source Code
https://gitlab.com/everwell/hub-foss

Contact Information
Andrew Cross, CEO & Founder, andrew@everwell.org
Sarbani Dey Sarkar, Program Manager, sarbani@everwell.org

Global scale:

Emergent | Established

An **emergent** global good is a digital health tool that shows great promise to be utilized in multiple countries though may require additional investments to adapt for a different context. An **established** global good has already been deployed in multiple countries.

Tool type:

Application | Infrastructure

An **application** component is a digital health tool that primarily is designed for use by clients of the health system or by health workers, An **infrastructure** component is a digital health tool that is designed to facilitate the exchange and interoperability of data between applications.

System categories: Electronic Medical Records • H

Electronic Medical Records • H

OpenMRS

Summary

OpenMRS is a software platform and a reference application that enables design of a customized medical records system (MRS). It is a common platform upon which health informatics and eHealth efforts in low-income countries can be built. Since the system is based on a conceptual database structure that is not dependent on the actual types of medical information required to be collected or on particular data collection forms, it can be customized for different uses. Both the platform and the new front-end reference application (OpenMRS 3.x) are designed to be modular, making it extremely extensible by allowing customizations to be added or removed to meet local needs.

OpenMRS is based on the principle that information should be stored in a way that makes it easy to summarize and analyze (i.e., minimal use of free text and maximum use of coded information). At its core, it is a concept dictionary that stores all diagnoses, tests, procedures, drugs, and other general questions and potential answers.

Health Verticals and Applications

Primary health care; HIV/AIDS care and treatment; tuberculosis and extremely drug-resistant tuberculosis; noncommunicable diseases and chronic diseases (e.g., hypertension, diabetes, chronic lung disease, epilepsy, and heart failure/cardiovascular disease); maternal, newborn, and child health; mental health; nutrition services; disease outbreak response (e.g., COVID-19, Ebola); emergency triage; post-surgery notes; oncology and chemotherapy; radiology orders and results; pathology specimen tracking.

Interoperability

OpenMRS supports the ability to exchange health care data in a widely used, standards-based format, easing integration with external systems and products. As an electronic medical record (EMR), OpenMRS is an integral point-of-service component of a fully functional health information exchange (HIE). In fact, the OpenMRS community works closely with OpenHIE, building and evaluating the ability of OpenMRS to share data through the defined OpenHIE architectural stack.

Geographic Reach

Albania, Argentina, Armenia, Australia, Bangladesh, Belarus, Bhutan, Bolivia, Botswana, Brazil, Burundi, Cambodia, Cameroon,* Chile, Colombia, Cote d'Ivoire, Democratic Republic of the Congo, Ecuador, Ethiopia, The Gambia, Georgia, Ghana, Haiti, Honduras, Hungary, India, Indonesia, Israel, Japan, Jordan, Kazakhstan, Kenya,* Kiribati, Kyrgyzstan, Laos, Lesotho, Liberia, Libya, Madagascar, Malawi, Malaysia, Mali, Mexico, Mozambique,* Myanmar, Nepal, Nicaragua, Nigeria,* Norway, Pakistan, Peru, Philippines, Rwanda, Senegal, Sierra Leone, South Africa, Spain, Sri Lanka, Tajikistan, Tanzania, Uganda,* Ukraine, United States, Vietnam, Zambia, Zimbabwe.

**Denotes OpenMRS has been selected by the Ministry of Health as the national electronic medical record for clinical care, either broadly or for a vertical system.*

COVID-19 Response

OpenMRS plays a central data management role in the COVID-19 care cascade: its primary focus is patient care and treatment data managed and reported by health facilities. OpenMRS supports developing extensible COVID-19 tools focused on two building blocks: the OpenMRS Concept Dictionary and modules.

OpenMRS' COVID-19 response includes adding standard COVID-19 concepts to the OpenMRS Concept Dictionary to support the development of OpenMRS COVID-19 forms and integration with external systems and access and use of a suite of tools via the COVID-19 Form Bank. These tools include forms to support patient care, treatment, and vaccination; integration with community-level tools to support contact tracing and follow-up; and aggregate reporting.

Impact Snapshot

At a global level, health care providers use OpenMRS at more than 6,500 health facilities—five times the number of sites since the OpenMRS community first began tracking implementations in 2016. These implementations help improve the health outcomes of more than 14.6 million patients by expanding health care providers' access to the information necessary for quality patient care and treatment. And, in turn, reducing the time and effort needed by the healthcare teams to focus on providing healthcare services.

Resources

Website
https://openmrs.org

Atlas
https://atlas.openmrs.org

Demo
https://openmrs.org/demo/

Wiki
https://wiki.openmrs.org

Discussion Forum
https://talk.openmrs.org

YouTube
https://www.youtube.com/watch?v=h0Z-_SSZaCY

Source Code
https://github.com/openmrs/

Contact Information
Paul Biondich, Executive Director
community@openmrs.org

OpenMRS
MEDICAL RECORD SYSTEM

Global scale:

Emergent | **Established**

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Tool type:

Applications | Infrastructure

An **application** component is a digital health tool that primarily is designed for use by clients of the health system or by health workers, An **infrastructure** component is a digital health tool that is designed to facilitate the exchange and interoperability of data between applications.

System categories: Electronic Medical Records • H

Electronic Medical Records • H

OpenSRP

Summary

Open Smart Register Platform (OpenSRP) is an open source mobile digital global goods platform whose primary users are frontline health workers. The tool empowers health workers by allowing them to digitally record the services they render at community- and health-facility levels, while simultaneously providing program managers and policymakers with current data for improved decision-making.

Health Verticals and Applications

Due to its functionally, modularity, and technologically adaptable architecture, OpenSRP has been used to build localized applications for reproductive, maternal, newborn, child, and adolescent health; routine immunization; early childhood development; malaria rapid diagnosis and management; tuberculosis treatment management; and HIV/AIDS, as well as COVID-19 testing and screening.

Interoperability

OpenSRP provides a best-in-class user experience for frontline workers using Android-based tablets and smartphones. It pushes the data to a deployment management system (the OpenSRP Server) and integrates with electronic medical records systems to provide scalable data management across large geographic areas.

Once the app is downloaded onto an Android device, OpenSRP allows for complete offline data collection, data syncing, and data reporting capabilities when a worker is in a low-bandwidth or bad connectivity setting. Through OpenSRP's Bluetooth-enabled peer-to-peer sync function, a worker can sync data collected on their device with their supervisor's device, without having access to the internet. OpenSRP also integrates with third-party systems like DHIS2 for automated reporting, RapidPro for direct-to-client or health worker messaging, and electronic data warehouse systems for robust data visualization and analytics.

From 2020 to 2021, the OpenSRP team made significant improvements to the OpenSRP Web interface to bring to program administrators and managers better security features and a more user-friendly way to manage users, locations, and access. Since late 2020, a consortium of partners, led by Ona, has embarked on a process of rebuilding the OpenSRP platform to be (to their best knowledge) the first fully Fast Health Interoperability Resources (FHIR)-compliant digital tool for frontline health workers globally.

Geographic Reach

Bangladesh, Chad, Democratic Republic of the Congo, Eswatini, Guinea, Indonesia, Kenya, Liberia, Madagascar, Malawi, Mauritania, Namibia, Nepal, Rwanda, Tanzania, Thailand, Togo, Tunisia, Vietnam, Zambia.

COVID-19 Response

OpenSRP has been adapted to strengthen the global response to the COVID-19 pandemic, Ona has worked with the Summit Institute of Development and the Clinicians Society of Indonesia to develop the OpenSRP-based COVID-19 Testing and Screening (CTS) app in Indonesia.

UNICEF in Mozambique, and through support from Johnson & Johnson, to build out the platform's micro-planning capabilities to better calculate coverage estimates based on where populations live in relation to their nearest health facility. OpenSRP has worked with the World Health Organization to develop a COVAX digital vaccine certificate reference app that is based on the Google FHIR Android SDK and is fully FHIR compliant.

Impact Snapshot

OpenSRP-based applications are currently being used by more than 15,000 health workers in 22 countries, mainly in Asia and Africa. Using the platform, these health workers collectively track and manage the health and well-being of over 50 million households.

Two examples of proven impact achieved to date using OpenSRP include the mCARE Tool (for supporting antenatal care and safe pregnancy and delivery) and the mTIKA tool (for tracking childhood immunizations) in Bangladesh.

Resources

Website
https://smartregister.org

Source Code
https://github.com/OpenSRP

Contact Information
Matt Berg, info@smartregister.org

OPENSRP

Global scale:

Emergent | Established

An **emergent** global good is a digital health tool that shows great promise to be utilized in multiple countries though may require additional investments to adapt for a different context. An **established** global good has already been deployed in multiple countries.

Tool type:

Applications | Infrastructure

An **application** component is a digital health tool that primarily is designed for use by clients of the health system or by health workers, An **infrastructure** component is a digital health tool that is designed to facilitate the exchange and interoperability of data between applications.

System categories: Electronic Medical Records • H

Electronic Medical Records • H

Tamanu

Summary

Tamanu is a free and open source patient-level electronic medical record (EMR) system for desktop and mobile. It allows health workers to track individual patients and provide clinical support.

Designed specifically for remote settings and the Asia-Pacific context, Tamanu allows health workers to monitor patients in hospitals, health centers, clinics, and even out in the community, enabling consistent, long-term management of patient conditions. The system is offline-first, with syncing capabilities, allowing users to work seamlessly with and without an internet connection. The mobile and desktop versions are fully integrated “out -of- the -box,” meaning there are no third-party integrations required for any core features.

Health Verticals and Applications

Tamanu supports a broad range of features that enable the management of patients across all levels of health care. Tamanu Desktop offers a full suite of EMR functionality, including inpatient management, appointment scheduling, birth and death registrations, admissions, location management and discharges, diagnoses and procedures, and clinical documentation. The system also supports medication, laboratory, and radiology orders and requests. Tamanu Mobile has a simple and user-friendly design, enabling users to record diagnoses, treatments, vaccinations, and clinical information. The mobile functionality also supports flexible data collection for public health programs, such as noncommunicable disease (NCD) screening, with clinical decision support and treatment pathways that use a configurable programs module.

Interoperability

Tamanu is designed to interface with existing patient administration and digital health systems including laboratory (currently working with SENAITE) and radiology management systems. Tamanu can also integrate with third-party systems such as mSupply, Tupaia and DHIS2.

Tamanu desktop and mobile communicate over HTTP; if a client has a valid authentication token, the server does not distinguish between native Tamanu applications and third-party systems. Any system capable of making a web request can integrate with Tamanu. Similarly, the Tamanu server can be extended to send data to any third-party system that has a web-facing application programming interface.

Tamanu has adopted HL7 FHIR as our standard for exchanging data and have live integrations using this protocol.

Geographic Reach

Tamanu is currently deployed in the following countries in the Indo-Pacific region: Fiji, India, Nauru, Papua New Guinea and Samoa. This year, Tamanu has planned deployments in Kiribati, Palau, Solomon Islands, Tuvalu, and Vietnam.

At the Pacific sub-regional level, by the end of 2022, Tamanu will have implementations in over 60% of the Pacific (Small Islands Developing States).

COVID-19 Response

Tamanu has been adapted to support the COVID-19 response across the Indo-Pacific Region. Tamanu Immunization Module, Laboratory Module and Programs Module have been adapted to create COVID-19 vaccination, testing and case management modules.

Impact Snapshot

In Samoa, COVID-19 Vaccination Module supports the COVID-19 vaccination campaign and recorded vaccines for over 80 percent of the population as of November 2021. In Fiji, COVID-19 Testing Module is used to record and result in COVID-19 tests, with over 30,000 recorded as of November 2021. In addition, Fiji and Samoa have implemented the Programs Module to support NCD screening.

The Immunization Module supports the typhoid mass vaccination campaign in Samoa and routine vaccinations in Nauru aligned with the national immunization schedule. Nauru uses the Patient Registration module to create a unique health identifier and print a patient ID card for each citizen.

India and Papua New Guinea use Tamanu to register clients and record the prescription of assistive technology devices as part of the Motivation Australia Assistive Technology Device Project.

Resources

Website
https://www.beyondessential.com.au/products/tamanu/

YouTube
https://www.youtube.com/watch?v=gGlhxmP7YAc

Mobile User Guide
https://beyond-essential.slab.com/public/posts/p86f4i89

Desktop User Guide
https://beyond-essential.slab.com/public/posts/0p3oz22g

Source Code
https://github.com/beyondessential/tamanu-open

Contact Information
Megan Lane, megan@beyondessential.com.au

tamanu

Global scale:

Emergent | Established

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Tool type:

Applications | Infrastructure

An **application** component is a digital health tool that primarily is designed for use by clients of the health system or by health workers, An **infrastructure** component is a digital health tool that is designed to facilitate the exchange and interoperability of data between applications.

System categories: Electronic medical record • H

Facility Management Information System • K

Global Open Facility Registry

Summary

The Global Open Facility Registry (GOFR) lets health data administrators analyze, de-duplicate, and curate lists of facilities. By reconciling data sets maintained by multiple sources, it helps health officials develop registries of all the unique health facilities in a country.

Data points such as the name and location of health facilities are essential to health information systems, reporting, and decision-making. However, up-to-date, accurate information on facilities may be difficult to find as different stakeholders with different information needs and naming conventions maintain separate lists. Additionally, governments often do not have access to a flexible, secure platform for facility management and information exchange.

GOFR saves time, improves accuracy, and allows administrators to compare data sets, compile lists of facilities, and manage federations.

Health Verticals and Applications

GOFR drives health information exchange across health verticals, strengthening comprehensive clinical care, dynamic case-based surveillance, data-driven public health policy, and epidemic control. GOFR can meet the management and organizational needs of a national ministry while also providing the public with access to essential information on the location of health services.

GOFR includes:

- An interface that adds value based on a HAPI FHIR server as the back end.
- The ability to import CSV, DHIS2, and FHIR servers as data sources.
- An API and back-end engine that uses FHIR location resources based on the mCSD profile.
- A modular system to extend algorithms for matching.
- Key cloak authentication and authorization for enterprise deployments.
- Ability to make a centralized list or let clients manage their own mirror on the server.
- A permissive (Apache 2.0) license.
- Easy customization using FHIR Shorthand (FSH). Just load new FHIR resources to change forms.

Interoperability

GOFR can pull facility data from multiple data sources and is interoperable with DHIS2, iHRIS, and any FHIR server. It supports the mCSD profile of FHIR and through its HAPI FHIR server back end, supports FHIR REST operations. It serves as the facility registry component in the OpenHIE Architecture and will soon be interoperable with OpenMRS and OpenELIS.

Geographic Coverage

GOFR has been used to support the US President's Emergency Plan for AIDS Relief (PEPFAR) Data for Accountability, Transparency and Impact Monitoring (DATIM) project to match 80,000 facilities across numerous administrative levels in 21 countries: Botswana, Burundi, Cameroon, Côte d'Ivoire, Democratic Republic of the Congo, Eswatini, Ethiopia, Haiti, Kenya, Lesotho, Malawi, Mozambique, Namibia, Nigeria, South Africa, South Sudan, Tanzania, Uganda, Ukraine, Zambia, and Zimbabwe. Beyond the DATIM project, ministries of health in Ethiopia, Guinea, Liberia, and Sierra Leone have used GOFR to reconcile facility lists.

Impact Snapshot

The Ethiopia Ministry of Health used GOFR to reconcile 21,768 public health facilities across DHIS2, Master Facility Registries and other facility data sources, including the Central Statistical Authority and Ethiopian Public Health Institute. The Ethiopia teams used GOFR to automatically align facilities and build on matches, which included high matching statistics on facilities with geospatial data.

Resources

Website
https://www.facilitymatch.net/

Demo
https://www.facilitymatch.net/disclaimer

Github
https://github.com/intrahealth/gofr

Documentation
https://facility-recon.readthedocs.io/en/latest/index.html

Contact Information
digitalhealth@intrahealth.org

FACILITY MATCH
Global Open Facility Registry

Global scale:

Emergent | Established

An **emergent** global good is a digital health tool that shows great promise to be utilized in multiple countries though may require additional investments to adapt for a different context. An **established** global good has already been deployed in multiple countries.

Tool type:

Applications | Infrastructure

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System categories: Facility management information system • K

Health Finance and Insurance Information System Core Role • M

openIMIS

Summary

Open Insurance Management Information System (openIMIS) is the first and only open source software for managing health financing schemes. It electronically links and processes beneficiary, provider, and payer data. The system is designed to manage various social protection systems, including health insurance schemes—from enrolling beneficiaries to transmitting and processing claims and calculating reimbursements. Free and ready to download, openIMIS offers a flexible solution that can be adjusted to the needs of different schemes and countries. The adaptable modular design covers health financing business processes in a user-friendly manner.

Health Verticals and Applications

OpenIMIS addresses health financing challenges across all vertical health interventions. Due to the central role of health financing systems in national eHealth architectures, openIMIS can also support or even substitute for a variety of other system categories and digital health interventions. Specifically, openIMIS supports:

Health system challenges: information, acceptability, efficiency, workflow management, accountability.

Information and communication technology system categories: health finance and insurance information system (core role), clinical terminology and classifications, data interchange interoperability and accessibility, identification registries and directories, public health, and disease surveillance system.

Digital health interventions: health financing (core intervention), clients, health care providers, client identification and registration, health system managers, certification/registration of health care providers, public health event notification, facility management.

Interoperability

For health financing schemes, a number of interfaces are relevant, offering the potential to streamline operations, improve data quality, and gain analytical insight. The openIMIS Initiative is actively engaged in OpenHIE working groups and co-founded the universal health coverage subgroup of OpenHIE. An interoperability layer based on FHIR standards allows for connection across electronic medical record systems, master facility lists, client registries, reporting platforms, and financial management systems such as ledger systems and payment hubs.

Geographic Reach

Cameroon, Chad, Democratic Republic of the Congo, The Gambia, Mauritania, Nepal, Niger, Tanzania.

COVID-19 Response

The Gambian government has customized openIMIS as a management information system to manage a government-to-people cash transfer scheme as part of the COVID-19 response. Accordingly, openIMIS was used to enroll more than 80,000 beneficiary households into the system and keep track of the payments made to these households. A longer-term cash transfer program is being planned in the country, and it is anticipated that the openIMIS-based tool will continue to be used for its management.

Impact Snapshot

As of November 2021, more than 8 million beneficiaries' health insurance schemes were managed by openIMIS in eight countries.

In Nepal, openIMIS has been used to pay over US$116 million in claims to health service providers to date.

Two new development partners are financially supporting the implementation of openIMIS for three new scheme operators.

Resources

Website
https://openimis.org

Demo
https://openimis.org/demo

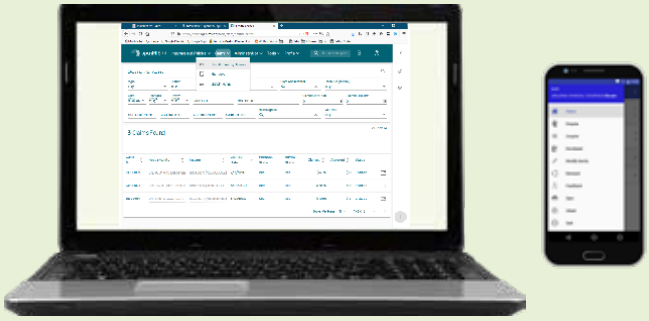
Wiki
https://wiki.openimis.org

Documentation
https://docs.openimis.org

Source Code
https://github.com/openimis

Contact Information
contact@openimis.org

openIMIS



Global scale:

Emergent | Established

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Tool type:

Applications | Infrastructure

An **application** component is a digital health tool that primarily is designed for use by clients of the health system or by health workers, An **infrastructure** component is a digital health tool that is designed to facilitate the exchange and interoperability of data between applications.

System categories: Health Finance and Insurance Information System Core Role • M

Health Management Information System • N

DHIS2

Summary

District Health Information Software 2 (DHIS2) is an open source, web-based Health Management Information System (HMIS) platform. DHIS2 supports the collection, analysis, visualization, and sharing of both aggregate and individual-level data, including mobile and offline data collection using the DHIS2 Android app. The core DHIS2 software development is managed by the Health Information Systems Program (HISP) at the University of Oslo. HISP is a global network of 15 in-country and regional organizations, providing daily direct support to ministries of health and local implementers of DHIS2

Health Verticals and Applications

Since DHIS2's release in 2006, nongovernmental organizations (NGOs) and national governments in more than 100 countries have deployed DHIS2 for health-related projects, including monitoring patient health, improving disease surveillance and pinpointing outbreaks, and speeding up health data access. DHIS2 has been applied to HIV/AIDS; tuberculosis; malaria; reproductive, maternal, newborn, and child health; neglected tropical diseases; highly communicable and noncommunicable diseases; water, sanitation, and hygiene; food security; crisis response; integrated management of childhood illness and community case management; facility electronic medical records; and immunization. HISP collaborates with the World Health Organization (WHO) and others to produce best-practice health system configurations based on global standards, which are available as downloadable metadata packages.

Interoperability

The open application programming interface (API) makes it easy to connect DHIS2 to other external software through an interoperability layer or with a direct API-to-API connection.

Many generic DHIS2 interoperability layers exist, such as OpenFn, and direct-connection DHIS2 plug-ins for dozens of other external software, such as Tableau. More specifically, DHIS2 has turnkey interoperability with iHRIS, the most widely applied open source human resources information system, as well as OpenLMIS, the largest open source logistics management information system.

Geographic Reach

DHIS2 is the world's largest HMIS platform, used in 73 low- and middle-income countries, including national- scale deployments in 60 countries, pilot programs in 13 countries, and 14 Indian states implementing at full scale. With the inclusion of NGO-based programs, DHIS2 is used in more than 100 countries. More than 2.3 billion people live in countries using DHIS2.

COVID-19 Response

DHIS2 has developed ready-to-install metadata packages to support COVID-19 surveillance and response based on WHO guidelines that can be integrated into existing DHIS2 systems or deployed as stand-alone systems. Translations of these packages are available in Arabic, French, Norwegian, Portuguese, Russian, and Spanish, and additional languages can be added on request.

DHIS2 has also produced training materials to help organizations deploy these packages. DHIS2 has several ready-to-install metadata packages to support COVID-19 vaccine delivery based on WHO guidelines. All packages are optimized for Android or web-based data collection, including in offline mode. Since the beginning of the COVID-19 pandemic, more than 40 countries have use DHIS2 to manage their COVID-19 vaccination campaigns.

Impact Snapshot

DHIS2 is used by national ministries of health and NGOs in more than 100 countries for health information management for a wide range of health programs. DHIS2 allows countries to break their data out of silos to facilitate cross-cutting analysis and promote data-driven decision-making, while also providing robust tools for online and offline data entry that improve the timeliness and accuracy of data entry. For example, in Bangladesh, DHIS2 was used to manage a nationwide measles-rubella vaccination campaign that reached 35 million children. In Rwanda, DHIS2 was deployed for a paperless COVID-19 testing system, greatly reducing processing time and allowing clients to access test results securely from their mobile phones.

Website
https://www.dhis2.org/

Documentation
https://docs.dhis2.org/

Community of Practice
https://community.dhis2.org/

YouTube
https://www.youtube.com/c/Dhis2Org

Online Academy
https://academy.dhis2.org/

COVID-19 Resources
https://dhis2.org/covid-19

Impact Stories
https://dhis2.org/category/impact-stories/

Source Code
https://github.com/dhis2/

Contact Information
post@dhis2.org

dhis2

Global scale:

Emergent | **Established**

An **emergent** global good is a digital health tool that shows great promise to be utilized in multiple countries though may require additional investments to adapt for a different context. An **established** global good has already been deployed in multiple countries.

Tool type:

Applications | Infrastructure

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System categories: Health Management Information System • N

Health Management Information System • N

The Global Healthsites Mapping Project

Summary

The Global Healthsites Mapping Project is building a global commons of health facility data by making OpenStreetMap useful to the medical community and humanitarian sector. This open data approach invites organizations to share health facility data and collaborate to establish an accessible global baseline of health facility data. The project supports individual facility updates and publishes national shapefiles of downloadable health facility data. The API allows regional analysis. The project is part of the Global Open Facility Registry solution and is linked to the Design and Analysis Toolkit for Inventory and Monitoring (DATIM) project.

Health Verticals and Applications

Some examples of common workflows that the Healthsites can support are:

- **Maintaining baseline health facility data.** By sharing data with OpenStreetMap, stakeholders in the health sector, including the Ministry of Health, can support the maintenance of baseline health facility data.
- **Sharing baseline health facility data.** During disease outbreaks, up-to-date, accessible health capacity data are vital.
- **Responding to disease outbreaks.** Epidemiologists need to know the capacity of health facilities in order to respond to regional disease outbreak events.
- **Planning a vaccination rollout campaign.** Knowing the geolocation and capacity of health facilities is crucial for planning a vaccination campaign.
- **Advancing maternity care**. Open and accurate health care facility data is a valuable resource for pregnant women looking for support when planning a birth.
- **Planning health care capacity.** Open and accurate health care facility data supports the possibility of public-private partnerships and capacity planning.
- **Supporting social entrepreneurs.** Open and accurate health care facility data provides an enabling environment to support entrepreneurs focused on improving health outcomes.

Interoperability

Healthsites uses OpenStreetMap as the data store. As such, the data are available under an Open Database License (ODbL). The data are also available for download off the healthsites.io platform in a shapefile format and published through an open API. In addition, the baseline data are published to the Humanitarian Data Exchange (HDX) where they are available in a variety of accessible formats, including Shapefile, GeoJSON, and CSV with Humanitarian Exchange Language.

Saving baseline health facility data to OpenStreetMap improves interoperability between stakeholders in the health sector and harnesses the contributions of citizens, academic institutions, businesses, and organizations who use the data in their daily operations.

Geographic Coverage

Healthsites.io is a global resource along with its data store, OpenStreetMap.org.

COVID-19 Response

Together with project partners OpenStreetMap Senegal, Afrimapr, and Heidelberg Institute for Geoinformation Technology at Heidelberg University, the Healthsites team mapped hospitals and clinics across Senegal, resulting in 104 structures across the country updated, 35 new structures added to the OpenStreetMap database and 79 structures receiving updated attributes. The mapping process included data validation with the Centre des Opérations d'Urgence Sanitaire (Health Emergency Operations Center) and PATH Senegal. Together with working group partners, Healthsites created the health catchment area online guide and contributed to "A reproducible picture of open access health facility data in Africa and R tools to support improvement," published in *Wellcome Open Research.*

Impact Snapshot

Healthsites publishes national baseline health facility data sets to the HDX. Since the first quarter of 2019, these data sets are consistently identified as one of the most downloaded data sets on the HDX platform. Between July and September 2021, there were 26,674 national health facility list downloads, an average of 290 downloads per day.

Resources

Website
https://healthsites.io/

Blog
https://medium.com/healthsites-io

Humanitarian Data Exchange
https://data.humdata.org/organization/healthsites

YouTube
In English: https://youtu.be/S5Y-A_unnuc
En français: https://youtu.be/gas5D8CSs2U

Wiki
https://github.com/healthsites/healthsites/wiki

User Guide
https://wiki.openstreetmap.org/wiki/Global_Healthsites_Mapping_Project

Source Code
https://github.com/healthsites/healthsites

Contact Information
Mark Herringer | sharehealthdata@healthsites.io

Global scale:

Emergent | Established

An **emergent** global good is a digital health tool that shows great promise to be utilized in multiple countries though may require additional investments to adapt for a different context. An **established** global good has already been deployed in multiple countries.

Tool type:

Applications | Infrastructure

An **application** component is a digital health tool that primarily is designed for use by clients of the health system or by health workers, An **infrastructure** component is a digital health tool that is designed to facilitate the exchange and interoperability of data between applications.

System categories: Health Management Information System • N

Human Resource Information System • O

iHRIS

Summary

Many countries experience critical shortages of health workers and struggle to meet the health care needs of their people. The COVID-19 pandemic has exacerbated this problem, making it more difficult for health workers to deliver lifesaving, people-centered care. Effective health workforce management is crucial for countries to address these gaps. Human resources managers and other decision-makers require up-to-date and accurate data on the current number of health workers, where they are deployed, their skill sets, and information on vacant posts and migration. Yet many countries lack this information in a central database, making it difficult to locate employee records or aggregate data for analysis. iHRIS is a free and open source software solution that has been used by ministries of health, district health offices, and health care facilities in over 30 countries to more easily collect, maintain, analyze, and manage health workforce data and resources.

Health Verticals and Applications

Each health vertical can leverage iHRIS features to help manage its human resources. iHRIS is a package of software built on a flexible framework that can be adapted to meet a wide variety of needs for managing health workforce information. iHRIS supports ministries of health and other service delivery organizations to:

- Track, manage, deploy, and map their health workforce.
- Predict likely workforce changes and needs under different scenarios.
- Plan and cost workforce retention interventions.
- Manage training activities, including pre- service and in-service education.

iHRIS also enables professional councils and associations to maintain a database of registered and licensed health professionals to support increased quality of care.

Interoperability

In many countries, health worker data are managed by multiple systems. iHRIS solves health registry data issues with its native use of the Fast Health interoperability Resources (FHIR) protocol to allow seamless data exchange with other FHIR or OpenHIE compliant systems.

iHRIS also supports other interoperability standards, including Care Services Discovery for health worker information, Statistical Data and Metadata eXchange format for medical indicators, Sharing Value Sets for standardized lists, and DXF2 for the DHIS2 Exchange Format.

Geographic Reach

Benin, Botswana, Burundi, Chad, Democratic Republic of the Congo, Dominican Republic, Ethiopia, Ghana, Guatemala, Guinea, India, Kenya, Laos, Lesotho, Liberia, Malawi, Mali, Namibia, Nepal, Nigeria, Rwanda, Senegal, Sierra Leone, South Sudan, Tajikistan, Tanzania, Timor-Leste, Togo, Uganda, Zambia.

COVID-19 Response

Using data from iHRIS, Demographic and Health Surveys, and other national data to World Health Organization planning tools, governments have been able to model the timing and magnitude of the COVID-19 pandemic. As a result, ministries of health can determine when and where frontline health workers should be available and how many are needed. Having accurate and available health workforce data allows the government to rapidly mobilize and prepare health workforces to address COVID-19 while minimizing the negative impact on essential health services such as HIV/AIDS, family planning, and maternal and child health.

Impact Snapshot

In Uganda, health sector leaders have used iHRIS data to advocate for hiring 7,200 health workers, to improve regulation, and combat health worker absenteeism as well as unlicensed practitioners. The increased availability and more equitable distribution of health workers has led more clients to access key health services, including family planning, antenatal care, and antiretroviral therapy. The Uganda Medical and Dental Practitioners Council used iHRIS to increase re-licensure compliance from fewer than 100 to more than 2,300 doctors.
IntraHealth supported combining iHRIS data with mobile phone technology to create a mobile directory that allows citizens to send text messages to the council to find out if a provider is registered, licensed, and has a specialty. After rolling out iHRIS-based attendance tracking tools in 27 priority districts in 2016, unapproved absences fell by 62 percent in just a few months and have remained low. This approach is now used in over 4,500 facilities in 116 districts.

Resources

Website
https://www.ihris.org/

Demo
https://www.ihris.org/ihris-suite/ihris-demos/

Road Map
https://trello.com/b/PnyMpHsl/ihris-roadmap

Implementation Guide
https://www.ihris.org/toolkit-new/

Developer Guide
https://www.ihris.org/implementers/developers-guide/

Community Groups
https://www.ihris.org/community-support/

Source Code
https://wiki.ihris.org/wiki/Developer_Resources

Contact Information
digitalhealth@intrahealth.org

iHRIS

Global scale:

Emergent | Established

An **emergent** global good is a digital health tool that shows great promise to be utilized in multiple countries though may require additional investments to adapt for a different context. An **established** global good has already been deployed in multiple countries.

Tool type:

Applications | Infrastructure

An **application** component is a digital health tool that primarily is designed for use by clients of the health system or by health workers, An **infrastructure** component is a digital health tool that is designed to facilitate the exchange and interoperability of data between applications.

System categories: Human Resource Information System • O

Identification Registries and Directories • P

Project Catalog Management Tool

Summary

The Project Catalog Management Tool (PCMT) connects product catalogs to show a clear journey from manufacturer to patient. It establishes master data that include GS1 identifiers, global categories, and mappings to local identifiers. This enables end-to-end visibility, allows shipments to flow between systems, and helps supply chains perform.

Health Verticals and Applications

Many health organizations and their IT systems must interact with product catalogs, either explicitly as a part of a health supply chain or indirectly as a participant in other's health catalogs—from clinical contexts to financing and health management. PCMT helps every organization, big and small, understand these catalogs and the products they contain. Easy to get started, PCMT makes the process of understanding product catalogs visible and the results easily shareable with downstream applications. Extending good product data up and down the supply chain is essential to achieving end-to-end visibility and ensuring that the products used are the right ones.

Interoperability

PCMT performs a pivotal role in health system architectures by aligning product catalogs and IT systems. PCMT is a reference technology in the OpenHIE Product Registry. It supports an open REST application programming interface I and highly configurable import and export profiles via CSV and Excel formats, making it easy to get catalog data into and out of the system. Furthermore, the PCMT group is actively involved within technical working groups to shape new open standards for Product and Item in Health Level Seven Fast Healthcare Interoperability Resources suite.

Geographic Coverage

PCMT is currently adopted in Ethiopia, Malawi, Rwanda, and Zambia. The base open source product that PCMT builds upon, Akeneo, is used across the globe in many different sectors.

COVID-19 Response

PCMT has included in its standard dataset the World Health Organization's *Emergency Global Supply Chain System (COVID-19)* catalog.

PCMT and OpenLMIS built an integration for the OpenLMIS COVID-19 Edition so that PCMT can serve product master data to OpenLMIS, enabling OpenLMIS to report supply chain metrics and indicators based on a common product catalog to DHIS2.

Impact Snapshot

PCMT is used at scale in four countries (Ethiopia, Malawi, Rwanda, and Zambia) as their National Product Catalog and is a key component in global and subnational installations where it is used to create organizational product catalogs for more efficient integration of supply chain operations for health. These efforts are the first steps toward better e-health architecture integrations and better health supply chain traceability for improved care.

Resources

Website
https://productcatalog.io

Demo
https://demo.productcatalog.io

GitHub
https://gitlab.com/pcmt

Wiki
https://gitlab.com/pcmt/pcmt/-/wikis/home

Feature Guide
https://docs.google.com/document/d/1zv8hhq8zpR1SNw5ssddCl10UpgsLuwd0s96BR5hRSNc/edit?usp=sharing

User Guide
https://docs.google.com/document/d/1DIWDSR-8MAKSHVc2JDlp0h4MdhSpnjEQFKT8y0WsPC8/edit?usp=sharing

YouTube
https://youtu.be/TLGRf_A66hg

Source Code
https://gitlab.com/pcmt/pcmt/

Contact Information
Josh Zamor, pcmt@villagereach.org or josh.zamor@villagereach.org

PCMT | Product Catalog Management Tool

Global scale:

Emergent | Established

An **emergent** global good is a digital health tool that shows great promise to be utilized in multiple countries though may require additional investments to adapt for a different context. An **established** global good has already been deployed in multiple countries.

Tool type:

Applications | Infrastructure

An **application** component is a digital health tool that primarily is designed for use by clients of the health system or by health workers, An **infrastructure** component is a digital health tool that is designed to facilitate the exchange and interoperability of data between applications.

System categories: Identification Registries and Directories • P

Identification Registries and Directories • P | Pharmacy Information System • U

Pharmadex

Summary

Pharmadex is a web-based tool that helps national medicines regulatory authorities (NMRAs) streamline and track medicine registrations to ensure they have the most updated medicines available and approved for prescribing and use. Pharmadex is a Java-based application that can run on a desktop or an Android tablet/smartphone. With Pharmadex, NMRAs can:

- Record and organize information on suppliers and products.
- Track product applications in the registration process.
- Analyze and compare suppliers and products.
- Track critical information for decision-making, such as cost, usage, and safety.

Pharmadex was originally developed by the Systems for Improved Access to Pharmaceuticals and Services (SIAPS) program, which was funded by the US Agency for International Development (USAID) and implemented by Management Sciences for Health. Currently, the USAID Medicines, Technologies, and Pharmaceutical Services (MTaPS) program is supporting NMRAs to implement electronic pharmaceutical management information systems using Pharmadex. The MTaPS program plans to add new modules to Pharmadex to expand its functionality with import/export and registration and inspection of pharmacies.

Health Verticals and Applications

Pharmadex enables:

- **Comprehensive system management:** An administrator can configure and manage the system.
- **A transparent process:** An applicant (e.g., distributor or manufacturer) can submit and track an application or amendment.
- **Product life cycle management:** Coordinators and evaluators can assign and track evaluations; regulators can approve, renew, suspend, or cancel a product; and health care users can search for and verify approved products.
- **International standards access:** The tool provides access to international standards terminology databases and dictionaries.
- **Monitoring and evaluation:** The tool facilitates overview of aggregate data and management information.
- **Adjustable modules and user privileges:** Modules may be added or removed and user access restricted.

Interoperability

Currently an application program interface is not available but can be built.

Geographic Coverage

Bangladesh, Ethiopia (now advanced into the Electronic Regulatory Information system - eRIS), Mozambique, and Namibia.

Resources

Website
https://mtapsprogram.org/resources/pharmadex
Demo
https://pharmadex.msh.org/

Source Code, User, and Implementers Guide
https://github.com/MSH/Pharmadex

Contact Information
digital@msh.org

Global scale:

Emergent | Established

An **emergent** global good is a digital health tool that shows great promise to be utilized in multiple countries though may require additional investments to adapt for a different context. An **established** global good has already been deployed in multiple countries.

Tool type:

Applications | Infrastructure

An **application** component is a digital health tool that primarily is designed for use by clients of the health system or by health workers, An **infrastructure** component is a digital health tool that is designed to facilitate the exchange and interoperability of data between applications.

System categories: Identification Registries and Directories • P | Pharmacy information system • U

Identification Registries and Directories • P

SantéMPI

Summary

Standardized approaches and tools for assigning, identifying, and managing the unique identity of citizens in health systems are often lacking in low- and middle-income countries. This, along with implementation of siloed digital health solutions that often implement multiple patient identifiers (IDs), create significant barriers to operationalizing holistic, person-centered care; achieving universal health coverage; and generating high-fidelity, discrete data and information to guide the transformation of health systems. These barriers also make it difficult to reduce the burden of data collection and indicator reporting on frontline health workers and improve data accuracy and timeliness, which is essential for building integrated, national digital health ecosystems based on evidence-based feedback loops.

SantéMPI's origins date back to 2006 when its predecessor was developed to create a reference implementation of Canada's national digital health architecture framework. It has since been continuously enhanced and refined through feedback from health system end users as well as investments by governments, the private sector, and nongovernmental organizations.

Building on this foundation, SantéMPI is a next-generation, robust, fully featured Master Patient Index/Client Registry (MPI/CR) platform that is designed to overcome barriers to leveraging person-centered data as a tool for transforming health systems. The MPI is recognized as an essential building block for facilitating data harmonization, data sharing, and interoperability across national digital health landscapes.

Health Verticals and Applications

All health verticals and applications can leverage SantéMPI to facilitate data sharing across the health system, allowing for more accurate and timely reporting, interoperability, and management of unique health IDs.

Interoperability

SantéMPI implements all existing interoperability specifications and requirements related to Client Registry in the OpenHIE specification, and supports Client Registry as a service, including Health Level Seven Fast Healthcare Interoperability Resources (HL7 FHIR) standards and widely deployed legacy HL7v2 standards. SantéMPI provides a proven platform for integrating and leveraging investments in both existing and future solutions.

SantéMPI also supports the following interoperability standards:

- GS1 (Global Standards 1)
- PDQ or PDQm - (Mobile) Patient Demographics Query
- PIX or PIXm - (Mobile) Patient Identifier Cross Reference
- XDS - Cross-Enterprise Document Sharing

Geographic Coverage

Myanmar, Tanzania.

COVID-19 Response

SantéMPI was adapted in collaboration with Myanmar's Ministry of Health and Sports to support the country's national COVID-19 response activities, such as implementing immunization registration, vaccination cohort identification and planning as well as application integration and data sharing—including linkage to case management and vaccine delivery systems, aggregate reporting, and data visualization.

Impact Snapshot

Myanmar leveraged SantéMPI and its Mobile Registration App to support a comprehensive, nationwide COVID-19 response for the country's population of 54 million people. Myanmar also recognized and seized the opportunity to integrate this agile initiative as a strategic step in operationalizing its national digital health architecture blueprint/roadmap and implement a "twinning" strategy by rolling out SantéMPI along with the SantéIMS Electronic Immunization Registry.

Resources

Website
https://www.santesuite.com

Blog
http://blog.santesuite.org/

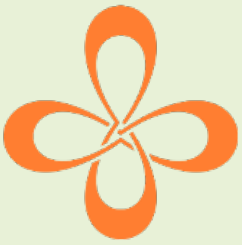
GitHub
https://github.com/santedb

Help Portal
https://help.santesuite.org/

YouTube
https://www.youtube.com/channel/UCpt09LqYEgML_sVAQ6ovPDA

Source Code
https://github.com/santedb/santempi

Contact Information
info@santesuite.com



Global scale:

Emergent | **Established**

An **emergent** global good is a digital health tool that shows great promise to be utilized in multiple countries though may require additional investments to adapt for a different context. An **established** global good has already been deployed in multiple countries.

Tool type:

Applications | Infrastructure

An **application** component is a digital health tool that primarily is designed for use by clients of the health system or by health workers, An **infrastructure** component is a digital health tool that is designed to facilitate the exchange and interoperability of data between applications.

System categories: Identification Registries and Directories • P

Identification Registries and Directories • P

Open Client Registry (OpenCR)

Summary

Open Client Registry (OpenCR) is an open source and standards-based client registry. Client registries use sophisticated record linkage processes to uniquely identify patients across multiple health information systems in facilities, pharmacies, lab systems, and elsewhere. As a critical component of an interoperable health information exchange (HIE), it allows patients to be tracked across facilities and decreases instances of duplicate and incomplete records, as well as interruptions in treatment. It is a necessary tool in public health to help manage patient safety and care coordination, monitoring, reporting, surveillance, and medical research.

OpenCR leverages the powerful HAPI FHIR reference server and the popular ElasticSearch engine. OpenCR is highly configurable for diverse decision rules for matching patient records and includes both deterministic and probabilistic matching and incorporates 25 algorithm variations.

Health Verticals and Applications

OpenCR supports data exchange within a health information architecture across health verticals. As a powerful platform for record linkage, some examples of common workflows that OpenCR supports are:

- Clinicians can view a comprehensive record of care history to ensure patient safety.
- District data managers can be confident that reported indicators are free of duplication.
- Laboratory data managers can deduplicate records and more accurately track key indicators like HIV viral load over time and place.
- Case-based surveillance officers can more accurately track trigger events for patients over time and in the aggregate.

Interoperability

OpenCR can accept submissions from any point of service (POS) that conforms to the specifications for transactions and data structures in FHIR. It includes an OpenMRS module to make implementation easy. As it uses the HAPI FHIR server, it can easily exchange data with any system using FHIR interoperability standards.

Geographic Coverage

OpenCR's development was informed by stakeholders in Uganda, including the Ministry of Health (MOH) and the Central Public Health Laboratories (CPHL). It is currently being adapted for use in the reference architecture for the PEPFAR Data for Accountability, Transparency and Impact Monitoring (DATIM) project for aggregated reporting using patient-level data.

Resources

Website
https://openclientregistry.com

GitHub
https://github.com/intrahealth/client-registry

Feature Guide

https://intrahealth.github.io/client-registry/dev/addalgos/

Implementers Guide
https://intrahealth.github.io/client-registry/user/guide/

User Guide
https://intrahealth.github.io/client-registry/user/introduction/

Contact Information
digitalhealth@intrahealth.org

Source Code
https://github.com/intrahealth/client-registry

OpenCR
OPEN CLIENT REGISTRY

Global scale:

Emergent | Established

An **emergent** global good is a digital health tool that shows great promise to be utilized in multiple countries though may require additional investments to adapt for a different context. An **established** global good has already been deployed in multiple countries.

Tool type:

Applications | Infrastructure

An **application** component is a digital health tool that primarily is designed for use by clients of the health system or by health workers, An **infrastructure** component is a digital health tool that is designed to facilitate the exchange and interoperability of data between applications.

System categories: Identification Registries and Directories • P

Knowledge Management System • Q

Digital Health Atlas

Summary

The Digital Health Atlas (DHA) is a global web platform overseen by the World Health Organization that supports Ministry of Health (MOH) leadership teams, financial and technical investors, and technology partners to inventory and assess digital health projects globally. The data in the DHA are of critical importance to inform technology decisions. These technologies include tools that facilitate planning, surveillance, testing, contact tracing, quarantine, and more. The DHA is essential to address global health challenges and ensure the World Health Organization's vision of a global strategy on digital health is fulfilled. By enabling global data exchange, the DHA accelerates the deployment and uptake of digital health technologies and strengthens public health preparedness. The DHA is made more effective by the contributions made to it; when more data are contributed, more information is available to all, and everyone benefits.

Health Verticals and Applications

The DHA is a crosscutting tool that collects information on digital health tools and specific digital health projects across health verticals.

Interoperability

Within countries, the DHA is an inventory registry designed to help monitor and coordinate individual digital health projects. The registration process includes a standard questionnaire that can be enhanced by an MOH team to include additional questions relevant to the national digital health system planning process. Within the standard questionnaire, there are data fields that ask specific planning questions regarding how each project aligns with components of the OpenHIE architecture. The MOH team can then leverage this information to enhance planning activities in-country. For interoperability with external systems, the DHA provides a flexible, lightweight Read application programming interface to integrate with other digital applications that need to consume the inventoried projects' data.

Geographic Reach

The DHA has registered projects in 51 countries globally, representing North America, South America, Europe, Asia, and Africa. It is the recognized inventory tool of the ministries of health of Kenya, Lesotho, Malawi, Nigeria, Sri Lanka, and Uganda.

Resources

Website
www.digitalhealthatlas.org

Source Code
https://github.com/pulilab/digital-health-atlas

Contact Information
digital-health-atlas@who.int

Digital Health Atlas

Global scale:

Emergent | (Established)

An **emergent** global good is a digital health tool that shows great promise to be utilized in multiple countries though may require additional investments to adapt for a different context. An **established** global good has already been deployed in multiple countries.

Tool type:

(Applications) | Infrastructure

An **application** component is a digital health tool that primarily is designed for use by clients of the health system or by health workers, An **infrastructure** component is a digital health tool that is designed to facilitate the exchange and interoperability of data between applications.

System categories: Knowledge Management System • Q

Laboratory and Diagnostics Information System • R

Child Growth Monitor

Summary

Malnutrition is one of the leading causes of death in children, especially in the most remote regions of the world. Malnutrition is extremely complex to monitor, as traditional measuring tools are often too expensive, prone to human error, inaccurate, and costly to deploy. Child Growth Monitor (CGM) uses mobile technology (augmented reality and artificial intelligence) to capture body scans of children as anthropometric data to deduce levels and variations in malnutrition. This allows efficient measurement, early diagnosis, and rapid emergency response to the early symptoms and effects of malnutrition.

Health Verticals and Applications

- **Planning and forecasting:** Macro-level planning due to real-time, supply and demand data analysis.
- **Service delivery:** Leverages real-time diagnosis and speedy response time due to interoperability with treatment and other social services.
- **Reporting and analytics:** Easy-to-use dashboards and reporting metrics.
- **Child monitoring:** Real-time tracking on progress following diagnosis.
- **Mobile integration:** Leverages mobile applications to equip health workers with fast and reliable diagnostic tools. The tool (in contrast to current, traditional measures) allows for rapid, cost-efficient deployment in remote and resource-scarce communities.

Interoperability

The open source CGM application aims to complement and be interoperable with the existing ecosystem of digital innovations and instruments dedicated to addressing child malnutrition and hunger broadly. Through application programming interface (API)–driven interoperability, CGM works with a country's existing health management information system, specifically to improve measurement and data quality. Other components include a client registry as well as shared health records.

Geographic Reach

CGM is currently rolled out in India in four provinces. Welthungerhilfe has a large footprint in both Southeast Asia and Africa and intends to roll out CGM in every constituency.

Resources

Website
https://childgrowthmonitor.org/

Overview
https://www.itu.int/en/ITU-T/AI/2018/Documents/Presentations/Jochen%20Moninger.pdf

Video
https://youtu.be/f2doV43jdwg

Source Code
https://github.com/Welthungerhilfe/ChildGrowthMonitor

Contact Information
Jochen Moninger, Jochen.Moninger@welthungerhilfe.de

Markus Matiaschek, MMatiaschek@gmail.com

Ayanda Ntombela, Ayanda.Ntombela@welthungerhilfe.de

Child Growth Monitor

Global scale:

Emergent | Established

An **emergent** global good is a digital health tool that shows great promise to be utilized in multiple countries though may require additional investments to adapt for a different context. An **established** global good has already been deployed in multiple countries.

Tool type:

Applications | Infrastructure

An **application** component is a digital health tool that primarily is designed for use by clients of the health system or by health workers, An **infrastructure** component is a digital health tool that is designed to facilitate the exchange and interoperability of data between applications.

System categories: Laboratory and Diagnostics Information System • R

Laboratory and Diagnostic Information System • R

OpenELIS Global

Summary

The Open Enterprise Laboratory Information System (OpenELIS) global software is an enterprise-level laboratory information system built on open source, web-based technologies that has been tailored for low- and middle-income country public health laboratories. The software serves as both an effective laboratory software solution and business process framework. It supports the efficient functioning of public health laboratories for best laboratory practice and accreditation.

OpenELIS can act with or without an internet connection and can be a stand-alone offline system within a laboratory or as part of a national laboratory network. English and French languages are both fully integrated into OpenELIS, making it appropriate for both anglophone and francophone deployments.

Health Verticals and Applications

OpenELIS can be used in a wide range of contexts and can be customized easily to fit specific needs. OpenELIS is appropriate for all levels of clinical laboratories, from general hospitals to national reference. OpenELIS has advanced feature sets to help laboratories achieve a high output of samples and efficiently refer tests as needed. This functionality is directly applicable to large programs, such as viral load monitoring and early infant diagnosis for national HIV/AIDS programs, and to respond to urgent public health crises (e.g., Ebola, COVID-19). Routine testing for every health facility is fully supported. Tuberculosis testing features help diagnose and manage multidrug-resistant TB cases. OpenELIS has been used in just about every setting where there is a laboratory.

Interoperability

OpenELIS has a wide range of interoperability, from a local connection to a medical records system to entire national laboratory information networks, there are application programming interfaces and tools available to help meet client goals, such as:

- Viral load and early infant diagnosis dashboards for displaying comprehensive up-to-date national data.
- Fast Healthcare Interoperability Resources (FHIR) and Health Level Seven International (HL7) interfaces for exchanging test requests and results with electronic medical records systems, and other test requesting systems. FHIR-based consolidated server for comprehensive laboratory data collection. Bidirectional and flat-file clinical analyzer integration, using both HL7 and ASTM.
- An airport arrival application for COVID-19 screening.
- Connections to demographic systems for importing demographics.
- Ability to send high-priority results via email and SMS text messaging.
- Integration with the Global Open Facility Registry and out-of-the-box connectivity with OpenMRS via the FHIR module.

Geographic Coverage

National deployments in Côte d'Ivoire, Haiti, and Mauritius. Other large deployments in Vietnam, or as part of Bahmni.

COVID-19 Response

OpenELIS now offers the ability to text via SMS and/or to email results to clinicians and patients, offering a much faster turnaround time for returning results for critical diagnoses. OpenELIS Global has added COVID-19 metadata for laboratory testing and resulting. It supports central data repository for national-level laboratory data. This allows for national COVID-19 surveillance and real-time reporting and dashboarding.

Impact

OpenELIS Global is used on a national scale in two countries. In Côte d'Ivoire, it powers the entire laboratory system, with more than 100 laboratories using OpenELIS, its dashboards for viral load and prevention of mother-to-child transmission of HIV, a key tool for the Ministry of Health. Mauritius has a national OpenELIS implementation for both COVID-19 response and routine laboratory work. This implementation includes all laboratories and remote influenza clinics doing COVID-19 testing and sending samples to the national reference laboratory.

Resources

Website
https://openelis-global.org

Demo
https://openelis-global.org/getting-started/demo/

Wiki
http://docs.openelis-global.org/

YouTube
https://www.youtube.com/channel/UC3s_NFSeFC_wMbV2FVFsADw

Github and Source Code
https://github.com/I-TECH-UW/OpenELIS-Global-2

Contact Information
digit@uw.edu or caseyi@uw.edu

OPENELIS GLOBAL

Global scale:

Emergent | **Established**

An **emergent** global good is a digital health tool that shows great promise to be utilized in multiple countries though may require additional investments to adapt for a different context. An **established** global good has already been deployed in multiple countries.

Tool type:

Applications | Infrastructure

An **application** component is a digital health tool that primarily is designed for use by clients of the health system or by health workers, An **infrastructure** component is a digital health tool that is designed to facilitate the exchange and interoperability of data between applications.

System categories: Laboratory and Diagnostic Information System • R

Logistics Management Information System • T

OpenBoxes

Summary

OpenBoxes is an open source logistics management information system (LMIS) designed to serve the supply chain management demands of public health systems. OpenBoxes enables real-time monitoring of inventory levels, expiry dates, and incoming and outgoing quantities at multiple facilities within a health system. OpenBoxes also transforms consumption and requisition data into a demand signal, facilitating purchasing decisions based on real need rather than past availability. OpenBoxes is a web-based system that can be deployed to the cloud or on-premises.

Health Verticals and Applications

OpenBoxes can be used to manage products across the full spectrum of health services, including primary care, HIV/AIDS, cancer, tuberculosis, and more. It supports a wide range of supply chain workflows, including:

- Creating a purchase order and managing shipping, receipt, and invoice reconciliation for purchased items.
- Creating shipments from a purchase order or packing list, printing custom shipping documents, and sending notifications to specific stakeholders upon shipment or receipt.
- Managing inventory of health commodities, including bin tracking and expiration management.
- Receiving electronic stock requests from facilities, verifying against inventory, and tracking request fulfillment patterns.
- Performing basic forecasting using inventory on hand, user-defined stock levels, and demand from requests, stock in transit, and purchase orders.

Interoperability

OpenBoxes team is engaged in OpenHIE working groups around integrating LMIS functionality. An installation package aligned with the Instant OpenHIE framework is currently being developed, and an integration with OpenMRS is planned in the near future.

Geographic Coverage

Used by facilities in Haiti, Liberia, Madagascar, Malawi, Rwanda, Sierra Leone, and United States.

COVID-19 Response

Implementing organizations have used OpenBoxes throughout the pandemic to manage purchasing, transportation, and distribution of personal protective equipment, test kits, cold storage equipment, and other COVID-19-related supplies. While the software has not been specifically adapted for COVID-19, it can be used in its current form for inventory management of all the supplies needed for pandemic response.

Impact Snapshot

OpenBoxes is used in ten arrondissements – municipal district, in Haiti to manage primary and secondary care supplies, and was used to redistribute needed supplies after the earthquake in 2021. In Rwanda, OpenBoxes is used to manage purchasing and distribution of cancer care supplies. OpenBoxes was also used to manage distribution of $10.5 million COVID-19-related supplies in 2020 and 2021.

Resources

Website
https://openboxes.com/

Blog:
https://openboxes.com/blog/

Demo
https://demo.openboxes.com

GitHub
https://github.com/openboxes/

Guide
https://openboxes.com/docs/

YouTube
https://openboxes.com/videos

Source Code
https://github.com/openboxes/openboxes

Contact Information
support@openboxes.com

openboxes

Global scale:

Emergent | Established

An **emergent** global good is a digital health tool that shows great promise to be utilized in multiple countries though may require additional investments to adapt for a different context. An **established** global good has already been deployed in multiple countries.

Tool type:

Applications | Infrastructure

An **application** component is a digital health tool that primarily is designed for use by clients of the health system or by health workers, An **infrastructure** component is a digital health tool that is designed to facilitate the exchange and interoperability of data between applications.

System categories: Logistics Management Information System • T

Logistics Management Information System • T

OpenLMIS

Summary

Health systems in many countries continue to experience stockouts of essential medicines, leaving people vulnerable to treatable illness. The OpenLMIS initiative seeks to improve supply chain visibility, agility, reliability, and responsiveness in low-resource settings to ensure that people—no matter where they live—have access to essential medicines and products when they need them.

OpenLMIS is a powerful, open source, cloud-based electronic logistics management information system (LMIS) purpose-built to manage health commodity supply chains. OpenLMIS automates LMIS business processes throughout the entire supply chain, reducing the burden on health workers while improving data accuracy, data timeliness, and data visibility.

Health Verticals and Applications

OpenLMIS is not specific to the needs of any one vertical and has been used to manage multiple verticals concurrently—from essential medicines, family planning, nutrition, and the Expanded Program on Immunization to HIV and tuberculosis. Each health vertical/business can leverage the following features to support the management of its supply chain:

- **Requesting and ordering:** Using stock data to generate orders using the configurable approval process.
- **Order fulfillment:** Viewing and fulfilling orders from other facilities and sending shipments to initiate a receiving process.
- **Inventory management:** Capturing inventory data and stock movements to provide a full overview of stock availability for any program or product.
- **Mobile integration:** Leveraging mobile tools to track stock movements at facilities with limited connectivity through third-party products like OpenSRP and custom-built OpenLMIS-based applications such as SIGLUS.
- **Mobile application:** Capturing inventory data and stock movements via mobile devices to provide an overview of full stock availability for any program or product.
- **Reporting and analytics:** Employing easy-to-use dashboards and reporting metrics across all programs and facilities makes it simple to analyze data at both aggregate and individual levels.
- **Cold chain inventory management:** Capturing cold chain equipment inventory, functional status, and temperature status

Interoperability

Through application programming interface (API)–driven interoperability, OpenLMIS works with a country's existing health information system to increase supply chain efficiency. OpenLMIS supports Integrating the Healthcare Enterprise's Mobile Care Services Discovery (mCSD) and Mobile Aggregate Data Exchange (mADX) with Fast Healthcare Interoperability Resources (FHIR), GS1 Global Trade Item Number (GTIN) and Global Location Number (GLN), REST with JavaScript Object Notation (JSON), and OAuth2.

Geographic Reach

Angola, Benin, Côte d'Ivoire, Guinea, Malawi, Mozambique, Nigeria, Tanzania (mainland and Zanzibar) and Zambia.

COVID-19 Response

At the start of the pandemic, COVID-19-related products were not part of routine ordering and inventory management systems, so countries had to quickly adapt to track and replenish supplies. To meet this need, OpenLMIS team created the OpenLMIS COVID-19 Edition, which has all the same features and functionality of OpenLMIS but packaged into a tool that is technically simpler, quicker to deploy, and designed specifically for COVID-19-related supplies, including vaccines, personal protective equipment, and other products.

Impact Snapshot

OpenLMIS is currently used to manage logistics processes at more than 12,000 health facilities across ten geographies in Africa, providing ordering, reporting, and inventory management for a mix of health programs, including for vaccines (Expanded Program on Immunization), HIV, malaria, tuberculosis, family planning, and essential medicines.

Resources

Website
https://openlmis.org/

Community:
http://openlmis.org/about/community/

Demo
https://openlmis.atlassian.net/wiki/spaces/OP/pages/250249255/Version+3+Demo+Supporting+Documentation

Roadmap
https://openlmis.atlassian.net/wiki/spaces/OP/pages/35487752/Living+Product+Roadmap

COVID-19 Edition
https://openlmis.org/covid-19-edition/
https://openlmis.org/wp-content/uploads/2021/03/OpenLMIS-COVID-Edition-Vaccine-Update-March-2021.pdf

YouTube
https://www.youtube.com/results?search_query=openlmis+3.3

Source Code
https://github.com/OpenLMIS/open-lmis

Contact Information
info@openlmis.org

Global scale:

Emergent | **Established**

An **emergent** global good is a digital health tool that shows great promise to be utilized in multiple countries though may require additional investments to adapt for a different context. An **established** global good has already been deployed in multiple countries.

Tool type:

Applications | Infrastructure

An **application** component is a digital health tool that primarily is designed for use by clients of the health system or by health workers, An **infrastructure** component is a digital health tool that is designed to facilitate the exchange and interoperability of data between applications.

System categories: Logistics Management Information System • T

Public Health and Disease Surveillance System • V

mHero

Summary

mHero is a two-way, mobile phone–based communication system that connects ministries of health and health workers. mHero brings together existing health information systems with locally popular communication platforms to facilitate the exchange of important health information. It reduces the barriers that can exist between health workers and their support systems, playing a critical role in ensuring effective and efficient responses, particularly in a crisis.

Health Verticals and Applications

mHero can be used for any type of communication between health officials and health workers, spanning all health verticals and for diverse health system needs.

IntraHealth International and UNICEF created mHero in 2014 to support health-sector communication during the Ebola outbreak in West Africa. mHero connected Liberia's health workforce information system, iHRIS, with RapidPro, a platform that, at the time, delivered basic text and audio messages. The use of RapidPro made it possible to reach most Liberian frontline health workers using only basic mobile phones. mHero played a crucial role in coordinating the emergency response by making it possible to get urgent information and updates to frontline health workers, including those in the most remote locations, and it enabled frontline health workers to share important information about issues they were facing in their facilities and communities. There are countless ways that mHero can be used:

- **For all health workers,** such as message blasts offering words of encouragement and appreciation for the work being done.
- **Targeted at specific segments of health workers,** such as knowledge checks for participants in a particular training or announcements of health campaign dates for each district.
- **For all health workers,** such as message blasts offering words of encouragement and appreciation for the work being done.
- **Targeted at specific segments of health workers,** such as knowledge checks for participants in a particular training or announcements of health campaign dates for each district.
- **One-way,** such as notifications of new policies or procedures.
- **Two-way,** such as checking stock levels of essential medicines.
- **Routine,** such as reminders about submitting reports.
- **Non-routine,** such as important updates or urgent warnings during an emergency.
- **From the Ministry of Health,** such as validating the personnel information in their human resource records.
- **Initiated by health workers,** such as reporting cases of infectious diseases.

Interoperability

mHero can connect any FHIR-based database, such as iHRIS, OpenMRS, and certain DHIS2 deployments, with communication systems like RapidPro, Facebook Messenger, and WhatsApp.

It can also be implemented alongside a traditional call center, where curated messages can enable trained staff to respond with speed and effectiveness. Additionally, mHero is being enhanced to incorporate Natural Language Processing, a form of artificial intelligence. That means that frontline health workers can ask questions using normal speech and the system can respond with the appropriate government-approved messages.

Geographic Coverage

Democratic Republic of Congo (DRC), Guinea, Kenya, Liberia, Mali, Sierra Leone, Uganda.

COVID-19 Response

mHero has been launched in Kenya and Uganda for COVID-19 communication between health workers and ministries of health (or other institutions that oversee cadres of health workers, such as UNICEF). Customizations were made in both countries to meet specific needs. The mHero team has collaborated with the OpenHIE COVID-19 Task Force to build a library of FHIR-compliant workflows that align with global reporting standards. The existing mHero instance in Liberia has been used for COVID-19 case reporting, health worker education on COVID-19, and health sector communication related to the COVID-19 response.

Impact Snapshot

mHero is actively used in Kenya, Liberia, and Uganda. In Kenya, within the first year of implementation, more than 2 million messages were sent through the system to more than 20,000 health workers throughout the country. In Liberia, a disease surveillance workflow developed after the Ebola outbreak was quickly updated to include COVID-19 as a disease for which health workers could report cases. Over 12,000 health workers have received messages via mHero in Liberia. In both Kenya and Liberia, mHero is fully managed and operated by the respective ministries of health.

Resources

Website
https://www.mhero.org/

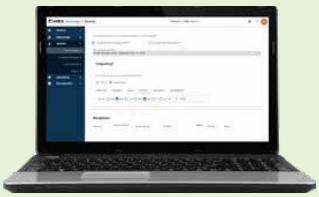
Demo
https://www.ihris.org/ihris-50

Documentation and User Guide
https://www.mhero.org/resources

Source Code
https://github.com/intrahealth/emNutt

Contact Information
digitalhealth@intrahealth.org

mHero



Global scale:

Emergent | Established

An **emergent** global good is a digital health tool that shows great promise to be utilized in multiple countries though may require additional investments to adapt for a different context. An **established** global good has already been deployed in multiple countries.

Tool type:

Application | Infrastructure

An **application** component is a digital health tool that primarily is designed for use by clients of the health system or by health workers, An **infrastructure** component is a digital health tool that is designed to facilitate the exchange and interoperability of data between applications.

System categories: Public health and disease surveillance system • V

Public Health and Disease Surveillance • V

Reveal

Summary

Without an accurate and comprehensive understanding of the size and distribution of a population, it is challenging to optimize service delivery and ensure interventions reach recommended coverage thresholds. Reveal is an open source platform and digital global good that uses geospatial data and technology, including high-resolution satellite imagery, machine learning risk models, and front-end mobile tools to efficiently and effectively deliver lifesaving interventions. Reveal, formerly known as mSpray, was conceptualized in 2010 and has since been developed in collaboration with country governments and implementing partners to support public health interventions.

Health Verticals and Applications

Reveal is capable of adapting to different countries and contexts and supporting multiple health verticals. To date, Reveal has been configured and deployed to help plan, guide, monitor, and adjust the delivery of interventions related to malaria, neglected tropical diseases, and childhood vaccination. More specifically, these interventions include indoor residual spraying (IRS), insecticide-treated net distribution, focal investigations, mass drug administration, and childhood vaccination registration and delivery. Possible additional applications include, but are not limited to, family planning and reproductive health services, childhood nutrition services, and HIV, as well as risk communication and community engagement campaigns.

Interoperability

Reveal is an open source digital register platform, based on global standards of care, that integrates with existing country health information systems and architectures.

While Reveal implementations have not yet required testing of messaging standards consistent with OpenHIE,

Reveal aims to demonstrate this by building an application programming interface to create aggregates aligned with the Integrating the Healthcare Enterprise Aggregate Data Exchange Technical Framework. Our 2022 roadmap aims for several integrations, including DHIS2 and other community-based platforms that could benefit from geospatial functionality.

Geographic Coverage

Reveal has been deployed or is in the process of being deployed in Angola, Kenya, Mali, Namibia, Nigeria, Senegal, Thailand, and Zambia, with additional countries indicating their interest in also deploying the platform.

COVID-19 Response

Reveal can be configured to incorporate COVID-19-related data as well as guide and track COVID-19 vaccination coverage. Reveal supports the attainment of high vaccination coverage by achieving last-mile delivery. The planning module supports all arms of governments to distribute resources such as food and economic aid, sanitation, routine health resources, and COVID-19 vaccination for populations in need.

Impact Snapshot

Use of Reveal has increased health campaign coverages by 20 to 30 percent. In one trial focused on malaria control, malaria incidence dropped by more than 15 percent when IRS for malaria was supported with Reveal versus IRS alone (Keating et al 2021).

Reveal also creates significant cost savings per disease case averted. Before Reveal, the cost per malaria case averted was US$118; with Reveal, that cost dropped by 63 percent% (to US$44 per case averted).

Resources

Website
https://revealprecision.com

About
https://akros.com/mspray/

Stories
https://africatimes.com/2015/12/04/how-tech-is-changing-international-development/

http://vitalwave.com/article-presentation/mobile-solutions-for-malaria-elimination-surveillance-systems/

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5824454/

https://malariajournal.biomedcentral.com/articles/10.1186/s12936-021-03710-5

https://storymaps.arcgis.com/stories/6edfe59250e24fcaa923d614f6110fe7

Source Code
https://github.com/akrosinc

Contact Information
Anna Winters awinters@akros.com

Reveal
REDEFINING PRECISION

Global scale:

Emergent | Established

Tool type:

Applications | Infrastructure

System categories: Public Health and Disease Surveillance • V

Public Health and Disease Surveillance • V

SORMAS

Summary

The Surveillance Outbreak Response Management and Analysis System (SORMAS) is an open source mobile eHealth software that is designed to organize and facilitate disease control and outbreak management procedures in addition to disease surveillance and epidemiological analysis for all administrative levels of the public health system. Its mission is to improve prevention and control of communicable diseases. SORMAS is free of charge and adheres to the highest data protection standards, good scientific practice, and open access policy. SORMAS is characterized by the following features: digitalized notification at the health facility level, multi-directional information flow, offline functionality, contact follow-up management, event management, laboratory functionality, analytics, and user-centered design.

Health Verticals and Applications

SORMAS intentionally follows a comprehensive and integrated approach to health care and prevention. SORMAS has a modular and flexible architecture and is adaptable, which was proven during the 2017 monkeypox outbreak in Nigeria and the COVID-19 pandemic in 2020, when SORMAS was able to integrate and deploy a module for these novel and emerging diseases within two weeks. SORMAS also includes user-specific interfaces and workflows for 25 different user types, including hospital informants, laboratory officers, surveillance officers, community officers, point-of-entry officers, and epidemiologists. Of the 44 diseases included in SORMAS, 20 include disease-specific, case-based outbreak response process models. With this approach, SORMAS addresses the strategic goal of the 2017 Berlin Declaration of the G20 Health Ministers and the core capacity requirements laid out in the International Health Regulations.

SORMAS is available in a default installation or dockerized version and in different set-up concepts:

SORMAS-Common provides one central database of all users and participating health authorities of a country or jurisdictional area (region, district, community, facility). Different user roles have different user rights.

SORMAS-Local is an isolated instance with one server per jurisdictional area within a country. The respective local health authority could be a region, district, community, or facility. Different user roles in the local health authority have different user rights.

SORMAS-eXchange is an expansion of SORMAS-Local in which each individual instance is connected to each other and allows horizontal as well as pseudonymized data exchange between local instances.

SORMAS-eXtra Layer is an expansion of any of the SORMAS concepts by which anonymized data from all participating instances is extracted to a central database for joint analyses and cross-jurisdictional area or border analyses of transmission chains.

SORMAS-SymptomDiary allows for the person (e.g., case, contact, immunized, travel returnee) under follow-up to self-notify their symptom monitoring data directly into SORMAS.

SORMAS-Mobile is an Android-based secured mobile app version of SORMAS that allows offline utilization and wireless synchronization with the respective main system (SORMAS-Common, SORMAS-Local, or SORMAS-eXchange).

Interoperability

SORMAS has a fully functional application program interface (API) with other third-party platforms. The API framework within SORMAS supports interoperability, which is in line with and takes into consideration the International Organization for Standardization standards like ISO/TC 215 and OpenHIE standards like HL7 FHIR.

Geographic Coverage

Côte d'Ivoire (piloting phase: 2 of 31 regions), Fiji (nationwide), France (14 of 18 regions), Ghana (nationwide), Germany (347 of 375 districts), Nepal (preparatory phase), Nigeria (nationwide), Switzerland (12 of 26 cantons), Tanzania (preparatory phase), Tunisia (preparatory phase).

COVID-19 Response

To support the fight against COVID-19, SORMAS ensures the availability of validated, real-time surveillance data, which can in turn lower the disease burden through enabled contact tracing while monitoring the potential for future cases. Specifically, the newly introduced travelers' section and expanded features of events help for better analysis of (super-)spreading events on a national as well as international basis.

Offering easy-to-use, multifunctional mobile health (mHealth) and electronic health (eHealth) applications, SORMAS provides real-time data availability and compatibility with standard surveillance systems. A newly introduced vaccination module in SORMAS is used for the comprehensive documentation of vaccinations and convalescence status of former COVID-19 patients.

Resources

Website
https://sormas.org/

Demo
https://sormasorg.helmholtz-hzi.de/sormas-demo.html

Configuration Guide
https://github.com/hzi-braunschweig/SORMAS-Project/blob/development/README.md

YouTube
https://youtu.be/4sM-VCIAhYk

Source Code
https://github.com/hzi-braunschweig/SORMAS-Project

Contact Information
Gerard Krause, Gerard.Krause@helmholtz-hzi.de

Global scale:

Emergent | Established

An **emergent** global good is a digital health tool that shows great promise to be utilized in multiple countries though may require additional investments to adapt for a different context. An **established** global good has already been deployed in multiple countries.

Tool type:

Applications | Infrastructure

An **application** component is a digital health tool that primarily is designed for use by clients of the health system or by health workers, An **infrastructure** component is a digital health tool that is designed to facilitate the exchange and interoperability of data between applications.

System categories: Public Health and Disease Surveillance • V

Shared Health Record and Health Information Repository • X

HAPI FHIR

Summary HAPI FHIR

HAPI FHIR is an open source (Apache 2.0 licensed) implementation of the HL7 FHIR interoperability standard. It is not typically used as an end-user product (for example, it is not an electronic medical record or a health information exchange on its own) but consists of a number of software modules that are widely used as core components in these types of solutions.

Health Verticals and Applications

HAPI FHIR is a core component in several other global goods, including OpenMRS, OpenELIS, OpenHIE, and DHIS2. HAPI FHIR is also used in many commercial products, government-run information exchanges, academic projects, and multiple other areas.

Among the included functionality in HAPI FHIR are:

- Parsers, serializers, and data models for the HL7 FHIR standard. All data models and all major releases of HL7 FHIR are supported.
- A facade layer that can be used to layer HL7 FHIR interoperability capabilities onto existing applications.
- A fully functional clinical data repository using HL7 FHIR as the core storage and interchange format.
- Publish/subscribe services (provided by HL7 FHIR "Subscription" functionality).
- Data validation services.
- A Master Data Management module that can be used as an enterprise master patient index or for other types of data as well.

Interoperability

HAPI FHIR uses HL7 FHIR as its core model for both data storage and data exchange. As such, interoperability is a core use case.

Geographic Coverage

Argentina, Australia, Brazil, Chile, Denmark, Germany, India, Indonesia, Italy, New Zealand, Paris, Philippines, Poland, Russia, South Korea, Switzerland, The Netherlands, The United Kingdom, United States of America, Vietnam.

COVID-19 Response

HAPI FHIR has been used as a reference server in several initiatives targeting the COVID-19 response (for example, the Situational Awareness for Novel Epidemic Response [SANER] Implementation Guide) but has not contributed any direct end-user solutions.

Impact Snapshot

HAPI FHIR is used in countless systems, solutions, and products around the world. Because it is typically implemented by partners and vendors, the team does not have specific cost-benefit numbers.

Resources

Website
https://hapifhir.io

Source Code
https://github.com/hapifhir/hapi-fhir

Contact information
James Agnew, Project Lead,
jamesagnew@gmail.com

Global scale:

Emergent | Established

An **emergent** global good is a digital health tool that shows great promise to be utilized in multiple countries though may require additional investments to adapt for a different context. An **established** global good has already been deployed in multiple countries.

Tool type:

Applications | Infrastructure

An **application** component is a digital health tool that primarily is designed for use by clients of the health system or by health workers, An **infrastructure** component is a digital health tool that is designed to facilitate the exchange and interoperability of data between applications.

System categories: Shared Health Record and Health Information Repository • X

Laboratory and Diagnostics Information System • R

OpenLabConnect

Summary

OpenLabConnect is a decoupled mediator that transports and transforms data and commands between laboratory test instruments and laboratory information systems (LIS). Collecting data from laboratory analyzer instruments can be time consuming and highly subject to error due to manual transcription between the order, the machine, and the results report. Additionally, precise algorithms and rules for quality assurance and validation are often haphazardly followed by staff. Historically, much of the digital interfacing with instruments has been custom and tightly coupled to its software through point-to-point programming. OpenLabConnect can be used as a generalized solution to bridge the LIS and the laboratory analyzer exchange to mitigate these issues.

Health Verticals and Applications

HIV care and treatment, cholera, and otherinfectious disease outbreaks.

Interoperability

OpenLabConnect is intended to work as a mediatorwithin a facility for connecting data into the LIS. It uses the OpenHIM tool to do so; however, it can alsobe connected into the OpenHIE architecture to report results back to the clinic's electronic medical records, and shared health records system, and for program and disease surveillance in national repositories, such as DHIS2 or other data warehouses.

Geographic Reach

Vietnam.

Resources

Source Code
https://github.com/OpenLabConnect/OpenLabConnect

Contact Information
Jan Flowers, Lead OpenHIE LIS CoP, jflow2@uw.edu

Global scale:

Emergent | Established

An **emergent** global good is a digital health tool that shows great promise to be utilized in multiple countries though may require additional investments to adapt for a different context. An **established** global good has already been deployed in multiple countries.

Tool

Applications | Infrastructure

An **application** component is a digital health tool that primarily is designed for use by clients of the health system or by health workers, An **infrastructure** component is a digital health tool that is designed to facilitate the exchange and interoperability of data between applications.

Shared Health Record and
Health Information Repository • X

OpenCHS

Open Child Helpline System

Summary

Open Child Helpline System (OpenCHS) manages cases of abused children and in some countries gender-based violence. The system was developed on an open source platform with a mobile app for Android and iOS and a back end that receives calls and SMS, Chat, and social media messages reported by or on behalf of victims as well as a front end that is used for case registration, case management, escalation, and follow-up.

Resources

Website
https://165.227.145.55/helpline/

Source Code
https://github.com/openchlsystem/helpline/blob/main/README.md

Contact Information
James Nganga Kaminju,
james.nganga@bitz-itc.com

Environmental Monitoring System • J

PlanWise

PlanWise

Summary

PlanWise is a tool that helps health and development planners and responders in low-resource settings identify the ideal location to maximize the impact of interventions and serve as many people as possible, as cost-effectively as possible.

Resources

Website
https://planwise.instedd.org/

Source Code
http://github.com/instedd/planwise

Contact Information
Nicolás di Tada, Director of Engineering,
nditada@instedd.org

Appendix

digital square

OpenHIE

The global goods presented in this guidebook are each designed to address specific business domains within health information exchange (HIE) systems. When deployed together, they provide a strong backbone for the digital health infrastructure within a country. In this section, you will find an overview of OpenHIE, which provides a framework for best practices in interoperability and open standards for bringing these global goods together.

Launched in 2013, OpenHIE evolved from work initially begun in 2009 to establish the Rwandan Health Information Exchange. As the benefits of the approach adopted in Rwanda became apparent, interest gathered from other countries looking to apply similar architectural tactics within their environments.

OpenHIE's approaches, reference technologies, and community of practice are now being leveraged or explored in multiple countries. Today, members from more than 55 countries work with standard-setting bodies and technology providers to align the world toward appropriate uses of standards and to further grow and evolve the community and its framework.

This community has had direct influence on countless national eHealth strategies, including in Ethiopia, Kenya, Liberia, Malawi, Nigeria, Rwanda, Sierra Leone, South Africa, Tanzania, Uganda, and many of the countries supported by the Asia eHealth Information Network. Most of these countries are moving past plans, to concrete implementations of health data sharing architectures. Digital Square is also supporting the Latin American health exchange journey with Red Centroamericana de Informática en Salud.

OpenHIE background

In a fragmented health data environment, health information systems typically operate independently of one another. Each member of a health care team (e.g., primary care physicians, specialists, nurses, technicians, public health practitioners, community health workers, and health system management personnel) has specific, limited interactions with an individual patient and differing vantage points into the patient's health. The result is disaggregated information stored in different locations and formats, making it impossible for data to be harmonized and for health care personnel to share knowledge, collaborate in care, and truly understand the full breadth of an individual's health history. Those who manage and oversee the health system have little ability to make inferences from these data for monitoring and evaluation purposes. And health care personnel are forced to make life-altering decisions for their population without key health information.

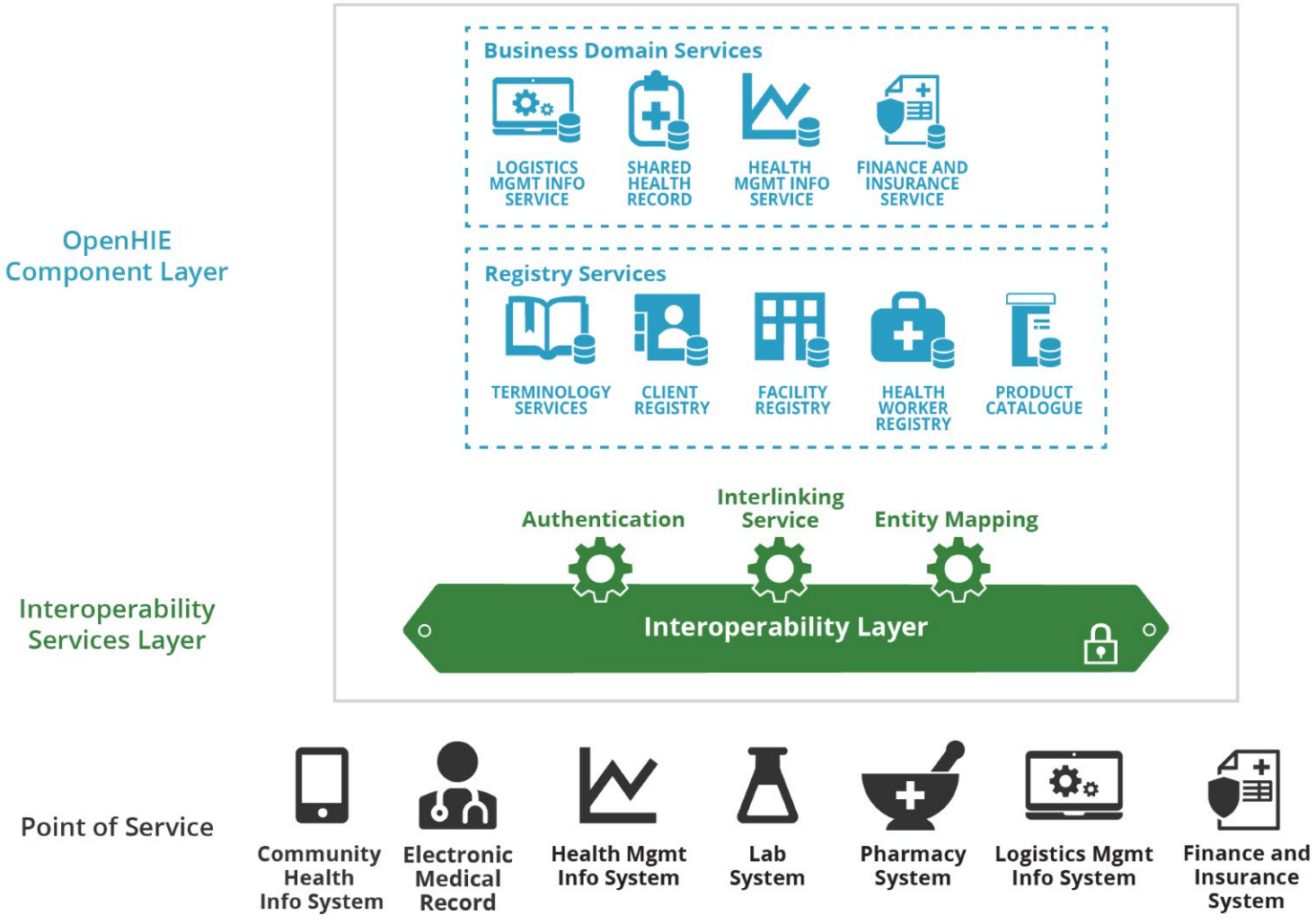
OpenHIE is dedicated to improving the health of individuals in resource-emerging environments through open and collaborative development and support of country-driven, large-scale health information–sharing architectures by:

- Enabling large-scale health information interoperability.
- Offering freely available, standards-based approaches and reference technologies.
- Supporting needs through peer technical assistance communities.

OpenHIE envisions a world where all countries are empowered to pragmatically implement sustainable health information–sharing architectures that measurably improve health outcomes.

OpenHIE community

The OpenHIE community supports interoperability through a reusable, conceptual architectural framework that introduces a service-oriented approach, maximally leverages health information standards, enables flexible implementation by country partners, and supports interchangeability of individual components.



For a more detailed description of each of the components, please review OpenHIE's architecture specifications.

Several OpenHIE community offerings are described below.

Community network

OpenHIE Discourse is a diverse peer learning network providing a knowledge space for ministries of health and other government entities as well as implementers, funders, domain and technical experts, developers, end users, standards development organizations, and others who have an interest in implementing an HIE framework. Members are available as resources to help support project needs in real time.

Architecture specifications

OpenHIE architecture specifications are community-developed patterns of reusable architecture practices that constitute OpenHIE. The specifications include components and business domains that the OpenHIE framework supports, and the framework evolves as standards and implementer needs change. The purpose of each specification release is to:

- Provide an overview of the OpenHIE architecture.
- Articulate the requirements for OpenHIE components.
- Articulate the workflows (data exchanges) that are currently recognized as data exchange patterns to follow.
- Provide a reference for implementers to use in their architecture and/or implementation.

Getting started guide

The OpenHIE Getting Started Guide is designed to help ministries of health, implementers, and others involved in establishing eHealth architecture and health system project teams get started with an HIE.

Impact stories

On the OpenHIE website, members publicly share the work they have accomplished or are progressing toward using the OpenHIE framework and network as a way to contribute to the community. Sharing the impact OpenHIE has around the world helps members build upon successes together, learn from others in the community, and improve patient care.

Community members from all over the world have already published their stories on projects like data aggregation, immunization registries, health information exchange systems, client and facility registries, lab information systems, and more.

COVID-19 response

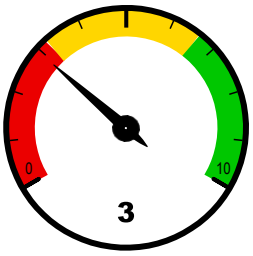
The OpenHIE community is addressing the information exchange challenges of COVID-19; sharing case reports, vaccine certificates, and test results; and producing OpenHIE artifacts. To join the conversation, see COVID-19 Task Force Calls.

Global Good Maturity Model

To help identify areas where investment is needed in global goods, Digital Square collaborated with the digital health community, including the Health Data Collaborative's Digital Health & Interoperability Working Group, to develop the Global Good Maturity Model for digital health tools. The Global Good Maturity Model specifies common metrics for understanding how advanced a digital health tool is so that we can compare global goods and prioritize the most promising global goods for investment. The model assesses the maturity of the tool as low, medium,or high across three dimensions:

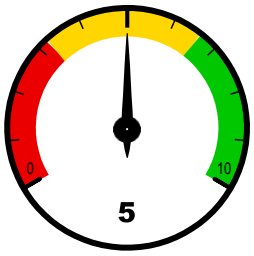
- **Global Utility:** Assesses how widely the tool is used, how well funded it is, and other metrics measuring its adoption and potential for use.
- **Community Support:** Assesses both support for a community of users (such as documentation and multilingual support) and engagement of the user community with the tool.
- **Software Maturity:** Assesses the level of development of the software in such areas as security, interoperability, technical documentation, and scalability.

The Global Good Maturity Model provides at-a-glance ratings of potential global goods. The Maturity Model is used to prioritize investments and identify the digital health tools with the most potential for scaling, adaptation, and sustainability.



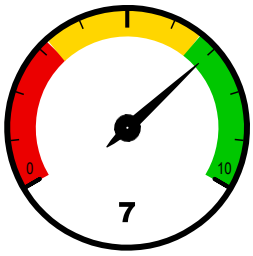
Global Utility

- Country utilization
- Country strategy
- Digital health interventions
- Source code accessibility
- Funding and revenue



Community Support

- Community engagement
- Community governance
- Software roadmap
- User documentation
- Multilingual support



Software Maturity

- Security
- Scalability
- Software productization
- Technical documentation
- Interoperability and data accessibility

For more information on the Global Good Maturity Model, please visit the Digital Square wiki

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For use by the digital health community

The Global Good Maturity Model is a framework that has been, and continues to be, used by developers, implementers, decision-makers, and donors as they consider global goods.

For **developers**, the Maturity Model may serve as a prompt to adjust their product to better support areas such as community engagement or software scalability.

Implementers can leverage the Maturity Model to understand the level of community resources available as they consider deployment.

Decision-makers are able to get a better sense of the maturity of the tool and its broader use prior to approving it for use in their context.

Donors are able to evaluate functionality as well as level of maturity to create a stronger vision of where investment would be well suited for adopting or scaling global goods.

SMART Guidelines

As the United Nations agency responsible for international public health, the World Health Organization (WHO) connects countries, partners, and people to advocate for universal health care, monitor public health risks, coordinate responses to health emergencies, and promote health and well-being. A core function of WHO is the development of global guidelines to ensure appropriate use of evidence. The guidelines articulate and endorse rigorously tested recommendations for health interventions to be adopted within country programs. When applied correctly and consistently, guideline recommendations save lives and improve the health of individuals and populations.

WHO guidelines for digital health

With countries increasingly investing in digital technologies for health, WHO member states and their implementation partners need guidance to more efficiently and accurately adopt WHO health and data recommendations into digital systems.

To support this effort, WHO has developed SMART Guidelines to translate complex guidelines and standards of care into actionable and standardized health and data requirements. SMART Guidelines—**S**tandards-based, **M**achine-readable, **A**daptive, **R**equirements-based, and **T**estable—are a set of reusable digital health components (e.g., interoperability standards, code libraries, algorithms, technical and operational specifications) that provide a five-step pathway to advance the adoption of best clinical and data practices as a country ramps up its digital capabilities. Use of SMART Guidelines can help ensure standards-based, interoperable systems that can share accurate data and become part of stronger, more sustainable health information systems.

DAK: A key support

For countries to implement the SMART recommendations, national governments and technology partners must interpret and then adapt the content to align with local policies, procedures, and digital tools across many health areas. This work can be challenging and ambiguous. For this reason, WHO has led the development of digital adaptation kits (DAKs) to package its guidelines and operational resources in a standardized format that provides a common language across various audiences, including health program managers, software developers, and digital system implementers.

Through practical components such as workflows and data dictionaries, DAKs distill content from a range of published WHO guidance to ensure relevant health information is included for a specific health area. In short, DAKs:

- Are software-neutral, operational, and structured documents based on WHO clinical, health system, and data use recommendations to systematically and transparently inform the design of digital systems.
- Identify the necessary core data elements required for each system and the support logic for a functioning system.

- Include generic personas, or descriptions of end users, and user scenarios to help stakeholders understand the types of users and the ways in which they would interact with each digital system use case.
- Include functional and nonfunctional requirements for a digital system for the designated use case, providing stakeholders a starting place for designing or adapting a digital health tool.
- Allow country governments to adopt global goods with confidence.

Annex

digital square

Digital Public Goods

Digital public goods (DPGs) are open source software, open data, open artificial intelligence (AI) models, open standards, and open content that adhere to privacy and other applicable laws and best practices, do no harm by design, and help attain the Sustainable Development Goals (SDGs).

Once a solution is recognized as a digital public good, it is discoverable on the DPG Registry. The registry acknowledges digital public goods software, which focuses on SDG 3 regarding "Good Health and Well-being." Several digital public goods are also global goods. (Learn how global goods are similar to and different from digital public goods for health on page 8).

Below is an extract from the DPG Registry. The digital public goods listed here have successfully been reviewed and found to meet the DPG Standard and received a DPG icon. Please visit the Digital Public Good Registry to explore this list and learn more about DPGs, how they can help attain the Sustainable Development Goals, and why digital solutions should become DPGs.

Note: The list can be filtered by status (nominee or DPG), SDGs, and type (AI model, content, data, software, or standard). Find all digital health software tools listed below, filtered by status (DPG), type (software), and SDG (SDG 3 Good Health and Well-being). Global goods are marked as ***Name****

Digital Public Goods for SDG 3 Good Health and Well-being

Aam Digital

Avyantra Health Technologies

Bahmni*

Bisa Health (Bisa)

Cboard

CommCare*

Community Health Toolkit (CHT)*

Coronasafe Care

DHIS2 (District Health Information System 2)*

DIVOC (Digital Infrastructure for Vaccination Open Credentialing) Find

Your Immunization (FYI)

Glific

Global Healthsites Mapping Project*

Global Open Facility Registry (GOFR)*

GNU Health (MyGNUHealth)

If Me

Immunization Calculation Engine (ICE)

InaSAFE

Kindly (Kindly API)

KoBoToolbox

MERON (Methods for Extremely Rapid Observation of Nutritional Status)

mHero*

Modular Open Source Identity Platform (MOSIP)

ODK*

Oky

OpenG2P

openIMIS*

OpenLMIS*

OpenMRS*

OpenSRP (Open Smart Register Program)*

RapidPro

Sanitation Digital Solutions Platform (SaniDigS)

SanteIMS

SantéMPI*

Simple

Somleng

Sunbird RC (Sunbird Registry & Credential)

Surveillance Outbreak Response Management and Analysis System (SORMAS)*

VaccineLedger

VivoosVR

VRapeutic

X-Road

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Scan here to learn more about the Global Goods Guidebook.